CHAPTER 10
ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

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ACRONYMS AND ABBREVIATIONS

ac.	acre
ALARA	As Low As Reasonably Achievable
AP1000	Westinghouse Electric Company, LLC, AP1000 Reactor
APE	Area of Potential Effect
BMP	best management practice
CFBC	Cross Florida Barge Canal
CFR	Code of Federal Regulations
Ci	Curie
CO	carbon monoxide
CO_2	carbon dioxide
COL	Combined License
COLA	Combined License Application
CREC	Crystal River Energy Complex
CRS	Congressional Research Service
CWA	Clean Water Act
CWIS	cooling water intake structure
CWS	circulating water system
dBA	decibel (A-weighted scale)
DOE	U.S. Department of Energy
DSM	demand-side management
DWRM2	District Wide Regulation Model, Version 2
EAB	exclusion area boundary
E&SCP	Erosion and Sedimentation Control Plan

ACRONYMS AND ABBREVIATIONS (CONTINUED)

EIA	Energy Information Administration
EIS	Environmental Impact Statement
EPAct 2005	Energy Policy Act of 2005
ER	Environmental Report
ESRP	Environmental Standard Review Plan
FDEP	Florida Department of Environmental Protection
FPS	fire protection system
FPSC	Florida Public Service Commission
ft.	foot
$ft.^2$	square foot
ft^3/sec	cubic foot per second
gal.	gallon
GEIS	Generic Environmental Impact Statement
gpm	gallon per minute
ha	hectare
HLW	high-level waste
HV	high voltage
IRP	Integrated Resource Plan
kg	kilogram
km	kilometer
km^2	square kilometer
kV	kilovolt
kW	kilowatt

ACRONYMS AND ABBREVIATIONS (CONTINUED)

kWh	kilowatt hour
L	liter
lb.	pound
LNP	proposed Levy Nuclear Plant Units 1 and 2
LNP 1	proposed Levy Nuclear Plant Unit 1
LNP 2	proposed Levy Nuclear Plant Unit 2
LWR	light water reactor
m	meter
m^2	square meter
m^3	cubic meter
m^3/s	cubic meter per second
mi.	mile
$mi.^2$	square mile
M	million
MIT	Massachusetts Institute of Technology
MT	metric ton
MW	megawatt
MWe	megawatt electric
MWh	megawatt hour
MWt	megawatt thermal
NEPA	National Environmental Policy Act of 1969
NESC	National Electric Safety Code
NHPA	National Historic Preservation Act

ACRONYMS AND ABBREVIATIONS (CONTINUED)

NO_x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
OECD	Organization for Economic Co-operation and Development
OSHA	Occupational Safety and Health Administration
PEF	Florida Power Corporation doing business as Progress Energy Florida, Inc.
PM	particulate matter
PM_{10}	Particulate matter of 10 micrometers and smaller
PWR	pressurized water reactor
ROI	Region of Interest
ROW	right-of-way
RWS	raw water system
SHPO	State Historic Preservation Officer
SO_2	sulphur dioxide
SO_x	sulphur oxide
SPCC	spill prevention, control, and countermeasures
SWFWMD	Southwest Florida Water Management District
SWP3	Stormwater Pollution Prevention Plan
SWS	service water system
TYSP	Ten-Year Site Plan
UC	University of Chicago
UFC	uranium fuel cycle

ACRONYMS AND ABBREVIATIONS (CONTINUED)

UF_6	uranium hexafluoride
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
Westinghouse	Westinghouse Electric Company, LLC
yd^3	cubic yard

10.0 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

In accordance with NUREG-1555, Environmental Standard Review Plan (ESRP) 10.0, this section provides the environmental consequences of the proposed action. Section 102(c) of the National Environmental Policy Act of 1969 (NEPA) specifies three special NEPA requirements that an Environmental Impact Statement (EIS) must evaluate. This chapter provides an evaluation of these three requirements, as well as a benefit-cost balance associated with constructing and operating the proposed Levy Nuclear Plant Units 1 and 2 (LNP). The three NEPA requirements are evaluated in the following four Environmental Report (ER) Chapter 10 sections:

- ER Section 10.1 — Unavoidable Adverse Environmental Impacts
- ER Section 10.2 — Irreversible and Irretrievable Commitments of Resources
- ER Section 10.3 — Relationship between Short-Term Uses and Long-Term Productivity of the Human Environment
- ER Section 10.4 — Benefit-Cost Balance

ER Sections 10.1, 10.2, and 10.3 are based on the environmental impact evaluations presented in ER Chapters 4 and 5. This chapter is intended to provide decision-makers with an analysis of issues beyond the evaluation of direct and indirect effects. This information is intended for the decision-maker's use when making decisions regarding the course of action and determining mitigation measures that may be required.

10.1 UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

In accordance with NUREG-1555, ESRP 10.1, this section provides a summary description of the predicted adverse environmental effects of plant construction and operation that cannot be avoided, and for which there are no practical means of mitigation. This section presents the unavoidable adverse impacts that may result from construction and operation of the LNP. The potential environmental consequences of the construction of the LNP and appurtenant structures, as well as those that may occur during regular operation of the facility are identified. After consideration of mitigation procedures, unavoidable adverse impacts that remain are identified and discussed.

Throughout this section, construction-related environmental impacts will be assessed using the U.S. Nuclear Regulatory Commission's (NRC's) three-level standard of significance — SMALL, MODERATE, or LARGE. This standard of significance was developed using the Council on Environmental Quality guidelines set forth in the footnotes to Table B-1 of Title 10 of the Code of Federal Regulations (CFR) Part 51, Subpart A, Appendix B:

- **SMALL** — Environmental effects are not detectable or are so minor they will neither destabilize nor noticeably alter any important attribute of the resource.

- **MODERATE** — Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

- **LARGE** — Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

The impact categories evaluated in this chapter are the same as those used in the Generic Environmental Impact Statement (GEIS) for License Renewal of Nuclear Plants, NUREG-1437, Volumes 1 and 2.

10.1.1 CONSTRUCTION

Unavoidable adverse environmental impacts that are expected to result from the construction of LNP and appurtenant structures and mitigation measures to reduce or eliminate these impacts are identified below, tabulated in Table 10.1-1, and evaluated in more detail in ER Chapter 4.

- Land use.

- Hydrological and water use.

- Ecological (terrestrial and aquatic).

- Socioeconomic.

- Radiological.

- Atmospheric and meteorological.

- Environmental justice.

Florida Power Corporation, doing business as Progress Energy Florida, Inc. (PEF) is committed to limiting, minimizing, and reducing adverse environmental effects during construction activities to the greatest degree possible. In addition, local, state, and federal regulations and guidelines, as well as permit and license requirements, will be met during preconstruction and construction phases. For many of the impacts related to construction activities, mitigation measures that will be applied are referred to as best management practices (BMPs). Typically, BMPs are based on the types of activities that are to be performed and are often implemented through construction planning procedures and permitting requirements. In addition, environmental requirements will be incorporated into construction contracts.

10.1.1.1 Land Use

The LNP site is approximately 1257 hectares (ha) (3105 acres [ac.]) in size. Unavoidable adverse impacts associated with construction of LNP and appurtenant facilities (including electric transmission lines, anticipated barge slip, heavy haul road, barge slip access road, electric switchyard, blowdown pipelines and structures, intake structure and pumphouse, and makeup water system pipeline) include ground disturbances from grading and recontouring; removal of vegetation; potential degradation of wetlands, streams and rivers, and floodplains; stockpiling of soils; the addition of surfaces that are impervious to water infiltration, such as parking lots, storage yards, and laydown areas; and generation of waste material. Overall land use impacts would be SMALL.

10.1.1.2 Hydrological and Water Use

Unavoidable adverse hydrologic impacts associated with construction of the LNP include alteration of the existing watershed surface by removal of woody vegetation at the proposed site and construction corridor; disturbance of the ground surface for stockpiles, material storage, and construction of temporary access roads; construction of water intake and discharge structures; construction of cofferdams and storm sewers; construction of intake structure basin, or other structures that may alter shoreline processes; dredging operations; temporary dewatering activities and other operations affecting water levels; construction activities contributing to sediment runoff; changes in surface water drainage characteristics; decreases of surface water infiltration (increases of impervious surfaces); increased erosion and sedimentation; changes in groundwater levels related to temporary dewatering activities; and subsidence resulting from groundwater withdrawals.

Water will be used for LNP construction activities. A specific quantity of water usage is not known at this time. However, proper mitigation and management methods implemented during construction will limit the potential water quantity and quality effects to surface water and groundwater. Construction-related effects to surface water resources are relatively small, but represent a natural resource that may no longer be available for use. However, as part of the natural hydrologic cycle, this water is eventually recycled through the ecosystem.

Construction-related water use impacts will be minimized through the implementation of BMPs, erosion, grading, and sediment control measures; stormwater control measures; spill prevention plan; and observance of federal, state, regional, tribal, and local regulations pertaining to nonpoint source discharges. Overall water-related impacts would be SMALL.

10.1.1.3 Ecological (Terrestrial and Aquatic)

Unavoidable adverse impacts on the terrestrial ecosystem associated with construction of the new unit include noise, clearing and grading, and potential collisions of birds with new structures. Construction of the LNP will result in direct mortality for certain wildlife and will reduce the available habitat area, but will not

adversely affect local or regional populations of wildlife species. Construction of the LNP is not expected to adversely impact the regional population of any protected plant or animal species. Native habitats on the property have been significantly altered through silvicultural operations, and mobile listed species are likely to preferentially utilize less disturbed habitats on adjacent conservation lands. Therefore, impacts to terrestrial ecosystems and important species are expected to be SMALL. The terrestrial ecology impacts from construction of the transmission line corridors are anticipated to be SMALL.

Unavoidable adverse impacts to the aquatic ecology may include loss of wetlands and temporary loss of habitat and short-term degradation of water quality in isolated areas due to in-water and shoreline construction of the cooling water intake structure (CWIS), makeup water pipeline, and cooling system blowdown discharge pipeline. Adverse construction impacts to existing aquatic pool habitats are anticipated to be SMALL. The adverse impacts of construction of the CWIS are anticipated to be SMALL due to the currently poor condition of the sediments and benthic fauna in the vicinity of the proposed CWIS construction, and the similar nature of the sediments in nearby areas that are anticipated to experience redeposition. The impacts of construction of a blowdown pipeline crossing will be SMALL since the quality of the benthic fauna is low and the fauna is anticipated to return to the prior condition within a relatively short time frame following the completion of construction. Aquatic ecology impacts from construction of the transmission line corridors are anticipated to be SMALL.

Mitigation for unavoidable impacts to wetlands is required through both the Federal Section 404/10 and the State of Florida Environmental Resource Permitting processes. Functions of these wetlands will be mitigated through the permitting process. Overall impacts to wetlands as a result of the LNP construction are expected to be MODERATE. Unavoidable adverse impacts on the terrestrial and aquatic ecosystems will likely be avoided and mitigated by implementing BMPs during construction.

10.1.1.4 Socioeconomic

None of the socioeconomic effects related to construction of the LNP are expected to be permanent. Temporary unavoidable adverse effects that may occur during construction include minor increases in noise, dust, and fuel emissions that may migrate from the construction sites; and an increase in traffic and accidents due to the movement of construction workers, materials, and equipment. Overall construction-related transportation impacts are anticipated to be SMALL to MODERATE. It is anticipated that adverse physical impacts from construction activities will be short-term and will not significantly affect people in the LNP site, vicinity, or region. No long-term direct or indirect cumulative impacts from construction noise are anticipated. No long-term indirect or cumulative impacts to air quality are anticipated from construction-related activities. It is anticipated that the long-term indirect or cumulative impacts to visual aesthetics are expected to be SMALL. It is anticipated that construction-related impacts to historic properties will be SMALL. A temporary

SMALL beneficial economic impact is expected due to the increased employment of regional construction workforce. Where impacts are identified as having the potential to be adverse, mitigating these physical impacts, where possible, will be accomplished through the use of construction-related BMPs. Overall, socioeconomic impacts are expected to be SMALL.

10.1.1.5 Radiological

Because a portion of the proposed Levy Nuclear Plant Unit 2 (LNP 2) construction period overlaps operation of proposed Levy Nuclear Plant Unit 1 (LNP 1), construction workers at LNP 2 could possibly be exposed to direct radiation and gaseous radioactive effluents from LNP 1. Doses to construction workers during construction of LNP 1 are not evaluated since the only radiation sources prior to the start-up of LNP 1 are background sources. Adhering to applicable regulations, it is anticipated that unavoidable adverse impacts to workers during construction of LNP 2 resulting from annual doses associated with the ongoing operation of LNP 1 will be SMALL.

10.1.1.6 Atmospheric and Meteorological

Per ER Subsection 4.4.1.2, the construction of the LNP site has the potential to have an impact on ambient air quality in the immediate vicinity of the main plant site, and to a lesser extent, in the vicinity of the heavy haul road, transmission corridors, pipeline corridors, and the intake structure and pumphouse near the Cross Florida Barge Canal (CFBC). However, because of the very large nature of the site (approximately 1257 ha [3105 ac.], exclusive of pipeline corridors or other linear routes) and the relatively large distance from the center of the project site (where most construction and equipment laydown will occur) to the site boundaries, impacts on air quality at off-site locations are expected to be infrequent and minimal during site development and plant construction.

Emissions from on-site construction equipment including cranes, trucks, earthmoving equipment, compressors, pile drivers, and other diesel- and gasoline-powered equipment will also occur, primarily as emissions of particulate matter of 10 micrometers and smaller (PM_{10}), sulphur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compounds (VOCs). These emissions are expected to be consistent with emissions from other large construction projects of this size, and there should be no significant impacts on air quality at off-site locations during the construction period. A variety of control measures will be implemented as best management practices (BMPs) during the construction period, and a fugitive dust control plan will be developed and reviewed periodically to assess and improve the effectiveness of fugitive dust control measures and practices during all phases of construction. Additionally, an on-site concrete batch plant is expected to be utilized during construction, which will effectively reduce truck traffic to and from the site. All of these measures will minimize air emissions and their potential impact on the surrounding environment, particularly at off-site locations. Overall air quality impacts to the surrounding area attributable to the construction of the LNP site will be SMALL.

10.1.1.7 Environmental Justice

There is no disproportionately high effect on minority or low income populations from construction activities. Thus, there are no unavoidable adverse environmental effects; as a result, overall environmental justice effects would be SMALL.

10.1.2 OPERATION

Unavoidable adverse environmental impacts that are expected to result from the operation of LNP and appurtenant structures and mitigation measures to reduce or eliminate these impacts are identified below, tabulated in Table 10.1-2, and evaluated in more detail in ER Chapter 5.

- Land use.
- Hydrological and water use.
- Ecological (terrestrial and aquatic).
- Socioeconomic.
- Radiological.
- Atmospheric and meteorological.
- Environmental justice.

10.1.2.1 Land Use

Changes in land use from operation of the LNP will be primarily associated with the change in the site designation from undeveloped forestry/rural residential to developed industrial; the creation of three stormwater ponds; an increase in the workforce; the operation of the cooling and heat dissipation systems; and the operation of the CFBC makeup water system. Unavoidable adverse effects of LNP operation activities on land use include an increase in impervious surfaces at the site and minor effects of salt drift, fogging, and icing associated with the cooling towers. Approximately 40.5 ha (100 ac.) of land are committed for fuel cycle activities (Table 10.1-2). As discussed in ER Subsection 5.5.1.2.1, cold waste will be generated during LNP operation activities that will need to be disposed of in area landfills. Segregation and recycling of waste will be practiced to the greatest extent practical. It is expected that PEF will contract with an outside vendor to perform weekly collections and disposal at area landfills. The waste is not expected to affect site terrestrial ecology, soil, or groundwater. Overall land use effects from operation of the LNP are anticipated to be SMALL.

10.1.2.2 Hydrological and Water Use

The proposed project is to install and operate two Westinghouse Electric Company, LLC (Westinghouse), AP1000 Reactors (AP1000) at the LNP site. As discussed in ER Subsection 3.3.1, operation of the two reactors will require additional water supply for cooling tower evaporation, cooling tower blowdown, service water tower evaporation, service water tower blowdown, sanitary waste discharge, raw water use, demineralizer water discharge, raw water makeup to the demineralizer, and fire protection. Per Table 3.3-2, it is estimated that the normal consumptive water use from cooling tower evaporation is 2.3 cubic meters per second (m^3/s) (81.4 cubic feet per second [ft^3/sec]) or 30,427 gallons per minute (gpm). Consumptive water use from service tower evaporation is 0.08 m^3/s (2.8 ft^3/sec) or 1248 gpm (Table 3.3-2). Water consumption for fuel cycle activities would require approximately 43,067 million liters (L) (11,377 million gallons [gal.]) of water (Table 10.2-2).

As discussed in ER Section 5.2, unavoidable adverse effects on hydrology and water use are primarily associated with water withdrawal from the CFBC. These effects would be minimized by meeting permit requirements for water withdrawal. The proposed withdrawal of makeup water from the CFBC will have SMALL impacts on water availability and SMALL impacts on water quality in the CFBC and Gulf of Mexico. Discharge of blowdown water through the Crystal River Energy Complex (CREC) discharge canal to the Gulf of Mexico will have a SMALL effect on water availability and a SMALL effect on water quality. Ensuring permitted limits are met through operational controls and monitoring will minimize the potential for adverse impacts.

Per ER Subsection 5.2.1.4, it is anticipated that the groundwater supply would be sufficient to provide the water supply for service water tower evaporation, service water tower drift, potable water supply, raw water supply, raw water to the demineralizer, fire protection, service water strainer backwash, and media filter backwash. Use of the groundwater supply could alter the groundwater characteristics in the area. Groundwater impacts will be evaluated using the Southwest Florida Water Management District's (SWFWMD) District Wide Regulation Model, version 2 (DWRM2). The overall impact on groundwater in the vicinity of the plant is SMALL.

10.1.2.3 Ecological (Terrestrial and Aquatic)

Unavoidable adverse effects to the terrestrial ecosystem during LNP operation activities are associated with limited maintenance of access roads and vegetation along the pipeline and transmission line corridors. Maintenance activities may temporarily displace wildlife that use the land. Impacts to vegetative communities will occur as a result of clearing activities. Impacts will be noticeable but will not destabilize the resource. Overall, impacts on terrestrial habitat are anticipated to be SMALL.

Impacts on the CFBC aquatic ecology from those organisms impinged and entrained into the LNP CWIS are projected to be minimal due to compliance with

the 316(b) component of the National Pollutant Discharge Elimination System (NPDES) permit. Impacts on aquatic ecology are anticipated to be SMALL due to implementation of operational controls and monitoring. The anticipated impacts to aquatic ecology from transmission system maintenance are anticipated to be SMALL.

10.1.2.4 Socioeconomic

There will be no physical impacts (noise, air, and aesthetic disturbances) from the operation of the new facilities outside of the radius of the vicinity. The surrounding area will buffer any potential noise, air, or aesthetic disturbances. There will be an increase in traffic on local roads from the influx of workers needed to operate the LNP. Per ER Subsection 5.8.2.8, it is anticipated that adverse impacts the transportation infrastructure in the area would be SMALL. The operation of the LNP will create new jobs, which would provide a SMALL beneficial economic impact to the region. In addition, PEF annual property tax payments from the operation of the LNP would provide a LARGE beneficial economic impact to Levy County; therefore, mitigation is not warranted.

There are no known archaeological or historic sites on the LNP site or associated facilities. It is unlikely that unidentified resources would be found on the LNP site during facility operation. During post-construction operation, land disturbance activities would cease in the vicinity of an inadvertent cultural resource discovery and the Florida State Historic Preservation Officer (SHPO) would be notified. It is anticipated that no historic properties will be affected by the operation of the LNP site and associated facilities; therefore adverse impacts are anticipated to be SMALL.

10.1.2.5 Radiological

Unavoidable adverse radiological effects associated with the uranium fuel cycle (UFC) are insignificant in comparison with background radiation. Control actions such as monitoring and the ongoing collection of air and water samples will ensure that radiological effects are minimized during operation. Landfills and other site uses may be restricted after decommissioning. The overall environmental impacts of the UFC will be SMALL, and mitigation is not warranted.

10.1.2.6 Atmospheric and Meteorological

As discussed in ER Subsection 5.8.1.2, as a nuclear-powered electrical generating plant, the LNP will have very few sources of air emissions. With the exception of some relatively small diesel-fueled emergency power-generating equipment and fire pumps, the plant will not have any significant sources of emissions attributable to the combustion of fossil or other fuels. The LNP will contain two banks of mechanical draft cooling towers (one for each reactor), which will emit water vapor and particulate matter (PM) to the atmosphere. Water vapor is not considered a pollutant, and its emissions are not regulated at the state or federal level in Florida. No odors should be associated with the cooling

tower plumes. Because of the very low level of emissions from the LNP, its operation is not expected to cause or contribute to a violation of any state or federal ambient air quality standard for any pollutant at any location.

There will be a small increase in regional and local air emissions as a result of increased vehicular traffic associated with plant operations and the workforce employed by the LNP. As described in ER Subsection 5.8.1.2, the increase in traffic-related emissions from this workforce is not expected to result in a significant change in the total number of vehicle miles traveled in the region, and the increase will not represent either a measurable or discernible change in air quality. Air quality impacts to people, buildings, roads, and recreation areas from operation of the LNP and appurtenant facilities, including impacts due to increased worker and other vehicular traffic in the area, are expected to be SMALL, and no mitigation measures are warranted.

As discussed in ER Subsection 6.4.1, the LNP contains an on-site meteorological measurement program (established in February 2007) that monitors meteorological parameters at two levels above ground level. The monitoring results are used to characterize the on-site meteorological conditions for the LNP site. The meteorological monitoring results establish baseline conditions for determining preoperational and operational environmental impacts. It is anticipated that there would be no unavoidable adverse effects with respect to meteorological impacts during operation of the LNP.

10.1.2.7 Environmental Justice

It is anticipated that there would be no disproportionately high effect on minority or low income populations. Thus, there are no unavoidable adverse effects with respect to the goals of environmental justice. Therefore, environmental justice impacts are expected to be SMALL, and mitigation is not warranted.

Table 10.1-1 (Sheet 1 of 8)
Construction-Related Unavoidable Adverse Environmental Impacts

Impact Category	Potential Adverse Impacts	Potential Mitigation Measures	Unavoidable Adverse Impacts
Land Use	• Removal of existing vegetation. • Potential impacts to wetlands and 100-year floodplains. • Stockpiling of soils on site. • Storage yards and laydown areas of construction materials. • Construction of structures, roads, and impervious surfaces (for example, parking lots, laydown areas). • Generation of waste material from construction and right-of-way (ROW) clearing operations. • Ground-disturbing activities including grading, excavation, and recontouring. As outlined in ER Chapter 4, land will be permanently re-surfaced for the construction of the LNP and associated infrastructure. SMALL	• Conduct ground-disturbing activities in accordance with regulatory and permit requirements. • Use adequate and approved erosion controls and stabilization measures to minimize impacts as described in the Erosion and Sedimentation Control Plan (E&SCP). • Follow procedures in Spill Prevention, Control, and Countermeasures (SPCC) Plan to address the handling of fuel and other materials. • Minimize potential impacts through avoidance and compliance with applicable permitting requirements and best management practices (BMPs). • Restrict construction activities to the LNP site. • When appropriate, relocate sensitive vegetative species from construction zones. • Control access of construction traffic to the LNP site. • Develop and implement a blasting plan addressing scheduling, charge size, noise, and other procedures, if necessary. • Avoid disturbance of critical or sensitive habitats/species. • Maximize practical use of existing ROW access roads. • Adhere to applicable federal, state, and local regulations and permit requirements with regard to seasonal restrictions for in-water work, installation of appropriate erosion control measures, drainage controls to convey stream flow, and construction stormwater management. • Limit vegetation cutting and removal and herbicide application.	• Land use impacts would occur throughout the entire construction period unless mentioned otherwise. • Land use impacts would result in an irreversible commitment of resources (as identified in ER Section 10.2). • Ground disturbances associated with grading and re-contouring. • As outlined in ER Chapter 4, land will be permanently resurfaced for the construction of the LNP and associated infrastructure. Impacts are anticipated to last throughout the plant lifetime. • Removal of existing vegetation. • Impacts to wetland and floodplains. • Stockpiling of soils. • Construction of structures, roads, and impervious surfaces. Impacts are anticipated to last throughout the plant lifetime. • Storage yards and laydown areas. • Construction of transmission lines ROWs and associated transmission system infrastructure. Impacts are anticipated to last throughout the plant lifetime. SMALL

Table 10.1-1 (Sheet 2 of 8)
Construction-Related Unavoidable Adverse Environmental Impacts

Impact Category	Potential Adverse Impacts	Potential Mitigation Measures	Unavoidable Adverse Impacts
Land Use (Continued)		• Retain vegetated screen at ROW and other linear junctions. • Dispose of clearing waste material at landfill, use as windrow along ROW or as ground cover to prevent erosion. • Use existing PEF procedures that require contacting the appropriate federal, state, or tribal regulatory agencies following a discovery of potential historic or archeological resources. • Conduct a cultural resource assessment and consult with State Historic Preservation Officer (SHPO). • If necessary, conduct sub-surface testing prior to initiating ground-disturbing activities to identify any buried historic or archeological resources. • Take appropriate actions (for example, stop work) following discovery of potential historic or archeological resources.	
Water-Related Impacts	• Alteration of existing watershed surface by the addition of buildings, structures, and impervious surfaces (for example, parking lots, laydown areas). • Temporary disturbance of ground surface for soil stockpiles and construction material storage. • Dewatering, dredging, and other operations temporarily affecting water levels.	• Adhere to applicable federal, state, and local regulations and permit requirements with regard to seasonal restrictions for in-water work, installation of appropriate erosion control measures, and construction stormwater management. • Limit tree and vegetation cutting and removal to the minimum necessary to satisfy construction access and clearance for construction zones.	• Water-related impacts would occur throughout the entire construction period unless mentioned otherwise. • Water use impacts would result in an irreversible commitment of resources (as identified in ER Section 10.2). • Alteration of some watershed surfaces from the addition of buildings and other impervious surfaces. Impacts are anticipated to last throughout the plant lifetime.

Table 10.1-1 (Sheet 3 of 8)
Construction-Related Unavoidable Adverse Environmental Impacts

Impact Category	Potential Adverse Impacts	Potential Mitigation Measures	Unavoidable Adverse Impacts
Water-Related Impacts (Continued)	• Removal of existing trees and vegetation. • Potential changes in surface water drainage characteristics and groundwater levels from dewatering. • Erosion and sedimentation and subsidence from construction groundwater dewatering. • Potential impacts from releases of fuel, oils, or other chemicals associated with construction to surface or ground water.	• Install drainage controls (for example, channels) to direct stormwater runoff into stormwater ponds. • Install temporary sump pump system for intermittent use for excavation dewatering control during construction. • Design and install appropriate barrier (for example, turbidity curtain) to prevent turbid water from migrating into the Cross Florida Barge Canal (CFBC). • Conduct ground-disturbing activities in accordance with regulatory and permit requirements.	• Water used for construction-related activities and associated structures would result in an irretrievable commitment of resources (as identified in ER Section 10.2). • Temporary disturbances to the ground surface for the purpose of stockpiling soils and construction materials. • Construction of structures such as the intake structure, pumphouse, and cofferdams. Impacts are anticipated to last throughout the plant lifetime. • Construction of impervious surfaces including temporary access roads. Impacts are anticipated to last throughout the plant lifetime. • Removal of vegetation. • Dewatering and dredging operations that will potentially temporarily affect groundwater levels and surface water drainage characteristics and may cause erosion, sedimentation, and subsidence. • Sedimentation in stormwater and potential releases of fuels, oils, or other chemicals during construction activities. SMALL

Table 10.1-1 (Sheet 4 of 8)
Construction-Related Unavoidable Adverse Environmental Impacts

Impact Category	Potential Adverse Impact	Potential Mitigation Measures	Unavoidable Adverse Impact
Water-Related Impacts (Continued)	• Potential effect to local water table because of construction dewatering activities. SMALL	• Use adequate and approved erosion controls and stabilization measures to minimize impacts and control sediment loads and dust from the construction zones as described in the E&SCP. • Follow procedures in SPCC Plan to address the handling of fuel and other materials. • Develop and implement a blasting plan addressing scheduling, charge size, noise, and other procedures, if necessary. • Develop and implement a construction Stormwater Pollution Prevention Plan (SWP3) and spill response plan during construction activities. • Implement an E&SCP that describes use of approved/recognized BMP. • Limit dewatering activities only to those necessary for construction. • Install system of on-site monitoring. • Install wells and piezometers to evaluate local groundwater resources.	
Terrestrial and Aquatic Ecology	• Clearing and grading activities and habitat loss will displace existing mobile animals such as birds and larger mammals from construction zones. Wildlife (for example, birds, small mammals) may be startled or frightened away by noisy construction activities. • Potential impacts from avian collisions with manufactured structures (for example, cranes, buildings) during construction.	• Conduct ground-disturbing activities in accordance with federal, state, and local regulatory and permit requirements. • Minimize potential effects to construction zones through avoidance and compliance with applicable permitting requirements and BMPs.	• Terrestrial and aquatic ecology impacts are anticipated to last throughout the entire construction period unless mentioned otherwise. • Terrestrial and aquatic ecology impacts would result in an irreversible commitment of resources (as identified in ER Section 10.2).

Table 10.1-1 (Sheet 5 of 8)
Construction-Related Unavoidable Adverse Environmental Impacts

Impact Category	Potential Adverse Impacts	Potential Mitigation Measures	Unavoidable Adverse Impacts
Terrestrial and Aquatic Ecology (Continued)	• Construction zone impacts to vegetative diversity and wildlife habitat. • Potential impacts on surface water from releases of fuel, oils, or other chemicals associated with construction to surface water. • Temporarily degraded water quality because of in-water and shoreline work for the proposed intake structure, pumphouse, outfall/discharge structure, and makeup water system pipeline. • Temporary loss of benthic habitat and organisms near proposed intake structure. • 88 ha (218 ac.) of wetlands on-site will be permanently affected through construction • Terrestrial and aquatic impacts from transmission line corridors are anticipated to be SMALL. • Impacts to wetlands are anticipated to be MODERATE. • LNP terrestrial and aquatic ecology impacts would be SMALL.	• Limit tree and vegetation removal to the minimum necessary to satisfy construction access and clearance for construction zones, restrict soil stockpiling and re-use, and restrict construction activities to construction zones. • Coordinate with U.S. Fish and Wildlife Service (USFWS) and State of Florida to identify federally or state-listed species within the LNP site and vicinity. • Develop and implement a construction SWP3 and spill response plan during construction activities. • Implement an E&SCP that adequately describes use of approved/recognized water quality BMP for addressing potential effects in construction zones. • Design and install appropriate barriers (for example, turbidity curtain) to prevent turbid water from migrating into the surface water bodies. • Consult with USFWS and State of Florida about federally- and state-listed fish and mussel species, and critical fish spawning times, prior to initiating construction.	• Noise impacts. • Loss of terrestrial habitat resulting from clearing and grading. Impacts are anticipated to last throughout the plant lifetime. • Potential collisions of birds with new structures. • Loss of wetlands. Temporary loss of habitat and degraded water quality due to in-water and shoreline work associated with the intake structure. • Potential sedimentation, or fuel or chemical release. • LNP terrestrial and aquatic ecology impacts would be SMALL. • Impacts to wetlands are anticipated to be MODERATE • Terrestrial and aquatic impacts from transmission line corridors are anticipated to be SMALL. Impacts are anticipated to last throughout the plant lifetime.

Table 10.1-1 (Sheet 6 of 8)
Construction-Related Unavoidable Adverse Environmental Impacts

Impact Category	Potential Adverse Impacts	Potential Mitigation Measures	Unavoidable Adverse Impacts
Socioeconomic	• Potential temporary and limited impact to sensitive populations because of noise, fugitive dust, and gaseous emissions resulting from construction activities. • Potential for increased construction traffic near the construction zones. Overall transportation impacts are anticipated to be SMALL to MODERATE. • Temporary aesthetic and visual impacts in the construction areas. • Long-term effects on the visual aesthetics are anticipated to be SMALL. • Potential impacts on existing transportation network near the construction area. • General increase in construction equipment and material deliveries. • Impacts to historic properties are anticipated to be SMALL. • Construction will have a SMALL beneficial impact on the region's economy.	• Train and appropriately protect the LNP site and temporary construction personnel (that is, those most directly and frequently affected by construction noise, dust, and gaseous emissions) to reduce the risk of potential harmful exposures from noise, dust, and gaseous emissions. • Provide on-site services for emergency first aid care and conduct regular health and safety monitoring for affected personnel on site. • Post signs at or near construction entrances and exits to make the public aware of potentially high construction traffic areas. • Make public announcements and/or notifications before conducting atypical or noisy construction activities (for example, pile driving). • Use normal dust control measures (for example, watering, stabilizing disturbed areas, covering truckloads). • Manage concerns from adjacent residents, business owners, or landowners, on a case-by-case basis through a PEF-prepared concern resolution process. • Develop a construction traffic management plan prior to construction to address potential impacts on local roadways. • Encourage the use of shared (for example, carpooling) and multi-person transport (for example, buses) of construction personnel to the construction sites. • Coordinate schedules during workforce shift changes to limit impacts on local roads. • Schedule delivery of larger pieces of equipment or structures on off-peak traffic hours (for example, at night) or through other transportation modes.	• Socioeconomic impacts are anticipated to last throughout the entire construction period unless mentioned otherwise. • Socioeconomic impacts would result in an irreversible commitment of resources (as identified in ER Section 10.2). • Noise, dust, and fuel emissions that may migrate from the construction sites. • Potential for increased construction traffic near the construction zones. Overall transportation impacts are anticipated to be SMALL to MODERATE. • Temporary aesthetic and visual impacts in the construction areas. • Long-term effects on the visual aesthetics are anticipated to be SMALL. Impacts are anticipated to last throughout the plant lifetime. • Impacts to historic properties are anticipated to be SMALL.

Table 10.1-1 (Sheet 7 of 8)
Construction-Related Unavoidable Adverse Environmental Impacts

Impact Category	Potential Adverse Impacts	Potential Mitigation Measures	Unavoidable Adverse Impacts
Socioeconomic (Continued)		• Consider coordinating with local planning authorities for the upgrading of local roads, intersections, and signals to handle increased traffic loads, if necessary. • Provide local planning agencies with normal operation construction schedule prior to construction to allow for notification to locals.	• Construction will have a SMALL beneficial impact on the region's economy.
Atmospheric and Meteorological	• Temporary ambient air quality impacts associated with construction equipment and construction-workforce vehicle traffic. SMALL	• Adhere to applicable federal, state, and local regulations and permit requirements.	• Atmospheric and meteorological impacts are anticipated to last throughout the entire construction period unless mentioned otherwise. • Atmospheric and meteorological impacts would result in an irreversible commitment of resources (as identified in ER Section 10.2). • Temporary ambient air quality impacts associated with construction equipment and construction-wor kforce vehicle traffic. SMALL

Table 10.1-1 (Sheet 8 of 8)
Construction-Related Unavoidable Adverse Environmental Impacts

Impact Category	Potential Adverse Impacts	Potential Mitigation Measures	Unavoidable Adverse Impacts
Radiological	• Potential for radiological dose effects to the LNP site construction workers during construction of LNP 2 once LNP 1 is in operation. • Potential for exposure of LNP 2 construction workers to direct radiation and to the radioactive effluents from sources resulting from LNP 1 routine operation (for example, cycled condensates and concentrates, N-16 radiation from the turbine building). SMALL	• Establish administrative controls and plant procedures for maintaining the doses from radiation sources and facilities during normal operations within regulatory limits and as low as reasonably achievable (ALARA). • Locate temporary facilities (such as trailers, tents, and containers) in areas outside of plant structures. • Provide on-site services for emergency first aid care and conduct regular health and safety monitoring for affected personnel on-site.	• Radiological impacts are anticipated to last throughout the entire construction period unless mentioned otherwise. • Radiological impacts would result in an irreversible commitment of resources (as identified in ER Section 10.2). • Uranium fuel cycle (UFC) impacts would result in an irretrievable commitment of resources (as identified in ER Section 10.2). • Potential for radiological exposure limited to construction workers. SMALL
Environmental Justice	• It is anticipated that activities will not affect minority or low income populations. SMALL	• There is no disproportionate high impact on minority or low income populations.	• No unavoidable adverse impacts. SMALL

Table 10.1-2 (Sheet 1 of 13)
Operation-Related Unavoidable Adverse Environmental Impacts

Impact Category	Potential Adverse Impacts	Potential Mitigation Measures	Unavoidable Adverse Impacts
Land Use	• Impacts from operation of the proposed facility and appurtenant facilities. • Cooling and heat dissipation systems impacts. • Operation impacts within transmission corridors and off-site areas. • Approximately 40.5 hectares (ha) (100 acres [ac.]) of land is committed for fuel cycle activities. • It is estimated that employees typically generate approximately 4.8 kilograms (kg) (10.5 pounds [lb.]) of cold waste (non-radiologically contaminated solid waste such as office waste and recyclable material) per employee per day or conversely, 5.9 kg (13 lb.) of waste per 92 square meters (m^2) (1000 square feet [$ft.^2$]) of working area per day, in a commercial environment such as the LNP. Overall land use impacts are anticipated to be SMALL	• Transport impervious surface (for example, parking lots, laydown areas) runoff and/or sediment to adjacent areas as defined in the National Pollutant Discharge Elimination System (NPDES) permit. • Install stormwater ponds and storm sewers to collect the increased runoff from impervious areas. • Follow procedures in Spill Prevention, Control and Countermeasures (SPCC) Plan to address the handling of fuel and other materials. • Minimize potential impacts through avoidance and compliance with applicable federal, state, and local regulations and permit requirements and the use of BMPs. • Segregate and recycle waste to the greatest extent practical. It is expected that PEF will contract with an outside vendor who will perform weekly collections and disposal at area landfills. • Potential impacts to land use from cooling towers are primarily related to salt drift. It is assumed that cooling towers would produce salt concentrations similar to cooling towers at other nuclear sites. • Limit impacts to maintenance of access roads and vegetation, as required, for maintenance and repair of the pipelines. These maintenance activities will take place on pre-exiting road and transmission line right-of-ways (ROWs), and are not expected to cause any significant land use impacts.	• Land use impacts would occur throughout the plant lifetime unless mentioned otherwise. • Land use impacts would result in an irreversible commitment of resources (as identified in ER Section 10.2). • Increase in impervious surfaces at the site. • Salt drift, fogging, and icing associated with the cooling towers. • Operation impacts within transmission corridors and off-site areas would be SMALL. • Changes in land use associated with operation of the facility. • Approximately 40.5 ha (100 ac.) of land are committed for fuel cycle activities.

Table 10.1-2 (Sheet 2 of 13)
Operation-Related Unavoidable Adverse Environmental Impacts

Impact Category	Potential Adverse Impacts	Potential Mitigation Measures	Unavoidable Adverse Impacts
Land Use (Continued)		• Monitor the pipelines to ensure erosion control measures are in place (that is, impacts from runoff are minimized and restoration activities are adequate and effective). • Use adequate and approved erosion controls and stabilization measures to minimize impacts, as described in the Erosion and Sedimentation Control Plan (E&SCP), such as stabilization methods or seeding and erosion control matting that will be installed immediately following construction. • Perform monitoring that will be required to determine effects of water withdrawal on population dynamics in the Cross Florida Barge Canal (CFBC) from the intake structure and pumphouse. • Ensure operational monitoring, as well as monitoring of wetland areas created for mitigation purposes, will be designed to Clean Water Act (CWA) 404/401 permit requirements.	• It is estimated that employees typically generate approximately 4.8 kg (10.5 lb.) of cold waste (non-radiologically contaminated solid waste such as office waste and recyclable material) per employee per day or conversely, 5.9 kg (13 lb.) of waste per 92 m^2 (1000 $ft.^2$) of working area per day, in a commercial environment such as the LNP. • Restricted land uses after decommissioning. Overall land use impacts are anticipated to be SMALL

Table 10.1-2 (Sheet 3 of 13)
Operation-Related Unavoidable Adverse Environmental Impacts

Impact Category	Potential Adverse Impacts	Potential Mitigation Measures	Unavoidable Adverse Impacts
Land Use (Continued)		• Follow specific monitoring requirements for operational activities affecting wetlands, floodplains, and other natural areas that will require monitoring as specified in the permits, or as designated by appropriate agencies. • Ensure transmission towers are placed in an existing corridor or ROW if possible. • Provide local planning agencies with normal operation schedule to allow for notification to locals of any potential change in land usage. • Manage concerns from adjacent residents, business owners, landowners, and/or recreation users on a case-by-case basis through a PEF-prepared concern resolution process. • Design specific monitoring requirements for transmission lines and corridors, and associated switchyards to meet conditions of permits, to minimize adverse environmental impacts, and to ensure that organisms are protected against transmission line alterations. • Conduct seasonally appropriate annual surveys for species of interest that inhabit areas and habitat types bisected by transmission lines. • Follow applicable procedures to address the handling of fuel and other materials. Use adequate and approved erosion controls and stabilization measures to minimize impacts. • PEF will consult with the Florida State Historic Preservation Officer (SHPO) to comply with Section 106 of the National Historic Preservation Act (NHPA), if operation activities identify any historic or cultural resources of significance.	

Table 10.1-2 (Sheet 4 of 13)
Operation-Related Unavoidable Adverse Environmental Impacts

Impact Category	Potential Adverse Impacts	Potential Mitigation Measures	Unavoidable Adverse Impacts
Water-Related Impacts	• Adequate water to meet necessary operational water withdrawal criteria. • It is estimated that the normal consumptive water use from cooling tower evaporation is 2.3 cubic meters per second (m^3/s) (81.4 cubic feet per second (ft^3/sec]) or 30,427 gallons per minute (gpm). Consumptive water use from service tower evaporation is 0.08 m^3/s (2.8 ft^3/sec) or 1248 gpm. Water consumption for fuel cycle activities would require approximately 43,067 million liters (L) (11,377 million gallons [gal.]) of water. • Diminished water quality. • Groundwater near the plant. • Potential impacts to wetlands, 100-year floodplains, and protected mussels and fish. • Hydrodynamic impacts. • Aquatic impacts. • Thermal discharge. SMALL	• Adhere to applicable federal, state, and local regulations and permit requirements with regard to water usage. The plant will be required to register their water withdrawal with applicable federal, state, and local agencies. • Design operational monitoring for the CFBC to identify impacts from the operation of the LNP. • Conduct operational monitoring to detect any chemical impacts to surface water and groundwater that could result from facility operation. • To the extent practical, wetland areas will be avoided and impacts minimized. Operation of the plant should not impact the wetlands beyond receiving stormwater runoff from the site. Stormwater runoff from the LNP site will be collected and controlled by a stormwater drainage system to meet FDEP requirements.	• Water-related impacts would occur throughout the plant lifetime unless mentioned otherwise. • Water use impacts would result in an irreversible commitment of resources (as identified in ER Section 10.2). • It is estimated that the normal consumptive water use from cooling tower evaporation is 2.3 m^3/s (81.4 ft^3/sec or 30,427 gpm. Consumptive water use from service tower evaporation is 0.08 m^3/s (2.8 ft^3/sec) or 1248 gpm. Water consumption for fuel cycle activities would require approximately 43,067 million L (11,377 million gal.) of water. • Water used for operation-related activities would result in an irretrievable commitment of resources (as identified in ER Section 10.2). • Thermal discharge from operation of the LNP will be maintained below permitted limits. SMALL

Table 10.1-2 (Sheet 5 of 13)
Operation-Related Unavoidable Adverse Environmental Impacts

Impact Category	Potential Adverse Impacts	Potential Mitigation Measures	Unavoidable Adverse Impacts
Water-Related Impacts (Continued)		• Develop specific elements for the assessment of surface water quality in consultation with the appropriate federal, state, and local agencies relative to NPDES permit requirements. • Perform monitoring which will provide data necessary to assess alterations of surface water flow fields, sediment transport, floodplains or wetlands. • Monitoring in compliance with the CWA 404/401 permits would be required for any future post-construction dredging activities occurring within the CFBC to protect aquatic species. • Determine other operations that require monitoring. Other operations that may require monitoring include intake and discharge of cooling water and intake of makeup water. Permits will be required for operation activities, and specific monitoring requirements will be listed in the permits. • Perform monitoring to determine effects of water withdrawal on population dynamics in the CFBC from the intake structure and pumphouse. Design operational monitoring, as well as monitoring of wetland areas created for mitigation purposes; to meet CWA 404/401 permit requirements. • Follow specific monitoring requirements for operational activities affecting wetlands, floodplains, and other natural areas that will require monitoring as specified in the permits, or as designated by appropriate agencies. Monitoring may include seasonally appropriate surveys conducted for species of interest which inhabit areas and habitat types, and yearly monitoring for potential receptors and target species.	

Table 10.1-2 (Sheet 6 of 13)
Operation-Related Unavoidable Adverse Environmental Impacts

Impact Category	Potential Adverse Impacts	Potential Mitigation Measures	Unavoidable Adverse Impacts
Water-Related Impacts (Continued)		• Coordinate with USFWS and State of Florida to identify federally or state-listed species within the LNP site and vicinity. • Design specific monitoring requirements to meet conditions of the CWA 316b permit to minimize adverse environmental impact and to ensure that organisms will be protected against entrainment and impingement on the cooling water intake structures. • Perform monitoring to provide data to help assess overall water quality of the CFBC, identify any natural or power plant-induced effects on water quality, determine aquatic flora and fauna, and evaluate sensitive habitat and species of interest. • Design operational monitoring, as well as monitoring of wetland areas created for mitigation purposes, to meet CWA 404/401 permit requirements. • Minimize potential impacts through avoidance, compliance with applicable federal, state, local regulations and permit requirements, and use of BMPs. • Implement operational monitoring to establish changes in water temperature resulting from operation of LNP. The specific operational monitoring requirements will be developed in consultation with the State of Florida, relative to NPDES permit requirements.	

Table 10.1-2 (Sheet 7 of 13)
Operation-Related Unavoidable Adverse Environmental Impacts

Impact Category	Potential Adverse Impacts	Potential Mitigation Measures	Unavoidable Adverse Impacts
Water-Related Impacts (Continued)		•	
Terrestrial and Aquatic Ecology	• Terrestrial and aquatic ecosystem impacts will be SMALL. • Radiation impacts to the biota will be SMALL. • Anticipated terrestrial and aquatic ecology impacts from transmission lines would be SMALL.	• Develop an aquatic monitoring program to support and satisfy various environmental regulations, licenses, and permits associated with operation. • Monitoring will provide data to help assess overall water quality, identify any natural or power plant-induced effects on water quality, document the introduction and expansion of nonnative plant and animal populations, determine aquatic flora and fauna, and evaluate sensitive habitat and species of interest. • Permits will be required for operation activities, and specific monitoring requirements will be listed in the permits. The CFBC will be monitored during operation to ensure that water withdrawal remains within operating parameters.	• Terrestrial and aquatic ecosystem impacts would occur throughout the plant lifetime unless mentioned otherwise. • Terrestrial and aquatic ecology impacts would result in an irreversible commitment of resources (as identified in ER Section 10.2). • Discharge of small quantities of chemicals to surrounding water bodies. SMALL • Discharges will be maintained below permitted levels to minimize adverse impacts. SMALL • Limited maintenance of access roads and vegetation along the pipeline and transmission line corridors. Anticipated impacts would be SMALL • Erosion and sedimentation associated with the makeup water system pipeline and the cooling system. SMALL

Table 10.1-2 (Sheet 8 of 13)
Operation-Related Unavoidable Adverse Environmental Impacts

Impact Category	Potential Adverse Impacts	Potential Mitigation Measures	Unavoidable Adverse Impacts
Terrestrial and Aquatic Ecology (Continued)		• Monitoring will be required to determine effects of water withdrawal on population dynamics in the CFBC from the intake structure and pumphouse. • Design operational monitoring, as well as monitoring of wetland areas created for mitigation purposes, to meet CWA 404/401 permit requirements. • Follow specific monitoring requirements for operational activities affecting wetlands, floodplains, and other natural areas that will require monitoring as specified in the permits, or as designated by appropriate agencies. • Minimize potential impacts through avoidance, compliance with applicable federal, state, and local regulations and permit requirements, and the use of BMPs. • Conduct surveys to monitor soil and terrestrial plant and animal communities as needed. • Perform operational monitoring which will consist of specific permit requirements such as air and effluent monitoring, and specifically follow NPDES and CWA permit requirements. • Perform monitoring which will provide data to help assess overall water quality identify any natural or power plant-induced effects on water quality, document the introduction and expansion of nonnative plant and animal populations, determine aquatic flora and fauna, evaluate sensitive habitat and species of interest. • Collect aquatic vegetation, fish, and sediments to detect the presence of any radioisotopes related to the operation of the LNP.	• Terrestrial and aquatic ecosystem impacts would be SMALL. • Anticipated terrestrial and aquatic ecology impacts from transmission lines would be SMALL.

Table 10.1-2 (Sheet 9 of 13)
Operation-Related Unavoidable Adverse Environmental Impacts

Impact Category	Potential Adverse Impacts	Potential Mitigation Measures	Unavoidable Adverse Impacts
Terrestrial and Aquatic Ecology (Continued)		• Limit impacts from maintenance of access roads and vegetation as required for maintenance and repair of the pipelines. These maintenance activities will take place on preexisting road and transmission line ROWs, and are not expected to cause any significant impacts. • Conduct seasonally appropriate annual surveys for species of interest that inhabit areas and habitat types bisected transmission lines. • Design specific monitoring requirements for new transmission lines and corridors, and associated switchyards to meet conditions of permits, to minimize adverse environmental impacts, and to ensure that organisms are protected against transmission line alterations. • Obtain federal, state and local permits before installation of transmission lines at wetland and stream crossings. Wetlands would be delineated and regulatory status determined according to CWA 404/401permit requirements; regulated wetlands would be mitigated in accordance with these permit requirements. Stream and channel crossings will be monitored to ensure that adequate restoration has been implemented, if applicable. • Monitor salt drift from cooling towers and regulate per regulations and permitting regulations to avoid impacts to terrestrial ecosystems.	

Table 10.1-2 (Sheet 10 of 13)
Operation-Related Unavoidable Adverse Environmental Impacts

Impact Category	Adverse Impact	Mitigation Measure	Unavoidable Adverse Impact
Socioeconomic	• Impacts to the public. SMALL • Impacts from transmission systems. SMALL • Noise. SMALL • Visual (aesthetic) Intrusion. SMALL • Increase in traffic on local roads. SMALL • Potential impacts on existing transportation network, public services/facilities, infrastructure (transportation, roads, housing, schools, and recreation facilities). SMALL • Impacts to historic properties are anticipated to be SMALL. • PEF annual property tax payments from the operation of the LNP would provide a LARGE beneficial economic impact to Levy County. • Operation of the LNP would provide a SMALL beneficial economic impact to the region.	• Make public announcements and/or notifications prior to undertaking necessary activities if atypical or noisy. • Manage concerns from adjacent residents, business owners, or landowners, on a case-by-case basis through a PEF-prepared concern resolution process. • Train and appropriately protect LNP site personnel (that is, those most directly and frequently affected by operation activities) to reduce the risk of potentially harmful exposures from noise or gaseous emissions. • Provide on-site services for emergency first aid care and conduct regular health and safety monitoring for affected personnel on-site. • Base operation of transmission lines on the guidance provided by the National Electric Safety Code, state and local regulations, and any other permitting requirements. • Design transmission towers and lines to include lights and markers, where appropriate, to alert helicopter traffic to potential hazards created by the proposed structures. The towers will not be excessively high such that aircraft safety is compromised or unnecessary visual impacts result from excessive tower height. • Design to minimize induced currents resulting from high electric fields created by overhead transmission lines in accordance with the National Electric Safety Code (NESC).	• Socioeconomic impacts would occur throughout the plant lifetime unless mentioned otherwise. • Socioeconomic impacts would result in an irreversible commitment of resources (as identified in ER Section 10.2). • Impacts to the public. SMALL • Impacts from transmission systems. SMALL • Noise. SMALL • Visual (aesthetic) Intrusion. SMALL • Increase in traffic on local roads. SMALL • Potential impacts on existing transportation network, public services/facilities, infrastructure (transportation, roads, housing, schools, and recreation facilities). SMALL • Impacts to historic properties are anticipated to be SMALL. • PEF annual property tax payments from the operation of the LNP would provide a LARGE beneficial economic impact to Levy County. • Operation of the LNP would provide a SMALL beneficial economic impact to the region.

Table 10.1-2 (Sheet 11 of 13)
Operation-Related Unavoidable Adverse Environmental Impacts

Impact Category	Adverse Impact	Mitigation Measure	Unavoidable Adverse Impact
Socioeconomic (Continued)		• The transmission lines will be designed and operated to minimize corona discharge and electromagnetic interference. It is expected that radio and television interference from the proposed new lines will be minimal. • The transmission lines will be designed and operated with hardware and conductors that have features for eliminating corona discharge to mitigate noise impacts. • The Occupational Health and Safety Administration (OSHA) noise exposure limits will be met for worker personnel. • Noise levels will be controlled by compliance with federal, state, and local regulatory requirements. • Traffic noise will be limited to normal weekday business hours. Traffic control and administrative measures, such as staggered shift hours, will reduce traffic noises. • Visual intrusions from t LNP are anticipated to have minimal adverse impacts given the rural setting for the plant. • Visual intrusion from the plume will vary depending on the viewpoint location, but it will be temporary. • Encourage the use of shared (for example, carpooling) and multi-person transport (for example, buses) of workers. • Coordinate schedules during workforce shift changes to limit impacts on local roads. • Schedule delivery of larger pieces of equipment or structures on off-peak traffic hours (for example, at night) or through other transportation modes. • Consider coordinating with local planning authorities for the upgrading of local roads, intersections, and signals to handle increased traffic loads, if necessary.	

Table 10.1-2 (Sheet 12 of 13)
Operation-Related Unavoidable Adverse Environmental Impacts

Impact Category	Potential Adverse Impacts	Potential Mitigation Measures	Unavoidable Adverse Impacts
Atmospheric and Meteorological	• Ambient air quality impacts from operation-workforce vehicle traffic. SMALL	• Adhere to applicable federal, state, and local regulations and permit requirements. • Use of the LNP on-site meteorological measurement program to monitor meteorological parameters at two levels above ground level, to establish baseline conditions for determining preoperational and operational environmental impacts.	• Atmospheric and meteorological impacts would occur throughout the plant lifetime unless mentioned otherwise. • Atmospheric and meteorological impacts would result in an irreversible commitment of resources (as identified in ER Section 10.2). • Ambient air quality impacts from operation-workforce vehicle traffic. SMALL
Radiological	• Exposure pathway. • Potential for radiation exposure. • Radiation impacts to the public. • Uranium fuel cycle impacts. • Decommissioning. SMALL	• Monitor for potential radiological exposures to workers, the general public, and the surrounding environment during facility operations. • Measurements will be performed to provide information about the types of radiation and radionuclides present. • A network of active air samplers will be used to monitor the vent stacks. Air sampling stations will be strategically located in areas that are most likely to reveal any measurable effects resulting from the release of radioactive effluents from the LNP. • Water monitoring (for example, the collection of drinking water, surface water, and groundwater [well water] samples) will be used to detect the presence of any radioisotopes relative to the operation of the LNP. • Quality assurance program monitoring will be conducted to the standards established in the U.S. Nuclear Regulatory Commission (NRC) Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs.	• Radiological impacts would occur throughout the plant lifetime unless mentioned otherwise. • Radiological impacts would result in an irreversible commitment of resources (as identified in ER Section 10.2). • Uranium fuel cycle impacts would result in an irretrievable commitment of resources (as identified in ER Section 10.2). SMALL

Table 10.1-2 (Sheet 13 of 13)
Operation-Related Unavoidable Adverse Environmental Impacts

Impact Category	Potential Adverse Impacts	Potential Mitigation Measures	Unavoidable Adverse Impacts
Radiological (Continued)		• The environmental impacts from the uranium fuel cycle (UFC) and the transportation of fuel and radioactive wastes are bounded by the values given in 10 Code of Federal Regulations (CFR) 51.51, Table S-3 and 10 CFR 51.52(c), Table S-4. • A Post Shutdown Decommissioning Activities Report will be prepared and submitted per applicable federal laws and regulation. • Appropriate segregation and shielding of buildings/rooms and system designs minimize the radiation zones and helps facilitate decommissioning. • Applicable federal, state, and local environmental compliance laws and permitting regulations will be adhered to for the decommissioning of the facility. • Train and appropriately protect LNP site personnel (that is, those most directly and frequently affected by operation activities) to reduce the risk of potentially harmful exposures from noise or gaseous emissions. • Establish administrative controls and plant procedures for maintaining the doses from radiation sources and facilities during normal operations within regulatory limits and as low as reasonably achievable.	
Environmental Justice	• It is anticipated that operation of the LNP will not adversely affect minority or low income populations. SMALL	• There is no disproportionate high impact on minority or low income populations.	• No unavoidable adverse impacts. Mitigation is not warranted. SMALL

10.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

In accordance with NUREG-1555, ESRP 10.2, this section provides a summary of the irreversible and irretrievable material commitments of resources associated with the construction and operation of the LNP. “Irreversible” refers to environmental resource commitments that cannot be altered to restore the present condition. “Irretrievable” refers to material resources that, once used, cannot be recycled or restored for other uses.

This section is organized into the following subsections:

- ER Subsection 10.2.1 — Irreversible Environmental Commitments
- ER Subsection 10.2.2 — Irretrievable Material Commitments of Resources

10.2.1 IRREVERSIBLE ENVIRONMENTAL COMMITMENTS

Table 10.2-1 summarizes the irreversible environmental commitments that are expected to result from the construction and operation of LNP and the associated structures. The following areas are evaluated below for irreversible environmental commitments:

- Land use.
- Hydrological and water use.
- Ecological (terrestrial and aquatic).
- Socioeconomic.
- Radiological.
- Atmospheric and meteorological.
- Disposal of hazardous and radioactively contaminated waste.
- Commitment of underground geological resources for disposal of radioactive spent fuel.
- Destruction of geological resources during uranium mining and fuel cycle.

10.2.1.1 Land Use

The LNP site is approximately 1257 ha (3105 ac.) in size. The two reactors and ancillary power production support facilities will be located near the center of the site. The LNP will consist of two pressurized water reactors (PWR), LNP 1 and

LNP 2. These units are based on the AP1000 standard design. The plant arrangement (for each AP1000 unit) is comprised of the following five principal building structures: nuclear island, turbine building, annex building, diesel generator building, and radwaste building. Other components of the LNP consist of an exclusion area boundary (EAB) that is the sum of the EABs for each unit, makeup and blowdown water system piping, proposed transmission corridors, cooling towers, switchyard, and intake structure on the CFBC. The overall plant arrangement uses building configurations and structural designs to minimize the building volumes and quantities of bulk materials consistent with safety, operational maintenance, and structural requirements.

As discussed in ER Subsection 2.2.2 and ER Section 3.7, transmission lines and associated infrastructure will be needed to connect the LNP to the PEF electrical grid. Four major 500-kilovolt (kV) transmission lines will leave the station switchyard and connect with three high-voltage (HV) substations and a 500-kV switchyard east and south of the LNP site. Additional system upgrades will be constructed by PEF to accommodate demand in the central and southern Florida areas primarily served by the LNP. Detailed descriptions of the transmission line system and associated construction- and operation-related environmental impacts are described in ER Section 3.7 and ER Chapters 4 and 5, respectively.

The proposed routing of the transmission lines may be within the footprint of new or existing transmission line corridors, to lessen adverse environmental impacts. Most transmission corridors would pass through land that is primarily agricultural and forest land. The areas are mostly rural and remote, with low population densities. The longer lines cross numerous state and United States highways. The effect of these corridors on land usage is minimal; farmlands that have corridors passing through them generally continue to be used as farmland. PEF will design and construct the LNP transmission lines in accordance with industry standards and guidance. Transmission line maintenance practices would be conducted to ensure the conformance of the lines with applicable electrical safety code requirements for on line clearance to limit shock from induced currents.

New land use commitments will be needed for the makeup and blowdown water system pipelines associated with LNP. It is anticipated that the pipelines will follow a pipeline corridor located in Levy and Citrus counties and will not significantly alter land use. Another alteration of land use will be the relatively small area associated with the land needed for the makeup water system pipeline pumphouse. As described in ER Subsection 2.2.3.1, no federal, state, or regional land use plans apply to the area where the intake structure and pumphouse will be located. Furthermore, this alteration is not irreversible because the structure could be dismantled and the habitat restored, if necessary.

The overall commitment of land required for LNP is not large. Large areas of habitat exist in proximity to the site, making it possible for wildlife to relocate. In addition, permit and regulatory requirements will be met in order to minimize the impact to this area. Therefore, no irreversible land use commitments are expected to result from the construction or operation of the LNP, including the makeup and blowdown water system pipelines. As discussed in ER Sections 4.1

and 5.6, the LNP power transmission system is expected to have a SMALL impact on irreversible land use commitments.

10.2.1.2 Hydrological and Water Use

The LNP will require water for both plant cooling and operational uses. The plant will use two independent circulating water systems (CWSs) with seawater used for the CWS that cools the turbine-generator, and freshwater used for the service water system (SWS). The waters in the CFBC downstream of Inglis Lock vary in salinity, seasonally and with tidal influences; however, when the intake is operational, it is anticipated that the makeup water to the cooling towers will be seawater drawn from shallow, nearshore Gulf waters. Freshwater from the raw water system (RWS) will also be used for the other water services required for operation. The other water services supplied from the RWS will consist of potable water, demineralized water treatment, and the fire protection system (FPS). Potable water is required for human consumption, sanitary, and other domestic purposes. The RWS supply will be from supply wells installed into the freshwater aquifer at the site. Makeup water for the CWS will be supplied from the intake structure located on the CFBC.

The CWIS will be located on the berm that forms the north side of the CFBC and is in close proximity to the Inglis Lock. Per Table 3.3-2, it is estimated that the normal consumptive water use from cooling tower evaporation is 2.3 m^3/s (81.4 ft^3/sec) or 30,427 gpm. Consumptive water use from service water cooling tower evaporation is 0.08 m^3/s (2.8 ft^3/sec) or 1248 gpm (Table 3.3-2). Water consumption for fuel cycle activities would require approximately 43,067 million L (11,377 million gal.) of water (Table 10.1-2).

The LNP will withdraw cooling water from the CFBC, which is fed by the Gulf of Mexico. In this case, the availability of minimum water is not applicable to the LNP site because there is an unlimited supply of water for cooling water needs. Cooling tower blowdown from a series of mechanical draft cooling towers, including residual waste heat, will be transported in two pipelines (one for each unit) from the LNP. The pipelines will run south to the CFBC and then west along the northern edge of the Inglis Lock Bypass Channel. They will then cross the bypass channel just north of CREC, run south, and will discharge into the CREC discharge canal and ultimately into the Gulf of Mexico. Waste heat will be dissipated by a series of on-site mechanical draft cooling towers, which will draw cooling water makeup from the CFBC. This canal extends from the Inglis Lock at Lake Rousseau to the Gulf of Mexico.

It is expected that normal releases of contaminants into the environment from the LNP will have negligible effects on surface and groundwater uses and will be in compliance with an approved NPDES permit issued by the Florida Department of Environmental Protection (FDEP). ER Section 3.6 discusses the FDEP requirements for applying for an NPDES permit. This permit will ensure that discharges are controlled from systems such as discharge lines, sewage treatment facilities, radwaste treatment systems, activated carbon treatment systems, water treatment waste systems, and facility service water. The effect on

water quality due to the operation of the LNP will be monitored to ensure compliance with the issued NPDES permits for construction and operation.

PEF will monitor water quality in the CFBC in order to evaluate the water body's health and track changes in water quality. This monitoring will continue throughout the life of the plant and efforts will be made to minimize impacts and changes that may take place due to the construction and operation of the LNP. Impacts of heated water discharge to the discharge receiving water body will be limited to the vicinity of the discharge structure. These impacts will not be significant as a whole and are not irreversible because the effects will be localized and only occur during operation of the cooling towers. No heated water will be discharged once plant operations permanently cease.

10.2.1.3 Ecological (Terrestrial and Aquatic)

ER Section 4.3 provides a discussion about sensitive species that can be found in or near the affected areas. Surveys for sensitive species will be conducted as necessary and mitigation requirements and permit conditions will be met in order to minimize risk of loss. Therefore, construction and operation of the new units and associated off-site structures is expected to have a minimal short- or long-term effect on terrestrial ecology.

No irreversible effects to the terrestrial ecology will occur due to LNP construction or operation at this location. A section of the blowdown water system pipelines will follow an existing transmission line corridor located in Citrus County, minimizing potential impacts to terrestrial ecology.

The makeup system pipeline will extend north from the CWIS pumphouse to the plant site. The pumphouse will be placed on the north side of the CFBC. This area has previously been disturbed from past construction activities. The habitat in this location is already edge habitat, so although the ecosystem in the cleared area will be altered, this clearing action will not cause a significant effect to the terrestrial ecosystem in the vicinity.

The proposed routing of the transmission lines may be within the footprint of new or existing transmission line corridors to lessen adverse terrestrial environmental impacts. These areas may have previously been disturbed from past construction activities. The habitats in these locations may already be edge habitats, so although the ecosystem in the cleared area will be altered, this clearing action will not cause a significant effect to the terrestrial ecosystem in the vicinity. These areas will be disturbed only for occasional maintenance once construction is complete, so the irreversible environmental commitment associated with these structures will be relatively small.

The largest irreversible environmental effect associated with the construction and operation of the LNP is the loss of land and terrestrial habitat within the LNP plant site. There is ample available land in the vicinity and region for terrestrial species to relocate. ER Chapters 4 and 5 discuss several mitigation measures

that will be encompassed in order to minimize the degree of impact on the flora and fauna in the area during construction and operation activities.

LNP plant operation should not have significant effects on the aquatic/marine ecology and water quality. A small area along the north bank of the CFBC below the water surface will be temporarily disturbed for the installation of the new intake structure. However, construction of the intake structure is anticipated to have a minimal effect on aquatic life, and therefore, no irreversible ecological commitment. The thermal effect from the LNP discharge water is minimized through plant design and compliance with NPDES permit requirements. There will be no thermal effects beyond some thermally-sensitive species possibly avoiding the immediate area of the discharge opening. This should not affect the general community structure or ecology in the remaining areas of the discharge waterbody. It is anticipated that no important aquatic species or its habitat will be affected. No irreversible effects to aquatic ecology in the CFBC are expected to occur due to construction and operation of the LNP.

10.2.1.4 Socioeconomic

The LNP will not draw from the community's socioeconomic standing, but it will produce jobs and tax revenues. According to ER Section 5.8, the majority of the operations workforce for the LNP is expected to come from within the region; therefore, the additional workforce will not have a significant impact on the regional population. No impacts to agriculture, structures, residences, public services, educational facilities, hospitals, or other institutional facilities or any noise, air, or aesthetic disturbances are anticipated. There will be a small increase in traffic on local roads. If required, improvements to roadways are expected to offset any effects of this increase. The LNP will provide a new source of reliable electricity to the region, which may result in the introduction of new industries in the region or expansion of existing industries. Operation of the new facilities will have a SMALL beneficial economic impact on the region through the generation of tax income. The positive economic impact of the local expansion of industry and the increase in local property tax revenue will be LARGE. These impacts on the economy are expected to persist after plant decommissioning; therefore, there will be no irreversible socioeconomic commitments.

10.2.1.5 Atmospheric and Meteorological

When the LNP is in operation, atmospheric emissions other than water vapor will be minimal. Water vapor from the mechanical draft cooling towers will be the main constituent of emissions during operation. This water vapor will at times form a visible plume of varying lengths and opacity. The frequency of occurrence and length of these visible plumes will be greatest during winter months when ambient air temperatures are cool and the air is moist. It is anticipated that the LNP will utilize back-up diesel-fueled generators to provide a backup source of electrical power and during periodic testing performed as required by the plant's technical specifications. Minor emissions of VOCs may be released from the storage tanks used to supply diesel fuel to this equipment. However, federal, state, and local guidelines and regulations that apply to the

operation of these tanks will be met, and any necessary air permits will be secured before operations begin. Air emissions from the LNP during normal operation of the facility are not expected to have a significant or measurable impact on local or regional meteorological conditions; therefore, there will be no irreversible atmospheric or meteorological commitments.

10.2.1.6 Disposal of Hazardous and Radioactively Contaminated Waste

The LNP will generate radioactive, hazardous, and non-hazardous waste. Each waste will require proper storage, on-site management, and disposal or treatment in accordance with applicable permits and regulations. Radioactive waste will be disposed in radioactive landfills in accordance with regulations governing radioactive waste. Final disposition of hazardous waste will be managed in accordance with the permit and regulatory requirements governing permitted hazardous waste treatment, storage, and disposal facilities. Non-hazardous waste will be beneficially used, recycled, or disposed of in accordance with applicable permits and regulations governing non-hazardous waste. Universal wastes generated by the facility may be recycled with an authorized universal waste handler in lieu of land disposal in a FDEP-permitted industrial landfill. Used oil may be recycled via permitted used-oil handlers. Land committed to the disposal of radioactive and hazardous waste is an irreversible impact because it is committed to that use and can be used for few other purposes.

10.2.1.7 Commitment of Underground Geological Resources for Disposal of Radioactive Spent Fuel

After uranium is utilized in the LNP as fuel for the new reactors, the waste will be considered a high-level radioactive waste and referred to as “spent nuclear fuel.” If no options are available to reprocess the uranium, the spent nuclear fuel must be isolated from the environment for a period of time ranging from thousands to tens of thousands of years. Proposed disposal options call for the disposal in a deep underground geological repository. This long-term commitment makes the surrounding geological resource unusable for thousands or tens of thousands of years and is considered an irreversible commitment of geologic resources.

10.2.1.8 Destruction of Geological Resources during Uranium Mining and Fuel Cycle

The mining of uranium is required to generate uranium for use as fuel in the LNP. Impacts from mining are considered an indirect impact of the construction and operation of the LNP. Mining can result in the destruction of geologic resources and the pollution of surrounding soil. Impacts to surrounding lakes, streams, and groundwater can also result from pollutants released during mining. During the mining process and for some period of time following the mining operation, aesthetic impacts result from changes in the natural landscape.

A detailed description of the UFC is provided in ER Section 5.7. Environmental data on the UFC are tabulated in Table 10.2-2. The environmental data describe the contribution of the environmental effects related to UFC activities associated

with licensing a nuclear power reactor. Specifically, these data describe the contribution of environmental effects associated with uranium mining and milling, the production of uranium hexafluoride, isotopic enrichment, fuel fabrication, reprocessing of irradiated fuel, transportation of radioactive materials, and management of low-level wastes and high-level wastes.

10.2.2 IRRETRIEVABLE MATERIAL COMMITMENTS OF RESOURCES

Irretrievable environmental commitments resulting from the LNP include the following:

- Construction materials.
- Water consumption.
- Uranium fuel and energy consumption.

10.2.2.1 Construction Materials

This ER discusses the proposition of building the facility at the selected site, but does not discuss the actual construction details. It can be assumed that the irretrievable commitment of resources would be similar to that required for any similarly sized, multi-year construction project. The amounts and types of material required should be comparable to those that would be necessary for the construction of any type of power plant or other large industrial facility including materials such as concrete, steel and other metals, glass, and several forms of plastics. According to a recent U.S. Department of Energy (DOE) study, each new reactor would require approximately 9356.6 cubic meters (m^3) (12,239 cubic yards [yd^3]) of concrete, 2818.6 metric tons (MT) (3107 tons) of rebar, 2,743,200 meters (m) (9,000,000 feet [ft.]) of cable, and 83,820 m (275,000 ft.) of piping (Table 10.2-3) (Reference 10.2-001). However, the amount of materials that would be irretrievably committed to the project should be insignificant in relation to the availability of these materials on the national or global market.

10.2.2.2 Water Resources

During operation of the LNP, some of the cooling water will be lost through the cooling towers through evaporation or as drift. Small amounts of potable water are also used during construction and operation of the LNP. Impacts to water resources are expected to be SMALL and may be replenished through the natural hydrologic cycle. The use of water does not represent an irretrievable commitment of water resources.

10.2.2.3 Uranium Fuel and Energy Consumption

Irreversible and irretrievable commitments of resources during operation would consist primarily of the uranium used for fuel. A study of available uranium by the World Nuclear Association projects the availability of a 50-year supply of low-cost uranium. The World Nuclear Association study also projects that increased

market prices will drive additional exploration and could result in a tenfold increase in available uranium (Reference 10.2-002). The uranium used by the LNP units to produce nuclear power would be irretrievable, but would have a SMALL impact on the long-term availability of uranium.

Other irretrievable commitments of resources would include the energy required to produce the fuel for the reactors. Materials required for normal operation of an industrial plant like the LNP that cannot be recycled or recovered, would also result in irretrievable commitments of resources. It is also expected that some materials will become radioactive as a result of their proximity to the fuel source. Using presently available technologies, these materials could not be recovered or recycled for other uses.

10.2.3 REFERENCES

10.2-001 U.S. Department of Energy, "Application of Advanced Construction Technologies to New Nuclear Power Plants," MPR-2610, Revision 2, September 24, 2004.

10.2-002 World Nuclear Association, "Supply of Uranium," Website, www.world-nuclear.org/info/inf75.html?terms=supply+of+uranium, accessed March 11, 2008.

Table 10.2-1
Irreversible Environmental Commitments

Land Use	The LNP site is approximately 1257 hectares (ha) (3105 acres [ac.]) in size. The two reactors and ancillary power production support facilities will be located near the center of the site. The LNP will consist of two pressurized water reactors (PWR), LNP 1 and LNP 2. These units are based on the Westinghouse Electric Company, LLC (Westinghouse) AP1000 (AP1000) standard design. The plant arrangement (for each AP1000 unit) is comprised of the following five principal building structures: nuclear island, turbine building, annex building, diesel generator building, and radwaste building. The overall plant arrangement uses building configurations and structural designs to minimize the building volumes and quantities of bulk materials consistent with safety, operational maintenance, and structural requirements. There are no irreversible land use commitments.
Hydrologic and Water Use	Consumptive water use from cooling tower evaporation is 2.3 cubic meters per second (m^3/s) (81.4 cubic feet per second [ft^3/sec]) or 30,427 gallons per minute (gpm). Consumptive water use from service tower evaporation is 0.08 m^3/s (2.8 ft^3/sec) or 1248 gpm. Water consumption for fuel cycle activities would require approximately 43,067 million liters (L) (11,377 million gallons [gal.]) of water. Monitoring will occur to ensure water use permit conditions are met. Impacts would be short-term and localized. There are no irreversible hydrological and water use commitments.
Ecological	No irreversible environmental commitments to terrestrial and aquatic ecology.
Socioeconomic	A positive LARGE beneficial impact due to local expansion of industry and an increase in local property tax revenue. Impacts from increased traffic. There are no irreversible socioeconomic commitments.
Radiological	Use of uranium for fuel and commitment of material that will become radioactive during plant operation; and land committed to the disposal of radioactive waste are considered an irreversible commitment of resources.
Atmospheric and Meteorological	There are no irreversible atmospheric and meteorological commitments.

Table 10.2-2 (Sheet 1 of 3)
Uranium Fuel Cycle Environmental Data

Environmental Consideration	Total	Maximum Effect per Annual Fuel Requirement or Reference Reactor Year of Model 1000 MWe Light Water Reactor (LWR)
Natural Resource Use		
Land (acres [ac.])		
Temporarily Committed [(a)]	100	
Undisturbed Area	79	
Disturbed Area	22	Equivalent to a 110-megawatt electric (MWe) coal-fired power plant.
Permanently Committed	13	
Overburden Moved (millions of metric tons [MT])	2.8	Equivalent to a 95-MWe coal-fired power plant.
Water (millions of gallons [gal.])		
Discharged to Air	160	Equal to 2 percent of model 1000 MWe LWR with cooling tower.
Discharged to Water Bodies	11,090	
Discharged to Ground	127	
Total	11,377	Less than 4 percent of model 1000 MWe LWR with once through cooling.
Fossil Fuel:		
Electrical Energy (thousands of MW-hour)	323	Less than 5 percent of model 1000 MWe output.
Equivalent Coal (thousands of MT)	118	Equivalent to the consumption of a 45-MWe coal-fired power plant.
Natural Gas (millions of scf)	135	Less than 0.4 percent of model 1000 MWe energy output.
Effluents-Chemical (MT)		
Gases (including entrainment)[(b)]		
SO_X (sulphur oxide)	4400	
NO_x [(c)]	1190	Equivalent to emissions from 45-MWe coal-fired plant for a year.
Hydrocarbons	14	
CO	29.6	
Particulates	1154	
Other Gases		
F	0.67	Principally from uranium hexafluoride (UF_6) production, enrichment, and reprocessing. Concentration within range of state standards which are below the level that has effects on human health.

Table 10.2-2 (Sheet 2 of 3)
Uranium Fuel Cycle Environmental Data

Environmental Consideration	Total	Maximum Effect per Annual Fuel Requirement or Reference Reactor Year of Model 1000 MWe Light Water Reactor (LWR)
HCl	0.014	
Liquids:		
SO_4^-	9.9	From enrichment, fuel fabrication, and reprocessing steps. Components that constitute a potential for adverse environmental effect are present in dilute concentrations and receive additional dilution by receiving bodies of water to levels below permissible standards. The constituents that require dilution and the flow of dilution water are NH^3 (600 cubic feet per second [ft^3/sec]), NO_3 (20 ft^3/sec), Fluoride (70 ft^3/sec).
NO_3^-	25.8	
Fluoride	12.9	
Ca^{++}	5.4	
Cl^-	8.5	
Na^+	12.1	
NH_3	10.0	
Fe	0.4	
Tailing Solutions (thousands of MT)	240	From mills only—no significant effluents to environment.
Solids	91,000	Principally from mills—no significant effluents to environment.
Effluents- Radiological (curies [Ci])		
Gases (including entrainment):		
Rn-222		Presently under reconsideration by the NRC.
Ra-226	0.02	
Th-230	0.02	
Uranium	0.034	
Tritium (thousands)	18.1	
C-14	24	
Kr-85 (thousands)	400	
Ru-106	0.14	
I-129	1.3	
I-131	0.83	

Table 10.2-2 (Sheet 3 of 3)
Uranium Fuel Cycle Environmental Data

Environmental Consideration	Total	Maximum Effect per Annual Fuel Requirement or Reference Reactor Year of Model 1000 MWe Light Water Reactor (LWR)
Tc-99		Presently under consideration by the NRC.
Fission Products and Transuranics	0.203	
Liquids:		
Uranium and Daughters	2.1	Principally from milling — included tailing liquor and returned to ground — no effluents: therefore, no effect on the environment.
Ra-226	0.0034	From UF_6 production.
Th-230	0.0015	
Th-234	0.01	From fuel fabrication plants — concentration 10 percent of 10 CFR 20 for total processing, 26 annual fuel requirements for model LWR.
Fission and Activation Products	5.9×10^{-6}	
Solids (buried on-site)		
Other than High Level (shallow)	11,300	About 9100 Ci comes from low-level reactor wastes and 15,000 Ci comes from reactor decontamination and decommissioning — buried at land burial facilities. 600 Ci comes from mills — included in tailing returned to ground. Approximately 60 Ci comes from conversion and spent fuel storage. No significant effluent to the environment.
TRU and high-level waste (HLW) (deep)	1.1×10^{7}	Buried at federal repository.
Effluents—Thermal (billions of British thermal units [Btu])	4063	Less than 5 percent of model 1000 MWe LWR.
Transportation (person-rem):		
Exposure of Workers and General Public	2.5	
Occupational Exposure	22.6	From reprocessing and waste management.

Notes:

In some cases where no entry appears, it is clear from the background documents that the matter was addressed and that, in effect, the table is read as if a specific zero entry was made. However, there are other areas that are not addressed in the table.

a) The contributions to temporarily committed land from reprocessing are not prorated over 30 years, since the complete temporary impact accrues regardless of weather the plant services one reactor for one year or 57 reactors for 30 years.

b) Estimated effluents based upon combustion of equivalent coal for power generation.

c) 1.2 percent from natural gas use and process.

Table 10.2-3
Irretrievable Commitments of Construction Resources

Material	Quantity Used [(a)]
Concrete	9357 cubic meters (m^3) (12,239 cubic yards[yd^3])
Rebar	2819 metric tons (MT) (3107 tons)
Steel cable	2,743,200 linear meters (9,000,000 linear feet)
Piping	83,820 meters (m) (275,000 feet [ft.])

Notes:

a) Application of Advanced Construction Technologies to New Nuclear Power Plants, U.S. Department of Energy, MPR-2610, September 2004.

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

In accordance with NUREG-1555, ESRP 10.3, this section provides an analysis of the predicted short-term unavoidable environmental impacts (or environmental benefits) of plant construction and operation and the predicted long-term environmental impacts (or environmental benefits) resulting from plant construction and operation. This section also provides an evaluation of the extent to which the construction and operation of the proposed project's use of the environment will preclude any options for other future use of the environment and an evaluation of the project's impact on short-term use and long-term productivity capabilities of the human environment.

For the purpose of this section, the term "short-term" represents the period from the start of construction to the end of plant life, including prompt decommissioning. In contrast, the term "long-term" represents the period extending beyond the end of plant life, including the period up to and beyond that required for delayed plant decommissioning. In addition, for the analysis of long-term impacts, it was assumed that appurtenant infrastructure and facilities will be maintained in the operating conditions set forth for the LNP.

Throughout this section, environmental impacts will be assessed using the U.S. NRC's three-level standard of significance — SMALL, MODERATE, or LARGE. This standard of significance was developed using the Council on Environmental Quality guidelines set forth in the footnotes to Table B-1 of Title 10 CFR Part 51, Subpart A, Appendix B:

- **SMALL** — Environmental effects are not detectable or are so minor they will neither destabilize nor noticeably alter any important attribute of the resource.

- **MODERATE** — Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

- **LARGE** — Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

The impact categories evaluated in this chapter are the same as those used in the GEIS, NUREG-1437, Volumes 1 and 2.

10.3.1 CONSTRUCTION PREEMPTIONS AND PRODUCTIVITY

This subsection provides an evaluation of the extent to which the construction of the proposed project's use of the environment will preclude any options for other future use of the environment and an evaluation of the project's impact on short-term use and long-term productivity capabilities of the human environment.

10.3.1.1 Land Use

As previously noted, construction of the LNP reactor units and associated structures will occur at a location within the LNP site. The LNP site is approximately 1257 ha (3105 ac.) in size and is located in Levy County, Florida. The two reactors and ancillary power production support facilities will be located near the center of the site. The LNP will consist of two PWRs, LNP 1 and LNP 2. These units are based on the AP1000 standard design. The plant arrangement (for each AP1000 unit) is comprised of the following five principal building structures: nuclear island, turbine building, annex building, diesel generator building, and radwaste building.

Per ER Section 2.2, Levy County's current zoning and land use designation for the LNP site is forestry/rural residential. Mixed forest land and forested wetlands comprise 91 percent of the total land use Agricultural lands encompass 3.4 percent of the site area and limited transportation, communications, and utilities land uses are present within the site boundary. There are no residential, commercial or industrial services, strip mines, quarries, or gravel pits within the site. There are no special land use categories within the site boundary. Deciduous forest lands, mixed forest lands, evergreen forest land, and forested wetlands comprise 68 percent of the vicinity; 8.6 percent of the vicinity is comprised by residential land use. There are no confined feeding operations within the vicinity. Cropland and pasture and other agricultural lands encompass 4.1 and 3.9 percent of the vicinity, respectively. There are no prime farm lands on the site or in the vicinity. Commercial and services, industrial, and transportation land uses are limited in the vicinity.

Per ER Section 4.1, construction of the LNP and associated infrastructure will necessitate the need to permanently resurface land within the LNP site. This includes asphalt or crushed stone covering, with seeded topsoil covering the remaining disturbed area. In addition, areas will be covered with crushed stone and utilized for temporary construction purposes. Portions of the areas that will be resurfaced permanently or temporarily currently contain wetlands and or forested areas. Construction activities will conform to the goals and criteria set forth in applicable local, state, and federal regulatory guidelines and requirements in order to minimize adverse impacts. As a result, the overall land use impact will be SMALL.

10.3.1.2 Appurtenant Infrastructure

According to ER Chapter 5, operations at the LNP will require makeup water from the CFBC. A new CWIS and pumphouse will be required to move water from the canal to the LNP. The CWIS will be located on the berm that forms the north side of the CFBC and is in close proximity to the Inglis Lock. The LNP will withdraw cooling water from the CFBC, which is fed by the Gulf of Mexico. In this case, the availability of minimum water is not applicable to the LNP site because there is an unlimited supply of water for cooling water needs. Cooling tower blowdown from a series of mechanical draft cooling towers, including residual waste heat, will be transported in two pipelines (one for each unit) from the LNP.

The pipelines will run south to the CFBC and then west along the northern edge of the bypass channel. They will then cross the bypass channel just north of CREC, run south, and will discharge into the CREC discharge canal and ultimately into the Gulf of Mexico. Waste heat will be dissipated by a series of on-site mechanical draft cooling towers, which will draw cooling water makeup from the CFBC. This canal extends from the Inglis Lock at Lake Rousseau to the Gulf of Mexico. It is anticipated that the proposed makeup and blowdown water system pipelines will follow a pipeline corridor located in Levy and Citrus counties. The impacts from construction to the current land use in the pipeline corridors are expected to be short-term and SMALL.

10.3.1.3 Air

A small increase in air emissions may occur during LNP construction activities. During construction activities, controls will be implemented to mitigate potential air emissions from construction sources. Overall, air quality impacts are anticipated to be short-term and SMALL.

10.3.1.4 Water

Hydrologic impacts associated with construction of the LNP include alteration of some watershed surfaces; temporary disturbances to the ground surface due to stockpiling soils and construction materials; construction of structures such as the intake structure, pumphouse, construction of new impervious surfaces including temporary access roads; removal of vegetation that would potentially affect groundwater levels and surface water drainage characteristics temporarily causing erosion, sedimentation, and subsidence. Unavoidable adverse effects on water use are limited to those associated with sedimentation in stormwater resulting from construction activities. Hydrologic impacts associated with waste runoff generated by large batch plants would comply with applicable federal, state, and local regulations and permit requirements and the use of BMPs.

Water will be used for construction activities of LNP. A specific quantity of water usage is not known at this time. However, proper mitigation and management methods implemented during construction will limit the potential water quantity and quality effects to surface water and groundwater. Construction-related effects to surface water resources are relatively small, but represent a natural resource that may no longer be available for use. However, as part of the natural hydrologic cycle, this water is eventually recycled through the ecosystem.

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

10.3.1.5 Terrestrial and Aquatic Ecosystems

As discussed in ER Section 4.3, construction of the LNP will result in temporary and permanent impacts to terrestrial ecological communities. Construction will cause direct loss of planted pine and forested wetland communities, and

alteration of some of the remaining communities on the LNP site that are located near the construction areas. Wetlands comprise the major important terrestrial habitats on-site. Mitigation for unavoidable impacts to wetlands is required through both the Federal Section 404/10 and the State of Florida Environmental Resource Permitting processes. Functions of these wetlands will be mitigated through the permitting process. Overall impacts to wetlands as a result of the LNP construction are expected to be MODERATE.

Terrestrial ecosystems on-site have been degraded through decades of silvicultural operations. Conversion from a diverse natural system to planted pine reduces the habitats available to wildlife. Construction will result in alteration of some of the remaining habitat through modification in community structure and composition. Construction will further modify a landscape already highly fragmented by silvicultural rotations of pine plantings and harvesting. Clearing the LNP site will decrease the vegetation and the wildlife within the terrestrial habitat, resulting in a long-term effect. Wildlife will experience some short-term direct effects associated with clearing and construction activities and long-term direct and indirect effects from the loss of habitat. Most mobile wildlife is expected to avoid the LNP site during active construction periods, and either return following after construction is complete, or migrate to adjacent natural lands. Because the site borders conservation lands and other undeveloped areas that represent abundant and similar habitats for displaced wildlife, it is anticipated that wildlife will relocate and adapt to the altered habitat area over time. Creation of additional open area (transmission corridor and other clearings) will favor wildlife species that prefer ecotonal or “edge” environments.

Birds collide with many types of anthropogenic structures. Hoist cranes are the construction infrastructure expected to pose a risk for avian collisions at the LNP construction site. The NRC evaluated nuclear plants and found that avian mortality resulting from collisions with nuclear plant infrastructure does not have substantial effects on bird populations. A proactive measure to avoid avian collisions would be to illuminate construction equipment at night. Other recommendations to prevent avian collisions include avoiding areas where birds are known to congregate, enhancing power line visibility, and limiting construction to the daytime hours on days with good weather (Reference 10.3-001). The expected adverse effect to birds related to collisions is short-term.

Construction of the LNP will result in direct mortality for certain wildlife and will reduce the available habitat area, but will not adversely affect local or regional populations of any protected plant or animal species. Native habitats on the property have been significantly altered through silvicultural operations, and mobile listed species are likely to preferentially utilize less disturbed habitats on adjacent conservation lands. Impacts to important species and terrestrial ecosystems are expected to be SMALL. It is anticipated that construction of the transmission line corridors will have a SMALL impact on terrestrial ecology.

Aquatic ecology impacts include temporary loss of habitat and short-term degradation of water quality in isolated areas due to in-water and shoreline construction of the CWIS and makeup water and blowdown discharge pipelines.

Adverse impacts of construction on existing aquatic pool habitats are anticipated to be SMALL. The adverse impacts of construction of the CWIS are anticipated to be SMALL due to the currently poor condition of the sediments and benthic fauna in the vicinity of the proposed CWIS construction, and the similar nature of the sediments in nearby areas anticipated to experience redeposition. The impacts of construction of a blowdown pipeline crossing will be SMALL since the quality of the benthic fauna is low and the fauna is anticipated to return to the prior condition within a relatively short time frame following the completion of construction. It is anticipated that construction of the transmission line corridors will have a SMALL impact on aquatic ecology. Short-term adverse aquatic ecological effects stemming from site preparation and construction runoff effluent and sedimentation will be limited or prevented through compliance with regulations, BMPs, and control measures.

10.3.1.6 Noise

Construction noise will occur during LNP site preparation activities such as clearing, and grading. Construction noise will also occur during construction activities and while installing equipment (such as turbines, generators, pumps, transformers, and switchyard equipment). Construction activities will increase ambient noise levels. Construction noise will not be sustained for prolonged periods of time. In addition, it will vary based on the specific activities and their locations.

Typical equipment used in construction and clearing generate peak noise levels between 70 and 98 decibels (A-weighted scale) (dBA) at a distance of 15 m (50 ft.) from the equipment (Reference 10.3-002). Because multiple pieces of equipment are likely to be operating simultaneously, the total noise could exceed the peak noise level of any one piece of equipment by 1 to 3 dBA. Noise naturally attenuates over distance, typically decreasing by 3 dBA with every doubling of distance (Reference 10.3-003). Therefore, the actual noise levels experienced by wildlife after relocating from the construction area would be lower than the noise level at 15 m (50 ft.).

To minimize the increased ambient noise, mitigation measures will be implemented. In addition, noise levels are controlled by the following regulations: OSHA has developed noise exposure limits (29 CFR 1910) and the U.S. Environmental Protection Agency (USEPA) federal noise pollution control regulations (40 CFR 204) identify noise emission standards for construction equipment.

Given the rural setting of the LNP site, overall, construction noise would result in short-term temporary SMALL noise impacts to surrounding residential communities and sensitive receptors, such as schools and nearby recreation areas.

10.3.1.7 Transmission Lines

Transmission lines and associated infrastructure will be needed to connect the LNP to the PEF electrical grid. The proposed routing of the transmission lines may be within the footprint of new or existing transmission line corridors to lessen adverse environmental impacts. PEF will design and construct the LNP transmission lines in accordance with industry standards and guidance. Land-clearing or construction activities in the corridors would follow BMPs and would be mitigated to the extent possible.

Most transmission corridors would pass through land that is primarily agricultural and forest land. The areas are mostly rural and remote, with low population densities. The longer lines cross numerous state and United States highways. The effect of these corridors on land usage is minimal; farmlands that have corridors passing through them generally continue to be used as farmland. In the short-term, this may result in some potential loss in agricultural productivity or natural habitats. However, this does not represent a long-term loss as the land may be released for other uses or returned to its natural state after decommissioning. As a result, environmental impacts of transmission corridor construction would be SMALL.

10.3.1.8 Cultural Resources

The proposed project will comply with Section 106 of the National Historic Preservation Act (NHPA), 16 United States Code (USC) § 470, and its implementing regulations (36 CFR 800). Cultural resource investigations, as required by the NHPA, were conducted to identify the full extent of historic properties in the Area of Potential Effect (APE). The APE included areas of direct construction impact for the two reactor units, the areas of direct construction impact for the makeup and blowdown water lines and cooling water intake structure pumphouse. No NRHP-eligible or -listed properties were found during these surveys. It is anticipated that impacts to cultural resources would be SMALL based on the results of the cultural resource surveys of the proposed construction areas.

If a project or work activity inadvertently uncovers an archaeological site or other historical artifacts, activities in the site area will be halted, and the appropriate PEF Environmental Support Organization will be contacted. For the LNP project, PEF's Environmental Health and Safety Services (EHSS) would be contacted. In the event of an inadvertent find, a cultural resource assessment would be performed, and EHSS would consult with the SHPO, as necessary, to determine appropriate steps to be taken prior to resuming site activities. PEF will coordinate directly with the Florida SHPO to determine appropriate mitigation or other measures, as needed, in accordance with federal and state regulations and PEF policy.

10.3.1.9 Socioeconomic

Socioeconomic construction-related impacts are described in the subsections below.

10.3.1.9.1 Transportation

According to ER Subsection 4.4.2.10, additional traffic will be generated in the area during construction of the LNP. The peak construction period is anticipated to occur once the LNP is 50- to 70-percent complete. It is estimated that at the peak construction/operational phase, the project will attract 4725 daily trip ends associated with construction traffic. Once these tasks are complete, the workforce and average daily vehicle traffic are expected to decline steadily until the LNP is operational. Some limited congestion problems may occur as vehicles enter and exit the LNP site when work shifts begin and end.

An increase in traffic to and from the LNP site would temporarily increase the level of vehicular noise for those residences along routes that access the LNP site. At times, the construction schedule could span 24-hour days, up to 7 days per week. In some instances, it is anticipated that the night-shift construction activities would involve a fewer number of workers than the day-shift construction activities. Standard noise control devices (such as mufflers and sound-proofing) will be used to reduce noise impacts to nearby residences and other sensitive receptors. The increased traffic volumes associated with construction of the facility would be temporary and short-term.

Overall transportation impacts are anticipated to be SMALL to MODERATE.

10.3.1.9.2 Aesthetics

Per ER Subsection 3.1.4.3, the structures at the LNP site will not be high enough to be visible from public areas at ground level, and only the cooling tower plumes are likely to be visible to a few residences and recreational users in the vicinity. The effects, if any, of seasonal changes on the vegetation that would affect the viewshed surrounding the LNP are considered minor. The site is heavily forested and vegetated and is secluded from public areas. Plans to screen the LNP will not be required nor warranted. Given its remote location, it is anticipated that construction activities at the plant site would not be visible to nearby residences. Therefore, aesthetic impacts within the construction areas are expected to be SMALL. It is anticipated that long-term indirect or cumulative impacts to visual aesthetics will be SMALL.

10.3.1.9.3 Labor

As discussed in ER Subsection 4.4.2, it is estimated that the peak construction workforce will reach approximately 2700 workers. This maximum construction workforce would occur only for a short duration during the peak construction time period.

While it is assumed that the majority of the workers needed for construction of the LNP would come from the surrounding area, there would be a small in-migration of specialized construction-related workers who may relocate to the area. Specialized construction-related workers will temporarily reside in the region, frequent local establishments, and purchase goods and services within the vicinity and the region. There will be little change to the existing social structure and patterns of the surrounding community. No significant change in population is anticipated; therefore, the social structure would remain unchanged during construction of the LNP.

10.3.1.9.4 Tax Revenues and Economic Characteristics

As discussed in ER Subsection 4.4.2, economic impacts of construction first consider the total (that is, direct, indirect, and induced) contribution of constructing the LNP to regional employment, income (that is, wages and salaries, proprietors' [business owners'] income, and other income) and output. Second, the construction activity is placed in the context of the larger economy to evaluate the significance of the net contribution to the regional economy.

PEF estimates a total escalated construction cost of $16.6 billion, which includes the cost of constructing LNP 1 ($5.6 billion), LNP 2 ($3.7 billion), and the transmission corridors ($2.5 billion), as well as the cost of financing. With a peak construction workforce of approximately 2700 workers, an estimate of $49.9 million in peak earnings will be generated from construction. Along with direct earnings, there would be additional indirect earnings over the construction period through an earnings multiplier for construction of 1.6. Therefore, the total earnings would increase by $79.8 million during the peak construction year. The earnings would be lower in the nonpeak years. Overall, the peak year of construction would contribute less than 1 percent in earnings to the region.

In addition to jobs and earnings, the construction of the LNP would contribute positively to the regional economy through purchases of capital and materials that are produced in the region. It is assumed that 10 percent of the total construction costs, or $930 million over the 6-year construction period, will be for local expenditures. Based on this assumption, direct local construction expenditures would average $155 million per year ($930 million divided by 6 years) over the 6-year construction period. These direct expenditures would tend to be distributed over the eight counties in the region in rough proportion to the sizes of their existing economies. In addition to the direct expenditures, the local economy would benefit from increased indirect expenditures as a result of an output multiplier of 1.7. Therefore, on average for each of the 6 years of construction, the total increase in local output would be $263 million. Based on this information, a temporary, SMALL beneficial economic impact is expected because of the increased employment of regional construction workforce and earnings, and the purchase of local goods and services.

As discussed in ER Subsection 4.4.2.2, increased tax payments from constructing the LNP site are viewed as a benefit to the state and the local jurisdictions in the region. Construction-related activities would generate sales

tax revenue. Corporate income taxes are a second source of revenue for the state, while property taxes are primarily paid to Levy County.

During the construction period, workers and their families would spend part of their income in the region on taxable items from restaurants, hotels, and retail shops, contributing to tax revenue. Their expenditures would also result in higher personal income for current residents in the region. As these residents experience an increase in earnings, they also would spend some of the increase in their disposable income on taxable goods in the region. Increased sales and use tax could result from the purchase of taxable materials and services to construct the LNP site. Sales and use tax collections from constructing the project will contribute less than 1 percent to Florida sales tax revenue. Some of this revenue will be returned to the counties to help fund local services. One additional source of sales tax revenue that would accrue to local jurisdictions is the local tourism tax. To the extent that construction workers use local hotels, they would be subject to this tax, which in Levy County is 2 percent.

PEF would pay corporate income taxes to the State of Florida once the LNP site is generating income by producing power. However, to the extent that PEF purchases goods and services in the state during the construction phase, this contributes to the earnings of other corporations. Similarly, the purchases made by the construction workforce and other households whose jobs are indirectly related to the construction activity will contribute toward corporate income.

10.3.1.9.5 Recreation

As identified in ER Section 2.2, there are no recreational areas within the LNP site; however, it has been used historically on a limited basis for hunting. Recreational opportunities such as picnicking, hiking, bicycling, fishing, wildlife viewing, horseback riding, and hunting exist on properties adjacent to the site. It is assumed that 50 percent of the construction workers will already live within the region and commute from their current homes, so no significant increase in nearby population is expected. Therefore, there will be no impact to recreational facilities as a result of additional construction workers in the vicinity.

10.3.1.9.6 Educational System

As stated in ER Subsection 4.4.2.5, constructing the LNP should not significantly increase the number of pupils in the surrounding school systems because it is anticipated that 50 percent of the workers already live in the region. However, if the number of school-aged children increases slightly, the school system would have sufficient capacity to serve them. Therefore, no impacts to the educational system are anticipated.

10.3.1.9.7 Environmental Justice

As stated in ER Subsection 4.4.3, no impacts to minority, ethnic, or special groups are anticipated as a result of the construction of the LNP. No impacts to low-income populations are anticipated as a result of the construction of the LNP.

10.3.1.10 Radiation

Per ER Section 4.5, it is anticipated that there would be no significant radiological impact on the environment or on public health and safety from the construction of the LNP.

10.3.1.11 Mitigation to Lessen Impacts

Mitigation measures designed to lessen the short-term impact of construction activities will be specific to erosion control, controlled access roads for personnel and vehicle traffic, and restricted construction zones. PEF and its contractors will comply with federal, state, and local regulations, ordinances, and BMPs. The LNP site preparation work will be completed in two stages. The first stage will consist of stripping, excavating, and backfilling the construction areas. The second stage will consist of developing the LNP site with the necessary facilities to support construction, such as construction offices, warehouses, trackwork, large unloading facilities, water wells, construction power, and construction drainage. Grading and drainage will be designed to avoid erosion during the construction period. Action will be taken to restore areas consistent with existing and natural vegetation. If necessary, temporary crushed-stone roads will be installed, along with site grading and drainage facilities. This will permit all-weather use of the LNP site for travel and storage of materials and equipment during construction. Proper mitigation, management methods, and construction erosion, sediment, and stormwater control measures implemented during construction will limit the potential water quantity and quality effects to the surface waters and groundwater.

10.3.2 OPERATIONS PREEMPTIONS AND PRODUCTIVITY

This subsection provides an evaluation of the extent to which the operation of LNP's use of the environment will preclude any options for other future use of the environment and an evaluation of the project's impact on short-term use and long-term productivity capabilities of the human environment.

10.3.2.1 Land Use

In general, direct land use impacts from operation of the LNP would include an increase in impervious surfaces (for example, parking lots, laydown areas) at the reactor sites due to the additional infrastructure. Stormwater ditches and storm sewers will be installed to collect the increased runoff.

Operation of the proposed facility will cause minimal impact to land use at the site and in the vicinity. Once the reactors cease to operate and the plant is

decommissioned to NRC standards, the land will be available for other industrial or non-industrial uses.

The operation of the new reactor units will slightly increase air emissions as a result of burning fuel for equipment. This equipment will be operated in accordance with applicable federal, state, and local regulations and will not create any measurable impacts on regional air quality. Potential impacts to land use from cooling towers are primarily related to salt drift. It is assumed that new cooling towers would produce salt concentrations similar to cooling towers at existing nuclear power plants. According to the GEIS, NUREG-1437, Volumes 1 and 2), the impact of salt drift on crops, ornamental vegetation, and native plants was evaluated for existing nuclear power plants in the GEIS, and was found to be of minor significance. In addition, the potential for fogging, icing, or drift damage may also result from a cooling tower plume. While there is the potential for minor salt drift, fogging, and icing to occur, it is expected to be of such small magnitude that no land use changes will result. Normal maintenance activities and precipitation will prevent the buildup of salt in the soil at the cooling towers. No future issues for the long-term uses of the site will result from the impacts of increased air emissions or salt deposition. Once the plant ceases to operate and is decommissioned, impacts will cease.

Additional direct impacts will be primarily associated with the makeup water system intake structure, pumphouse, and discharge structure. The discharge structure would be designed and operated in a manner to ensure dissipation of water energy so as to avoid adverse impacts to the CREC canal. Therefore, anticipated land use impacts due to operation of the discharge structure are expected to be minimal. Once the makeup water system and blowdown pipelines have been installed, operational impacts will be minimal. Impacts will be limited to maintenance of access roads and vegetation as required for maintenance and repair of the pipelines. These maintenance activities will take place on pre-existing road and pipeline corridors and are not expected to cause any significant impacts. Operation of the LNP and appurtenant facilities will cause SMALL land use impacts.

10.3.2.2 Air

Air quality impacts to workers and nearby residents from operation of the LNP and appurtenant facilities are anticipated to be negligible. The average annual exposure at the site boundary from gaseous sources will not exceed applicable regulations during normal operation. The generation of significant fossil fuel air emissions, particularly carbon dioxide is avoided by operating the LNP and forgoing construction of a comparably sized coal or gas fired plant. Additionally, it is anticipated that air emission levels at the site boundary will be insignificant, as defined by USEPA. Additional air emissions attributable to an increase in local and regional vehicular traffic during operation can be expected, but the impact on air quality is not expected to be significant or measurable in Levy County. Overall air quality impacts are anticipated to be SMALL.

10.3.2.3 Water

Operating the new reactor units will require makeup water that is withdrawn from the CFBC. After the reactors cease to operate and the units are decommissioned, water withdrawal from the canal will cease. The LNP will adhere to applicable federal, state, and local regulations and permit requirements with regard to water usage, including makeup water withdraws from the CFBC. Therefore, water use impacts are anticipated to be SMALL.

Per ER Subsection 5.2.1.4, it is anticipated that the groundwater supply would be sufficient to provide the water supply for service water tower evaporation, service water tower drift, potable water supply, raw water supply, raw water to the demineralizer, fire protection, service water strainer backwash, and media filter backwash. Use of the groundwater supply could alter the groundwater characteristics in the area. Groundwater impacts were evaluated using the SWFWMD's DWRM2 model. As described in ER Subsection 5.2.2.3, the overall impact on groundwater in the vicinity of the plant is anticipated to be SMALL.

10.3.2.4 Terrestrial and Aquatic Ecosystems

Impacts to the terrestrial ecosystems at the LNP during operation activities are associated with limited maintenance of access roads and vegetation along the pipeline and transmission line corridors. It is anticipated that surveys to monitor soil and terrestrial plant and animal communities would be conducted, as directed by the applicable agencies. Generally, data would be collected on a seasonal basis and should be sufficient to characterize seasonal variations throughout at least one cycle. Additional data may be needed on a site-specific basis, or as directed by appropriate permit requirements. Surveys may include terrestrial field investigations and surveys for terrestrial flora and fauna, sensitive habitat and species of interest. Therefore, impacts on terrestrial wildlife and habitat are anticipated to be SMALL.

Impacts on the CFBC aquatic ecology from those organisms impinged and entrained into the LNP CWIS are projected to be minimal due to compliance with the 316(b) component of the NPDES permit. It is anticipated that specific monitoring requirements would be designed to minimize adverse environmental impacts and to ensure that organisms will be protected against the cooling water intake structures. An aquatic monitoring program would be developed to support and satisfy various environmental regulations, licenses, and permits associated with operation of the LNP. Water quality would be monitored at the locations expected to be impacted by operation of the LNP site including the makeup water system pipeline outfall. Impacts on aquatic ecology are anticipated to be SMALL due to implementation of operational controls and monitoring. Impacts to aquatic ecology from transmission system maintenance are anticipated to be SMALL.

10.3.2.5 Noise

Equipment used for operation of the LNP will follow applicable federal, state, and local noise control regulations. Noise control devices will be used on equipment

that exceeds noise abatement criteria. Equipment manufacturers will be required to guarantee that specifications on allowable octave bands will be met. Most equipment will be located inside structures; therefore, building walls will reduce outside noise levels. Further, reduction in noise impacts will be achieved as noise travels out towards the property line. It is anticipated that noise impacts would be SMALL.

10.3.2.6 Transmission

It is anticipated that PEF would acquire transmission line right-of-ways (ROWs) (either by outright purchase of the land, easements, or permits) that would allow access and control over how the land in the transmission corridor is managed. PEF would ensure that land use in the corridors and underneath the high-voltage lines is compatible with the reliable transmission of electricity. Vegetation communities in these corridors would be kept at an early successional stage by maintenance activities, such as mechanical clearing, hand cutting, and herbicide application. PEF's control and management of these ROWs would preclude residential and industrial use of the transmission corridors. PEF would establish transmission vegetation management and line maintenance procedures that would be used to maintain the new corridors and transmission lines. Therefore, impacts to land use in transmission corridors would be SMALL and not require mitigation.

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

Routine inspections of the ROW would be conducted periodically to monitor vegetation growth, ROW contractor effectiveness, and encroachments within the ROW. Maintenance and repair inspections required by cause, such as storms that may down timber on or near the lines, will be as required by the circumstances. These occurrences are expected to be few, and will have limited impact on the land.

10.3.2.7 Cultural Resources

There are no known historic properties on the LNP site or associated facilities. It is unlikely that unidentified resources would be found on the LNP site during facility operation. During post-construction operation, land disturbance activities would cease in the vicinity of an inadvertent cultural resource discovery and the Florida SHPO would be notified. It is anticipated that no historic properties will be affected by the operation of the LNP site and associated facilities; therefore, adverse impacts are anticipated to be SMALL.

10.3.2.8 Socioeconomic

Socioeconomic operation-related impacts are described in the subsections below.

10.3.2.8.1 Transportation

As indicated in ER Subsection 5.8.2.8, roads and highways in the vicinity of the LNP would not be significantly impacted by operation activities. Because it is expected that most of the operational workers already live within the 80-kilometer (km) (50-mile [mi.]) radius of the plant site, traffic would be divided over the primary access routes. It is anticipated that approximately 773 people will be needed to operate the LNP (with an additional 800 workers needed every 18 months for 25 to 30 days to refuel the facility). Therefore, it is estimated that at the operations stage, the project will attract 1840 daily trip ends associated with operations traffic.

The increased traffic volumes on area roads would generate SMALL impacts. Some limited congestion problems may occur as vehicles enter and exit the LNP site when work shifts begin and end.

10.3.2.8.2 Aesthetics

The LNP will discharge two cooling tower plumes. Because the surrounding land is primarily undeveloped, rural, and wooded, the plumes are blocked from view and are not visible from nearby roads in many areas. The operation of the LNP will have a SMALL impact on visual aesthetics for nearby residences and recreational areas; no mitigation will be required.

10.3.2.8.3 Labor

As discussed in ER Subsection 5.8.2, the operation workforce for the LNP will consist of approximately 773 employees (with an additional 800 workers needed every 18 months for 25 to 30 days to refuel the facility). It is assumed that the majority of these workers would come from the surrounding area. However, a small proportion of these workers with specialized skills may relocate to the area to work at the site. It is assumed that these workers will bring families that would settle in the surrounding area. However, the overall population increase will be SMALL in relation to the existing population in the region. In addition, the communities surrounding the LNP site will not experience any physical impact from station operation. No impacts to structures, including residences near the plant site or vicinity, are anticipated. No significant impacts to hospitals or other institutional facilities are anticipated.

The direct operations jobs, as well as the indirect and induced jobs, would likely benefit the three counties closest to the LNP (Levy, Marion, Citrus). Operation of the LNP would help provide a consistent and long-term source of employment for the region. It is anticipated that the LNP would contribute over 10 percent to the region's transportation and utility sector's earnings, but less than 1 percent of

total earnings within the region. However, assuming that a majority of the workforce will live in Levy, Marion, and Citrus counties, this area will receive a stronger positive benefit related to increased earnings.

10.3.2.8.4 Tax Revenue and Economic Characteristics

Similar to the tax impacts from construction of the LNP, several sources of tax revenue and public expenditure are tied to the operation of the LNP. These include sales taxes, property taxes, and corporate income taxes.

Sales taxes will be levied on materials purchased during operation of the LNP, as well as on goods and services purchased by workers. Sales taxes on such purchases will be beneficial impact to the local economy. Similarly, there may be direct and indirect beneficial economic impacts from sales tax revenue generated from goods and services purchased by workers who do not currently work in the region.

The LNP will increase the property value of the site and thus, increase property tax collections in Levy County. Levy County property tax collections on the LNP property are estimated to be approximately $63 million a year with one unit in operation and approximately $104 million a year when both units are operating.

PEF will pay corporate income taxes of approximately 5.5 percent of its net state income. However, these payments will be made at the corporate entity level and will be paid to the State of Florida, which extends beyond the 80-km (50-mi.) region.

Operation of the LNP will have a SMALL beneficial impact on the economic productivity of the region. Property tax revenue generated from the operation of the LNP will have a LARGE beneficial economic impact on Levy County.

10.3.2.8.5 Recreation

The workforce for the proposed project is expected to already live in the area. Therefore, no additional increase in recreational activities in the surrounding areas is expected as a result of the operation of the LNP and appurtenant structures and facilities. No impacts to recreation opportunities in the surrounding area are anticipated from the operation of the LNP.

10.3.2.8.6 Education

It is assumed that the operation of the LNP will not result in a significant increase in school-age population in the surrounding area. It is anticipated that there is sufficient capacity for a small increase in population anticipated as a result of the proposed project. No impacts to the educational system are anticipated as a result of increased operational workforce.

10.3.2.8.7 Environmental Justice

Operation of the new facilities will comply with federal, state, and local regulations. Therefore, no disproportionately high or adverse impacts on minority and low income populations are anticipated as a result of operation of the LNP.

10.3.2.8.8 Public Facilities

It is anticipated that existing public facilities will be able to absorb the minor increase in load due to the small influx of people expected. It is anticipated that there is sufficient capacity in the local water and wastewater supply facilities to accommodate a potential increase in population in the region. No impacts to public services and facilities are anticipated as a result of the additional operational workforce.

Current public services and facilities are sufficient to absorb any incremental growth associated with a small workforce in-migration. It is anticipated that local emergency management agencies have emergency response plans in place for responding to emergency situations. Therefore, operation of the new facilities will have negligible impacts on the public and security services.

10.3.2.9 Radiation

Impacts to humans, biota, air, or water resources due to radiological emissions will be small, since the operation of the units will be in accordance with federal and state regulations. Radiological emissions will not contaminate the LNP property or surrounding land. Once the plant ceases to operate and is decommissioned, radiological releases will cease.

There is the possibility of a major nuclear accident, although the probability is very remote. Because the probability of such an event is so small, the overall risk of a nuclear accident is likewise so small as not to constitute a potentially significant impact upon the human environment. However, the long-term environmental impacts could be severe if an accident did occur.

The construction and the operation of the LNP would contribute to the long-term cumulative depletion of the global uranium supply. Over the long term, the spent fuel must be managed as a high-level radioactive waste, and either reprocessed or isolated from the biosphere for thousands or tens of thousands of years. This represents a long-term commitment of the contaminated waste disposal/repository area.

10.3.2.10 Mitigation to Lessen Impacts

PEF employees and its contractors will comply with federal, state, and local regulations, ordinances, and BMPs to mitigate and lessen potential impacts associated with the operation of the LNP.

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

The construction and operation of the LNP and appurtenant infrastructure and facilities results in a commitment of land use. In the short term, the project results in some potential loss of natural habitats and woodlands. Construction and operation of the LNP does not necessarily represent a long-term loss as the land might be released for other uses or returned to its natural state after the reactors are decommissioned.

Construction and operation of the LNP and appurtenant infrastructure disrupts or destroys some flora and fauna on and near the LNP and in the area of the appurtenant infrastructure. However, no significant effect to species or habitats is expected to occur. After construction, some flora and fauna may recover in areas that are no longer affected by construction activities or plant operations. The impacts to biota and habitat are relatively small. Operation of the LNP does not result in any significant long-term detrimental disturbance to biota or their habitats.

The energy used in constructing the LNP and appurtenant infrastructure results in facilities that produce a net increase of electrical power for a period of 40 years. The use of materials in constructing the LNP is also critical to the goal of producing a clean and reliable supply of electrical power. A relatively modest quantity of cooling water is lost through evaporation and drift. In the long term, construction and operation of the LNP contribute to the cumulative long-term irreversible use of materials, energy, and water used in the construction and operation of the facility. However, the new reactors provide far more energy than is consumed in their construction.

The project stimulates economic growth and productivity in the local area. Revenue derived from this project may fund increased infrastructure and social services. In the long term, property taxes paid by PEF and wages spent by the LNP operational staff may inject significant revenues into the local economy that have long-lasting economic growth and development effects that may continue after the LNP is decommissioned.

The radioactively contaminated reactor vessel and equipment are required for the short-term production of nuclear energy using uranium, which provides a short-term supply of relatively clean energy. The construction and operation of the LNP contributes to the long-term cumulative depletion of the global uranium supply. Over the long term, the spent fuel must be managed as a high-level radioactive waste, and either reprocessed or isolated from the biosphere for thousands or tens of thousands of years. This represents a long-term commitment of the contaminated waste disposal/repository area.

In conclusion, the effects resulting from the construction and operation of the LNP would result in some adverse short-term effects. The principal short-term benefit is the production of electrical energy. In addition, the economic benefit of the LNP site and the associated workforce is large compared with the economic

benefit from agriculture or other likely uses for the site. The negative aspects of facility construction and operation, as they affect the human environment, are outweighed by the positive enhancement of regional productivity through the generation of electrical energy, creation of jobs, and stimulation of the local economy. Construction and operation of the LNP does not necessarily represent a long-term loss as the land might be released for other uses or returned to its natural state after the reactors are decommissioned. Therefore, there would be no long-term adverse impacts to the site because of restoration of the site during decommissioning.

10.3.4 REFERENCES

10.3-001 California Energy Commission, “Avian Collision and Electrocution: An Annotated Bibliography,” P700-95-001, October 1995.

10.3-002 Federal Highway Administration, “Special Report: Highway Construction Noise: Measurement, Prediction, and Mitigation,” Website, www.fhwa.dot.gov/environment/noise/highway/index.htm, accessed March 7, 2008.

10.3-003 Minnesota Pollution Control Agency, “A Guide to Noise Control in Minnesota: Acoustical Properties, Measurement, Analysis, Regulation,” revised March 1999.

10.4 BENEFIT-COST BALANCE

In accordance with NUREG-1555, ESRP 10.4, this section describes the benefit-cost balance of the project. ER Subsection 10.4.1 describes the project benefits, ER Subsection 10.4.2 discusses the project costs, and ER Subsection 10.4.3 provides a benefit-cost balance summary.

10.4.1 BENEFITS

Per guidance provided in NUREG-1555, Rev. 1, ESRP 10.4.1, this subsection discusses the benefits resulting from the proposed construction and operation of the project. Information provided in this subsection includes the following:

- A summary of the net electrical generating benefits of the proposed plant.
- A summary of the average annual production of other commercial products.
- A summary of the expected annual tax payments to local and State governments (1) for the construction period and (2) during plant operation.
- A summary of the incremental increase in regional productivity (1) during the construction period and (2) during the operation period or during the renewal period).
- A summary of those technical (e.g., technology development) and nonmonetary benefits (e.g., new recreational facilities.

Table 10.4-1 summarizes the benefits of the proposed construction and operation of the LNP, including the following:

- The identification of appropriate plant production benefits.
- The 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 (for example, reduced dependence on scarce fossil fuels).
- The quantification of benefits in monetary or other appropriate terms.

- The evaluation of the significance of the benefits on a political boundary or regional basis.

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

10.4.1.1 Need for Power

This subsection summarizes the need for power in Florida. A detailed discussion on the need for power is provided in ER Section 8.4. The need for power in Florida is based on PEF's Ten-Year Site Plan (TYSP) and an Integrated Resource Plan (IRP). PEF's TYSP is an annual report of its resource plan containing a 10-year forecast of loads and generating capacity. The report process accounts for conservation, load management, and other demand-side options along with new utility-owned generating plants, non-utility generation, and other supply-side options in order to identify the resource plan that will be most cost-effective for the ratepayers consistent with the provision of adequate, reliable service.

A summary of the findings of the TYSP indicate that PEF's need for power is based on the following:

- Florida has a well-defined, systematic, and comprehensive resource-planning program that adequately reviews resources and growing demand for additional baseload, eliminating the need for additional NRC review.

- Within PEF's service territory, 2184 megawatts (MW) for summer net capacity and 2240 MW for winter net capacity are identified as "planned, prospective, or committed project" (see Tables 8.1-6 and 8.1-7). These planned additions for 2016 and 2017 will need to be baseload capacity.

- The Florida Public Service Commission (FPSC) has concluded that there is a need for new baseload capacity, and this conclusion has been given "great weight" in this ER, as allowed by NUREG-1555.

- The IRP process gives NRC the assurance that the need for power is real and that the benefits of satisfying that need would be realized.

- The growing demand for new capacity shows benefits to be derived from the LNP.

- Given concerns in Florida and the rest of the south about climate change and carbon emissions, the LNP will serve another important need by reducing carbon emissions in the state. The LNP will displace significant amounts of carbon as soon as the plant becomes operational, as compared to a coal-fired generating plant.

10.4.1.2 Energy Alternatives

The following paragraphs provide a summary of the evaluation that was conducted in ER Section 9.2 to determine a suitable electric generating power source to meet the demand for new power in Florida. 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 and demand-side management (DSM), reactivating or extending the service life of existing plants within the power system, and purchasing electric power from other sources.

The analysis determined that DSM is not a feasible alternative and that extending the service life of existing plants or reactivating old plants and/or purchasing power from other utilities or power generators also are not feasible alternatives. The analysis determined that a coal-fired and a gas-fired facility would entail a significantly greater environmental impact on air quality than would a new nuclear plant. 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 equivalent or greater environmental impacts, higher costs, and larger land requirements than a new nuclear facility. Based on environmental impacts and economics, PEF has concluded that nuclear power is a suitable electric generating power source.

10.4.1.3 Alternative Locations for the Proposed Facility

The following paragraphs provide a summary of the evaluation that was conducted in ER Section 9.3 that identified a preferred location for the new nuclear power facility. The objective of the evaluation was to verify that no obviously superior location for the site of a new nuclear unit exists. The decision to choose a new nuclear facility site was based on market factors and a comparison of alternative sites chosen from within PEF's identified Region of Interest (ROI). The alternative sites are located in Florida and include the LNP site in Levy County, the Crystal River site in Citrus County, the Dixie County site, the Highlands County site, and the Putnam County site. The sites were evaluated based on potential impacts to land use, air quality, water quality, terrestrial and aquatic ecology, sensitive species, demographics, and historic, cultural, and archeological resources.

As discussed in ER Section 9.3, the LNP was selected as the proposed site for the PEF Combined License Application (COLA) based on the following site characteristics:

- Transmission system direct connect and upgrade costs lower than those for the Dixie, Highlands, and Putnam sites.

- Significant strategic reliability advantages over Crystal River, both with respect to storm surge flooding and the potential for single weather event outages.
- Geotechnical conditions that allow design of facility foundations that will support deployment of a certified design without a requirement for deep foundations.
- Ecological conditions similar to those at other alternative sites.
- Adequate water supply (from the Gulf of Mexico through the CFBC), without impacting riverine surface water resources.

Although many of the above characteristics also apply to Crystal River, the severe potential impact of single-event weather-related outages if all units were placed at the Crystal River site drives the decision to select the LNP site over the Crystal River site. The significant additional reliability inherent in developing a nuclear plant at LNP, rather than at Crystal River, is the primary reason for selecting LNP as the preferred site for preparation of the PEF COLA in Florida. Finally, no alternative sites are environmentally preferable and, therefore, cannot be considered obviously superior to the LNP site.

10.4.1.4 Benefits of the Proposed Facility

10.4.1.4.1 Tax Payments

As discussed in ER Subsection 4.4.2.2, construction-related activities will generate sales tax revenue. Corporate income taxes are a second source of revenue for the state, while property taxes are primarily paid to Levy County.

During the construction period, workers and their families will spend part of their income in the region on taxable items from restaurants, hotels, and retail shops, contributing to tax revenue. Their expenditures will also result in higher personal income for current residents in the region. As these residents experience an increase in earnings, they also will spend some of the increase in their disposable income on taxable goods in the region. Increased sales and use tax could result from the purchase of taxable materials and services to construct the LNP site. Sales and use tax collections from constructing the project will contribute less than 1 percent to Florida sales tax revenue. Some of this revenue will be returned to the counties to help fund local services. One additional source of sales tax revenue that would accrue to local jurisdictions is the local tourism tax. To the extent that construction workers use local hotels, they would be subject to this tax, which in Levy County is 2 percent.

PEF will pay corporate income taxes to the state of Florida once the LNP site is generating income by producing power. However, to the extent that PEF purchases goods and services in the state during the construction phase, this contributes to the earnings of other corporations. Similarly, the purchases made

by the construction workforce and other households whose jobs are indirectly related to the construction activity will contribute toward corporate income. Construction of the LNP will have a SMALL beneficial economic impact to the region.

As discussed in ER Subsection 5.8.2, several sources of tax revenue and public expenditure are tied to the operation of the LNP. These include sales taxes, property taxes, and corporate income taxes. Sales taxes will be levied on materials purchased during operation of the LNP as well as on goods and services purchased by workers. Sales taxes on such purchases will be beneficial impact to the local economy. Similarly, there may be direct and indirect beneficial economic impacts from sales tax revenue generated from goods and services purchased by workers who do not currently work in the region. The LNP will increase the property value of the site and thus, increase property tax collections in Levy County. Levy County property tax collections on the LNP property are estimated to be approximately $63 million a year with one unit in operation and approximately $104 million a year when both units are operating. PEF will pay corporate income taxes of approximately 5.5 percent of its net state income. However, these payments will be made at the corporate entity level and will be paid to the State of Florida, which extends beyond the 80-km (50-mi.) region. Operation of the LNP would afford a SMALL beneficial economic impact to the region. Operation of the LNP would provide a LARGE beneficial economic impact to Levy County through PEF annual property tax revenue. 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.

10.4.1.4.2 Local and State Economy

As discussed in ER Subsection 4.4.2, economic impacts of construction first consider the total (that is, direct, indirect, and induced) contribution of constructing the LNP to regional employment, income (that is, wages and salaries, proprietors' [business owners'] income, and other income) and output. Second, the construction activity is placed in the context of the larger economy to evaluate the significance of the net contribution to the regional economy.

PEF estimates a total escalated construction cost of $16.6 billion, which includes the cost of constructing LNP 1 ($5.6 billion), LNP 2 ($3.7 billion), and the transmission corridors ($2.5 billion), as well as the cost of financing. With a peak construction workforce of approximately 2700 workers, an estimate of $62 million in peak earnings will be generated from construction. Along with direct earnings, there will be additional indirect earnings over the construction period through an earnings multiplier for construction of 1.57. Therefore, the total earnings will increase to $97.3 million ($62 million multiplied by 1.57) during the peak construction year. The earnings will be lower in the nonpeak years. Overall, the peak year of construction will contribute less than 1 percent in earnings to the region.

In addition to jobs and earnings, the construction of the LNP will contribute positively to the regional economy through purchases of capital and materials that are produced in the region. It is assumed that 10 percent of the total construction costs, or $930 million over the 6-year construction period, will be for local expenditures. Based on this assumption, direct local construction expenditures will average $155 million per year ($930 million divided by 6 years) over the 6-year construction period. These direct expenditures will tend to be distributed over the eight counties in the region in rough proportion to the sizes of their existing economies. In addition to the direct expenditures, the local economy will benefit from increased indirect expenditures as a result of an output multiplier of 1.7. Therefore, on average for each of the 6 years of construction, the total increase in local output will be $263 million. Based on this information, a temporary, SMALL beneficial economic impact to the region is expected because of the increased employment of regional construction workforce and earnings, and the purchase of local goods and services.

As discussed in ER Subsection 5.8.2, the operation workforce for the LNP will consist of approximately 773 employees (with an additional 800 workers needed every 18 months for 25 to 30 days to refuel the facility). It is assumed that the majority of these workers will come from the surrounding area. However, a small proportion of these workers with specialized skills may relocate to the area to work at the site.

Construction and operation workers are expected to live and spend most of their salaries within the local area and surrounding region. In addition, these workers are likely to spend some portion of their salaries in the local area for gasoline, beverages, food, and incidental items. Because construction workers will be at this location for some time, there will be a small multiplier effect where money is spent and re-spent in the local area and later in the region. By patronizing local retail and service sector businesses, construction workers may temporarily increase sales. The economic multiplier effect is one way of measuring secondary effects and means that every dollar spent by nuclear plants results in the creation of an additional $1.13 in the community (Reference 10.4-001).

Construction worker spending may have positive temporary direct and indirect impacts on the business community, sustaining existing businesses in the area and the region, while potentially providing opportunities for some new businesses. As a result, unemployment levels in the region may temporarily decrease, providing an additional indirect beneficial economic impact. The direct operations jobs, as well as the indirect and induced jobs, will likely provide a SMALL economic benefit the three counties closest to the LNP (Levy, Marion, Citrus). Operation of the LNP would help provide a consistent and long-term source of employment for the region. It is anticipated that the LNP will contribute over 10 percent to the region's transportation and utility sector's earnings, but less than 1 percent of total earnings within the region. However, assuming that a majority of the workforce will live in Levy, Marion, and Citrus counties, this area will receive a stronger positive benefit related to increased earnings.

10.4.1.4.3 Non-Monetary Benefits

10.4.1.4.3.1 Regional Productivity

As discussed in ER Sections 4.4 and 5.8, construction of the proposed facility is anticipated to require approximately 2700 workers, while operation of both of the new reactor units would require approximately 773 employees. Construction workers are expected to live and spend most of their salaries within the region. In addition, these workers are likely to spend some portion of their salaries in the local area for gasoline, beverages, food, and incidental items. Because construction workers will be at this location for some time, there will be a small multiplier effect where money is spent and re-spent in the local area and later in the region. By patronizing local retail and service-sector businesses, construction workers may temporarily increase sales. Construction worker spending may have positive temporary direct and indirect effects on the business community, sustaining existing businesses in the area and the region, while potentially providing opportunities for some new businesses. As a result, unemployment levels in the region may temporarily decrease, providing an additional indirect beneficial economic impact. Operation of the plant is anticipated to require both direct and indirect jobs that will add permanent new jobs to the region.

10.4.1.4.4 Net Electrical Generating Benefits

As described in ER Chapter 8, there is a growing baseload demand in PEF's service territory. As presented in Table 3.2-1, the proposed AP1000 reactors for the LNP have a rated core thermal power of 3415 megawatts thermal (MWt) with an associated core power of 3400 megawatts thermal (MWt) and a rated net electrical output of greater than or equal to 1000 MWe. The NRC will initially license the LNP to operate for a term not to exceed 40 years. PEF may apply for license renewal for LNP 1 and LNP 2, which would extend their 40-year operation by an additional 20 years or until 2076 and 2077. At the end of the operation of the LNP, additional work and resulting benefits would occur during the shutdown and decommissioning of the plant. These new units provide a benefit by meeting the growing industrial, commercial, and residential need for additional electrical power.

10.4.1.4.5 Air Pollution and Emissions Avoidance

As discussed in ER Chapter 8 and Section 9.2, power generation facilities that utilize natural gas and coal for electrical generation produce significant air pollutant emissions (for example, nitrogen oxides, sulphur dioxide, and carbon dioxide) or methyl mercury that adversely affect human health. Nuclear power generation results in significant local and national air quality benefits. Nuclear reactors have the added benefit that they do not contribute to smog.

Given concerns in the state about climate change and carbon emissions, the LNP serves an important environmental benefit need by reducing carbon emissions in the state. When the plant becomes operational, the LNP will add needed power in state without depleting significant amounts of finite fossil fuels

and generating significant amounts of air pollutant emissions, compared to a coal-fired generating plant.

10.4.2 COSTS

Per guidance provided in NUREG-1555, Rev. 1, ESRP 10.4.2, this subsection summarizes construction and operation costs that are predicted for the proposed project. Table 10.4-1 summarizes the costs of the proposed construction and operation of the LNP including the following:

- A summary of the estimated impacts of construction.
- A summary of the estimated impacts of operation.
- A summary of the estimated costs of alternative modifications and additions to the site preparation and construction monitoring programs and preoperational monitoring programs, if any.
- A summary of the environmental impacts of postulated accidents.
- A summary of the estimated construction and operating costs of any alternative plant and transmission systems deemed to be preferable by the staff.
- A summary of the estimated costs associated with the staff analysis of the relationship between short-term uses and long-term productivity.
- A summary of the estimated costs associated with any irreversible and irretrievable commitments of resources.

10.4.2.1 Internal Costs

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

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

- Organization for Economic Co-operation and Development (OECD) study of projected electricity generating costs (Reference 10.4-002).
- University of Chicago (UC) study on the economic future of nuclear power (Reference 10.4-003).

- Massachusetts Institute of Technology (MIT) study on the future of nuclear power (Reference 10.4-004).

- Energy Information Administration (EIA) annual energy outlook (Reference 10.4-005).

The four economic studies identified above provide sufficient economic information to assess and predict costs of the proposed project. By conducting a systematic review of the economics of nuclear power, the studies were able to generate a financial model that estimated the costs of new nuclear plants coming on line 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 fuel price changes, and the potential economic impact of greenhouse gas control policies and technology.

- An analysis of several federal financing policy alternatives designed to make nuclear power competitive in the future.

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

10.4.2.2 Monetary – Construction

In evaluating the LNP nuclear facility monetary cost, a review of published literature, vendor information, internally generated general/site-specific information, and the four studies identified above was conducted. The phrase commonly used to describe the monetary cost of constructing large capital projects such as 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. Overnight costs are exclusive of interest and include engineering, procurement, and construction costs, owner’s costs, and contingencies.

The four studies identified in ER Subsection 10.4.2.1 estimate overnight capital costs that range from $1100 per kilowatt (kW) to $2300 per kW, with $1500 to $2000 per 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 units built, allocation of first-of-a-kind costs, site location

and parity adjustments to allow comparison between countries, and allowances for contingencies. The estimates are not based on nuclear plant construction experience in this country, which is more than 20 years old. Actual construction costs overseas have been less than most recent domestic construction, suggesting that the industry has learned from the domestic experience. There is an assumption that the overseas experience can be applied domestically, and the studies have found the overseas experience to be most applicable to estimating the cost of the new domestic nuclear plant construction.

The four studies identified in ER Subsection 10.4.2.1 tend to support $2000 per kW as a reasonable high-end overnight capital cost estimate. The $2300 value presented above is based on construction in Japan (Reference 10.4-002). While no explanation is offered as to why this 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 purposes of analysis in this ER, to avoid understating the cost, $2000 per kW value was chosen. The $2000/kW cost is also selected due to the rising cost of construction material, such as cement, steel, and copper. According to Table 3.2-1, it is anticipated that the two new units for LNP will each be rated at a nuclear steam supply system power of 3415 MWt, with an associated core power of 3400 MWt and a rated net electrical output of greater than or equal to 1000 MWe. As identified in ER Subsection 4.4.2, PEF estimates a total escalated construction cost of $16.6 billion which includes the cost of constructing LNP 1 ($5.6 billion), LNP 2 ($3.7 billion), and the transmission corridors ($2.5 billion), as well as the cost of financing.

10.4.2.3 Monetary – Operation

Operational costs for power 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 a third of the levelized cost, and interest costs on the overnight costs account for another 25 percent (Reference 10.4-003). The four studies identified in ER Subsection 10.4.2.1 show a wide range of operation cost estimates. Levelized cost of electricity estimates range from $36 to $83 per megawatt hour (MWh) (3.6 to 8.3 cents per kWh). Factors affecting the range include choices for discount rate, construction duration, plant life span, capacity factor, cost of debt and equity and split between debt and equity financing, depreciation time, tax rates, and premium for uncertainty. 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. According to the UC study, the projected cost associated with operating a new nuclear facility (similar to the size of the LNP) is in the range of $31 to $46 per MWh ($0.031 to $0.046 cents per kWh) (Reference 10.4-003). PEF indicated in a February 6, 2008 news release that nuclear energy has the lowest production costs of any major source of electricity, including coal and natural gas-fired power plants. The nuclear industry's average production – encompassing fuel, operations, and maintenance – set a record low in 2007 of 1.68 cents per kWh.

In addition to nuclear plant costs, the four studies provide coal- and gas-fired generation costs for comparison. One study showed nuclear costs competitive with coal and gas (Reference 10.4-002). 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 that the government could take to improve nuclear economic viability (Reference 10.4-004). Since the study was issued, the government has undertaken the following steps to improve economic viability of nuclear energy:

- The DOE has provided financial support for plants testing the NRC licensing processes for early site permits and combined operating licenses.
- The United States 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 on line in the United States.

During a speech on August 8, 2005 at Sandia National Laboratories/New Mexico in Albuquerque, New Mexico, President Bush made the following statement regarding the signing of the Energy Policy Act of 2005:

> Nuclear power is another of America's most important sources of electricity. Of all our nation's energy sources, only nuclear power plants can generate massive amounts of electricity without emitting an ounce of air pollution or greenhouse gases. And thanks to the advances in science and technology, nuclear plants are far safer than ever before. Yet America has not ordered a nuclear plant since the 1970s. To coordinate the ordering of new plants, the bill I sign today continues the Nuclear Power 2010 Partnership between government and industry. It also offers a new form of federal risk insurance for the first six builders of new nuclear power plants. With the practical steps in this bill, America is moving closer to a vital national goal. We will start building nuclear power plants again by the end of this decade. (Reference 10.4–006)

PEF has concluded that the government's steps have negated the MIT study conclusion that new nuclear power is not economically competitive.

The federal Energy Policy Act of 2005 (EPAct 2005), signed into law August 2005, provided the nuclear industry with a variety of financial incentives for new nuclear power plants. One of the incentives in the EPAct 2005 is the authorization of an 8-year production tax credit of 1.8 cents per kWh for up to 6000 MW of capacity from new, qualified advanced nuclear power facilities. The credit is further limited to $125 million annually per thousand MW of capacity allocated to the facility. To qualify for the credit, a facility must be of a design first approved by the NRC after 1993 and facilities must be newly in service prior to January 1, 2021 (Reference 10.4-007).

The EPAct 2005 provides an innovative form of insurance for the first six reactors while the new process is being tested. The federal government, specifically the DOE, will provide insurance policies to cover debt service for the first six new plants ($500 million for the first two plants; $250 million for the next four) if commercial operation is delayed for reasons beyond the company's control, such as litigation or a failure by the NRC to meet license review schedules. (Reference 10.4-007) Specifically, the EPAct 2005 authorizes the DOE to develop the Nuclear Power 2010 program to encourage new nuclear power plants (Reference 10.4-007). It is a cost-share program with industry to reduce the uncertainty in the decision-making process for building new nuclear power plants.

PEF considers this project economically viable and expects to continue with licensing and construction of the LNP regardless of the project's eligibility for financial incentives available through the EPAct 2005.

In addition to the financial incentives discussed above, the EPAct 2005 provides for the following additional financial incentives for new nuclear power plants (Reference 10.4-007):

- Loan guarantees for up to 80 percent of project costs for advanced nuclear energy facilities.
- Extended Price-Anderson Act protection until December 31, 2025, which establishes an insurance system for nuclear plants in the case of accidents.
- A total of $1.25 billion for fiscal 2006 through 2015 for a prototype next-generation nuclear power plant at the Idaho National Laboratory that will produce both electricity and hydrogen.
- An advanced fuel recycling technology, research, development and demonstration program for proliferation-resistant fuel recycling and transmutation technologies.

10.4.2.4 External Costs

External costs are the non-monetary environmental and social costs of constructing and operating the LNP. External costs can include the costs of impacts from loss of wildlife habitat, loss of land, hydrological, and water uses, terrestrial and aquatic biology impacts, and socioeconomic impacts.

10.4.2.4.1 Land Use

Loss of habitat is one of the costs of constructing the new nuclear reactor units and appurtenant structures. The current land use designation for the proposed LNP is forestry/rural residential. As discussed in ER Sections 4.1 and 5.1, locating the new reactors on the LNP property is expected to realize SMALL adverse impacts. Appropriate BMPs will be implemented to minimize the potential for land use impacts including erosion and sedimentation.

10.4.2.4.2 Hydrological and Water Use

There are costs associated with providing water for various needs during construction and operation of the new facilities. As presented in Table 3.3-2, the consumptive water use for the LNP is approximately 2.3 m^3/s (81.4 ft^3/sec) or 30,427 gpm, and consumptive water use from service water cooling tower evaporation is 0.08 m^3/s (2.8 ft^3/sec) or 1248 gpm. Water consumption for fuel cycle activities would require approximately 43,067 million L (11,377 million gal.) of water (Table 10.1-2). A portion of the cooling water is lost to evaporation, and therefore, represents a permanent consumptive loss. Hydrological and water use impacts are anticipated to be SMALL.

10.4.2.4.3 Terrestrial and Aquatic Biology

Some costs associated with loss of wildlife, other species, and their habitats during construction are anticipated. These potential losses are not expected to be large enough to affect the long-term stability of wildlife populations in the area. Construction of the new intake structure and pumphouse is anticipated to result in a SMALL and temporary disruption of the aquatic environment.

10.4.2.4.4 Air Emissions

Relatively small amounts of air emissions from diesel generators and vehicles are generated during construction and operation of the facilities. Cooling tower drift deposits salt on the surrounding vicinity, but the levels are not likely to result in any measurable impact on vegetation. Air emission impacts are anticipated to be SMALL.

10.4.2.4.5 Radioactive Emissions, Effluents, and Wastes

Minor radioactive air emissions are released into the atmosphere and back into the discharge receiving water. Low-level and high-level radioactive wastes are generated and need to be disposed of according to local, state, and federal permitting regulations. Overall radioactive emissions, effluents and waste impacts are anticipated to be SMALL.

10.4.2.4.6 Socioeconomic

It is anticipated that the region affords necessary infrastructure and services to meet the demands of the construction and operation workforce. If additional infrastructure and services are needed to meet the demands of the people moving into the area to support the construction and operation of the new facility, these costs should be offset by the LARGE beneficial increased tax revenues to the local economy and the overall SMALL beneficial economic input to the region from those individuals and families.

10.4.3 SUMMARY

Per guidance provided in NUREG-1555, Rev. 1, ESRP 10.4.1, Table 10.4-1 summarizes the benefits and costs of the proposed project. The table also provides information regarding select mitigation measures for potential impacts. Costs that are environmental impacts are those anticipated after proposed mitigation measures are implemented. The costs of mitigation are not easily determined at this time. It is anticipated that mitigation would be built into the project design (for example, scheduling to ensure construction is completed in the shortest possible time, using construction BMPs to limit erosion, fugitive dust, runoff, spills, and air emissions, providing first aid stations at the construction site). Relying on early and frequent communication between PEF and the affected communities will help to minimize cost and ensure effective management of the proposed project.

The important conclusions from Table 10.4-1 can be summarized as follows:

- The new plant will provide more than 1000 MWe from each unit that will help meet the growing power demand in PEF's service territory.
- There will be a large beneficial impact to the local economy through the creation of jobs and from tax revenue.
- The cooling tower design will minimize aesthetic impacts from the project.
- Due to previous land use and disturbance on the site, there will be limited impact to ecological receptors.
- The cost of the LNP and associated transmission lines is estimated to be 16.6 billion, which includes the cost of constructing LNP 1 ($5.6 billion), LNP 2 ($3.7 billion), and the transmission corridors ($2.5 billion), as well as the financing costs.
- Consumptive water use will be 2.3 m^3/s during operation of the new units, but NPDES permit conditions will be required and monitored.
- The CFBC provides an adequate source of cooling water for the plant.
- Discharge to the Gulf will occur at the existing CREC.
- Wetland impacts will occur on the site, but impacts will be minimized and mitigated as required by permit conditions.
- Impacts on traffic and infrastructure will be localized and limited in nature.

In summary, there is a growing baseload demand and growing baseload supply shortfall in the region of interest. PEF evaluated several energy alternatives with nuclear power being the choice to meet the energy demands in the region. PEF determined that the new nuclear facility should be located in Levy County,

Florida. The LNP will result in a reduction in emissions with respect to comparably-sized coal- or gas-fired alternative power generating facilities. While the additional direct and indirect creation of jobs for the construction and operation of the new facility may place a temporary burden on local services and infrastructures, the annual taxes and revenue generated by the new workers contributes to the local economy and the region's productivity.

The need for additional power is clearly documented in PEF's service territory. The careful evaluation of alternative sites and the planning associated with the LNP site have resulted in a location for the new plant that will meet power needs and minimize environmental and socioeconomic impacts. While some impact to local land use and habitat will occur, a large economic benefit will be realized by local economies in the form of long-term tax revenue and job growth. Overall, the benefits of the plant outweigh the costs associated with construction and operation.

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

10.4.4 REFERENCES

10.4-001 Southern States Energy Board, "Nuclear Energy: Cornerstone of Southern Living, Today and Tomorrow," July 2006.

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10.4-005 U.S. Department of Energy/Energy Information Administration, *Annual Energy Outlook 2004 With Projections to 2025*, DOE/EIA-0383(2004), January 2004.

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Table 10.4-1 (Sheet 1 of 16)
Summary of the Benefits and Costs of the Proposed Project

Benefit Category	Proposed Site LNP Site	Option 1 Crystal River Site	Option 2 Dixie County Site	Option 3 Highlands County Site	Option 4 Putnam County Site
Project Description	The LNP site is a greenfield located in Levy County, Florida. The site is owned by PEF.	The Crystal River site is located in Citrus County, Florida. The proposed site is located at the Crystal River Energy Complex which is a nuclear facility owned and operated by PEF.	The Dixie County site is a greenfield site located in Dixie County, Florida.	The Highlands County Site is a greenfield site located in Highlands County, Florida.	The Putnam County Site is a greenfield site located in Putnam County, Florida.
BENEFITS					
Electricity Generated and Generating Capacity	Westinghouse AP1000 reactors for the LNP has a rated core thermal power of 3415 MWt with an associated core power of 3400 MWt and a rated net electrical output of greater than or equal to 1000 MWe.	It is assumed that the electricity generated and generating capacity would be similar to that of the LNP.	It is assumed that the electricity generated and generating capacity would be similar to that of the LNP.	It is assumed that the electricity generated and generating capacity would be similar to that of the LNP.	It is assumed that the electricity generated and generating capacity would be similar to that of the LNP.
Fuel Diversity	Nuclear provides option to natural gas. Does not have price volatility of natural gas, fuel availability issues limited.	Nuclear provides option to natural gas. Does not have price volatility of natural gas, fuel availability issues limited.	Nuclear provides option to natural gas. Does not have price volatility of natural gas, fuel availability issues limited.	Nuclear provides option to natural gas. Does not have price volatility of natural gas, fuel availability issues limited.	Nuclear provides option to natural gas. Does not have price volatility of natural gas, fuel availability issues limited.
Licensing Certainty	Resolution of design criteria through certification; resolution of site, construction and operational issues in Combined Operating License Application (COLA); reliance on nuclear as generation.	Resolution of design criteria through certification; resolution of site, construction and operational issues in COLA; reliance on nuclear as generation.	Resolution of design criteria through certification; resolution of site, construction and operational issues in COLA; reliance on nuclear as generation.	Resolution of design criteria through certification; resolution of site, construction and operational issues in COLA; reliance on nuclear as generation.	Resolution of design criteria through certification; resolution of site, construction and operational issues in COLA; reliance on nuclear as generation.

Table 10.4-1 (Sheet 2 of 16)
Summary of the Benefits and Costs of the Proposed Project

Benefit Category	Proposed Site LNP Site	Option 1 Crystal River Site	Option 2 Dixie County Site	Option 3 Highlands County Site	Option 4 Putnam County Site
Carbon Emissions (reduction)	Coal: (1,908,000 carbon dioxide equivalents [CO_2eq]) Natural Gas: (623,000 CO_2e) Nuclear: No carbon emissions.	It is assumed that carbon emissions reduction would be similar to the LNP. Nuclear: No carbon emissions.	It is assumed that carbon emissions reduction would be similar to LNP. Nuclear: No carbon emissions.	It is assumed that carbon emissions reduction would be similar to the LNP. Nuclear: No carbon emissions.	It is assumed that carbon emissions reduction would be similar to the LNP. 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.	Retail choice of “clean” energy source in addition to menu of renewable sources.
Local Economy	Add 2700 new employees to the workforce for construction of the new facility. It is anticipated that a workforce of approximately 773 employees would be needed for operation. Construction and operation workforce provide an economic benefit to the community.	It is assumed that similar size work force to that which is anticipated for the LNP.	It is assumed that similar size work force to that which is anticipated for the LNP.	It is assumed that a similar size work force to that which is anticipated for the LNP.	It is assumed that a similar size work force to that which is anticipated for the LNP.
Aesthetic Values	Selection of design and cooling tower technology allows for minimal aesthetic impacts.	Selection of design and cooling tower technology allows for minimal aesthetic impacts. Site contains existing nuclear power facility structures.	Selection of design and cooling tower technology allows for minimal aesthetic impacts.	Selection of design and cooling tower technology allows for minimal aesthetic impacts.	Selection of design and cooling tower technology allows for minimal aesthetic impacts.
Air Quality	Major beneficial impact in terms of avoidance of power plant emissions.	Major beneficial impact in terms of avoidance of power plant emissions.	Major beneficial impact in terms of avoidance of power plant emissions.	Major beneficial impact in terms of avoidance of power plant emissions.	Major beneficial impact in terms of avoidance of power plant emissions.

Table 10.4-1 (Sheet 3 of 16)
Summary of the Benefits and Costs of the Proposed Project

Benefit Category	Proposed Site LNP Site	Option 1 Crystal River Site	Option 2 Dixie County Site	Option 3 Highlands County Site	Option 4 Putnam County Site
Land Use	Land to be used for new units is owned by PEF. The land is currently a greenfield site that will need to be re-zoned for development of the nuclear facility.	The Crystal River site is on land that is already owned by PEF and is already zoned for uses compatible with development of new nuclear units. The new reactors will be co-located with the existing Crystal River Energy Complex nuclear facility.	The Dixie County site is on land which is currently a greenfield site. The land will need to be re-zoned for development of the nuclear facility.	The Highlands County site is on land which is currently a greenfield site. The land will need to be re-zoned for development of the nuclear facility.	The Highlands County site is on land which is currently a greenfield site. The land will need to be rezoned for development of the nuclear facility.
State/Local Tax Payments during Construction and Operations	Construction will generate tax revenues from sources including income tax, retail sales tax on materials, supplies, and selected construction services; retail sales tax on expenditures by workers; and corporate income taxes paid by contractors. During operation of the facility, local government tax revenues will accrue from property taxes and permitting and impact fees. Tax payments would occur annually over the life of the new reactor units. Beneficial economic impacts associated with station operation. Operations will result in approximately 1800 direct and indirect jobs with the associated increases in sales, property tax, and output revenues. The current $18 million Levy County annual property tax base will gain an additional $63 million and another $41 million when LNP 1 and LNP 2 become operational, respectively.	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. During operation of the facility, local government tax revenues will accrue from property taxes and permitting and impact fees. Tax payments would occur annually over the life of the new reactor units.	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. During operation of the facility, local government tax revenues will accrue from property taxes and permitting and impact fees. Tax payments would occur annually over the life of the new reactor units.	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. During operation of the facility, local government tax revenues will accrue from property taxes and permitting and impact fees. Tax payments would occur annually over the life of the new reactor units.	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. During operation of the facility, local government tax revenues will accrue from property taxes and permitting and impact fees. Tax payments would occur annually over the life of the new reactor units.

Table 10.4-1 (Sheet 4 of 16)
Summary of the Benefits and Costs of the Proposed Project

Benefit Category	Proposed Site LNP Site	Option 1 Crystal River Site	Option 2 Dixie County Site	Option 3 Highlands County Site	Option 4 Putnam County Site
Effects on Regional Productivity	Anticipate an increase in regional productivity through the influx of construction and station operation workers. Workers will create additional new indirect (service related) jobs in the region through the multiplier effect of direct employment. Construction workforce and their families will increase the population in the area. The expenditures of construction and facility operation workers for food, shelter, and services will create jobs, which will have a SMALL to LARGE positive impact on the region's economy. Job creation will inject millions of dollars in the region's economy, reducing unemployment and creating business opportunities.	Anticipate an increase in regional productivity through the influx of construction and station operation workers. Workers will create additional new indirect (service related) jobs in the region through the multiplier effect of direct employment. Construction workforce and their families will increase the population in the area. The expenditures of construction and facility operation workers for food, shelter, and services will create jobs, which will have a small to large positive impact on the region's economy. Job creation will inject millions of dollars in the region's economy, reducing unemployment and creating business opportunities.	Anticipate an increase in regional productivity through the influx of construction and station operation workers. Workers will create additional new indirect (service related) jobs in the region through the multiplier effect of direct employment. Construction workforce and their families will increase the population in the area. The expenditures of construction and facility operation workers for food, shelter, and services will create jobs, which will have a small to large positive impact on the region's economy. Job creation will inject millions of dollars in the region's economy, reducing unemployment and creating business opportunities.	Anticipate an increase in regional productivity through the influx of construction and station operation workers. Workers will create additional new indirect (service-related) jobs in the region through the multiplier effect of direct employment. Construction workforce and their families will increase the population in the area. The expenditures of construction and facility operation workers for food, shelter, and services will create jobs, which will have a small to large positive impact on the region's economy. Job creation will inject millions of dollars in the region's economy, reducing unemployment and creating business opportunities.	Anticipate an increase in regional productivity through the influx of construction and station operation workers. Workers will create additional new indirect (service-related) jobs in the region through the multiplier effect of direct employment. Construction workforce and their families will increase the population in the area. The expenditures of construction and facility operation workers for food, shelter, and services will create jobs, which will have a small to large positive impact on the region's economy. Job creation will inject millions of dollars in the region's economy, reducing unemployment and creating business opportunities.

Technical and Other Non-Monetary Improvements (for example, New Recreational Facilities and Improvements to Local Facilities)	Anticipate that existing local and county Police, Fire, and medical facilities and/or personnel would be able to accommodate the influx of construction and facility operation workers. Anticipate that the existing water supply and wastewater treatment facilities can accommodate the added increase in population.	Co-located with an existing power generating facility. The existing Police, Fire, and medical facilities and/or personnel should be able to accommodate the influx of construction and facility operation workers. Anticipate that the existing water supply and wastewater treatment facilities can accommodate the added increase in population.	Anticipate that existing local and county Police, Fire, and medical facilities and/or personnel would be able to accommodate the influx of construction and facility operation workers. Anticipate that the existing water supply and wastewater treatment facilities can accommodate the added increase in population.	Anticipate that existing local and county Police, Fire, and medical facilities and/or personnel would be able to accommodate the influx of construction and facility operation workers. Anticipate that the existing water supply and wastewater treatment facilities can accommodate the added increase in population.	Anticipate that existing local and county Police, Fire, and medical facilities and/or personnel would be able to accommodate the influx of construction and facility operation workers. Anticipate that the existing water supply and wastewater treatment facilities can accommodate the added increase in population.

Table 10.4-1 (Sheet 5 of 16)
Summary of the Benefits and Costs of the Proposed Project

Benefit Category	Proposed Site LNP Site	Option 1 Crystal River Site	Option 2 Dixie County Site	Option 3 Highlands County Site	Option 4 Putnam County Site
Technical and Other Non-Monetary Improvements (for example, New Recreational Facilities and Improvements to Local Facilities) (Continued)	Anticipate that the existing education and social services facilities can accommodate the increase in population. Construction and operation activities should not have long-term, adverse impacts to recreational use of the surrounding area. Neither technical developments nor recreational enhancements are anticipated at this time from the construction and operation of the proposed nuclear facility. In addition, minor road improvements would occur near the proposed nuclear facility, on an as needed basis, to support construction and operation activities.	Anticipate that the existing education and social services facilities can accommodate the increase in population. Construction and operation activities should not have long-term, adverse impacts to recreational use of the surrounding area. Neither technical developments nor recreational enhancements are anticipated at this time from the construction and operation of the proposed nuclear facility. In addition, minor road improvements would occur near the proposed nuclear facility, on an as needed basis, to support construction and operation activities.	Anticipate that the existing education and social services facilities can accommodate the increase in population. Construction and operation activities should not have long-term, adverse impacts to recreational use of the surrounding area. Neither technical developments nor recreational enhancements are anticipated at this time from the construction and operation of the proposed nuclear facility. In addition, minor road improvements would occur near the proposed nuclear facility, on an as needed basis, to support construction and operation activities.	Anticipate that the existing education and social services facilities can accommodate the increase in population. Construction and operation activities should not have long-term, adverse impacts to recreational use of the surrounding area. Neither technical developments nor recreational enhancements are anticipated at this time from the construction and operation of the proposed nuclear facility. In addition, minor road improvements would occur near the proposed nuclear facility, on an as needed basis, to support construction and operation activities.	Anticipate that the existing education and social services facilities can accommodate the increase in population. Construction and operation activities should not have long-term, adverse impacts to recreational use of the surrounding area. Neither technical developments nor recreational enhancements are anticipated at this time from the construction and operation of the proposed nuclear facility. In addition, minor road improvements would occur near the proposed nuclear facility, on an as needed basis, to support construction and operation activities.

Table 10.4-1 (Sheet 6 of 16)
Summary of the Benefits and Costs of the Proposed Project

Benefit Category	Proposed Site LNP Site	Option 1 Crystal River Site	Option 2 Dixie County Site	Option 3 Highlands County Site	Option 4 Putnam County Site
Environmental Enhancement	Reduction in carbon emissions with the use of nuclear power. The LNP site has a smaller number of listed, threatened, or endangered species and critical habitat than the Dixie, Highlands, and Putnam sites. The LNP site demonstrated an advantage over the Dixie, Highlands, and Putnam sites due to larger acreage of PEF-owned property The need for transmission line upgrades is significantly less for the LNP site than for the Dixie, Highlands, and Putnam sites. If possible, existing transmission lines and corridors would be used and/or expanded for the proposed reactors.	Reduction in carbon emissions with the use of nuclear power. The Crystal River site has a smaller number of listed, threatened, or endangered species and critical habitat than the Dixie, Highlands, and Putnam sites. The Crystal River site demonstrated an advantage over the Dixie, Highlands, and Putnam sites due to larger acreage of PEF-owned property and the clear ability to accommodate additional future generation capacity. The Crystal River Energy Complex (CREC) was originally designed as a four-reactor site, although only two reactors were built. The need for transmission line upgrades is significantly less for the Crystal River site than for the Dixie, Highlands, and Putnam sites. Existing transmission lines and corridors would be used and/or expanded for the proposed reactors.	Reduction in carbon emissions with the use of nuclear power.	Reduction in carbon emissions with the use of nuclear power.	Reduction in carbon emissions with the use of nuclear power.

Table 10.4-1 (Sheet 7 of 16)
Summary of the Benefits and Costs of the Proposed Project

Cost Category	Proposed Site LNP Site	Option 1 Crystal River Site	Option 2 Dixie County Site	Option 3 Highlands County Site	Option 4 Putnam County Site
INTERNAL COSTS					
Construction Cost Note: Cost value is a roll-up of the Internal Cost values for constructing the facility, which include land, labor, materials, and equipment).	The proposed reactors at LNP will each be rated with a net electrical output of greater than or equal to 1000 MWe. Per ER Subsection 4.4.2, PEF estimates a total escalated construction cost of $16.6 billion, which includes the cost of constructing LNP 1, $5.6 billion, LNP 2, $3.7 billion, and the transmission corridors, $2.5 billion, as well as the cost of financing.	It is anticipated that the installed reactors will be similar to the proposed reactors at the LNP (net electrical output of greater than or equal to 1000 MWe. It is assumed that construction costs will be similar to the LNP site.	It is anticipated that the installed reactors will be similar to the proposed reactors at the LNP (net electrical output of greater than or equal to 1000 MWe. It is assumed that construction costs will be similar to the LNP site.	It is anticipated that the installed reactors will be similar to the proposed reactors at the LNP (net electrical output of greater than or equal to 1000 MWe. It is assumed that construction costs will be similar to the LNP site.	It is anticipated that the installed reactors will be similar to the proposed reactors at the LNP (net electrical output of greater than or equal to 1000 MWe. It is assumed that construction costs will be similar to the LNP site.
Transmission System	The LNP site would require a transmission system. Required transmission system costs are estimated to be $2.5 billion. Transmission corridors and towers would be situated (if possible) in existing ROWs to avoid critical or sensitive habitats/species as much as possible.	The Crystal River site is located near the existing Crystal River Nuclear Power Plant. As such, transmission lines are located in the immediate vicinity of the proposed site. New transmission lines will connect the switchyard to the PEF grid. The proposed routing of the new lines is being evaluated to be adjacent to or within the existing Crystal River Energy Complex maintained transmission corridors. The new corridors are conservatively estimated to require an additional 100 ft. of width. Transmission system upgrades are approximately 563 million. Transmission corridors and towers would be situated (if possible) in existing ROWs to avoid critical or sensitive habitats/species as much as possible.	The Dixie County site would require a transmission system. Required transmission system costs are approximately 726 million. Transmission corridors and towers would be situated (if possible) in existing ROWs to avoid critical or sensitive habitats/species as much as possible.	The Highlands County site would require a transmission system. The cost of the transmission system is estimated at approximately $1.37 billion. Transmission corridors and towers would be situated (if possible) in ROWs to avoid critical or sensitive habitats/species as much as possible.	The Putnam County site would require a transmission system. The cost of the transmission system is estimated at approximately $1.013 billion. Transmission corridors and towers would be situated (if possible) in ROWs to avoid critical or sensitive habitats/species as much as possible.

Table 10.4-1 (Sheet 8 of 16)
Summary of the Benefits and Costs of the Proposed Project

Cost Category	Proposed Site LNP Site	Option 1 Crystal River Site	Option 2 Dixie County Site	Option 3 Highlands County Site	Option 4 Putnam County Site
Operating Cost Note: Cost value is a roll-up of the Internal Cost values for operating the facility which include labor, materials, and services).	The nuclear industry's average production cost in 2007 was 1.68 cents per kWh.	Costs would be similar to the LNP site.	Costs would be similar to the LNP site.	Costs would be similar to the LNP site.	Costs would be similar to the LNP site.
Land Use	The LNP is located on land already owned by PEF. Site is characterized primarily by forested pineland but has been heavily timbered with associated disturbance to site ecology. Some wetlands indicator species apparent on relatively small fraction of site area. Small land use impacts would also result from construction of off-site facilities, including intake system and pipeline, blowdown pipeline, heavy haul road, and transmission lines. Siting of a nuclear facility at the LNP site would require a land use change. Overall land use impacts are anticipated to be SMALL.	The Crystal River site is on land already owned by PEF and is already zoned for uses compatible with development of new units. The existing facility is integrated into the surrounding land use patterns. Construction at the Crystal River site is not expected to have long-term impacts on land use. It is expected that the industrial nature of the facility will continue during construction. Overall land use impacts are anticipated to be SMALL.	The Dixie County site is a greenfield site located in Dixie County, Florida. The site is characterized primarily by open forested pineland with some evidence of timbering. Overall land use impacts are anticipated to be SMALL to MODERATE.	The Highlands County site is a greenfield site that is located in a rural and agricultural area of Highlands County, Florida. The surrounding land has been cleared for agricultural purposes, including sod and cattle/dairy farming. Overall land use impacts are anticipated to be SMALL to MODERATE.	The Putnam County site is a greenfield site that is characterized by mostly open canopied forest. Overall land use impacts are anticipated to be SMALL to MODERATE.

Table 10.4-1 (Sheet 9 of 16)
Summary of the Benefits and Costs of the Proposed Project

Cost Category	Proposed Site LNP Site	Option 1 Crystal River Site	Option 2 Dixie County Site	Option 3 Highlands County Site	Option 4 Putnam County Site
Materials	Construction materials include: concrete, aggregate, rebar, conduit, cable, piping, building supplies, and tools. Operating materials include uranium.	Construction materials include: concrete, aggregate, rebar, conduit, cable, piping, building supplies, and tools. Operating materials include uranium.	Construction materials include: concrete, aggregate, rebar, conduit, cable, piping, building supplies, and tools. Operating materials include uranium.	Construction materials include: concrete, aggregate, rebar, conduit, cable, piping, building supplies, and tools. Operating materials include uranium.	Construction materials include: concrete, aggregate, rebar, conduit, cable, piping, building supplies, and tools. Operating materials include uranium.
Equipment	Typical construction equipment will include cranes, cement trucks, excavation equipment, dump truck, and graders. Equipment for the new facility would include the necessary components for the facility such as the reactors, turbines, cooling systems, water processing/ treatment systems, and cooling towers.	Typical construction equipment will include cranes, cement trucks, excavation equipment, dump truck, and graders. Equipment for the new facility would include the necessary components for the facility such as the reactors, turbines, cooling systems, water processing/ treatment systems, and cooling towers.	Typical construction equipment will include cranes, cement trucks, excavation equipment, dump truck, and graders. Equipment for the new facility would include the necessary components for the facility such as the reactors, turbines, cooling systems, water processing/ treatment systems, and cooling towers.	Typical construction equipment will include cranes, cement trucks, excavation equipment, dump truck, and graders. Equipment for the new facility would include the necessary components for the facility such as the reactors, turbines, cooling systems, water processing/ treatment systems, and cooling towers.	Typical construction equipment will include cranes, cement trucks, excavation equipment, dump truck, and graders. Equipment for the new facility would include the necessary components for the facility such as the reactors, turbines, cooling systems, water processing/ treatment systems, and cooling towers.
Services	Support services and supplies would be needed during construction. Security, maintenance, trash removal, and/or landscaping services may be needed during operation of the facility.	Support services and supplies would be needed during construction. Security, maintenance, trash removal, and/or landscaping services may be needed during operation of the facility.	Support services and supplies would be needed during construction. Security, maintenance, trash removal, and/or landscaping services may be needed during operation of the facility.	Support services and supplies would be needed during construction. Security, maintenance, trash removal, and/or landscaping services may be needed during operation of the facility.	Support services and supplies would be needed during construction. Security, maintenance, trash removal, and/or landscaping services may be needed during operation of the facility.

Table 10.4-1 (Sheet 10 of 16)
Summary of the Benefits and Costs of the Proposed Project

Cost Category	Proposed Site LNP Site	Option 1 Crystal River Site	Option 2 Dixie County Site	Option 3 Highlands County Site	Option 4 Putnam County Site
Water Use	The consumptive water use for plant operation is estimated to be approximately 2.3 cubic meters per second (m^3/s) (81.4 cubic feet per second [ft^3/sec]) or 30,427 gallons per minute (gpm). Consumptive water use from service tower evaporation is 0.08 m^3/s (2.8 ft^3/sec) or 1248 gpm. Water consumption for fuel cycle activities would require approximately 43,067 million liters (11,377 million gallons) of water. The Cross Florida Barge Canal will supply adequate surface water for plant use. Water use impacts are anticipated to be SMALL.	It is estimated that consumptive water use for a nuclear facility at Crystal River would be similar to that which is proposed for the LNP site. Due to Crystal River's close proximity to the Gulf of Mexico, adequate cooling water is available to support a two-unit plant for any of the designs under consideration. Water use impacts are anticipated to be SMALL.	It is estimated that consumptive water use for a nuclear facility at the Dixie County site would be similar to that which is proposed for the LNP site. The primary water source is the Suwannee River. However, because of potential water usage issues, the proposed site may likely require the construction of a reservoir (size not known at this time). Consequently, pumping distances could be longer, depending on reservoir siting. Water use impacts are anticipated to be MODERATE to LARGE.	It is estimated that consumptive water use for a nuclear facility at the Highlands County site would be similar to that which is proposed for the LNP site. The primary water source is the Kissimmee River. However, there are regulatory intricacies and potential costs associated with the use of the river as a primary water source. In addition, there is also the unknown of what effect, if any, the Kissimmee Restoration River Project might have on water availability and whether the project would limit water supply thus necessitating the need for a reservoir. Water use impacts are anticipated to be MODERATE to LARGE.	It is estimated that consumptive water use for a nuclear facility at the Putnam County site would be similar to that which is proposed for the LNP site. The primary water source is the St. Johns River. However, because of potential water flow issues, the proposed site may likely require the construction of a reservoir (size not known at this time). Consequently, pumping distances could be longer, depending on reservoir siting. Water use impacts are anticipated to be MODERATE to LARGE.
EXTERNAL COSTS					
	Proposed Site LNP Site	**Option 1 Crystal River Site**	**Option 2 Dixie County Site**	**Option 3 Highlands County Site**	**Option 4 Putnam County Site**
Air Quality	The power facility must meet applicable federal, state, and local air quality permitting regulations.	The power facility must meet applicable federal, state, and local air quality permitting regulations.	The power facility must meet applicable federal, state, and local air quality permitting regulations.	The power facility must meet applicable federal, state, and local air quality permitting	The power facility must meet applicable federal, state, and local air quality permitting regulations.

regulations.

Table 10.4-1 (Sheet 11 of 16)
Summary of the Benefits and Costs of the Proposed Project

Cost Category	Proposed Site LNP Site	Option 1 Crystal River Site	Option 2 Dixie County Site	Option 3 Highlands County Site	Option 4 Putnam County Site
Terrestrial Biology	Terrestrial species that are listed as threatened or endangered by the USFWS and the State of Florida and have the potential to occur within Levy County are presented in ER Subsection 2.4.1. No rare, threatened, or endangered species are known to occur in the immediate vicinity of the site. Wetlands which may be impacted upon by construction of the proposed facility are discussed in ER Section 4.3.	Terrestrial species that are listed as threatened or endangered by the USFWS and the State of Florida and have the potential to occur within Citrus County are presented in Table 9.3-11. No rare, threatened, or endangered species are known to occur in the immediate vicinity of the site. There are approximately 82 ac. of high quality wetlands within the proposed site area which may be impacted upon construction of the proposed facility.	Terrestrial species that are listed as threatened or endangered by the USFWS and the State of Florida and have the potential to occur within Dixie County are presented in Table 9.3-13. No rare, threatened, or endangered species are known to occur in the immediate vicinity of the site. There are approximately 11 ac. of high quality wetlands within the proposed site area which may be impacted upon construction of the proposed facility.	Terrestrial species that are listed as threatened or endangered by the USFWS and the State of Florida and have the potential to occur within Highlands County are presented in Table 9.3-15. No rare, threatened, or endangered species are known to occur in the immediate vicinity of the site. There are approximately 34 ac. of high quality wetlands within the proposed site area which may be impacted upon construction of the proposed facility.	Terrestrial species that are listed as threatened or endangered by the USFWS and the State of Florida and have the potential to occur within Putnam County are presented in Table 9.3-17. No rare, threatened, or endangered species are known to occur in the immediate vicinity of the site. There are approximately 273 ac. of high quality wetlands within the proposed site area which may be impacted upon construction of the proposed facility.

Table 10.4-1 (Sheet 12 of 16)
Summary of the Benefits and Costs of the Proposed Project

Cost Category	Proposed Site LNP Site	Option 1 Crystal River Site	Option 2 Dixie County Site	Option 3 Highlands County Site	Option 4 Putnam County Site
Aquatic Biology	Aquatic species that are listed as threatened or endangered by the USFWS and the State of Florida and have the potential to occur in Levy County are presented in ER Subsection 2.4.2. Operation under the NPDES permit should result in the maintenance of a balanced, indigenous population of fish, shellfish, and other aquatic organisms in the vicinity of the discharge structure. Discharge to the Gulf will occur at the existing CREC. Proposed facilities at the site will include cooling towers that would reduce the amount of cooling water withdrawal required for plant operation. Through the use of cooling towers with an appropriate intake design, it is anticipated that potential adverse impacts from entrainment or impingement of aquatic organism would be minor and would not significantly disrupt existing populations.	Aquatic species that are listed as threatened or endangered by the USFWS and the State of Florida and have the potential to occur in Citrus County are presented in Table 9.3-11. Operation under the NPDES permit should result in the maintenance of a balanced, indigenous population of fish, shellfish, and other aquatic organisms in the vicinity of the discharge structure. Proposed facilities at the site will include cooling towers that would reduce the amount of cooling water withdrawal required for plant operation. Through the use of cooling towers with an appropriate intake design, it is anticipated that potential adverse impacts from entrainment or impingement of aquatic organism would be minor and would not significantly disrupt existing populations.	Aquatic species that are listed as threatened or endangered by the USFWS and the State of Florida and have the potential to occur in Dixie County are presented in Table 9.3-13. Operation under the NPDES permit should result in the maintenance of a balanced, indigenous population of fish, shellfish, and other aquatic organisms in the vicinity of the discharge structure. Proposed facilities at the site will include cooling towers that would reduce the amount of cooling water withdrawal required for plant operation. Through the use of cooling towers with an appropriate intake design, it is anticipated that potential adverse impacts from entrainment or impingement of aquatic organism would be minor and would not significantly disrupt existing populations.	Aquatic species that are listed as threatened or endangered by the USFWS and the State of Florida and have the potential to occur in Highlands County are presented in Table 9.3-15. Operation under the NPDES permit should result in the maintenance of a balanced, indigenous population of fish, shellfish, and other aquatic organisms in the vicinity of the discharge structure. Proposed facilities at the site will include cooling towers that would reduce the amount of cooling water withdrawal required for plant operation.	Aquatic species that are listed as threatened or endangered by the USFWS and the State of Florida and have the potential to occur in Putnam County are presented in Table 9.3-17. Operation under the NPDES permit should result in the maintenance of a balanced, indigenous population of fish, shellfish, and other aquatic organisms in the vicinity of the discharge structure.

Table 10.4-1 (Sheet 13 of 16)
Summary of the Benefits and Costs of the Proposed Project

Cost Category	Proposed Site LNP Site	Option 1 Crystal River Site	Option 2 Dixie County Site	Option 3 Highlands County Site	Option 4 Putnam County Site
Aquatic Biology (Continued)				Through the use of cooling towers with an appropriate intake design, it is anticipated that potential adverse impacts from entrainment or impingement of aquatic organism would be minor and would not significantly disrupt existing populations.	Proposed facilities at the site will include cooling towers that would reduce the amount of cooling water withdrawal required for plant operation. Through the use of cooling towers with an appropriate intake design, it is anticipated that potential adverse impacts from entrainment or impingement of aquatic organism would be minor and would not significantly disrupt existing populations.
Socioeconomic	Socioeconomic impacts associated with the construction and operation of LNP is discussed in ER Section 5.8. It is expected that most construction workers would come from within region surrounding the site. Should a larger than expected number of construction workers come from outside the region, there could be a noticeable increase in population, but it would not be excessive.	Citrus County has a 2006 population estimate of 138,143, which is a 17.0 percent increase from the 2000 population. The median household income is $33,576 per year. Approximately 11.2 percent of the county's population lives below the poverty level. The mean value of owner-occupied housing units was $84,400. There were 9.825 firms doing business in the county in 2002.	Dixie County has a 2006 population estimate of 14,964, which is an 8.2 percent increase from the 2000 population. The median household income is $26,999 per year. Approximately 18.0 percent of the county's population lives below the poverty level. The mean value of owner-occupied housing units was $61,700. There were 840 firms doing business in the county in 2002.	Highlands County has a 2006 population estimate of 97,987, which is a 12.2 percent increase from the 2000 population. The median household income is $30,343 per year. Approximately 13.1 percent of the county's population lives below the poverty level. The mean value of owner-occupied housing units was $72,800. There were 6,020 firms doing business in the county in 2002.	Putnam County has a 2006 population estimate of 74,083, which is a 5.2-percent increase from the 2000 population of 70,423. As of 2004, the annual median household income was $30,098, and the mean value of owner-occupied housing units was $68,500. Approximately 17.3 percent of the county's population lives below the poverty level. There were 4372 firms doing business in the county in 2002.

Table 10.4-1 (Sheet 14 of 16)
Summary of the Benefits and Costs of the Proposed Project

Cost Category	Proposed Site LNP Site	Option 1 Crystal River Site	Option 2 Dixie County Site	Option 3 Highlands County Site	Option 4 Putnam County Site
Socioeconomic (Continued)	The overall population level is anticipated to be sufficiently large that the impact on area employment from construction and operation of the two new nuclear units would be low. It is expected that the impact on housing and community services would be negligible. The site area appears to have sufficient population centers within commuting distance such that its public services sector would be able to absorb the population in-migration associated with plant construction and operation with minimal impact.	The impact on area employment from construction and operation of the proposed nuclear facility would be low because Citrus County is in close proximity to one population center within 20 mi. (Dunnellon, Florida [1898 persons per square mile {psm}]) and one densely populated area within 40 mi. (Ocala, Florida [1189 psm]). Due to the population size in the vicinity of the plant, it is expected that most construction workers would come from within the region surrounding the site. Should a larger than expected number of construction workers come from outside the region, there could be a noticeable increase in population, but it would not be excessive. The overall population level is anticipated to be sufficiently large that the impact on area employment from construction and operation of the two new units would be low. It is expected that the impact on housing and community services would be negligible. The site area appears to have sufficient population centers within commuting distance such that its public services sector would be able to absorb the population in-migration associated with plant construction and operation with minimal impact.	Due to the population size in the vicinity of the plant, it is expected that most construction workers would come from within the region surrounding the site. Should a larger than expected number of construction workers comes from outside the region, there could be a noticeable increase in population, but it would not be excessive. The overall population level is anticipated to be sufficiently large that the impact on area employment from construction and operation of the two new units would be low. It is expected that the impact on housing and community services would be negligible. The site area appears to have sufficient population centers within commuting distance such that its public services sector would be able to absorb the population in-migration associated with plant construction and operation with minimal impact.	Due to the population size in the vicinity of the plant, it is expected that most construction workers would come from within the region surrounding the site. Should a larger than expected number of construction workers comes from outside the region, there could be a noticeable increase in population, but it would not be excessive. The overall population level is anticipated to be sufficiently large that the impact on area employment from construction and operation of the two new units would be low. It is expected that the impact on housing and community services would be negligible. The site area appears to have sufficient population centers within commuting distance such that its public services sector would be able to absorb the population in-migration associated with plant construction and operation with minimal impact.	Due to the population size in the vicinity of the plant, it is expected that most construction workers would come from within the region surrounding the site. Should a larger than expected number of construction workers comes from outside the region, there could be a noticeable increase in population, but it would not be excessive. The overall population level is anticipated to be sufficiently large that the impact on area employment from construction and operation of the two new units would be low. It is expected that the impact on housing and community services would be negligible. The site area appears to have sufficient population centers within commuting distance such that its public services sector would be able to absorb the population in-migration associated with plant construction and operation with minimal impact.

Table 10.4-1 (Sheet 15 of 16)
Summary of the Benefits and Costs of the Proposed Project

Cost Category	Proposed Site LNP Site	Option 1 Crystal River Site	Option 2 Dixie County Site	Option 3 Highlands County Site	Option 4 Putnam County Site
Housing	No anticipated short-term impact on availability of housing units in the area during construction.	No anticipated short-term impact on availability of housing units in the area during construction.	No anticipated short-term impact on availability of housing units in the area during construction.	No anticipated short-term impact on availability of housing units in the area during construction.	No anticipated short-term impact on availability of housing units in the area during construction.
Local Infrastructure	Local infrastructure surrounding the LNP site is discussed in ER Sections 2.1 and 2.2. There are sufficient roads that provide access to the LNP site. However, construction of local access roads would be required. No egress limitations are anticipated from the area surrounding the site based on the current level of service designations. Active rail is located approximately 10 miles southeast of the site. Barge access is available in the vicinity along the CFBC 3.2 miles south of the site. Use of barge will require construction of supporting infrastructure. No airports are located within the vicinity. Emergency evacuation of the area is possible in all directions. Increased traffic at beginning and end of shifts may increase traffic on highways to and from plant. Little impact on availability of services.	There are sufficient roads that provide main access to the proposed Crystal River Site. Local roads provide access to the Crystal River Energy Complex, co-located with the proposed site. Therefore, new road construction is expected to be minimal. Local rail is located approximately 1.1 mi. south of the site (co-located with the CREC). The local rail line connects to Seaboard Coast rail road approximately 7.8 mi. east of site near Citronelle, Florida. Barge access is available in the immediate vicinity since the Crystal River site is located approximately 3 mi. east of the Gulf of Mexico and approximately 1.5 mi. northeast of an inlet channel near the Crystal River Energy Complex.	The Dixie site is located near suitable roads which provide main access to the area. However, construction of local access roads would be required. Both railroad and barge access could be made available, but may not be practical because of the need to construct supporting infrastructure. Emergency evacuation of the area is possible in three directions, being limited to the west by the Gulf of Mexico. Increased traffic at beginning and end of shifts may increase traffic on highways to and from plant. Little impact on availability of services.	There are sufficient roads that provide main access to the proposed Highlands County Site. However, construction of local access roads would be required. Both railroad and barge access could be made available, but may not be practical because of the need to construct supporting infrastructure. Emergency evacuation of the area is possible in all directions, but is limited to the southeast due to Lake Okeechobee. Increased traffic at beginning and end of shifts may increase traffic on highways to and from plant. Little impact on availability of services.	There appears to be sufficient roads in the vicinity of the Putnam County site which provides main access to the area. However, construction of local access roads would be required. Both railroad and barge access to the site may be practical. Emergency evacuation of the area is possible in all directions, but area evacuation is limited to the east due to the Atlantic Ocean. Increased traffic at beginning and end of shifts may increase traffic on highways to and from plant. Little impact on availability of services.

Table 10.4-1 (Sheet 16 of 16)
Summary of the Benefits and Costs of the Proposed Project

Cost Category	Proposed Site LNP Site	Option 1 Crystal River Site	Option 2 Dixie County Site	Option 3 Highlands County Site	Option 4 Putnam County Site
Local Infrastructure (Continued)		Emergency evacuation of the area is possible in three directions, being limited to the west by the Gulf of Mexico. The site is adjacent to the CREC, and brings the advantage of already having an Emergency Plan that could easily be adapted to include the new site. Increased traffic at beginning and end of shifts may increase traffic on highways to and from plant. Little impact on availability of services.			
Radiological Heath	Radiological exposure below limits to workers and public.	Radiological exposure below limits to workers and public.	Radiological exposure below limits to workers and public.	Radiological exposure below limits to workers and public.	Radiological exposure below limits to workers and public.
Loss of Resources	Loss of resources is discussed in ER Sections 10.1, 10.2, and 10.3. It is expected that losses will be mitigated to minimize the impact of the loss.	Loss of resources is discussed in ER Sections 10.1, 10.2, and 10.3. It is expected that losses will be mitigated to minimize the impact of the loss.	Loss of resources is discussed in ER Sections 10.1, 10.2, and 10.3. It is expected that losses will be mitigated to minimize the impact of the loss.	Loss of resources is discussed in ER Sections 10.1, 10.2, and 10.3. It is expected that losses will be mitigated to minimize the impact of the loss.	Loss of resources is discussed in ER Sections 10.1, 10.2, and 10.3. It is expected that losses will be mitigated to minimize the impact of the loss.
Measures and Controls to Reduce Environmental Impact	Costs associated with mitigation will be SMALL, since the nuclear units will be built on an undeveloped site. Mitigation and environmental monitoring programs will need to be implemented to account for the new units.	Costs associated with mitigation will be SMALL, since the nuclear units will be built adjacent to an existing nuclear site. Existing mitigation and environmental monitoring programs will be expanded to account for the new units.	Costs associated with mitigation will be MODERATE, since the nuclear units will be built on an undeveloped site. Mitigation and environmental monitoring programs will need to be implemented to account for the new units.	Costs associated with mitigation will be MODERATE, since the nuclear units will be built on an undeveloped site. Mitigation and environmental monitoring programs will need to be implemented to account for the new units.	Costs associated with mitigation will be MODERATE, since the nuclear units will be built on an undeveloped site. Mitigation and environmental monitoring programs will need to be implemented to account for the new units.