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NUREG-2176, Vol. 2

Environmental Impact Statement for Combined Licenses (COLs) for Turkey Point Nuclear Plant Units 6 and 7

Draft Report for Comment

Volume 2

U.S. Nuclear Regulatory Commission
Office of New Reactors
Washington, DC 20555-0001

U.S. Army Corps of Engineers
Jacksonville District
Jacksonville, Florida 32232-0019

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Abstract

This environmental impact statement (EIS) has been prepared in response to an application submitted to the U.S. Nuclear Regulatory Commission (NRC) by Florida Power and Light Company (FPL) for two combined construction permits and operating licenses (combined licenses or COLs). The proposed actions related to the FPL application are (1) NRC issuance of COLs for two new power reactor units (Units 6 & 7) at the Turkey Point Nuclear Power Plant site in Miami-Dade County, Florida, and (2) U.S. Army Corps of Engineers (USACE) decision to issue, deny, or issue with modifications a Department of the Army (DA) permit to perform certain dredge and fill activities in waters of the United States and to construct structures in navigable waters of the United States related to the project. The NRC, its contractors, and USACE make up the review team. The National Park Service (NPS) is also a cooperating agency on this EIS but does not now have a request to take any specific regulatory action before it. Due to this unique set of circumstances, impact determinations made in this EIS should only be attributed to the review team. This EIS documents the review team's analysis, which considers and weighs the environmental impacts of constructing and operating two new nuclear units at the Turkey Point site and at alternative sites, including measures potentially available for reducing or avoiding adverse impacts.

The EIS includes an evaluation of the impacts of construction and operation of Turkey Point Units 6 & 7 on waters of the United States pursuant to Section 404 of the Clean Water Act and on navigable waters of the United States pursuant to Section 10 of the Rivers and Harbors Act of 1899. The USACE will base its evaluation of FPL's DA permit application, on the requirements of USACE regulations, the Clean Water Act Section 404(b)(1) Guidelines, and the USACE public interest review process.

After considering the environmental aspects of the proposed action before the NRC, the NRC staff's preliminary recommendation to the Commission is that the COLs be issued as proposed. This recommendation is based on (1) the application, including the Environmental Report (ER), submitted by FPL; (2) consultation with Federal, State, Tribal, and local agencies; (3) the review team's independent review; (4) the consideration of public scoping comments; and (5) the assessments summarized in this EIS, including the potential mitigation measures identified in the ER and this EIS.

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Executive Summary

This environmental impact statement (EIS) presents the results of a U.S. Nuclear Regulatory Commission (NRC) environmental review of an application for a combined construction permit and operating license (combined license or COL) for two new nuclear reactor units at a proposed Turkey Point site in Miami-Dade County, Florida. The U.S. Army Corps of Engineers (USACE) participated in the preparation of the EIS as a cooperating agency and as a member of the review team, which consisted of the NRC staff, its contractor staff, and the USACE staff. The National Park Service (NPS) participated in the environmental review as a cooperating agency by providing special expertise for the areas in and around the adjacent national parks (Biscayne and Everglades National Parks). The NPS does not now have a request to take any specific regulatory actions related to the proposed COLs before it. Due to this unique set of circumstances, all impact determinations made in this EIS should not be attributed to NPS, but only to the NRC and USACE (also referred to as the review team). The NPS's participation in connection with this EIS does not imply NPS concurrence.

Background

On June 30, 2009, the Florida Power and Light Company (FPL) submitted an application to the NRC for a combined construction permit and operating license (combined license or COL) for Turkey Point Units 6 and 7.

Upon acceptance of FPL's application, the NRC review team began the environmental review process by publishing a Notice of Intent to prepare an EIS and conduct scoping in the *Federal Register* on June 15, 2010. As part of this environmental review, the review team did the following:

- conducted public scoping meetings on July 15, 2010 in Homestead, Florida
- conducted a site visit of the proposed Units 6 and 7 plant area on the Turkey Point site in June 2010
- conducted visits to alternative sites in July 2010
- reviewed FPL's Environmental Report (ER)
- consulted with Tribal Nations and other agencies such as the U.S. Fish and Wildlife Service (FWS), Advisory Council on Historic Preservation, Florida Fish and Wildlife Conservation Commission, National Marine Fisheries Service, Miami-Dade Office of Historic and Archaeological Resources, and Florida Division of Historical Resources
- conducted the review following guidance set forth in NUREG-1555:
    - "Standard Review Plans for Environmental Reviews for Nuclear Power Plants
    - Supplement 1: Operating License Renewal"
- considered public comments received during the 60-day scoping process from June 15, 2010 to August 16, 2010.

Proposed Action

FPL initiated the proposed Federal action by submitting an application for Turkey Point Units 6 and 7 to the NRC. The NRC's Federal action is issuance of COLs for two Westinghouse AP1000 reactors at the Turkey Point site near Homestead, Florida.

The USACE is a cooperating agency in preparation of this EIS. The USACE's Federal action is its decision of whether to issue, deny, or issue with modifications a Department of Army (DA) permit pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899 to authorize certain construction activities potentially affecting waters of the United States.[(1)]

Purpose and Need for Action

The purpose of the proposed NRC action, issuance of the COL, is to provide for additional baseload electric generating capacity for use in the FPL service territory.

The USACE determines both a basic and an overall project purpose pursuant to the Clean Water Act Section 404(b)(1) Guidelines, 33 CFR Section 230.10. The basic purpose is to meet the public's need for electric energy. The overall purpose is to meet the public's need for reliable increased electrical baseload generating capacity in FPL's service territory.

Affected Environment

The Turkey Point site is located in southeast Miami-Dade County, Florida, near Homestead (Figure ES-1). Turkey Point Units 6 and 7 would be located on the same site as the existing Turkey Point site, which has five other power plants, including two nuclear power reactors. Turkey Point would be located 25 mi south of Miami and 4.5 and 8 mi east of Homestead and Florida City, respectively. Cooling water would be provided by reclaimed wastewater. The ultimate heat sink for Turkey Point Units 6 and 7 is the atmosphere, using three mechanical draft cooling towers per reactor.

(1) Waters of the United States" is used to include both "waters of the United States" as defined by 33 C.F.R. Part 328 defining the extent of USACE geographic jurisdiction pursuant to Section 404 of the Clean Water Act and "navigable waters of the United States" as defined by 33 CFR. Part 329 defining the extent of USACE geographic jurisdiction pursuant to Section 10 of the Rivers and Harbors Act of 1899.

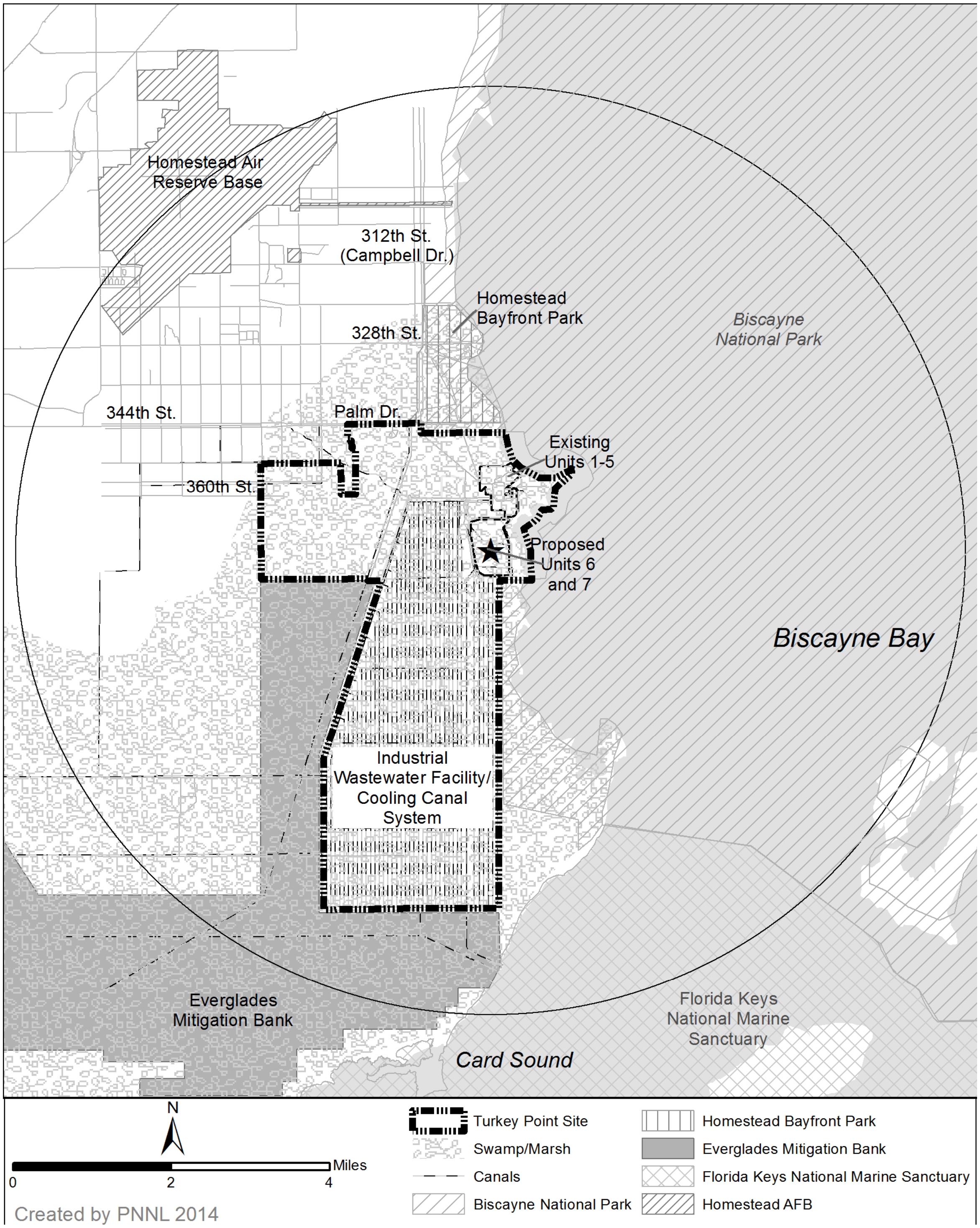

Figure ES-1. The Turkey Point Site and Affected Environment.

Evaluation of Environmental Impacts

This EIS evaluates the potential environmental impacts of the construction and operation of the two new nuclear plants proposed for the Turkey Point site related to the following resource areas:

- land use
- air quality
- aquatic ecology
- terrestrial ecology
- surface and groundwater
- waste (radiological and nonradiological)
- human health (radiological and nonradiological)
- socioeconomics
- environmental justice
- cultural resources
- fuel cycle, decommissioning, and transportation

> **SMALL:** Environmental effects are not detectable or are so minor that 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 impacts are designated as SMALL, MODERATE, or LARGE. The incremental impacts related to the construction and operations activities requiring NRC authorization are described and characterized, as are the cumulative impacts resulting from the proposed action when the effects are added to, or interact with, other past, present, and reasonably foreseeable future effects on the same resources. A summary of the construction and operation impacts are outlined in Tables ES-1. Table E-2 summarizes the review team’s assessment of cumulative impacts. The review team’s detailed analysis which supports the impact assessment of the proposed new units can be found in Chapters 4, 5, and 7, respectively.

1 **Table ES-1. Environmental Impact Levels of the Proposed Turkey Point Units 6 and 7**

Resource Category	Preconstruction and Construction	Operation
Land Use	MODERATE (NRC authorized construction impact level is SMALL)	MODERATE (NRC authorized construction impact level is SMALL)
Water-Related		
Water Use – Surface Water	SMALL	SMALL
Water Use – Groundwater Use	SMALL	SMALL
Water Quality – Surface Water	SMALL	SMALL
Water Quality – Groundwater	SMALL	SMALL
Ecology		
Terrestrial Ecosystems	MODERATE (NRC authorized construction impact level is SMALL)	MODERATE
Aquatic Ecosystems	SMALL to MODERATE	SMALL
Socioeconomic		
Physical Impacts	SMALL	SMALL
Demography	SMALL	SMALL
Economic Impacts on the Community	SMALL	SMALL
Infrastructure and Community Services	SMALL to MODERATE	SMALL to MODERATE
Environmental Justice	NONE[(a)]	NONE[(a)]
Historic and Cultural Resources	MODERATE (NRC authorized construction impact level is SMALL)	SMALL
Air Quality	SMALL	SMALL
Nonradiological Health	SMALL	SMALL
Nonradiological Waste	SMALL	SMALL
Radiological Health	SMALL	SMALL
Postulated Accidents	n/a	SMALL
Fuel Cycle, Transportation, and Decommissioning	n/a	SMALL

(a) A determination of "NONE" for Environmental Justice analyses does not mean there are no adverse impacts to minority or low-income populations from the proposed project. Instead, an indication of "NONE" means that while there are adverse impacts, those impacts do not affect minority or low-income populations in any disproportionate manner, relative to the general population.

Table ES-2. Cumulative Impacts on Environmental Resources, Including the Impacts of Proposed Turkey Point Units 6 and 7

Resource Category	Impact Level
Land Use	MODERATE
Water-Related	
Water Use – Surface Water	SMALL
Water Use – Groundwater Use	SMALL
Water Quality – Surface Water	SMALL
Water Quality – Groundwater	SMALL
Ecology	
Terrestrial Ecosystems	MODERATE to LARGE
Aquatic Ecosystems	MODERATE
Socioeconomic	
Physical Impacts	SMALL to MODERATE
Demography	SMALL
Economic Impacts on the Community	SMALL
Infrastructure and Community Services	SMALL to MODERATE
Environmental Justice	NONE[(a)]
Historic and Cultural Resources	MODERATE
Air Quality	SMALL to MODERATE for criteria pollutants and MODERATE for GHGs
Nonradiological Health	SMALL
Nonradiological Waste	SMALL
Radiological Health	SMALL
Postulated Accidents	SMALL
Fuel Cycle, Transportation, and Decommissioning	SMALL

(a) A determination of “NONE” for Environmental Justice analyses does not mean there are no adverse impacts to minority or low-income populations from the proposed project. Instead, an indication of “NONE” means that while there are adverse impacts, those impacts do not affect minority or low-income populations in any disproportionate manner, relative to the general population.

Alternatives

The review team considered the environmental impacts associated with alternatives to issuing a COL for the two new nuclear units proposed by FPL for the Turkey Point site. These alternatives included a no-action alternative (i.e., not issuing the COL) and alternative energy sources, siting locations, and system designs.

The no-action alternative would result in the COL not being granted or the USACE not issuing its permit. Upon such a denial, construction and operation of new units at the Turkey Point site would not occur and the predicted environmental impacts would not take place. If no other facility would be built or strategy implemented to take its place, the benefits of the additional electrical capacity and electricity generation to be provided would also not occur and the need for baseload power would not be met.

Based on the NRC staff’s review of energy alternatives, the NRC staff concluded that, from an environmental perspective, none of the viable alternatives is environmentally preferable to building a new baseload nuclear power generation plant at the Turkey Point site. The NRC staff eliminated several energy sources (e.g., wind, solar, geothermal, and biomass) from full consideration because they are not currently capable of meeting the need of this project. None of the viable baseload alternatives (natural gas, coal, or a combination of alternatives) was environmentally preferable to the proposed Turkey Point units.

After comparing the cumulative effects of a new nuclear power plant at the proposed site against those at the alternative sites, the NRC staff concluded that none of the alternative sites would be environmentally preferable to the proposed site for building and operating a new nuclear power plant (Table ES-3). The four alternatives sites selected were as follows (Figure ES-2):

- Glades
- Martin
- Okeechobee 2
- St. Lucie.

Table ES-3. Comparison of Cumulative Impacts at the Turkey Point and Alternative Sites

Resource Category	Turkey Point Site[(a)]	Glades[(b)]	Martin[(b)]	Okeechobee 2[(b)]	St. Lucie[(b)]
Land Use	MODERATE	MODERATE	MODERATE	MODERATE	MODERATE
Water-Related					
Surface-water use	SMALL	MODERATE	MODERATE	MODERATE	SMALL
Groundwater use	SMALL	SMALL	SMALL	SMALL	SMALL
Surface-water quality	SMALL	MODERATE	MODERATE	MODERATE	MODERATE
Groundwater quality	SMALL	SMALL	SMALL	SMALL	SMALL
Ecology					
Terrestrial and wetland ecosystems	MODERATE to LARGE	MODERATE	MODERATE	MODERATE	MODERATE
Aquatic ecosystems	MODERATE	MODERATE	MODERATE	MODERATE	SMALL to MODERATE
Socioeconomics					
Physical impacts	SMALL adverse except for MODERATE beneficial impacts on roads	SMALL except for MODERATE impacts on roads and aesthetics	SMALL except for MODERATE impacts on roads and aesthetics	SMALL except for MODERATE impacts on roads and aesthetics	SMALL except for LARGE impacts on buildings and roads
Demography	SMALL	SMALL	SMALL	SMALL	SMALL, except for LARGE residential displacement impacts
Economic impacts on the community	SMALL and beneficial	SMALL and beneficial, except for LARGE and beneficial property tax revenues for Glades County and School District	SMALL and beneficial, except for LARGE and beneficial property tax revenues for Martin County and School District	SMALL and beneficial, except for LARGE and beneficial property tax revenues for Okeechobee County and School District	SMALL and beneficial

Table ES-3. (contd)

Resource Category	Turkey Point Site[(a)]	Glades[(b)]	Martin[(b)]	Okeechobee 2[(b)]	St. Lucie[(b)]
Infrastructure and community services	SMALL except for MODERATE adverse impacts on traffic	SMALL except for MODERATE adverse impacts on traffic	SMALL except for MODERATE adverse impacts on traffic	SMALL except for MODERATE adverse impacts on traffic	SMALL except for MODERATE adverse impacts on traffic
Environmental Justice	None[(c)]	None[(c)]	None[(c)]	None[(c)]	None[(c)]
Historic and Cultural Resources	MODERATE	MODERATE	SMALL	MODERATE	SMALL
Air Quality					
Criteria pollutants	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Greenhouse gas emissions	MODERATE	MODERATE	MODERATE	MODERATE	MODERATE
Nonradiological Health	SMALL	SMALL	SMALL	SMALL	SMALL
Radiological Health	SMALL	SMALL	SMALL	SMALL	SMALL
Postulated Accidents	SMALL	SMALL	SMALL	SMALL	SMALL

(a) Cumulative impact determinations taken from EIS Table 7-3.
(b) Cumulative impact determinations taken from EIS Table 9-28.
(c) A determination of "NONE" for Environmental Justice analyses does not mean there are no adverse impacts to minority or low-income populations from the proposed project. Instead, an indication of "NONE" means that while there are adverse impacts, those impacts do not affect minority or low-income populations in any disproportionate manner, relative to the general population.

Table ES-3 provides a summary of the cumulative impacts for the proposed and alternative sites. The NRC staff concluded that all of the sites were generally comparable, and it would be difficult to state that one site is preferable to another from an environmental perspective. In such a case, the proposed site prevails because none of the alternatives is environmentally preferable to the proposed site.

Table ES-4 provides a summary of the EIS-derived impacts for a new nuclear power plant in comparison with the energy alternatives. The NRC staff concluded that none of the viable energy alternatives is preferable to construction of a new baseload nuclear power-generating plant located within FPL's region of interest.

The NRC staff considered various alternative systems designs, including seven alternative heat-dissipation systems and multiple alternative intake, discharge, and water-supply systems. The review team identified no alternatives that were environmentally preferable to the proposed Turkey Point Units 6 and 7 systems design.

Figure ES-2. Location of Sites Considered as Alternatives to the Turkey Point Site

Table ES-4. Summary of Environmental Impacts of Construction and Operation of New Nuclear, Coal-Fired, and Natural-Gas-Fired Generating Units and a Combination of Alternatives

Impact Category	Nuclear	Coal[a]	Natural Gas[a]	Combination of Alternatives[a]
Land Use	MODERATE	MODERATE	MODERATE	MODERATE
Air Quality	SMALL	MODERATE	SMALL to MODERATE	SMALL to MODERATE
Water Use and Quality	SMALL	SMALL	SMALL	SMALL
Ecology	MODERATE	MODERATE	MODERATE	MODERATE
Waste Management	SMALL	MODERATE	SMALL	SMALL
Socioeconomics	SMALL Beneficial to MODERATE Adverse	SMALL Beneficial to MODERATE Adverse	SMALL Beneficial to SMALL Adverse	SMALL Beneficial to MODERATE Adverse
Human Health	SMALL	SMALL	SMALL	SMALL
Historic and Cultural Resources	MODERATE	MODERATE	MODERATE	MODERATE
Environmental Justice	NONE[b]	NONE[b]	NONE[b]	NONE[b]

(a) Impacts taken from EIS Table 9-4. These conclusions for energy alternatives should be compared to NRC-authorized activities reflected in Chapters 4, 5, and Sections 6.1, and 6.2.
(b) A determination of "NONE" for Environmental Justice analyses does not mean there are no adverse impacts to minority or low-income populations from the proposed project. Instead, an indication of "NONE" means that while there are adverse impacts, those impacts do not affect minority or low-income populations in any disproportionate manner, relative to the general population.

Benefits and Costs

The NRC staff compiled and compared the pertinent analytical conclusions reached in the EIS. It gathered all of the expected impacts from building and operating proposed Turkey Point Units 6 and 7 and aggregated them into two final categories: (1) expected environmental costs and (2) expected benefits to be derived from approval of the proposed action. Although the analysis in Section 10.6 is conceptually similar to a purely economic benefit-cost analysis, which determines the net present dollar value of a given project, the purpose of the section is to identify potential societal benefits of the proposed activities and compare them to the potential internal (i.e., private) and external (i.e., societal) costs of the proposed activities. In general, the purpose is to inform the COL process by gathering and reviewing information that demonstrates the likelihood that the benefits of the proposed activities outweigh the aggregate costs.

On the basis of the assessments in this EIS, the building and operation of proposed Turkey Point Units 6 and 7, with mitigation measures identified by the review team, would accrue benefits that most likely would outweigh the economic, environmental, and social costs. For the NRC-proposed action (i.e., NRC-authorized construction and operation), the accrued benefits would also outweigh the costs of preconstruction, construction, and operation of proposed Turkey Point Units 6 and 7.

Public Involvement

A 60-day scoping period was held from June 15, 2010, to August 16, 2010. On July 15, 2010, the NRC held two public scoping meetings in Homestead, Florida. The review team received many oral comments during the public meetings and 32 e-mails and 10 letters throughout the rest of the scoping period on numerous topics including energy alternatives, terrestrial ecology, ground and surface water, and socioeconomics. The review team's response to the in-scope public comments can be found in Appendix D. The Scoping Summary Report (Agencywide Document Access and Management System (ADAMS) Accession No. ML103130609) contains all of the comments, even those considered out-of-scope (e.g., security, safety issues).

Once the draft EIS is published, the U.S. Environmental Protection Agency will issue a Notice of Availability in the *Federal Register*, which will begin a 75-day comment period for the public to submit comments on the results of the staff's environmental review. There are several ways to submit comments, which will be outlined in the *Federal Register* Notice. During the comment period, the NRC will hold public meetings near the Turkey Point site to describe the results, respond to questions, and accept public comments.

Recommendation

The NRC's preliminary recommendation to the Commission related to the environmental aspects of the proposed action is that the COL should be issued.

This recommendation is based on the following:

- the application, including the ER, submitted by FPL
- consultation with Federal, State, Tribes, and local agencies
- site audit and alternative sites audit
- consideration of public comments received during scoping
- the review team's independent review and assessment summarized in this EIS.

The NRC's determination is independent of the USACE's determination of whether to issue, deny, or issue with modifications the DA permit application for the Turkey Point Units 6 and 7. The USACE will conclude its Clean Water Act Section 404(b)(1) Guidelines and public interest analyses in its Record of Decision.

Abbreviations/Acronyms

AADT	annual average daily traffic
ac	acre(s)
ACC	averted cleanup and decontamination costs
ac-ft	acre (foot) feet
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey
AD	Anno Domini
ADAMS	Agencywide Documents Access and Management System
ALARA	as low as reasonably achievable
a.m.	ante meridian
AP1000	Advanced Passive 1000 pressurized water reactor
AP-42	EPA's Compilation of Air Pollutant Emission Factors document
APE	Area of Potential Effect
APPZ	Avon Park Permeable (or Producing) Zone
AQCR	Air Quality Control Region
ARRA	American Recovery and Reinvestment Act of 2009
ASR	aquifer storage and recovery (system)
ATC	Atlantic Coastal Ridge
BA	Biological Assessment
BACT	Best Available Control Technologies
BBCW	Biscayne Bay Coastal Wetlands
BC	Before Christ
BEBR	University of Florida's Bureau of Economic and Business Research
BEA	U.S. Bureau of Economic Analysis
BEIR VII	Biological Effects of Ionizing Radiation VII
bgs	below ground surface
BISC	Biscayne Bay
BLS	U.S. Bureau of Labor Statistics
BMP	Best Management Practice
Btu	British thermal unit
°C	degree(s) Celsius
μCi	microcurie(s)
μCi/mL	microcuries per milliliter
CAA	Clean Air Act
CAIR	Clean Air Interstate Rule
CCR	coal combustion residuals
CCS	cooling-canal system

CDF	core damage frequency
CDMP	Comprehensive Development Master Plan
CEC	chemical/contaminant of emerging concern
CEQ	Council on Environmental Quality
CERP	Comprehensive Everglades Restoration Program (also Project, Plan)
CFR	*Code of Federal Regulations*
cfs	cubic foot/feet per second
cm	centimeter(s)
cm^2	square centimeter(s)
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COL	combined construction permit and operating license
CPUE	catch per unit effort
CSAPR	Cross-State Air Pollution Rule
CTEMISS	cooling-tower emissions processor
CWA	Clean Water Act (aka Federal Water Pollution Control Act)
CWS	circulating-water system
CZMP	Coastal Zone Management Plan
d	day(s)
D	Directional Distribution Factor
DA	Department of the Army
dB	decibel(s)
dBA	decibel(s) on the A-weighted scale
DBA	design basis accident
DCD	Design Control Document
DEIS	draft environmental impact statement
DERM	Miami-Dade County Department of Environmental Resources Management
DNL	day-night average sound level
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DPS	distinct population segment
DSM	demand-side management
DZMW	dual-zone monitoring well
EAB	exclusion area boundary
EAI	Ecological Associates, Inc.
EC10	effective concentration required to induce a 10% effect
EC50	effective concentration required to induce a 50% effect

EDR	Florida Legislature’s Office of Economic and Demographic Research
EEL	Environmentally Endangered Lands (Program)
EFH	essential fish habitat
EIA	Energy Information Administration
EIS	environmental impact statement
EJ	environmental justice
ELF	extremely low frequency
ELF-EMF	extremely low frequency-electromagnetic field
EMB	Everglades Mitigation Bank
EMF	electromagnetic field
ENP	Everglades National Park
EPA	U.S. Environmental Protection Agency
EPOC	emerging pollutant of concern
EPRI	Electric Power Research Institute
ER	Environmental Report
ESA	Endangered Species Act of 1973, as amended
ESOC	emerging substance of concern
ESRP	Environmental Standard Review Plan (NUREG-1555, Supplement 1, Operating License Renewal)
EW	exploratory well

°F	degree(s) Fahrenheit
FAA	Federal Aviation Administration
FAC	Florida Administrative Code or Fla. Admin. Code
FDEP	Florida Department of Environmental Protection
FDHR	Florida Division of Historic Resources
FDOH	Florida Department of Health
FDOT	Florida Department of Transportation
FEC	Florida East Coast (Railway)
FEFP	Florida Education Finance Program
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FFWCC	Florida Fish and Wildlife Conservation Commission
FKNMS	Florida Keys National Marine Sanctuary
FLUCFCS	Florida Land Use, Cover, and Forms Classification System
FLUM	Future Land Use Map
FMNH	Florida Museum of Natural History
FMP	fishery management plan
FMSF	Florida Master Site File (form)
FNAI	Florida Natural Areas Inventory
FPL	Florida Power and Light Company

fps	foot(feet) per second
FPSC	Florida Public Service Commission
FR	*Federal Register*
FRCC	Florida Reliability Coordinating Council
FSAR	Final Safety Analysis Report
FSER	Final Safety Evaluation Report
ft	foot/feet
ft^2	square foot/feet
ft/d	foot(feet) per day
ft^2/d	square foot(feet) per day
ft^3	cubic foot(feet)
ft^3/d	cubic foot (feet) per day
ft^3/yr	cubic foot (feet) per year
FWPCA	Federal Water Pollution Control Act (also known as the Clean Water Act of 1977)
FWS	U.S. Fish and Wildlife Service
FY	fiscal year
µg	microgram(s)
µg/L	microgram(s) per liter
µGy	microgray(s)
g	gram(s) or gravity of Earth (g-force)
gal	gallon(s)
gal/yr	gallon(s) per year
GC	gas centrifuge
g/cm^3	gram(s) per cubic centimeter
GCRP	U.S. Global Change Research Program
GEIS	Generic Environmental Impact Statement (for License Renewal of Nuclear Plants, NUREG-1437)
GHG	greenhouse gas
GIS	geographic information system
gpd	gallon per day
gpm	gallon per minute
gpm/ft	gallon(s) per minute per foot
g/s	gram(s) per second
GU	Interim District (zone)
GW	gigawatt(s)
GWh	gigawatt hour(s)
ha	hectare(s)
HAP	hazardous air pollutant

HAPC	habitat area of particular concern
HBB	health-based benchmark
HDR	HDR Engineering, Inc.
HEC-RAS	Hydrologic Engineering Centers River Analysis System
hr	hour
HUD	U.S. Department of Housing and Urban Development
Hz	hertz

I	Interstate
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
ID	identification
IGCC	integrated gasification combined-cycle
in.	inch(es)
IRWST	in-containment refueling water storage tank
ISFSI	independent spent-fuel storage installation
IUCN	World Conservation Union
IWF	industrial wastewater facility

K	Standard Peak Hour Factor
kg	kilogram(s)
kg/d	kilogram(s) per day
kg/L	kilogram(s) per liter
kg/yr	kilogram(s) per year
kg/ha/mo	kilogram(s)/hectare/month
kHz	kilohertz
km	kilometer(s)
km^2	square kilometer(s)
km/hr	kilometer(s) per hour
kt	knot(s)
kV	kilovolt(s)
kV/m	kilovolt(s) per meter
kW	kilowatt(s)
kWh	kilowatt-hour(s)

L	liter(s)
lb	pound(s)
lb/yr	pound(s) per year
L_{dn}	day-night average sound level
LEDPA	least environmentally damaging practicable alternative
L_{eq}	noise level equivalent

LLC	Limited Liability Company
LLW	low-level waste
LOEC	lowest-observed effect concentration
LOS	level of service
LPZ	low-population zone
LST	local standard time
LWA	Limited Work Authorization
LWR	light water reactor
μmhos/cm	micromhos per centimeter
m	meter(s)
m/s	meter(s) per second
m^2	square meter(s)
m^3	cubic meter(s)
m^3/d	cubic meters per day
m^3/s	cubic meter(s) per second
mA	milliampere(s)
MACCS	MELCOR Accident Consequence Code System
mcu	Middle Confining Unit
MDC	Miami-Dade County
M-DCPS	Miami-Dade County Public School District
MDWASD	Miami-Dade Water and Sewer Department
MEI	maximally exposed individual
mg	milligram(s)
mG	milliGauss
Mgd	million gallon(s) per day
Mgd/yr	million gallon(s) per day per year
Mgm	million gallons per month
Mg/L	milligram(s) per liter
Mg/m^3	milligram(s) per cubic meter
mg N/L	milligrams of nitrate per liter
mg P/L	milligrams of phosphate per liter
mGy	milligray(s)
mGy/d	milligray(s) per dayMFCMA Magnuson–Stevens Fishery Conservation and Management Act **(or** Magnuson–Stevens Act**)**
MHz	megahertz
mi	mile(s)
mi^2	square mile(s)
min	minute(s)
MIT	Massachusetts Institute of Technology
mL	milliliter(s)

MMBtu	one million British thermal units
MMBtu/hr	one million British thermal units per hour
MMBtu/yr	one million British thermal units per year
MOU	Memorandum of Understanding
mph	mile(s) per hour
mrad	millirad
mrem	millirem
msl or MSL	mean sea level
mSv	millisievert(s)
MSW	municipal solid waste
MT	metric ton(nes)
MTU	metric ton uranium
MW	megawatt(s)
MWd/MTU	megawatt-days per metric ton of uranium
MW(e)	megawatt(s) electric
MW(t)	megawatt(s) thermal
MWh	megawatt hour(s)
MWh/yr	megawatt hour(s) per year
N	north or nitrogen
NA	not applicable
NAAQS	National Ambient Air Quality Standard
NAD83	North American Datum of 1983
NASCAR	National Association for Stock Car Auto Racing
NAVD88	North American Vertical Datum of 1988
NCI	National Cancer Institute
NCRP	National Council on Radiation Protection and Measurements
NEPA	National Environmental Policy Act of 1969, as amended
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NFC	Natural Forest Community
NGCC	natural-gas combined-cycle
NGVD	National Geodetic Vertical Datum
NHPA	National Historic Preservation Act
NIEHS	National Institute of Environmental Health Sciences
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NO_3+NO_2	nitrate+nitrite
NO_x	nitrogen oxides
NOAA	National Oceanographic and Atmospheric Administration
NOEC	no-observed effect concentration

NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRC	U.S. Nuclear Regulatory Commission
NRHP	National Register of Historic Places
NSR	new source review
NUREG	U.S. Nuclear Regulatory Commission technical document
NWS	National Weather Service
O_2	oxygen
O_3	ozone
ODCM	Offsite Dose Calculation Manual
OFW	Outstanding Florida Water
ORV	off-road vehicle
OSHA	Occupational Safety and Health Administration
P	phosphorus
PAH	polycyclic aromatic hydrocarbon
PC	personal computer
PCB	polychlorinated biphenyl
pCi/L	picocurie(s) per Liter
pH	measure of acidity or basicity in solution
P/L	phosphorus per liter
PIR	Public Interest Review or Project Implementation Report
PIRF	Public Interest Review Factor
PK-12	preschool through 12th grade
p.m.	post meridian
PM_{10}	particulate matter with an aerodynamic diameter of 10 microns or less
$PM_{2.5}$	particulate matter with an aerodynamic diameter of 2.5 microns or less
PPSA	Power Plant Siting Act
ppm	part(s) per million
ppt	parts per thousand
PRA	probabilistic risk assessment
PSA	probabilistic safety assessment
PSD	Prevention of Significant Deterioration (Permit)
psu	practical salinity unit
PWR	pressurized water reactor
rad	radiation absorbed dose
RAI	Request for Additional Information
RCRA	Resource Conservation and Recovery Act of 1976, as amended
RCW	radial collector well

rem	roentgen equivalent man
REMP	radiological environmental monitoring program
RfC	reference concentration
RFI	Request for Information
RHA	Rivers and Harbors Act of 1899
RIMS II	Regional Input-Output Modeling System
RMS	root mean square
Rn-222	radon-222
ROD	Record of Decision
ROI	region of interest
RRY	reference reactor year
RSICC	(Oak Ridge) Radiation Safety Information Computational Center
RV	recreational vehicle
RWTF	reclaimed water treatment facility
Ryr	reactor year
s or sec	second(s)
SAFMC	South Atlantic Fisheries Management Council
SAMA	severe accident mitigation alternative
SAMDA	severe accident mitigation design alternative
SAV	submerged aquatic vegetation
SCA	Site Certification Application
scf	standard cubic feet
SCR	selective catalytic reduction
SDWWTP	South District Wastewater Treatment Plant
SER	Safety Evaluation Report
SFRPC	South Florida Regional Planning Council
SFWMD	South Florida Water Management District
SGWEA	Southern Glades Wildlife Environmental Area
SHA	seismic hazard analysis
SHPO	State Historic Preservation Office (or Officer)
s/m^3	seconds per cubic meter
SO_2	sulfur dioxide
SO_x	oxides of sulfur
SOR	Save Our Rivers (Program)
SPCC	Spill Prevention, Control, and Countermeasure (Plan)
SR	State Route
SRP	Standard Review Plan
SSC	Species of Concern
SU	Standard Unit(s)
Sv	sievert(s)

SWPPP	stormwater pollution prevention plan
SWS	service-water system
T	ton(s) or tonne(s)
T/B	Tug/Barge
TB_q	terrabequerel
TCP	traditional cultural property
T&E	threatened and endangered
TDS	total dissolved solids
TEDE	total effective dose equivalent
THPO	Tribal Historic Preservation Officer
TKN	total Kjeldahl nitrogen
TLD	thermoluminescent dosimeter
TN	total nitrogen
TOC	total organic carbon
TP	total phosphorus
TRC	total reportable cases
TVA	Tennessee Valley Authority
UDB	urban development boundary
UF_6	uranium hexafluoride
UIC	Underground Injection Control
UMAM	Uniform Mitigation Assessment Method
UMTRI	University of Michigan Transportation Research Institute
UNESCO	United National Educational, Scientific and Cultural Organization
UO_2	uranium dioxide
US	U.S. (State Highway)
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCB	U.S. Census Bureau
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USDW	underground source of drinking water
USGS	U.S. Geological Survey
VOC	volatile organic compound
W	west
W.A.T.E.R.	Wetland Assessment Technique for Environmental Review
WCA	water conservation area
Westinghouse	Westinghouse Electric Company, LLC

WHO	World Health Organization
wk	week(s)
WOTUS	waters of the United States
WRDA	Water Resources Development Act
WTP	water treatment plant
χ/Q	atmospheric dispersion factor(s); annual average normalized air concentration value(s)
yd^3	cubic yards
yr	year(s)

8.0 Need for Power

Chapter 8 of the U.S. Nuclear Regulatory Commission's (NRC's) NUREG–1555, Environmental Standard Review Plan (ESRP) (NRC 2000-TN614) guides the staff's review and analysis of the need for power for a proposed nuclear power plant. The guidance states the following:

> Affected states or regions continue to prepare need-for-power evaluations for proposed energy facilities. The NRC will review the evaluation for the proposed facility and determine if it is (1) systematic, (2) comprehensive, (3) subject to confirmation, and (4) responsive to forecasting uncertainty. If the State's or region's need-for-power evaluation is found acceptable, no additional independent review by NRC is needed, and the State's analysis can be the basis for ESRPs 8.2 through 8.4 (NRC 2000-TN614).

In a 2003 response to a petition for rulemaking (68 FR 55905) (TN733), the NRC concluded that "… need for power must be addressed in connection with new power plant construction so that the NRC may weigh the likely benefits (e.g., electrical power) against the environmental impacts of constructing and operating a nuclear power reactor." The NRC also stated in its response to the petition discussed above that (1) the NRC does not supplant the States, which have traditionally been responsible for assessing the need for power-generating facilities, their economic feasibility, and regulating rates and services; and (2) the NRC has acknowledged the primacy of State regulatory decisions regarding future energy options (68 FR 55905) (TN733). Consequently, the NRC staff's role with regard to a need-for-power review is to identify whether an independently derived needs determination meets the four acceptability criteria and, if it does, report the conclusions of that independently derived determination. No independent assessment of the relevant service area's need for power is necessary for the NRC staff to meet its responsibility under the National Environmental Policy Act of 1969 (42 USC 4321 et seq.) (TN661), as amended.

The purpose and need for the Turkey Point Nuclear Power Plant (Turkey Point) Units 6 and 7 project identified in Chapter 1 is to generate 2,200 MW(e) baseload power to meet the need for baseload power within the Florida Power and Light Company (FPL) service territory by 2022 and 2023. In 2008, the Florida Public Service Commission (FPSC) analyzed the need for power upon which the NRC staff relied to reach its conclusion that there is a need for power from Turkey Point Units 6 and 7 by 2020. The FPSC analysis showed a need for at least that amount of baseload power. Because the demand for baseload power is at least as much as the supply from Units 6 and 7, a need for the power exists. The following sections discuss the need for power in the context of FPSC's determination (FPSC 2008-TN735).

8.1 Description of the Power System

In Florida, investor-owned utilities such as FPL are regulated by a public service commission and serve a well-defined service territory. The State of Florida, through the FPSC, regulates FPL rates, electric service and grid reliability, and the planning and implementation of generation and transmission resources to serve loads within the FPL service territory. Expansion of FPL's power system depends on the determination of the need for additional power within the FPL service territory. In the case of the proposed Turkey Point Units 6 and 7, FPL has obtained a "Determination of Need" from the FPSC, based on Final Order PSC-08-0237-FOF-EI, dated April 11, 2008 (FPSC 2008-TN735). In its decision, FPSC provides its full reasoning, based on FPL's petition and FPSC's own analysis, for making its determination. For the purposes of this environmental impact statement (EIS), the NRC staff identified FPSC's Determination of Need as an independently derived needs determination that was (1) systematic, (2) comprehensive, (3) subject to confirmation, and (4) responsive to forecasting uncertainty. Therefore, the NRC staff relied upon that FPSC Determination of Need for the remainder of this chapter of the EIS.

The remainder of this chapter characterizes the institutional and physical characteristics of the FPL system, and the NRC staff's basis for relying on FPSC's Determination of Need. Section 8.1.1 reviews the current power system, including geographic considerations, and regional characteristics. Section 8.1.2 provides an assessment of the FPSC's analytical processes in the context of the NRC's four acceptability criteria. It discusses the specific criteria FPSC used to make its determination. Section 8.2 discusses some of the key factors affecting the demand for electricity and provides a table from the FPL Environmental Report (ER) (FPL 2014-TN4058) showing the FPL/FPSC analysis of future demand. Section 8.3 describes the FPL and FPSC assessments of the supply of electricity. Section 8.4 reports the FPSC's conclusions regarding the determination of the need for power as proposed by FPL and verified by the FPSC evaluation.

8.1.1 Description of the FPL System

FPL is an investor-owned utility operating within a defined service territory in southern and northeastern Florida. It serves approximately 9 million customers within a 27,650 mi^2 area, and includes the large metropolitan areas of Miami and Fort Lauderdale (see Figure 8-1 for a map of FPL's service area counties) (FPL 2014-TN3360). The region of influence for the proposed action is this 35-county area.

The region of influence is within the administrative region of the Florida Reliability Coordinating Council (FRCC), which is an administrative subregion of the North American Electric Reliability Corporation (NERC). The FRCC, which includes investor-owned utilities, cooperative utilities, municipal utilities, Federal power agencies, power marketers, and independent power producers, was created to ensure the reliability and adequacy of current and future bulk electricity supply in Florida and the United States. The entire FRCC region is within the Eastern Interconnection of the alternating current power grid.

FPL is part of an interconnected power network that enables power exchange between utilities. FPL is interconnected with 21 municipal and rural electric cooperative systems (FPL 2014-TN4058). FPL's transmission system includes approximately 6,734 circuit miles of transmission lines (TenYrPlan2014). In 2013, FPL had total summer capacity resources of approximately 26,183 MW, consisting of system firm generation of 24,239 MW and 1,944 MW of firm purchased power (FPL 2014-TN3360). FPL provided electricity service to over 4.6 million customers in 35 counties in 2013, including retail and wholesale customers, municipalities, utilities, and power agencies (FPL 2014-TN3360).

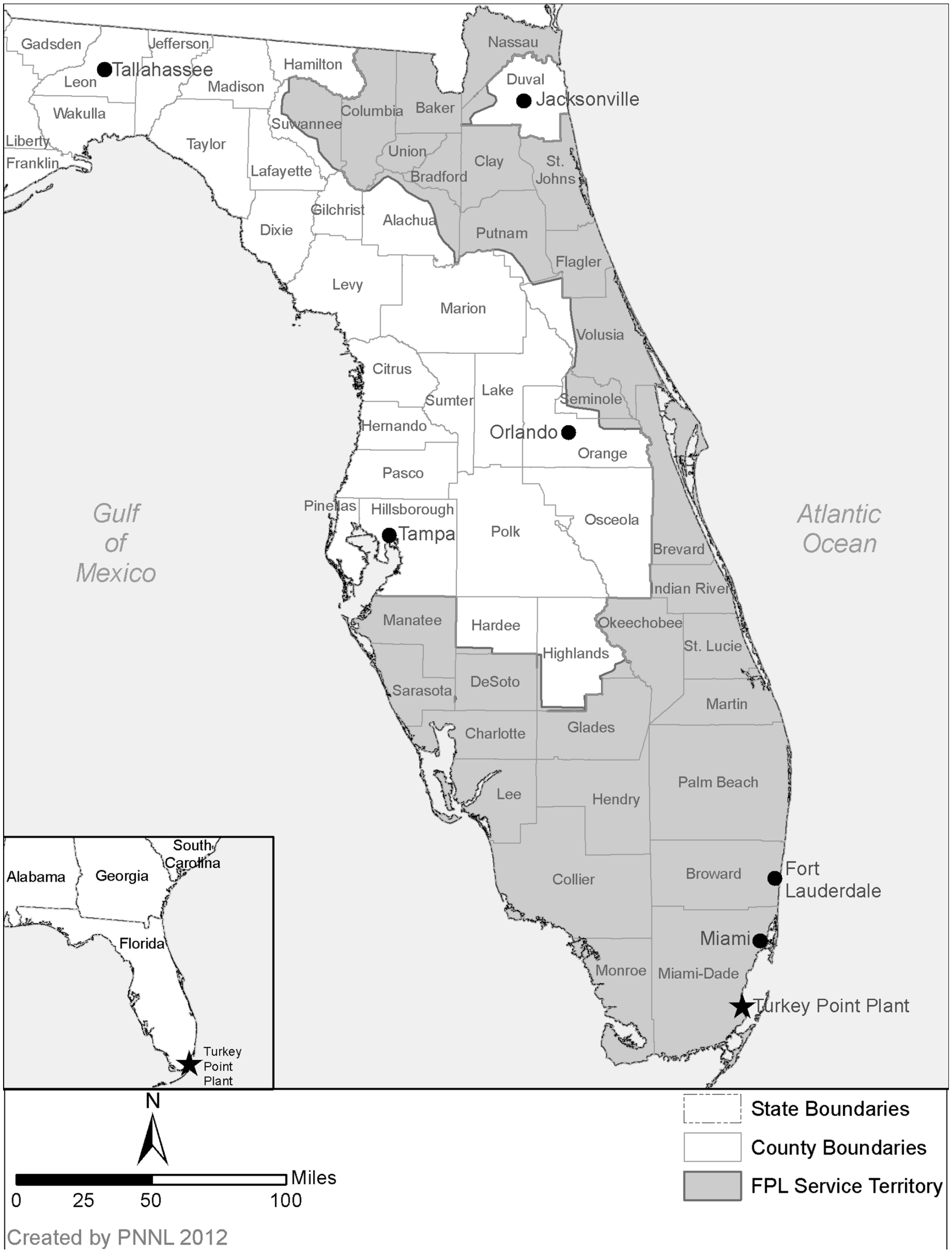

Figure 8-1. FPL Service Territory |GN121|

Table 8-1 illustrates recent trends in electricity sales by customer class (FPL 2014-TN3360). FPL relies on two measures of reliability in its resource planning. First, a deterministic measure known as “reserve margin” is used to reflect FPL’s ability to meet its forecasted seasonal peak load with firm capacity. Simply stated, the reserve margin is the percentage of a utility’s total available capacity that must be available for service (firm), over and above the system peak load, as insurance against forced outages and other planned or unplanned events that could cause outages. FPL uses a 20 percent minimum reserve margin criterion in its resource-supply planning. It uses another measure of reliability—"loss of load probability"—that reflects the probability a company will be unable to meet its load throughout the year. This measure is a utility industry standard reflecting the maximum of 1 day in 10 years (one-tenth of a day per year) loss of load probability.

Table 8-1. Shares of Electricity Sales by FPL Customer Class (FPL 2014-TN3360)

Customer Class	2009	2010	2011	2012	2013
Residential (%)	51.9	52.9	51.8	50.6	51.1
Commercial (%)	43.3	41.8	42.7	42.9	43.0
Industrial (%)	3.1	2.9	2.9	2.9	2.8
Wholesale (%)	1.1	1.9	2.1	2.1	2.0
Other (%)	0.5	0.5	0.5	0.5	0.5
Total (GWh)	**103,911**	**106,606**	**105,502**	**104,462**	**104,943**

8.1.2 Evaluation of the FPL Analytical Process

In accordance with NUREG–1555 (NRC 2000-TN614), the NRC staff determined the analytical process and need-for-power evaluation performed by the FPSC met the four NRC criteria for being (1) systematic, (2) comprehensive, (3) subject to confirmation, and (4) responsive to forecasting uncertainty. The following sections describe how the FPSC process met the four NRC criteria.

8.1.2.1 Systematic

The NRC staff determined that FPSC used a systematic process for determining the need for the proposed Turkey Point Units 6 and 7. Regulatory provisions in Florida state that, on an annual basis, FPL must provide the most up-to-date forecast and expected resource portfolio, respective of all known current conditions. FPL accomplishes this through an iterative process for load forecasting, which is updated and reviewed annually as directed by the State through the FPSC. Load forecasts use utility industry best practices and methodological approaches to determine the utility's need for power and the most cost-effective strategies to meet its regulatory obligations. In the Determination of Need proceedings, the FPSC staff and other witnesses indicated that FPL's forecasts were reasonable for planning purposes, and the FPSC found that FPL had provided a reliable and appropriate basis for assessing the need for Turkey Point Units 6 and 7. Therefore, the regulatory provisions combined with FPSC's Determination of Need Proceedings demonstrate to the NRC staff that a systematic process was applied for determining the need for Units 6 and 7.

8.1.2.2 Comprehensive

The NRC staff concluded FPSC's analysis of issues affecting the need for power in the FPL service territory is comprehensive. The factors analyzed by FPSC include electric system reliability, the specific need for baseload capacity, the basis for forecasts and cost assumptions, the existence of viable alternatives, and cost-effectiveness. FPSC reviewed FPL's peak demand and energy forecasts which incorporate key influencing factors, such as economic and demographic trends, weather, and implemented load-reduction programs such as new energy efficiency and demand-side management (DSM) programs. Forecasts generated included each sector of the economy, and separate forecasts were developed to determine both short- and long-term demand. Power-supply forecasts include a comprehensive evaluation of present and planned generating capabilities as well as present and planned power purchases and sales in the service territory. FPL identified all existing generators by fuel type, planned expansions, new construction, and potential closure over the relevant time period, all of which FPSC found reasonable. All analyses are performed with forecasting and statistical modeling and methodological approaches appropriate for the power industry.

The FPSC review process also takes into account the need for a reliable power system, fuel diversity, dependable supply of electricity, baseload power-generating capacity, adequate electricity at reasonable cost, and whether the project is the most cost-effective option (FPSC 2008-TN735). These factors are outside the authority of the NRC review, but demonstrate the standards of the FPSC Determination of Need review process. In view of the above, the NRC staff determined FPSC's analysis of issues affecting the need for power in the FPL service territory is comprehensive.

8.1.2.3 Subject to Confirmation

The NRC staff concluded the process, models, and estimations used in the FPSC Determination of Need are subject to a rigorous confirmation process by expert witnesses and the general public. These proceedings and relevant findings are all documented in the Final Order issued by the FPSC (2008-TN735). The FPSC performed an independent analysis of the FPL assertions made in its application and affirmed the forecasting methods and results. The NRC staff reviewed the FPSC analysis conclusions and did not identify contradictory or unconfirmed conclusions in any other independent sources such as the NERC long-term reliability assessment (NERC 2008-TN734). Accordingly, the NRC staff determined FPSC's process for making the Determination of Need was subject to confirmation.

8.1.2.4 Responsive to Forecasting Uncertainty

The NRC staff also determined that the FPSC Determination of Need was based on a forecasting methodology that incorporated uncertainty by the use of alternative scenario analysis and probabilistic modeling of the electrical system, which are standard industry practices. FPSC relied on FPL analyses that tested the validity of its overall forecast by analyzing the impact of alternative load forecasts (high, medium, and low). In addition, FPSC quantified uncertainty in the load forecast by evaluating the resource portfolios against variations in future sensitivities, such as fuel and construction costs, load forecasts, environmental laws and regulations, and risk. In doing so, FPL developed resource portfolios that quantify the long-term cost to customers under varying potential sensitivities while understanding the fundamental strengths and weaknesses of various resource configurations. Accordingly, the NRC staff determined the forecasting methodology relied upon by FPSC is responsive to forecasting uncertainty.

8.2 Determination of Demand

FPL performs demand forecasts to provide continuous service to its regulated service territory, meet its contractual commitments to wholesale customers, and contributes to the reliability of the FRCC region. Forecasts are based on expected population growth and other economic factors. These analyses are contained in FPL's annual 10-Year Site Plan and became the basis for FPL's petition to the State of Florida for a Determination of Need for the proposed project. This process is governed by Section 403.519 of the Florida Statutes (Fla. Stat. 29-403.519-TN1057) and by Rule 25-22.080 of Florida Administrative Code (Fla. Admin. Code 25-22-TN1056). The FPSC reviewed FPL's petition for a Determination of Need, which was submitted in October 2007; and the resulting Final Order granting the petition was issued by the FPSC on April 11, 2008 (FPSC 2008-TN735).

8.2.1 Factors in the FPSC Determination of Need

This section discusses key factors affecting the future demand for electricity that FPSC considered in the issuance of its Determination of Need Final Order. The FPSC provides an independent review of the FPL forecasts and other assertions to draw its own conclusions regarding the FPL case that a need exists for both proposed units at the Turkey Point site. Each section below describes a specific factor FPSC considered in granting its Determination of Need.

8.2.1.1 Growth in Demand

The principal factor affecting the change in demand for electricity over time is the change in the number and type of customers needing that power. Electrical demand and energy usage in Florida are unique compared to other states because residential customers make up the largest part of the customer base, composing over 89 percent of Florida's electricity customers and consuming 52 percent of the total generating capacity available in the State. Because population projections are the key factor in determining the demand for electricity in Florida, FPL used population projections as one of its main independent variables. Therefore, FPL used population projections produced by the Florida Bureau of Economic and Business Research at the University of Florida to estimate growth in its customer base to develop its annual Ten Year Power Plant Site Plan. FPL also applied standard State and national economic assumptions on growth that were produced by the independent group IHS Global Insight. Based on data from the University of Florida's Demographic Estimating Conference, FPL stated in its Ten Year Power Plant Site Plan that net migration into Florida fell to a record low in 2009 and, although there has been a small rebound, net migration into Florida still remains below historical averages. However, higher rates of population growth are anticipated from 2014 until 2018 and then level off after 2018 (FPL 2014-TN3360). FPL projected that summer peak demand will grow from 21,700 MW in 2011 to 30,200 MW in 2026 (FPL 2014-TN4058).

8.2.1.2 Electric System Reliability

One of the most important functions of an electricity generating unit is to contribute to the protection of the overall distribution system having available (and ready to generate) by producing more electricity than its service area demands. This approach is taken as a hedge against unforeseen emergencies that could disrupt the delivery of electricity. This excess production capacity is commonly called a "reserve margin," and FPL applies a 20 percent reserve margin to all of its demand projections (FPL 2014-TN4058). The FPSC reviewed FPLs assertion that, without the proposed action, FPL would be unable to maintain its minimum reserve margin planning requirement beginning in 2018. FPSC also reviewed FPL's assertion that with no growth in demand, that there is a need for power solely from power plant retirements and expiration of purchase power agreements. The FPSC found no issue with the forecast assumptions, regression models, and projected system peak demands provided by FPL for this petition and affirmed FPL's reliance on the 20 percent reserve margin. Table 8-2 presents FPL's reserve margin analysis (FPL 2014-TN3360).

Table 8-2. FPL Summer Reserve Margin Forecast by Case (FPSC 2008-TN735)

	FPL Reserve Margin (%)		
Year	**w/ Units 6 and 7[(a)]**	**w/o Units 6 and 7[(a)]**	**No Growth, 2008−2012[(b)]**
2015	23.6	23.6	28.3
2016	20.6	20.6	19.3
2017	21.2	21.2	16.5
2018	22.9	18.6	13.9
2019	20.4	16.2	11.4
2020	21.9	13.7	8.8

(a) Includes previously certified nuclear uprates in 2012 and 2013 as well as new uncertified gas combined-cycle units in 2011, 2015, 2016, and 2017.
(b) Includes previously certified nuclear uprates in 2012 and 2013, but no new gas units.

8.2.1.3 Fuel Diversity

FPSC reviewed FPL's assertion that without the proposed action, nuclear power generation would decline to 16 percent of its portfolio by 2021 and cause FPL to rely on natural-gas power generation for up to 75 percent of its power generation. Regardless of Units 6 and 7, FPL's coal share will drop from 16 percent to 7 percent because of the expiration of purchased power contracts in 2015. Under Section 403.519 of the Florida Statutes as amended (Fla. Stat. 29-403.519-TN1057), the FPSC is mandated to consider fuel diversity in its evaluation of electricity generation expansion plans. Section 403.519(4) (b) of the Florida Statutes (Fla. Stat. 29-403.519-TN1057) directs FPSC to account for reductions in the State's dependence on foreign natural gas and fuel oil. The FPSC concluded FPL demonstrated that the proposed action is needed to maintain a diverse fuel supply, reduce the State's dependence on natural gas, and provide a significant source of non-carbon-emitting baseload generation.

8.2.1.4 Baseload Capacity

The FPSC reviewed FPL's assertion that without the proposed action FPL would not meet its baseload needs and reduce carbon emissions because most renewable generation cannot provide baseload capacity. FPSC found that the addition of proposed Units 6 and 7 to the fleet would enable FPL to meet part of its baseload need without the use of more carbon-emitting generation. FPSC found that, by 2020, FPL's baseload needs are expected to increase by 6,000 MW, and even with substantial decreases in load forecasts or increases in DSM and renewable generation, the need for Units 6 and 7 would remain. The FPSC also found that the expected high capacity rates of Units 6 and 7 would represent a substantial addition of baseload capacity on the FPL system. Therefore, neither renewable generation resources nor DSM resources currently available or in the foreseeable future could provide enough baseload capacity to avoid or mitigate the need that would be met by the proposed action.

8.2.1.5 Adequate Electricity at a Reasonable Cost

The FPSC reviewed FPL's assertion that relative to fossil fuels, nuclear fuel will continue to be the most stable in price and lowest-cost fuel available to FPL. The FPSC found FPL's economic assumptions and estimates of capital cost, transmission cost, and fuel price to be reasonable. These findings are based on FPSC's own analyses and on testimony from several expert witnesses (FPSC 2008-TN735).

The FPSC reviewed whether FPL included a reasonable level of environmental compliance costs associated with the proposed action. The FPSC found that because nuclear power generation is a non-carbon-emitting power-generation source, an increase in environmental compliance costs associated with expected carbon dioxide (CO_2) regulation would increase the overall cost-effectiveness of the proposed new units. Because these costs have not yet been imposed but are expected to be imposed by the time the proposed units become operational, conclusions are based on four independent assessments of potential CO_2 compliance costs.

8.2.1.6 Demand-Side Management and Renewable Energy Sources and Technologies

In its analysis of the Determination of Need for Turkey Point Units 6 and 7, the FPSC considered the availability of viable alternatives. Its findings relative to alternatives are presented here to fully characterize the FPSC's decision about the need for the new units. The NRC analysis of potential alternatives to Units 6 and 7 is documented in Chapter 9 of this EIS. Based on the record reported in its Final Order (FPSC 2008-TN735), the FPSC found that there are no renewable energy resources, technologies, DSM options, or other conservation measures reasonably available to FPL that could supply the need for 2,200 MW(e) of baseload power that Units 6 and 7 would provide. The record reflects the following observations by the FPSC:

- FPL has searched and continues to search for reliable renewable generation sources and technologies.
- FPL offers a wide range of residential and commercial DSM programs, such as load management, building envelope, lighting, and air-conditioning programs.
- Although FPL's load forecast assumes the addition of 144 MW of renewable firm capacity to its portfolio and the extension of 143 MW of renewable firm capacity from expiring municipal waste-to-energy contracts, additional capacity still would be needed to meet the need for baseload generation.
- FPL's DSM programs through 2009 resulted in summer peak reduction of 4,257 MW and energy savings of 51,055 gigawatt-hours at the generator. In 2004, FPL received approval for 802 MW (at the generator) of additional DSM from 2006 to 2014. By 2020, an additional 1,899 MW (at the generator) of additional summer demand reduction is expected (FPL 2014-TN4058).

8.2.1.7 Most Cost-Effective Source of Power

In accordance with Section 403.519(4) of the Florida Statutes (Fla. Stat. 29-403.519-TN1057), the FPSC reviewed FPL's assertion that the proposed action would provide the most cost-effective source of power. The FPSC found the breadth of planning scenarios that FPL analyzed, including 18 different fuel-cost and/or environmental-cost scenarios, provided a reasonable basis for considering the question of cost-effectiveness. These scenarios included nine different fuel-cost forecasts (low, medium, and high) and environmental-cost projections. Subsequent FPSC reviews showed the proposed action to be cost-effective in 17 of the 18 scenarios. None of the FPL scenarios included potential Federal incentives that, if considered, would serve to increase the cost-effectiveness in all cases.

Because cost savings were projected from seven of the eight plausible projection cases identified, the FPSC concluded it is highly likely that FPL rate payers would realize net benefits over the life of the proposed new units. It found that the proposed action is projected to result in nearly $1 billion in fuel-cost savings beginning in 2021 and about $94 billion over the life of the permits when compared to reasonable combined-cycle alternatives. According to the FPCS, because nuclear generation is considered a "non-emitting" technology for greenhouse gas emissions, the higher the CO_2-compliance costs imposed on other technologies, the more cost-effective the proposed action becomes.

The FPSC also recognized the role of uncertainty with long lead-time projects such as nuclear power generation, as well as the Florida provisions for early cost recovery through rate increases. As a result, the FPSC recommends that FPL continue to pursue joint ownership opportunities as a means to mitigate rate impacts. Therefore, as part of annual cost-recovery proceedings ordered by the FPSC, FPL must provide updates on its progress in this regard. As part of the annual cost-recovery proceedings, FPL must provide the FPSC with updated fuel forecasts, environmental forecasts, non-binding capital cost estimates, and an accounting of sunk costs. The FPSC then will consider each year's new information and determine the feasibility of continued construction of the proposed Turkey Point Units 6 and 7.

8.2.2 FPL's Demand for Electricity

This section reproduces the expected demand for electricity (Table 8-3) developed by FPL for the ER's Chapter 8, Need for Power.

8.3 Determination of Supply

The FPSC reported in its 2008 Determination of Need that in 2006, FPL's generation capacity profile in Florida was approximately as follows: 18 percent coal generated, 50 percent natural-gas generated, and 21 percent nuclear generated (FPSC 2008-TN735).

For its power-supply and capacity forecasts, FPL considered its present and planned generating capabilities (including planned uprates, closures of facilities, and additional new power-generation facilities), present and planned purchases of power from generators outside the service territory, and its sales of power to consumers outside the service territory.

FPL is expected to fall below the 20 percent summer reserve margin requirement in 2016 by 824 MW. By 2022, the projected year during which Unit 6 would begin operations, the reserve margin would be 5.4 percent. Therefore, approximately 3,486 MW would be needed, assuming no Turkey Point Units 6 and 7, power uprates, and other capacity additions. Table 8-4 below shows the forecasted capacities and reserve margins from 2015 through 2026 (FPL 2014-TN4058).

Table 8-3. Forecasted Energy Consumption, Capacity, and Peak Demand

	Residential (GWh)	Commercial (GWh)	Industrial (GWh)	Railroads and Railways (GWh)	Street and Highway Lighting (GWh)	Other Public Authorities (GWh)	Total Sales (GWh)	Sales for Resale (GWh)	Utility Use and Losses (GWh)	Net Energy for Load (GWh)
2015	59,326	47,089	3,013	92	487	30	110,038	5,566	8,006	123,610
2016	60,382	47,869	3,015	92	500	30	111,888	5,599	8,106	125,593
2017	61,118	48,660	3,004	92	514	30	113,418	5,625	8,208	127,251
2018	61,828	49,456	2,992	92	529	30	114,928	5,672	8,310	128,910
2019	62,480	50,385	2,987	92	544	30	116,518	5,717	8,443	130,679
2020	63,575	51,512	2,981	92	560	30	118,749	5,770	8,601	133,121
2021	64,716	52,695	2,973	92	576	30	121,081	5,821	8,979	135,881
2022	66,123	54,033	2,952	92	592	30	123,823	5,872	9,177	138,872
2023	67,592	55,353	2,945	92	609	30	126,621	5,923	9,379	141,923
2024	69,121	56,665	2,975	92	627	30	129,510	5,973	9,587	145,070
2025	70,702	58,104	3,006	92	645	30	132,578	6,022	9,806	148,406
2026	72,010	59,344	3,019	92	663	30	135,157	6,077	9,994	151,229

Source: FPL 2014-TN4058

Table 8-4. Forecasted Capacities and Reserve Margins During the Summer Peak Period

August of the Year	Projections of FPL Unit Capacity (MW)	Projections of Firm Purchases (MW)	Projections of Scheduled Maintenance (MW)	Projection of Total Capacity (MW)	Peak Load Forecast (MW)	Summer DSM Forecast (MW)	Forecast of Firm Peak (MW)	Forecast of Summer Reserves (MW)	Forecast of Summer Reserve Margins w/o Additional (%)	MW Needed to Meet 20% Reserve Margin (MW)
2015	24,867	2,046	350	26,563	24,172	2,710	21,462	5,100	23.8	(808)
2016	24,867	740	350	25,257	24,605	2,871	21,734	3,523	16.2	824
2017	24,867	740	350	25,257	25,025	3,016	22,009	3,248	14.8	1,154
2018	24,867	740	350	25,257	25,266	3,149	22,117	3,139	14.2	1,284
2019	24,867	740	350	25,257	25,690	3,271	22,419	2,837	12.7	1,647
2020	24,867	740	350	25,257	26,193	3,371	22,822	2,434	10.7	2,130
2021	24,867	740	350	25,257	26,830	3,471	23,359	1,897	8.1	2,775
2022	24,867	740	350	25,257	27,523	3,571	23,952	1,304	5.4	3,486
2023	24,867	740	350	25,257	28,208	3,671	24,537	719	2.9	4,188
2024	24,867	740	350	25,257	28,849	3,771	25,078	178	0.7	4,838
2025	24,867	490	350	25,007	29,525	3,871	25,654	(648)	-2.5	5,779
2026	24,867	160	350	24,677	30,213	3,904	26,309	(1,633)	-6.2	6,895

Source: FPL 2014-TN4058

8.4 Conclusions

As stated in Section 8.0, the NRC acknowledges the primacy of states to assess and regulate their own power needs. The State of Florida has officially determined that there is a need for about 6,000 MW (e) of additional baseload electricity generation by 2020. Further, the State has determined that, for many reasons, the need should be filled by the proposed action of constructing and operating Turkey Point Units 6 and 7. The FPSC granted FPL a Determination of Need for Units 6 and 7 in April of 2008. The NRC staff outlined in Section 8.1 how the FPSC process was (1) systematic, (2) comprehensive, (3) subject to confirmation, and (4) responsive to forecasting uncertainty. Because its review process met the NRC's four criteria for reliability, the NRC staff finds no reason to challenge the FPSC conclusions. Consequently the NRC staff finds the applicant's need for power conclusions to be reasonable and establishes a positive need for power for the proposed Turkey Point Units 6 and 7.

9.0 Environmental Impacts of Alternatives

This chapter describes alternatives to the proposed U.S. Nuclear Regulatory Commission (NRC) action for a combined construction permit and operating license (combined license or COL) and the U.S. Army Corps of Engineers' (USACE's) action for a Department of the Army (DA) permit and discusses the environmental impacts of those alternatives. Section 9.1 discusses the no-action alternative. Section 9.2 addresses alternative energy sources. Section 9.3 reviews the region of interest (ROI) evaluated in the site-selection process, the Florida Power and Light Company (FPL) site-selection process, details specific to each one of the respective alternative sites, and summarizes and compares the cumulative environmental impacts for the proposed and alternative sites. Section 9.4 examines plant design alternatives.

The need to compare the proposed action with alternatives arises from the requirement in Section 102(2)(c)(iii) of the National Environmental Policy Act of 1969, as amended (NEPA) (42 USC 4321 et seq.) (TN661), that environmental impact statements (EISs) include an analysis of alternatives to the proposed action. The NRC implements this requirement through its regulations in Title 10 of the *Code of Federal Regulations* (CFR) Part 51 (TN250) and its Environmental Standard Review Plan (ESRP) (NRC 2000-TN614). The environmental impacts of the alternatives are evaluated using the NRC's three-level standard of significance—SMALL, MODERATE, or LARGE—developed using Council on Environmental Quality (CEQ) guidelines (40 CFR 1508.27) (TN428) and set forth in the footnotes to Table B-1 of 10 CFR Part 51 (TN250), Subpart A, Appendix B. The issues evaluated in this chapter are the same as those addressed in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*, NUREG–1437, Volumes 1, 2, and 3 (NRC 2013-TN2654). Although NUREG–1437 was developed for license renewal, it provides useful information for the review of new reactors, and is referenced where appropriate throughout this chapter. Additional guidance on conducting environmental reviews is provided in *Interim Staff Guidance on Environmental Issues Associated with New Reactors* (NRC 2014-TN3767).

As part of the evaluation of permit applications subject to Section 404 of the Clean Water Act, the USACE is required by regulation to apply the criteria set forth in the joint U.S. Environmental Protection Agency (EPA) and USACE CWA Section 404(b)(1) guidelines (40 CFR Part 230) (TN427) (hereinafter "404 (b)(1) Guidelines"). These guidelines establish criteria that must be met for the proposed activities to be permitted pursuant to Section 404, which governs specification of disposal sites for dredged or fill material. Specifically, the 404 Guidelines state, in part, that no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge that would have less adverse impacts on the aquatic ecosystem provided the alternative does not have other significant adverse consequences. An area not presently owned by the applicant that could reasonably be obtained, used, expanded, or managed to fulfill the basic purpose of the proposed activity may be considered if it is otherwise a practicable alternative. The USACE will conclude its Clean Water Act Section 404(b)(1) Guidelines and public interest analyses in its Record of Decision.

9.1 No-Action Alternative

For the purposes of an application for a COL, the no-action alternative refers to a scenario in which the NRC would deny the COLs requested by FPL, which would result in the proposed Units 6 and 7 not being built. The USACE no-action alternative is one which results in no construction requiring a DA permit. This could be accomplished by the applicant minimizing project impacts so that all work under the jurisdiction of USACE is eliminated or by USACE denying the DA permit application. Upon receiving such a denial by the NRC or the USACE, the construction and operation of two new nuclear units at the Turkey Point Nuclear Power Plant (Turkey Point) site in accordance with 10 CFR Part 52 (TN251) would not occur and the predicted environmental impacts associated with the project would not occur. Some preconstruction impacts associated with activities not within the NRC's definition of construction at 10 CFR 50.10(a) (TN249) and 51.4 (TN250) may occur nonetheless. However, no activities, including preconstruction activities, involving the discharge of dredged or fill materials into waters of the United States or work in navigable waters of the Unites States, could occur without a DA permit from the USACE.

If no other power plants were to be built in lieu of the proposed project or other strategy implemented to take its place, the benefits of the additional electrical capacity and electricity generation to be provided by the project would not occur. If no additional measures (e.g., conservation, importing power, restarting retired power plants, and/or extending the life of existing power plants) were implemented to realize the amount of electrical capacity that would otherwise be required for power in FPL's ROI (see Section 9.3.1), then the need for baseload power, discussed in Chapter 8, would not be met. Therefore, the purpose and need of this project would not be satisfied if the no-action alternative was chosen and the need for power was not met by other means.

If other generation sources were installed, either at another site or using a different energy source, the environmental impacts associated with these other sources would eventually occur. As discussed in Chapter 8, there is a demonstrated need for power and FPL has regulatory responsibilities in Florida to provide electrical service in its service area. It is reasonable to assume that other options to meet the need for power would be pursued. This needed power may be provided and supported through several alternatives that are discussed in Sections 9.2 and 9.3.

9.2 Energy Alternatives

The purpose and need for the proposed project identified in Section 1.3 is to provide additional baseload electrical generation capacity for use in FPL's current markets. This section examines the potential environmental impacts associated with alternatives to construction of a new baseload nuclear power plant. Section 9.2.1 discusses energy alternatives not requiring new generating capacity. Section 9.2.2 discusses energy alternatives requiring new generating capacity. Other alternatives are discussed in Section 9.2.3. A combination of alternatives is discussed in Section 9.2.4. Section 9.2.5 compares the environmental impacts from new nuclear, coal-fired, and natural-gas−fired generating units and a combination of energy sources at the Turkey Point site.

For analysis of energy alternatives, FPL assumed a bounding target value of 2,200 MW(e) net electrical output (FPL 2014-TN4058). The NRC staff also used this level of output in its analysis of energy alternatives.

The review team's analysis is based on an in-service date for Unit 6 of 2022 and Unit 7 of 2023 based on FPL's 2014 Ten-Year Plan (FPL 2014-TN3360). Even if the actual in-service date were to slip by a few years, the NRC staff would not expect such a change to affect the overall conclusions regarding energy alternatives for two reasons. First, the projections by FPL and by the U.S. Department of Energy, Energy Information Administration (DOE/EIA) that the NRC staff has used in its analyses do not change appreciably in the later years and are generally consistent with the data used for 2023. Second, the environmental impacts of the feasible alternatives are not likely to change appreciably, so the NRC staff's conclusions regarding environmental preferability are unlikely to change.

9.2.1 Alternatives Not Requiring New Generating Capacity

Four alternatives to the proposed action that do not require FPL to construct new generating capacity are as follows:

- Purchase the needed electric power from other suppliers.
- Extend the operating life of existing power plants.
- Reactivate retired power plants.
- Implement conservation or demand-side management programs.

9.2.1.1 Purchased Power

If power to replace the capacity of the proposed new nuclear units was to be purchased from sources within the United States or from a foreign country, the generating technology likely would be one of those described in NUREG–1437 (e.g., coal, natural gas, or nuclear) (NRC 2013-TN2654). The environmental impacts of other technologies described in the Generic Environmental Impact Statement (GEIS) for License Renewal of Nuclear Plants, (NUREG–1437) are representative of the impacts associated with the construction and operation of new generating units at the Turkey Point site. The environmental impacts of coal-fired and natural-gas−fired plants are discussed in Sections 9.2.2.1 and 9.2.2.2, respectively.

Under the purchased power alternative, the environmental impacts of power production would still occur, but they would occur elsewhere in the region or nation. If the purchased power alternative was to be implemented, the most significant environmental unknown would be whether new transmission line corridors would be required. The construction of new transmission lines could have both environmental and aesthetic consequences, particularly if new transmission lines require new corridors (as opposed to collocating new lines with existing lines in existing corridors). The review team concludes that the local environmental impacts from purchased power would be SMALL when existing transmission line corridors are used and could range from SMALL to LARGE if acquisition of new corridors is required. The overall environmental impacts of power generation would depend on the generation technology and location of the generation site and, therefore, are unknown. However, as discussed in Section 9.2.5, the NRC staff concluded that from an environmental perspective, none of the viable energy alternatives would be clearly preferable to construction of a new baseload nuclear power-generation plant located within FPL's ROI.

9.2.1.2 Reactivating Retired Power Plants or Extending Operating Life

In its Environmental Report (ER), FPL acknowledged that reactivating or extending the service life of existing plants or extending their capacity through power uprates or other efficiency improvements could theoretically reduce the need for a new nuclear power station. FPL also noted in the 2014 Ten-Year Plan (FPL 2014-TN3360) that it has completed power uprates at FPL's four existing nuclear units (Turkey Point Units 3 and 4 and St. Lucie Units 1 and 2). The capacity uprates have added approximately 520 MW of capacity to FPL's system. In addition, FPL has already received renewed licenses for all of its existing nuclear units that extend the licenses through 2032 to 2043 (depending on the unit). Because extending the service life of these nuclear plants and constructing the proposed Turkey Point Units 6 and 7 are both already considered as part of FPL's future baseload generation capacity, the NRC staff concludes that extending the service life of the existing nuclear plants alone is not a feasible alternative to the proposed Turkey Point Units 6 and 7.

Another potential strategy is repowering one or more of FPL's existing generating plants. Repowering involves modifying a plant to use a different fuel source. In its ER, FPL described plans that were approved by the Florida Public Service Commission (FPSC) in September 2008 and were incorporated in FPL's recent Integrated Resource Plan to repower two existing generating plants, Cape Canaveral and Riviera Beach, each of which consists of two older fossil-fuel−fired steam-generating units that will be converted into new highly efficient natural-gas combined-cycle units. The two-unit plant at FPL's Cape Canaveral site has been replaced with a new combined-cycle plant that has an output of approximately 1,210 MW. This new unit is called the Cape Canaveral Next-Generation Clean Energy Center. The two-unit plant at FPL's Riviera site has also been replaced by a new combined-cycle plant that has an output of approximately 1,210 MW (FPL 2014-TN3360).

Older existing fossil-fueled plants, predominately coal-fired and natural-gas−fired plants, are likely to need refurbishing to extend plant life for an extended period (the proposed action assumes a minimum operating period of 40 years), and meeting current environmental requirements would also be costly. Such plants would typically be old enough that the refurbished plants would likely be viewed as new sources, subject to the current-day complement of regulatory controls on air emissions and waste management. In the ER, of its COL application, FPL identified some deactivated generators within its service area (FPL 2014-TN4058). None of these retired units individually would be able to meet the proposed 2,200 MW(e) output of the Units 6 and 7. The review team also concluded that it is unlikely that a combination of retired units could be developed to meet this demand and successfully meet applicable environmental requirements. In addition, FPL's 2014 Ten-Year Plan no longer considers reactivation of these older units (FPL 2014-TN3360).

Retired generating plants, predominately coal-fired and natural-gas−fired plants that potentially could be reactivated, would ordinarily require extensive refurbishment prior to reactivation. Such vintage plants would typically require costly refurbishment to meet current environmental requirements. The environmental impacts of any reactivation scenario would be bounded by the impacts associated with coal-fired and natural-gas−fired alternatives (Section 9.2.2), which the NRC staff concludes are not environmentally preferable to the proposed actions (Section 9.2.5). Given both these refurbishment costs and the environmental impacts of operating such facilities, the NRC staff concludes that reactivating retired generating plants would not be a reasonable alternative to the proposed action.

9.2.1.3 Energy Efficiency and Demand-Side Management

Improved energy efficiency and demand-side management (DSM) strategies can potentially cost less than construction of new generation and provide a hedge against market, fuel, and environmental risks. The FPSC approved FPL's current DSM plan in an Order dated August 16, 2011 (FPSC 2011-TN1357), as confirmed in an Order dated December 22, 2011 (FPSC 2011-TN1358). See docket 100155-EG on the FPSC website for more details. In approving the FPL plan, the FPSC determined that two other plans that would have increased DSM would be too costly to the FPL customers. On April 2, 2014, FPL submitted an updated DSM Plan to the FPSC for its review (see docket 130199). As of December 11, 2014 that review is ongoing.

The need-for-power discussion in Chapter 8 takes planned energy efficiency and DSM programs into account. The NRC staff concluded in Chapter 8 that there is a justified need for power in the FPL service territory even with the implementation of conservation and DSM programs. The NRC staff concludes that improved energy efficiency and DSM programs would not be a reasonable alternative to the proposed action.

9.2.1.4 Summary Statement Regarding Alternatives Not Requiring New Generating Capacity

Based on the preceding discussion, the NRC staff concludes that the options of purchasing electric power from other suppliers, reactivating retired power plants, extending the operating life of existing power plants, and energy efficiency and DSM programs are not reasonable alternatives to providing new baseload power-generation capacity.

9.2.2 Alternatives Requiring New Generating Capacity

Consistent with the NRC's evaluation of alternatives to operating license renewal for nuclear power plants, a reasonable set of energy alternatives to the building and operation of two new nuclear units at the Turkey Point site should be limited to analysis of discrete power-generation sources, a combination of sources, and those power-generation technologies that are technically reasonable and commercially viable (NRC 2013-TN2654). The current mix of baseload power-generation options in Florida is one indicator of the feasible choices for power-generation technology within the State. The electricity produced in Florida in 2012 came mainly from coal (20.0 percent), natural gas (67.7 percent), nuclear energy (8.1 percent), and oil (0.6 percent) (DOE/EIA 2014-TN3813). The balance came from renewable energy (2.1 percent, including hydropower) and miscellaneous sources (1.5 percent).

This section discusses the environmental impacts of energy alternatives to the proposed action that would require FPL to construct new generating capacity. The three primary energy sources for generating electric power in the United States are coal, natural gas, and nuclear energy (DOE/EIA 2014-TN3585). Coal-fired plants are the primary source of baseload generation in the United States (DOE/EIA 2014-TN3585). Natural-gas combined-cycle power-generation plants are often used as intermediate generation sources, but they are also used as baseload generation sources (SSI 2010-TN1405).

Each year, the EIA, a component of the U.S. Department of Energy (DOE), issues an Annual Energy Outlook. In its updated Annual Energy Outlook 2014, the EIA's reference case projects that total electric generating capacity additions between 2011 and 2040 will add 351 GW of new generating capacity using the following fuels (in GW and the approximate percentages of the total increase): natural gas[(1)] (256 GW/73 percent), renewables (84 GW/24 percent), nuclear (11 GW/3 percent) and coal (4 GW/1 percent) (DOE/EIA 2014-TN3585). DOE/EIA also predicts that total coal capacity will decrease by 53.8 GW by 2040 (DOE/EIA 2014-TN3585). The EIA projection includes baseload, intermittent, and peaking units and is based on the assumption that providers of new generating capacity would seek to minimize cost while meeting applicable environmental requirements.

The discussion in Section 9.2.2 is limited to a reasonable range of the individual energy alternatives that appear to be viable for new baseload generation: coal-fired and natural-gas combined-cycle generation. The impacts discussed in Section 9.2.2 are estimates based on present technology. Section 9.2.3 addresses alternative generation technologies that have demonstrated commercial acceptance but may be limited in application, total capacity, or technical feasibility when based on the need to supply reliable, baseload capacity.

The review team assumed that (1) new generation capacity would be located at the Turkey Point site for the coal- and natural-gas−fired alternatives,[(2)] (2) the cooling approach planned for proposed Units 6 and 7 (Section 3.2.2.2) would be used for plant cooling, and (3) two new 500 kV circuits and three new 230 kV circuits would be built to serve a new coal- or natural-gas−fired plant sited at the Turkey Point site, consistent with the FPL proposal for Units 6 and 7 (FPL 2014-TN4058).

9.2.2.1 Coal-Fired Power Generation

For the coal-fired generation alternative, the NRC staff assumed construction of four pulverized-coal−fired units, each with a total net capacity of 550 MW(e). The team's estimates of coal consumption, coal-combustion technology, air emissions, and waste products are based on the EPA's Compilation of Air Pollutant Emission Factors document (EPA AP-42), Section 1.1, Bituminous and Subbituminous Coal Combustion (EPA 2011-TN1088). The NRC staff also assumed that additional transmission line corridors would be acquired, as discussed in Section 2.2.2. The plant was assumed to have an operating life of 40 years. Because FPL assumed a pulverized-coal−fired alternative would consist of three boiler units, each with a net capacity of 728.4 MW (FPL 2014-TN4058), the NRC staff compared its analyses to FPL's COL application and found the results to be consistent.

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(1) Includes the projections for "combined cycle," "combustion turbine/diesel," and "distributed generation (natural gas)."

(2) The land needed for the coal alternative might exceed the land available at the site. The applicant might choose to locate the plant elsewhere or dispose of coal-combustion products in an offsite location in such a case. However, for the purposes of this analysis the review team assumed all facilities would be at the Turkey Point site.

Because the nearest rail line is 11 mi by road from the Turkey Point site (FPL 2014-TN4058), the rail line would have to be extended to the site or coal deliveries would have to be accomplished by barge. In its ER, FPL assumed that coal would be delivered to the site by barge, in the same way that fuel oil is currently delivered for Units 1 and 2 (FPL 2014-TN4058). The NRC staff used this assumption in its analysis.

The NRC staff also considered integrated gasification combined-cycle (IGCC) coal-fired plants. IGCC is an emerging technology for generating electricity with coal that combines modern coal gasification technology with both gas turbine and steam turbine power generation. The technology is cleaner than conventional pulverized-coal plants because major pollutants can be removed from the gas stream before combustion. The IGCC alternative also generates less solid waste than the pulverized-coal−fired alternative. The largest solid-waste stream produced by IGCC installations is slag—a black, glassy, sand-like material that is potentially a marketable byproduct. The other large-volume byproduct produced by IGCC plants is gypsum, which is produced when sulfur is extracted during the gasification process, and it can be marketed rather than placed in a landfill. IGCC units do not produce ash or scrubber wastes. In spite of the preceding advantages, the NRC staff concludes that, at present, a new IGCC plant is not a reasonable alternative to a 2,200 MW(e) nuclear power-generation facility for the following reasons: (1) IGCC plants are more expensive than comparable pulverized-coal plants (NETL 2010-TN1423), (2) the existing IGCC plants in the United States have considerably smaller plant capacity than the proposed 2,200 MW(e) nuclear plant,[3] (3) system reliability of existing IGCC plants has been lower than that of pulverized-coal plants, and (4) a lack of overall plant performance warranties for IGCC plants has hindered commercial financing (NPCC 2005-TN1406). For these reasons, IGCC plants are not considered further in this EIS.

Therefore, for the coal-fired alternative, the NRC staff assumed that coal and limestone (calcium carbonate) would be delivered to the plant by barge (FPL 2014-TN4058). The NRC staff estimates that the plant would consume 6.55 million T/yr of pulverized bituminous coal with an ash content of approximately 9 percent (EPA 2011-TN1088). Slaked lime or limestone, used in the flue-gas scrubbing process for control of sulfur dioxide (SO_2) emissions, is injected as slurry into the hot effluent combustion gases to remove entrained SO_2. The limestone-based scrubbing solution reacts with SO_2 to form calcium sulfite (a food additive) or calcium sulfate (gypsum), which precipitates and is removed from the process as sludge for dewatering and then sold to industry for use in the manufacture of wallboard or other industrial products. The NRC staff estimates that approximately 450,000 T/yr of limestone, which could come from local sources, would be used for flue-gas desulfurization, generating approximately 700,000 T/yr of marketable scrubber sludge.

Air Quality

The impacts on air quality from coal-fired generation would vary considerably from those of nuclear power generation because of emissions of SO_2, nitrogen oxides (NO_x), carbon monoxide (CO), particulate matter (PM), volatile organic compounds (VOCs), and hazardous air

(3) The review team is aware that Duke Energy placed a 618-MW(e) IGCC plant into service in June 2013 (Duke 2013-TN2662) and that Mississippi Power is building an IGCC plant in Kemper County, Mississippi, with an output of 582 MW(e) (MPC 2014-TN3776).

pollutants such as mercury and lead. The NRC staff estimates that a 2,200 MW(e) coal-fired plant would also have unregulated carbon dioxide (CO_2) emissions of 18.7 million T/yr that could affect climate change (EPA 2011-TN1088).

The coal-fired plant emissions were determined based on factors contained in EPA AP-42 (EPA 2011-TN1088). The estimates of emissions are based on "as fired" and controlled conditions using both combustion and post-combustion technologies to reduce criteria pollutants to maintain local and regional attainment status for the criteria pollutants listed below. Emissions estimates are not necessarily representative of what would be permitted.

A final air permit would likely require applicable Best Available Control Technologies (BACTs). The NRC staff's estimates of the emissions from the coal-fired generation alternative are approximately as follows[(4)] (PM_{10} is particulate matter with an aerodynamic diameter equal to or less than 10 microns (40 CFR 50.6) (TN1089):

- SO_2 – 7,469 T/yr
- NO_x – 1,638 T/yr
- CO – 1,638 T/yr
- PM – 147 T/yr
- PM_{10} – 34 T/yr[(5)]
- $PM_{2.5}$ – 20 T/yr
- Mercury – 0.085 T/yr.

The acid rain requirements of the Clean Air Act, as amended (42 USC 7401 et seq.) (TN1141) capped the nation's SO_2 emissions from power plants. FPL would need to obtain sufficient pollution credits either from a set-aside pool or purchases on the open market to cover annual emissions from the plant.

Historically, CO_2, an unavoidable byproduct of combustion of carbonaceous fuels, has not been regulated as a pollutant. However, regulations are now under development for CO_2 and other greenhouse gases (GHGs). In response to the Consolidated Appropriations Act of 2008 (Public Law 110-161) (121 Stat. 1844) (TN1485), the EPA promulgated final mandatory GHG reporting regulations in October 2009, effective in December 2009 (74 FR 56260) (TN1024) (see also http://www.epa.gov/climatechange/emissions/ghgrulemaking.html [EPA 2012-TN1670]). The rules are applicable to major sources of CO_2 (those emitting more than 25,000 T/yr). New utility-scale coal-fired power plants would be subject to those regulations.

The coal-fired alternative plant would qualify as a major generator of GHGs under the "Tailoring Rule" promulgated by the EPA (75 FR 31514) (TN1404). Beginning January 2, 2011, operating permits issued to major sources of GHGs under the Prevention of Significant Deterioration (PSD) or Title V Federal permit programs must contain provisions requiring the use of BACTs to limit the emissions of GHGs if those sources would be subject to PSD or Title V permitting requirements because of their non-GHG pollutant emission potentials and their estimated GHG

(4) Based on 6,552,000 T/yr of bituminous coal and controlled using overfire air in combination with low-NO_x burners and selective catalytic reduction, limestone-based flue-gas desulfurization, and conventional particulate capture technology (EPA 2011-TN1088).

(5) The value for PM_{10} includes particles of smaller diameter, such as $PM_{2.5}$.

emissions are at least 75,000 T/yr of CO_2 equivalents (CO_2e). The amount of CO_2 released per unit of power produced would depend on the quality of the fuel and the firing conditions and overall firing efficiency of the boiler. Meeting permit limitations for GHG emissions may require installation of carbon capture and sequestration devices on any new coal-fired power plant, which could add substantial power penalties. On January 8, 2014, the EPA proposed new regulations that would limit the amount of CO_2 that can be emitted from new coal-fired power plants (79 FR 1430) (TN3720). The relative efficiency penalty for adding CO_2 capture ranges from 21 to 29 percent on average, meaning that a new coal plant would have to be much larger than 2,200 MW(e) to provide a comparable amount of power to proposed Units 6 and 7 (NETL 2010-TN1423). In addition, once extracted the CO_2 would have to be piped either to a permanent sequestration site, or for use in enhanced oil recovery. Regardless of end use, the construction of a CO_2 pipeline would have the potential to increase the impacts on resources such as, but not limited to, terrestrial and aquatic ecology, socioeconomics, and cultural and historic resources. Because the exact location of such sequestration is beyond the scope of this analysis the magnitude of the impacts could not be quantified by the NRC staff. The NRC staff concludes that the cumulative impacts of construction of both a coal-fired power plant and a CO_2 pipeline could increase the level of impacts. For example, SMALL ecological impacts from a coal plant alone may become MODERATE when combined with those of a CO_2 pipeline.

A new coal-fired power-generation plant at the Turkey Point site would need a PSD permit and an operating permit under the Clean Air Act. The plant would need to comply with the new source performance standards for such plants in 40 CFR Part 60 (TN1020), Subpart Da. The standards establish emission limits for particulate matter and opacity (40 CFR 60.42Da), SO_2 (40 CFR 60.43Da), NO_x (40 CFR 60.44Da), and mercury (40 CFR 60.45Da) (TN1020). EPA determined that coal-fired and oil-fired electric utility steam-generating units are significant emitters of the following hazardous air pollutants (HAPs): arsenic, beryllium, cadmium, chromium, dioxins, hydrogen chloride, hydrogen fluoride, lead, manganese, and mercury (65 FR 79825) (TN2536). The EPA concluded that mercury is the HAP of greatest concern and that (1) a link exists between coal combustion and mercury emissions, (2) electric utility steam-generating units are the largest domestic source of mercury emissions, and (3) certain segments of the U.S. population (e.g., the developing fetus and subsistence fish-eating populations) are believed to be at potential risk of adverse health effects resulting from mercury exposures caused by the consumption of contaminated fish (65 FR 79825) (TN2536). On March 28, 2013, the EPA finalized updates to emission standards, including mercury, for power plants under the Mercury and Air Toxics Standards (EPA 2013-TN2537). This Rule became effective April 24, 2013 (78 FR 24073) (TN3051). However, the NRC staff recognizes that the environmental impacts of air emissions from the coal-fired plant would be significantly greater than those from a proposed nuclear power plant at the Turkey Point site, even after application of any new mercury emissions standards.

The NRC staff assumes that fugitive dust emissions from construction activities would be mitigated using Best Management Practices (BMPs), similar to mitigation discussed in Chapter 4 for proposed Turkey Points Units 6 and 7. Such emissions would be limited to the construction period.

The EPA has various regulatory requirements for visibility protection in 40 CFR Part 51 (TN1090), Subpart P, including a specific requirement for review of any new major stationary source in an area designated as in attainment or unclassified for criteria pollutants under the Clean Air Act (40 CFR 51.307(a)) (TN1090). The entire State of Florida is designated as in attainment or unclassified for all criteria pollutants except for Hillsborough County, which is classified for lead (EPA 2012-TN1245). National Ambient Air Quality Standards for criteria pollutants are in 40 CFR Part 50 (TN1089). Section 169A of the Clean Air Act (42 USC 7401 et seq.) (TN1141) establishes a national goal of preventing future impairment of visibility and remedying existing impairment in mandatory Class I Federal areas when impairment is from air pollution caused by human activities. In addition, EPA regulations provide that for each mandatory Class I Federal area located within a State, the State must establish goals that provide for reasonable progress toward achieving natural visibility conditions. The reasonable progress goals must provide for an improvement in visibility on the most-impaired days over the period of the implementation plan and make sure there is no degradation in visibility for the least-impaired days over the same period (40 CFR 51.308(d)(1)) (TN1090). If a new coal-fired power plant was located close to a mandatory Class I or II area, additional air-pollution control requirements could be imposed. There are three mandatory Class I Federal areas in Florida (FPL 2014-TN4058):

- Chassahowitzka Wilderness Area – >250 mi northwest of the Turkey Point site
- St. Marks Wilderness Area – >250 mi northwest of the Turkey Point site
- Everglades National Park – 13 mi west of the Turkey Point site.

Of these, only Everglades National Park is close enough to the Turkey Point site to be potentially affected by air emissions from the site due to the close proximity and prevailing wind directions.

Florida is one of 27 states whose stationary sources of criteria pollutants would have been subject to revised emission limits for SO_2 and NO_x under the Clean Air Interstate Rule (CAIR). Florida stationary sources of SO_2 and NO_x would be subject to this Rule, as well as complementary regulatory controls developed at the State level (http://www.epa.gov/cair/index.html). On July 6, 2011, the EPA announced the finalization of the Cross-State Air Pollution Rule (CSAPR, previously referred to as the Transport Rule) as a response to previous court decisions and as a replacement to the CAIR. Following the August 2012 decision by the U.S. Court of Appeals for the D.C. Circuit to vacate the CSAPR, CAIR remains in effect (EPA 2013-TN2538). Fossil-fuel power plants in Florida would be subject to the CAIR and would be required to reduce emissions of SO_2 and NO_x to help reduce downwind ambient concentrations of fine particulates ($PM_{2.5}$) and ozone. However, the NRC staff recognizes that the environmental impacts of air emissions from the coal-fired plant would be significantly greater than those from a proposed nuclear power plant at the Turkey Point site, even after application of the CAIR.

NUREG–1437 (NRC 2013-TN2654) indicates that air-quality impacts from a coal-fired power plant can be significant. NUREG–1437 also provides estimates of CO_2 and other emissions (NRC 2013-TN2654). Adverse human health effects, such as cancer and emphysema, have been associated with the byproducts of coal combustion. The fugitive dust emissions from construction activities would be mitigated using BMPs, and would be temporary.

Overall, the NRC staff concludes that air-quality impacts from new coal-fired power generation at the Turkey Point site, despite the availability of BACTs, would be MODERATE. The impacts would be clearly noticeable, but would not destabilize air quality.

Waste Management

Coal combustion generates waste in the form of ash, and equipment for controlling air pollution generates additional ash, spent selective catalytic reduction catalyst, and scrubber sludge. The NRC staff estimates that the coal-fired plants would generate approximately 590,000 T/yr of ash these coal combustion residuals (CCR) (DOE/EIA 2009-TN1415). In 2012, approximately 40 percent of CCR was recycled for use in commodity products such as wallboard, concrete, roofing materials, and bricks, thus reducing the total volume needing disposal (EPA 2014-TN4164). Most CCR are managed in dedicated disposal units, i.e., landfills (dry systems) or surface impoundments (wet systems), with lesser quantities disposed of in underground mines or municipal solid waste landfills.

Effective 6 months after publication of the final rule signed by the EPA Administrator on December 19, 2014, CCR from electric utilities will be regulated as solid waste under Subtitle D of the Resource Conservation and Recovery Act of 1976, as amended (RCRA) (42 USC 6901 et seq.) (TN1281). The minimum criteria for new CCR units include location restrictions; design and operating criteria; groundwater monitoring and corrective action; closure requirements and post closure care; and requirements for recordkeeping, notification, and Internet posting. Different criteria apply to landfills and surface impoundments. Any existing CCR units that do not meet the location restrictions or cannot meet the structural integrity criteria must close. Any surface impoundment without a liner that exceeds the groundwater protection standard for any constituent must either install a liner or close, with limited exceptions. Inactive CCR surface impoundments that still contain water and CCR must meet the new criteria or be closed and capped (EPA 2014-TN4164).

Waste impacts on groundwater and surface water could extend beyond the operating life of the plant if leachate or runoff from the waste-storage area occurs. Disposal of the waste could noticeably affect land use (because of the acreage needed for waste) but with appropriate management and monitoring, it would not destabilize any resources. After closure of the waste site and revegetation, the land could be available for some other uses. Construction-related debris would be generated during plant construction activities, and would be disposed of in approved landfills.

For the reasons stated above, the NRC staff concludes that the impacts from waste generated at a coal-fired plant would be MODERATE. The impacts would be clearly noticeable, but would not destabilize any important resource.

Human Health

Coal-fired power generation introduces worker risks from coal and limestone mining, worker and public risk from coal and lime/limestone transportation, worker and public risk from disposal of coal-combustion waste, and worker and public risk from inhalation of stack emissions. Adverse human health effects, such as cancer, asthma, and emphysema, have been associated with the byproducts of coal combustion. In addition, the discharges of uranium and thorium from coal-fired plants can potentially produce radiological doses in excess of those arising from nuclear power plant operations (Gabbard 1993-TN1144).

Regulatory agencies, including the EPA and State agencies, base air emission standards and requirements on human health impacts. These agencies also impose site-specific emission limits as needed to protect human health. Given the regulatory oversight exercised by the EPA and State agencies, the NRC staff concludes that the human health impacts from radiological doses and inhaled toxins and particulates generated from coal-fired generation would be SMALL.

Other Impacts

Land Use

Based on the 1996 version of NUREG–1437 (NRC 1996-TN288), at least 3,700 ac of land would need to be converted to industrial use on the Turkey Point site for the power block, infrastructure and support facilities, coal and limestone storage and handling, reclaimed wastewater line, and landfill disposal of ash and scrubber sludge. Additional land would be needed for five new transmission lines in two corridors, water pipelines, and access roads, consistent with the FPL proposal for Units 6 and 7 (FPL 2014-TN4058). As for nuclear facilities, the coal plant facilities would be in close proximity to Biscayne National Park and the transmission lines would pass close to urban land uses and Everglades National Park. It is assumed that coal mining would occur at an undetermined offsite existing coal mining operation, but land-use changes would also occur if expansion of an existing mine or mines were required to supply coal for the plant. In the 1996 version of NUREG–1437 (NRC 1996-TN288), the NRC staff estimated that approximately 22,000 ac would be needed for coal mining and waste disposal to support a 1,000 MW(e) coal-fired plant over its operating life (corresponding to 48,000 ac for the 2,200 MW(e) plant needed to produce the equivalent baseload generation provided by the proposed Turkey Point Units 6 and 7). Based on the amount of land affected for the site, mining, and waste disposal (see waste-management subsection above), the NRC staff concludes that land-use impacts would be MODERATE.

Water Use and Quality

The amount of water used and the impacts on water use and quality from constructing and operating a coal-fired plant at the Turkey Point site would be comparable to those associated with a new nuclear plant. The new facility would use steam-cycle electrical generation with closed-cycle cooling. Water consumption due to evaporative cooling in the cooling systems would be somewhat less than that of a new nuclear facility because the coal plant would operate at a somewhat higher thermal efficiency. All discharges would be injected into the Boulder Zone (in the Lower Florida aquifer) and regulated by the Florida Department of Environmental Protection (FDEP). Water quality would be affected by acids and mercury from air emissions from the coal-fired plant and drift of reclaimed wastewater from the cooling towers. Some of the emissions are regulated to minimize impacts. Given the sensitivity of the local aquatic and terrestrial environments, consideration of emissions, such as mercury, might have impacts even at levels compliant with emission standards. In NUREG 1437, the NRC staff determined that some erosion and sedimentation would likely occur during construction of new facilities (NRC 2013-TN2654). Coal plants require only relatively shallow excavations and foundations. Constructing the plant with stormwater and sediment discharged to cooling canals would ensure the impacts are minor. These impacts would be similar to those for a new nuclear plant. Overall, the NRC staff concludes that the water-use and water-quality impacts would be SMALL.

Ecological Resources

The coal-fired power-generation alternative would introduce ecological impacts from construction and new incremental impacts from operations. The impacts would generally be similar to those of the proposed, especially losses of mangrove forest and other wetlands, action at the Turkey Point site and along the transmission line and pipeline corridors. The impacts could include terrestrial and aquatic habitat loss and degradation, habitat fragmentation, reduced productivity, and a local reduction in biological diversity. Impacts on the site could be greater than described for the proposed action because of the greater land-use demands for the coal plants. The impacts could occur not only at the Turkey Point site and offsite corridors, but also at the sites used for coal and limestone mining and effects related to transporting coal to the site. If transportation by barge were used, potential vessel collisions with protected species and potential groundings could occur. Construction and maintenance of new transmission line corridors, access roads, and pipeline corridors would have ecological impacts as described for the proposed action. Stack emissions and disposal of waste products could also affect aquatic and terrestrial resources. Siting of the coal plant at Turkey Point would result in permanent loss of critical habitat for the American crocodile (*Crocodylus acutus*). Additional impacts on threatened and endangered species could result from ash disposal and mining activities, especially if the locations of such activities overlap with habitat for protected species. Overall, the NRC staff concludes that the ecological impacts would be MODERATE, primarily because of potential impacts associated with disposal of ash, impacts on South Florida wetlands and associated important species, and the large area of land affected.

Socioeconomics

Socioeconomic impacts would result from the peak workforce of approximately 2,500 construction workers and the approximately 250 workers needed to operate the coal-fired facility (FPL 2014-TN4058). Overall, the size of the workforce would be smaller than that for the proposed project, which indicates the socioeconomic impacts from building and operating a coal-fired facility at the Turkey Point site would be similar to, but of a lesser magnitude than, the same effects from building and operating the proposed project. Because the Turkey Point site is a heavily industrialized location relatively isolated from the surrounding population centers and would require fewer workers to construct and operate the plant, the NRC staff determined that the impacts of the proposed Units 6 and 7 establish an upper bound to the socioeconomic impacts of an appropriately sized coal-fired installation. This is especially relevant in the assessment of beneficial impact categories. The overnight capital costs of a coal-fired power plant, the building and operations workforces, and the local expenditures for materials and equipment would be lower for a coal-fired plant than those of a nuclear facility. Therefore, the NRC staff concludes that the tax benefits of a coal-fired plant would be would be SMALL for Miami/Dade County. The NRC staff determined traffic-related impacts during construction and operations for the proposed project would be MODERATE. However, while the increase in traffic in the vicinity of the proposed site would be less than the traffic increase for the proposed action, the construction related traffic increases would still constitute a noticeable but not destabilizing impact. Therefore, the NRC staff determined the construction-related traffic impacts would still be MODERATE and adverse, but the roads would provide a MODERATE and beneficial impact from identified upgrades. The NRC staff concluded that as was the case for the proposed project, all other socioeconomic impacts would be SMALL.

Coal-fired power generation would introduce mechanical sources of noise that would be much greater than the noise generated at a nuclear power plant and would likely be audible offsite. Sources contributing to the noise produced by plant operation are classified as continuous or intermittent. Continuous sources include the mechanical equipment associated with normal plant operations, such as the equipment related to coal handling (conveyors, crushers, pulverizers). Intermittent sources include solid-waste disposal, transportation related to coal and lime/limestone delivery, transportation related to the removal of ash and other solid wastes, use of outside loudspeakers horns and sirens, and the commuting of plant employees. The impacts of noise are attenuated by distance. The closest residents and recreational areas are located over 1.5 mi from the proposed site and the NRC staff expects impacts from noise generated at the proposed plant site to be SMALL for the general public. Because power generators would be built adjacent to existing units on the Turkey Point site, the aesthetic impacts of coal-fired power generators at the proposed site are also expected to be SMALL to the general public. However, because the noise level of a coal-fired power plant is much greater than that of a nuclear facility, the impact on visitors to the Biscayne Aquatic Preserve or boaters in the bay would be MODERATE. Any segments of the western transmission line corridor between Everglades National Park and the Levee substation would follow SW 187th Avenue, and the presence of the road would attenuate any visual contrast with the natural environment. The resulting aesthetic impacts are expected to be SMALL.

Environmental Justice

Because the NRC staff did not identify disproportionately high and adverse impacts from any pathway associated with the building and operations of Turkey Point Units 6 and 7, there is no indication that the construction and operation of a coal-fired power plant at the same site would impose any disproportionately high and adverse impacts on minority or low-income populations. Therefore, there would be no disproportionate impacts on minority and low-income populations associated with a coal-fired plant at the Turkey Point site.

Historic and Cultural Resources

The historic and cultural resource impacts for a new coal-fired plant located at the Turkey Point site would be similar to the impacts for a new nuclear plant, as discussed in Sections 4.6 and 5.6. Other lands that would be acquired to support the plant would likely need an inventory of cultural resources, identification and recording of existing historic and archaeological resources, and possible mitigation of the adverse effects from ground-disturbing actions. The studies would likely be needed for all areas of potential disturbance at the plant site, any offsite affected areas, such as mining and waste-disposal sites, and along associated corridors where new construction would occur (e.g., pipeline corridors, roads, and transmission line corridors). The impact on historic or cultural resources at FPL plant property during studies for the new nuclear plant, were determined to be MODERATE because of the visual impacts from transmission lines. The reason the impacts on cultural and historic resources are similar to a coal-fired plant is that both plants would require the same amount of transmission lines and would affect the resource in the same manner and therefore the impact would be the same. The NRC staff concludes that the historic and cultural resource impacts for a coal plant located at Turkey Point would be similar to those for the nuclear plant; MODERATE.

The construction and operational impacts of a 2,200 MW(e) coal-fired power-generation plant at the Turkey Point site are summarized in Table 9-1.

Table 9-1. Summary of Environmental Impacts of Coal-Fired Power Generation at the Turkey Point Site

Impact Category	Impact	Comment
Land Use	MODERATE	At least 3,700 ac would be needed for power block; coal-handling, storage, and transportation facilities; infrastructure facilities; and cooling-water facilities. Additional land would be needed for new transmission line and pipeline corridors and access roads. Coal mining (offsite) and waste-disposal activities would require an additional 48,000 ac.
Air Quality	MODERATE	SO_2 – 7,469 T/yr NO_x – 1,638 T/yr CO – 1,638 T/yr PM – 147 T/yr PM_{10} – 34 T/yr $PM_{2.5}$ – 20 T/yr Mercury – 0.085 T/yr CO_2 – 18.7 million T/yr Small amounts of hazardous air pollutants.
Water Use and Quality	SMALL	Impacts would be comparable to the impacts for a new nuclear power plant located at the Turkey Point site.
Ecology	MODERATE	Impacts could include terrestrial and aquatic habitat loss and modification, habitat fragmentation, reduced productivity, and a local reduction in biological diversity. Impacts could occur at the Turkey Point site and vicinity, along transmission line corridors, access roads, and pipeline corridors, and at the sites used for coal and limestone mining. Disposal of ash could also affect the terrestrial and aquatic environments. Additional impacts on threatened and endangered species could result from transporting coal to the site and permanent loss of critical habitat to the American crocodile. Project footprint would be larger than needed for the proposed action, resulting in greater permanent impact on habitats and wetlands.
Waste Management	MODERATE	Total volume of combustion wastes would exceed 1 million T/yr (590,000 T/yr ash and 700,000 T/yr scrubber sludge).
Socioeconomics	MODERATE Beneficial to MODERATE Adverse	All socioeconomic impacts are SMALL and adverse, with the exceptions of: SMALL beneficial economic and tax impacts throughout the 500 mi region, MODERATE and beneficial impacts from road improvements, and MODERATE adverse impacts from traffic. Impacts during operations would likely be smaller than during construction with the exception of an increased adverse noise impact from operations, which would be MODERATE.

Table 9-1. (contd)

Impact Category	Impact	Comment
Human Health	SMALL	Regulatory controls and oversight are assumed to be protective of human health.
Historic and Cultural Resources	MODERATE	Any potential impacts could likely be effectively managed. Most of the facility and infrastructure would be built on previously disturbed ground. Impacts may also be associated with new transmission line or pipeline corridors.
Environmental Justice	NONE[(a)]	Based on analysis of census data and field interviews, no disproportionately high and adverse impacts on minority or low-income populations would be anticipated.

(a) A determination of "NONE" for Environmental Justice analyses does not mean there are no adverse impacts to minority or low-income populations from the proposed project. Instead, an indication of "NONE" means that while there are adverse impacts, those impacts do not affect minority or low-income populations in any disproportionate manner, relative to the general population.

9.2.2.2 Natural-Gas−Fired Power Generation

For the natural-gas alternative, the NRC staff assumed building and operation of a natural-gas−fired plant at the Turkey Point site. The NRC staff assumed that the plant would use four combined-cycle combustion turbines, with a net capacity of 550 MW(e) per unit. In its COL, FPL assumed three 728.4 MW natural-gas combined-cycle (NGCC) units (FPL 2014-TN4058). The team's estimates of natural-gas consumption, air emissions, and waste products are based on EPA AP-42 (Stationary Gas Turbines (EPA 2011-TN1088). The NRC staff also assumed the construction of two additional transmission line corridors, as discussed in Chapters 2 and 3. The natural-gas−fired plant is assumed to have an operating life of 40 years. The NRC staff estimated that the natural-gas−fired plant would use approximately 114 billion standard cubic feet of gas per year (EPA 2011-TN1088).

Air Quality

Natural gas is a cleaner burning fuel than combusted coal. The associated emissions estimates were estimated based on factors contained in EPA AP-42 (EPA 2011-TN1088) except where noted. It is noted that emissions estimates are based on "as fired" and controlled conditions and are not necessarily representative of what would likely be permitted.

A new natural-gas−fired power-generation plant would need a PSD permit and an operating permit under the Clean Air Act. A new NGCC plant would also be subject to the new source performance standards specified in 40 CFR Part 60 (TN1020), Subparts Da and GG. These regulations establish emission limits for particulates, opacity, SO_2, and NO_x.

The EPA has various regulatory requirements for visibility protection in 40 CFR Part 51 (TN1090), Subpart P, including a specific requirement for review of any new major stationary source in areas designated as in attainment or unclassified under the Clean Air Act. The entire State of Florida is designated as in attainment or unclassified for all criteria pollutants except for Hillsborough County, which is classified for lead (EPA 2012-TN1245).

Section 169A of the Clean Air Act (42 USC 7401 et seq.) (TN1141) establishes a national goal of preventing future impairment of visibility and remedying existing impairment in mandatory Class I Federal areas when impairment is from air pollution caused by human activities. In addition, the EPA regulations provide that for each mandatory Class I Federal area located within a State, the State regulatory agencies must establish goals that provide for reasonable progress toward achieving natural visibility conditions. The reasonable progress goals must provide for an improvement in visibility for the most-impaired days over the period of the implementation plan and make sure there is no degradation in visibility for the least-impaired days over the same period (40 CFR 51.308(d)(1)) (TN1090). If a new natural-gas−fired power plant was located close to a mandatory Class I area, additional air-pollution control requirements could be imposed. As discussed under the coal alternative, there is one mandatory Class I Federal area near the Turkey Point site

A natural-gas−fired plant equipped with appropriate combustion and post-combustion pollution-control technology would have approximately the following emissions.(6)

- SO_2 – 32 T/yr
- NOx – 564 T/yr
- CO – 214 T/yr
- PM – 108 T/yr
- PM_{10} – 108 T/yr(7)
- $PM_{2.5}$ – 108 T/yr.

The NRC staff estimates that a natural-gas−fired power plant would also have unregulated CO_2 emissions of 6.3 million T/yr that could affect climate change (EPA 2011-TN1088). Historically, CO_2, an unavoidable byproduct of combustion of carbonaceous fuels, has not been regulated as a pollutant. However, regulations are now under development for CO_2 and other GHGs. In response to the Consolidated Appropriations Act of 2008 (Public Law 110-161) (121 Stat. 1844) (TN1485), the EPA promulgated final mandatory GHG reporting regulations in October 2009, effective in December 2009 (74 FR 56260) (TN1024). The rules are applicable to major sources of CO_2 (those emitting more than 25,000 T/yr). New utility-scale gas-fired power plants would be subject to those regulations.

The combustion turbine portion of the combined-cycle plant would be subject to EPA's National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines (40 CFR 63) (TN1403) because the site would be a major source of HAPs.

The NRC staff assumes that fugitive dust emissions from construction activities would be mitigated using BMPs similar to mitigation discussed in Chapter 4 for proposed Turkey Point Units 6 and 7. Such emissions would be temporary. A new gas-fired generation plant would qualify as a major generator of GHGs under the "Tailoring Rule" recently promulgated by the EPA (75 FR 31514) (TN1404). Beginning January 2, 2011, operating permits issued to major sources of GHGs under the PSD or Title V Federal permit programs must contain provisions

(6) Emissions based on 114 × 10E+6 MMBTU/yr and control technology, including lean-premix combustion, and catalytic control for NO_x at a 90 percent reduction rate and CO at a 75 percent reduction rate.

(7) The value for PM_{10} includes particles of smaller diameter such as $PM_{2.5}$.

requiring the use of BACTs to limit the emissions of GHGs if those sources would be subject to PSD or Title V permitting requirements because of their non-GHG pollutant emission potentials and if their estimated GHG emissions are at least 75,000 T/yr of CO_2e. Meeting permit limitations for GHG emissions may require installation of carbon capture and sequestration devices on any new natural gas-fired power plant, which could reduce power output. However, the NRC staff recognizes that the environmental impacts of air emissions from the natural-gas−fired power plant would be significantly greater than those of a proposed nuclear power plant at the Turkey Point site, even after application of any new GHG emissions standards.

The impacts of emissions from the natural-gas−fired alternative would be noticeable, but would not be sufficient to destabilize air resources. The impacts would be greater than the impacts from the proposed action (which were SMALL), but less than the impacts for the coal alternative (which were MODERATE). Overall, the NRC staff concludes that air-quality impacts resulting from construction and operation of the natural-gas−fired alternative at the Turkey Point site would be SMALL to MODERATE.

Waste Management

In the 1996 version of NUREG–1437, the NRC staff concluded that waste generation from natural-gas−fired technology would be minimal (NRC 1996-TN288). The only significant waste generated at a natural-gas−fired power plant would be spent selective catalytic reduction (SCR) catalyst, which is used to control NO_x emissions. The spent catalyst would be regenerated or disposed of offsite. Other than spent SCR catalyst, waste generation at an operating natural-gas−fired plant would be largely limited to typical operations and maintenance waste. Construction-related debris would be generated during construction activities. Overall, the NRC staff concludes that waste impacts from natural-gas−fired power generation would be SMALL.

Human Health

Natural-gas−fired power generation introduces public risk related to gaseous emissions. The risk may be attributable to NO_x emissions that contribute to ozone formation, which in turn contributes to health risk. Regulatory agencies, including the EPA and State agencies, base air emission standards and requirements on human health impacts. These agencies also impose site-specific emission limits as needed to protect human health. Given the regulatory oversight exercised by the EPA and State agencies, the NRC staff concludes that the human health impacts from natural-gas−fired power generation would be SMALL.

Other Impacts

<u>Land Use</u>

Based on the 1996 version of NUREG–1437 (NRC 1996-TN288), the natural-gas−fired power-generating plant would require at least 240 ac for the power block and support facilities for the 2,200 MW(e) plant. The plant would still not fit entirely onto the 218 ac island proposed as the site for Units 6 and 7, but the extent of land requirements elsewhere on the Turkey Point site may be somewhat reduced relative to the proposed action. Turkey Point Unit 5 is currently served by an existing 24 in. gas pipeline and it is assumed that if a new line were needed it could be sited within the existing pipeline corridor to minimize land-use impacts (FPL 2014-

TN4058). Assuming a new pipeline within the existing corridor, the total land-use commitment, not including natural-gas wells and collection stations, would be at least 240 ac. Consistent with the proposed project, additional land would be needed for five new transmission lines in two corridors (FPL 2014-TN4058). As for nuclear facilities, the gas plant facilities would be in close proximity to Biscayne National Park and the transmission lines would pass close to urban land uses and Everglades National Park. More than 7,000 ac of additional land away from the Turkey Point site would also be required for natural-gas wells and collection stations (NRC 1996-TN288). Overall, the NRC staff concludes that the land-use impacts from new natural-gas−fired power generation would be MODERATE primarily because of the land conflicts related to the transmission lines and the land requirements for the gas wells and collection stations.

Water Use and Quality

The water use for a natural-gas−fired combined-cycle plant is about a third of an equivalent nuclear plant (NREL 2011-TN3850). Because the plant would use reuse water for cooling and discharge to the Boulder Zone, the impacts on water use and quality from constructing and operating a natural-gas−fired plant at the Turkey Point site would be comparable to the impacts associated with building and operating a new nuclear facility. The impacts on water quality from sedimentation during construction of a natural-gas−fired plant were characterized in the 1996 version of NUREG–1437 as SMALL (NRC 1996-TN288). The NRC staff also noted in the 1996 version of NUREG–1437 that the impacts on water quality from operations would be similar to, or less than, the impacts from other power-generating technologies (NRC 1996-TN288). Overall, the NRC staff concludes that impacts on water use and quality would be SMALL.

Ecological Resources

A natural-gas−fired plant at the Turkey Point site may have fewer ecological impacts than a new nuclear facility because less land would be affected. However, the plant would still not fit entirely onto the 218 ac plant area proposed as the site for Units 6 and 7 and therefore would require filling mangrove forest outside of the plant area and result in permanent loss of critical habitat for the American crocodile. Constructing a new underground gas pipeline to the site would result in temporary and permanent loss of some terrestrial and aquatic function as well as conversion and fragmentation of habitat, including mangrove forest; however, ecological impacts from the gas pipeline would be limited because there is an existing 24 in. transmission line pipeline to the Turkey Point site to serve Unit 5, and connection to natural-gas distribution systems would occur onsite and would use the existing natural-gas pipeline corridor. Impacts on threatened and endangered species would generally be as described for a new nuclear facility located at the Turkey Point site, despite the somewhat smaller overall onsite footprint. Overall, the NRC staff concludes that ecological impacts would be MODERATE because of the impacts on the American crocodile and impacts from transmission line corridors, access roads, and water supply pipeline corridors (all of which are expected to follow the same routes as described for the proposed nuclear units).

Socioeconomics

Socioeconomic impacts would result from the approximately 1,200 construction workers and 150 workers needed to operate the natural-gas−fired facility (FPL 2014-TN4058). Overall, the size of the workforce would be smaller than that for the proposed project, which indicates the impacts from building and operating a natural-gas facility at the Turkey Point site would be similar to, but of a lesser magnitude than the same effects from building and operating the proposed project. Because the Turkey Point site is a heavily industrialized location relatively isolated from the surrounding population centers and would require fewer workers to construct and operate the plant, the NRC staff determined that the impacts of the proposed Units 6 and 7 establish an upper bound to the socioeconomic impacts of an appropriately sized natural gas-fired installation. This is especially relevant in the assessment of beneficial impact categories. The overnight capital costs of a natural-gas−fired power plant, the building and operations workforces, and the local expenditures on materials and equipment are substantially lower at a natural-gas plant than those of a nuclear facility. Therefore, the NRC staff concludes that the tax benefits of a natural-gas−fired plant would be would be SMALL for Miami/Dade County. The NRC staff determined traffic-related impacts during building and operations of Turkey Point Units 6 and 7 would be MODERATE. However, while there would be some increase in traffic in the vicinity of the proposed site for the natural-gas plant, that increase would be substantially less than the increase for the proposed action. Therefore, the NRC staff determined the adverse impact from an increase in traffic would be SMALL. The NRC staff concluded that, as was the case for the proposed project, all other socioeconomic impacts would be SMALL.

The turbine buildings, four exhaust stacks (each approximately 200 ft high) and associated emissions, and the gas-pipeline compressors would be visible during daylight hours from offsite. Noise and light from the plant would be detectable offsite. The new transmission lines would have an aesthetic impact. Overall, the NRC staff concludes that the aesthetic impacts associated with new natural-gas−fired power generation at the Turkey Point site would be SMALL. The impact along new transmission lines would be SMALL, similar to the proposed Turkey Point Units 6 and 7.

Environmental Justice

Because the NRC staff did not identify any disproportionately high and adverse impacts from any pathway associated with the building and operations of Turkey Point Units 6 and 7, there is no indication that the building and operation of a natural-gas−fired power plant at the same site would impose any disproportionately high and adverse impacts on minority or low-income populations. Therefore, there would be no disproportionate impacts on minority and low-income populations associated with a natural-gas−fired plant at the Turkey Point site.

Historical and Cultural Resources

Historic and cultural resource impacts for a new natural-gas−fired plant located at the Turkey Point site would be similar to the impacts for a new nuclear plant, as discussed in Sections 4.6 and 5.6. Other lands (if any) that are acquired to support the plant would also likely need an inventory of cultural resources, identification and recording of existing historic and archaeological resources, and possible mitigation of the adverse effect from ground-disturbing actions. The studies would likely be needed for all areas of potential disturbance at the plant site, any offsite affected areas, such as gas wells, collection stations, and waste-disposal sites, and along associated corridors where new construction would occur (e.g., roads and any new pipelines). Given that the impacts on historic or cultural resources at FPL plant property during studies for the new nuclear plant were determined to be MODERATE due to the visual impacts from transmission lines, the NRC staff concludes that the historic and cultural resource impacts for a natural-gas plant located at Turkey Point would also be MODERATE.

The impacts of natural-gas−fired power generation at the Turkey Point site are summarized in Table 9-2.

Table 9-2. Summary of Environmental Impacts of Natural-Gas−Fired Power Generation

Impact Category	Impact	Comment
Land Use	MODERATE	At least 240 ac would be needed for power block, cooling towers, and support systems, and connection to a natural-gas pipeline. Additional land would be needed for transmission line corridors, gas supply pipeline, other infrastructure, and facilities.
Air Quality	SMALL to MODERATE	SO_2 – 32 T/yr NO_x – 564 T/yr CO – 214 T/yr PM – 108 T/yr PM_{10} – 108 T/yr $PM_{2.5}$ – 108 T/yr CO_2 – 6.3 million T/yr Some hazardous air pollutants
Water Use and Quality	SMALL	Impacts would be comparable to the impacts for a new nuclear power plant located at the Turkey Point site.
Ecology	MODERATE	Constructing a new underground gas pipeline to the site would result in loss of some terrestrial and aquatic function as well as conversion and fragmentation of habitat. Most impacts from pipeline construction would be temporary. Impacts on the Turkey Point site would be less than the impacts from new nuclear generating units, although the footprint could still not be confined to the 218 ac island where the main plant facilities would be built. Although permanent impacts on wetlands within the project footprint would occur but would also be proportionally less due to a smaller project footprint, species and habitats would still be affected along transmission line and pipeline corridors. Permanent loss of critical habitat for the American crocodile would occur.
Waste Management	SMALL	The only significant waste would be from spent selective catalytic reduction catalyst used for control of emissions of NO_x.
Socioeconomics	MODERATE Beneficial to SMALL Adverse	Construction and operations workforces would be relatively small and generate small yet positive local impacts on the economy and taxes. Some construction-related impacts would occur, but the impacts would be SMALL and adverse, with the exception of a MODERATE and beneficial impact from road improvements and SMALL beneficial economic and tax impacts throughout the 500-mi region. Aesthetic impacts associated with new natural-gas−fired power generation at the Turkey Point site would be SMALL. The impact along new transmission lines would be SMALL similar to the proposed project.

Table 9-2. (contd)

Impact Category	Impact	Comment
Human Health	SMALL	Regulatory controls and oversight would be protective of human health.
Historic and Cultural Resources	MODERATE	Most of the facility and infrastructure would be built on previously disturbed ground. Impacts may also be associated with transmission line and pipeline corridors.
Environmental Justice	NONE[a]	No disproportionately high or adverse impacts on minority or low-income populations would be anticipated based on analysis of census data and field interviews.

(a) A determination of "NONE" for Environmental Justice analyses does not mean there are no adverse impacts to minority or low-income populations from the proposed project. Instead, an indication of "NONE" means that while there are adverse impacts, those impacts do not affect minority or low-income populations in any disproportionate manner, relative to the general population.

9.2.3 Other Alternatives

This section discusses other energy alternatives, the NRC staff's conclusions about the feasibility of each alternative, and the NRC staff's basis for its conclusions. New nuclear units at the Turkey Point site would be baseload generation units. As discussed in Section 9.2.3 of the ESRP (NRC 2000-TN614), any feasible alternative to the new units would need to generate baseload power. In evaluating other energy technologies, FPL used the technologies discussed in the 1996 version of NUREG–1437 (NRC 1996-TN288). The NRC staff reviewed the information submitted by FPL in its COL and also conducted an independent review. The NRC staff determined that the other energy alternatives are not reasonable alternatives to two new nuclear units that would provide baseload power. Also, the FPSC stated that renewable generation available today or in the foreseeable future cannot provide enough baseload capacity to avoid the need for the addition of proposed Turkey Point Units 6 and 7 (FPSC 2008-TN735).

The NRC staff has not assigned significance levels to the environmental impacts associated with the alternatives discussed in this section because, as noted above, the generation alternatives are not feasible for providing 2,200 MW(e) of baseload power. In addition, some of the generation alternatives would have to be installed at a location other than the Turkey Point site, and any attempt to assign significance levels would require the NRC staff's speculation about the unknown site.

9.2.3.1 Oil-Fired Power Generation

The EIA's reference case in its *Annual Energy Outlook* 2014 projects that in the United States electric power generation using petroleum will decrease by around 10 percent between 2012 and 2040 (DOE/EIA 2014-TN3585). Oil-fired generation is more expensive than nuclear, natural-gas−fired, or coal-fired generation options. In addition, future increases in oil prices are expected to make oil-fired generation increasingly more expensive. The high cost of oil has resulted in a decline in its use for electricity generation. In Section 8.3.11 of the 1996 version of NUREG–1437, the NRC staff estimated that construction of a 1,000 MW(e) oil-fired plant would require about 120 ac of land (NRC 1996-TN288). Ecological impacts would be less than those identified for the proposed action because less critical habitat for the American crocodile would be lost. Operation of an oil-fired power plant would have air emissions that would be similar to those of a comparably sized coal-fired plant (NRC 1996-TN288).

For the preceding economic and environmental reasons, the NRC staff concludes that an oil-fired power plant would not be a reasonable alternative to construction of a 2,200 MW(e) nuclear power-generation facility that would be operated as a baseload plant within FPL's ROI.

9.2.3.2 Wind Power

Onshore areas within the FPL service territory are in a wind power Class 2 region (average wind speeds lower than 5.1 m/s at 10 m) (NREL 2012-TN1395). Offshore areas around the FPL service territory are in a wind power Class 3 region (average wind speeds 5.1 to 5.6 m/s at 10 m) (NREL 2009-TN1396). Areas designated Class 3 or greater are suitable for most wind turbine applications, whereas Class 2 areas are marginal (NREL 2009-TN1397). Therefore, commercial-scale development of wind energy in Florida would have to be sited in offshore locations. Modern wind turbines typically operate at an average capacity factor of 30 percent to 35 percent compared to 90 percent to 95 percent for a baseload plant such as a nuclear plant (Wiser and Bolinger 2011-TN1361). The world's largest operating wind farms are less than 1,000 MW, but most are well under 200 MW. The 454 MW Cape Wind Project covers approximately 25 mi^2 (MMS 2009-TN1402). Based on this, a utility-scale offshore wind power-generation project would generally require about 35 ac/MW of installed capacity. The Office of Energy Efficiency and Renewable Energy's 2011 Wind Technologies Market Report indicates that average wind turbine size was about 1.79 MW for U.S. installations in 2010 (Wiser and Bolinger 2011-TN1361). Therefore even with modern wind turbine designs, more than 1,000 wind turbines would be required to produce a peak output that matches the 2,200 MW(e) of the proposed nuclear units. These wind turbines would need to be coupled with a 2,200 MW(e) NGCC plant to provide power when the wind turbines are operating at less than full power. Alternately, in order to match the average annual generation expected from the proposed nuclear units (17,345 GWh) with wind power alone, more than 3,300 2 MW(e) wind turbines would have to be installed, coupled with energy storage on a very large scale. There is no such large-scale energy-storage mechanism available in Florida. Finally, the DOE/EIA projects no growth in wind power in the Florida Reliability Coordinating Council (FRCC), which includes the FPL service territory, from 2011 to 2023 (DOE/EIA 2014-TN3823). Based on this, the NRC staff assumes no growth in wind capacity for FPL from 2011 to 2023.

Because (1) the wind resource in Florida is not optimal for utility-scale generation, (2) the DOE/EIA projects no growth in wind energy in Florida, (3) the capacity factor of wind power is too low for baseload applications, and (4) the offshore area needed (and the associated environmental impacts) would be very large, the NRC staff concludes that a wind-energy facility at the Turkey Point site or elsewhere within FPL's ROI would not be a reasonable alternative to construction of a 2,200 MW(e) nuclear power-generation facility that would be operated as a baseload plant.

9.2.3.3 Solar Power

Solar technologies use energy and light from the sun to provide heating and cooling, light, hot water, and electricity for consumers. Solar energy can be converted to electricity using solar thermal technologies or photovoltaics. Solar thermal technologies use concentrating devices to create temperatures suitable for power production. Concentrating thermal technologies is currently less costly than photovoltaics for bulk power production. They can also be provided with energy storage or auxiliary boilers to allow operation during periods when the sun is not shining (NPCC 2006-TN1408). The largest operational solar thermal plant is the 310 MW(e) Solar Energy Generating System located on approximately 1,500 ac in the Mojave Desert in southern California (NextEra 2012-TN1400).

Solar insolation has a low energy density relative to other common energy sources. Consequently, a large total acreage is needed to gather an appreciable amount of energy. Typical solar thermal power plants require 3 to 8 ac for every megawatt of generating capacity (Mendelson et al. 2012-TN1399). For solar photovoltaics, the National Renewable Energy Laboratory reports 6.38 ac are typically required per megawatt (Roberts 2011-TN1398). For FPL's target capacity of 2,200 MW(e) for Units 6 and 7, land requirements would be approximately 6,600 to 17,600 ac. Solar thermal electric technologies also typically require considerable water supplies. In addition, according to DOE/EIA an average solar capacity factor ranges from 18 to 25 percent in the United States (DOE/EIA 2010-TN1401). Finally, the DOE/EIA projects limited growth in solar power in the FRCC, which includes the FPL service territory. From 2011 to 2023, DOE/EIA projects solar capacity in the FRCC will increase by about 660 MW (DOE/EIA 2014-TN3823). In 2012, FPL generated about 46 percent of the power in the FRCC (DOE/EIA 2014-TN3813). Attributing about half of the growth to FPL, the NRC staff assumes that growth in solar capacity for FPL from 2011 to 2023 would be around 330 MW.

Because (1) the projections for growth in solar energy in Florida are limited, (2) the area needed (and the associated environmental impacts) would be very large, and (3) the capacity factor of solar power is too low for baseload applications, the NRC staff concludes that a solar-energy facility at or in the vicinity of the Turkey Point site would not be a reasonable alternative to construction of a 2,200 MW(e) nuclear power-generation facility that would be operated as a baseload plant.

9.2.3.4 Hydropower

The EIA's reference case in its *Annual Energy Outlook* 2012 projects that U.S. electricity production from hydropower plants will remain essentially stable through the year 2035 (DOE/EIA 2011-TN1368). In the 1996 version of NUREG–1437, the NRC staff estimated that land requirements for hydroelectric power are approximately 1 million ac per 1,000 MW(e) (NRC 1996-TN288). For the target capacity of 2,200 MW(e) for proposed Turkey Point Units 6 and 7, land requirements would thus be 2.2 million ac.

A study conducted by the DOE estimates that there are 13 undeveloped potential hydropower sites in Florida. The results for individual site capacities range from 200 kW to 18 MW. The capacities of the majority (69 percent) of the hydropower sites in Florida are greater than 1 MW, and less than 10 MW. The 13 identified sites are located within one major river basin (Appalachicola River Basin) and several minor river basins (Conner and Francfort 1998-TN1367). Thus, the available hydropower in the entire State of Florida is well below the approximate 2,200 MW(e) net capacity of the proposed nuclear project.

Because of the extremely low amount of undeveloped hydropower resource in Florida and the large land-use and related environmental and ecological resource impacts associated with siting hydroelectric facilities large enough to produce 2,200 MW(e), the NRC staff concludes that hydropower is not a feasible alternative within the FPL ROI to construction of a new nuclear power-generation facility operated as a baseload plant at the proposed site.

As discussed in NUREG–1437 (NRC 2013-TN2654), ocean and tidal technologies are being developed but are in their infancy and have not been used at utility scale. In addition, in the *Annual Energy Outlook 2014*, DOE/EIA has not included these technologies in its projections (DOE/EIA 2014-TN3585). Therefore, the NRC staff concludes that these technologies are not feasible alternatives within the FPL ROI to construction of a new nuclear power-generation facility operated as a baseload plant at the proposed site.

9.2.3.5 Geothermal Energy

Geothermal energy has an average capacity factor of 90 percent and can be used for baseload power where available. Geothermal plants are most likely to be sited in the western continental United States, Alaska, and Hawaii, where hydrothermal reservoirs are prevalent (DOE 2008-TN1409). Geothermal systems have a relatively small footprint and minimal emissions (MIT 2006-TN1410). Florida has high-temperature geothermal resources that are suitable for space heating applications, but not for baseload power generation (DOE 2010-TN1411). A study led by the Massachusetts Institute of Technology concluded that a $300-million to $400-million investment over 15 years would be needed to make early-generation enhanced geothermal system power plant installations competitive in the evolving U.S. electricity supply markets (MIT 2006-TN1410).

The University of Florida Geophysical Laboratory has investigated heat flow values for the Gulf coastal plain and north-central Florida. Thermal gradients found in the majority of the wells drilled in Florida were below average to average, indicating little promise of a significant geothermal resource (State of Florida 1984-TN1422).

For these reasons, the NRC staff concludes that a geothermal energy facility at the Turkey Point site or elsewhere in FPL's ROI would not be a reasonable alternative to construction of a 2,200 MW(e) nuclear power-generation facility operated as a baseload plant.

9.2.3.6 Wood Waste

A wood-burning facility can provide baseload power and operate with a high annual capacity factor and with thermal efficiency similar to a coal plant (EPA 2007-TN2660; NREL 1993-TN2661). The fuels required are variable and site-specific. A significant impediment to the use of wood waste to generate electricity is the high cost of fuel delivery and high construction cost per megawatt of generating capacity. Estimates in NUREG–1437 suggest that the overall level of construction impacts per megawatt of installed capacity would be approximately the same as that for a coal-fired plant (NRC 2013-TN2654). Similar to coal-fired plants, wood-waste plants require large areas for fuel storage and processing and involve the same type of combustion equipment. In the *Annual Energy Outlook 2014* (DOE/EIA 2014-TN3823), DOE/EIA projects that growth in the generating capacity from biomass (which includes wood waste) in the FRCC region between 2011 and 2023 will be about 150 MW(e).

Because of the small projected increase in generating capacity for wood power-generation plants, the NRC staff concludes that wood waste would not be a reasonable alternative to a 2,200 MW(e) nuclear power-generation facility operated as a baseload plant.

9.2.3.7 Municipal Solid Waste

Municipal solid-waste combustors incinerate waste and can use the resultant heat to produce steam, hot water, or electricity. The combustion process reduces the volume of waste and the need for new solid-waste landfills. Mass-burning technologies are most commonly used in the United States. This group of technologies processes raw municipal solid waste with little or no sizing, shredding, or separation before combustion. More than one-fifth of the U.S. municipal solid-waste incinerators use refuse-derived fuel. In contrast to mass burning—where the municipal solid waste is introduced "as is" into the combustion chamber—refuse-derived fuel facilities are equipped to recover recyclables (e.g., metals, cans, and glass) followed by shredding the combustible fraction into fluff for incineration (EPA 2009-TN1412).

Municipal solid-waste combustors generate SO_2 and NO_x emissions and an ash residue that is buried in landfills. The ash residue is composed of bottom ash and fly ash. Bottom ash refers to the portion of the unburned waste that falls to the bottom of the grate or furnace. Fly ash represents the small particles that rise from the furnace during the combustion process. Fly ash is generally removed from flue gases using fabric filters and/or scrubbers (EPA 2008-TN1413).

Currently, 84 waste-to-energy plants are operating in the United States (Michaels 2014-TN3849). These plants have a combined generating capacity of approximately 2,770 MW(e), or an average of approximately 33 MW(e) per plant (Michaels 2014-TN3849). Given the small average output of existing plants, the NRC staff concludes that generating electricity from municipal solid waste would not be a reasonable alternative to a 2,200 MW(e) nuclear power-generation facility operated as a baseload plant within FPL's ROI.

One additional generating resource that uses municipal solid waste as a fuel derivative is the capture and combustion of landfill-based gas. There are currently 21 operating landfill-based gas facilities in Florida, generating a total of 83.3 MW. Units range in size from 0.4 to 11.3 MW (EPA 2012-TN1414). Given the relatively small size of the plants and the finite number of usable resources, the NRC staff concludes that generating electricity from landfill-based gas would not be a reasonable alternative to construction and operation of a 2,200 MW(e) nuclear power plant supplying baseload electricity.

9.2.3.8 Other Biomass-Derived Fuels

In addition to wood and municipal solid-waste fuel, several other biomass-derived fuels are available for fueling electric generators, including burning crops, converting crops to a liquid fuel such as ethanol, and gasifying crops (including wood waste). The EIA estimates that wind and biomass will be the largest sources of renewable electricity generation among the non-hydropower renewable fuels through 2040 (DOE/EIA 2014-TN3585).

Co-firing biomass with coal is possible when low-cost biomass resources are available. Co-firing is the most economic option for the near future to introduce new biomass power generation. These projects require small capital investments per unit of power-generation capacity. Co-firing systems range in size from 1 to 30 MW(e) of biopower capacity (DOE 2008-TN1416).

Finally, the DOE/EIA projects limited growth in biomass power in the FRCC, which includes the FPL service territory. From 2011 to 2023, DOE/EIA projects biomass capacity (including wood-burning facilities) in the FRCC will increase by about 150 MW(e) (DOE/EIA 2014-TN3823). In 2012, FPL generated about half of the power in the FRCC (DOE/EIA 2014-TN3813). Based on this, the NRC staff assumes that growth in biomass capacity for FPL from 2011 to 2023 would be around 75 MW(e).

The NRC staff concludes that given the relatively small average output of biomass power-generation facilities, biomass-derived fuels do not offer a reasonable alternative to a 2,200 MW(e) nuclear power-generation facility operated as a baseload plant within FPL's ROI.

9.2.3.9 Fuel Cells

Fuel cells work without combustion and its associated environmental side effects. Power is produced electrochemically by passing a hydrogen-rich fuel over an anode, air over a cathode, and then separating the two by an electrolyte. The only byproducts are heat, water, and CO_2. Hydrogen fuel can come from a variety of hydrocarbon resources by subjecting them to steam under pressure. Natural gas is typically used as the source of hydrogen.

Phosphoric acid fuel cells are generally considered first-generation technology. Higher-temperature, second-generation fuel cells achieve higher fuel-to-electricity and thermal efficiencies. The higher temperatures contribute to improved efficiencies and give the second-generation fuel cells the capability to generate steam for cogeneration and combined-cycle operations.

During the past three decades, significant efforts have been made to develop more practical and affordable fuel-cell designs for stationary power applications, but progress has been slow. The cost of fuel-cell power systems must be reduced before they can be competitive with conventional technologies (DOE 2008-TN1417). DOE has an initiative called the Solid State Energy Conversion Alliance (SECA) with the goal of developing large (i.e., 250 MW or greater) fuel-cell power systems, including those based on coal-derived fuels. Another SECA goal is to cut the costs of electricity generated via fuel cells to $700 per kilowatt (electrical) (DOE 2011-TN2083). However, it is not clear whether DOE will achieve these goals and, if so, when the associated fuel cells might reach commercial operations.

The NRC staff concludes that, at the present time, fuel cells are not economically or technologically competitive with other alternatives for baseload electricity generation. Future gains in cost competitiveness for fuel cells compared to other fuels are speculative.

For the preceding reasons, the NRC staff concludes that a fuel-cell energy facility located at or in the vicinity of the proposed site would not currently be a reasonable alternative to construction of a 2,200 MW(e) nuclear power-generation facility operated as a baseload plant.

9.2.4 Combination of Alternatives

Individual alternatives to the construction of two new nuclear units at the Turkey Point site might not be sufficient on their own to generate FPL's target value of 2,200 MW(e) because of the limited availability of the resource or lack of cost-effective opportunities. Nevertheless, it is conceivable that a combination of alternatives might be cost-effective. There are many possible combinations of alternatives. It would not be reasonable to examine every possible combination of alternatives in an EIS. Doing so would be counter to CEQ guidance that an EIS should be analytic rather than encyclopedic, should be kept concise, and should be no longer than absolutely necessary to comply with NEPA and CEQ regulations (40 CFR 1502.2(a), (b) [TN2123]; CEQ 2005-TN1394). Given that FPL's objective is for a new baseload generation facility, a fossil-fuel energy source, most likely natural gas or coal, would need to be a significant contributor to any reasonable alternative energy combination.

Section 9.2.2.2 assumes the construction of four 550 MW(e) natural-gas−fired, combined-cycle power-generating units at the Turkey Point site using closed-cycle cooling with cooling towers. For a combined alternatives option, the NRC staff assessed the environmental impacts of an assumed 1,915 MW(e) of natural-gas−fired, combined-cycle power-generating units at the Turkey Point site using closed-cycle cooling with cooling towers, and the following contributions from within FPL's ROI: 210 MW(e) from conservation and DSM programs beyond what is currently planned, 330 MW(e) from solar, and 75 MW(e) from biomass sources, including municipal solid waste. Solar energy would need to be combined with a backup power source (most likely NGCC) or an energy-storage mechanism, such as compressed air energy storage, to be used to meet a baseload need. The 1,915 MW(e) natural-gas plant assumed by the NRC staff would provide the backup power source for solar. The NRC staff believes that the preceding contributions are reasonable and representative for FPL's ROI. The contributions reflect the NRC staff's analysis in Sections 9.2.2 and 9.2.3.

The environmental impacts of the natural-gas portion of the combination of energy alternatives will be somewhat less than those for the plant discussed in Section 9.2.2.2. The additional conservation and DSM should not have any direct impacts on the environment, although the program will involve increased costs to FPL customers. Because of its modest size, the biomass component will have minor impacts. The solar portion of the combination could have noticeable impacts on land use and terrestrial resources, depending on how it is implemented (i.e., built on cleared land versus rooftop installations). Overall, this alternative would have impacts similar to those of the natural-gas−only alternative discussed in Section 9.2.2.2. A summary of the NRC staff's characterizations of the environmental impacts associated with the construction and operation of the preceding assumed combination of alternatives is provided in Table 9-3.

1 **Table 9-3. Summary of Environmental Impacts of a Combination of Power Sources**

Impact Category	Impact	Comment
Land Use	MODERATE	A natural-gas−fired plant would have land-use impacts for the power block, new transmission line corridors, cooling towers, and support systems, and connection to a natural-gas pipeline. Solar facilities and transmission lines could have noticeable land-use impacts because of the large footprints required for these facilities, especially the solar facilities.
Air Quality	SMALL to MODERATE	Emissions from the natural-gas−fired plant would be approximately as follows: SO_2 – 27 T/yr NO_x – 466 T/yr CO – 177 T/yr PM_{10} – 89 T/yr $PM_{2.5}$ –89 T/yr CO_2 – 5.2 million T/yr Some hazardous air pollutants. Biomass would also have some emissions.
Water Use and Quality	SMALL	Impacts would be less than the impacts for a new nuclear power plant located at the proposed site.
Ecology	MODERATE	Impacts would be similar to the proposed project. Solar facilities could add to impacts on terrestrial resources. Permanent impact on wetlands within the project footprint would occur.
Waste Management	SMALL	The only significant waste would be from spent selective catalytic reduction catalyst used for control of NO_x emissions and ash from biomass.
Socioeconomics	MODERATE Beneficial to SMALL Adverse	Construction and operation impacts would be similar to those for the natural gas-fired alternative, with all impacts SMALL and adverse, with the exception of a MODERATE and beneficial impact from road improvements and SMALL beneficial economic and tax impacts throughout the 500 mi region. Some construction-related impacts occur, but the impacts would be minor because of the small workforce involved. Aesthetic impacts would be SMALL.
Human Health	SMALL	Regulatory controls and oversight would be protective of human health.
Historic and Cultural Resources	MODERATE	The new transmission lines would have a noticeable adverse impact on the viewshed for cultural and historic resources. The impacts could be greater if the biomass or solar component was constructed on a location that contained archaeological resources.
Environmental Justice	NONE[(a)]	No disproportionately high or adverse impacts on minority or low-income populations would be anticipated based on analysis of census data and field interviews.

(a) A determination of “NONE” for Environmental Justice analyses does not mean there are no adverse impacts to minority or low-income populations from the proposed project. Instead, an indication of “NONE” means that while there are adverse impacts, those impacts do not affect minority or low-income populations in any disproportionate manner, relative to the general population.

9.2.5 Summary Comparison of Alternatives

Table 9-4 contains a summary of the NRC staff's environmental impact characterizations for constructing and operating new nuclear, coal-fired, and natural-gas−fired power-generating units, and a combination of alternatives at the Turkey Point site. The combination of alternatives shown in Table 9-4 assumes siting of the natural-gas−fired, combined-cycle units at the Turkey Point site and siting of other alternative power-generating units within FPL's ROI. The significance levels used in the comparison table for the nuclear category originate from Chapters 4, 5, and 6, for construction and preconstruction as well as operational impacts. Because all or most of the electrical generation for the alternatives would be sited at the proposed site, the consideration of climate change in Appendix I would be applicable to these energy alternatives.

The NRC staff reviewed the available information about the environmental impacts of power-generation alternatives compared to the construction of new nuclear units at the Turkey Point site. Based on this review, the NRC staff concludes that, from an environmental perspective, none of the viable energy alternatives is environmentally preferable to construction of a new baseload nuclear power-generation plant at the Turkey Point site.

Table 9-4. Summary of Environmental Impacts of Construction and Operation of New Nuclear, Coal-Fired, and Natural-Gas-Fired Generating Units and a Combination of Alternatives

Impact Category	Nuclear	Coal	Natural Gas	Combination of Alternatives
Land Use	MODERATE	MODERATE	MODERATE	MODERATE
Air Quality	SMALL	MODERATE	SMALL to MODERATE	SMALL to MODERATE
Water Use and Quality	SMALL	SMALL	SMALL	SMALL
Ecology	MODERATE	MODERATE	MODERATE	MODERATE
Waste Management	SMALL	MODERATE	SMALL	SMALL
Socioeconomics	SMALL Beneficial to MODERATE Adverse	MODERATE beneficial to MODERATE adverse	MODERATE beneficial to SMALL adverse	MODERATE beneficial to SMALL adverse
Human Health	SMALL	SMALL	SMALL	SMALL
Historic and Cultural Resources	MODERATE	MODERATE	MODERATE	MODERATE
Environmental Justice	NONE[a]	NONE[a]	NONE[a]	NONE[a]

(a) A determination of "NONE" for Environmental Justice analyses does not mean there are no adverse impacts to minority or low-income populations from the proposed project. Instead, an indication of "NONE" means that while there are adverse impacts, those impacts do not affect minority or low-income populations in any disproportionate manner, relative to the general population.

Because of current concerns related to GHG emissions, it is appropriate to specifically discuss the differences among the alternative energy sources regarding CO_2 emissions. The CO_2 emissions for the proposed action and energy-generation alternatives are discussed in Sections 5.7.1, 9.2.2.1, 9.2.2.2, and 9.2.4. Table 9-5 summarizes the CO_2 emission estimates for a

40-year period for the alternatives considered by the NRC staff to be viable for baseload power generation. These estimates are limited to the emissions from power generation and do not include CO_2 emissions for workforce transportation, construction, fuel cycle, or decommissioning. Among the reasonable energy-generation alternatives, the CO_2 emissions for nuclear power are a small fraction of the emissions of the other viable energy-generation alternatives. Even when the transportation emissions attributable to the nuclear workforce and the fuel-cycle emissions are added in, which would increase the emissions for plant operations over a 40-year period to about 11,000,000 MT CO_2 equivalent, this number is still significantly lower than the emissions for the plant operations portion of the other reasonable energy-generation alternatives.

Table 9-5. Comparison of Carbon Dioxide Emissions for Energy Alternatives

Generation Type	Years	CO_2 Emissions (MT)[(a)]
Nuclear Power[(b)]	40	362,000
Coal-Fired Generation[(c)]	40	748,000,000
Natural-Gas-Fired Generation[(d)]	40	252,000,000
Combination of Alternatives[(e)]	40	208,000,000

(a) Nuclear power emissions are in units of MT CO_2e whereas the other energy alternatives emissions estimates are in units of MT CO_2. If nuclear power emissions were represented in MT CO_2, the value would be slightly less, because other GHG emissions would not be included.
(b) From Section 5.7.1 for two units operational emissions, not including CO_2 emissions for workforce transportation.
(c) From Section 9.2.2.1.
(d) From Section 9.2.2.2.
(e) From Section 9.2.4

On January 8, 2014, the EPA introduced new regulations that would limit the amount of CO_2 that can be emitted from new fossil-fuel−fired power plants (79 FR 1430) (TN3720). The EPA has proposed separate limits for fossil-fuel−fired boilers and IGCC units, and natural-gas−fired stationary combustion units. The proposed limits for fossil-fuel−fired utility boilers and IGCC units are 1,100 lb CO_2/MWh gross over a 12-month operating period, or 1,000−1,050 lb CO_2/MWh gross over an 84-month (7-year) operating period.[(8)] The proposed limits for natural-gas-fired stationary combustion units are 1,000 lb CO_2/MWh gross for larger units (>850 MMBtu/hr) and 1,100 lb CO_2/MWh gross for smaller units (≤850 MMBtu/hr). If these proposed limits are finalized, they have the potential to reduce the amount of GHGs emitted from stationary source facilities. The implementation of this Rule could reduce the amount of GHGs from the values indicated in Table 9-5 for coal and natural gas, as well as from other alternative energy sources that would otherwise have appreciable uncontrolled GHG emissions. The GHG emissions from the production of electricity from a nuclear power source are primarily from the fuel cycle, and such emissions could be reduced further if the electricity from the assumed fossil-fuel source powering the fuel cycle is subject to BACTs. The emission of GHGs from the production of electrical energy from a nuclear power source is orders of magnitude less than those of the reasonable alternative energy sources. Accordingly, the comparative relationship between the energy sources listed in Table 9-5 would not change meaningfully, even if possible reductions to the GHG emissions from the nuclear fuel cycle are ignored, because GHG

(8) To put the limits in perspective, if a coal plant achieved the lower limit of 1,000 lb CO_2/MWh, and generated an average of 17,345 GWh/yr for 40 years (the same as the assumed output for the nuclear units), it would emit about 315,000,000 MT of CO_2.

emissions from the other energy source alternatives would not be sufficiently reduced to make them environmentally preferable to the proposed project.

The CO_2 emissions associated with generation alternatives evaluated in Section 9.2.3 (e.g., wind, solar, and hydropower) are not discussed in this EIS because the NRC staff determined that these alternatives do not meet the purpose and need of the proposed action.

As discussed in Chapter 8, the NRC staff concludes that the need for additional baseload power generation has been demonstrated. Also, as discussed earlier in this chapter, the NRC staff concludes that the viable alternatives to the proposed action all would involve the use of fossil fuels (coal or natural gas). Consequently, the NRC staff concludes that the proposed action results in the lowest level of emissions of GHGs among the viable alternatives.

9.3 Alternative Sites

The NRC's ESRP (NRC 2000-TN614) states that the ER, submitted in conjunction with an application for a COL, should include an evaluation of alternative sites to determine if any obviously superior alternative to the proposed site exists. The NRC's site-selection process guidance calls for identification of a ROI, followed by successive screening to identify candidate areas, potential sites, candidate sites, and the proposed site (NRC 2000-TN614). This section includes a discussion of FPL's ROI for the proposed siting of a new nuclear power plant, and describes its alternative site-selection process. This is followed by the review team's evaluation of the FPL site-selection process, a description of the alternative sites selected, and discussion of the environmental impacts of locating the proposed facilities at each alternative site.

The review of alternative sites consists of a two-part sequential test (NRC 2000-TN614). The first part of the test determines whether any of the alternative sites are environmentally preferable. To determine if a site is environmentally preferable, the NRC staff considers whether the applicant has (1) reasonably identified candidate sites, (2) evaluated the likely environmental impacts of the proposed action at these sites, and (3) used a logical means of comparing sites that led to selection of the proposed site. Based on its independent review, the NRC staff determines whether any of the alternative sites are environmentally preferable to the applicant's proposed site. If the NRC staff determines that one or more alternative sites are environmentally preferable, it then proceeds with the second part of the test.

The second part of the test determines if an environmentally preferable alternative site is not simply marginally better, but obviously superior to the proposed site. The NRC staff examines whether (1) one or more important aspects, either singly or in combination, of an acceptable and available alternative site are obviously superior to the corresponding aspects of the applicant's proposed site, and (2) the alternative site does not have offsetting deficiencies in other important areas. Included in this part of the test is the consideration of estimated costs (i.e., environmental, economic, and time of building the proposed plant) at the proposed site and at the environmentally preferable site or sites (NRC 2000-TN614).

The specific resources that could be affected by the incremental effects of the proposed action and other actions in the same geographic area were assessed. For the purposes of this alternative sites evaluation, impacts evaluated include NRC-authorized construction, operation, and other cumulative impacts including preconstruction activities. Sections 9.3.2 through 9.3.5

provide a site-specific description of the environmental impacts at each alternative site based on issues such as land use, water resources, terrestrial and aquatic ecology, socioeconomics, environmental justice, historic and cultural resources, air quality, nonradiological health, radiological impacts of normal operation, and postulated accidents. Section 9.3.6 contains a table of the NRC staff's characterization of the impacts at the alternative sites and comparison with the proposed site to determine if there are any alternative sites that are environmentally preferable to the proposed site.

9.3.1 Alternative Site-Selection Process

FPL's site-selection process was based on guidance provided in the NRC's ESRP (NRC 2000-TN614), NRC Regulatory Guide 4.7, Revision 2 (NRC 1998-TN1008), and the Electric Power Research Institute siting guide (EPRI 2002-TN1799). The site-selection and comparison process focused on identifying and evaluating sites that represented an acceptable range of alternatives for the proposed Turkey Point Units 6 and 7. The following information details the process used to identify and screen sites in successive steps until a reasonable number of alternative sites were determined and evaluated, and the proposed Turkey Point plant site was selected (FPL 2014-TN4058).

FPL's screening process proceeded through the following steps, which successively reduced the number of sites down to the final candidate sites (FPL 2014-TN4058):

- ROI: Largest geographic area of consideration, defined as the FPL service area.
- Candidate Areas: Areas within the ROI that would support the facility as proposed. These areas were determined by using exclusionary and/or avoidance criteria to screen the ROI to eliminate those areas where it would not be feasible to site a nuclear facility because of regulatory, institutional, plant design, and/or significant environmental impacts.
- Potential Sites: Discrete parcels of land found within the candidate areas that would support the facility as proposed. Potential sites were determined by using a refined set of exclusionary and/or avoidance criteria to screen the candidate areas. The screening data set was more refined and of higher detail than the data set used to identify the candidate areas.
- Candidate Sites: Sites that were selected by applying suitability criteria to the potential site list. This selection process used a quantifiable weighting and ranking process, including sensitivity analysis.
- Proposed Site: FPL selected the Turkey Point site based on the exception discussed in ESRP 9.3 (NRC 2000-TN614). FPL also retained the St. Lucie site based on this exception. FPL then compared the proposed and alternative sites on an issue-by-issue basis that allowed the applicant to identify both cost and environmental trade-offs associated with developing each of the sites. This approach provided a high level of assurance that the proposed site had no fatal flaw that could result in environmental impacts outside the identified scope, licensing delays, or increased cost.

ESRP 9.3 (NRC 2000-TN614) recognizes the potential value of including existing nuclear power plant sites that were "previously found acceptable on the basis of a National Environmental Policy Act (NEPA) review, or have [been] demonstrated to be environmentally acceptable on the basis of operating experience, or allocated to an applicant by a state government from a list of state approved power plant sites." Based on FPL's interpretation of ESRP 9.3, of the five final candidate sites, FPL determined that both the Turkey Point and the St. Lucie plant sites met the preceding criteria of having been found previously acceptable after a NEPA review. The NRC staff notes that previous determinations of site acceptability do not exempt that site from the same level of rigor of evaluation applied to the other alternative sites. The ESRP simply recognizes that a significant level of site characterization may have already been conducted thereby providing a reasonable basis for assessment.

FPL's site-selection process is summarized herein and in its ER (FPL 2014-TN4058). A more detailed discussion of FPL's site-selection process is available in FPL's initial 2006 siting document, *Project Bluegrass New Nuclear Power Generation Final Site Selection Study Report* (FPL 2007-TN3854). Subsequently, the ER and the Siting report were supplemented in 2011 with a report titled *Florida Power & Light Company Turkey Point 6 & 7 New Nuclear Power Generation (Formerly Project Bluegrass) Augmented Site Selection Study Report* (FPL 2011-TN63; FPL 2011-TN36) in response to the NRC's environmental audit and requests for additional information (NRC 2011-TN3751) to demonstrate that the site-selection process was conducted in a manner consistent with NUREG–1555, Section 9.3 (NRC 2000-TN614; FPL 2014-TN4058).

9.3.1.1 Selection of Region of Interest

For this COL application, the FPL defined the ROI as the area within (or immediately adjacent to) the FPL service territory. The FPL service territory is shown in Figure 9-1.

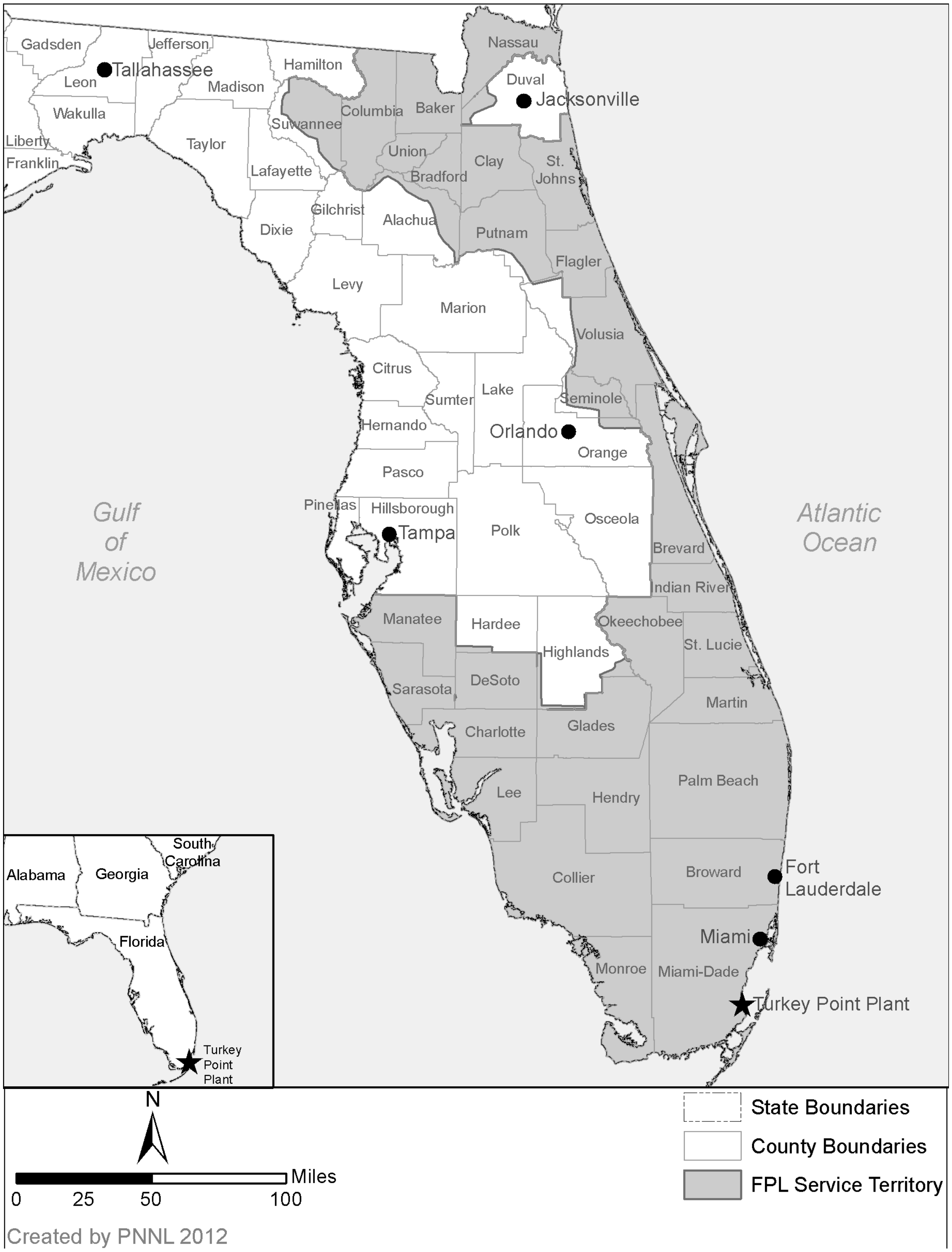
Although FPL's service territory extends north to south across the State of Florida, FPL indicated that its need for power is focused primarily on the load centers for the greater Miami area (FPL 2011-TN36; FPL 2014-TN4058).

9.3.1.2 Selection of Candidate Areas

FPL reduced the ROI to candidate areas by applying the following five exclusionary criteria: (FPL 2014-TN4058)

- areas greater than 10 mi from qualifying rivers and 10 mi from the Atlantic Ocean and the Gulf of Mexico
- areas greater than 10 mi from qualifying wastewater-treatment plants
- census block groups where population density >300 persons/mi^2
- lands designated as national parks, National Wildlife Refuges, National Marine Sanctuary Areas, military installations, Indian lands, and Florida State parks
- critical habitat for the following U.S. Fish and Wildlife Service (FWS)-listed threatened or endangered species: American crocodile (Crocodylus acutus), Cape Sable seaside sparrow (*Ammodramus maritimus mirabili*), Choctawhatchee beach mouse (*Peromyscus polionotus allophrys Bowen*), Everglade snail kite (*Rostrhamus sociabilis plumbeus*), frosted flatwoods salamander (*Ambystoma cingulatum Cope*), Gulf Sturgeon (*Acipenser oxyrinchus*), Johnson's seagrass (*Halophila johnsonii*), Perdido Key beach mouse (*Peromyscus polionotus trissyllepsis Bowen*), piping plover (*Charadrius melodus*), purple bankclimber (*Elliptoideus sloatianus*), rice rat (*Oryzomys palustris*), right whale (*Eubalaena glacialis*), St. Andrew beach mouse (*Peromyscus polionotus Peninsularis*).

1 After applying these exclusionary criteria, FPL identified the 16 candidate areas identified in
2 Figure 9-2 and Figure 9-3.



3

4 **Figure 9-1. FPL Service Territory**

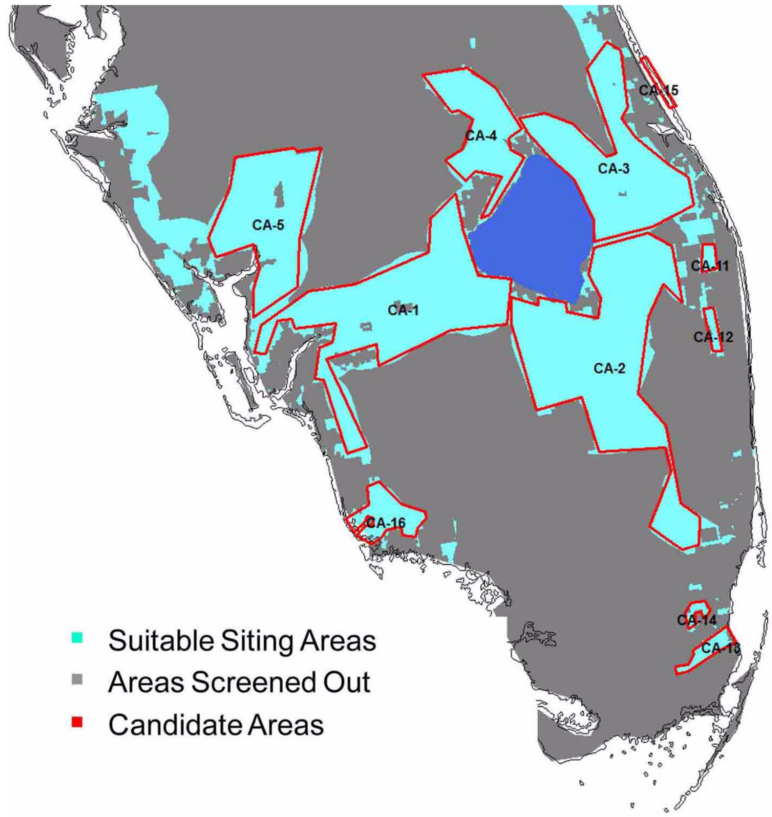


Figure 9-2. Candidate Areas: Southern Service Territory

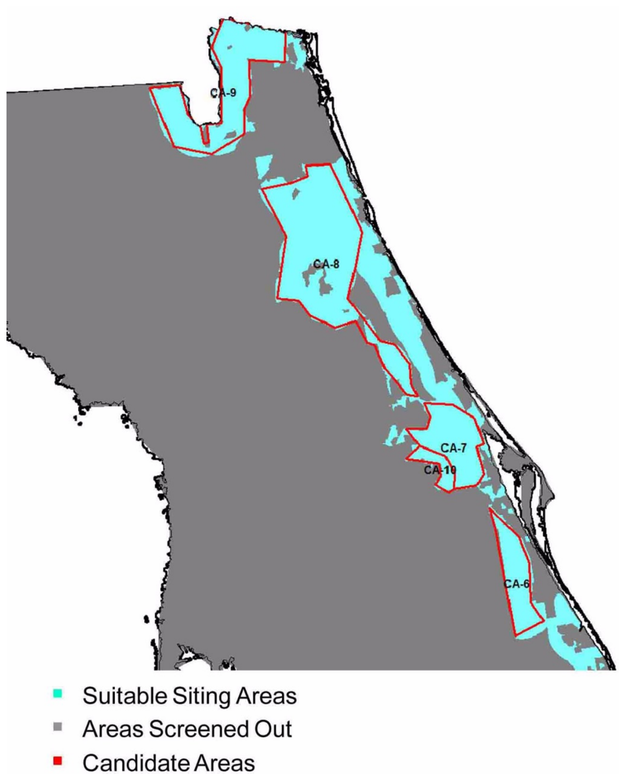


Figure 9-3. Candidate Areas: Northern Service Territory

9.3.1.3 Selection of Potential Sites

In FPL's initial site-selection process (FPL 2007-TN3854) an internal FPL team was canvassed to identify known available sites within the 16 candidate areas. This initial effort identified 23 potential sites consisting of existing FPL power-generation sites, FPL-owned greenfield sites, and other greenfield sites that FPL did not own. These 23 potential sites were qualitatively evaluated using the following criteria (FPL 2014-TN4058):

- sufficient land currently exists for new nuclear power plant construction
- sufficient land can be obtained for new nuclear power plant construction
- adequate sources of water
- transmission feasibility.

Based on this evaluation, the original 23 potential sites were screened down to 15 sites. FPL eliminated four sites because they were too distant from the primary load center of Miami-Dade requiring new, difficult to obtain transmission line rights-of-way. An additional four sites were eliminated by FPL based on insufficient available space and determinations that additional lands were either not available or would be difficult to obtain (FPL 2014-TN4058).

As described previously in Section 9.3.1, in 2011 FPL supplemented its initial screening evaluation with its Augmented Site Selection Study Report (FPL 2011-TN63) and applied the following screening criteria to the 16 candidate areas:

- avoidance of high-population areas
- avoidance of ecologically sensitive and special designation areas
- avoidance of special dedicated land uses (e.g., national parks)
- proximity to target transmission/load centers
- a minimum size of 5,000 ac
- flexibility to optimize site layout and design for cost minimization
- flexibility to optimize site layout and design for avoidance or mitigation of environmental impacts
- optimization of site engineering factors (e.g., topography, foundation conditions, grading requirements) (FPL 2014-TN4058).

Through this process, FPL identified 6 additional greenfield sites to consider as potential sites for a total of 21 potential sites as identified on Figure 9-4.

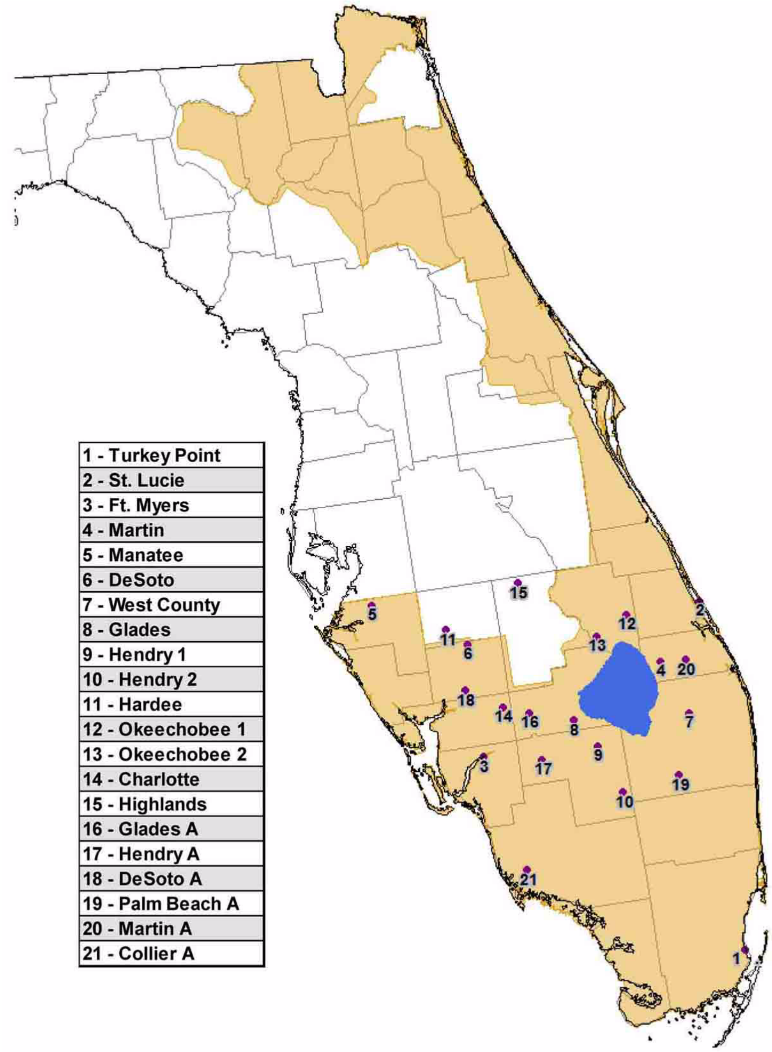


Figure 9-4. Potential Site Locations

9.3.1.4 Selection of Candidate Sites

FPL evaluated the 21 potential sites against the following 9 weighted screening criteria (FPL 2014-TN4058):

- cooling-water supply
- flooding
- population
- hazardous land uses
- ecology
- wetlands
- railroad access
- transmission access
- land acquisition.

FPL's detailed description of the metrics and rating rationale for each of these criteria is provided in the ER in Table 9.3-3. Of the original 21 potential sites FPL selected the top 8 ranked sites, and even though they ranked below these 8 sites, FPL also retained the Turkey Point and St. Lucie sites "based on the fact that they are existing, operating nuclear power plant sites within the ROI," and FPL's determination that the sites fall within " the special case (described above) for licensed nuclear power plant sites" (FPL 2014-TN4058). The resulting 10 candidate sites were:

- DeSoto
- Glades
- Glades A
- Hendry 1
- Martin
- Martin A
- Okeechobee 1
- Okeechobee 2
- St. Lucie
- Turkey Point.

9.3.1.5 Selection of Alternative Sites

FPL next subjected these 10 candidate sites to further evaluation against 34 weighted screening criteria, including 12 health and safety criteria; 8 environmental criteria; 3 socioeconomic criteria; and 11 engineering and cost criteria. A detailed list of all 34 criteria can be found in the ER in Table 9.3-5 (FPL 2014-TN4058).

In the resulting composite scores, the Okeechobee 1, DeSoto, and Hendry 1 sites rated lowest and were eliminated from further consideration. Of the remaining seven sites, FPL determined that neither the Martin A nor the Glades A sites presented any significant advantages over the Martin and Glades sites, respectively (sites that had already been evaluated in detail in the 2006 study), and therefore they were also dropped from further consideration. The resulting five alternative sites proposed by FPL, from highest to lowest composite score, are

- Turkey Point
- St. Lucie
- Martin
- Okeechobee 2
- Glades.

9.3.1.6 Selection of the Proposed Site

FPL subjected the five alternative sites to an additional qualitative review using the following 11 criteria:

- Environmental impact – Existence of ecological or environmental permitting issues
- Transmission – Availability of existing right-of-way and cost of upgrades

- Land acquisition – Existing land ownership and expected difficulty of acquiring site (if applicable)
- Reliability (transmission) – Analysis of reliability from a power-transmission perspective
- Reliability (generation) – Qualitative analysis of risk factors for reliable power production and supply
- Public acceptance – Ability to obtain public acceptance to support siting activities
- Political (local) – Governmental/organizational support at the local level
- Political (state) – Governmental and regulatory support at the State and Federal level
- Transmission takeaway – Feasibility of constructing the necessary upgrades to deliver power to the system
- Schedule compatibility – Level of confidence that site will support commencement of combined license application activities in January 2007
- Site layout feasibility – Ability of site to accommodate plant layout.

Using a three-point scoring system where 1 equaled more favorable and 3 equaled less favorable, FPL overall scoring ranked the sites in numerical order as follows:

1. Turkey Point
2. Glades
3. Martin
4. Okeechobee 2
5. St. Lucie.

Thus FPL selected the Turkey Point site as its proposed site based on this ranking and its determination that the site was the preferred site for meeting FPL's overall business objectives (FPL 2014-TN4058).

9.3.1.7 Review Team Evaluation of FPL's Site-Selection Process

The NRC staff evaluated the methodology used by FPL and concluded that the process was reasonable and consistent with the guidelines presented in the ESRP and the Electric Power Research Institute (EPRI) Siting Guide. The review team found that the systematic alternative siting analysis demonstrated a logical selection process and application of screening and exclusionary siting criteria. The analysis enabled the evaluation of the likely environmental impacts associated with the respective sites, including the evaluation of suitability criteria; identified acceptable alternative sites; and clearly provided the mechanism for selection of the final proposed site.

Following the guidance provided in ESRP 9.3 (NRC 2000-TN614), the review team visited the four alternative sites and collected and analyzed reconnaissance-level information for each. The review team then used the information in the ER, siting studies, and responses to requests for additional information (RAIs), information from other Federal and State agencies, and information gathered during the site visits to evaluate environmental impacts of building and operating two new nuclear power plants at those sites. The analysis considered the impacts of

NRC-authorized construction and operation as well as potential cumulative impacts associated with other actions affecting the same resources, including but not limited to preconstruction.

The cumulative impact analysis for the alternative sites was performed in the same manner as discussed in Chapter 7 for the proposed site except that, as specified in ESRP 9.3 (NRC 2000-TN614), the analysis was conducted at the reconnaissance level. The review team researched EPA databases for recent EISs within the State; used an EPA database for permits for water discharges in the geographic area to identify water-use projects; and used www.recovery.gov to identify projects in the geographic area funded by the American Recovery and Reinvestment Act of 2009 (ARRA) (26 USC 1) (TN1250). The review team developed tables of the major projects near each alternative site that were considered relevant in the cumulative analysis. The review team used the information to perform an independent evaluation of the direct, indirect, and cumulative impacts of the action at the alternative sites to determine if one or more of the alternative sites were environmentally preferable to the proposed site.

Included are past, present, and reasonably foreseeable Federal, non-Federal, and private actions that could have meaningful cumulative impacts with the action. For the purposes of this analysis, the past is defined as the time period prior to receipt of the COL application. The present is defined as the time period from the receipt of the COL application until the beginning of NRC-authorized construction of proposed Units 6 and 7. Future actions are those that are reasonably foreseeable through NRC-authorized construction and operation of the proposed Units 6 and 7 and decommissioning.

The specific resources and components that could be affected incrementally by the action and other actions in the same geographic area were identified. The affected environment that serves as the baseline for the cumulative impacts analysis is described for each alternative site, and a qualitative discussion of the general effects of past actions is included. The geographic area over which past, present, and future actions could reasonably contribute to cumulative impacts is defined and described for each resource area. The analysis for each resource area at each alternative site concludes with a cumulative impact finding (SMALL, MODERATE, or LARGE). For conclusions greater than SMALL, the review team also discussed whether building and operating the proposed facilities would be a significant contributor to the cumulative impact. In the context of this evaluation, “significant” is defined as a contribution that is important in reaching that impact-level determination.

The review team considered in Appendix I how future climate change could affect the evaluation of the impacts of operating the proposed new nuclear units at the Turkey Point site. The considerations in Appendix I would also apply to the alternative sites because all of the alternative sites are in the same geographic area (the Southeast Region) as the proposed site for the purposes of the analysis in the third National Climate Change Assessment by the U.S. Global Change Research Program (GCRP 2014-TN3472). The inland alternative sites could experience fewer impacts from sea-level rise, but may also experience greater impacts from other climate change indicators, such as rising temperature.

The nonradiological waste impacts described in Sections 4.10 and 5.10 would not substantially vary from one site to another. The types and quantities of nonradiological and mixed waste would be approximately the same for construction and operation of two Westinghouse

Advanced Passive 1000 (AP1000) pressurized water reactors at any of the alternative sites. For each alternative site, all wastes destined for land-based treatment or disposal would be transported offsite by licensed contractors to existing, licensed, disposal facilities operating in compliance with all applicable Federal, State, and local requirements. All nonradioactive, liquid discharges would be discharged in compliance with the provisions of the applicable National Pollutant Discharge Elimination System (NPDES) permit. For these reasons, these impacts are expected to be minimal and will not be discussed separately in the evaluation of each alternative site.

The impacts described in Chapter 6 of this EIS (e.g., nuclear fuel cycle and decommissioning) would likewise not substantially vary from one site to another because the NRC staff assumes the same reactor design (therefore, the same fuel-cycle technology, transportation methods, and decommissioning methods) for all of the sites. As such, these impacts would not differentiate between the sites and would not be useful in the determination of whether an alternative site is environmentally preferable to the proposed site. For this reason, these impacts are not discussed in the evaluation of the alternative sites.

Three of the four alternative sites are located near Lake Okeechobee, the largest lake in the southeastern United States (SFWMD et al. 2011-TN3087). However withdrawal of water from the lake and its tributaries is heavily regulated to meet management and restoration goals for the lake and other resources in South Florida (SFWMD 2012-TN3085). As a result, FPL has proposed a combination of surface water and groundwater resources to meet the cooling-water needs of two nuclear power units at these alternative sites. During periods of excess flow, water from the Kissimmee River/Lake Okeechobee system would be withdrawn and stored in a 3,000 ac reservoir on the site. During periods when this water was not sufficient, groundwater from the Avon Park Producing Zone (APPZ) would be withdrawn and treated with reverse osmosis to reduce the salinity of the water so that sensitive plant and animal communities in the area would not be affected by salt drift from the cooling towers (FPL 2013-TN3052). Blowdown water would be disposed of by injecting the water in the Boulder Zone resulting in no discharge of wastewater to surface waters or groundwaters used as potable water supplies.

To minimize the environmental impacts at these alternative sites, the review team considered an alternative configuration of the cooling system that FPL proposed. The review team was unable to confirm that, based on the drift rates provided by FPL for the Turkey Point cooling towers using brackish or saline water, salt deposition would be sufficiently adverse to the ecosystem to preclude the use of groundwater from the APPZ for cooling without a reverse osmosis system. The review team concluded that such a system would not be required. In addition, increased use of groundwater could reduce or eliminate the requirement for a surface-water reservoir. Therefore, the review team performed an analysis that did not include either a surface-water reservoir or a reverse osmosis system as part of the cooling system for each inland alternative site. The review team assumed that the revised design would use surface water only at times of excess flow. The review team acknowledges that the revised cooling-system design would result in a reduced number of cycles of concentration, greater groundwater pumping, and greater deep-well injection, all of which may contribute to greater operational and maintenance costs.

The review team also notes that no power-generating station in Florida relies on groundwater from an aquifer of the depth of the APPZ, and it knows of no individual user of groundwater from this depth that would use water in the quantities necessary to cool two AP1000 units. There is, therefore, significant uncertainty regarding how the cooling system might be implemented at any of these three sites. To address some of this uncertainty, in addition to evaluating the environmental impacts of its version of the cooling system, the review team qualitatively assessed how those impacts would be different if a 3,000 acre reservoir was included in the design of the system. Based on that assessment, including the reservoir would increase the impacts on land use and terrestrial ecology, while also increasing in a minor way the impacts on aquatic ecology and surface-water use. Impacts on other resources would likely not change appreciably. The review team did not include any assessment of the impacts with reverse osmosis treatment of the water because the team concluded that such treatment would not be necessary.

The cumulative impacts are summarized for each resource area in the subsections that follow. The level of detail is commensurate with the potential significance of the impacts. The four alternative sites are described in the following sections—Glades site (9.3.2), the Martin site (9.3.3), the Okeechobee 2 (9.3.4), and the St. Lucie site (9.3.5). A summary comparison of the review team's characterization of the impacts of the proposed action at the proposed and alternative sites is presented in Section 9.3.6 and Table 9-28.

9.3.2 Glades Site

This section covers the review team's evaluation of the potential environmental impacts of siting a new two-unit nuclear power plant on the Glades site. The Glades site is located in an undeveloped area in southeastern Glades County approximately 1 mi south of U.S. Highway 27 (US-27). Nearby towns include Moore Haven (2 mi east), Clewiston (15 mi southeast), La Belle (18 mi west), and Okeechobee (35 mi northeast). The Miami load center is approximately 75 mi southeast of the Glades site. Lake Okeechobee is approximately 5 mi to the northeast (FPL 2014-TN4058). The location of the Glades site is shown in Figure 9-5.

The Glades site is an undeveloped greenfield site approximately 3,000 ac in size (FPL 2014-TN4058). The majority of the site is currently agricultural fields. Topography does not vary considerably over the site.

FPL assumed the facility footprint, including the power units, support buildings, switchyard, storage areas, stormwater-retention ponds, and other structures, would require an estimated 362 ac Figure 9-6. Building at the Glades site would also require the creation of a transmission line corridor of approximately 121 mi, a 1.9 mi access road (23.1 ac), installation of 6.2 mi of railway (74.8 ac), and an intake/makeup pipeline (3.4 ac). Additional area (up to several hundred acres) would be temporarily disturbed for activities such as laydown areas, a batch plant, and for fill and spoil deposition (FPL 2014-TN4058). As discussed in Section 9.3.1.7, the review team considered an alternative configuration of the cooling system that FPL proposed.

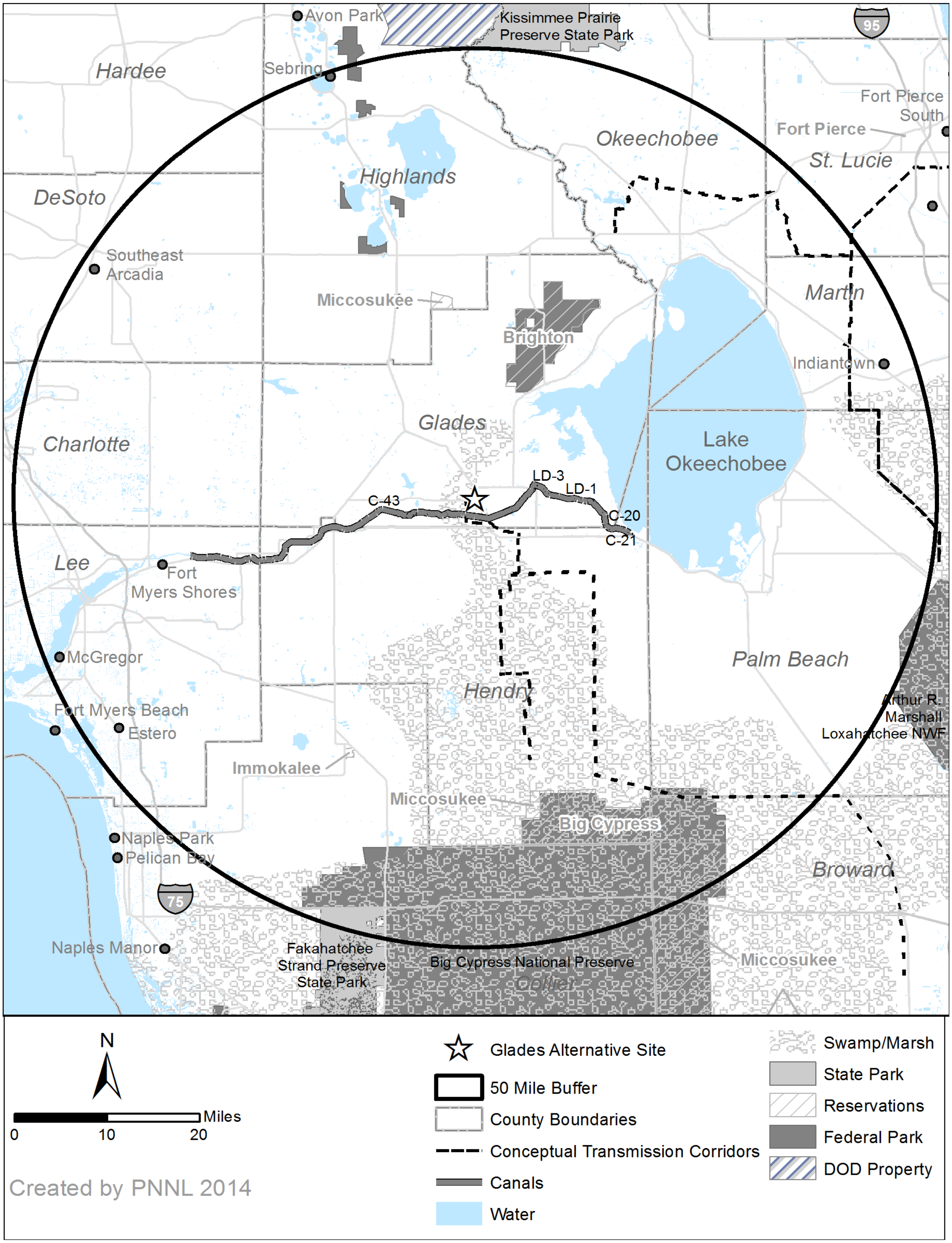


Figure 9-5. The Glades Site Region

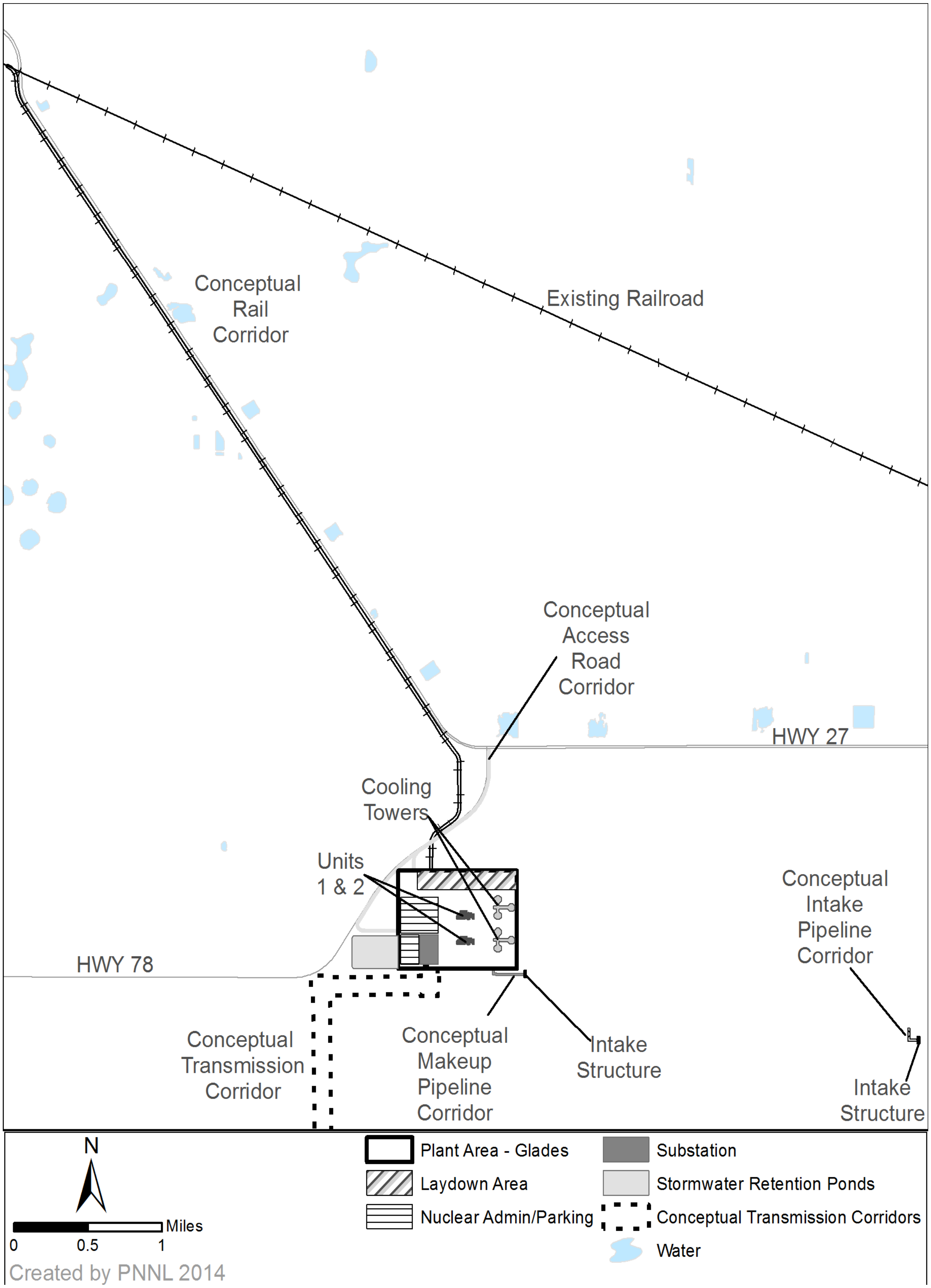


Figure 9-6. Glades Site Footprint

The following sections include a cumulative impact assessment conducted for each major resource area. The specific resources and components that could be affected by the incremental effects of the proposed action if implemented at the Glades site and other actions in the same geographic area were considered. This assessment includes the impacts of NRC-authorized construction and operations and impacts of preconstruction activities. Also included in the assessment are past, present, and reasonably foreseeable future Federal, non-Federal, and private actions that could have meaningful cumulative impacts when considered together with the proposed action if implemented at the Glades site. Other actions and projects considered in this cumulative analysis are described in Table 9-6.

The geographic area of interest for cumulative impacts considers all existing and proposed nuclear power plants that have the potential to increase the probability-weighted consequences (i.e., risks) from a severe accident at any location within 50 mi of the Glades site. An accident at a nuclear plant within 100 mi of the Glades site could potentially increase this risk. However, other nuclear plants in Florida, Alabama, and Georgia that are more than 100 mi from the Glades site are not included in the cumulative impact analysis.

Table 9-6. Past, Present, and Reasonably Foreseeable Projects and Other Actions in the Vicinity of the Glades Alternative Site

Project Name	Summary of Project	Location	Status
Energy Projects			
St. Lucie	Two 3,020 MW(t) nuclear power reactors	68 mi NE of the Glades alternative site	Operational, Units 1 and 2 underwent license renewal in 2003. Units 1 and 2 completed 320 MW(t) power uprates in 2013 (NRC 2012-TN1668; FPL 2014-TN3360)
West County Energy Center	Three 1,250 MW natural-gas−powered units	50 mi SE of the Glades alternative site	Operational (FDEP 2013-TN2965)
Martin	Combined natural-gas/oil and solar power-generating station	41 mi NE of the Glades alternative site	Operational (FPL 2014-TN2974)
Indiantown Cogeneration Company	330 MW coal-fired power plant	43 mi NE of the Glades alternative site	Operational (FDEP 2013-TN2967)
J.H. Phillips Sebring Station	36 MW two-unit oil power facility	45 mi NW of the Glades alternative site	Put in reserve standby status in 2009) (TECO 2014-TN4125)

Table 9-6. (contd)

Project Name	Summary of Project	Location	Status
Ft. Myers	Combination of oil and gas units with a total combined capacity (summer) of 2,396 MW. FPL has proposed to replace the twelve 63 MW oil-fired units with three new 200 MW gas-fired units.	39 mi SW of the Glades alternative site	Operational and Proposed. Replacement of the 12 oil-fired units is expected by 2016 (FDEP 2013-TN3003; FPL 2014-TN3360)
Lee County Waste-To-Energy Plant	Waste-to-energy power generation	39 mi SW of the Glades alternative site	Operational (Lee County 2014-TN2984)
Okeelanta Cogeneration Facility	140 MW biomass power-generation facility	31 mi SE of the Glades alternative site	Operational (FDEP 2013-TN2968)
FPL pipeline	126 mi pipeline from Sabal Trail's Central Florida Hub to FPL's Martin Clean Energy Center	Throughout region NE of the Glades alternative site	Proposed, construction set to begin 2016 (FPL 2014-TN2975)
Floridian Natural Gas Storage Company - Natural Gas Storage Facility	Storage of Natural Gas	40 mi NE of the Glades alternative site	Proposed, amendment to modify application sent to the Federal Energy Regulatory Commission (FERC) in 2013 (78 FR 58529) (TN3002)
DeSoto Next-Generation Solar Energy Center	25 MW solar-energy plant	50 mi NW of the Glades alternative site	Operational (FPL 2014-TN2974)
Southeastern Renewable Fuels Biorefinery and Cogeneration Plant	30 MW biofuel using leftover sweet sorghum stalk fiber	19 mi SE of the Glades alternative site	Proposed, Final air permit issued by FDEP in 2010 (FDEP 2010-TN2970)
Mining Projects			
Five Stone Mining	Stone/quarry mining	37 mi NE of the Glades alternative site	Operational (EPA 2013-TN2959)
Daniel Shell Pit, Phase 6	Stone/quarry mining	32 mi NE of the Glades alternative site	Operational (EPA 2013-TN2956)
Florida Shell and Rock	Stone/quarry mining	40 mi NW of the Glades alternative site	Operational (EPA 2013-TN2960)
Jay Rock Mine	Stone/quarry mining	40 mi NW of the Glades alternative site	Operational (EPA 2013-TN2962)
E R Jahna Industries Inc - Ortona Mine	Stone/quarry mining	8 mi SW of the Glades alternative site	Operational (EPA 2013-TN2958)

Table 9-6. (contd)

Project Name	Summary of Project	Location	Status
Harper Bros Inc - Alico Quarry	Stone/quarry mining	39 mi SW of the Glades alternative site	Operational (EPA 2014-TN2961)
Bonita Grande Properties	Stone/quarry mining	46 mi SW of the Glades alternative site	Operational (EPA 2014-TN2955)
Various other mine and quarry projects	Stone/quarry mining	Throughout region	Operational (FDEP 2010-TN2966)
Transportation Projects			
Various Transportation Projects	Road, traffic, pedestrian projects	Throughout region	Ongoing (FDOT 2014-TN4014)
Parks and Aquaculture Facilities			
Big Cypress National Preserve	Backcountry access plan to provide off-road vehicle secondary trails, non-motorized trails, and a camping management to the backcountry	38 mi S of the Glades alternative site	Proposed, backcountry access plan and EIS being developed by the National Park Service (NPS) (NPS 2014-TN3754)
Arthur R. Marshall Loxahatchee National Wildlife Refuge	Activities include picnicking, boating, fishing, and hiking	27–60 mi SE of the Glades alternative site	Development likely limited within this area (FWS 2013-TN2992)
Okaloacoochee Slough State Forest	Activities include bicycling, camping, hunting, fishing, and hiking	15–22 mi SW of the Glades alternative site	Development likely limited within this area (SFWMD 2014-TN3005)
Everglades Wildlife Management Area	Activities include bicycling, camping, hunting, fishing, and hiking	40 mi SE of the Glades alternative site	Development likely limited within this area (FFWCC 2014-TN2977)
Dupuis Wildlife and Environmental Area	Activities include bicycling, camping, hunting, fishing, and hiking	37–40 mi NE of the Glades alternative site	Development likely limited within this area (FFWCC 2014-TN2977)
Kissimmee River	Activities include bicycling, Horseback riding, hunting, camping, fishing, and hiking	N and NW of the Glades alternative site	Development likely limited within this area (FFWCC 2014-TN3004)
Okeechobee Battlefield State Park	Hiking, camping	36 mi NE of the Glades alternative site	Development likely limited within this area (FDEP 2010-TN2971)
Archbold Biological Station	Ecological research station and preserve, organization owns and protects a 5,193 ac globally significant Florida scrub preserve located on the southern end of the Lake Wales Ridge	28 mi NW of the Glades alternative site	Development likely limited within this area (Archbold Biological Station 2014-TN2954)
Highlands Hammock State Park	Activities include bicycling, camping, picnicking, horseback riding, fishing, and hiking	48 mi NW of the Glades alternative site	Development likely limited within this area (FSP 2014-TN2972)

Table 9-6. (contd)

Project Name	Summary of Project	Location	Status
Lake June in Winter Scrub State Park	Activities include picnicking, fishing, and hiking	36 mi NW of the Glades alternative site	Development likely limited within this area (FSP 2014-TN2973)
Lake Okeechobee	730 mi^2 freshwater lake, restoration and protection plan	14 mi E and NE of the Glades alternative site	Ongoing, Florida Legislature in 2007 expanded the Lake Okeechobee Protection Act (SFWMD 2014-TN2988)
Lake Wales Ridge National Wildlife Refuge	Composed of four tracts within Polk and Highlands Counties. Closed to the public	46 mi NW of the Glades alternative site	Development likely limited within this area (FWS 2011-TN2993)
Other State Nature Preserves and Wildlife Management Areas	Public recreational activities	Throughout region	Development likely limited within these areas (FFWCC 2014-TN2981)
Comprehensive Everglades Restoration Plan Projects			
C-43 Basin Aquifer Storage and Recovery	The Comprehensive Everglades Restoration Plan (CERP) Restudy envisioned aquifer storage and recovery wells with a capacity of approximately 220 million gallons per day and associated pre- and post- water quality treatment located in the C-43 Basin in Hendry, Glades, or Lee Counties in conjunction with another project.	24 mi SW of the Glades alternative site	Proposed, Project in Preconstruction, Engineering and Design phase (USACE and SFWMD 2014-TN3009)
Caloosahatchee River (C-43) West Basin Storage	Project to improve the timing, quantity, and quality of freshwater flows to the Caloosahatchee River estuary	21 mi SW of the Glades alternative site	Proposed, Project in Planning phase. (USACE and SFWMD 2014-TN3010)
Indian River Lagoon - South	Project purpose is to improve surface-water management in the C-23/C-24, C-25, and C-44 basins for habitat improvement in the Saint Lucie River Estuary and southern portions of the Indian River Lagoon.	49 mi E of the Glades alternative site	Proposed, Project in Preconstruction, Engineering and Design phase (USACE and SFWMD 2014-TN3013)
Everglades Agricultural Area Storage Reservoirs	The purpose of this project is to improve the timing of environmental deliveries to the Water Conservation Areas, including reducing damaging flood releases from the Everglades Agricultural Area to the Water Conservation Areas.	Throughout region	Proposed, Final Project Implementation Report submitted 2012 (USACE and SFWMD 2014-TN3011)

Table 9-6. (contd)

Project Name	Summary of Project	Location	Status
Flows to Northwest and Central Water Conservation Areas 3A	The purpose of this feature is to increase environmental water-supply availability, increase depths and extend wetland hydropatterns in the northwest corner and west-central portions of Water Conservation Area 3A.	43 mi SW of the Glades alternative site	Proposed, Project in Preconstruction, Engineering and Design phase (USACE and SFWMD 2014-TN3012)
Lake Okeechobee Aquifer Storage and Recovery	A series of aquifer storage and recovery wells adjacent to Lake Okeechobee	2 mi E of the Glades alternative site	Proposed, Project in Preconstruction, Engineering and Design phase (USACE and SFWMD 2014-TN3014)
Lake Okeechobee Watershed Project	Project to increase aquatic and wildlife habitat, regulate extreme highs and lows in lake staging, reduce phosphorus loading, and reduce damaging releases to the surrounding estuaries	Throughout Okeechobee County	Proposed, Project in Preconstruction, Engineering and Design phase (USACE and SFWMD 2014-TN3015)
Melaleuca Eradication and other Exotic Plants	The project includes (1) upgrading and retrofitting the current quarantine facility in Gainesville, and (2) large-scale rearing of approved biological control organisms for release at multiple sites within the South Florida ecosystem to control Melaleuca, Brazilian pepper, Australian pine, and Old World climbing fern.	Throughout region	Operational, Facility completed in 2013 (USACE and SFWMD 2014-TN3020)
Miccosukee Tribal Water Management Plan	Construction of a managed wetland on the Tribe's Reservation in western Broward County.	43 mi SE of the Glades alternative site	Proposed, Project in Preconstruction, Engineering and Design phase (USACE and SFWMD 2014-TN3016)
Modify Holey Land Wildlife Management Area Operation Plan	Modification of the current operating plan and rules for Holey Land Wildlife Management Area will be made to implement rain-driven operations for this area to improve the timing and location of water depths within this wildlife management area.	35 mi SE of the Glades alternative site	Proposed, Project in planning phase. (USACE and SFWMD 2014-TN3017)
Modify Rotenberger Wildlife Management Area Operation Plan	Modification of the current operating plan for the Rotenberger Wildlife Management Area will be made to implement rain-driven operations for this area as	32 mi S of the Glades alternative site	Proposed, Project in planning phase. (USACE and SFWMD 2014-TN3018)

Table 9-6. (contd)

Project Name	Summary of Project	Location	Status
	needed. Water deliveries are made to the Rotenberger Area from Stormwater-Treatment Area 5.		
Palm Beach County Agriculture Reserve Aquifer Storage and Recovery	Supplement water supplies for central and southern Palm Beach County by capturing and storing excess water currently discharged to the Lake Worth Lagoon.	46 mi E of the Glades alternative site	Proposed, Project in Preconstruction, Engineering and Design phase (USACE and SFWMD 2014-TN3019)
Other Actions/Projects			
Herbert Hoover Dike Major Rehabilitation Project	Rehabilitation Project and Dam Safety Modification Study	5-37 mi NE of the Glades alternative site	Proposed, Notice of Intent to file EIS submitted by USACE in Feb. 2013 (78 FR 1164) (TN2991)
Kissimmee River Restoration	When restoration is completed in 2017, more than 40 mi^2 of river-floodplain ecosystem will be restored, including almost 20,000 ac of wetlands and 44 mi of historic river channel.	Along Kissimmee River 30-50 mile N/NW of the Glades site	Ongoing (USACE 2014-TN3061)
Atlantic Sugar Association	Sugar manufacturing	32 mi E of the Glades alternative site	Operational (FDEP 2013-TN2964)
Southern Gardens Citrus Processing Corp.	Food production/distribution	6 mi SE of the Glades alternative site	Operational (FDEP 2013-TN2969)
United States Sugar Corporation Clewiston	Sugar manufacturing	15 mi SE of the Glades alternative site	Operational (EPA 2014-TN2963)
Various wastewater-treatment plant facilities	Sewage treatment	Throughout region	Operational
Various Hospitals Using Nuclear Material	Medical and other industrial isotopes	Throughout region	Ongoing
Various water/flood-management projects	Water and flood management	Throughout region	Ongoing (USACE 2012-TN1133)
Future Urbanization	Construction of housing units and associated commercial buildings; roads, bridges, and rail; construction of water- and/or wastewater-treatment and distribution facilities and associated pipelines, as described in local land-use planning documents	Throughout region	Construction would occur in the future, as described in State and local land-use planning documents

9.3.2.1 Land Use

The following analysis includes land-use impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable future actions that impact land use, including other Federal and non-Federal projects listed in Table 9-6. For the analysis of land-use impacts at the Glades site and the area within the transmission line corridors, the review team determined that a 10 mi radius, similar to that used for the Turkey Point site, would encompass an effective geographic area of interest for cumulative impact assessment for land use. The geographic area of interest includes the site and associated facilities. It also includes the nearest community, the small city of Moore Haven, 2 mi east of the Glades alternative site (2009 population of 2,358). In evaluating the land-use impacts of using the Glades site, the review team used, in addition to the project application, readily obtainable data from the Internet or published sources, including aerial photographs of the site and vicinity, U.S. Department of Agriculture (USDA) soils information, local zoning and planning documents, and data acquired from the Florida Land Use, Cover, and Forms Classification System (FLUCFCS). Impacts from both building and station operation are discussed.

Building and Operation Impacts

Existing land uses in the vicinity of the Glades alternative site consist predominantly of cultivated agriculture. The nearest community is Moore Haven, which is the county seat of Glades County. The larger region is primarily devoted to agriculture, with scattered small rural communities. The closest population center with more than 25,000 population is Fort Myers (2009 population 61,870), (FPL 2014-TN4058; USCB 2009-TN3395), 45 mi to the west. The Glades alternative site is located approximately 5 mi southwest of Lake Okeechobee.

Existing land uses at the Glades site consist predominantly of cultivated agriculture, primarily sugar cane (FPL 2014-TN4058). No commercial mineral resources are identified on the site and in vicinity (Calver 1956-TN3752; Spencer 1993-TN3753). Based on a site visit (NRC 2010-TN3304) and inspection of aerial photographs included on Google Earth, it appears that no substantial areas of developed land uses occur on or within the vicinity of the site. Wildlife management areas and recreational areas are located to the east, nearer Lake Okeechobee, several miles from the alternative plant site. The Glades County 2020 Comprehensive Plan (Glades County 2010-TN3303) identifies the existing land use at and in the vicinity of the Glades alternative site as “Agriculture” and the future land use on the Future Land Use Map (FLUM) (Glades County 2010-TN3303) as “Commercial” and “Transition.” The map depicts a small rural community that includes a roughly 1 mi^2 area on the north and south sides of US-27 of “Transition” surrounding a small commercial area. Areas to the south are designated as Agricultural. “Transition” is defined in the Glades 2020 Comprehensive Plan (Glades County 2010-TN3303) as follows:

> **Transition:** Mixed Use Areas in which the present primary use is agricultural, but which have scattered residential and nonresidential use areas and are likely to be infilled with additional residential uses. This category will not include more than 2.5% of the total land area of Glades County. The maximum densities are a gross residential density of 7 residential units per acre and the maximum floor to area ratio for nonresidential uses shall be 0.3.

Therefore, the review team believes that use of the Glades alternative site for a power plant would be inconsistent with the current Glades County FLUM. This does not mean that the plant could not be built at this location, but a change in the current FLUM would be needed.

No Prime farmland is identified on or in the vicinity of the site. However, most of the soils on and in the vicinity of the plant site are considered farmlands of Unique Importance. (USDA 2014-TN3358). Unique farmland is defined in Section 2(c) of the Farmland Protection Policy Act (7 USC 4201 et seq.) (TN708) as "land, other than Prime farmland, that has combined conditions to produce sustained high quality and high yields of specialty crops, such as citrus, nuts, fruits, and vegetables when properly managed." No portion of the alternative plant site or site vicinity falls within the Coastal Zone (FPL 2014-TN4058). Although no rivers are located near the alternative plant site, as shown on the Federal Emergency Management Agency (FEMA) Flood Zones, 2020 map in the Glades 2020 Comprehensive Plan (Glades County 2010-TN3303), and, as FPL states in its application (FPL 2014-TN4058), portions of the plant site fall within the 100-year flood zone. The 15 ft fill that the ER states would be required at the alternative plant site (FPL 2014-TN4058) could noticeably affect the flood plain, because it is such a large area and such a large amount of fill.

Building and operation of the project at the Glades site would result in the conversion of existing land uses, including approximately 296.8 ac from agriculture to power-generation uses as shown in Table 9-7. Because this is a small amount of farmland in the context of the large amount of farmland under cultivation in Glades County, conversion of this amount of farmland to another use would not substantially affect the agricultural economy of the region.

Additional land-use impacts include possible additional growth and land conversions in the vicinity to accommodate new workers and services. This could result in the loss of additional farmland. Because the workforce would be dispersed over larger geographic areas in the labor supply region, the impacts from land conversion for residential and commercial buildings induced by new workers relocating to the local area can be absorbed in the wider region. Therefore, the review team concludes that such impacts would be minimal.

Table 9-7. Glades Site Land-Use Impacts (Acres)

	Agricultural Lands (FLUCFCS 200 Land Use Series)	Non-Agricultural Lands (all other FLUCFCS designations)	Total
Plant Site	207	113	320
Access Roads	18	5	23
Rail Corridor	47	28	75
Intake Pipeline Corridor	0	1	1
Makeup Pipeline Corridor	2	0.1	2
Stormwater-Retention Ponds	22	20	42
Total[a]	297	167	463
Transmission-Line Corridors	3,966	1,851	5,824
Grand Total	4,062	2,018	6,287

(a) Totals may not add due to rounding

Sources: FPL 2011-TN59 and FPL 2014-TN4058

Approximately 121 mi of new transmission lines would have to be built to serve the plant. FPL states in its application (FPL 2014-TN4058) that none of the transmission lines would pass through the Coastal Zone. Approximately 5,824 ac of land would be at least temporarily affected. Of this land, approximately 3,966 ac are agricultural land, with the remainder primarily open lands and roadways. The agricultural land within the transmission line corridors would be converted from agricultural use to transmission line use, although FPL states in its application (FPL 2014-TN4058) that agriculture could continue within and along the transmission line rights-of-way.

Under the Florida Site Certification application process explained in Section 4.1, the State approves a corridor and the applicant chooses a specific right-of-way within the approved corridor. The objective of this process, as stated in the electrical power plant and transmission line statute (FDEP 2013-TN2629) is “that the location of transmission line corridors and the construction, operation, and maintenance of electric transmission lines produce minimal adverse effects on the environment and public health, safety, and welfare” and “to fully balance the need for transmission lines with the broad interests of the public in order to effect a reasonable balance between the need for the facility as a means of providing reliable, economical, and efficient electric energy and the impact on the public and the environment resulting from the location of the transmission line corridor and the construction, operation, and maintenance of the transmission lines.” Engineering considerations and costs are likely to suggest designs that favor collocation with existing transmission lines in existing corridors. The siting criteria identified by FPL in the application include land-use considerations to minimize potential disruption to such areas as national, state, and county parks; wildlife refuges; estuarine sanctuaries; landmarks; and historical sites. FPL states in its application that, in its development of the conceptual transmission line corridor for the Glades alternative site, it attempted to select corridors that would allow collocation with existing transmission line corridors and avoided populated areas or residential land uses to some extent (FPL 2014-TN4058). The State certification review process also includes a determination of land-use consistency with local land-use plans and zoning ordinances (Fla. Stat. 29-403.50665-TN1470).

The review team concludes that the land-use impacts from building and operating two new nuclear units at the Glades alternative site would be noticeable, but not destabilizing.

Cumulative Impacts

Within the geographic area of interest, there are no other reasonably foreseeable future projects with the potential to affect cumulative land-use impacts. The Glades County FLUM does not identify other non-agricultural future land uses near the Glades alternative site, other than the area designated for Transition and Commercial uses noted above that covers the Glades alternative site (Glades County 2010-TN3303).

In the area affected by the transmission lines, other linear projects are proposed, including the FPL pipeline from Sabal Trail’s Central Florida Hub to FPL’s Martin Clean Energy Center. The review team expects that the contribution of these other projects to overall land-use impacts in the geographic area of interest would be minimal.

Summary Statement

Based on the information provided by FPL and the review team's independent review, the review team concludes that the cumulative land-use impacts of building and operating the power plant at the Glades alternative site would be MODERATE. The incremental impact from the proposed project at the alternative site would be a significant contributor to the MODERATE impacts due to conflicts with the Glades 2020 Comprehensive Plan.

9.3.2.2 Water Use and Quality

The following impact analysis includes impacts from building and operating two new nuclear units at the Glades site. The analysis also considers other past, present, and reasonably foreseeable future actions that affect water use and quality, including the other Federal and non-Federal projects listed in Table 9-6. The Glades site is located in rural Glades County in Florida southwest of Lake Okeechobee and near the Caloosahatchee River, which is also known as the C-43 Canal (Figure 9-6).

The geographic area of interest for surface water at the Glades site is the Kissimmee-Okeechobee-Everglades watershed because this is the resource that would be affected if the proposed project were located at the Glades site. The Kissimmee-Okeechobee-Everglades watershed includes an area of about 9,000 mi^2 (McPherson and Halley 1996-TN98). For groundwater, the ROI includes 1) the surficial aquifer and the Upper Floridan aquifer at the site, 2) the APPZ of the Middle Floridan aquifer upgradient and downgradient of the site for water withdrawals, and 3) the Boulder Zone of the Lower Floridan aquifer upgradient and downgradient of the site for disposal of blowdown water.

Building Impacts

The water use for building activities at the Glades site would be comparable to the proposed water use for building activities for the Turkey Point site. During building, peak water use is estimated to be 565 gpm (0.8 Mgd) (see Table 3-4). The review team assumes that water for building the two units at the Glades site would come from a combination of surface water and groundwater. Surface water from the Caloosahatchee River or Lake Okeechobee may be available for building purposes during times of high surface-water flow. At less than 1 percent of the inflow for even the lowest month reported (January 1963), the peak water-use rate of 0.8 Mgd during the building phase is inconsequential when compared to the historic average monthly flow into Lake Okeechobee. Surface water from onsite stormwater ponds and groundwater from excavation dewatering may also be used, when available, for building purposes. The South Florida Water Management District (SFWMD) would regulate any use of surface water or shallow groundwater for plant construction.

The review team concludes that the impact of groundwater and limited surface-water use for building the potential units at the Glades site would be minimal for the following reasons:

- Withdrawal is inconsequential compared to the water resources in the Lake Okeechobee watershed.

- Any use of surface water or shallow groundwater would regulated by SFWMD and be limited to time periods when there would not be a negative impact on the Lake Okeechobee system or shallow aquifers.
- Water use for building would be limited to the building period and the peak use of 0.8 Mgd is much less than the average 22.26 Mgd groundwater withdrawal rate reported for Glades County in 2005 (Marella 2009-TN1521).

The review team assumes that the impact of dewatering the excavations needed for building two units at the site would be managed through the installation of diaphragm walls and grouting as is proposed for the Turkey Point site. Therefore, because there would be no use of non-saline groundwater and the impact of dewatering would be controlled, the review team determined that there would be little or no impact on groundwater availability.

Surface-water quality would potentially be affected by stormwater runoff during site preparation and the building of the facilities. The FDEP would require FPL to develop an erosion and sediment control plan and a stormwater pollution prevention plan (SWPPP) before initiation of site-disturbance activities (FPL 2014-TN4058).

The plans would identify BMPs to control the impacts on surface-water quality cause by stormwater runoff. The review team anticipates that FPL would construct new detention/infiltration ponds and drainage ditches to control delivery of sediment from the disturbed area to onsite waterbodies. Sediment carried with stormwater from the disturbed area would settle in the detention ponds and the stormwater would infiltrate into the shallow aquifer. Implementation of BMPs should minimize impacts on surface waterbodies near the Glades site. Therefore, the surface-water−quality impacts near the Glades site would be temporary and minimal.

While building new nuclear units at the Glades site, groundwater quality may be affected by leaching of spilled effluents into the subsurface. The review team assumes that the BMPs FPL has proposed for the Turkey Point site would be in place during building activities and therefore the review team concludes that any spills would be quickly detected and remediated. In addition, groundwater impacts would be limited to the duration of these activities, and therefore, would be temporary. The review team reviewed the general BMPs that could be expected to be required at such a site (State of Florida 2014-TN3637). Because any spills related to building activities would be quickly remediated under BMPs, and the activities would be temporary, the review team concludes that the groundwater-quality impacts from building at the Glades site would be minimal.

Wastewater streams from building activities could be injected to the Boulder Zone of the Lower Floridan aquifer as planned at Turkey Point (FPL 2014-TN4058). Construction and operation of the disposal wells would be performed under the conditions of an Underground Injection Control (UIC) permit issued by the FDEP, with the objective of protecting water quality within the APPZ and overlying aquifers.

Operations Impacts

FPL (2014-TN4058) indicates that the water needed to operate two units would be approximately 50,000 gpm or 72.7 Mgd. As indicated in Chapter 3, evaporative losses from cooling two units would be approximately 28,800 gpm (41.5 Mgd). The review team assumed that the two units at the Glades site would primarily use brackish groundwater from the permeable zone (APPZ) within the Avon Park formation for makeup cooling water. This relatively permeable zone is considered part of the Middle Floridan aquifer and is more than 1,000 ft below ground surface near the Glades site. The SFWMD has informed NRC that consumptive use of surface water from Lake Okeechobee or its tributaries would be limited (SFWMD 2012-TN3085). Use of water from Lake Okeechobee and the Caloosahatchee River would also have to avoid any negative impact on restoration projects in South Florida. Therefore, surface water from Lake Okeechobee and the Caloosahatchee River could be used only at times of excess surface-water flow that typically occur during the wet season.

The APPZ aquifer is not generally used because of the salinity of its water (FPL 2013-TN3052). Therefore, the current impacts of using this water for power production are minor. Because brackish or saline groundwater is not in demand, use of this resource will not result in water-use conflicts. However, groundwater in the Middle Floridan aquifer at this site is a potential source of brackish water for desalinization. If demand for desalinization source water increases, water for the plant may be obtained from deeper, more saline formations.

Blowdown discharge and other wastewater streams would be pumped into the Boulder Zone of the Lower Floridan aquifer. The Boulder Zone is isolated from the Avon Park permeable zone by low-permeability units. Additional low-permeability confining units separate the Avon Park permeable zone from the overlying Upper Floridan aquifer. Construction and operation of the disposal wells would be performed under the conditions of a UIC permit issued by the FDEP.

As indicated in Chapter 3, the consumptive water use due to evaporative losses from cooling two units would be approximately 28,800 gpm (41.5 Mgd). However, the review team assumed that surface water would only be consumed during periods of excess flow, thereby precluding water-use conflicts.

During the operation of two new nuclear units at the Glades site, impacts on surface-water quality would be minimal because wastes would be injected into the Boulder Zone and not released to the surface water. The FDEP would require FPL to develop a SWPPP (FPL 2014-TN4058). These plans would identify measures to be used to control stormwater runoff. All discharges to surface waterbodies would be required to comply with limits established by FDEP in a NPDES permit.

During the operation of the two units at the Glades site, impacts on groundwater quality could result from potential spills. Spills that might affect the quality of groundwater would be controlled and mitigated by BMPs. Like the proposed site, any wastewater at this inland alternative site would be combined with cooling-tower blowdown and discharged into Boulder Zone with no loss of beneficial uses of the water resource.

Cumulative Impacts

In addition to water-use and water-quality impacts from building and operations activities, cumulative analysis considers past, present, and reasonably foreseeable future actions that affect the same water resources.

For the cumulative analysis of impacts on surface water and groundwater at the Glades site, the geographic area of interest is the same as what was considered for building and operational impacts, and was defined earlier in this section.

Actions that have past, present, and future potential impacts on water supply and water quality near the Glades site include existing agriculture and existing and future urbanization in the region.

Cumulative Impacts on Water Use

The impacts of the other projects listed in Table 9-6 are considered in the analysis included above or would have little or no adverse impact on surface-water use. The projects believed to have little impact are excluded from the analysis either because they are too distant from the Glades site, use relatively little or no surface water, or have little or no discharge to surface water. Some projects (for example park and forest management) are ongoing, and changes in their operations that could have large impacts on surface-water use appear to be unlikely.

In 2000, the Florida Legislature passed the Lake Okeechobee Protection Act to establish a restoration and protection program for Lake Okeechobee (SFWMD et al. 2011-TN3087; SFWMD 2010-TN3086). Part of the focus of this Act was to restore the natural hydrology of the system after years of altering the natural drainage around the lake to permit development of the land and to reduce flood damage. The State of Florida and the Federal government are spending hundreds of millions of dollars to restore the Lake Okeechobee and other water resources in the watershed; therefore, the review team concluded that the cumulative impact on surface-water use would be MODERATE.

Surface-water use during the building and operation of two units at the Glades site would be dominated by water use for operations. As discussed above, surface water would only be withdrawn during periods of excess flow. Therefore, the review team concluded that building and operating the proposed units at the Glades site would not be a significant contributor to the MODERATE impacts on surface-water use.

As stated above, the review team assumed that any use of shallow groundwater to build the units at the Glades site would be regulated by the SFWMD. If this source is not available in sufficient quantity for building activities, brackish groundwater from the APPZ could be used for some building activities. Groundwater impacts from dewatering would be controlled with diaphragm walls and grouting. Brackish groundwater from the APPZ would be used to operate the plant except when excess surface water is available. The APPZ aquifer is not generally used because of the salinity of its water (FPL 2013-TN3052). Because brackish or saline groundwater is not in demand, use of this resource will not result in water-use conflicts.

The impacts of the other projects listed in Table 9-6 are considered elsewhere in this analysis or else would have little or no adverse impact on groundwater use. The projects believed to have little impact are excluded from the analysis either because they are too distant from the Glades site, or use relatively little or no groundwater. Some projects (for example park and forest management) are ongoing, and changes in their operations that would have large impacts on groundwater use appear unlikely. Therefore, the review team concludes that cumulative impacts on groundwater use would be SMALL.

Cumulative Impacts on Water Quality

Point and non-point source discharges have affected the surface-water quality of the Lake Okeechobee watershed and the Caloosahatchee River upstream and downstream of the site. Water-quality information presented above for the impacts of building and operating the proposed new units at the Glades site would also apply to evaluation of cumulative impacts. Lake Okeechobee has been the target of extensive efforts to reduce nutrient loading and improve water quality (SFWMD et al. 2011-TN3087). During the operation of two new nuclear units at the Glades site, impacts on surface-water quality from the units would be minimal because plant discharges would be injected into the Boulder Zone and not released to the surface water. The State of Florida requires an applicant to develop a SWPPP (FPL 2014-TN4058) and all discharges to surface waterbodies would be required to comply with limits established by FDEP in a NPDES permit. Such permits are designed to protect water quality. The SWPPP would identify measures to be used to control stormwater runoff (FPL 2014-TN4058). Therefore, the review team concluded that the cumulative impact on surface-water quality of the receiving waterbody would be MODERATE.

The review team concluded that building and operating the proposed units at the Glades site would not be a significant contributor to the MODERATE impacts on surface-water quality, because industrial and wastewater discharges from the proposed units would be discharged directly to the Boulder Zone and any stormwater runoff from the site during operations would be managed in compliance with the SWPPP (FPL 2014-TN4058).

The APPZ aquifer is not generally used because of the salinity of its water (FPL 2013-TN3052). Because brackish or saline groundwater is not in demand, use of this resource will not result in water-use conflicts. The review team also concludes that with the implementation of BMPs, the impacts on shallow groundwater quality from building and operating two new nuclear units at the Glades site would likely be minimal. Therefore, the cumulative impact on groundwater quality would be SMALL. The impacts of other projects listed in Table 9-6 are either considered in the analysis included above or would have little or no impact on surface-water and groundwater quality.

9.3.2.3 Terrestrial and Wetland Resources

This section addresses potential impacts on terrestrial resources from siting two new nuclear units on the Glades site and a transmission line corridor, which begins in Glades County and crosses portions of Hendry, Palm Beach, and Broward Counties. Most of the Glades site has been disturbed and is primarily used for agriculture, especially sugar cane. Small areas are maintained as improved and unimproved pasture. Natural upland habitats that include hardwood forest and coniferous plantations cover only small areas on the site. The remainder includes various wetland habitats including exotic and mixed wetland hardwoods, ditches, wet prairies, freshwater marsh, holding ponds (FPL 2011-TN59).

Glades County hosts species found in terrestrial habitats that are listed as Federally endangered or threatened and also species that are proposed for such listing (Table 9-8). Surveys were not conducted at the Glades site or along the conceptual transmission line corridor to determine the presence and distribution of listed species. However, surveys were conducted at the formerly proposed FPL Glades Power Park site that has similar topography and habitat (FPL 2014-TN4058). Therefore, the review team determined the likelihood of occurrence at project sites based on habitat preferences of each species and the land-cover types expected to be affected at Glades site and within the conceptual transmission line corridor. Audubon's crested caracaras (*Polyborus plancus audubonii*), the wood storks (*Mycteria americana*), and the Everglade snail kites were observed during surveys at the formerly proposed FPL Glades Power Park site, which is located approximately 4 mi north of the Glades site. Life history information for most of these species can be found in Section 2.4.1. Species not previously discussed in this document are discussed below.

Table 9-8. Federally Listed Terrestrial Species that May Occur on the Glades Site or within the Conceptual Transmission-Line Corridor

Scientific Name	Common Name	Federal Status
Birds		
Polyborus plancus audubonii	Audubon's crested caracara	Threatened
Ammodramus savannarum floridanus	Florida grasshopper sparrow	Endangered
Rostrhamus sociabilis plumbeus	Everglade snail kite	Endangered
Aphelocoma coerulescens	Florida scrub jay	Threatened
Campephilus principalis	Ivory-billed woodpecker	Endangered
Picoides borealis	Red-cockaded woodpecker	Endangered
Mycteria americana	Wood stork	Threatened
Grus americana	Whooping crane	Endangered
Charadrius melodus	Piping plover[a]	Threatened
Calidris canutus rufa	Red knot[a]	Proposed Threatened
Dendroica kirtlandii	Kirtland's warbler[a]	Endangered
Mammals		
Puma concolor coryi	Florida panther	Endangered
Peromyscus polionotus niveiventris	Southeastern beach mouse[a]	Threatened
Reptiles		
Drymarchon corais couperi	Eastern indigo snake	Threatened
Eumeces egregious	Bluetail mole skink	Threatened
Neoseps reynoldsi	Sand skink	Threatened
Invertebrates		
Cyclargus thomasi bethunebakeri	Miami blue[a]	Endangered
Strymon acis bartrami	Bartram's scrub-hairstreak[a]	Proposed Endangered
Anaea troglodyte floridalis	Florida leafwing[a]	Proposed Endangered
Plants		
Warea carteri	Carter's mustard	Endangered
Cucurbita okeechobeensis ssp. okeechobeensis	Okeechobee gourd	Endangered
Jacquemontia reclinata	Beach jacquemontia[a]	Endangered
Polygala smallii	Tiny polygala[a]	Endangered
Asimina tetramera	Four-petal pawpaw[a]	Endangered

(a) Additional listed species occur in Broward, Palm Beach, or Hendry Counties (FWS 2014-TN3761; FWS 2014-TN3759; FWS 2014-TN3760).

Audubon's crested caracara is a raptor that occurs in the United States from Florida west to Arizona, and also in Cuba, Mexico, and Central and South America (FWS 1999-TN136). Only the Florida population is listed in the United States. It forages in open habitats including agricultural fields, pastures, and wet prairies. Audubon's crested caracaras are known to congregate in an area north of US-27 in Glades County in an area of expansive improved pasture (FWS 1999-TN136). The Glades site is south of US-27. Wood storks are colonial nesters that often use historic colonies that are located in trees over water. Wood storks forage in shallow water largely free from vegetation and often use ditches and seasonal water features (FWS 1999-TN136). Everglade snail kites also prefer to nest over water, but prefer to feed exclusively on apple snails.

The Florida grasshopper sparrow (*Ammodramus savannarum floridanus*) only occurs in treeless tracts of dry prairie habitat frequented by wildfire (FWS 2008-TN2516). Florida scrub jays (*Aphelocoma coerulescens*) prefer early successional upland shrub-dominated landscapes that historically were maintained by natural wildfire in South Florida. Ivory-billed woodpeckers (*Campephilus principalis*) have historically occurred in extensive old-growth bottomland and wetland hardwood forests (FWS 1999-TN136). This species was believed to be extirpated from the United States since the 1940s. A reported sighting in 2005 in Arkansas has resulted in the FWS drafting an ivory-billed woodpecker recovery plan (FWS 2010-TN2574). Red-cockaded woodpeckers require forest dominated by pine trees that are generally 60 years in age or older (FWS 1999-TN136). Florida panthers (*Puma (=Felis) concolor coryi*) have been recorded in many different habitat types, including those found on the Glades site. Eastern indigo snakes (*Drymarchon corais couperi*) use a wide variety of habitats including upland habitats, wetlands, and human-altered habitats including agricultural fields. Both the bluetail mole skink (*Eumeces egregius lividus Mount*) and sand skink (*Neoseps reynoldsi Stejneger*) occur in dry upland habitats found in sandy soil associated with the Lake Wales Ridge (FWS 1999-TN136) Neither the bluetail mole skink nor the sand skink are known to occur anywhere in Glades County. Carter's mustard is a fire-dependent herb found in dry habitats of the Lake Wales Ridge (FWS 1999-TN136). The Okeechobee gourd (*Cucurbita okeechobeensis*) historically grew under pond apple (*Annona glabra*), elderberry (*Sambucus canadensis*), and buttonbush (*Cephalanthus occidentalis*) trees at sites that had frequent disturbance such as seasonal flooding from Lake Okeechobee, alligator nesting, and within mowed power line and road rights-of-way (FWS 1999-TN136).

The regular use of pesticides and herbicides along with frequent human presence further reduce habitat value for native species in a predominantly agricultural landscape already highly fragmented with few native plants or habitats. Wading birds have been observed using the canals. Wading birds are an ecologically important group in the South Florida ecosystem, and both herons and ibises are considered ecological indicators (FWS 1999-TN136). Wading bird species observed in a similar setting at the FPL Glades Power Park include the cattle egret (*Bubulcus ibis*), green heron (*Butorides virescens*), great egret (*Ardea albus*), glossy ibis (*Plegadis falcinellus*), least bittern (*Ixobrychus exilis*), great blue heron (*Ardea herodias*), black-crowned night-heron (*Nycticorax nycticorax*), and yellow-crowned night-heron (*N. violaceus*). Wetlands in the surrounding landscape also provide habitat much more suitable for wading birds and other wildlife species than the canals present on the Glades site.

Recreationally important species observed at the FPL Glades Power Park and also expected to occur on the Glades site include white-tailed deer (*Odocoileus virginianus*), feral hog (*Sus scrofa*), raccoon (*Procyon lotor*), coyote (*Canis latrans*), bobcat, mourning dove (*Zenaida macroura*), and bobwhite quail (*Colinus virginianus*). Waterfowl are also hunted in Florida and numerous species could occur in suitable habitats on the Glades site.

Building Impacts

Typical impacts from building nuclear units include permanent and temporary habitat loss from development, habitat fragmentation and degradation, disturbance and displacement of individuals, exposure of wildlife to increased noise levels and human presence, and increased risk of vehicle collision mortality. The conversion of fully developed and stable plant communities to earlier successional communities dominated by lower growing vegetation during development of linear transmission or pipeline corridors often results in a high degree of habitat fragmentation within the landscape.

FPL assumed a 362 ac area within the Glades site for evaluating potential impacts of building two new nuclear power reactors and associated infrastructure and an additional 3,000 ac for a cooling-water storage reservoir (FPL 2014-TN4058) (see Figure 9-6). The review team determined cooling water could be obtained from groundwater beneath the Glades site and that the cooling-water storage reservoir was unnecessary. FPL stated offsite facilities and development would also be needed to construct and operate nuclear power plants at the Glades site. FPL estimated a 121 mi transmission line would be necessary to service power plants at the Glades site. FPL also assumed a 1.9 mi access road, 6.2 mi rail line, and pipeline corridors connecting the C-43 Canal to the site (assumed cooling-water source) would be necessary.

Impacts from the plant area, access road, rail line, and pipeline corridors are discussed first below. Impacts from the transmission line are discussed in a separate section below. The access road would contribute 23 ac to the project footprint; the rail line would contribute 75 ac; and the intake/makeup pipeline corridors would contribute 3.4 ac.

Plant Facilities

If the plant facilities, access road, rail line, and pipelines were built within the proposed footprint, FPL estimated 464 ac would be affected (Table 9-9). Approximately half (243 ac) of this area is currently used for row crops. With the inclusion of other field crops as well as improved and unimproved pastures, agricultural lands cover 64 percent (297 ac) of the proposed footprint. Wetlands cover an additional 30 percent (141 ac) of the proposed footprint and include exotic and mixed wetland hardwoods, ditches, wet prairies, and freshwater marshes. Freshwater marsh occupies almost 2 percent (9.5 ac) of the footprint. The remaining 6 percent is conifer plantation, upland hardwood forest, or existing roads and highways.

Table 9-9. Acreage within the Conceptual Footprint at the Glades Site

FLUCFCS Code	Description	Site and Non-Transmission (ac)	Transmission (ac)
200-series	Agriculture	297	3,966
300-series	Uplands	0	108
400-series	Forest	26	91
500-600 series	Wetlands	141	1,627
800-series	Developed	0.1	32
Total		464	5,824

Source: FPL 2011-TN59

Surveys of the occurrence, abundance, and distribution of Federally listed species have not been performed for the Glades site. Audubon's crested caracaras, wood storks, and Everglade snail kites were observed during surveys at FPL's formerly proposed Glades Power Park site, which is nearby and in a similar landscape. The Glades site appears to provide habitat suitable for Audubon's crested caracara, including 37 ac of improved pasture. Wood storks may also use the ditches and wetlands for foraging. The 9.5 ac of freshwater marsh may be used by foraging storks as well as Everglade snail kites. However, it does not appear there is habitat suitable for nesting present for any of these three listed bird species. Florida panthers are known to occur in Glades County and may also occur on the Glades site, but they generally prefer upland habitats over wetlands and use native landscapes more than agricultural fields (FWS 1999-TN136). White-tailed deer, feral hogs, and many other medium-sized mammals are prey for Florida panthers. Although their abundance and distribution is unknown at the Glades site, their presence may indicate suitable habitat is present for panthers. The fragmented natural habitat and agricultural nature of the Glades site would likely preclude substantial use by Florida panthers, but the site lies very near the eastern boundary of the FWS-designated primary dispersal zone. Florida panthers may pass through the site while dispersing to more suitable habitats to the north, especially if prey is in abundance. Eastern indigo snakes are habitat generalists, are widely distributed, and likely occur on the Glades site. They would be prone to increased mortality from off-road vehicle use during land clearing and increased traffic during construction and operation. Limited distribution and/or lack of suitable habitat likely preclude the occurrence of the other listed species on the Glades site.

Although the Florida grasshopper sparrow has historically occurred in Glades County, it has not been observed there in recent years (FWS 2008-TN2516). The Florida scrub jay may currently occur in Glades County, but distribution information indicates this species is restricted to areas within the county west of the Glades site (FWS 2007-TN2517). High-quality forested wetlands are present on the Glades site, but large contiguous forested wetlands of the type that might harbor remnant individuals of ivory-billed woodpecker are not present. The Glades site contains both upland forest and conifer plantations, but the extent of forest and degree of forest fragmentation within the general landscape makes these habitats poorly suited to red-cockaded woodpeckers (*Picoides borealis*). The Lake Wales Ridge is not near the Glades site, excluding the occurrence of the blue mole skink, sand skink, and Carter's mustard (*Warea carteri*). The Okeechobee gourd is now limited to nine sites outside of Glades County (FWS 1999-TN136). Therefore, it is the staff's conclusion that Audubon's crested caracara, the wood stork, Everglade snail kite, Florida panther, and the eastern indigo snake could occur at the Glades site.

Potential foraging habitat for the caracara, stork, kite, and panther would be permanently lost during site preparation at the Glades site. Approximately 39 ac of both improved and unimproved pasture potentially suitable for caracaras would be lost. Lost ditch and freshwater marsh habitat that storks could forage in would total 19 ac. If apple snails are present in the wetland habitats within the Glades site, kites could lose less than 10 ac of habitat. The loss of 9.7 ac of upland forest and habitats that support panther prey and the subsequent loss of prey could also affect Florida panthers. However, the Glades site does not provide nesting or breeding habitat for any of the listed species and the suitability of these habitats would likely be low due to fragmentation within the landscape from agricultural development. Eastern indigo snakes could use most of the Glades site, and would likely be affected the most by preconstruction activities. Because they use burrows, they are also prone to direct mortality during preconstruction activities such as land clearing and grading. Snakes in general are also prone to vehicle collision mortality, and increased traffic could increase the risk of death to eastern indigo snakes on local roads. As with construction and operation at the Turkey Point site, mitigation requirements by the Florida Fish and Wildlife Conservation Commission (FFWCC) including staff awareness training and reporting would minimize negative impacts on the eastern indigo snake. Loss of habitats would also affect local populations of wildlife not Federally listed, but expected to occur within the region in suitable habitat. However, these effects are not expected to be noticeable and would not destabilize even local populations of any of these animals.

Transmission Lines

FPL stated offsite facilities and development would also be required to construct and operate nuclear power plants at the Glades site. The conceptual transmission line corridor is estimated to occupy 5,824 ac of additional land (Table 9-9). Because the conceptual transmission line corridor would pass through Glades, Hendry, and Broward Counties and could also pass through Palm Beach County depending on the exact route ultimately selected, the review team also considered impacts on Federally listed species and those species proposed for Federal listing known to occur in those counties. Similar to the Glades site, the major land cover within the conceptual corridor is agriculture. Most of the corridor is used for agricultural purposes, including field crops, row crops, citrus groves, and pastures. Wetlands, including freshwater marsh, mixed wetland hardwoods, and wet prairies, account for much of the remainder of the conceptual corridor. There are also some areas of upland habitats, including improved pasture and dry prairie, and others (FPL 2014-TN4058). Forested areas would be converted to more open habitats with low ground cover including grass (FPL 2014-TN4058).

FPL estimated approximately 1,780 ac of potential Audubon's crested caracara habitat would be altered within the conceptual transmission line corridor (FPL 2011-TN59). Approximately 1,037 ac of potential wood stork habitat would also be altered. Alteration of 995 ac of wetland habitats, including 902 ac of freshwater marsh, could affect the Everglade snail kite. Removal of trees could affect the quality and quantity of nesting habitats for these three bird species. The likelihood of non-native plants being accidentally introduced would also increase and could result in habitat alteration. Conversion of uplands into open habitats to accommodate the transmission right-of-way could increase foraging habitat for the caracara. The sum of remaining natural, upland habitats that would be crossed by the conceptual transmission line corridor and that could provide habitat value to panther's amounts to almost 150 ac or approximately 2.5 percent of the corridor (FPL 2011-TN59). Alteration of natural land cover from agricultural conversion has highly fragmented the landscape north of the Everglades National Park. This conversion and fragmentation not only reduces the amount of natural habitats usable by Florida panthers, it further reduces the value of habitats still present.

Two large swaths of land designated as Everglade snail kite critical habitat lie between the Glades site and the Andytown substation. A gap between these two swaths approximately 1.25 mi wide lies at the intersection of I-75 and SR-27 in Broward County. If the transmission line is built through this gap, then impacts on this critical habitat could be avoided. If not, then adverse impact on designated critical habitat for the Everglade snail kite could result. FPL would be expected to reduce and mitigate for increased mortality risk as well as lost habitat for listed species as required by the FFWCC and FWS. Effects from building the transmission lines would not be expected to result in a measurable decrease in the productivity of most local populations except possibly local populations of the Everglade snail kite. Impacts on designated critical habitat could measurably affect the snail kite and recovery efforts to save the species from extinction.

Operations Impacts

The operation of two nuclear units at the Glades site would create noise, fogging and dissolved solid deposition from cooling towers, runoff from increased impermeable surfaces, light pollution, and increased vehicle collision mortality of local wildlife populations. Operation of transmission lines could increase the risk of collision and electrocution mortality, especially to whooping cranes (*Grus americana*) and wood storks.

Operational noise from the cooling towers would only displace individual animals from the immediate vicinity of the cooling towers, as the use of splash guards on air inlets and stacks on mechanical fans would limit cooling-tower noise to approximately 73 dBA at a distance of 200 ft from the cooling towers (FPL 2014-TN4058). The review team determined the salinity of the groundwater used for cooling would be less than or equal to that of seawater and salt deposition from cooling-tower drift at the Glades site would be similar in scale and intensity to deposition at the Turkey Point site. Most of the salt would likely be deposited on developed land near the cooling towers, and concentrations as high as 10 kg/ha/mo that have resulted in observable effects to sensitive plant species could be expected as far as 1.25 mi from the cooling towers. Unlike Turkey Point, the Glades site is located inland, and vegetation growing there would not be expected to be as tolerant to atmospheric-deposited salt. Some sensitive vegetation could be affected by salt drift, but the spatial extent would be limited and the climate of South Florida would quickly dissipate salt deposited in the landscape.

The creation of impermeable surfaces at the Glades site would likely result in the concentration of stormwater runoff into surrounding wetlands. Increased runoff could result in siltation, pollutant deposition, and decreased habitat value of these areas to local natural communities.

Light pollution during facility operation could affect wildlife residing on or migrating through the Glades site. Design criteria could include minimization of upward lighting, turning off unnecessary lighting between 11 p.m. and sunrise, and luminary selection and mounting to provide light only where needed (FPL 2014-TN4058). If these actions are taken, the review team expects that impacts from light pollution on wildlife would be minimal.

The impacts of transmission line operation consist of bird collisions with transmission lines, electromagnetic field (EMF) effects on flora and fauna, and habitat alteration from vegetation control. Direct mortality resulting from birds colliding with tall structures has been observed (Avatar et al 2004-TN892). Factors that appear to influence the rate of avian impacts with structures are diverse and related to bird behavior, structure attributes, and weather. Migratory flight by flocking birds during darkness has contributed to the largest mortality events. Tower height, location, configuration, and lighting also appear to play roles in avian mortality. Weather, such as low cloud ceilings, advancing fronts, and fog, also contribute to this phenomenon. Waterfowl may be particularly vulnerable due to low, fast flight and flocking behavior (EPRI 1993-TN73). However, in NUREG–1437, the NRC staff concluded that the threat of avian collision as a biologically significant source of mortality is very low because only a small fraction of total bird mortality could be attributed to collision with nuclear power plant structures, including transmission line corridors with multiple transmission lines (NRC 1996-TN288). Although collision may contribute to local losses, thriving bird populations can withstand these losses without threat to their existence (EPRI 1993-TN73). Transmission-line structures, conductors, and guy wires all pose a potential avian collision hazard for all resident birds that live in the vicinity of the transmission lines and for migratory birds that may pass through these areas. At least 41 species of birds are known to have been killed by interaction with Florida electrical utility structures, 20 of which have been killed by FPL electrical utility structures (FPL 2011-TN1283). Transmission lines connecting the Glades site to the Andytown substation would pass through core foraging areas of multiple wood stork nesting colonies (FWS 2014-TN3732). Although the NRC has concluded that bird collisions with transmission lines at existing U.S. nuclear power plants are of small significance, including transmission line corridors with variable numbers of transmission lines (NRC 2013-TN2654), the threatened wood stork is particularly prone to transmission line collision mortality and wood storks have been killed by collision with and electrocution by FPL electrical utility structures (FPL 2011-TN1283). Wood storks are not particularly agile flyers and are especially uncoordinated when young. Wood storks also routinely perch on tall structures, and their large wing span could pose an increased risk to electrocution by bridging the gap between live wires and ground circuits.

The FWS Southeast Florida Ecological Services Office recognizes a 0.47 mi nest colony buffer. The FWS also recommends the establishment of at least a 500 ft primary zone around stork nesting colonies where no vegetation should be removed. Wetland vegetation under and surrounding the colony shall be maintained. Power-transmission lines, roadways, and other infrastructure should not be built within the primary zone. Also, humans should not get within 300 ft of the colony and human activity patterns should not be changed when storks are present at the colony. FWS also recommends the establishment of a secondary zone that extends 1,000 to 2,000 ft beyond the primary zone. The FWS also recommends that transmission lines not be built within 1 mi of stork nest colonies to lower the probability of low-flying stork strikes. FWS guidelines drafted to address management of the wood stork foraging habitat recommend an 18.6 mi core foraging area management zone around all known wood stork colonies that have had active nests within the last 10 years in South Florida. Human activity should be restricted within 300 ft of forage sites when storks are present and no closer than 750 ft if there is no vegetation to screen human activities from feeding storks (FWS 2010-TN226). It is not known whether the conceptual transmission line corridor contains any wood stork colonies or is within the range of the various protection distances (300 ft – 18.6 mi) recognized by the FWS.

If construction and operation were to occur at the Turkey Point site, FPL would be required by the FWS and FFWCC to conduct numerous activities and actions to minimize impacts on wood storks, and it is reasonable to assume the same requirements would be made for the use of the Glades site. Among these activities and actions are preconstruction and post-construction flight surveys of known wood stork nesting colonies to determine the flight corridors of fledging wood storks. FPL would be expected to conduct pre-clearing aerial survey of transmission line corridors if nesting by wading birds is confirmed to occur within 0.5 mi of proposed transmission line corridors. The FFWCC would require flight diverters on overhead ground wires of each transmission line near a wood stork colony and perch discouragers would be required on pole tops and arms. FPL would be expected to conduct post-construction monitoring during the breeding season after transmission line installation near wood stork colonies. Monitoring would include carcass searches and flight behavior observation near operating transmission lines. FPL had proposed to evaluate the loss of wood stork foraging habitat within designated core foraging areas that would be intersected by transmission line corridors emanating from the Turkey Point site if the plants were located there. Impacts on suitable foraging habitats from building at Turkey Point would require mitigation (FWS 2010-TN226) and the staff assumed these requirements would also occur if needed at the Glades site. Operational effects on other important species would be minimal.

FPL stated field surveys would be conducted for listed species as part of the permitting process before any preconstruction activities (FPL 2014-TN4058). Preconstruction activities would be conducted in accordance with all Federal and State regulations, permit conditions, good construction practices, and BMPs including the use of directed drainage ditches and silt fencing. Acreage within the conceptual transmission line corridor was minimized to the extent possible by using the most direct route while avoiding areas with important resources and high biological value. FPL also stated that any Glades site wetland functions affected would be replaced or restored.

EMFs are unlike other agents that have an adverse impact (e.g., toxic chemicals and ionizing radiation) in that dramatic acute effects cannot be demonstrated and long-term effects, if they exist, are subtle (NRC 2013-TN2654). A careful review of biological and physical studies of EMFs did not reveal consistent evidence linking harmful effects with field exposures (NRC 2013-TN2654). The impacts of EMFs on terrestrial flora and fauna are of small significance at operating nuclear power plants, including transmission line systems with variable numbers of power lines and lines energized at levels less than 765 kV (NRC 2013-TN2654). Since 1997, more than a dozen studies have been published that looked at cancer in animals that were exposed to EMFs for all or most of their lives (Moulder 2005-TN1329). These studies have found no evidence that EMFs cause any specific types of cancer in rats or mice (Moulder 2005-TN1329). Therefore, the incremental EMF impact posed by operation of existing transmission lines and the addition of new lines for two new nuclear units would be negligible at the Glades alternative site.

Transmission-line corridor vegetation-management activities (cutting and herbicide application) and related impacts on floodplains and wetlands in transmission line corridors are of minor significance at operating nuclear power plants, including those with transmission line corridors of variable widths (NRC 2013-TN2654). Consequently, the incremental effects of transmission line corridor maintenance and associated impacts on floodplains and wetlands for two new nuclear units would be negligible at the Glades site.

Cumulative Impacts

The geographic area of interest for the assessment of the potential cumulative impacts of building and operating a new reactor at the Glades site and other past, present, and reasonably foreseeable future actions on terrestrial resources and wetlands is defined as a 50 mi radius around the Glades site. A list of past, present, and reasonable foreseeable actions within 50 mi of the Glades site is presented in Table 9-6. This list includes a variety of energy-production projects, stone mining, manufacturing, transportation and infrastructure-development projects, set-aside areas for recreation and conservation, CERP-related projects, and other miscellaneous activities that could affect terrestrial and wetland resources.

Past land use in South Florida, especially agriculture and more recently urbanization, has greatly affected the distribution and abundance of unfragmented plant and wildlife habitats still remaining. Development and urbanization of higher elevation lands for energy, infrastructure, and manufacturing projects have further reduced the amount of pine flatwoods and other remaining upland habitat. Ditching and draining created more dry land, reducing the amount of wetlands available as habitat. The continued operation and maintenance of existing facilities would likely not exacerbate the current situation with respect to terrestrial and wetland ecosystems. New mining activities have the potential to expand their footprint and development in general on the landscape, as does continued human population growth in South Florida. Lands set aside for recreation and conservation provide buffers against development, provide habitat for plants and animals, and serve to preserve fragments of the ecosystem of South Florida. Projects that continue to incrementally reverse changes in land cover due to man-made changes in surface water flow, including CERP-related activities, would continue to benefit the terrestrial and wetland ecology of the region.

As described in Chapter 7, terrestrial and wetland environments in South Florida may also be affected by continued population growth and related development. The overall impact from past, present, and reasonably foreseeable future activities on regional terrestrial and wetland ecology is substantial.

Summary Statement

Most land cover in the Glades site landscape is already converted to agriculture. Approximately 140 ac of wetland and 26 ac of upland habitats would be permanently lost including high-quality forested wetlands. Although most of the conceptual transmission line corridor is currently used for agriculture, installation and operation of a 121 mi long transmission system could affect an undefined subset of the 1,767 ac of wetlands and nearly 400 ac of uplands contained within the conceptual transmission line corridor. Although the entire corridor would not be developed and all lands lost as habitat, some portion would be lost to pole installation, road development, or altered to low-growing vegetation. Significant amounts of ecologically valuable land-cover types would be affected and include freshwater marsh, wet prairies, and mixed wetland hardwoods. Intact habitats that reside in an already fragmented landscape would be fragmented further. Substantial amounts of potentially suitable habitat for Audubon's crested caracara, the wood stork, and Florida panther would be altered.

Based on the information provided by FPL and the review team's independent evaluation, the review team concludes that the cumulative impacts on terrestrial and wetland resources of building and operating two new nuclear units at the Glades alternative site, including impacts attributable to permanent conversion of habitat for the facility footprint as well as operation of the cooling towers and transmission lines would be MODERATE. The incremental effect of the building and operation of two new nuclear units at the Glades site would be a significant contributor to this impact primarily because of the proposed length of the transmission line corridor.

9.3.2.4 Aquatic Resources

What follows is an assessment of the potential impacts on aquatic resources that may occur if the two nuclear reactors described by FPL (2014-TN4058) were constructed and operated at the Glades alternative site. Based on a review of potential cooling-water sources discussed in Section 9.3.2.2, the review team assumes no cooling ponds or reverse osmosis facilities would be required for the Glades site. Unless otherwise noted, the information presented in this section was obtained from FPL's ER, Revision 6 (FPL 2014-TN4058).

The Glades site is an undeveloped greenfield site in the southeastern portion of Glades County that encompasses approximately 3,000 ac of primarily agricultural land. The site is located just north of the C-43 Channel (Caloosahatchee Canal) and Lake Hicpochee, and is approximately 5 mi southwest of Lake Okeechobee (Figure 9-4). The size and elevation of Lake Hicpochee is directly influenced by the water-management activities occurring at Lake Okeechobee to maintain the existing Lake Okeechobee level. Lake Hicpochee also receives stormwater from Lake Okeechobee during storm events. Thus, Lake Hicpochee may support aquatic biota during the wet season, while resembling a sandy desert plain during the dry season. For this assessment, the review team assumes FPL would use groundwater as a primary water source for reactor cooling, supplemented by additional water from the C-43 Channel during high surface-water flow periods using a conventional intake structure. Cooling-tower blowdown would be injected into the Boulder Zone.

The C-43 Channel connects to Lake Okeechobee just east of the Glades site, and likely contains aquatic resources that are similar to the lake. Lake Okeechobee is the largest lake in Florida, and the center of South Florida's regional water-management system, providing commercial and sport fisheries, flood control, and a source of potable and irrigation water. The lake encompasses over 730 mi^2, and has an average depth of about 9 ft (FFWCC 2013-TN2842). Desired lake elevations (stages) are between 12.5 ft and 15.5 ft (USACE and SFWMD 2009-TN2848). Major natural tributaries to the lake are Fisheating Creek, Taylor Creek, and the Kissimmee River. Approximately 70 percent of the water entering the lake is associated with these tributaries; rainfall accounts for the remaining 30 percent. Evaporation accounts for about 70 percent of the water loss, and the remaining water exits the lake through engineered outfalls (FFWCC 2013-TN2842).

As described in Section 2.4, water-management practices in South Florida over the past 100 years have dramatically changed the regional hydrology and sheet-water flow, and influenced the aquatic plants and animals in the area. Creation of levees, canals, and channels to support agriculture and development has confined Lake Okeechobee to a smaller area than historically present, and resulted in a variety of water-management activities to maintain the lake level during the dry season and reduce flooding during the wet season. Lake Okeechobee and the connecting rivers, canals, channels, and engineered outfalls are also greatly affected by weather events. During the hurricane season of 2004, Hurricanes Frances and Jeanne created high water surges of over 18 ft, and created turbid conditions that affected submerged aquatic vegetation; the drought of 2006 lowered the level of Lake Okeechobee to an all-time record of 8.82 ft msl (FFWCC 2013-TN2842). Currently, the USACE is responsible for managing water levels in Lake Okeechobee between 12.5 and 15.5 ft NGVD (National Geodetic Vertical Datum of 1929) to balance flood control, public safety, navigation, water supply, and public health (SFWMD 2012-TN2883).

Based on the information provided by FPL (2014-TN4058), the facility footprint at the Glades site will encompass approximately 362 ac. Although the affected area is primarily farmland, building activities have the potential to directly or indirectly affect aquatic resources present in small streams or ponds at or near the site. Installation of the water-intake structure for intermittent cropping of water in the C-43 Channel may temporarily affect resident aquatic biota, and the construction of a water pipeline to the site may temporarily affect surface-water habitats. As described by FPL (2014-TN4058), approximately 121 mi of transmission lines encompassing 5,823 ac may also affect aquatic resources in areas where the transmission lines support structures or access roads are adjacent to surface-water habitats. During the operation of the nuclear reactors, cooling water obtained from two intake structures on the C-43 Channel during high-flow periods creates the potential for impingement and/or entrainment of aquatic biota present in the channel, or those entering the channel from Lake Okeechobee. Because Lake Okeechobee and the rivers, streams, channels, and canals in the vicinity of the Glades site are highly connected, it is assumed the biota present in the lake are indicative of the aquatic resources that might be affected by the building and operation of two nuclear reactors, as described below.

Commercial and Recreational Species

As noted above, the review team assumes the fish and invertebrates present in the Lake Okeechobee would be representative of species occurring in the C-43 Channel and other surface water habitats near the lake, given the hydrological connections that are present. Recreational species present in Lake Okeechobee include Largemouth Bass (*Micropterus salmoides*), Black Crappie (*Pomoxis nigromaculatus*); commercial fishing also occurs for various species of catfish (Ictaluridae) and bream (*Lepomis* spp.).

Important Species

USACE (2013-TN2847) reports 69 species of fish present in Lake Okeechobee and the Okeechobee Waterway, ranging from small forage fish like the Threadfin Shad (*Dorosoma petenense)* and Inland Silversides (*Menidia beryllina)* to larger predatory species like the Largemouth Bass and Black Crappie (*P. nigromaculatus*). Electrofishing studies conducted by the FFWCC at 21 stations during the fall of 2011 yielded 34 species. Dominant species based on abundance, were Bluegill (*L. macrochirus*), Redear Sunfish (*Lepomis microlophus*), Largemouth Bass, Inland Silverside, and Gizzard Shad (*D. cepedianum*). Dominant species based on biomass were Largemouth Bass, Striped Mullet (*Mugil cephalus*), Bluegill, Florida Gar (*Lepisosteus platyrhincus*), Bowfin (*Amia calva*), Redear Sunfish, and Channel Catfish (*Ictalurus punctatus*). Lake-wide trawl sampling from 2005 to 2011 resulted in the capture of 3,281 fish. Dominant species by abundance were Threadfin Shad, Bluegill, White Catfish (*Ameiurus catus*) and Black Crappie. Dominant species based on biomass were White Catfish, Bluegill, Black Crappie, Florida Gar, Channel Catfish, Threadfin Shad, and Redear Sunfish (Zhang and Sharfstein 2013-TN2894).

Lake Okeechobee also supports a wide variety of benthic invertebrates. Because the restoration of Lake Okeechobee is one of the primary goals of CERP, a 3-year project funded by SFWMD was conducted by FFWCC to establish pre-CERP environmental conditions in the lake. During the 2005 to 2008 study period, sampling was conducted at 18 stations during wet and dry seasons. A total of 118 aquatic invertebrate taxa representing 28 major taxonomic group were collected. Samples were numerically dominated by oligochaete worms and larval chironomid midges. Pelecypod, amphipods, gastropods, and isopods were also observed in the samples (Warren et al. 2009-TN2846).

Non-Native or Nuisance Species

Of the 69 fish species present in Lake Okeechobee, the USACE (2013-TN2847) noted 17 species were non-native, including several species of catfish, carp, tilapia and cichlids. Additional information about exotic species is provided in the Lake Okeechobee Protection Program Exotic Species Plan, which includes the lake and 39 surrounding hydrologic basins identified in the Lake Okeechobee Surface Water Improvement and Management Plan (SFWMD 2003-TN2852). Exotic plants identified in the plan included hydrilla (*Hydrilla verticillata*), waterhyacinth (*Eichornia crassipes*), and waterlettuce (*Pista stratiotes*). Exotic aquatic animals identified in the plan included Blue Tilapia (*Oreochromis aureus*), Asian swamp eel (*Monopterus albus*), spiny water flea (*Daphnia lumholtzii*), Asiatic clam (*Corbicula fluminea* or *C. manilensis*), and Sailfin Catfish (*Pterygoplichthys multiradiatus*). Work by Harvey et al. (2010-TN3158) has shown that up to 70 percent of the fish community within a canal system may be composed of non-native species, and that the canals can also act as a conduit that enables invasive species to colonize new areas. Given the hydrological connections that exist in and around Lake Okeechobee, many or all of the above species could be present at or near the Glades site.

Federally and State-Listed Species and Critical Habitat

Federally and State-listed aquatic species present in Glades County that could occur at or near the Glades site include the endangered Florida manatee (*Trichechus manatus latirostis*), the threatened American crocodile, and the threatened American alligator (*Alligator mississippiensis*); the alligator is listed because of its similarity in appearance to the American crocodile (FNAI 2013-TN2850). Detailed information about these species is found in Section 2.4.2. Critical habitat for manatee and crocodile is not present at the Glades site, but the manatee consultation area includes Lake Okeechobee (FWS 2003-TN2916).

Building Impacts

Building-related impacts on aquatic species are unlikely at the Glades site, because the majority of the land required for the facility footprint is currently used for farming and agriculture. Some existing drainage ditches that support a seasonal population of some of the fish species listed above may be adversely affected. Building of the surface-water intake on the C-43 Channel may result in short-term increases in water turbidity, and some disturbance of the shoreline area, but it is expected these impacts would be temporary and minor, and addressed primarily by the use of BMPs discussed by FPL (2014-TN4058). Installation of the transmission line system necessary to connect the new facility to the power grid would disturb approximately 5,000 ac of agricultural land, with limited aquatic resources expected to be present. Building activities are not expected to affect the recreational and commercial aquatic resources in Lake Okeechobee or the C-43 Channel, or any Federal or State-listed species that may occur at or near the building area. FPL has also indicated that field surveys for listed species would occur before land preparation or building activities occurred. Building activities related to the facility and transmission line systems would be conducted in accordance with State and Federal regulations, permits, and BMPs. Installation of the intake structure would use turbidity curtains, silt screens, or similar technology to minimize impacts. The use of BMPs during tower erection and conductor installation would minimize building-related impacts along transmission line corridors.

Operations Impacts

Based on the review team assumptions described above, the majority of the water required to operate the cooling-water system for the two nuclear facilities at the Glades site would be obtained from groundwater resources, limiting the potential for impingement or entrainment of aquatic biota to periods of surface-water use. During times of excess surface-water flow that typically occurs during the wet season, supplemental water would be obtained from a surface-water intake located in the C-43 Channel. Impingement and entrainment of organisms from the intake canal would be the most likely operational impacts on aquatic populations that would occur. Assuming a closed-cycle cooling system and compliance with the EPA's 316(b) Phase I requirements for intake structures (66 FR 65256) (TN243), the intake is considered protective of aquatic life. The anticipated impacts attributed to impingement and entrainment are considered by the review team to be minimal. Furthermore the intakes would likely be only operated intermittently throughout the year when excess surface water is available. Impingement or entrainment that does occur should not result in noticeable changes to aquatic biota species composition or abundance. Because cooling-tower blowdown would be discharged into the Boulder Zone of the Lower Floridan aquifer via deep-injection wells, surface-water resources would not be adversely affected. There is no available information about biological communities that may be present in the Boulder Zone formations near the Glades site, so it is not possible to determine whether a complete exposure pathway is present or assess potential biological effects. Thus, the potential risk of chemical exposure to aquatic resources resulting from discharge of cooling-tower blowdown cannot be determined. Based on an NRC assessment of a similar cooling system proposed at the Levy site in western Florida using brackish saltwater for cooling-tower makeup water (NRC 2012-TN1976), cooling-tower drift impacts on aquatic resources would likely be minimal, because deposition would be expected to occur primarily on plant property or adjacent agricultural lands. No detectable increase in surface-water salinity resulting from salt-drift deposition is anticipated.

Cumulative Impacts

A list of past, present, or reasonably foreseeable projects in the vicinity of the Glades site is presented in Table 9-6. As shown in the table, a wide variety of energy, mining, transportation, restoration projects exist within the vicinity of the Glades site that have the potential to noticeably alter the surrounding landscape and affect plant, animal, and human populations. In addition, a variety of parks, wildlife refuges, and recreational areas are and will continue to provide both protection for wildlife and recreational opportunities for residents and visitors to South Florida. The operational or proposed regional energy facilities are powered by coal, oil, natural gas, biofuels, or solar energy. Collectively, these projects occupy land that was previously drained and channelized, as discussed in Section 2.4.2. Continued operation of these facilities may affect aquatic biota through interference with natural drainage patterns and consumptive water use. Rock-mining activities have the potential to negatively affect terrestrial and wetland species during excavation processes. However, rock mining may provide limited benefits to some aquatic species through the creation of new habitat after mining activities are completed.

As discussed above, the presence of parks, preserves, refuges, and natural areas will provide a net positive benefit to aquatic biota by maintaining or enhancing existing populations, providing recreational opportunities to residents and tourists, and ensuring that the potential impact of new projects near these areas are protective of the environment. Specific projects listed in Table 9-6 with the potential to provide a positive environmental benefit to aquatic resources are associated with the ongoing CERP. Examples include a proposed project to increase water-storage capacity in the C-43 Basin (USACE and SFWMD 2014-TN3009); a project to improve the timing, quantity, and quality of freshwater flows into the Caloosahatchee River estuary (USACE and SFWMD 2014-TN3010); and various regional projects to improve surface-water management and reduce damaging flood releases (USACE and SFWMD 2014-TN3013; USACE and SFWMD 2014-TN3011; 78 FR 1164 [TN2991]). In addition, a proposed project to increase aquatic and wildlife habitat, regulate extreme fluctuations in Lake Okeechobee elevations, and reduce nutrient loading will likely improve water quality in adjacent canal systems as well as coastal areas east and west of the Glades site (USACE and SFWMD 2014-TN3015). As discussed in Section 7.3.2, aquatic environments in this region of South Florida may also be affected by continued population growth and related development. Overall the review team concludes that the cumulative impacts on aquatic resources in the vicinity of the Glades site would be MODERATE.

Summary Statement

Based on a review of the information provided by FPL and the review team's independent assessment, it is likely the building and operation of a nuclear generating plant at the Glades site would contribute only minimally to the cumulative effects on aquatic species likely to occur in that portion of South Florida. Although the building of nuclear units at the Glades site would displace some existing agricultural land, surface-water habitats would be likely minimally affected. During the normal operation of the plant, groundwater would be used for reactor cooling, and deep aquifer discharge of cooling-tower blowdown would be employed, eliminating the need for conventional surface-water intake and discharge structures. During periods of excess surface-water flow, cooling water from the C-43 Channel (Caloosahatchee Canal) would be withdrawn for cooling. Some impingement and entrainment losses would be expected; however, assuming a closed-cycle cooling system and compliance with the EPA's 316(b) Phase I requirements for intake structures (66 FR 65256) (TN243), the intake is considered protective of aquatic life and the anticipated impacts attributed to impingement and entrainment are considered minimal. Furthermore, the intakes would likely be only operated intermittently throughout the year when surface water is available. Impingement or entrainment that does occur should not result in noticeable changes to aquatic biota species composition or abundance. Thus, the review team concludes that the cumulative impacts of building and operation of two new nuclear reactors at the Glades site, combined with the other past, present, or reasonably foreseeable future activities on aquatic resources would be MODERATE, but building and operating two new nuclear units at the Glades site would not be a significant contributor to the MODERATE impact.

9.3.2.5 Socioeconomics

The following impact analysis includes impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable future actions that affect socioeconomics, including other Federal and non-Federal projects listed in Table 9-6. For the analysis of socioeconomic impacts at the Glades site, the geographic area of interest is considered to be the 50 mi region centered on the Glades site with special consideration of Glades, Hendry, Highland, Lee and Okeechobee Counties because that is where the review team expects socioeconomic impacts to be the greatest. In evaluating the socioeconomic impacts of site development and operation at the Glades site near Moore Haven in Glades County, the review team used readily obtainable data from the Internet or published sources. Impacts from both building and station operation are discussed.

Physical Impacts

People who work or live around the site would be exposed to noise, fugitive dust and gaseous emissions from building and operations activities. Noise, dust, and air-pollution emissions generated within the boundaries of the Glades site would be expected to be similar to those for the Turkey Point site. Because the surrounding site is rural and sparsely populated and because noise and air-pollution impacts are attenuated by distance, members of the surrounding population exposed would be relatively few and the impacts would be expected to be negligible. Best practices and applicable regulations would be expected to protect building workers and personnel working onsite. Truck and vehicle traffic related to building and operations would generate noise, fugitive dust, and gaseous emissions offsite. In addition, offsite structures include an access road (and widening of a portion of SR-78), a railway, a transmission line, and intake/makeup pipelines (FPL 2014-TN4058). Because the area affected by offsite structures and traffic would also be rural and sparsely populated and because FPL would be expected to implement a dust-control plan similar to that for the Turkey Point site, noise and air-pollution impacts from these offsite activities would be expected to be minor.

Based on FPL's conceptual site layout for the Glades site (FPL 2011-TN59) and on aerial photography, there is one structure within the boundaries of the proposed site. There are also agricultural crops that would be lost. Offsite project-related building activities include construction of a 1.9 mi access road (and widening of a portion of SR-78), a 6.2 mi railway, a 121 mi transmission line, and intake/makeup pipelines (FPL 2014-TN4058). The conceptual design of these activities routes them, to the extent possible, along existing rights-of-way and avoids populated areas and residences (FPL 2014-TN4058). The physical impacts on existing structures and crops within the proposed site and offsite areas for supporting infrastructure would be minimal.

The area around the site is relatively flat, sparsely populated and is used mainly as farmland. Building would use cranes (which could exceed 400 ft in height) and would alter the regional viewscape. Construction of the transmission lines would pose similar impacts. The power plant and water-intake facilities would likely be visible from several angles and contrast highly with the present viewscape. Building and operation would noticeably alter the aesthetics of the area. Because of the sparse population, the negative impact would likely not interfere with the daily routine of local public around the Glades site and would not destabilize the aesthetic characteristics of the area.

Based on the information provided by FPL (2014-TN4058) and the review team's independent analysis, the review team concludes that the overall physical impacts of building activities and operations would be minor, with the exceptions of noticeable but not destabilizing impacts to roads and aesthetics near the Glades site.

Demography

The Glades site is located in Glades County, 2.0 mi west of Moore Haven (2012 population 2,700) and 45 mi east of Fort Myers (2012 population 63,427), the closest population center with more than 25,000 residents (FPL 2014-TN4058; USCB 2012-TN4098). The population distribution within and around the Glades site is typically rural with low population densities. There are 11 counties within the 50 mi area, but the review team estimates the areas in which workers would most likely live and from which they would commute are within Glades, Hendry, Highland, Okeechobee, Palm Beach and Lee Counties, based on current commuter patterns[(9)] (USCB 2011-TN4078). For the purposes of assessing potential socioeconomics impacts, the review team excluded Palm Beach County as a potential area of residence for construction and operation workers: the main residential areas in this county are along the coast, in cities such as West Palm Beach (at nearly a two-hour driving distance), which would be less likely to accommodate workers than closer communities, such as Fort Myers, in Lee County. Because the population of Palm Beach would be over 60 percent of the population of the six counties

(9) Over 80 percent of the workers in Glade County currently reside in one of these six counties (USCB 2011-TN4078).

together, the impacts would be distorted by the inclusion of Palm Beach County in the potential area of residence. The remainder of the analysis focuses on the five-county area encompassing Glades, Hendry, Highland, Okeechobee and Lee Counties.

FPL estimated the peak number of workers during building would be 3,983, including 33 operation workers. The review team assumed that the share of construction and operation workers relocating from outside the five-county area would be 87 percent of the estimated peak number of workers. This assumption was reached by using the assumption made for the proposed Turkey Point site as a reference and assuming that the share of workers that would come from outside the region is inversely proportional to the population of the region[(10)] (USCB 2009-TN3395). As described in Section 4.4, 70 percent of the construction workforce and 100 percent of the operation workforce that moved to the area were assumed to bring their families. Based on these assumptions, a peak of 3,437 construction and 29 operation workers would relocate to the area during the project construction phase, and 2,435 of these workers would bring their families. Based on an average household size of 3.25 people, the total increase in population attributable to the peak total workforce at the Glades site would be 8,946 people. An influx of 8,946 people represents a 1.1 percent increase in the five-county 2012 population of 814,289.

FPL estimated the total onsite operations workforce to be 806 workers. As explained above, the review team assumed that 87 percent of these workers (702) would relocate from outside the five-county area. For this analysis, the review team assumed that 100 percent of operation workers who relocate would bring their families. Based on an average household size of 3.25 people, the total population increase attributable to project operations is 2,282 (702 x 3.25) people. This represents a 0.3 percent increase in the five-county area.

The review team concluded that the impact on the local demography would not be noticeable.

Economic Impacts on the Community

Economy

FPL estimated the peak number of workers during building would be 3,983, including 33 operation workers. Employment of 3,983 construction and operation workers would have positive economic impacts in the five-county area. Based on a multiplier of 1.7604 jobs (direct and indirect) for every construction job and 2.3016 for every operation job, 3,983 new construction and operation jobs would create 3,047 indirect jobs, for a total of 7,030 new jobs in the five-county area during peak employment (3,950 x 1.7604 + 33 x 2.3016) (FPL 2011-TN56).[(11)] This represents a 2.0 percent increase in the total employment in the five-county

(10) The proposed Turkey Point site analysis assumed 50 percent of the peak workers would come from outside the 50 mi region and that 83.3 percent of them would reside in Miami-Dade County, i.e., 41.65 percent (0.5 x 0.833) of the peak workers would migrate into Miami-Dade County. Because the population of the five-county area is approximately 32 percent of that of Miami-Dade County (814,289/2,512,219; USCB 2012-TN4098), the review team assumed the share of peak workers migrating into the five-county area would be 1-(0.32 x 0.4165) ≈ 87 percent.

(11) Multipliers are for a four-county area (excluding Highlands County) and are used as an approximation.

area.[12] Peak employment would last 1 month and the average employment generated during the 10-year building period would be about half of that of peak employment. This added employment would generate added earnings to the economy of the five-county area, but the added employment and earnings would not be noticeable to most of those living or working in the area.

An estimated 806 workers would be required for the operation of two nuclear power facilities. Based on a multiplier of 2.3016 jobs (direct and indirect) for every operations job at the new units (FPL 2011-TN56), an influx of 806 workers would create 904 indirect jobs for a total of 1,855 new jobs in the region. This represents a 0.5 percent increase in the total employment in the five-county area. This added employment would also generate added earnings to the economy of the five-county area, but the added employment and earnings would not be noticeable to most of those living or working in the area.

Taxes

State corporate income taxes and sales and use taxes paid at the Glades site during construction and operations of the proposed units would be similar to those paid by the same units at the proposed Turkey Point site. As discussed in Sections 4.4 and 5.4, State taxes paid by the proposed units would not exceed 2 percent of the annual collected State corporate income and sales and use taxes. The impact would be minor and beneficial. County surtax rates in the five-county area are typically 1 percent, with the exception of Lee County, for which the rate is zero percent (FDOR 2014-TN3393). County surtax collections from the proposed units would be highest during construction when annual expenses related to the proposed units would be estimated to reach up to $1.56 billion (Section 4.4). A 1 percent sales surtax would generate $15.6 million in revenues for the five-county area.[13] This would correspond to approximately 1.1 percent of total County revenues in the five-county area for 2012.[14] The impact would be minor and beneficial. County and school district governments in Florida may levy taxes up to 10 mills each (1 percent) in property taxes (FDOR 2012-TN459). If the value of property taxes for the two nuclear reactors at the Glades site were the same as the value estimated for Units 6 and 7 at the Turkey Point site in Section 5.4.3.2, FPL would pay $20 million in property taxes to the Glades County School District and $20 million to Glades County. These payments would correspond to up to 1.7 times the Glades County School District 2011-12 total revenues ($20 million compared $11.7 million) (FLDOE 2012-TN3391) and 0.8 times the Glades County 2011-12 total revenues ($20 million compared to $26.3 million) (FLDFS 2013-TN3392). Because property taxes paid to school districts are reallocated through Florida's Education Finance Program, the benefit to the Glades County School District would be diluted to some extent, and the exact amount distributed to each school district is not known at this time. Because of the value of project-related property tax payments relative to current property taxes, the review team considers the impacts on tax revenues to both the Glades County School District and Glades County to be substantial and beneficial

(12) Employment of 348,759 (BLS 2013-TN4085)
(13) To the extent that some of the expenditures would be made in Lee County, and to the extent that the sales surtax rate in that County is kept at zero, the total sales surtax collected would be smaller.
(14) $1,405 million (FLDFS 2013-TN3392).

The review team concluded that the economic impact would not be noticeable and would be beneficial, with the exception of property tax revenues to Glades County and to the Glades County School District, which would be beneficial and substantially alter current property tax levels in Glades County and the Glades County School District.

Infrastructure and Community Service Impacts

Traffic

Workforce access to the Glades site would occur through US-27 coming from the east and the west, and from the north through SR-78. The review team estimated the current Level of Service (LOS) of these roads at three Florida Department of Transportation (FDOT) traffic-monitoring sites based on the peak hour directional traffic and FDOT LOS thresholds. Peak hour directional traffic information was obtained from FDOT Florida Traffic Online (FDOT 2013-TN3558) and consists of the Annual Average Daily Traffic (AADT) at each traffic-monitoring site, a Standard Peak Hour Factor (K) and a Directional Distribution Factor (D). The multiplication of these three elements (AADT x K x D) provides an estimate of the current peak hour directional traffic volume. The LOS was determined comparing this peak hour directional traffic volume with the maximum thresholds for each LOS in Table 9 (areas less than 5,000 population) of FDOTs Generalized Service Volume Tables (FDOT 2013-TN3297). The review team used FDOT's 2011 LOS Reports by County (FDOT 2011-TN3557) to determine the correct classification of each road for the purposes of identification of the appropriate threshold in the Generalized Service Volume Tables (e.g., whether the road should be considered highway or a freeway; whether the area should be considered rural developed or rural undeveloped). Based on the procedure described above, the LOS at all three traffic-monitoring sites is B. To estimate the project impact on the traffic LOS during the project's peak workforce building period, the review team followed a similar methodology as that described in Section 4.4: The peak workforce of 3,983 construction and operation workers were divided into two shifts, with 70 percent assigned to shift 1 (6:00 a.m. to 4:30 p.m.) and 30 percent to shift 2 (5:00 p.m. to 3:00 a.m.). The hour of peak commuting traffic would be 4:30 p.m. to 5:30 p.m. The review team also assumed up to 36 trucks per hour. The project-related directional traffic during the peak commuting hour would be 2,824 vehicles (70 percent x 3,983 + 36). The review team assumed that one-third of the project-related traffic would come from each of the three directions, east, west and north[(15)] (USCB 2011-TN4078). The results of this analysis are presented in Table 9-10 below. The additional building traffic would keep the roadway at a LOS classification of B in the western direction, and drop it to a LOS classification of C in the eastern direction. The LOS classification at the northern portion of SR-78 would drop the roadway to a LOS classification of D. The proposed widening of SR-78, however, would allow the LOS classification to remain at a B.

FPL estimated the total onsite operations workforce to be 806 workers. If access of this workforce to the Glades site were distributed among the three directions equally, the LOS at each of the three monitoring sites would remain at B.

(15) Based on U.S. Census Bureau commuter patterns (USCB 2011-TN4078) it was not possible to determine the likely direction of outgoing project-related traffic.

Table 9-10. Peak Workforce Traffic LOS Analysis for the Glades Site

Traffic-Monitoring Site	Baseline Peak Hour Directional Traffic	Baseline LOS	Distribution of Project-Related Peak Traffic	Added Peak Hour Directional Traffic	Peak Hour Directional Traffic with Project	LOS with Project
US-27 west of site	376	B	0.33	932	1,308	B
SR-78 north of site	145	B	0.33	932	1,077	D (B)[(a)]
US-27 east of site	533	B	0.33	932	1,465	C

(a) LOS with proposed widening of road.

Source: Review team calculations based on FDOT 2011-TN3557, FDOT 2013-TN3558 and FDOT 2013-TN3297

Based on the above analysis, the review team concludes that the impact of building and operations of the proposed nuclear reactors at the Glades site would be minor, after widening of SR-78, although noticeable on US-27 east of the site during the building phase.

Recreation

The Glades site is located approximately 11 mi from Lake Okeechobee and the Lake Okeechobee Scenic Trail that circles the lake. The lake is used for boating, fishing, and duck hunting, and the scenic trail is used for hiking and bird watching (PBC 2013-TN3298). The Nicodemus Slough is located at approximately 5 mi north of the site. Other parks and recreational areas exist within the county. The influx of project-related population to the five-county area would increase the number of local users of recreational facilities. Because the in-migrating population would be less than 2 percent of the local population, the review team expects the impact on current recreational infrastructure to be negligible.

Housing

The review team estimates that 3,466 construction and operation workers would migrate into the five-county area, and each of these workers would need a place to live. Based on American Community Survey 2008-2012 5-Year estimates, within the five-county area, there are 466,004 housing units of which 156,022 are vacant (33.5 percent). This includes housing that is designated as seasonal, recreational, or occasional use (USCB 2012-TN4089). The review team estimates that, in absolute numbers, the available housing would be sufficient to house the construction workforce. The in-migrating construction and operation workforce would occupy no more than 2.3 percent of vacant housing units in the five-county area. FPL estimated that approximately 806 workers would be needed for operation of two nuclear power facilities at the Glades site, and the review team assumed that 87 percent of these workers (702) would relocate from outside the region and would settle in the five-county area. Based on these assumptions, the entire operations workforce would occupy no more than 0.5 percent of vacant housing units in the five counties. The review team concludes that impact on housing would be minor.

Public Services

In-migrating construction workers and plant operations staff would also likely affect local municipal water, wastewater-treatment facilities, police and fire-protection services, and other public services in the region. These impacts would be expected to be in proportion with the demographic impacts experienced in the region. In-migration to the five-county area would represent an estimated 1.1 percent of the local population (less during operations). The review team concludes that impact on public services would be minor.

Education

Based on data for the 2011-12 school year, there are approximately 109,547 full-time equivalent students in public schools in the five-county area[16] (FLDOE 2013-TN3299). The review team estimated that 3,466 construction and operation workers would migrate to the area, and that 2,435 workers would bring a family. Based on an estimate of 0.8 school-aged children per family (Malhotra and Manninen 1981-TN1430), an estimated 1,948 (2,435 x 0.8) school-aged children would be migrating into the five-county area. This would yield a 1.8 percent increase in the student population. During operations, the review team assumed that 702 operation workers and their families would relocate from outside the region. This would include an estimated 562 (702 x 0.8) children in the PK-12 school range. This influx of students would increase the student population in the five-county area by 0.5 percent. The review team concludes that impact on education would be minor.

Based on the information provided by FPL (2014-TN4058) and the review team's independent analysis, the review team concludes that the overall infrastructure and community service impacts of building activities and operations at the Glades site would be minor except for noticeable, but not destabilizing adverse impacts on traffic.

Cumulative Impacts

In addition to the socioeconomic impacts from building and operations of the proposed project at the Glades site, the cumulative analysis also considers other past, present, and reasonably foreseeable future actions that could have socioeconomic impacts.

The socioeconomic impacts of past and present actions in the affected area are largely captured by the current baseline conditions used for analysis above of project impacts. For example, the impacts of past and present actions on the demography and economy of the area are largely captured by current baseline data on population, employment, and tax revenues, and are incorporated in the baseline and trend assessments of the Regional Input-Output Modeling System (RIMS II) multipliers.

Reasonably foreseeable future actions are listed in Table 9-6. Several of these future actions would be expected to have cumulative socioeconomic impacts with the proposed project at the Glades site. The Southeastern Renewable Fuels Biorefinery and Cogeneration Plant is proposed for Hendry County, approximately 20 mi southeast of the Glades site. During construction the plant would generate local employment and earnings and construction traffic on nearby roads. When operational, it would purchase sorghum from adjacent agricultural fields, also generating local employment and earnings, and also generating truck traffic, particularly during harvest (FDEP 2010-TN3394). The Herbert Hoover Dike Rehabilitation Project and Dam Safety Modification Study will likely generate some local expenditures in the affected area.

(16) Full-Time Equivalent (FTE) is a measure of enrollment based on the number of full-time students that it would take to fill the number of classes offered.

Other proposed projects that would generate employment and earnings during construction and operations include the Florida Southeast Connection pipelines proposed through Highlands, Okeechobee and Martin Counties (construction 2016-2017; FSC 2014-TN3301) and various proposed CERP water projects.

Summary Statement

The cumulative impact of the projects identified above with the proposed project at the Glades site would depend largely on the timing of construction, when employment and earnings impacts are expected to be highest. However, based on the location of the identified future projects and their magnitudes, the cumulative socioeconomic impacts would be expected to be SMALL and adverse; with the exception of MODERATE adverse physical impacts on roads, aesthetics, and traffic. The staff expects LARGE and beneficial impacts of property tax revenues to Glades County and to the Glades County School District. Building and operating two new nuclear units at the Glades alternative site would be a significant contributor to the MODERATE adverse impacts.

9.3.2.6 Environmental Justice

The following impact analysis includes impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable future actions that affect environmental justice, including other Federal and non-Federal projects listed in Table 9-6.

The 2008-2012 American Community Survey block groups were used to identify minority and low-income population distributions in the area (USCB 2012-TN4098). The census data for Florida characterizes 15.9 percent of the population as Black; 0.3 percent as American Indian or Alaskan Native; 2.5 percent as Asian; 0.1 percent as Native Hawaiian or other Pacific Islander; 2.6 percent as other single minorities; 2.2 percent as multiracial; 22.5 percent as Hispanic ethnicity; and 42.2 percent as aggregate minority. There are 611 block groups within 50 mi of the Glades site. Following the criteria described in Section 2.6.1, Black minority populations exist in 64 block groups; American Indian or Alaskan Native minority populations exist in 1 block group; Asian minority populations exist in 5 block groups; other race minority populations exist in 31 block groups; multiracial minority populations exist in 2 block groups; ethnic Hispanic minority populations exist in 99 block groups; and aggregate minority populations exist in 180 block groups. There are no block groups containing Native Hawaiian or other Pacific Islander minority populations within 50 mi of the Glades site. Three Indian Reservations lie within 50 mi of the Glades site: the Brighton Indian Reservation, the Big Cypress Indian Reservation, and a portion of the Miccosukee Indian Reservation. The locations of the aggregate minority populations and Indian Reservations within 50 mi of the Glades site are shown in Figure 9-7. The locations of Hispanic minority populations and Black minority populations within the 50 mi of the Glades site are shown in Figure 9-8 and Figure 9-9, respectively.

The U.S. Census Bureau (USCB) data characterize 15,3 percent of Florida residents as low income (USCB 2012-TN4098). Out of a possible 611 block groups within 50 mi of the Glades site, 91 block groups contain low-income populations. The locations of the low-income populations within 50 mi of the Glades site are shown in Figure 9-10.

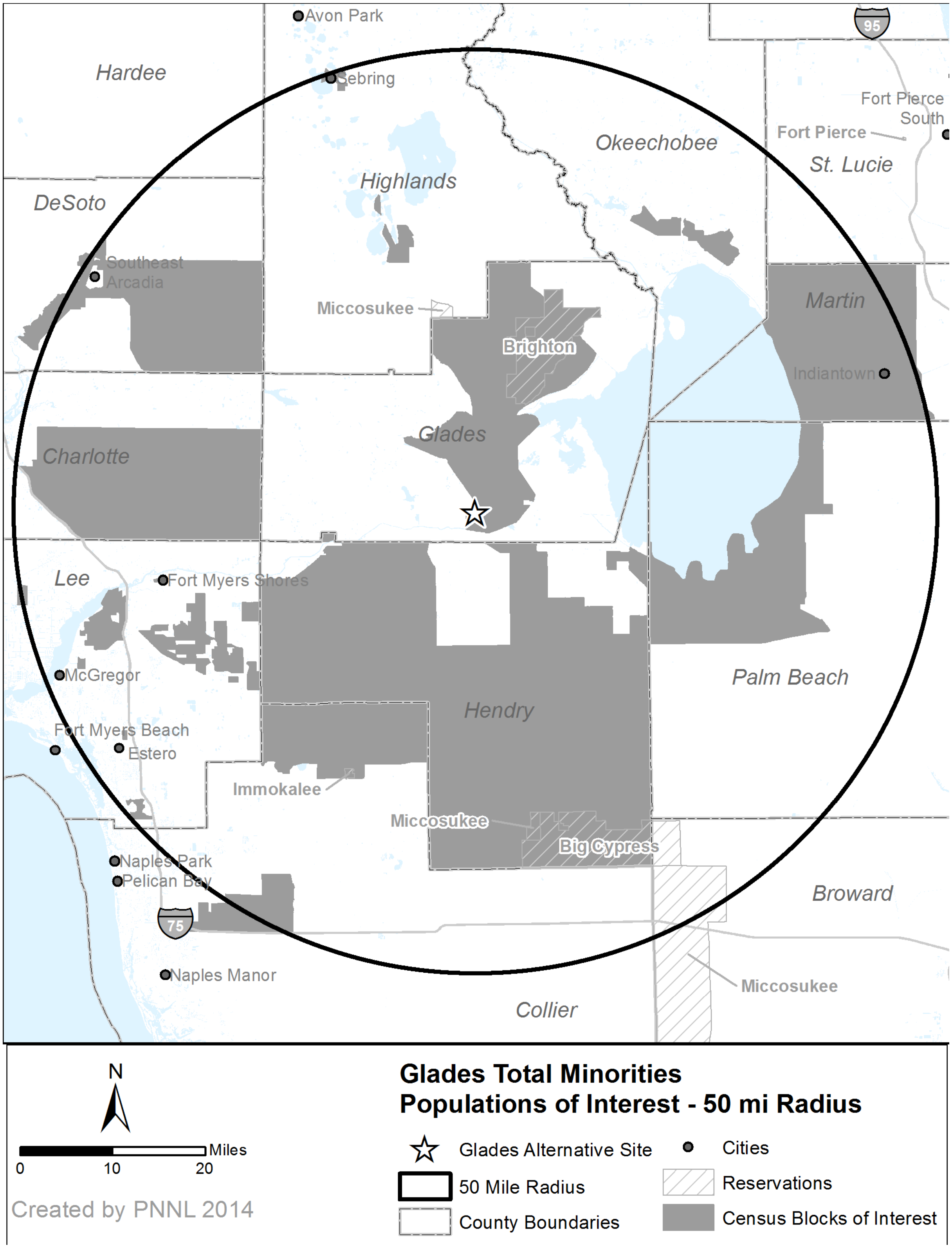


Figure 9-7. Aggregate Minority Populations in Block Groups that Meet the Environmental Justice Selection Criteria within 50 mi of the Glades Alternative Site

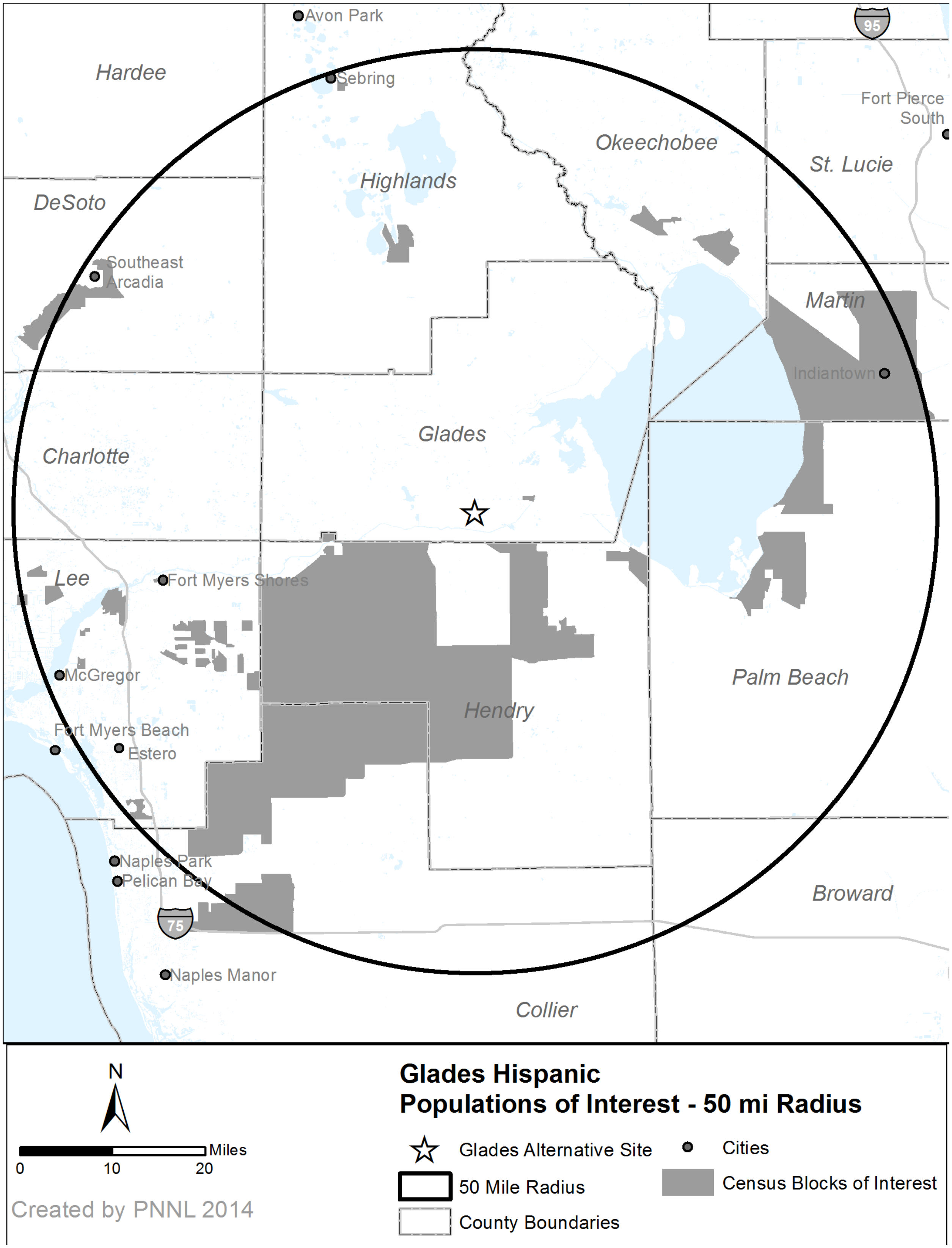


Figure 9-8. Hispanic Populations in Block Groups that Meet the Environmental Justice Selection Criteria within 50 mi of the Glades Alternative Site

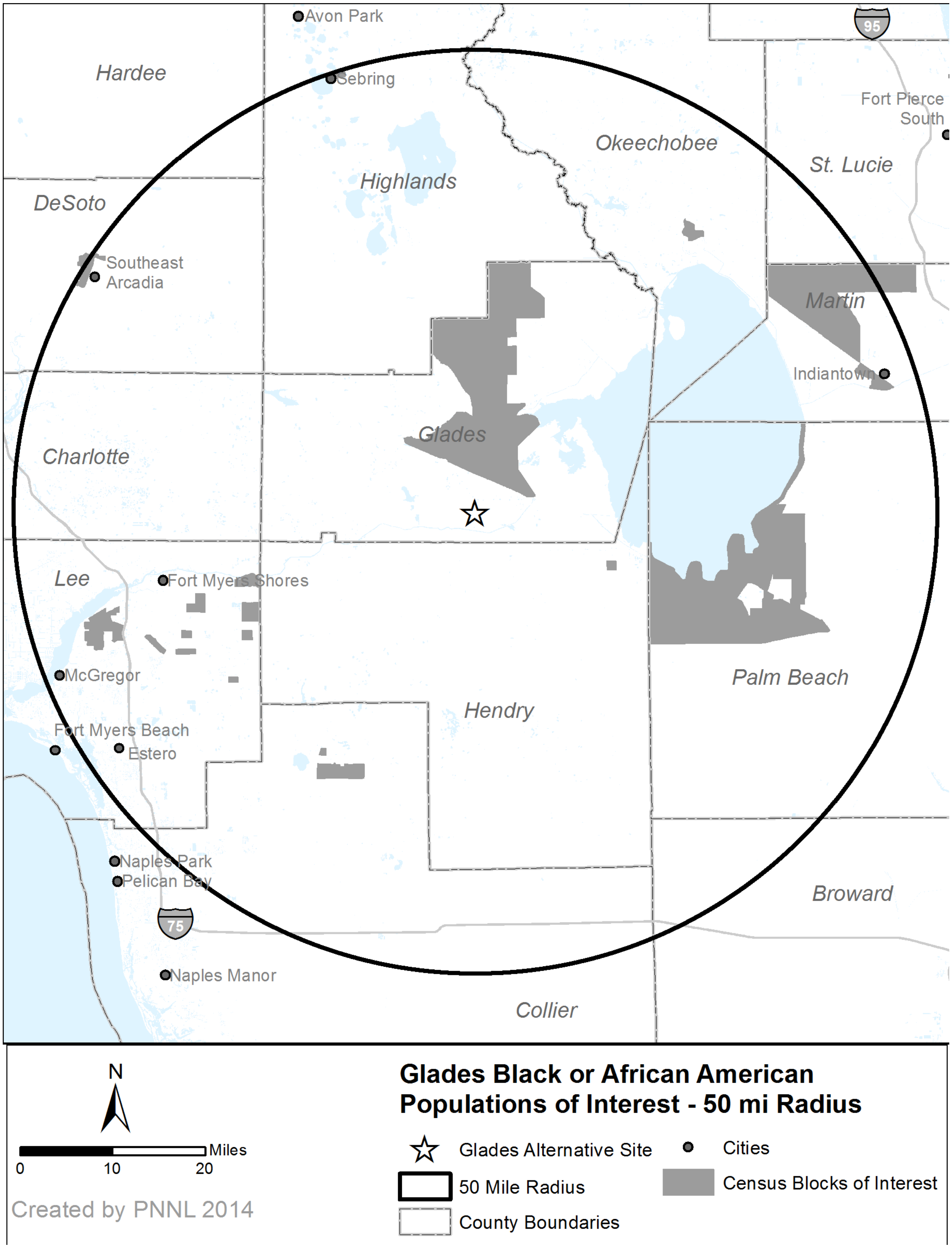


Figure 9-9. African American Populations in Block Groups that Meet the Environmental Justice Selection Criteria within 50 mi of the Glades Alternative Site

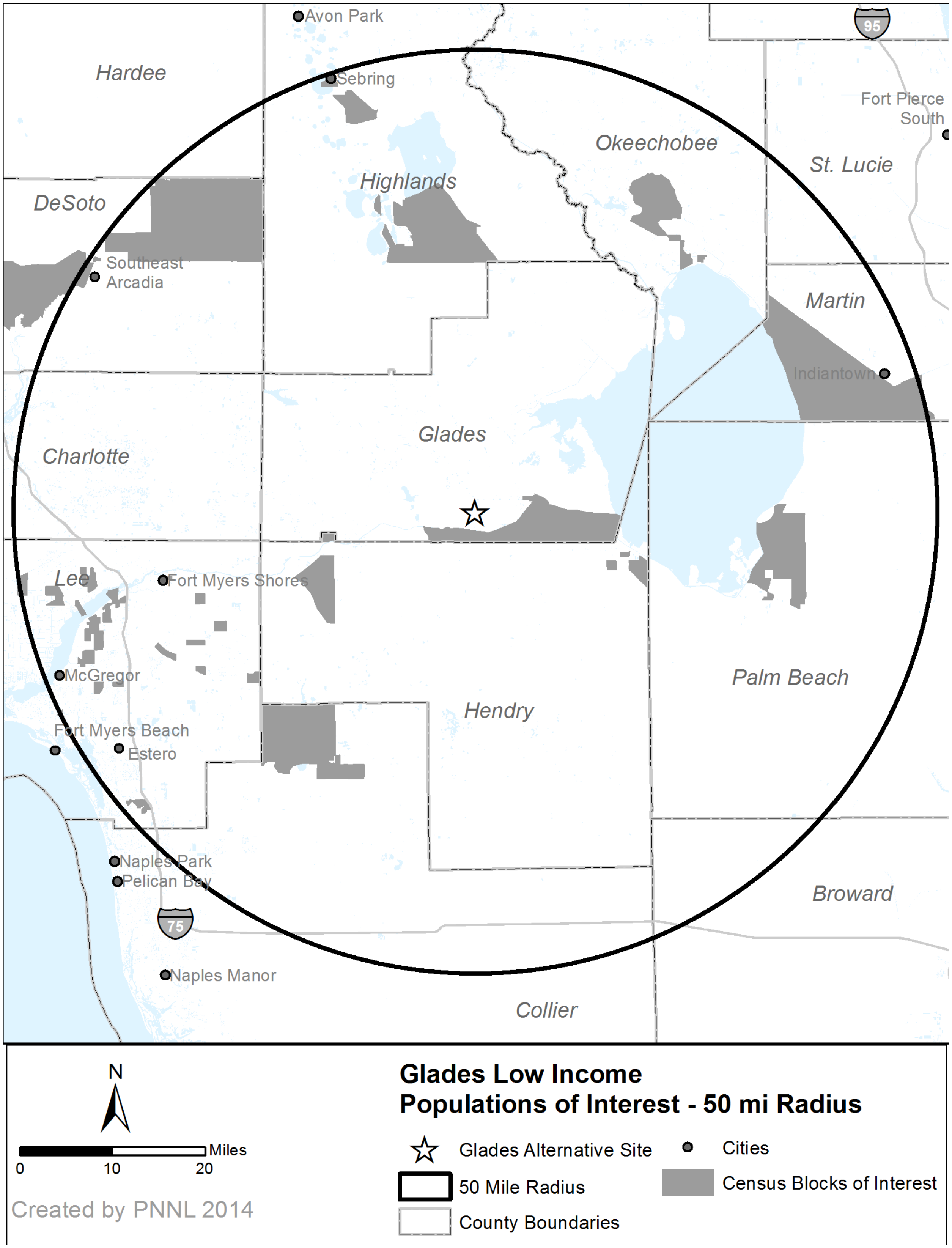


Figure 9-10. Low-Income Populations in Block Groups that Meet the Environmental Justice Selection Criteria within 50 mi of the Glades Alternative Site

The NRC's environmental justice (EJ) methodology includes an assessment of affected populations of particular interest or with unusual circumstances, such as minority communities that are exceptionally dependent on subsistence resources or identifiable in compact locations (e.g., Native American reservations) and those that have a high density of minority or low-income groups. Based on literature research, the review team did not identify high-density minority or low-income presence near the site, nor differentiated subsistence consumption of natural resources by EJ populations of interest.

The analyses of impacts of building and operating new nuclear reactors at the Glades site identified noticeable adverse impacts on land use, terrestrial and wetland ecosystems, aesthetics, traffic, and historic and cultural resources. The review team did not identify any special pathways through which any impacts would disproportionately affect EJ populations of interest. Therefore, the review team concluded there would be no disproportionately high and adverse impacts on EJ populations of interest.

Cumulative Impacts

In addition to the EJ impacts from building and operations of the proposed project at the Glades site, the cumulative analysis also considers other past, present, and reasonably foreseeable future actions that could have EJ impacts. Based on a literature review of past and present actions in the affected area, and based on the reasonably foreseeable actions listed in Table 9-6, the review team found no evidence that the cumulative effects would disproportionately impact EJ populations.

9.3.2.7 Historic and Cultural Resources

The following cumulative impact analysis addresses building and operating two new nuclear generating units at the Glades site. The analysis also considers other past, present, and reasonably foreseeable future actions that could affect cultural resources, including other Federal and non-Federal projects and the projects listed in Table 9-6. For the analysis of cultural impacts at the Glades site, the geographic area of interest is considered to be the Area of Potential Effect (APE) that would be defined for this proposed undertaking. This includes the direct effects APE, defined as the area physically affected by the site-development and operation activities at the site and transmission line corridors. The indirect effects APE is defined as the area visually affected and includes an additional 0.5 mi radius APE around the transmission line corridors and a 1 mi radius APE around the cooling towers.

Reconnaissance activities in a cultural resource review have particular meaning. Typically, they include preliminary field investigations to confirm the presence or absence of cultural resources. However, in developing this EIS, the review team relied upon reconnaissance-level information to perform its alternative site evaluation in accordance with ESRP 9.3 (NRC 2000-TN614). Reconnaissance-level information consists of data that are readily available from agencies and other public sources. It can also include information obtained through visits to the site area. The following information was used to identify the historic and cultural resources at the Glades site:

- NRC Alternative Sites Visit, July 2010 (NRC 2010-TN3304)
- FPL ER Revision 6 (FPL 2014-TN4058)

- Florida Historical Markers program (FDHR 2014-TN3875)
- National Register of Historic Places database (NPS 2014-TN3879).

The approximately 3,000 ac Glades site occurs in predominantly agricultural land. Historically, the Glades site and vicinity has remained largely undeveloped. Over time, the area has been disturbed by low-impact development including agriculture and low-density rural development, and it likely contains intact archaeological sites and other cultural resources associated with the past 10,000 years of human settlement. A search of the National Register shows that two significant historic districts are located within 10 mi of the Glades site (FPL 2014-TN4058; NPS 2014-TN3879). These two resources are the Glades Moore Haven Downtown Historic District and the Glades Moore Haven Residential Historic District, located several miles away. A total of 61 properties was found in four counties in the vicinity of the Glades site—Glades, Lee, Okeechobee, and Hendry Counties. A National Register search of the indirect effects APE for the proposed transmission line corridor shows that only the two properties noted above, the Glades Moore Haven Downtown Historic District and the Glades Moore Haven Residential Historic District, are located along the route, though still outside the indirect effects APE. Numerous historic properties are located within the urban coastal area of Broward County, toward the southeastern end of the transmission line corridor, but these occur more than 10 mi from the APE.

A search of the Florida Historical Markers Program revealed that there are two historic markers in Glades County (FDHR 2014-TN3875). One is for the “Lone Cypress” and Everglades Drainage in the city of Moore Haven. The marker is near the two Glades Moore Haven Historic Districts. The other is for the hurricane of 1924, and is located about 10 mi to the west of the Glades site.

In 2006, FPL conducted background research for a proposed project located north of the Glades site (FPL 2014-TN4058). That work identified five prehistoric sites and one prehistoric archaeological district in the vicinity of that project, but none has been evaluated for National Register eligibility. The resources include primarily prehistoric habitation sites and burial mounds, as well as the Fort Center Archaeological District, which contains numerous prehistoric archaeological sites and an historic period Seminole War fort. None of these resources has been evaluated for eligibility for the National Register. In addition, a historic district, the Herbert Hoover Dike, dating to the 1930s, is located in the area and has been determined eligible for the National Register, though it is not listed. None of these resources is located within the direct effects APE of the Glades site, but they do indicate that archaeological sites and historical resources are located in the area.

In addition, there are three Indian Reservations in the area. These include the Brighton Seminole Indian Reservation in Glades County approximately 12 mi to the northeast of the Glades site, the Big Cypress Seminole Reservation in Hendry and Palm Beach Counties, approximately 33 mi to the southeast, and the Miccosukee Indian Reservation a 5 mi farther south in Broward County. A portion of the proposed transmission line for the Glades site passes through the northern portion of the Big Cypress Seminole Indian Reservation, and within 5 mi of the Miccosukee Indian Reservation, but in this area the proposed transmission line follows an existing transmission line corridor.

While there are no known historic properties located within the direct effects APE of the Glades site, reconnaissance-level information shows that there are cultural, historic, and archaeological resources in the general vicinity of the site, including two historic districts located a few miles from the property (though outside the direct and indirect effects APE) and potentially significant archaeological resources associated with Lake Okeechobee, including burial mounds. No archaeological or architectural surveys have been conducted at the Glades site, and locating the nuclear plants there would require formal cultural resources survey and consultation with the State Historic Preservation Office (SHPO), Tribes, and other interested parties. If any significant cultural, historic, or archaeological resources are identified, the project could cause adverse effects and appropriate mitigation measures would need to be put in place before construction and operation.

Building Impacts

To accommodate the building of two nuclear units and associated facilities at the Glades site, FPL estimates that the total area of land that would be disturbed would involve approximately 362 ac for the facility footprint. In addition, a 1.9 mi long paved road and a 6.2 mi long railroad spur would need to be constructed in the predominantly agricultural land (FPL 2014-TN4058). Further, portions of SR-78 would need to be widened. An additional 3.4 ac would be required for pipelines and associated facilities (FPL 2014-TN4058). If the Glades site were chosen for the proposed project, identification of cultural resources would be accomplished through additional cultural resource surveys and consultation with the SHPO, Tribes, and interested parties. The results would be used in the site-planning process to address cultural resources impacts. If significant cultural resources were identified by these surveys, the review team assumes that FPL would use the same protective measures used at the Turkey Point site, and therefore the impacts would be minimal. If direct effects on significant cultural resources could not be avoided, land-clearing, excavation, and grading activities could potentially destabilize important attributes of historic and cultural resources.

There are no existing transmission lines connecting directly to the Glades site, and Section 9.3.2.1 discusses the proposed transmission lines, which would extend for a total of 121 mi through areas likely containing cultural and historic resources. FPL has stated that consideration would be given to sensitive environmental and built resources in determining a route for the transmission lines (FPL 2014-TN4058), but visual impacts from transmission lines may result in significant alterations to the visual setting of cultural and historic resources within the geographic area of interest. These include the Glades Moore Haven Downtown Historic District and the Glades Moore Haven Residential Historic District, both listed on the National Register. While both districts are located outside the indirect effects APE, both the nuclear generating plant and the new transmission lines likely would be visible from them. The effects would be particularly noticeable given that the setting in the area is primarily rural, without existing industrial development. If the Glades site were chosen for the proposed project, the review team assumes that FPL would conduct its transmission line−related cultural resource surveys and procedures in a manner similar to that for the Turkey Point site. In addition, the review team assumes that the State of Florida’s final Conditions of Certification (State of Florida 2014-TN3637) regarding transmission line siting and building activities would also apply at this site. If direct effects on significant cultural resources could not be avoided, land-clearing, excavation, and grading activities could potentially destabilize important attributes of historic cultural resources. Similarly, both the transmission lines and nuclear generating units could indirectly affect cultural and historic resources through visual impacts on the setting of the resources.

Operations Impacts

Impacts on historic and cultural resources from operation of two new nuclear generating units at the Glades site include those associated with the operation of new units and maintenance of transmission lines. The review team assumes that the same procedures developed by FPL for the Turkey Point site, as well as the State of Florida's final Conditions of Certification, would be used for onsite and offsite maintenance activities. Consequently, the incremental effects of the maintenance of transmission line corridors and operation of the two new units and associated impacts on the cultural resources would be negligible for the direct and indirect effects APEs. However the indirect visual impacts would continue throughout the life of the transmission lines.

Cumulative Impacts

Past actions in the geographic area of interest that have similarly affected historic and cultural resources include rural and agricultural development and activities associated with these land-disturbing activities such as road development. Table 9-6 lists past, present, and reasonably foreseeable projects and other actions that may contribute to cumulative impacts on historic and cultural resources in the geographic area of interest. Projects from Table 9-6 that may fall within the geographic area of interest for cultural resources include the Ortona Sand Mine Expansion and future urbanization, such as new or expanded roads and other infrastructure. These projects may significantly affect historic and cultural resources in a manner similar to those associated with the building and operation of two new nuclear generating units.

Long linear projects such as roadways and pipelines may intersect the proposed transmission line corridors. Because cultural resources can likely be avoided by long linear projects, impacts on cultural resources would likely be minimal. However, this is not necessarily the case for transmission lines, which can have indirect effects on cultural resources through alteration of the visual setting. If building associated with such activities results in significant alterations of cultural resources in the transmission line corridors, either physical or visual, then cumulative impacts on cultural and historic resources would be greater.

Summary Statement

Cultural resources are nonrenewable. Therefore, the impact of the destruction or visual alteration of cultural resources is cumulative. Based on the information provided by FPL and the review team's independent evaluation, the review team concludes that the cumulative impacts from building and operating two new nuclear generating units on the Glades site would be MODERATE. The impacts of building and operating the project at the Glades site would be a significant contributor to the MODERATE impact primarily because of the indirect viewshed impacts from the nuclear power-generating plant and transmission lines on historic properties. This impact-level determination is based on reconnaissance-level information and the review team assumes that, if the Glades site were to be developed, cultural resource surveys and evaluations would be conducted and FPL, in consultation with SHPO, Tribes, and interested parties, would assess and resolve any adverse effects of the undertaking. If additional cultural or historic resources are present, and if there are adverse effects to those resources, the project could result in greater cumulative impacts.

9.3.2.8 Air Quality

The following impact analysis includes impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable actions that impact air quality, including other Federal and non-Federal projects listed in Table 9-6. As described in Section 9.3.2, Glades is a greenfield site; there are currently no nuclear facilities on the site. The geographic area of interest for the Glades site is Glades County, which is in the Southwest Florida Intrastate Air Quality Control Region (40 CFR 81.97) (TN255).

Sections 4.7 and 5.7 discuss air-quality impacts during building and operation. The emissions related to building and operating a nuclear power plant at the Glades alternative site would be similar to those at the Turkey Point site. The air-quality attainment status for Glades County, as set forth in 40 CFR Part 81 (TN255), reflects the effects of past and present emissions from all pollutant sources in the region. Glades County is in attainment of all National Ambient Air Quality Standards.

As described in Chapters 4 and 5, the criteria pollutants from building and operation were found to have a SMALL impact on air quality. In Chapter 7, the cumulative impacts of criteria pollutants were evaluated and determined to be SMALL to MODERATE because of nearby emission sources. Reflecting on the projects listed in Table 9-6, there are no significant projects within the area of interest that would contribute in a meaningful way to the cumulative impacts of criteria pollutants for the Glades site.

The air-quality impacts from development of the Glades site would be local and temporary. The applicant would develop a dust-control plan that identifies specific measures to minimize fugitive dust emissions during building activities. The distance from building activities to the site boundary would be sufficient to generally avoid significant air-quality impacts. There are no land uses or projects in Table 9-6 that would have emissions during site development that would, in combination with emissions from the Glades site, result in degradation of air quality in the region. Emissions from operation of two new nuclear units at the Glades site would be intermittent and made at low levels with little or no vertical velocity, similar to operational impacts at the Turkey Point site as discussed in Section 5.7, and the associated air-quality impacts would be SMALL. Other sources of emissions in Table 9-6 would likely have de minimis impacts due to their distance from the site. Given that these projects are subject to Clean Air Act permitting requirements, it is unlikely that the air quality in the region would degrade to the extent that the region would be in nonattainment of the National Ambient Air Quality Standards.

The cumulative impacts of GHG emissions related to nuclear power are discussed in Section 7.6. The impacts of the emissions are not sensitive to location of the source. Consequently, the discussion in Section 7.6 is applicable to a nuclear power plant located at the Glades site. The review team concludes that the national and worldwide cumulative impacts of GHG emissions are noticeable but not destabilizing. The review team further concludes that the cumulative impacts would be noticeable but not destabilizing, with or without the GHG emissions of two new nuclear units at the Glades site.

Summary Statement

The review team concludes that cumulative impacts from other past, present, and reasonably foreseeable future actions on air-quality resources in the geographic areas of interest would be SMALL for criteria pollutants and MODERATE for GHG emissions. The incremental contribution of impacts on air-quality resources from building and operating two units at the Glades site would not be a significant contributor to the MODERATE impacts.

9.3.2.9 Nonradiological Health Impacts

The following analysis considers nonradiological health impacts from building and operating two new nuclear units at the Glades site. The analysis also includes past, present, and reasonably foreseeable future actions that could contribute to cumulative nonradiological health impacts on site workers (construction and operation workers) and members of the public, including other Federal and non-Federal projects and the projects listed in Table 9-6 within the geographic area of interest. Nonradiological health impacts at the Glades site are estimated based on information provided by FPL and the review team's independent evaluation. For the analysis of nonradiological health impacts at the Glades site, the geographic area of interest is the site and the immediate vicinity (~2 mi radius) and the associated road and transmission line corridors. This geographic area of interest is based on the localized nature of nonradiological health impacts and is expected to encompass all nonradiological health impacts.

Building activities that have the potential to affect the health of members of the public and workers at the Glades site include exposure to dust and vehicle exhaust, occupational injuries, noise, and increased traffic associated with the transport of construction materials and personnel to and from the site. The operations-related activities that have the potential to affect the health of members of the public and workers include exposure to etiological (disease-causing) agents, noise, EMFs, occupational injuries, and impacts from the transport of workers to and from the site.

Building Impacts

Nonradiological health impacts on construction workers and members of the public from building two new nuclear units at the Glades site would be similar to those evaluated in Section 4.8 for the Turkey Point site. During the site-preparation and building phase FPL would comply with applicable Federal and State regulations on air quality and noise (FPL 2014-TN4058). The Glades site is located in a rural area, and building impacts would likely be negligible on the surrounding populations, which are classified as medium- and low-population areas. The incidence of construction worker accidents would be the same as that for the Turkey Point site.

The review team concludes that nonradiological health impacts on construction workers and the public from building two new nuclear units and associated transmission lines at the Glades site would be minimal. Nonradiological health impacts associated with traffic accidents during building activities at the Glades alternative site were evaluated in Section 4.8.3 and the review team concludes that the impacts would be minimal.

Operations Impacts

Nonradiological health impacts on operation workers and members of the public would include those associated with the operation of cooling towers and transmission lines as described in Section 5.8. Based on the configuration of the proposed new units at the Glades site (see Chapter 3 for detailed site layout description), etiological agents would not be an issue with regard to members of the public because cooling-tower blowdown would be discharged into deep-injection wells not into surface waters. Impacts on workers' health from occupational injuries, noise, and EMFs would be similar to those described in Section 5.8 for the Turkey Point site. Noise and EMF exposure would be monitored and controlled in accordance with applicable Occupational Safety and Health Administration (OSHA) regulations. Although no detailed noise modeling has been performed for the Glades site, it is likely that noise impacts would be similar to those predicted for operations at the Turkey Point site. Effects of EMFs on human health would be controlled and minimized by conformance with National Electrical Safety Code criteria and adherence to the standards for transmission systems regulated by the FDEP.

The review team concludes that nonradiological health impacts on workers and the public from operating two new nuclear units and associated transmission lines at the Glades site would be minimal. Impacts associated with traffic accidents during operations at the Glades alternative site were evaluated in Section 5.8.6 and the review team concludes that the impacts would be minimal.

Cumulative Impacts

Table 9-6 identifies no past or present projects within the geographic area of interest that could affect nonradiological human health in a way similar to the building of two nuclear units at the Glades site. All of the projects that could apply are more than 10 mi from the Glades site.

Reasonably foreseeable projects that could affect nonradiological human health in a way similar to the building of two nuclear units at the Glades site identified in Table 9-6 include various transportation (roads, traffic, pedestrian) and mining/quarry projects that are planned throughout the region.

There are no past, present, or reasonably foreseeable projects within the geographic area of interest that would affect nonradiological human health in a way similar to operating two nuclear units at the Glades site.

The review team concludes that the cumulative impacts on nonradiological health from building and operating two new nuclear units and associated road and transmission lines at the Glades site would be minimal.

Summary Statement

Impacts on nonradiological health from building and operation of two new units at the Glades site are estimated based in the information provided by FPL and the review team's independent evaluation. Although some future activities in the geographical area of interest could affect nonradiological health in ways similar to the building and operation of two new units at the Glades site and associated offsite facilities, those impacts would be localized and managed through adherence to existing regulatory requirements. The review team concludes that nonradiological health impacts on workers and the public resulting from the building of two new nuclear units and associated road and transmission lines at the Glades site would be minimal. The review team expects that the nonradiological health impacts on the operations employees and the public of two new nuclear units at the Glades site would be minimal. Finally, the review team concludes that cumulative impacts on nonradiological health from past, present, and reasonably foreseeable actions in the geographic area of interest would be SMALL.

9.3.2.10 Radiological Impacts of Normal Operations

The following impact analysis includes impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable actions that affect radiological health, including other Federal and non-Federal projects listed in Table 9-6. As described in Section 9.3.2, Glades is a greenfield site; there are currently no nuclear facilities on the site. The geographic area of interest is the area within a 50 mi radius of the Glades site. There are no major facilities that potentially affect radiological health within the 50 mi radius of the Glades site. However, there are likely to be medical, industrial, and research facilities within 50 mi of the Glades site that use radioactive materials.

The radiological impacts of building and operating the two proposed Westinghouse AP1000 nuclear power units at the Glades site include doses from direct radiation and liquid and gaseous radioactive effluents. These pathways would result in low doses to people and biota offsite that would be well below regulatory limits. These impacts are expected to be similar to those estimated for the Turkey Point site.

The NRC staff concludes that the dose from direct radiation and effluents from hospitals and industrial facilities that use radioactive material would be an insignificant contribution to the cumulative impact around the Glades site. This conclusion is based on data from the radiological environmental monitoring programs conducted around currently operating nuclear power plants.

Based on the information provided by FPL and the NRC staff's independent analysis, the NRC staff concludes that the cumulative radiological impacts from building and operating the two proposed Westinghouse AP1000 nuclear power units and other existing and planned projects and actions in the geographic area of interest around the Glades site would be SMALL.

9.3.2.11 Postulated Accidents

The following impact analysis includes radiological impacts from postulated accidents from the operation of two nuclear units at the Glades alternative site. The analysis also considers other past, present, and reasonably foreseeable future actions that affect radiological health from postulated accidents, including other Federal and non-Federal projects and the projects listed in Table 9-6. As described in Section 9.3.2, the Glades site is a greenfield site; there are currently no nuclear facilities at the site. The geographic area of interest considers all existing and proposed nuclear power plants that have the potential to increase the probability-weighted consequences (i.e., risks) from a severe accident at any location within 50 mi of the Glades alternative site. Facilities potentially affecting radiological accident risk within this geographic area of interest are the existing two units of St. Lucie; Units 1 and 2.

As described in Section 5.11.1, the NRC staff concludes that the environmental consequences of design basis accidents (DBAs) at the Turkey Point site would be minimal for AP1000 reactors. DBAs are addressed specifically to demonstrate that a reactor design is robust enough to meet NRC safety criteria. The environmental consequences of DBAs depend on the plant design and the atmospheric dispersion. The AP1000 design is independent of site conditions and the differences in the meteorology of the Glades alternative and Turkey Point sites are not significant with regard to the conditions that are important to assessing DBAs. Therefore, the NRC staff concludes that the environmental consequences of DBAs at the Glades alternative site would be minimal.

With a lower population density and the land-use values for the Glades alternative site, the NRC staff expects the risks from a severe accident for an AP1000 reactor located at the Glades alternative site to be similar to or lower than those analyzed for the proposed Turkey Point site. The risks for the proposed Turkey Point site are presented in Tables 5-14 and 5-15 and are well below the median value for current-generation reactors. In addition, as discussed in Section 5.11.2, estimates of average individual early fatality and latent cancer fatality risks are well below the Commission's safety goals (51 FR 30028) (TN594). For existing plants within the geographic area of interest (St. Lucie Units 1 and 2), the Commission has determined that the probability-weighted consequences of severe accidents are small (10 CFR 51 [TN250], Appendix B, Table B-1). On this basis, the NRC staff concludes that the cumulative risks from severe accidents at any location within 50 mi of the Glades alternative site would be SMALL.

9.3.3 Martin Site

This section covers the review team’s evaluation of the potential environmental impacts of siting a new two-unit nuclear power plant on the Martin site. The site is located in western Martin County, approximately 40 mi northwest of West Palm Beach, 5 mi east of Lake Okeechobee, and 7 mi northwest of Indiantown. The Miami load center is approximately 65 mi to the south-southeast. The site is bounded on the west by the Florida East Coast Railway (FEC) and the adjacent SFWMD L-65 Canal; on the south by the St. Lucie Canal (C-44 or Okeechobee Waterway); and on the northeast by SR-710 and the adjacent CSX Railroad (FPL 2014-TN4058). The Martin site is an 11,300 ac area that includes five fossil-fired power units and a solar unit. The majority of the site is currently used for agriculture. The elevation reaches as high as 28 ft above sea level (FPL 2011-TN40), and the entire site lies outside the 100-year floodplain (FPL 2011-TN40). The location of the Martin site is shown in Figure 9-11.

The facility footprint (Figure 9-12), including the power units, support buildings, switchyard, storage areas, stormwater-retention ponds, and other structures, would encompass an estimated 363 ac. Use of the Martin site would also require the development of a 31 mi transmission line corridor (763.6 ac), a 39.3 mi access road (473.3 ac), a 4.3 mi railway (51.5 ac), and an intake/makeup pipeline connected to the C-44 Canal/St. Lucie Canal (21.7 ac). These additional features (not counting the transmission line) would add an estimated 547 ac to the overall permanent footprint at the site, and an additional area (up to several hundred acres) would have to be temporarily disturbed for activities, such as laydown areas, a batch plant, and spoil deposition.

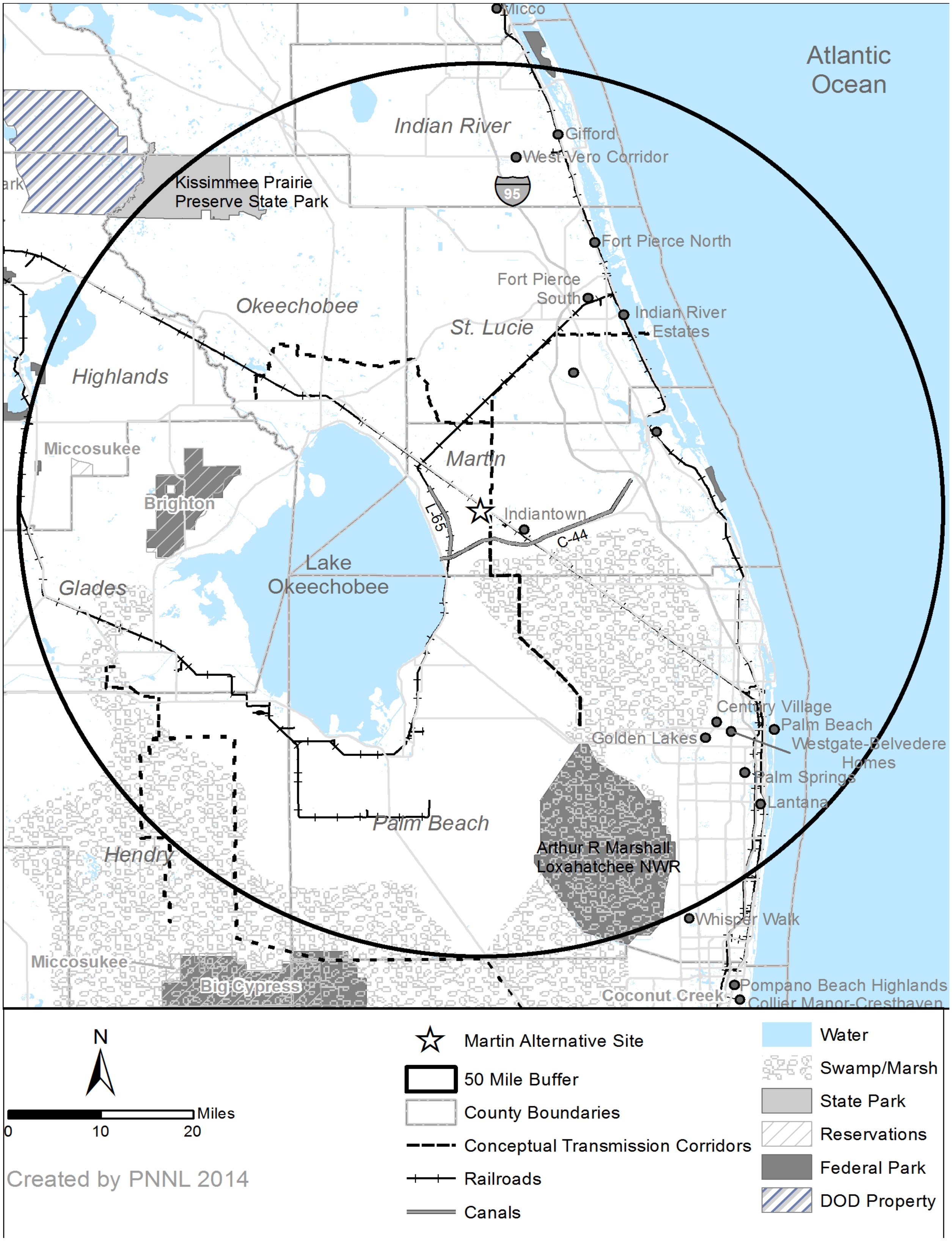


Figure 9-11. Martin Site Region

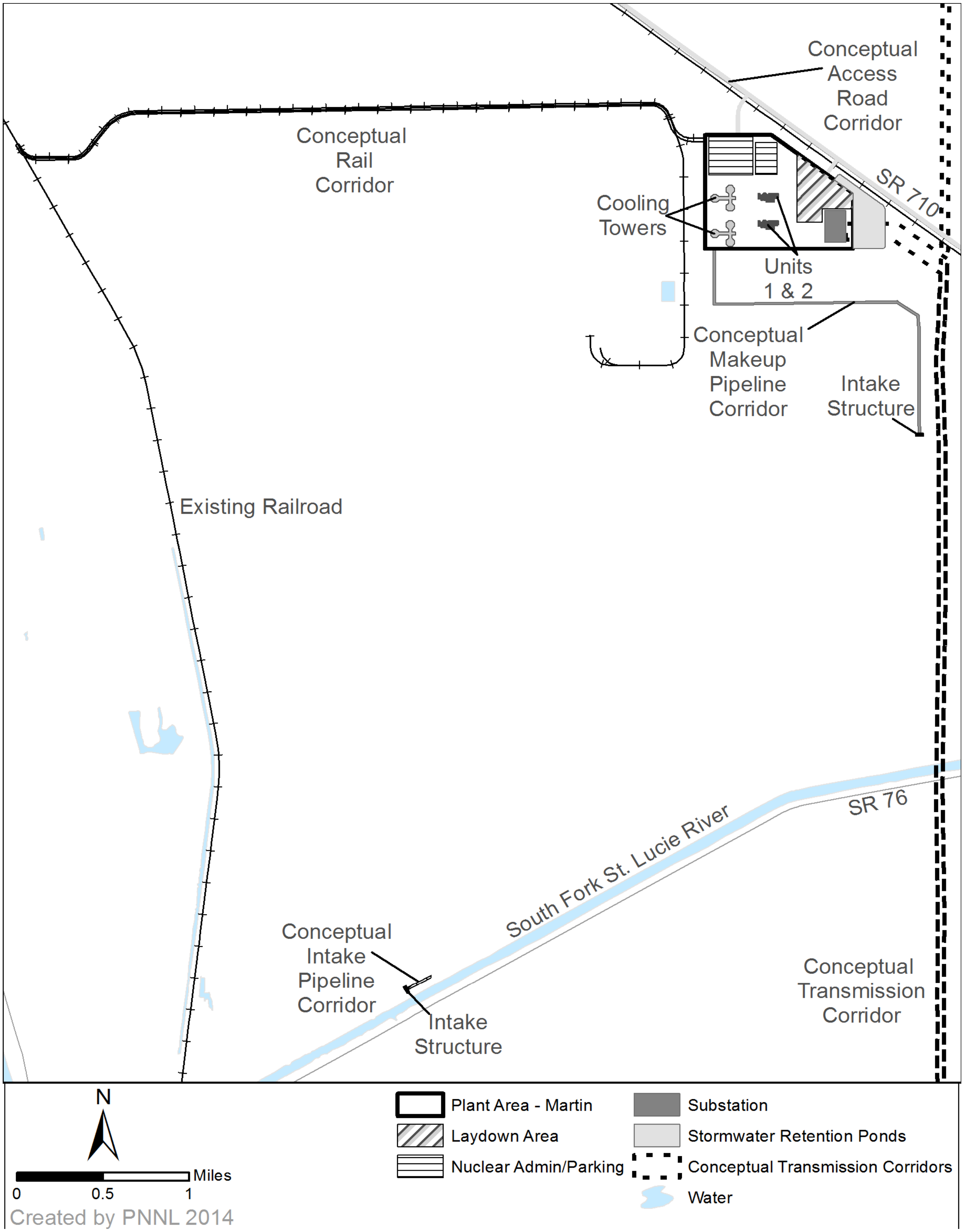


Figure 9-12. Martin Site Footprint

As discussed in Section 9.3.1.7, the review team considered an alternative configuration of the cooling system that FPL proposed.

The following sections include a cumulative impact assessment conducted for each major resource area. The specific resources and components that could be affected by the incremental effects of the proposed action if implemented at the Martin site and other actions in the same geographic area were considered. This assessment includes the impacts of NRC-authorized construction and operations and impacts of preconstruction activities. Also included in the assessment are past, present, and reasonably foreseeable future Federal, non-Federal, and private actions that could have meaningful cumulative impacts when considered together with the proposed action if implemented at the Martin site. Other actions and projects considered in this cumulative analysis are described in Table 9-11.

The geographic area of interest for cumulative impacts considers all existing and proposed nuclear power plants that have the potential to increase the probability-weighted consequences (i.e., risks) of a severe accident at any location within 50 mi of the Martin site. An accident at a nuclear plant within 100 mi of the Martin site could potentially increase this risk. However, other nuclear plants in Florida, Alabama, and Georgia that are more than 100 mi from the Martin site are not included in the cumulative impact analysis.

9.3.3.1 Land Use

The following analysis includes land-use impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable future actions that affect land use, including other Federal and non-Federal projects listed in Table 9-11. For the analysis of land-use impacts at the Martin site and its associated transmission line corridors, the review team determined that a 10 mi radius, similar to that used for the Turkey Point site, would encompass an effective geographic area of interest for cumulative impact assessment for land use, because it would include the site and associated facilities. In evaluating the land-use impacts of using the Martin site, the review team used information from the project application and other readily obtainable data from the Internet or published sources, including aerial photographs of the site and vicinity, USDA soils information, local zoning and planning documents, and FLUCFCS data. Impacts from both building and station operation are discussed.

Existing land uses in the vicinity of the Martin alternative site consist predominantly of cultivated agriculture. The nearest community is Indiantown, approximately 7 mi to the southeast, an unincorporated town in Martin County of just under 7,000 population (Martin County 2014-TN3306). The nearest incorporated city is Port St. Lucie, 20 mi to the east. The Martin alternative site is located approximately 5 mi east of Lake Okeechobee.

Table 9-11. Past, Present, and Reasonably Foreseeable Projects and Other Actions in the Vicinity of Martin Site

Project Name	Summary of Project	Location	Status
Energy Projects			
St. Lucie	Two 3,020 MW(t) nuclear power reactors	28 mi NE of the Martin alternative site	Operational, Units 1 and 2 underwent license renewal in 2003. Units 1 and 2 completed 320 MW(t) power uprates in 2013 (NRC 2012-TN1668; FPL 2014-TN3360)
West County Energy Center	Three 1,250 MW natural-gas−powered units	28 mi SE of the Martin alternative site	Operational (FDEP 2013-TN2965)
Martin	Combined natural-gas/oil and solar power-generating station	Adjacent	Operational (FPL 2014-TN2974)
Indiantown Cogeneration Company	330 MW coal-fired power plant	4 mi E of the Martin alternative site	Operational (FDEP 2013-TN2967)
Okeelanta Cogeneration Facility	140 MW biomass power-generation facility	35 mi SW of the Martin alternative site	Operational (FDEP 2013-TN2968)
FPL pipeline	126 mi pipeline from Sabal Trail's Central Florida Hub to FPL's Martin Clean Energy Center	Throughout region	Proposed, construction set to begin 2016 (FPL 2014-TN2975)
Floridian Natural Gas Storage Company - Natural Gas Storage Facility	Storage of natural gas	4 mi E of the Martin alternative site	Proposed, amendment to modify application sent to FERC in 2013 (78 FR 58529) (TN3002)
Southeastern Renewable Fuels Biorefinery and Cogeneration Plant	30 MW biofuel using leftover sweet sorghum stalk fiber	41 mi SW of the Martin alternative site	Proposed, Final air permit issued by FDEP in 2010 (FDEP 2010-TN2970)

Table 9-11. (contd)

Project Name	Summary of Project	Location	Status
Treasure Coast Energy Center	300 MW natural-gas power plant	25 mi NE of the Martin alternative site	Operational (FMPA 2014-TN3029)
Vero Beach Municipal Power Plant	Five-unit, 155 MW gas- and oil-fired plant	41 mi NE of the Martin alternative site	Operational (EPA 2014-TN3030) Status may change (FPL 2014-TN3360)
Tom G. Smith Power Plant (Lake Worth)	Three-unit, 105 MW gas- and oil-fired plant	43 mi SE of the Martin alternative site	Operational (EPA 2014-TN3031)
INEOS New Planet Bioenergy Center	6.3 MW bioenergy facility	37 mi NE of the Martin alternative site	Operational (EPA 2014-TN3032)
Riviera Beach Energy Center	1,250 MW gas-fired plant	37 mi SE of the Martin alternative site	Operational and completed in 2014 (FPL 2014-TN3033)
Okeechobee Landfill energy	Waste-to-Energy facility	21 mi NW of the Martin alternative site	Operational (Waste Management 2014-TN3034)
Mining Projects			
FiveStone Mining	Stone/quarry mining	8 mi SW of the Martin alternative site	Operational (EPA 2013-TN2959)
Daniel Shell Pit, Phase 6	Stone/quarry mining	33 mi NW of the Martin alternative site	Operational (EPA 2013-TN2956)
E R Jahna Industries Inc - Ortona Mine	Stone/quarry mining	48 mi SW of the Martin alternative site	Operational (EPA 2013-TN2958)
Florida Rock Industries/Fort Pierce	Stone/quarry mining	13 mi NE of the Martin alternative site	Operational (EPA 2014-TN3038)
Hammond Sand Mine	Sand/quarry mining	44 mi NE of the Martin alternative site	Operational (EPA 2014-TN3044)

Table 9-11. (contd)

Project Name	Summary of Project	Location	Status
Various other mine and quarry projects	Stone/quarry mining	Throughout region	Operational (FDEP 2010-TN2966)
Transportation Projects			
Various Transportation Projects	Road, traffic, pedestrian projects	Throughout region	Ongoing (FDOT 2012-TN1132)
Parks and Aquaculture Facilities			
Arthur R. Marshall Loxahatchee National Wildlife Refuge	Activities include picnicking, boating, fishing, and hiking	27-60 mi SE of the Martin alternative site	Development likely limited within this area (FWS 2013-TN2992)
Dupuis Wildlife and Environmental Area	Activities include bicycling, camping, hunting, fishing, and hiking	3mi S of the Martin alternative site	Development likely limited within this area (FFWCC 2014-TN2977)
Okeechobee Battlefield State Park	Hiking, camping	17 mi NW of the Martin alternative site	Development likely limited within this area (FDEP 2010-TN2971)
Archbold Biological Station	Ecological research station and preserve, organization owns and protects a 5,193 ac globally significant Florida scrub preserve located on the southern end of the Lake Wales Ridge	49 mi NW of the Martin alternative site	Development likely limited within this area (Archbold Biological Station 2014-TN2954)
Lake Okeechobee	730 mi^2 freshwater lake, restoration and protection plan	5−28 mi W of the Martin alternative site	Ongoing, Florida Legislature in 2007 expanded the Lake Okeechobee Protection Act (SFWMD 2014-TN2988)
Johnathan Dickinson State Park	Activities include bicycling, camping, boating, horseback riding, picnicking, fishing, and hiking	28 mi E of the Martin alternative site	Development likely limited within this area (FPS 2014-TN3048)
Savannas Preserve State Park	Activities include bicycling, boating, horseback riding, picnicking, fishing, and hiking	24 mi NE of the Martin alternative site	Development likely limited within this area (FPS 2014-TN3050)

Table 9-11. (contd)

Project Name	Summary of Project	Location	Status
Fort Pierce inlet State Park	Activities include bicycling, camping, boating, swimming, picnicking, fishing, and hiking	33 mi NE of the Martin alternative site	Development likely limited within this area (FSP 2014-TN3053)
Pepper Beach State Recreation Area	Activities include swimming, picnicking, fishing, and hiking	33 mi NE of the Martin alternative site	Development likely limited within this area (St. Lucie County 2014-TN3054)
St. Sebastian River Preserve State Park	Activities include bicycling, camping, boating, picnicking, fishing, and hiking	49 mi N of the Martin alternative site	Development likely limited within this area (FSP 2014-TN3055)
Hobe Sound National Wildlife Refuge	Activities include fishing, and hiking	26 mi E of the Martin alternative site	Development likely limited within this area (FWS 2013-TN3056)
John D. Macarthur Beach State Park	Activities include boating, swimming, picnicking, fishing, and hiking	35 mi SE of the Martin alternative site	Development likely limited within this area (FPS 2014-TN3057)
Peanut Island Park	Activities include boating, picnicking, fishing, and hiking	37 mi SE of the Martin alternative site	Development likely limited within this area (Palm Beach County 2014-TN3058)
Other State nature preserves and wildlife management areas	Public recreational activities	Throughout region	Development likely limited within these areas (FFWCC 2014-TN2981)
Comprehensive Everglades Restoration Plan Projects			
Acme Basin B	Goals of this project include capturing surface water for reuse for the Arthur R. Marshall Loxahatchee National Wildlife Refuge and the Lake Worth Drainage District municipal water supply that would otherwise be routed through Basin A to C-51 and lost to tide; and to reduce harmful discharges to the Lake	35 mi SE of the Martin alternative site	Proposed, Project in Preconstruction, Engineering and Design phase (USACE and SFWMD 2014-TN3045)

Table 9-11. (contd)

Project Name	Summary of Project	Location	Status
	Worth Lagoon.		
Indian River Lagoon -South	Project purpose is to improve surface-water management in the C-23/C-24, C-25, and C-44 basins for habitat improvement in the Saint Lucie River Estuary and southern portions of the Indian River Lagoon.	2 mi N of the Martin alternative site	Proposed, Project in Preconstruction, Engineering and Design phase (USACE and SFWMD 2014-TN3013)
Everglades Agricultural Area Storage Reservoirs	The purpose of this project is to improve the timing of environmental deliveries to the Water Conservation Areas, including reducing damaging flood releases from the Everglades Agricultural Area to the Water Conservation Areas.	Throughout region	Proposed, Final Project Implementation Report submitted 2012 (USACE and SFWMD 2014-TN3011)
Flows to Northwest and Central Water Conservation Areas 3A	The purpose of this feature is to increase environmental water-supply availability, increase depths and extend wetland hydropatterns in the northwest corner and west-central portions of Water Conservation Area 3A.	50 mi S of the Martin alternative site	Proposed, Project in Preconstruction, Engineering and Design phase (USACE and SFWMD 2014-TN3012)
Lake Okeechobee Aquifer Storage and Recovery	A series of aquifer storage and recovery wells adjacent to Lake Okeechobee	4 mi W of the Martin alternative site	Proposed, Project in Preconstruction, Engineering and Design phase (USACE and SFWMD 2014-TN3014)
Lake Okeechobee Watershed Project	Project to increase aquatic and wildlife habitat, regulate extreme highs and lows in lake staging, reduce phosphorus loading and reduce	Throughout Okeechobee County	Proposed, Project in Preconstruction, Engineering and Design phase (USACE and SFWMD 2014-TN3015)

Table 9-11. (contd)

Project Name	Summary of Project	Location	Status
	damaging releases to the surrounding estuaries		
Melaleuca Eradication and other Exotic Plants	The project includes (1) upgrading and retrofitting the current quarantine facility in Gainesville, and (2) large-scale rearing of approved biological control organisms for release at multiple sites within the South Florida ecosystem to control Melaleuca, Brazilian pepper, Australian pine, and Old World climbing fern.	Throughout region	Operational, Facility completed in 2013 (USACE and SFWMD 2014-TN3020)
Modify Holey Land Wildlife Management Area Operation Plan	Modification of the current operating plan and rules for Holey Land Wildlife Management Area will be made to implement rain-driven operations for this area to improve the timing and location of water depths within this wildlife management area.	43 mi S of the Martin alternative site	Proposed, Project in planning phase. (USACE and SFWMD 2014-TN3017)
Modify Rotenberger Wildlife Management Area Operation Plan	Modification to the current operating plan for the Rotenberger Wildlife Management Area will be made to implement rain-driven operations for this area as needed. Water deliveries are made to the Rotenberger Area from Stormwater-Treatment Area 5.	48 mi SW of the Martin alternative site	Proposed, Project in planning phase. (USACE and SFWMD 2014-TN3018)
Palm Beach County Agriculture Reserve Aquifer Storage and Recovery	Supplement water supplies for central and southern Palm Beach County by capturing and storing excess	42 mi SE of the Martin alternative site	Proposed, Project in Preconstruction, Engineering and Design phase (USACE and

Table 9-11. (contd)

Project Name	Summary of Project	Location	Status
	water currently discharged to the Lake Worth Lagoon.		SFWMD 2014-TN3019)
Palm Beach County Agriculture Reserve Reservoir	Project to supplement water supplies for central and southern Palm Beach County by capturing and storing excess water currently discharged to the Lake Worth Lagoon	42 mi SE of the Martin alternative site	Proposed, Project in Preconstruction, Engineering and Design phase (USACE and SFWMD 2014-TN3019)
Loxahatchee National Wildlife Refuge Internal Canal Structures	Project to improve the timing and location of water depths within the Refuge	28 mi NW of the Martin alternative site	Proposed, Project in Preconstruction, Engineering and Design phase (USACE and SFWMD 2014-TN3046)
Strazzulla Wetlands	Project to provide a hydrological and ecological connection to the Loxahatchee National Wildlife Refuge and expand the spatial extent of protected natural areas	36 mi SE of the Martin alternative site	Proposed, Project in Preconstruction, Engineering and Design phase (USACE and SFWMD 2014-TN3047)
Other Actions/Projects			
Herbert Hoover Dike Major Rehabilitation Project	Rehabilitation Project and Dam Safety Modification Study	5- 35 mi W of the Martin alternative site	Proposed, Notice of Intent to file EIS submitted by USACE in Feb. 2013 (78 FR 1164) (TN2991)
Comprehensive Shoreline Stabilization Project in Palm Beach County	Discharge fill for the purpose of shoreline stabilization	Shoreline of Palm Beach County	USACE submitted Notice of Intent in 2013 (78 FR 40128) (TN3059); EIS completed (CB&I 2014-TN4015)
Lake Worth Inlet Project	Deepening and widening of the Lake Worth Inlet	38 mi SE of the Martin alternative site	USACE completed integrated feasibility report and Environmental Impact Statement in 2014 (USACE 2014-TN4016);

Table 9-11. (contd)

Project Name	Summary of Project	Location	Status
Kissimmee River Restoration	When restoration is completed in 2017, more than 40 mi^2 of river-floodplain ecosystem will be restored, including almost 20,000 ac of wetlands and 44 mi of historic river channel.	Along Kissimmee River	Ongoing (USACE 2014-TN3061)
Atlantic Sugar Association	Sugar manufacturing	26 mi SW of the Martin alternative site	Operational (FDEP 2013-TN2964)
Southern Gardens Citrus Processing Corp.	Food production/distribution	41 mi SW of the Martin alternative site	Operational (FDEP 2013-TN2969)
United States Sugar Corporation Clewiston	Sugar manufacturing	32 mi SW of the Martin alternative site	Operational (EPA 2014-TN2963)
Harbor Branch Oceanographic Institute	Oceanic science and research	35 mi SE of the Martin alternative site	Operational (EPA 2014-TN3071)
Pratt & Whitney	Aircraft engine and engine parts manufacturing	19 mi SE of the Martin alternative site	Operational (EPA 2014-TN3062)
Maverick Boat Company	Fiberglass boat manufacturing	33 mi NE of the Martin alternative site	Operational (EPA 2014-TN3063)
Tropicana Products Inc.	Citrus and animal feed	24 mi NE of the Martin alternative site	Operational (EPA 2014-TN3068)
S2 Yachts Inc	Fiberglass boat manufacturing	32 mi NE of the Martin alternative site	Operational (EPA 2013-TN3069)
Twin Vee Inc.	Fiberglass boat manufacturing	28 mi NE of the Martin alternative site	Operational (EPA 2013-TN3070)

Table 9-11. (contd)

Project Name	Summary of Project	Location	Status
Various wastewater-treatment plant facilities	Sewage treatment	Throughout region	Operational
Various Hospitals using Nuclear material	Medical and other industrial isotopes	Throughout region	Ongoing
Various water/ flood-management projects	Water and flood management	Throughout region	Ongoing (USACE 2012-TN1133)
Future Urbanization	Construction of housing units and associated commercial buildings; roads, bridges, and rail; construction of water- and/or wastewater-treatment and distribution facilities and associated pipelines, as described in local land-use planning documents	Throughout region	Construction would occur in the future, as described in state and local land-use planning documents

Existing land uses at the Martin site consist of an operating power plant and other energy-generation uses FPL states in its application (FPL 2014-TN4058). In response to RAI EIS 9.3.1-8 (eRAI 6353), FPL acknowledged that its solar facility used available lands and that additional new land would have to be acquired in order to develop the new units (FPL 2012-TN1727). No commercial mineral resources are identified within the site and in the vicinity (Calver 1956-TN3752; Spencer 1993-TN3753). Based on a review of aerial photos available on Google Earth, no substantial areas of developed land uses other than existing energy-generating uses occur on or within the vicinity of the site (CleanEnergy 2012-TN3307). Wildlife management areas and recreational areas are located several miles from the alternative plant site. FPL has entered into a voluntary partnership with the Treasured Lands Foundation to protect approximately 400 ac of old-growth bald cypress swamp on the Martin site termed the Barley Barber Swamp, and offers public tours of an interpretative boardwalk traversing the swamp (TLF and FPL 2014-TN3755). The Barley Barber Swamp is located on a peninsula on the western shore of a reservoir in the central part of the Martin site.

Building and Operation Impacts

The Martin County FLUM (Martin County 2014-TN3756) designates the site “Major Power Generation” and the land in the vicinity of the site as “Agricultural.” Martin County zoning (Martin County 2012-TN3351) designates the site as a mix of industrial designations, and the vicinity as Agriculture. Therefore, the review team believes that use of the Martin alternative site for a power plant would be compatible with the Martin County FLUM. However, the review team notes that the applicant would have to acquire land adjoining the site in order to build and operate the proposed new facilities.

Most of the soils on and in the vicinity of the plant site, with the exception of those areas developed for energy-generation and related facilities, are considered farmlands of Unique Importance. Unique farmland is defined in Section 2(c) of the Farmland Protection Policy Act (7 USC 4201 et seq.) (TN708) as "land, other than Prime farmland, that has combined conditions to produce sustained high quality and high yields of specialty crops, such as citrus, nuts, fruits, and vegetables when properly managed." No Prime farmland soils are identified in the vicinity (USDA 2014-TN3353). For the purposes of this analysis, the review team assumes that the entire site consists of farmland of Unique Importance. The plant site and transmission line corridors fall within the Coastal Zone (FPL 2014-TN4058). The site falls within an area designated on the Flood Insurance Rate Map (FIRM; as shown on FEMA FIRM for Martin County Panel 250 of 527 dated October 4, 2002) as Zone X: areas of 500-year flood, areas of 100-year flood with average depths of less than 1 ft or with drainage areas less than 1 mi^2, and areas protected from the 100-year flood by levees (FEMA 2002-TN4119).

Building and operation of the project at the Martin site would result in the conversion of existing land uses, including approximately 264 ac owned by FPL, and additional lands FPL would need to acquire, from agriculture to power generation uses as shown in Table 9-12.

Table 9-12. Martin Alternative Site Land-Use Impacts (acres)

	Agricultural Lands (FLUCFCS 200 Land-Use Series)	Urban Developed Lands, including Power Generation (other than roads and pipelines)	Other Non-Agricultural Lands (all other FLUCFCS designations)	Total
Plant Site	60	260	0	320
Access Roads	195	260	18	473
Rail Corridor	1	50	0	52
Intake Pipeline Corridor	0	1	0	1
Makeup Pipeline Corridor	0	20	0	20
Stormwater-Retention Ponds	8	34	0	42
Total[(a)]	264	626	18	908
Transmission-Line Corridor	100	0	663	764
Grand Total	364	627	680	1,672

(a) Totals may not add due to rounding

Sources: FPL 2011-TN59 and FPL 2014-TN4058

Because this is a small amount of farmland in the context of the large amount of farmland under cultivation in Martin County, conversion of this amount of farmland to another use would not substantially affect the agricultural economy of the region. Although there could be a loss of more than 300 ac of farmlands of Unique Importance, the review team expects that the loss would not noticeably affect regional agriculture, considering the regional abundance of such farmland. However, because additional lands beyond those currently owned by FPL and used for power generation uses would have to be acquired, potentially noticeable land-use conflicts are possible.

The review team does not expect building or operation of the new units on the Martin site to interfere with continued public tours of the Barley Barber Swamp and boardwalk. The swamp and boardwalk are already operated within the confines of a privately owned and operated power-generation facility, and the two new units would be built near the periphery of the FPL-owned property and not immediately adjacent to the swamp.

Additional land-use impacts include possible additional growth and land conversions in the vicinity to accommodate new workers and services. Because the workforce would be dispersed over larger geographic areas in the labor supply region, the impacts from land conversion for residential and commercial buildings induced by new workers relocating to the local area can be absorbed in the wider region. Therefore, the review team concludes that such impacts would be minimal.

Use of the Martin site would also require the development of approximately 31 mi of transmission line corridor. FPL states in its application (FPL 2014-TN4058) that the new transmission lines would pass through the Coastal Zone. Approximately 763.6 ac of land would be at least temporarily affected by building and operating the transmission lines. Much of this land is agricultural land; the remainder is primarily open lands and roadways. The agricultural land within the transmission line corridors would be converted from agricultural use to transmission line use, although FPL states in its application (FPL 2014-TN4058) that agriculture could continue within and along the transmission line rights-of-way. The land uses along the conceptual corridors for new transmission lines to serve the Martin alternative site are identified in Table 9-12.

Under the Florida Site Certification application process explained in Chapter 4.1, the State approves a corridor and the applicant chooses a specific right-of-way within the approved corridor. The objective of this process, as stated in the electrical power plant and transmission line statute (Fla. Stat. 29-403.501 2011-TN1068) is “that the location of transmission line corridors and the construction, operation, and maintenance of electric transmission lines produce minimal adverse effects on the environment and public health, safety, and welfare” and “to fully balance the need for transmission lines with the broad interests of the public in order to effect a reasonable balance between the need for the facility as a means of providing reliable, economical, and efficient electric energy and the impact on the public and the environment resulting from the location of the transmission line corridor and the construction, operation, and maintenance of the transmission lines.” Finalized siting plans and permitting conditions that would be imposed by the various affected State and local agencies would minimize impacts within the corridors. Engineering considerations and costs are likely to suggest designs that favor collocation with existing transmission lines in existing corridors. The siting criteria include land-use considerations to minimize potential disruption to such areas as national, state, and county parks; wildlife refuges; estuarine sanctuaries; landmarks; and historical sites. FPL states in its application that, in its development of the conceptual transmission line corridor for the Martin alternative site, it attempted to select corridors that would allow collocation with existing transmission line corridors and avoided populated areas or residential land uses to some extent (FPL 2014-TN4058). The State certification review process also includes a determination of land-use consistency with local land-use plans and zoning ordinances (Fla. Stat. 29-403.50665-TN1470).

The review team concludes that the land-use impacts from building and operating two new nuclear units at the Martin alternative site would be noticeable, primarily because of the lack of adequate land on the Martin site and the expected need for FPL to acquire additional offsite land, likely from private owners.

Cumulative Impacts

The review team expects that the principal contribution to cumulative land-use impacts in the geographic area of interest defined for the Martin site would be from the two subject nuclear units. Within the geographic area of interest, there are several other reasonably foreseeable projects with the potential to affect cumulative land-use impacts as listed in Table 9-11, including the Lake Point Mine project and other existing and proposed power-generation uses at the Martin site. In addition, the Martin County FLUM designates land for future industrial uses near the Martin alternative site. But because these other projects are consistent with the existing and planned uses in the geographic area of interest, the review team does not expect them to noticeably contribute to cumulative land-use impacts.

Other linear projects are proposed for lands near the proposed conceptual corridor, including the Florida Gas Transmission Phase VIII Expansion Project, as listed in Table 9-11. However, the review team expects that the corridor would have only a minimal cumulative land-use impact.

Summary Statement

Based on the information provided by FPL and the review team's independent review, the review team concludes that the cumulative land-use impacts of building and operating the power plant at the Martin alternative site would be MODERATE. Building and operating the proposed nuclear units at the Martin site would be a significant, and the principal, contributor to these impacts primarily because of the lack of adequate land on the Martin site and the expected need for FPL to acquire additional offsite land, likely from private owners.

9.3.3.2 Water Use and Quality

The following impact analysis includes impacts from building and operating two new nuclear units at the Martin site. The analysis also considers other past, present, and reasonably foreseeable future actions that affect water use and quality, including the other Federal and non-Federal projects listed in Table 9-11. The Martin site is located in rural Martin County in Florida near an existing power plant and approximately 5 mi east of Lake Okeechobee and 2 mi north of the St. Lucie Canal.

The geographic area of interest for surface water at the Martin site is the Kissimmee-Okeechobee-Everglades watershed because this is the resource that would be affected if the proposed project were located at the Martin site. The Kissimmee-Okeechobee-Everglades watershed includes an area of about 9,000 mi^2 (McPherson and Halley 1996-TN98). For groundwater, the ROI is includes 1) the surficial aquifer and the Upper Floridan aquifer at the site; 2) the APPZ of the Middle Floridan aquifer upgradient and downgradient of the site for water withdrawals; and 3) and the Boulder Zone of the Lower Floridan aquifer upgradient and downgradient of the site for disposal of blowdown water.

Building Impacts

Water use for building activities at the Martin site would be comparable to the proposed water use for building activities for the Turkey Point site. During building, water use is estimated to be 565 gpm (0.8 Mgd) (see Table 3-4). The review team assumes that water for building the two units at the Martin site would come from a combination of surface water and groundwater. Surface water from the St. Lucie Canal or Lake Okeechobee may be available for building purposes during times of high surface-water flows. The peak water-use rate during the building phase is inconsequential when compared to the historic average monthly flows into Lake Okeechobee from the Kissimmee River; the rate of 0.8 Mgd is less than 1 percent of the river discharge for even the lowest month reported (January 1963). Surface water from stormwater ponds and groundwater from excavation dewatering may also be used, when available, for building purposes. Groundwater from the surficial aquifer would be used for building purposes when excess surface water is not available. The SFWMD would regulate any use of surface or shallow groundwater for plant construction.

The review team concludes that the impact of surface-water use for building the potential units at the Martin site would be minimal for the following reasons:

- Withdrawal is small compared to the water resources in the Lake Okeechobee watershed.
- Any use of surface water or shallow groundwater would be regulated by SFWMD and limited to time periods when there would not be a negative impact on the Lake Okeechobee system or shallow aquifers.
- Water use would be temporary and limited to the building period and the peak use of 0.8 Mgd is much less than the average 37.72 Mgd groundwater withdrawal rate reported for Martin County in 2005 (Marella 2009-TN1521).

The review team assumes that the impact of dewatering the excavations needed for building two units at the site would be managed through the installation of diaphragm walls and grouting as is proposed for the Turkey Point site. Therefore, because groundwater withdrawal caused by dewatering would be controlled, the review team determined that there would be little or no impact on groundwater resources.

Surface-water quality would potentially be affected by stormwater runoff during site preparation and the building of the facilities. The FDEP would require FPL to develop an erosion and sediment control plan and a SWPPP before initiation of site-disturbance activities (FPL 2014-TN4058).

The plans would identify BMPs to control the impacts on surface-water quality caused by stormwater runoff. The review team anticipates that FPL would construct new detention/infiltration ponds and drainage ditches to control delivery of sediment from the disturbed area to onsite waterbodies. Sediment carried with stormwater from the disturbed area would settle in the detention ponds and the stormwater would infiltrate into the shallow aquifer. Implementation of BMPs should minimize impacts on surface waterbodies near the Martin site. Therefore, the impacts on surface-water-quality near the Martin site would be temporary and minimal.

While building new nuclear units at the Martin site, groundwater quality may be affected by leaching of spilled effluents into the subsurface. The review team assumes that the BMPs FPL has proposed for the Turkey Point site would be in place during building activities and therefore the review team concludes that any spills would be quickly detected and remediated. In addition, groundwater impacts would be limited to the duration of these activities, and therefore, would be temporary. The review team reviewed the general BMPs that could be expected to be required at such a site (State of Florida 2014-TN3637). Because any spills related to building activities would be quickly remediated under BMPs, and the activities would be temporary, the review team concludes that the groundwater-quality impacts from building at the Martin site would be minimal.

Wastewater streams from building activities could be injected to the Boulder Zone of the Lower Floridan aquifer as planned at Turkey Point (FPL 2014-TN4058). Construction and operation of the disposal wells would be performed under the conditions of an UIC permit issued by the FDEP, with the objective of protecting water quality within the APPZ and overlying aquifers.

Operations Impacts

FPL (2014-TN4058) indicates that the water needed to operate two units would be approximately 50,000 gpm or 72.7 Mgd. As indicated in Chapter 3, evaporative losses from cooling two units would be approximately 28,800 gpm (41.5 Mgd). The review team assumed that the two units at the Martin site would primarily use brackish groundwater from the permeable zone (APPZ) within the Avon Park formation for makeup-cooling water. This relatively permeable zone is considered part of the Middle Floridan aquifer and is more than 1,000 ft below the ground surface near the Martin site. The SFWMD has informed the NRC that consumptive use of surface water from Lake Okeechobee or its tributaries would be limited (SFWMD 2012-TN3814). Use of water from Lake Okeechobee and the St. Lucie Canal would also have to avoid any negative impact on restoration projects in South Florida. Therefore, surface water from Lake Okeechobee and the St. Lucie Canal could be used only at times of excess surface-water flow that typically occur during the wet season.

The APPZ aquifer is not generally used because of the salinity of its water (FPL 2013-TN3052). Therefore, current impacts of using this water for power production are minor. Because brackish or saline groundwater is not in demand, use of this resource will not result in water-use conflicts. However, groundwater in the Middle Floridan aquifer at this site is a potential source of brackish water for desalinization. If demand for desalinization source water increases, water for the plant may be obtained from deeper, more saline formations.

Blowdown discharge and other wastewater streams would be pumped into the Boulder Zone of the Lower Floridan aquifer. The Boulder Zone is isolated from the APPZ by low-permeability units. Additional low-permeability confining units separate the Avon Park permeable zone from the overlying Upper Floridan aquifer. Construction and operation of the disposal wells would be performed under the conditions of an UIC permit issued by the FDEP.

As indicated in Chapter 3, the consumptive water use due to evaporative losses from cooling two units would be approximately 28,800 gpm (41.5 Mgd). However, the review team assumed that surface water would only be consumed during periods of excess flow, thereby precluding water-use conflicts.

During the operation of two new nuclear units at the Martin site, impacts on surface-water quality would be minimal because wastes would be injected into the Boulder Zone and not released to the surface water. FDEP would require FPL to develop a SWPPP (FPL 2014-TN4058). These plans would identify measures to be used to control stormwater runoff. All discharges to surface waterbodies would be required to comply with limits established by FDEP in a NPDES permit.

During the operation of the two units at the Martin site, impacts on groundwater quality could result from potential spills. Spills that might affect the quality of groundwater would be prevented and mitigated by BMPs. Like the proposed site, any wastewater at this inland alternative site would be combined with cooling-tower blowdown and discharged into Boulder Zone with no loss of beneficial uses of the water resource.

Cumulative Impacts

In addition to water-use and water-quality impacts from building and operations activities, cumulative analysis considers past, present, and reasonably foreseeable future actions that affect the same water resources.

For the cumulative analysis of impacts on surface water and groundwater at the Martin site, the geographic area of interest is the same as what was considered for building and operational impacts, and was defined earlier in this section.

Actions that have past, present, and future potential impacts on water supply and water quality near the Martin site include existing agriculture and existing and future urbanization in the region.

Cumulative Impacts on Water Use

The impacts of the other projects listed in Table 9-11 are considered in the analysis included above or would have little or no adverse impact on surface-water use. The projects believed to have little impact are excluded from the analysis either because they are too distant from the Martin site, use relatively little or no surface water, or have little or no discharge to surface water. Some projects (for example park and forest management) are ongoing, and changes in their operations that could have large impacts on surface-water use appear unlikely.

In 2000, the Florida Legislature passed the Lake Okeechobee Protection Act to establish a restoration and protection program for Lake Okeechobee (SFWMD et al. 2011-TN3087; SFWMD 2010-TN3086). Part of the focus of this act was to restore the natural hydrology of the system after years of altering the natural drainage around the lake to permit development of the land and to reduce flood damage. The State of Florida and the Federal government are spending hundreds of millions of dollars to restore the Lake Okeechobee and other water resources in the watershed; therefore, the review team concluded that the cumulative impact on surface-water use would be MODERATE.

Surface-water use during the building and operation of two units at the Martin site would be dominated by water use for operations. As discussed above, surface water would only be withdrawn during periods of excess flow. Therefore, the review team concluded that building and operating the proposed units at the Martin site would not be a significant contributor to the MODERATE impacts on surface-water use.

As stated above, the review team assumed that any use of shallow groundwater to build the units at the Martin site would be regulated by the SFWMD. If this source is not available in sufficient quantity for building activities, brackish groundwater from the APPZ could be used for some building activities. Groundwater impacts from dewatering would be controlled with diaphragm walls and grouting. Groundwater from the APPZ would be used to operate the plant except when excess surface water is not available. The APPZ aquifer is not generally used because of the salinity of it water (FPL 2013-TN3052). Because brackish or saline groundwater is not in demand, use of this resource will not result in water-use conflicts.

The impacts of the other projects listed in Table 9-11 are considered elsewhere in this analysis or else would have little or no adverse impact on groundwater use. The projects believed to have little impact are excluded from the analysis either because they are too distant from the Martin site, or use relatively little or no groundwater. Some projects (for example park and forest management) are ongoing, and changes in their operations that would have large impacts on groundwater use appear unlikely. Therefore, the review team concludes that cumulative impacts on groundwater use would be SMALL.

Cumulative Impacts on Water Quality

Point and non-point source discharges have affected the surface-water quality of the Lake Okeechobee watershed upstream, and the St. Lucie Canal and other discharge canals downstream of the Martin site. Water-quality information presented above for the impacts of building and operating the proposed new units at the Martin site would also apply to evaluation of cumulative impacts. Lake Okeechobee has been the target of extensive efforts to reduce nutrient loading and improve water quality (SFWMD et al. 2011-TN3087). Therefore, the review team concluded that the cumulative impact on surface-water quality of the receiving waterbody would be MODERATE. During the operation of two new nuclear units at the Martin site, impacts on surface-water quality from the units would be minimal because plant discharges would be injected into the Boulder Zone and not released to the surface water. The State of Florida requires an applicant to develop a SWPPP (FPL 2014-TN4058) and all discharges to surface waterbodies would be required to comply with limits established by FDEP in a NPDES permit. Such permits are designed to protect water quality. The SWPPP would identify measures to be used to control stormwater runoff (FPL 2014-TN4058).

The review team concluded that building and operating the proposed units at the Martin site would not be a significant contributor to the MODERATE impacts on surface-water quality, because industrial and wastewater discharges from the proposed units would be discharged directly to the Boulder Zone and any stormwater runoff from the site during operations would be managed in compliance with the SWPPP (FPL 2014-TN4058).

The APPZ aquifer is not generally used because of the salinity of its water (FPL 2013-TN3052). Because brackish or saline groundwater is not in demand, use of this resource will not result in water-use conflicts. The review team also concludes that with the implementation of BMPs, the impacts on shallow groundwater quality from building and operating two new nuclear units at the Martin site would likely be minimal. Therefore, the cumulative impact on groundwater quality would be SMALL. The impacts of other projects listed in Table 9-11 are either considered in the analysis included above or would have little or no impact on surface-water and groundwater quality.

9.3.3.3 Terrestrial and Wetland Resources

The following section addresses potential impacts on terrestrial resources from siting two new nuclear units on the Martin site and transmission line corridors, which crosses through portions of Martin and Palm Beach Counties. The proposed Martin power plant site presently supports existing power units which occupy about 300 ac along with a 6,500 ac cooling-water reservoir serving those units (FPL 2014-TN4058). A 1,200 ac wetland mitigation site exists immediately north of the reservoir and contains a 400 ac wetland forest preserved as a natural area known as the Barley Barber Swamp (FPL 2014-TN3750). Other wetland habitats include freshwater marsh and wet prairie. A significant portion of the site and vicinity also exists as upland land-cover classes including pine flatwoods, palmetto prairie, hardwood-conifer forest, and dry prairie. Habitats in the surrounding vicinity include pasture, rangeland, upland forest, wetland forest, freshwater marsh, and wet prairie.

Martin and Palm Beach Counties host species found in terrestrial habitats that are listed as Federally endangered or threatened as well as species that are proposed for such listing (Table 9-13). Nine of the listed species also occur in Glades County. Habitat preferences for those nine species were discussed in the Glades alternative site section, and only the other nine species that are unique to Martin County are described here. Surveys were not conducted at the Martin site or along the conceptual transmission line corridor to determine the presence and distribution of listed species. Therefore, the staff determined the likelihood of occurrence at project sites based on habitat preferences of each species and the land-cover types expected to be affected at Martin site and within the conceptual transmission line corridor. Kirtland's warbler (*Dendroica kirtlandii*) is a migrant songbird that does not nest in Florida and occurs there during spring and fall migration (FWS 1999-TN136). During migration, Kirtland's warblers use dense scrub vegetation less than 1.5 m (5 ft) in height. The piping plover is a shorebird that overwinters in Florida on wide beaches, mudflats, and other open coastal wetlands (FWS 1999-TN136). The Miami blue (*Cyclargus thomasi bethunebakeri*) is a butterfly that historically occurred in Martin County in tropical coastal hammocks, scrub, and pine rocklands (Daniels 2005-TN141). It is now only known to occur in on the Bahia Honda Key in Monroe County. The southeastern beach mouse (*Peromyscus polionotus niveiventris*) is found in sea oats (*Uniola paniculata*) and shrubs that grow on coastal sand dunes (FWS 1999-TN136). Beach jacquemontia (*Jacquemontia reclinata*) is a coastal species found on sand dunes (FWS 1999-TN136). Florida perforate cladonia (*Cladonia perforata*) is a species of lichen that grows among scrub habitat found high sand dune ridges along the Atlantic Coast as well as the Lake Wales Ridges (FWS 1999-TN136). Four-petal pawpaw (*Asimina tetramera*) is a shrub or small tree that inhabits coastal scrub vegetation of pine, oak, or palmetto on the Atlantic Coastal Ridge. This species is known to occur at one location each in northern and southern Martin County (CPC 2010-TN3729). Lakela's mint (*Decerandra immaculata*) is a small shrub that grows in sand scrub (CPC 2010-TN3730). This species was translocated to the Hobe Sound National Wildlife Refuge in Martin County and this is the only location within Martin County this plant is known to occur (CPC 2010-TN3730). The tiny polygala (*Polygala smalii*) is an herbaceous plant species that occurs in very dry habitats prone to natural fire including pine rocklands, scrub vegetation, high pine, and coastal spoil found on the Atlantic Coastal Ridge (FWS 1999-TN136).

Table 9-13. Federally Listed Terrestrial Species that May Occur on the Martin Site or within the Conceptual Transmission-Line Corridor

Scientific Name	Common Name	Federal Status
Birds		
Polyborus plancus audubonii	Audubon's crested caracara	Threatened
Rostrhamus sociabilis plumbeus	Everglade snail kite	Endangered
Aphelocoma coerulescens	Florida scrub jay	Threatened
Campephilus principalis	Ivory-billed woodpecker	Endangered
Dendroica kirtlandii	Kirtland's warbler	Endangered
Charadrius melodus	Piping plover	Threatened
Picoides borealis	Red-cockaded woodpecker	Endangered
Grus americana	Whooping crane	Endangered
Mycteria americana	Wood stork	Threatened
Calidris canutus rufa	Red knot	Proposed threatened
Mammals		
Puma concolor coryi	Florida panther	Endangered
Peromyscus polionotus niveiventris	Southeastern beach mouse	Threatened
Reptiles		
Drymarchon corais couperi	Eastern indigo snake	Threatened
Invertebrates		
Cyclargus thomasi bethunebakeri	Miami blue	Endangered
Strymon acis bartrami	Bartram's scrub-hairstreak[a]	Endangered
Anaea troglodyte floridalis	Florida leafwing	Endangered
Plants		
Jacquemontia reclinata	Beach jacquemontia	Endangered
Asimina tetramera	Four-petal pawpaw	Endangered
Decerandra immaculata	Lakela's mint	Endangered
Polygala smallii	Tiny polygala	Endangered
Cucurbita okeechobeensis ssp. okeechobeensis	Okeechobee gourd[a]	Endangered

(a) Additional listed species occurring in Palm Beach County (FWS 2014-TN3759)

(Source: FWS 2014-TN3731).

The Martin site is dominated by a 6,500 ac water reservoir and supporting dikes that provide cooling water for five fossil-fuel power units. The site also has a solar power-generation unit. FPL assumed a footprint of 362 ac for the new nuclear power units. The proposed site of the new nuclear power units contains both upland and wetland habitats (FPL 2011-TN59). Upland cover types include palmetto prairie, pine flatwoods, hardwood-coniferous forest, shrub and brushland, dry prairie, upland hardwood forest, woodland pasture, and unimproved pasture. Wetland cover types include freshwater marsh, wet prairies, and mixed wetland hardwoods (FPL 2011-TN59). Wading birds have been observed using the stormwater basin and ditch system for the existing units. White ibis (*Eudocimus albus*), little blue heron (*Egretta caerulea*), tricolored heron (*Egretta tricolor*), snowy egret (*Egretta thula*), wood stork, and sandhill crane (*Grus canadensis*) have either been observed or would be expected to occur in the project area (FPL 2014-TN4058). Wading birds are an ecologically important group in the South Florida ecosystem, and both herons and ibises are considered ecological indicators (FWS 1999-TN136). The wood stork is a Federally threatened species. Recreationally important species observed at the Martin site include white-tailed deer, feral hog, and turkey (*Meleagris gallopavo osceola*). Waterfowl are also hunted in Florida and numerous species could occur in suitable habitats on the Martin site.

Building Impacts

Typical impacts from building nuclear units include permanent and temporary habitat loss from development, habitat fragmentation and degradation, disturbance and displacement of individuals, exposure of wildlife to increased noise levels and human presence, and increased risk of vehicle collision mortality. The conversion of fully developed and stable plant communities to earlier successional communities dominated by lower growing vegetation during development of linear transmission line or pipeline corridors often results in a high degree of habitat fragmentation within the landscape.

FPL assumed a 362 ac area for the main power plant site within the Martin site for evaluating potential impacts of building two new nuclear power reactors and associated infrastructure and an additional 3,000 ac for a cooling-water storage reservoir (FPL 2014-TN4058). The review team determined cooling water could be obtained from groundwater beneath the Martin site and that the cooling-water storage reservoir was unnecessary. FPL stated offsite facilities and development would also be needed to construct and operate nuclear power plants at the Martin site. FPL estimated a 39 mi long corridor approximately 100 ft wide for road access and also plans to install 4.3 mi of rail line and pipeline corridors connecting the C-44 Canal to the site (assumed cooling-water source).

Impacts from the plant area, access road, rail line, and pipeline corridors are discussed first below. Impacts from the transmission line are discussed in a separate section below. The access road would contribute approximately 473 ac to the project footprint, the rail line would contribute approximately 52 ac, and the intake/makeup pipeline corridors would contribute approximately 22 ac.

<u>Plant Facilities</u>

If the nuclear power units, access road, rail line, and pipeline were built within the proposed footprint, an estimated total of 909 ac would be affected (Table 9-14). Approximately 362 ac of this area is naturally vegetated uplands, approximately 283 ac is currently used for agriculture, and approximately 151 ac is open water and wetlands (FPL 2011-TN59). Approximately 112 ac of the proposed footprint has been previously developed (FPL 2011-TN59). Although access to the Martin site is currently available to service the existing fossil units, SR-710 would require widening to accommodate additional traffic during construction of the new nuclear plant. Additional acreage may be permanently or temporarily disturbed when used for laydown areas, a batch plant, fill and spoil deposition. FPL would use cleared land to the greatest extent possible and temporary use areas would be reclaimed (FPL 2014-TN4058). Impacts from building the plant area, access road, rail line, and pipeline corridors are discussed first because most of these activities result in permanent habitat loss. Much of the impacts from building the transmission line represent habitat alteration rather than loss and are discussed in a separate section below.

Table 9-14. Acreage within the Conceptual Footprint at the Martin Site

FLUCFCS Code	Description	Site and Offsite Non-Transmission (ac)	Transmission (ac)
200-series	Agriculture	283	100
300-series	Uplands	162	288
400-series	Forest	200	53
500-600 series	Water and Wetlands	151	321
100, 700, and 800 series	Developed	112	2
Total		908	764

Source: FPL 2011-TN59

Surveys of the occurrence, abundance, and distribution of Federally listed species have not been performed for the Martin site. Only species that could be affected by the new nuclear power units at the Martin site are discussed here, because limited distribution and/or lack of suitable habitat likely preclude impacts on the ivory-billed woodpecker, piping plover, Miami blue, southeastern beach mouse, beach jacquemontia, Florida perforate cladonia, four-petal pawpaw, and Lakela's mint. Audubon's crested caracaras nest in palmetto prairie habitat and also use other open habitats such as both wet and dry prairie as well as improved pasture. Almost 87 ac of palmetto prairie at the Martin site would be permanently lost, as would approximately 169 ac of wet prairie, dry prairie, and improved pasture. Approximately 64 ac of freshwater marsh would also be lost. Everglade snail kites rely on freshwater marsh. Although their presence has not been documented at the site, the distribution of this species includes Lake Okeechobee and Martin County. Florida scrub jays and Kirtland's warblers thrive in scrub vegetation, especially oak scrub. Preconstruction activities would eliminate 27 ac of shrub and brushland cover. The red-cockaded woodpecker nests in mature pine forest and forages in mixed pine forest. Pine flatwoods is the single most affected cover type that is found on the Martin site and FPL estimated 143 ac would be permanently lost during preconstruction activities including 124 ac in the plant area. However the Martin site is not within the FWS red-cockaded woodpecker consultation area so the loss of these habitats on the site should not affect this species (FWS 2014-TN3734). Whooping cranes use wetlands including freshwater marsh and wet prairies and the combined acreage expected to be permanently lost is 78 ac. The wood stork is the only species that has either been observed at the Martin site or would be expected to occur there (FPL 2014-TN4058) and the loss of freshwater marsh could also affect this species. Wood storks nest and forage in forested wetlands and 4 ac of mixed wetland hardwoods would be lost. Although there is no known stork nest colony present on the site, the site lies within the core foraging area of at least one wood stork nest colony (FWS 2014-TN3732). The Florida panther uses many upland habitats, and preconstruction activities would permanently affect 320 ac of uplands within the FWS Florida panther consultation area (FWS 2012-TN3733). Eastern indigo snakes use a variety of upland habitats including pine flatwoods, dry prairie, and edges of freshwater marsh. The permanent loss 320 ac of uplands including 143 ac of pine flatwoods and 15 ac of dry prairie would represent lost habitat for the eastern indigo snake. They would also be prone to increased mortality from off-road vehicle use during land clearing and increased traffic during construction and operation. The tiny polygala is known to occur in pine rocklands, scrub vegetation, and under upland pine forest (FWS 1999-TN136). Loss of shrub and brushland cover as well as pine flatwoods and other mixed pine forest would also represent lost habitat for the tiny polygala.

The review team expects that the FWS would establish eastern indigo snake mitigation requirements similar to those established for the Turkey Point site, including preconstruction surveys, staff awareness training, and reporting mortality incidents (FPL 2014-TN4058; State of Florida 2014-TN3637). The 2013 Standard Protective Measures for the Indigo Snake are typically prescribed by FWS to conclude the Endangered Species Act consultation process (FWS 2013-TN3749).

Loss of habitats would also affect local populations of wildlife not Federally listed, but expected to occur within the region in suitable habitat. However, these effects are not expected to be noticeable and would not destabilize even local populations of any of these animals.

Transmission Lines and Access Roads

Offsite facilities and development required to construct and operate nuclear power plants at the Martin site include transmission lines and an access road. FPL estimated the 31 mi of transmission line would occupy an additional 764 ac. Similar to the Martin plant site, much of the corridor is uplands—one-half (380 ac) of the land area within the corridor comprises upland cover types. One-half of the uplands, or 190 ac, is herbaceous dry prairie. Pine flatwoods, shrub and brushland, mixed rangeland, hardwood-coniferous forest, and a small amount of palmetto prairie would also be contained within the corridor. Wetlands compose approximately 37 percent of the conceptual transmission line corridor including 179 ac of freshwater marsh, 55 ac of wet prairie, 24 ac of mixed wetland hardwoods, 18 ac of emergent aquatic vegetation, and small amounts cypress and waterbodies such as lakes, streams, and waterways. Approximately 16 percent (100 ac) of the corridor is used for agriculture including 79 ac of citrus groves, 14 ac of improved pasture, and 8 ac of field crops. Cover types that are dominated by low herbaceous vegetation, such as dry prairie, would not be altered extensively except where the towers pads would be placed and access roads created. Tall vegetation, including trees and wood brush, would have to be removed or mowed under power lines. Therefore, much of the pine flatwoods, hardwood-coniferous forest, palmetto prairie, mixed wetland hardwoods, cypress, and possibly the shrub and brushland would in essence be permanently lost when it would be converted to and maintained as low-growing vegetation cover. The likelihood of non-native plants being accidentally introduced would also increase and could result in habitat alteration.

Loss or conversion of palmetto and dry prairie could reduce the quality of Audubon's crested caracara habitat. Permanent loss from tower pads and access roads would occur and the risk of introducing non-native invasive plants would increase. However, plants within these cover types are low-growing and would not require clearing or vegetation control under transmission lines. In addition, the conversion of woody habitats into low-growing herbaceous habitats could increase the amount of habitat suitable for caracaras. Building transmission lines through 179 ac of freshwater marsh would likely exclude Everglade snail kites from wetlands at least temporarily and could also permanently degrade habitat through uncontrolled runoff and erosion. Snail kites would not be particularly prone to electrocution or collision with power lines. Shrub and brushland is a component within the transmission line corridor, but the elimination of trees from this component should not substantially affect either the Florida scrub jay or Kirtland's warbler and the conversion of forest cover to shrub-dominated habitats could result in a net increase of habitat for these two species within the transmission line corridor. Elimination of trees from 43 ac of pine flatwoods and 9 ac of mixed hardwood-coniferous forest could reduce the amount of habitat available to the red-cockaded woodpecker because the conceptual transmission line corridor is very near the border of the FWS red-cockaded woodpecker consultation area (FWS 2014-TN3734). Cutting a corridor through large patches of forest could also cause fragmentation and reduce the value of surrounding habitat. Freshwater marsh is a predominant habitat within the transmission line corridor, and approximately 55 ac wet prairie habitat would also exist within the corridor. Both of these habitats could potentially be used transiently by the whooping crane. These habitats would not necessarily be altered as they are already dominated by low-growing vegetation.

Native upland forested habitats are preferred by the Florida panther. The Martin site is within the Florida Panther Secondary Management Zone. Although building a 31 mi long transmission line corridor would result in more habitat conversion than permanent habitat loss, the conversion of habitats would likely result in panther habitat fragmentation, degradation, and ultimately loss of habitat value. The tiny polygala is associated with pine rocklands and scrub vegetation. Periodic maintenance of vegetation within the transmission line corridor could mimic periodic disturbances necessary to inhibit succession of rockland and shrub habitats into forest, possibly increasing habitat suitability for the tiny polygala. The eastern indigo snake inhabits many upland habitats. Conversion of habitats from forest to low-growing vegetation would not decrease habitat suitability for this species, and increased heterogeneity within the landscape may actually increase habitat quality. FPL stated field surveys would be conducted for Federally listed and State-protected species as part of the permitting process before any preconstruction activities would occur at the Martin site (FPL 2014-TN4058). Preconstruction activities would be conducted in accordance with all Federal and State regulations, permit conditions, good construction practices, and BMPs including the use of directed drainage ditches and silt fencing. Acreage within the conceptual transmission line corridor was minimized to the extent possible by using the most direct route while avoiding areas with important resources and high biological value. FPL also stated that any wetland functions affected within the transmission line corridor would be replaced or restored.

Operations Impacts

The review team assumed the facility configuration and operation at the Martin site would be similar to that at the Turkey Point site. Operation of two nuclear units at the Martin site would create noise, fogging and dissolved solid deposition from cooling towers, runoff from increased impermeable surfaces, light pollution, and increased vehicle collision mortality to local wildlife populations. Operation of transmission lines could increase the risk of collision and electrocution mortality, especially to whooping cranes and wood storks.

Operational noise from the cooling towers would only displace individual animals from the immediate vicinity of the cooling towers, because the use of splash guards on air inlets and stacks on mechanical fans would limit cooling-tower noise to approximately 73 dBA at a distance of 200 ft from the cooling towers. The review team determined the salinity of the groundwater used for cooling would be less than or equal to that of seawater and salt deposition from cooling-tower drift at the Martin site would be similar in scale and intensity to deposition at the Turkey Point site if the radial collector wells were the sole cooling-water source. Most of the salt would be deposited on developed land very near the cooling towers, and concentrations as high as 10 kg/ha/mo that have resulted in observable effects on sensitive plant species could be expected as far as 1.25 mi from the cooling towers. The Barley Barber Swamp, located on a peninsula within the cooling pond for the existing power units and the Martin site, is more than 1.25 mi from the existing plants and would be even further from any new units at the Martin site and would not be expected to be affected by salt from cooling-tower drift.

The creation of impermeable surfaces at the higher relative elevations of the Martin site would likely result in the concentration of stormwater runoff into surrounding wetlands, including the 6,500 ac water reservoir and supporting dikes that provides cooling water for five fossil-fuel power units and perhaps affect the 400 ac Barley Barber Swamp within the 1,200 ac mitigation site. Other wetlands, including nearby freshwater marsh and wet prairie, would also receive runoff. Although BMPs would be expected to be followed, runoff could result in silt and pollutant deposition into these areas.

Light pollution during facility operation could affect wildlife residing on or migrating through the Martin site. Design criteria could include minimization of upward lighting, turning off unnecessary lighting between 11 p.m. and sunrise, and luminary selection and mounting to provide light only where needed (FPL 2014-TN4058). If these actions are taken, the review team expects that impacts from light pollution on wildlife would be minimal.

Proposed transmission lines to support additional units at the Martin site could pose a risk to listed wildlife. Direct mortality resulting from birds colliding with tall structures has been observed (Avatar et al 2004-TN892). Factors that appear to influence the rate of avian impacts with structures are diverse and related to bird behavior, structure attributes, and weather. Migratory flight by flocking birds during darkness has contributed to the largest mortality events. Tower height, location, configuration, and lighting also appear to play roles in avian mortality. Weather, such as low cloud ceilings, advancing fronts, and fog, also contribute to this phenomenon. Waterfowl may be particularly vulnerable due to their low, fast flight and flocking behavior (EPRI 1993-TN73). However, in NUREG–1437, the NRC staff concluded that the threat of avian collision as a biologically significant source of mortality is very low because only a small fraction of total bird mortality could be attributed to collision with nuclear power plant structures, including transmission line corridors with multiple transmission lines (NRC 2013-TN2654). Although collision may contribute to local losses, thriving bird populations can withstand these losses without threat to their existence (EPRI 1993-TN73). Transmission-line structures, conductors, and guy wires all pose a potential avian collision hazard for all resident birds that live in the vicinity of the transmission lines and for migratory birds that may pass through these areas. At least 41 species of birds are known to have been killed by interaction with Florida electrical utility structures, 20 of which have been killed by FPL electrical utility structures (FPL 2011-TN1283). Although the NRC (NRC 2013-TN2654) has concluded that bird collisions with transmission lines at existing U.S. nuclear power plants are of small significance, including transmission line corridors with variable numbers of transmission lines, listed wildlife could still be at risk. Although endangered, whooping cranes in the Kissimmee

Prairie in central Florida are the result of efforts to establish a nonmigratory whooping crane population officially designated as an experimental nonessential population (58 FR 5647–5658) (TN3324). During 2001, additional efforts were initiated to establish a population of migratory whooping cranes that would winter on the Chassahowitzka National Wildlife Refuge in Citrus County, Florida. Chassahowitzka National Wildlife Refuge is approximately 165 mi northwest of the Martin site, while Kissimmee Prairie Preserve State Park is approximately 50 mi northwest. Whooping cranes are large birds that travel long distances and the conceptual transmission line corridor supporting the Martin site contains suitable whooping crane habitats. Transmission lines connecting the Martin site to the Corbett substation would have to pass through the core foraging areas of multiple wood stork nesting colonies (FWS 2014-TN3732). However, like the whooping crane, the risk of collision and electrocution mortality for the wood stork increases if transmission lines are operated within their range and there is suitable habitat within the transmission right-of-way. The level of risk is commensurate with the location of the transmission lines and wood stork nesting colonies, foraging habitat, and travel corridors. Operational effects on other important species would be minimal.

EMFs are unlike other agents that have an adverse impact (e.g., toxic chemicals and ionizing radiation) in that dramatic acute effects cannot be demonstrated and long-term effects, if they exist, are subtle (NRC 2013-TN2654). A careful review of biological and physical studies of EMFs did not reveal consistent evidence linking harmful effects with field exposures (NRC 2013-TN2654). The impacts of EMFs on terrestrial flora and fauna are of small significance at operating nuclear power plants, including transmission systems with variable numbers of power lines and lines energized at levels less than 765 kV (NRC 2013-TN2654). Since 1997, more than a dozen studies have been published that looked at cancer in animals that were exposed to EMFs for all or most of their lives (Moulder 2005-TN1329). These studies have found no evidence that EMFs cause any specific types of cancer in rats or mice (Moulder 2005-TN1329). Therefore, the incremental EMF impact posed by operation of existing transmission lines and the addition of new lines for two new nuclear units would be negligible at the Martin alternative site.

Transmission-line corridor vegetation-management activities (cutting and herbicide application) and related impacts on floodplains and wetlands in transmission line corridors are of minor significance at operating nuclear power plants, including those with transmission line corridors of variable widths (NRC 2013-TN2654). Consequently, the incremental effects of transmission line corridor maintenance and associated impacts to floodplains and wetlands for two new nuclear units would be negligible at the Glades site.

Cumulative Impacts

The geographic area of interest for the assessment of the potential cumulative impacts of building and operating a new reactor at the Martin site and other past, present, and reasonably foreseeable future actions on terrestrial resources and wetlands is defined as being within a 50 mi radius around the Martin site. A list of past, present, and reasonable foreseeable actions within 50 mi of the Martin site is presented in Table 9-11. This list includes a variety of energy-production projects, stone mining, manufacturing, transportation and infrastructure-development projects, set-aside areas for recreation and conservation, CERP-related projects, and other miscellaneous activities that could affect terrestrial and wetland resources.

Past land use in South Florida, especially agriculture and more recently urbanization, has greatly affected the distribution, quality, and quantity of plant and wildlife habitats still remaining. Development and urbanization of higher elevation lands for energy, infrastructure, and manufacturing projects has further reduced the amount of pine flatwoods and other remaining upland habitat. Ditching and draining created more dry land, reducing the amount of wetlands available as habitat. The continued operation and maintenance of existing facilities would likely not exacerbate the current situation with respect to terrestrial and wetland ecosystems. New mining activities have the potential to expand their footprint and development in general on the landscape, as does continued human population growth in South Florida. Lands set aside for recreation and conservation provide buffers against development, provide habitat for plants and animals, and serve to preserve fragments of the ecosystem of South Florida. Projects that continue to incrementally reverse changes in land cover due to man-made changes in surface-water flow, including CERP-related activities, would continue to benefit both terrestrial and wetland ecology of the region.

As described in Chapter 7, terrestrial and wetland environments in South Florida may also be affected by continued population growth and related development. The overall impact from past, present, and reasonably foreseeable future activities on regional terrestrial and wetland ecology is substantial.

Summary Statement

The landscape around the Martin site is composed mostly of upland cover types with scattered wetlands, in addition to a large cooling-water reservoir. Approximately 909 ac of upland and wetland habitat would be permanently lost at (and just outside of) the plant site, and approximately 764 ac of upland and wetland habitat would be affected by building and operating the transmission line corridor. Although the entire corridor would not be developed and all lands would not be lost as habitat, some portion would be lost to pole installation, road development, or altered to low-growing vegetation. Effects could involve the Florida panther, Audubon's crested caracara, Everglade snail kite, wood stork, and eastern indigo snake among others. Although the 31 mi long conceptual transmission line corridor is relatively short compared to the other sites considered, upland habitat would also be degraded through fragmentation if it were developed. Whooping cranes from the Chassahowitzka National Wildlife Refuge could range south and risk collision with transmission lines.

Based on the information provided by FPL and the review team's independent evaluation, the review team concludes that the cumulative impacts on terrestrial and wetland resources of building and operating two new nuclear units at the Martin alternative site, including impacts attributable to permanent conversion of habitat for the facility footprint as well as operation of the cooling towers and transmission lines would be MODERATE. The incremental effect of the building and operation of two new nuclear units at the Martin site would be a significant contributor to this impact primarily because of the proposed transmission line corridor impacts.

9.3.3.4 Aquatic Resources

What follows is an assessment of the potential impacts on aquatic resources that may occur if the two nuclear reactors described by FPL (2014-TN4058) were constructed and operated at the Martin alternative site. Based on a review of potential cooling-water sources discussed in Section 9.3.3.2, the review team assumes no cooling ponds or reverse osmosis facilities would be required for the Martin site. Unless otherwise noted, the information presented in this section was obtained from FPL's ER, Revision 6 (FPL 2014-TN4058).

The Martin site is located in western Martin County, approximately 40 mi northwest of West Palm Beach, 5 mi east of Lake Okeechobee, and 7 mi northwest of Indiantown, Figure 9-11. The existing 22,300 ac site includes five fossil-fired electrical generating units and a solar unit. The site is bounded on the west by SFWMD L-65 Canal and on the south by the St. Lucie Canal, also known as the C-44 Canal or Okeechobee Waterway. Onsite surface waterbodies at the Martin site include an existing cooling pond and a makeup/discharge canal that supports the fossil units, Barley Barber Swamp, and the Northwest Parcel mitigation area. FPL indicated in its ER that a 1,200 ac area north of the proposed site has been set aside as a mitigation area (FPL 2014-TN4058). The facility footprint for the proposed units would occupy approximately 362 ac. New transmission lines to support the nuclear power-generating units would be 31 mi long and encompass 764 ac that include previously disturbed areas, existing rights-of-way, forests, and agricultural land. As a basis for this assessment the review team assumes the primary water source for the reactor cooling system would be groundwater, with additional water obtained from the C-44 (St. Lucie) Channel during high-flow periods using a conventional intake. Cooling-tower blowdown would be injected into the Boulder Zone.

The C-44 Channel connects to Lake Okeechobee just west of the Martin site, and likely contains aquatic resources that are similar to the lake. Lake Okeechobee is the largest lake in Florida, and the center of South Florida's regional water-management system, providing commercial and sport fisheries, flood control, and a source of potable and irrigation water. The lake encompasses over 730 mi^2, and has an average depth of about 9 ft (FFWCC 2013-TN2842). Desired lake elevations (stages) are between 12.5 and 15.5 ft (USACE and SFWMD 2009-TN2848). Major natural tributaries to the lake are Fisheating Creek, Taylor Creek, and the Kissimmee River. Approximately 70 percent of the water entering the lake is associated with these tributaries; rainfall accounts for the remaining 30 percent. Evaporation accounts for about 70 percent of the water loss, and the remaining water exits the lake through engineered outfalls (FFWCC 2013-TN2842).

As described in Section 2.4, water-management practices in South Florida over the past 100 years have dramatically changed the regional hydrology and sheet-water flow, and influenced the aquatic plants and animals in the area. Creation of levees, canals, and channels to support agriculture and development has confined Lake Okeechobee to a smaller area than historically present, and resulted in a variety of water-management activities to maintain the lake level during the dry season and reduce flooding during the wet season. Lake Okeechobee and the connecting rivers, canals, channels, and engineered outfalls are also greatly affected by weather events. During the hurricane season of 2004, Hurricanes Frances and Jeanne created high water surges of over 18 ft, and created turbid conditions that affected submerged aquatic vegetation; the drought of 2006 lowered the level of Lake Okeechobee to an all-time record of 8.82 ft msl (FFWCC 2013-TN2842). Currently, the USACE is responsible for managing water levels in Lake Okeechobee between 12.5 and 15.5 ft NGVD (National Geodetic Vertical Datum of 1929) to balance flood control, public safety, navigation, water supply, and public health (SFWMD 2012-TN2883).

Based on the information provided by FPL (2014-TN4058), the facility footprint at the Martin site would encompass approximately 362 ac. Although the affected area is primarily farmland, building activities have the potential to directly or indirectly affect aquatic resources present in small streams or ponds at or near the site. Installation of the water-intake structure for intermittent cropping of water in the C-44 Channel may temporarily affect resident aquatic biota, and the construction of a water pipeline to the site may temporarily affect surface-water habitats. As described in FPL 2014-TN4058, approximately 31 mi of transmission lines encompassing 764 ac may also affect aquatic resources in areas where the transmission lines support structures or access roads are adjacent to surface-water habitats. During the operation of the nuclear reactors, cooling water obtained from two intake structures on the C-44 Channel during high-flow periods creates the potential for impingement and/or entrainment of aquatic biota present in the channel, or those entering the channel from Lake Okeechobee. Because Lake Okeechobee and the rivers, streams, channels, and canals in the vicinity of the Martin site are highly connected, it is assumed the biota present in the lake are indicative of the aquatic resources that might be affected by the building and operation of two nuclear reactors, as described below.

Commercial and Recreational Species

Because the St. Lucie and L-65 Canals both connect to Lake Okeechobee, it is assumed the aquatic biota are similar, and the general descriptions of fish and invertebrates presented for the Glades alternative site would apply (Section 9.3.2.4). Thus, the canal systems adjacent to the Martin site would likely support a diverse food web that includes smaller bait fish and larger piscivores, including Largemouth Bass, crappie, catfish, and bream, which have recreational and commercial importance.

Important Species

Based on the hydraulic connections described above, the important species described for the Martin site would be similar to those at the Glades site (Section 9.3.2.4). These would include a variety of forage fish, like Threadfin Shad and Inland Silversides, and larger predators like the Largemouth Bass and Black Crappie (USACE 2013-TN2847; Zhang and Sharfstein 2013-TN2894).

Non-Native or Nuisance Species

As noted previously in the discussion of the Glades site (Section 9.3.2.4), Lake Okeechobee and the connecting canal systems contain a variety of non-native and nuisance species. Many of these species would likely be present in the St. Lucie and L-65 Canal systems.

Federally and State-Listed Species and Critical Habitat

Based on information obtained from the Florida Natural Areas Inventory database (FNAI 2013-TN2900) Federally and State-listed aquatic species and Species of Concern present in Martin County include a variety of species that are found at or near the site: Striped Croaker (*Bairdiella sanctaeluciae*), the Opossum Pipefish (*Microphis brachyurus*), the American alligator (*Alligator mississippiensis*), and four species of sea turtle—loggerhead (*Caretta caretta*), green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), and hawksbill (*Eretmochelys imbricate*)

(FNAI 2013-TN2900). FPL also noted the endangered Smalltooth Sawfish (*Pristis pectinata*) and the threatened American crocodile has been reported from Martin County (FPL 2012-TN2043). Of these species, only the manatee and alligator would likely occur near the Martin site. Critical habitat for manatee and crocodile is not present at the Martin site, but the manatee consultation area includes Lake Okeechobee (FWS 2003-TN2916). FPL has indicated no listed species have been observed in St. Lucie Canal near the Martin site (FPL 2012-TN2043).

Building Impacts

Building of the proposed nuclear units at the Martin would occur primarily within the industrial area containing the existing fossil-fuel plants, or in small areas of farmland adjacent to the site. Some existing drainage ditches that support a seasonal population of some of the fish species listed above may be adversely affected. Building of the surface-water intake on the C-44 (St. Lucie) Canal would likely result in short-term turbidity and temporary displacement of aquatic resources, which would be expected to quickly recolonize after building is completed. Building activities related to the transmission lines would occur in previously disturbed areas, existing rights-of-way, and forest or agricultural land. FPL has indicated field surveys for Federally or State-listed species would be conducted prior to construction at the site or within transmission line corridors. Installation of the intake structure would use turbidity curtains, silt screens, or similar technology to minimize impacts. The use of BMPs during tower erection and conductor installation would minimize building-related impacts along transmission line corridors. Impacts would be comparable to those described for the Glades site (Section 9.3.2.4).

Operations Impacts

Based on the review team assumptions described above, the majority of the water required to operate the cooling-water system for the two nuclear facilities at the Martin site would be obtained from groundwater resources, limiting the potential for impingement or entrainment of aquatic biota to periods of surface-water use. During times of excess surface-water flow that typically occurs during the wet season, supplemental water would be obtained from a surface-water intake located in the St. Lucie Canal. Impingement and entrainment of organisms from the intake canal would be the most likely operational impacts on aquatic populations that would occur. Assuming a closed-cycle cooling system and compliance with the EPA's 316(b) Phase I requirements for intake structures (66 FR 65256) (TN243) the intake is considered protective of aquatic life. The anticipated impacts due to impingement and entrainment are considered by the review team to be minimal. Furthermore the intakes would likely be only operated intermittently throughout the year when excess surface water is available. Impingement or entrainment that does occur should not result in noticeable changes in aquatic biota species composition or abundance in the canal or Lake Okeechobee. Because cooling-tower blowdown would be discharged into the Boulder Zone of the Lower Floridan aquifer via deep-injection wells, surface-water resources would not be adversely affected. There is no available information about biological communities that may be present in the Boulder Zone formations near the Martin site, so it is not possible to determine if a complete exposure pathway is present or assess potential biological effects. Thus, the potential risk of chemical exposure to aquatic resources resulting from discharge of cooling-tower blowdown cannot be determined. Based on an NRC assessment of a similar cooling system proposed at the Levy site in western Florida using brackish saltwater for cooling-tower makeup water (NRC 2012-TN1976), cooling-tower drift impacts on aquatic resources would likely be minimal, because deposition would be expected to occur primarily on plant property or adjacent agricultural lands. Impacts would be comparable to those described for the Glades site (Section 9.3.2.4). No detectable increase in surface-water salinity resulting from salt-drift deposition is anticipated.

Cumulative Impacts

Past, present, and reasonable foreseeable projects and other actions in the vicinity of the Martin site are presented in Table 9-11. As described above for the Glades site, these activities include existing and proposed energy projects, mining activities, transportation projects, parks and aquaculture facilities, and restoration activities associated with CERP goals and objectives that are designed to improve surface-water management practices, restore hydrologic and natural process, and protect and restore natural resources. With the exception of the St. Lucie nuclear facility, most energy projects in the vicinity of the Martin site use coal, natural gas, oil, or biomass/biofuel to produce electrical power. These facilities require pipelines, transmission lines, and access to water to function, resulting in permanent loss of habitat and disturbance to both terrestrial and aquatic resources. Rock mining is also common in areas near the Martin site (five project examples are included in Table 9-11). These sites have the potential to affect hydrological patterns as well as terrestrial and aquatic resources. Areas near the Martin site have also provided opportunities for outdoor recreation and ecological research. The continued existence of these areas will provide sanctuaries and refuges for terrestrial and aquatic wildlife, and additional construction or development near these areas is expected to be limited. Restoration projects sponsored by CERP and others include integrated efforts to better manage surface-water resources, provide flood protection, and explore strategies for increasing aquifer storage. Given the proximity of the Martin site to Lake Okeechobee and the C-44 Canal, restoration activities designed to improve water quality and increase habitat in Lake Okeechobee and the adjacent canals, including the C-44 Canal, are expected to provide a positive benefit to both aquatic and terrestrial biota.

As shown in Table 9-11, a variety of existing, pending, or proposed projects will contribute to the overall cumulative effects that will occur near the Martin site. In some cases, the projects will contribute to habitat loss and lack of hydrologic connectivity that has plagued South Florida since the beginning of the last century. In other cases, the projects will contribute to the overarching goal of CERP to restore lost hydrologic and ecological function, providing an overall positive environmental benefit. As discussed in Section 7.3.2, aquatic environments in this region of South Florida will also be affected by continued population growth and related development, and short- or long-term changes in climate that have the potential to alter weather patterns and influence hydrology. Overall, the review team concludes that the cumulative impacts to aquatic resources in the vicinity of the Martin site are MODERATE.

Summary Statement

Based on a review of the information provided by FPL and the review team's independent assessment, it is likely the building and operation of a nuclear generating plant at the Martin site would contribute only minimally to the cumulative effects on aquatic species likely to occur in that portion of South Florida. Although the building of nuclear units at the Martin site would displace some existing agricultural land, surface-water habitats would be likely minimally affected. During the normal operation of the plant, groundwater would be used for reactor cooling, and deep aquifer discharge of cooling-tower blowdown would be employed, eliminating the need for conventional surface-water intake and discharge structures. During periods of excess surface-water flow, cooling water from the C-44 Channel would be withdrawn for cooling. Some impingement and entrainment losses are expected, however assuming a closed-cycle cooling system and compliance with the EPA's 316(b) Phase I requirements for intake structures (66 FR 65256) (TN243) the intake is considered protective of aquatic life and the anticipated impacts due to impingement and entrainment are considered minimal. Furthermore, the intakes would likely be only operated intermittently throughout the year when surface water is available. Impingement or entrainment that does occur should not result in noticeable changes to aquatic biota species composition or abundance. Thus, the review team concludes that the cumulative impacts of building and operation of two new nuclear reactors at the Martin site, combined with the other past, present, or reasonably foreseeable future activities on aquatic resources would be MODERATE. Building and operating two new nuclear units at the Martin site would not be a significant contributor to the MODERATE impact.

9.3.3.5 Socioeconomics

The following impact analysis includes impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable future actions that affect socioeconomics, including other Federal and non-Federal projects listed in Table 9-11. For the analysis of socioeconomic impacts at the Martin site, the geographic area of interest is considered to be the 50 mi region centered on the Martin site with special consideration of Martin, Okeechobee, St. Lucie and Palm Beach Counties because that is where the review team expects socioeconomic impacts to be the greatest. In evaluating the socioeconomic impacts of site development and operation at the Martin site near Indiantown in Martin County, the review team used readily obtainable data from the Internet or published sources.

Physical Impacts

People who work or live around the site would be exposed to noise, fugitive dust, and gaseous emissions from building and operations activities. Noise, dust, and air-pollution emissions generated within the boundaries of the Martin site would be expected to be similar to those for the Turkey Point site. Because the surrounding site is rural and sparsely populated and because noise and air-pollution impacts are attenuated by distance, the surrounding population exposed would be relatively few and the impacts would be expected to be negligible. Best practices and applicable regulations would be expected to protect building workers and personnel working onsite. Truck and vehicle traffic related to building and operations would generate noise, fugitive dust, and gaseous emissions offsite. In addition, offsite structures include an access road (and widening of a portion of SR-710), a railway, a transmission line and intake/makeup pipelines (FPL 2014-TN4058). Because the area affected by offsite structures and traffic would also be rural and sparsely populated and because FPL would be expected to implement a dust-control plan similar to that for the Turkey Point site, noise and air-pollution impacts from these offsite activities would be expected to be minor.

Offsite project-related building activities include construction of a 39.3 mi access road (and widening of a portion of SR-710), a 4.3 mi railway, a 31 mi transmission line, and intake/makeup pipelines (FPL 2014-TN4058). The conceptual design of these activities routes them, to the extent possible, along existing rights-of-way and avoids populated areas and residences (FPL 2014-TN4058). The physical impacts on existing structures and crops within the proposed site and offsite areas for supporting infrastructure would be minor.

The area around the site is relatively flat, sparsely populated, and is used mainly as farmland. Building would use cranes (which could exceed 400 ft in height) and would alter the regional viewscape. Construction of the transmission lines would pose similar impacts. The power plant and water-intake facilities would likely be visible from several angles. Building and operations would noticeably alter the aesthetics of the area. However, because there is already a power plant at the proposed site, the contrast with the existing viewscape would be somewhat attenuated. Because of the sparse population and existence of other power plants on the proposed site, the negative impact would likely not interfere with the daily routine of local public around the Glades site and would not destabilize the aesthetic characteristics of the area.

Based on the information provided by FPL (2014-TN4058) and the review team's independent analysis, the review team concludes that the overall physical impacts of building activities and operations would be minor, with the exceptions of noticeable but not destabilizing impacts on roads and aesthetics near the Martin site.

Demography

The Martin site is located in Martin County, 7 mi northwest of Indiantown (2012 population 6,730) and 20 mi southwest of Port St. Lucie (2012 population 163,748), the closest population center with more than 25,000 residents (FPL 2014-TN4058; USCB 2012-TN4098). The population distribution within and around the Martin site is typically rural with low population densities. There are nine counties within the 50 mi area, but the review team estimates the areas in which workers would most likely live in and from which they would commute are within Martin, St. Lucie, Palm Beach, and Okeechobee Counties, based on current commuter patterns of the FPL staff working on the existing Martin site power units.[(17)]

FPL estimated the peak number of workers during building would be 3,983, including 33 operation workers. The review team assumed that the share of construction and operation workers relocating from outside the four-county area would be 70 percent of the estimated peak number of workers. This assumption was reached by using the assumption made for the proposed Turkey Point site as a reference and assuming that the share of workers that would come from outside the region is inversely proportional to the population of the region.[(18)] As in Section 4.4, 70 percent of the construction workforce and 100 percent of the operation workforce that moved to the area were assumed to bring their families. Based on these assumptions, a peak of 2,765 construction and 24 operation workers would relocate to the area

(17) The entire workforce of these power units lives in this four-county area (FPL 2014-TN4058).

(18) The proposed Turkey Point site analysis assumed 50 percent of the peak workers would come from outside the 50-mi region and that 83.3 percent of those would reside in Miami-Dade County, i.e., 41.65 percent (0.5 x 0.833) of the peak workers would migrate into Miami-Dade County. Because the population of the four-county area is approximately 71 percent of that of Miami-Dade County (USCB 2012-TN4098), the review team assumed the share of peak workers migrating into the four-county area would be 1-(0.71 x 0.4165) ≈ 70 percent.

during the project construction phase, and 1,960 of these workers would bring their families. Based on an average household size of 3.25 people, the total increase in population attributable to the peak total workforce at the Martin site would be 6,370 people. An influx of 6,370 people represents a 0.4 percent increase in the four-county 2012 population of 1,788,607.

FPL estimated the total onsite operations workforce to be 806 workers. As explained above, the review team assumed that 70 percent of these workers (565) would relocate from outside the four-county area. For this analysis, the review team assumed that 100 percent of operation workers who relocate would bring their families. Based on an average household size of 3.25 people, the total population increase attributable to project operations is 1,837 (565 x 3.25) people. This represents a 0.1 percent increase in the four-county area.

The review team concluded that the impact on local demography would not be noticeable.

Economic Impacts on the Community

<u>Economy</u>

FPL estimated the peak number of workers during building would be 3,983, including 33 operation workers. Employment of 3,983 construction and operation workers would have positive economic impacts in the four-county area. Based on a multiplier of 1.7289 jobs (direct and indirect) for every construction job and 2.2799 for every operation job, 3,983 new construction and operation jobs would create 3,047 indirect jobs, for a total of 7,104 new jobs in the four-county area during peak employment (3,950 x 1.7289 + 33 x 2.2799) (FPL 2011-TN56). This represents a 0.9 percent increase in the total employment in the four-county area.[19] Peak employment would last 1 month and the average employment generated during the 10-year building period would be about half of that of peak employment. This added employment would generate added earnings to the economy of the four-county area, but the added employment and earnings would not be noticeable to most of those living or working in the area.

An estimated 806 workers would be required for the operation of two nuclear power facilities. Based on a multiplier of 2.2799 jobs (direct and indirect) for every operations job at the new units (FPL 2011-TN56), an influx of 806 workers would create 1,032 indirect jobs for a total of 1,838 new jobs in the region. This represents a 0.2 percent increase in the total employment in the four-county area. This added employment would also generate added earnings to the economy of the four-county area, but the added employment and earnings would not be noticeable to most people living or working in the area.

<u>Taxes</u>

State corporate income taxes and sales and use taxes paid at the Martin site during construction and operations of the proposed units would be similar to those paid by the same units at the proposed Turkey Point site. As discussed in Sections 4.4 and 5.4, State taxes paid by the proposed units would not exceed 2 percent of the annual collected State corporate income and sales and use taxes. The impact would be minor and beneficial. County sales surtax rates in the four-county area for the 2014 calendar year are zero percent for Martin and

(19) Employment of 793,457 (BLS 2013-TN4085).

Palm Beach Counties, one-half percent for St. Lucie, and 1 percent for Okeechobee County (FDOR 2014-TN3393). County surtax collections from the proposed units would be highest during construction when annual expenses related to the proposed units would be estimated to reach up to $1.56 billion (Section 4.4). A 1 percent sales surtax would generate $15.6 million in revenues for the four-county area.[(20)] This would correspond to less than 1 percent of total County revenues in the four-county area for 2014.[(21)] The impact would be minor and beneficial. County and school district governments in Florida may levy taxes up to 10 mills each (1 percent) in property taxes (FDOR 2012-TN459). If the value of property taxes for the two nuclear reactors at the Martin site were the same as the value estimated for Units 6 and 7 at the Turkey Point site in Section 5.4.3.2, FPL would pay $20 million in property taxes to the Martin School District and $20 million to Martin County during operations. These payments would correspond to 15.6 percent of the Martin School District 2011-12 total revenues ($20 million compared to $128 million)[(22)] and to 6.2 percent the Martin County 2011-12 total revenues ($20 million compared to $322.2 million).[(23)] Because property taxes paid to school districts are reallocated through Florida's Education Finance Program, the benefit to the Martin School District would be diluted to some extent, and the exact amount distributed to each school district is not known at this time. Because of the value of project-related property tax payments relative to current property taxes, the review team considers the impacts on tax revenues to the Martin School District to be noticeable and beneficial.

The review team concluded that the economic impact would not be noticeable and would be beneficial, with the exception of property tax revenues to the Martin School District, which would be noticeable and beneficial, but not substantially alter current property tax levels in the Martin School District.

Infrastructure and Community Service Impacts

Traffic

Workforce access to the Martin site would occur through SR-710 coming from the east and the west. The review team estimated the current LOS (Level of Service) of these roads at two FDOT traffic-monitoring sites based on the peak hour directional traffic and FDOT LOS thresholds. Peak hour directional traffic information was obtained from FDOT Florida Traffic Online (FDOT 2013-TN3558) and consists of the AADT at each traffic-monitoring site, a Standard Peak Hour Factor (K) and a Directional Distribution Factor (D). The multiplication of these three elements (AADT x K x D) provides an estimate of the current peak hour directional traffic volume. The LOS was determined comparing this peak hour directional traffic volume with the maximum thresholds for each LOS in Table 9 (areas less than 5,000 population) of FDOTs Generalized Service Volume Tables (FDOT 2013-TN3297). Based on this procedure, the LOS at both traffic-monitoring sites is B. To estimate the project impact on traffic LOS during the project's peak workforce building period, the review team followed a methodology similar to that described in Section 4.4: The peak workforce of 3983 construction and operation

(20) To the extent that some of the expenditures would be made outside Okeechobee County, and assuming the sales surtax rates are unchanged, the total sales surtax collected would be smaller.
(21) $ 3,412 million (FLDFS 2013-TN3392).
(22) FLDOE 2013-TN3299
(23) FLDFS 2013-TN3392

workers were divided into two shifts, with 70 percent assigned to shift 1 (6:00 a.m. to 4:30 p.m.) and 30 percent to shift 2 (5:00 p.m. to 3:00 a.m.). The hour of peak commute would be 4:30 p.m. to 5:30 p.m. The review team also assumed up to 36 trucks per hour. The project-related directional traffic during the peak commute hour would be 2,824 vehicles (70 percent x 3,983 + 36). The review team assumed that half of the project-related traffic would come from each direction, east and west.(24) Results of this analysis are presented in Table 9-15 below. The additional building traffic would drop the LOS classification at both traffic-monitoring sites to F. The proposed widening of SR-710 would bring the LOS classification to a C.

Table 9-15. Peak Workforce Traffic LOS Analysis for the Martin Site

Traffic-Monitoring Site	Baseline Peak Hour Directional Traffic	Baseline LOS	Distribution of Project-Related Peak Traffic	Added Peak Hour Directional Traffic	Peak Hour Directional Traffic with Project	LOS with Project
SR-710 west of site	276	B	0.50	1,412	1,688	F (C)[a]
SR-710 east of site	364	B	0.50	1,412	1,776	F (C)[a]

(a) LOS classification with widening of SR 710

Source: Review team calculations based on FDOT 2013-TN3297 and FDOT 2013-TN3558

FPL estimated the total onsite operations workforce to be 806 workers. If access of this workforce to the Martin site were distributed among the two directions equally, the LOS at each of the two monitoring sites would drop to C.

Based on the above analysis, the review team concludes that the impact of building and operations of the proposed nuclear reactors at the Martin site would be noticeable during building, although not destabilizing, after widening of SR-710.

Recreation

The Martin site is located within 2 mi from Lake Okeechobee and the Lake Okeechobee Scenic Trail that circles the lake. The lake is used for boating, fishing, and duck hunting, and the scenic trail is used for hiking and bird watching (PBC 2013-TN3298). The Dupuis Wildlife and Environmental Area is located just south of the Martin site. During building, access to these sites from some directions could be affected by increased traffic. Other parks and recreational areas exist within the county. The influx of project-related population to the four-county area would increase the number of local users of recreational facilities. Because the in-migrating population would be less than 1 percent of the local population, the review team expects the impact on current recreational infrastructure to be negligible.

Housing

The review team estimates that 2,789 construction and operation workers would migrate into the four-county area, and each of these workers would need a place to live. Based on

(24) Based on U.S. Census Bureau commuter patterns (USCB 2011-TN4078) it was not possible to determine the likely direction of outgoing project-related traffic.

American Community Survey 2008-2012 5-Year estimates, within the four-county area, there are 896,705 housing units of which 195,413 are vacant (21.8 percent). This includes housing that is designated as seasonal, recreational, or occasional use (USCB 2012-TN4089). The review team estimates that, in absolute numbers, the available housing would be sufficient to house the construction workforce. The in-migrating construction and operation workforce would occupy no more than 1.5 percent of vacant housing units in the four-county area. FPL estimated that approximately 806 workers would be needed for operation of two nuclear power facilities at the Martin site, and the review team assumed that 70 percent of these workers (565) would relocate from outside the region and would settle in the four-county area. Based on these assumptions, the entire operations workforce would occupy no more than 0.3 percent of vacant housing units in the four counties. The review team concludes that impact on housing would be minor.

Public Services

In-migrating construction workers and plant operations staff would also likely affect local municipal water, wastewater-treatment facilities, police and fire-protection services and other public services in the region. These impacts would be expected to be in proportion with the demographic impacts experienced in the region. In-migration to the four-county area would represent an estimated 0.4 percent of the local population (less during operations). The review team concludes that impact on public services would be minor.

Education

Based on data for the 2011-12 school year, there are approximately 238,373 full-time equivalent students in public schools in the four-county area(FLDOE 2013-TN3299).[25] The review team estimated that 2,789 construction and operation workers would migrate into the area, and that 1,960 workers would bring their families. Based on an estimate of 0.8 school-aged children per family (Malhotra and Manninen 1981-TN1430), an estimated 1,568 (1,960 x 0.8) school-aged children would be migrating into the four-county area. This would yield a 0.7 percent increase in the student population. During operations, the review team assumed that 565 operation workers and their families would relocate from outside the region. This would include an estimated 452 (565 x 0.8) children in the PK-12 school range. This influx of students would increase the student population in the four-county area by 0.2 percent. The review team concludes that the impact on education would be minor.

Based on the information provided by FPL (2014-TN4058) and the review team's independent analysis, the review team concludes that the overall infrastructure and community service impacts of building activities and operations at the Martin site would be minor except for noticeable, but not destabilizing, adverse impacts on traffic.

(25) FTE is a measure of enrollment based on the number of full-time students that it would take to fill the number of classes offered.

Cumulative Impacts

In addition to the socioeconomic impacts from building and operations of the proposed project at the Martin site, the cumulative analysis also considers other past, present, and reasonably foreseeable future actions that could have socioeconomic impacts.

The socioeconomic impacts of past and present actions in the affected area are largely captured by the current baseline conditions used for analysis above of project impacts. For example, the impacts of past and present actions on the demography and economy of the area are largely captured by current baseline data on population, employment, and tax revenues and are incorporated in the baseline and trend assessments of the RIMS II multipliers.

Reasonably foreseeable future actions are listed in Table 9-11. Several of these future actions would be expected to have cumulative socioeconomic impacts with the proposed project at the Martin site. The proposed Floridian Natural Gas Storage Facility in Martin County would be located at Indiantown, 3 mi east of the proposed Martin site on SR- 710. The construction would likely generate added traffic on SR-710. During construction it would also generate an estimated 1,000 jobs in Martin County during peak employment. An estimated 250 jobs would be supported statewide during operations (Stronge et al. 2007-TN3302). Other proposed projects that would generate employment and earnings during construction and operations include the Florida Southeast Connection pipelines proposed through Highlands, Okeechobee and Martin counties (construction 2016-2017, FSC 2014-TN3301), and various proposed CERP water projects. The Herbert Hoover Dike Rehabilitation Project and Dam Safety Modification Study will likely also generate some local expenditures in the affected area.

Summary Statement

The cumulative impact of the projects identified above with the proposed project at the Martin site would depend largely on the timing of construction. In particular, cumulative impacts on traffic along SR-710 could add to the adverse impact that would be expected from the proposed project on the Martin site. Other potential cumulative impacts that would be beneficial include increased employment and earnings during construction and operations. Based on the location of the identified future projects and their magnitudes, the cumulative socioeconomic impacts would be expected to be SMALL, and adverse, with the exception of MODERATE adverse physical impacts on roads, and aesthetics, and traffic; and MODERATE and beneficial impacts of property tax revenues to the Martin School District. Traffic impacts on SR-710 could add to the already MODERATE impacts of the proposed project on the Martin site to the point of making them LARGE, depending on the timing of construction. Building and operating two new nuclear units at the Martin alternative site would be a significant contributor to the adverse impacts that are greater than SMALL.

9.3.3.6 Environmental Justice

The following impact analysis includes impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable future actions that impact EJ, including other Federal and non-Federal projects listed in Table 9-11.

The 2008-2012 American Community Survey census block groups were used to identify minority and low-income population distributions in the area (USCB 2012-TN4098). The census data for Florida characterizes 15.9 percent of the population as Black; 0.3 percent as American Indian or Alaskan Native; 2.5 percent as Asian; 0.1 percent as Native Hawaiian or other Pacific Islander; 2.6 percent as other single minorities; 2.2 percent as multiracial; 22.5 percent as Hispanic ethnicity; and 42.2 percent as aggregate minority. There are 1,098 block groups within 50 mi of the Martin site. Following the criteria described in Section 2.6.1, Black minority populations exist in 151 block groups; American Indian or Alaskan Native minority populations exist in 2 block groups; Asian minority populations exist in 3 block groups; other race minority populations exist in 11 block groups; multiracial minority populations exist in 2 block groups; ethnic Hispanic minority populations exist in 116 block groups; and aggregate minority populations exist in 323 block groups. There are no block groups containing Native Hawaiian or other Pacific Islander minority populations within 50 mi of the Martin site. The locations of the aggregate minority populations within 50 mi of the Martin site are shown in Figure 9-13. The locations of Hispanic minority populations and Black minority populations within the 50 mi of the Martin site are shown in Figure 9-14 and Figure 9-15, respectively.

The USCB data characterize 15.3 percent of Florida residents as low-income (USCB 2012-TN4098). Out of a possible 1,098 block groups, 108 block groups contain low-income populations. The locations of the low-income populations within 50 mi of the Martin site are shown in Figure 9-16.

The analyses of impacts of building and operating new nuclear reactors at the Martin site identified noticeable adverse impacts on land use, terrestrial and wetland ecosystems, aesthetics, and traffic. The review team did not identify any special pathways through which any impacts would disproportionately affect EJ populations of interest. Therefore, the review team concluded there would be no disproportionately high and adverse impacts on EJ populations of interest.

The NRC's EJ methodology includes an assessment of affected populations of particular interest or with unusual circumstances, such as minority communities that are exceptionally dependent on subsistence resources or identifiable in compact locations (e.g., Native American reservations) and those that have a high density of minority or low-income groups. Based on a literature research, the review team did not identify high-density minority or low-income presence in the proximity of the site, or any differentiated subsistence consumption of natural resources by EJ populations of interest.

Cumulative Impacts

In addition to the EJ impacts from building and operations of the proposed project at the Martin site, the cumulative analysis also considers other past, present, and reasonably foreseeable future actions that could have EJ impacts. Based on a literature review of past and present actions in the affected area, and based on the reasonably foreseeable actions listed in Table 9-11, the review team found no evidence that the cumulative effects would disproportionately impact EJ populations of interest.

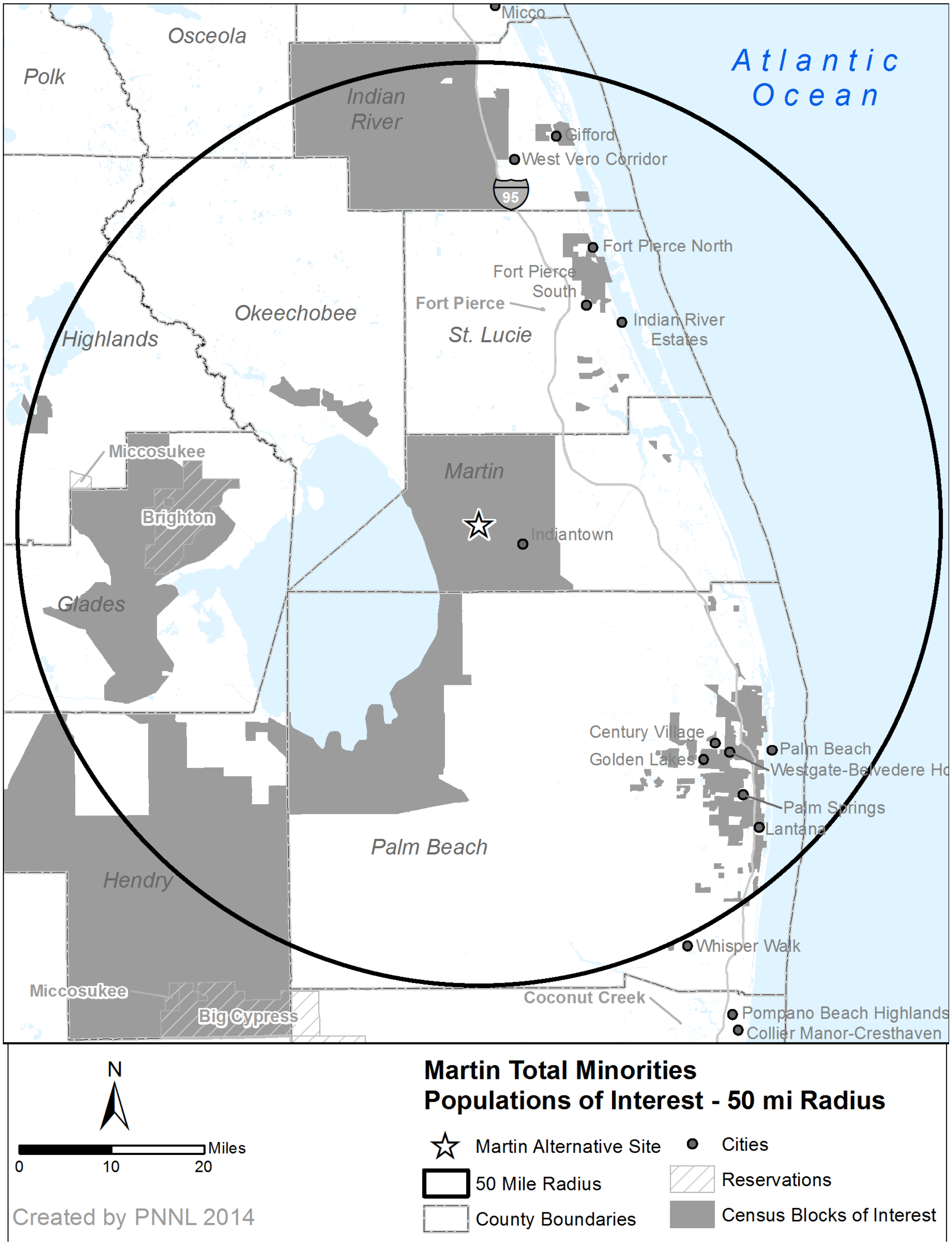


Figure 9-13. Aggregate Minority Populations in Block Groups that Meet the Environmental Justice Selection Criteria within 50 mi of the Martin Alternative Site

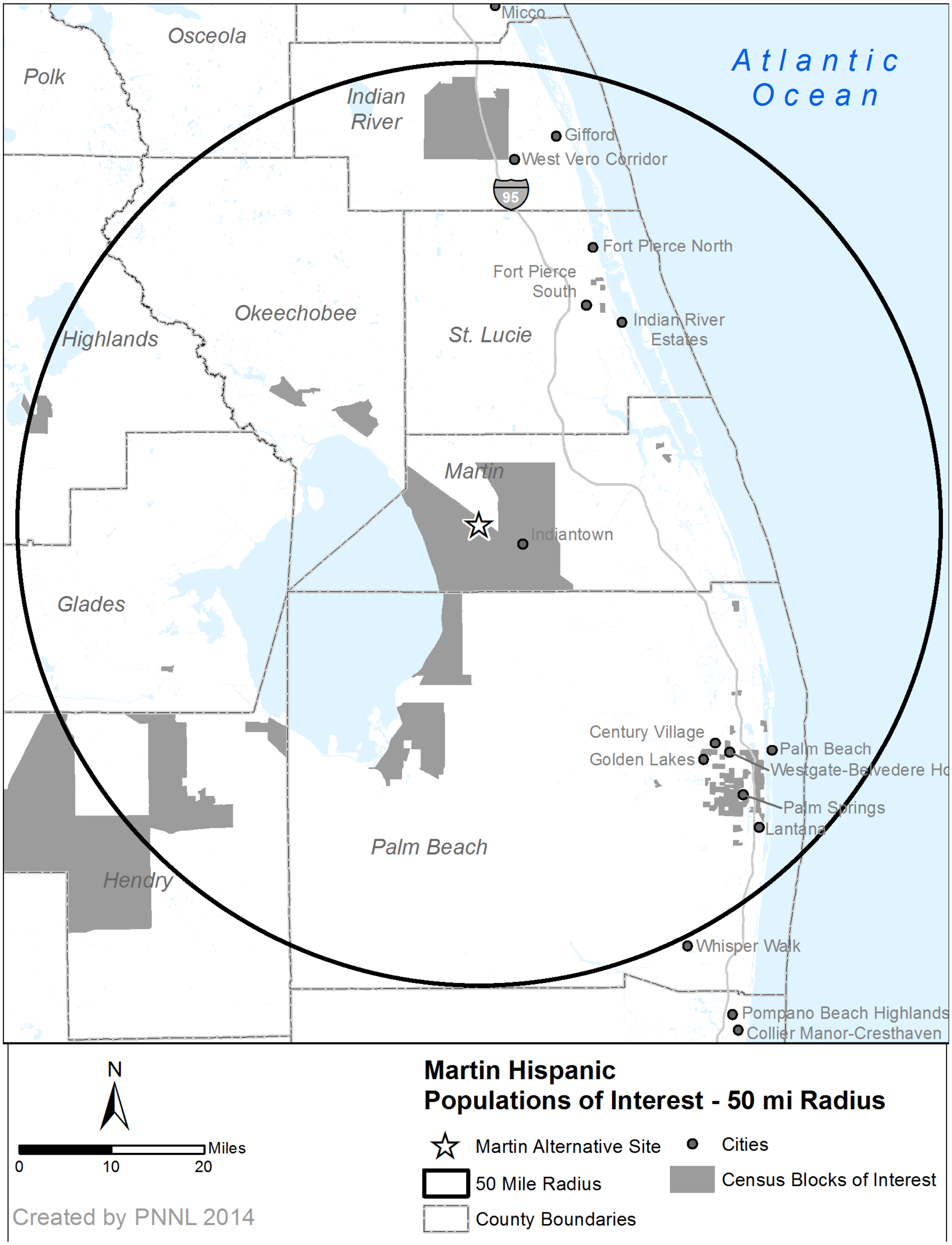


Figure 9-14. Hispanic Populations in Block Groups that Meet the Environmental Justice Selection Criteria within 50 mi of the Martin Alternative Site

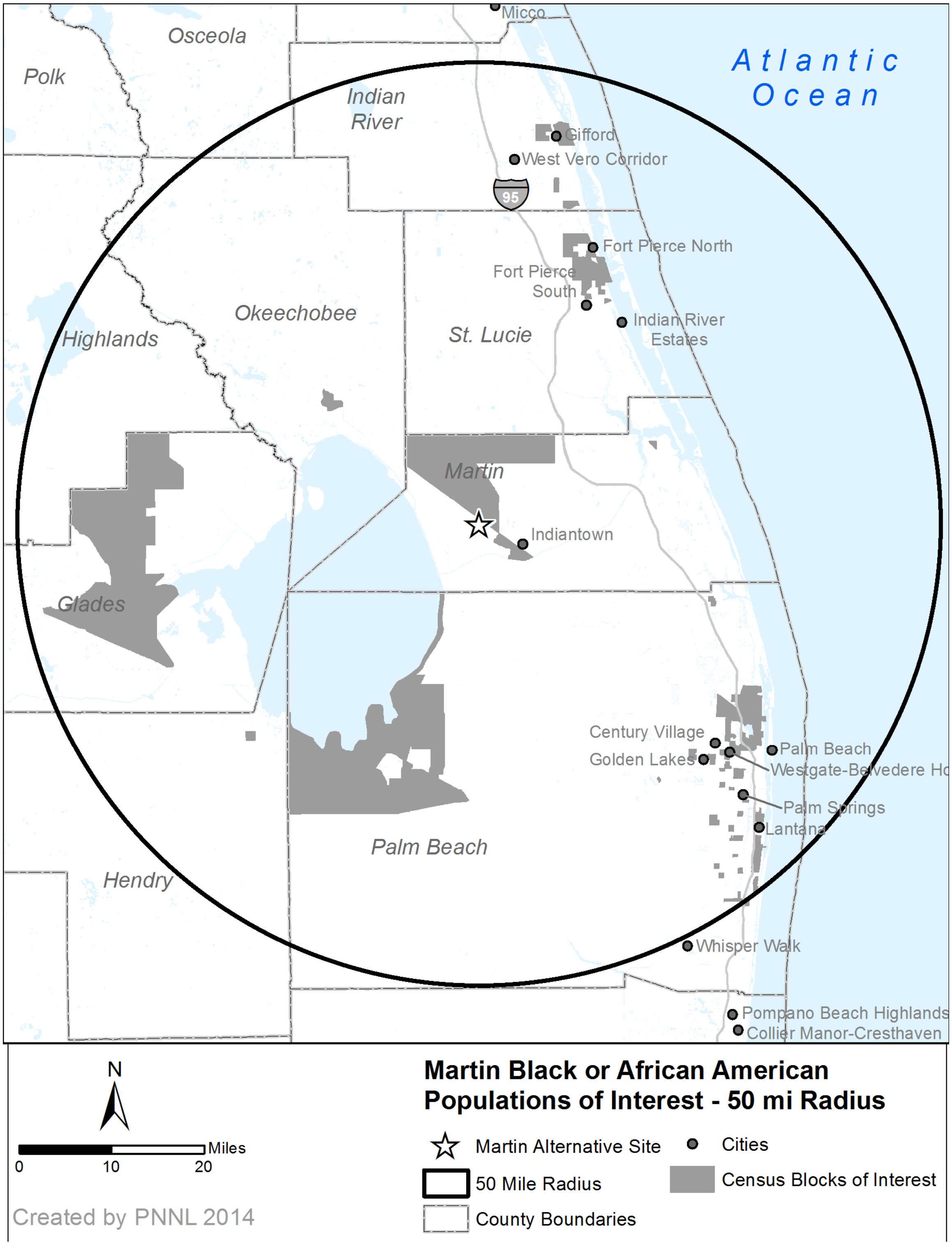


Figure 9-15. African American Populations in Block Groups that Meet the Environmental Justice Selection Criteria within 50 mi of the Martin Alternative Site

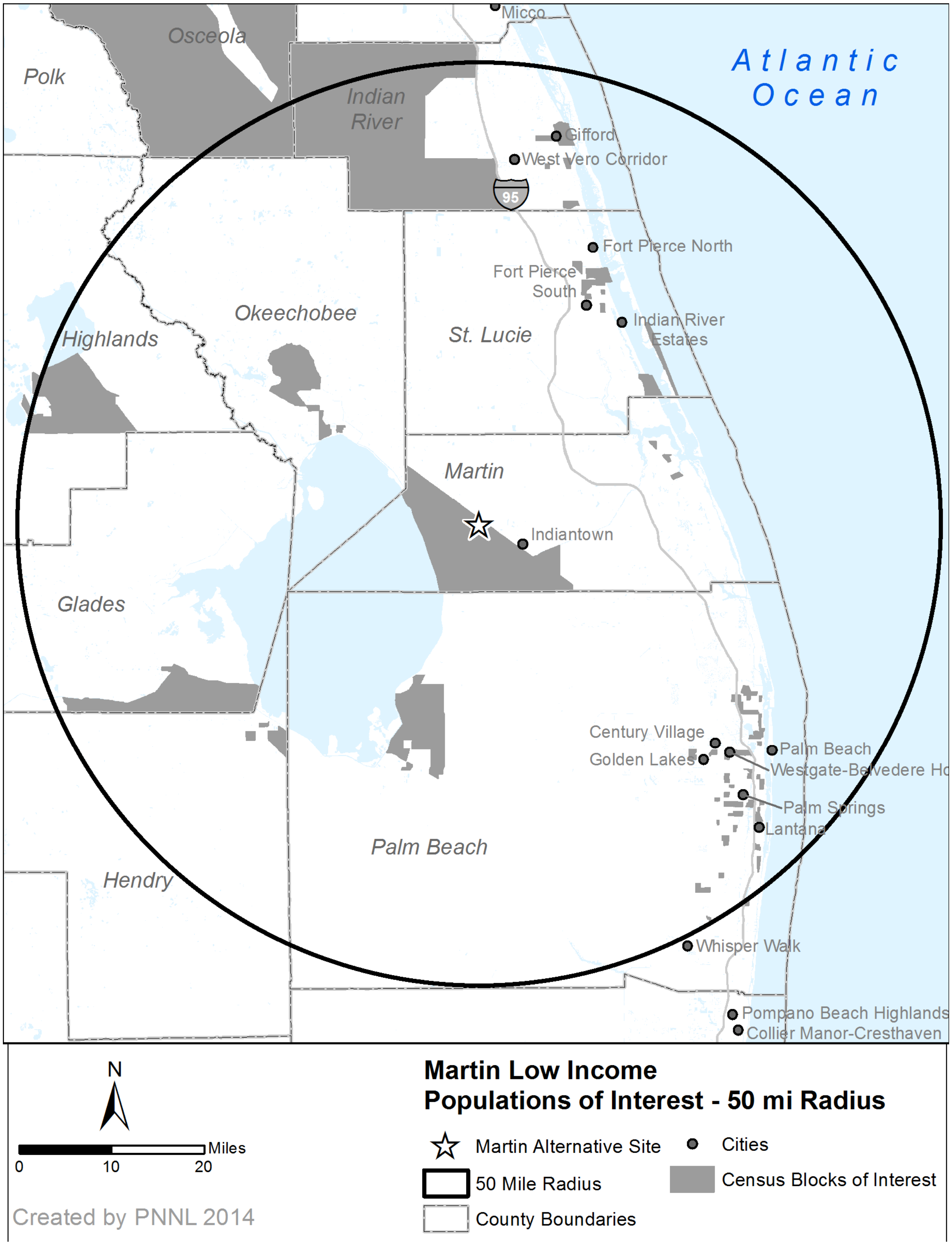


Figure 9-16. Low-Income Populations in Block Groups that Meet the Environmental Justice Selection Criteria within 50 mi of the Martin Alternative Site

9.3.3.7 Historic and Cultural Resources

The following cumulative impact analysis addresses building and operating two new nuclear power-generating units at the Martin site. The analysis also considers other past, present, and reasonably foreseeable future actions that could affect cultural resources, including the other Federal and non-Federal projects listed in Table 9-11. For the analysis of cultural impacts at the Martin site, the geographic area of interest is considered to be the APE that would be defined for this site. This includes the direct effects APE, defined as the area physically affected by the site-development and operation activities at the site and within transmission line corridors. The indirect effects APE is defined as the area visually affected and includes an additional 0.5 mi radius APE around the transmission line corridors and a 1 mi radius APE around the cooling towers.

Reconnaissance activities in a cultural resource review have particular meaning. Typically, they include preliminary field investigations to confirm the presence or absence of cultural resources. However, in developing this EIS, the review team relied upon reconnaissance-level information to perform its alternative site evaluation in accordance with ESRP 9.3 (NRC 2000-TN614). Reconnaissance-level information consists of data that are readily available from agencies and other public sources. It can also include information obtained through visits to the site area. The following information was used to identify the historic and cultural resources at the Martin site:

- NRC Alternative Sites Visit, July 2010 (NRC 2010-TN3304)
- FPL ER Revision 6 (FPL 2014-TN4058)
- Florida Historical Markers program (FDHR 2014-TN3876)
- National Register of Historic Places database (NPS 2014-TN3880).

The approximately 11,300 ac Martin site is an FPL-owned property located in predominantly forested land, scattered wetlands, and agricultural land. The site has been developed for power generation and contains five fossil-fired power units, occupying 300 ac, and a 6,800 ac water reservoir. A solar unit was recently constructed (FPL 2014-TN4058). Historically, the Martin site and vicinity were largely undeveloped and likely contained intact archaeological sites associated with the past 10,000 years of human settlement. Over time, the area has been heavily disturbed by impacts related to agricultural and industrial development.

A search of the National Register shows that one significant historic property, the Seminole Inn in Indiantown, is located within 10 mi of the Martin site (FPL 2014-TN4058; NPS 2014-TN3880). A total of 100 properties was found in the four counties in the vicinity of the Martin site, consisting of Martin, Palm Beach, St. Lucie, and Okeechobee Counties. A National Register search of the indirect effects APE for the proposed transmission line corridor shows that only the single property noted above, the Seminole Inn, occurs within the area. The property lies approximately 4 mi to the east of the proposed transmission line route. However, the proposed transmission line follows an existing transmission line corridor in this area and any impacts caused by the addition of a new transmission line would be negligible.

A search of the Florida Historical Markers Program (FDHR 2014-TN3876) revealed that there are six historic markers in Martin County, but none are found within 10 mi of the Martin site. One marker, for the Jupiter Indiantown Road, is located just outside Indiantown, about 4 mi from the transmission line corridor. In addition, there is a known archaeological resource within the Barley Barber Swamp adjacent to the plant property, but the area is preserved as a nature area and will not be directly affected.

In 1989, FPL conducted detailed cultural resources studies for an expansion of the Coal Gasification/Combined-Cycle facility located on the Martin site (FPL 2014-TN4058). Approximately 3,300 ac of FPL's existing plant property were assessed. However, any additional property required for the new nuclear generating units was not surveyed as part of the 1989 study. The study included a review of the Florida Master Site Files, and examination of historical and archaeological literature, historical records, maps, and photographs. Areas identified as archaeologically sensitive were systematically surveyed in the field. The research revealed that no archaeological sites have been recorded in the 3,300 ac study area for that project, and the archaeological survey did not identify any new resources.

Reconnaissance-level information indicates that there are no known historic properties located within surveyed portions of the existing Martin plant. However, any additional land that would be acquired for the project has not been surveyed for archaeological or historical resources. Further, reconnaissance-level information shows that there are historic properties in the general vicinity of the site, including archaeological resources nearby and historic resources in the broader region.

Building Impacts

To accommodate the building of two nuclear generating units and associated facilities at the Martin site, FPL estimates that the total area of land that would be disturbed would be approximately 362 ac for the facility footprint. In addition, a 39.3 mi long paved road and a 4.3 mi long railroad spur would need to be constructed through predominantly agricultural or undeveloped land (FPL 2014-TN4058). A portion of SR-710 would need to be widened, and 21.7 ac would be disturbed for pipeline corridors and associated facilities (FPL 2014-TN4058). If the Martin site were chosen for the proposed project, identification of cultural resources would be accomplished through additional cultural resource surveys and consultation with the SHPO, Tribes, and interested parties. The results would be used in the site-planning process to address cultural resources impacts. If significant cultural resources were identified by these surveys, the review team assumes that FPL would use the same protective measures used at the Turkey Point site, and therefore the impacts would be minimal. If direct effects on significant cultural resources could not be avoided, land-clearing, excavation, and grading activities could potentially destabilize important attributes of historic and cultural resources.

Section 9.3.3.1 describes the transmission line corridors, which will extend for a distance of 31 mi following extant transmission line corridors for the existing Martin plant. FPL has stated that consideration would be given to sensitive environmental and built resources in determining a route for the transmission lines (FPL 2014-TN4058). If the Martin site were chosen for the proposed project, the review team assumes that FPL would conduct its transmission line related cultural resource surveys and procedures in a manner similar to that for the Turkey Point site.

In addition, the review team assumes that the State of Florida's final Conditions of Certification (State of Florida 2014-TN3637) regarding transmission line siting and building activities would also apply, and therefore impacts would be minimal. If direct effects on significant cultural resources could not be avoided, land-clearing, excavation, and grading activities could potentially destabilize important attributes of historic cultural resources. Similarly, both the transmission lines and nuclear power-generating units could indirectly affect cultural and historic resources through visual impacts on the setting of the resources.

Operations Impacts

Impacts on historic and cultural resources from operation of two new nuclear generating units at the Martin site include those associated with the operation of new units and maintenance of transmission lines. The review team assumes that the same procedures developed by FPL for the Turkey Point site, as well as the State of Florida's final Conditions of Certification, would be used for onsite and offsite maintenance activities. Consequently, the incremental effects of the maintenance of transmission line corridors and operation of the two new units and associated impacts on the cultural resources would be negligible for the direct and indirect effects APEs.

Cumulative Impacts

Past actions in the geographic area of interest that have similarly affected historic and cultural resources include rural, agricultural, and industrial development and associated activities such as road construction. Table 9-11 lists past, present, and reasonably foreseeable projects and other actions that may contribute to cumulative impacts on historic and cultural resources in the geographic area of interest. Projects from Table 9-11 that may fall within the geographic area of interest for cultural resources include the Florida Gas Transmission Expansion project, the Florida Natural Gas Storage Facility, the FPL Martin Next-Generation Solar Energy Center, various water-storage and water-treatment projects, the Lake Point Mine project, and future urbanization. These projects may significantly affect historic and cultural resources in a manner similar to those associated with the building and operation of two new nuclear generating units.

Long linear projects such as new or expanded roads and pipelines may intersect the proposed transmission line corridors. Because cultural resources can likely be avoided by long linear projects, impacts on cultural resources would likely be minimal. If building associated with such activities results in significant alterations of cultural resources in the transmission line corridors, either physical or visual, then cumulative impacts on cultural and historic resources would be greater.

Cultural resources are nonrenewable. Therefore, the impact of the destruction of cultural resources is cumulative. Based on the information provided by FPL and the review team's independent evaluation, the review team concludes that the cumulative impacts from building and operating two new nuclear generating units on the Martin site would be SMALL. This impact-level determination is based on reconnaissance-level information and reflects the fact that there are no known cultural resources on the proposed site. Although the proposed transmission line would extend approximately 31 mi, it would follow an existing transmission line corridor and would only incrementally add to potential visual impacts on cultural resources. The assessment also assumes that, if the Martin site were to be developed, cultural resource surveys and evaluations would be conducted and FPL, in consultation with SHPO, Tribes, and interested parties, would assess and resolve any adverse effects of the undertaking. If cultural or historic resources are present, and if there are adverse effects on those resources, the project could result in greater cumulative impacts.

9.3.3.8 Air-Quality Impacts

The following impact analysis includes impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable actions that impact air quality, including other Federal and non-Federal projects listed in Table 9-11. As described in Section 9.3.3, the Martin site area includes five fossil-fueled (gas and oil) power units; there are no current nuclear facilities at the site. The geographic area of interest for the Martin site is Martin County, which is in the Southeast Florida Intrastate Air Quality Control Region (40 CFR 81.49) (TN255).

Sections 4.7 and 5.7 discuss air-quality impacts during building and operation. The emissions related to building and operating a nuclear power plant at the Martin alternative site would be similar to those at the Turkey Point site. The air-quality attainment status for Martin County, as set forth in 40 CFR Part 81 (TN255), reflects the effects of past and present emissions from all pollutant sources in the region. Martin County is in attainment of all National Ambient Air Quality Standards.

As described in Chapters 4 and 5, the criteria pollutants from building and operation were found to have a SMALL impact on air quality. In Chapter 7, the cumulative impacts of criteria pollutants were evaluated and also determined to be SMALL to MODERATE. Reflecting on the projects listed in Table 9-11, the most significant of the facilities operating in the county are the five fossil-fueled (oil and gas) units (Martin plant), with a combined 3,734 MW capacity, operating at the Martin site and a 330 MW coal-fired power plant (Indiantown Cogeneration) located 4 mi east of the Martin site. Emissions from power plants such as these are released through stacks and with significant momentum and buoyancy. In addition, a proposed liquefied natural-gas storage and vaporization facility (Florida Natural Gas Storage Facility) with designed storage capacity of eight billion cubic feet will operate at a distance of about 2 mi from the Martin site. Other industrial projects listed in Table 9-11 would likely have de minimis impacts. Given that these projects are subject to Clean Air Act permitting requirements, it is unlikely that the air quality in the region will degrade to the extent that the region would be in nonattainment of the National Ambient Air Quality Standards.

The air-quality impact from development of the Martin site would be local and temporary. The applicant would develop a dust-control plan that identifies specific measures to minimize fugitive dust emissions during building activities. The distance from building activities to the site boundary would be sufficient to generally avoid significant air-quality impacts. There are no land uses or projects in Table 9-11, including the aforementioned sources, that would have emissions during site development that would, in combination with emissions from the Martin site, result in degradation of air quality in the region. Emissions from operation of two new nuclear units at the Martin site would be intermittent and made at low levels with little or no vertical velocity, similar to operational impacts at the Turkey Point site as discussed in Section 5.7. The air-quality impacts of the Martin fossil-fuel units are included in the baseline air-quality status. The air-quality impacts of the Florida Natural Gas Storage Facility would be similar to the air-quality impacts of the natural-gas−fired power plant units discussed in Section 9.2.2.10, which would be noticeable but not destabilizing. The cumulative impacts from emissions of effluents from the Martin site and the aforementioned sources would be noticeable but not destabilizing.

The cumulative impacts of GHG emissions related to nuclear power are discussed in Section 7.6. The impacts of the emissions are not sensitive to location of the source. Consequently, the discussion in Section 7.6 is applicable to a nuclear power plant located at the Martin site. The review team concludes that the national and worldwide cumulative impacts of GHG emissions are noticeable but not destabilizing. The review team further concludes that the cumulative impacts would be noticeable but not destabilizing, with or without the GHG emissions of the two new nuclear units at the Martin site.

The review team concludes that cumulative impacts from other past, present, and reasonably foreseeable future actions on air-quality resources in the geographic areas of interest would be SMALL to MODERATE for criteria pollutants and MODERATE for GHG emissions. The incremental contribution of impacts on air-quality resources from building and operating two units at the Martin site would not be a significant contributor to the MODERATE impacts.

9.3.3.9 Nonradiological Health

The following analysis considers nonradiological health impacts from building and operating two new nuclear units at the Martin site. The analysis also includes past, present, and reasonably foreseeable future actions that could contribute to cumulative nonradiological health impacts on site workers (construction and operation workers) and members of the public, including other Federal and non-Federal projects and the projects listed in Table 9-11 within the geographic area of interest. Nonradiological health impacts at the Martin site are estimated based on information provided by FPL and the review team's independent evaluation. For the analysis of nonradiological health impacts at the Martin site, the geographic area of interest is the site and the immediate vicinity (~2 mi radius) and the associated road and transmission line corridors. This geographic area of interest is based on the localized nature of nonradiological health impacts and is expected to encompass all nonradiological health impacts.

Building activities with the potential to affect the health of members of the public and workers at the Martin site include exposure to dust and vehicle exhaust, occupational injuries, noise, and increased traffic associated with the transport of construction materials and personnel to and from the site. The operations-related activities that have the potential to affect the health of members of the public and workers include exposure to etiological (disease-causing) agents, noise, EMFs, occupational injuries, and impacts from the transport of workers to and from the site.

Building Impacts

Nonradiological health impacts on construction workers and members of the public from building two new nuclear units at the Martin site would be similar to those evaluated in Section 4.8 for the Turkey Point site. During the site-preparation and building phase, FPL would comply with applicable Federal and State regulations on air quality and noise (FPL 2014-TN4058). The Martin site is located in a rural area, and building impacts would likely be negligible on the surrounding populations, which are classified as medium- and low-population areas. The incidence of construction worker accidents would be the same as that for the Turkey Point site.

The review team concludes that nonradiological health impacts on construction workers and the public from building two new nuclear units and associated transmission lines at the Martin site would be minimal. Nonradiological health impacts associated with traffic accidents during building activities at the Martin alternative site were evaluated in Section 4.8.3 and the review team concludes that the impacts would be minimal.

Operations Impacts

Nonradiological health impacts on operation workers and members of the public would include those associated with the operation of cooling towers and transmission lines as described in Section 5.8. Based on the configuration of the proposed new units at the Martin site (see Chapter 3 for detailed site layout description), etiological agents would not be an issue with regard to members of the public because cooling-tower blowdown would be discharged into deep-injection wells not into surface waters. Impacts on workers' health from occupational injuries, noise, and EMFs would be similar to those described in Section 5.8 for the Turkey Point site. Noise and EMF exposure would be monitored and controlled in accordance with applicable OSHA regulations. Although no detailed noise modeling has been performed for the Martin site, it is likely that noise impacts would be similar to those predicted for operations at the Turkey Point site. The effects of EMFs on human health would be controlled and minimized by conformance with National Electrical Safety Code criteria and adherence to the standards for transmission systems regulated by the FDEP.

The review team concludes that nonradiological health impacts on workers and the public from operating two new nuclear units and associated transmission lines at the Martin site would be minimal. Impacts associated with traffic accidents during operations at the Martin alternative site were evaluated in Section 5.8.6 and the review team concludes that the impacts would be minimal.

Cumulative Impacts

The past and present project that is within the geographic area of interest that could affect nonradiological human health in a way similar to the building of two nuclear units at the Martin site identified in Table 9-11 is a combined natural-gas/oil and solar power-generating station adjacent to the proposed Martin site and various transportation (roads, traffic, pedestrian) and mining/quarry projects that have occurred and are ongoing throughout the region.

Reasonably foreseeable projects that could affect nonradiological human health in a way similar to the building of two nuclear units at the Martin site identified in Table 9-11 include various transportation (roads, traffic, pedestrian) and mining/quarry projects that are planned throughout the region.

The review team concludes that the cumulative impacts on nonradiological health from building and operating two new nuclear units and associated transmission lines at the Martin site would be minimal.

Summary Statement

Impacts on nonradiological health from building and operation of two new units at the Martin site are estimated based in the information provided by FPL and the review team's independent evaluation. Although some future activities in the geographical area of interest could affect nonradiological health in ways similar to the building and operation of two new units at the Martin site and associated offsite facilities, those impacts would be localized and managed through adherence to existing regulatory requirements. The review team concludes that nonradiological health impacts on workers and the public resulting from the building of two new nuclear units and associated road and transmission lines at the Martin site would be minimal. The review team expects that the nonradiological health impacts on the operations employees and the public of two new nuclear units at the Martin site would be minimal. Finally, the review team concludes that cumulative impacts on nonradiological health from past, present, and reasonably foreseeable actions in the geographic area of interest would be SMALL.

9.3.3.10 Radiological Impacts of Normal Operations

The following impact analysis includes impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable actions that affect radiological health, including other Federal and non-Federal projects listed in Table 9-11. As described in Section 9.3.3, Martin is a fossil-fuel power plant and a solar power plant site (; there are currently no nuclear facilities on the site. The geographic area of interest is the area within a 50 mi radius of the Martin site. St. Lucie Units 1 and 2 (i.e., two nuclear power plants) are the only major facilities within this geographic area of interest that potentially affect radiological health. In addition, there are likely to be medical, industrial, and research facilities within 50 mi of the Martin site that use radioactive materials.

The radiological impacts of building and operating the two proposed Westinghouse AP1000 nuclear power units at the Martin site include doses from direct radiation and liquid and gaseous radioactive effluents. These pathways would result in low doses to people and biota offsite that would be well below regulatory limits. These impacts are expected to be similar to those estimated for the Turkey Point site.

The radiological impacts of St. Lucie Units 1 and 2 include doses from direct radiation and liquid and gaseous radioactive effluents. These pathways result in low doses to people and biota offsite that are well below regulatory limits as demonstrated by the ongoing radiological environmental monitoring program conducted around St. Lucie Units 1 and 2. The NRC staff concludes that the dose from direct radiation and effluents from hospitals and industrial facilities that use radioactive material would be an insignificant contribution to the cumulative impact around the Martin site. This conclusion is based on data from the radiological environmental monitoring programs conducted around currently operating nuclear power plants.

Based on the information provided by FPL and the NRC staff's independent analysis, the NRC staff concludes that the cumulative radiological impacts from building and operating the two proposed Westinghouse AP1000 nuclear power units and other existing and planned projects and actions in the geographic area of interest around the Martin site would be SMALL.

9.3.3.11 Postulated Accidents

The following impact analysis includes radiological impacts from postulated accidents from the operation of two nuclear units at the Martin alternative site. The analysis also considers other past, present, and reasonably foreseeable future actions that affect radiological health from postulated accidents, including other Federal and non-Federal projects and the projects listed in Table 9-11. As described in Section 9.3.3, the Martin site is a brownfield site with existing solar power and fossil-fuel facilities. There are currently no nuclear facilities at the site. The geographic area of interest considers all existing and proposed nuclear power plants that have the potential to increase the probability-weighted consequences (i.e., risks) from a severe accident at any location within 50 mi of the Martin alternative site. Facilities potentially affecting radiological accident risk within this geographic area of interest are the existing two units of St. Lucie Units 1 and 2.

As described in Section 5.11.1, the NRC staff concludes that the environmental consequences of DBAs at the Turkey Point site would be minimal for AP1000 reactors. DBAs are addressed specifically to demonstrate that a reactor design is robust enough to meet NRC safety criteria. The environmental consequences of DBAs depend on the plant design and the atmospheric dispersion. The AP1000 design is independent of site conditions and the differences in meteorology of the Martin alternative and Turkey Point sites are not significant with regard to the conditions that are important to assessing DBAs. Therefore, the NRC staff concludes that the environmental consequences of DBAs at the Martin alternative site would be minimal.

With the lower population density and land-use values for the Martin alternative site, the NRC staff expects the risks from a severe accident for an AP1000 reactor located at the Martin alternative site to be similar to or lower than those analyzed for the proposed Turkey Point site. The risks for the proposed Turkey Point site were presented in Tables 5-19 and 5-20 and are well below the median value for current-generation reactors. In addition, as discussed in Section 5.11.2, estimates of average individual early fatality and latent cancer fatality risks are well below the Commission's safety goals (51 FR 30028) (TN594). For existing plants within the geographic area of interest (St. Lucie Units 1 and 2), the Commission has determined that the probability-weighted consequences of severe accidents are small (10 CFR 51, Appendix B, Table B-1) (TN250). On this basis, the NRC staff concludes that the cumulative risks from severe accidents at any location within 50 mi of the Martin alternative site would be SMALL.

9.3.4 Okeechobee 2 Site

This section covers the review team's evaluation of the potential environmental impacts of siting a new two-unit nuclear power plant at the Okeechobee 2 alternative site in central Florida. The site is located in a rural area in Okeechobee County east of the Kissimmee River and north of Lake Okeechobee. Okeechobee 2 is a greenfield site not currently owned by FPL (2014-TN4058) The location of the Okeechobee 2 site is shown in Figure 9-17.

The Okeechobee site is a 3,000 ac undeveloped greenfield site. The majority of the site is currently used for agriculture and contains a lot of pasture for cattle and dairy farms as well as citrus fields. Topography does not vary considerably over the site (FPL 2014-TN4058).

FPL assumed the facility footprint (Figure 9-18) that would include the power units, support buildings, switchyard, storage areas, stormwater-retention ponds, and other structures would require 362 ac. Building at the Okeechobee site would also require the creation of a transmission line corridor of approximately 38 mi, a 9.3 mi access road (112.3 ac), installation of 3.9 mi of railway (46.6 ac), and an intake/makeup pipeline (22.5 ac). The area permanently affected by these facilities and infrastructure (except the transmission line) is approximately 502 ac. The conceptual transmission line corridor would occupy an additional 3,022 ac. Additional area (up to several hundred acres) would be temporarily disturbed for activities such as laydown areas, a batch plant, and for fill and spoil deposition (FPL 2014-TN4058).

As discussed in Section 9.3.1.7, the review team considered an alternative configuration of the cooling system that FPL proposed.

The following sections include a cumulative impact assessment conducted for each major resource area. The specific resources and components that could be affected by the incremental effects of the proposed action if implemented at the Okeechobee 2 site and other actions in the same geographic area were considered. This assessment includes the impacts of NRC-authorized construction and operations and impacts of preconstruction activities. Also included in the assessment are past, present, and reasonably foreseeable future Federal, non-Federal, and private actions that could have meaningful cumulative impacts when considered together with the proposed action if implemented at the Okeechobee 2 site. Other actions and projects considered in this cumulative analysis are described in Table 9-16.

The geographic area of interest for cumulative impacts considers all existing and proposed nuclear power plants that have the potential to increase the probability-weighted consequences (i.e., risks) from a severe accident at any location within 50 mi of the Okeechobee 2 site. An accident at a nuclear plant within 100 mi of the Okeechobee 2 site could increase this risk. The St. Lucie nuclear plant is within 50 mi of the Okeechobee 2 site and is included in Table 9-16. Other nuclear plants in Florida, Alabama, and Georgia are more than 100 mi from the Okeechobee 2 site and are therefore not included in the cumulative impact analysis.

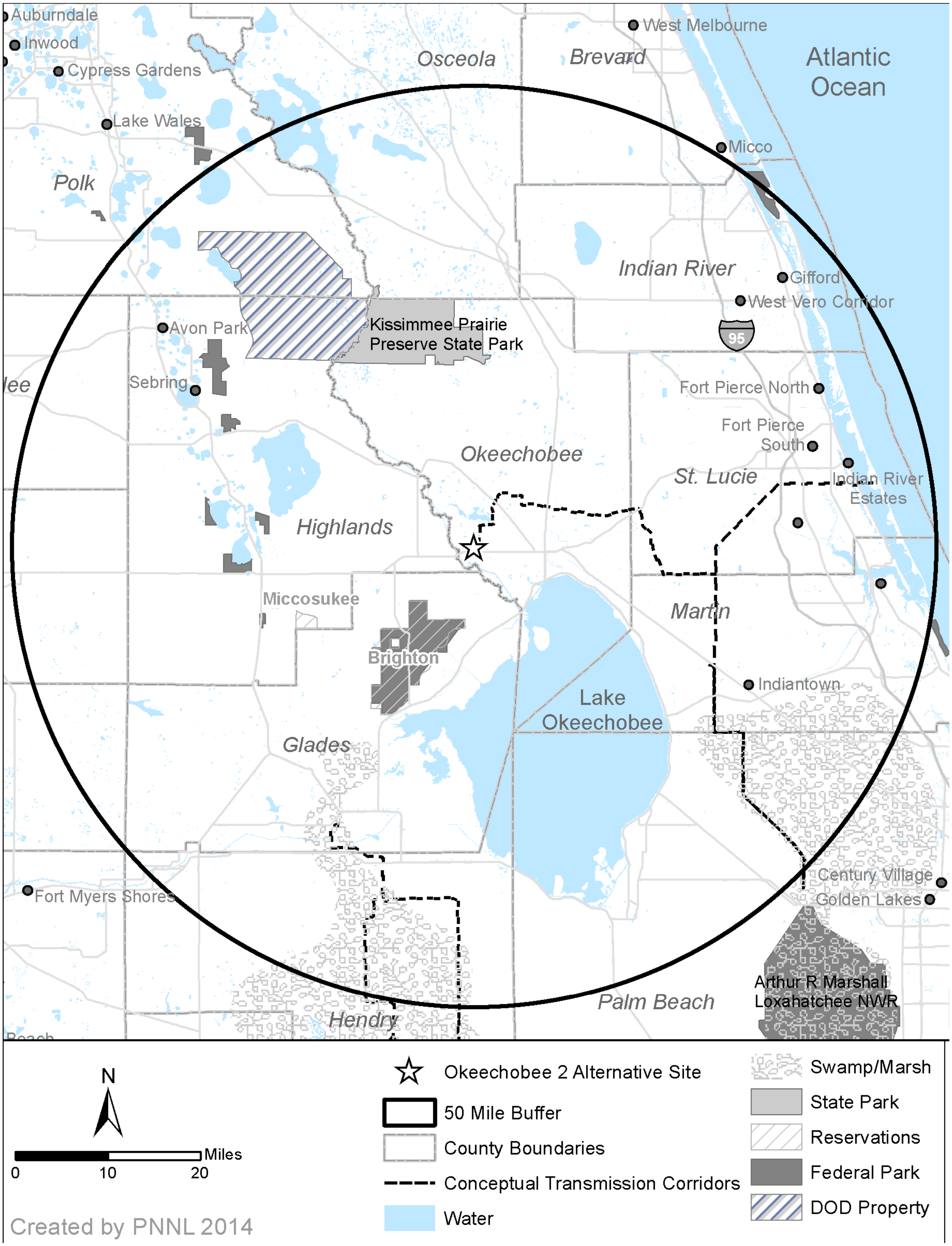


Figure 9-17. Okeechobee 2 Site Region

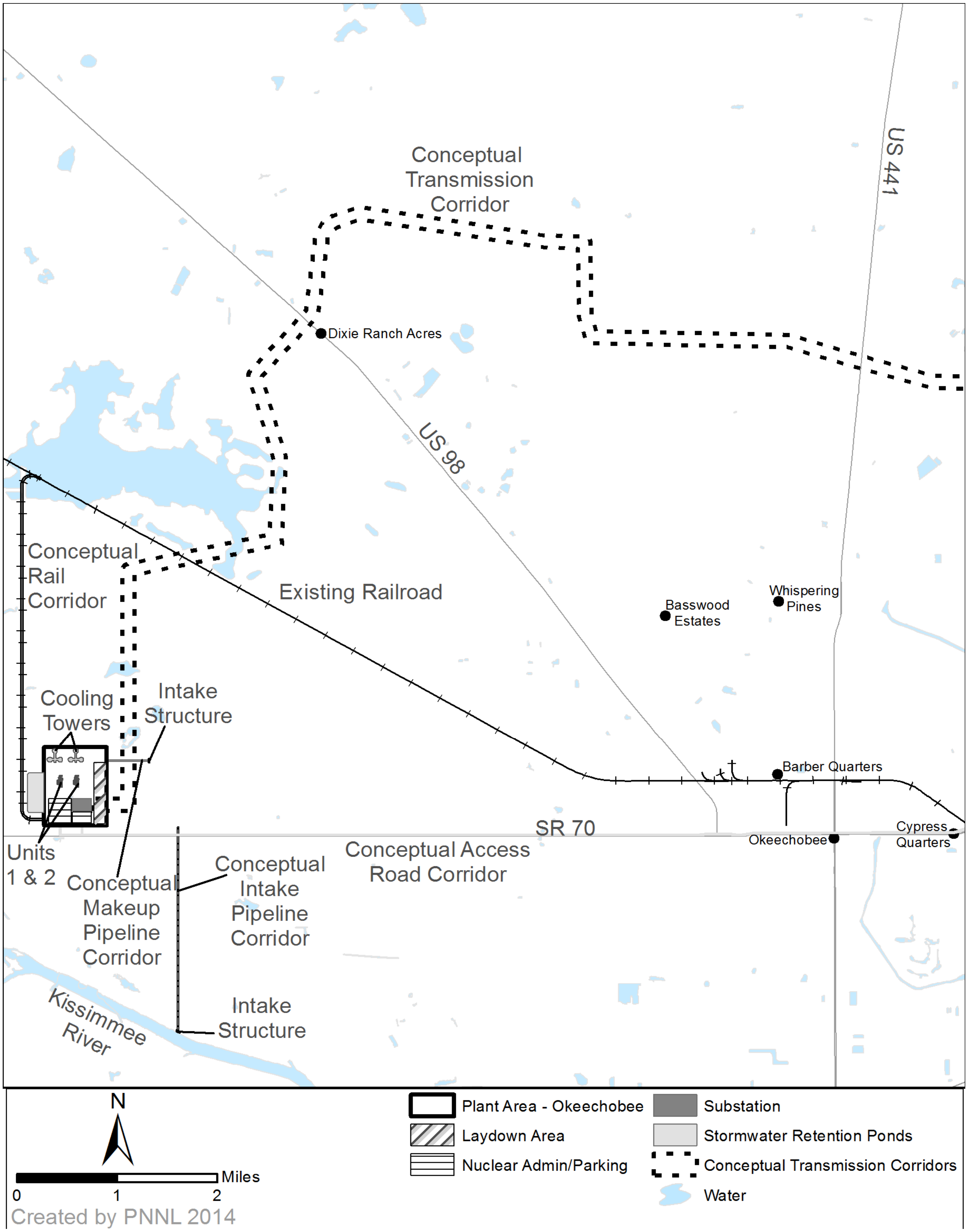


Figure 9-18. Okeechobee 2 Site Footprint

1 **Table 9-16. Past, Present, and Reasonably Foreseeable Projects and Other Actions in**
2 **the Vicinity of the Okeechobee 2 Site**

Project Name	Summary of Project	Location	Status
Energy Projects			
St. Lucie	Two 3,020 MW(t) nuclear power reactors	43 mi E of the Okeechobee alternative site	Operational, Units 1 and 2 underwent license renewal in 2003. Unit 1 and 2 completed 320 MW(t) power uprates in 2013 (NRC 2012-TN1668; FPL 2014-TN3360)
West County Energy Center	Three 1,250 MW natural-gas−powered units	50 mi SE of the Okeechobee alternative site	Operational (FDEP 2013-TN2965)
Martin	Combined natural-gas/oil and solar power-generating station	26 mi SE of the Okeechobee alternative site	Operational (FPL 2014-TN2974)
Indiantown Cogeneration Company	330 MW coal-fired power plant	29 mi SE of the Okeechobee alternative site	Operational (FDEP 2013-TN2967)
Okeelanta Cogeneration Facility	140 MW biomass power-generation facility	47 mi S of the Okeechobee alternative site	Operational (FDEP 2013-TN2968)
FPL pipeline	126 mi pipeline from Sabal Trail's Central Florida Hub to FPL's Martin Clean Energy Center	Throughout region	Proposed, construction set to begin 2016 (FPL 2014-TN2975)
Floridian Natural Gas Storage Company - Natural Gas Storage Facility	Storage of natural gas	29 mi SE of the Okeechobee alternative site	Proposed, amendment to modify application sent to FERC in 2013 (78 FR 58529) (TN3002)
Southeastern Renewable Fuels Biorefinery and Cogeneration Plant	30 MW biofuel using leftover sweet sorghum stalk fiber	45 mi S of the Okeechobee alternative site	Proposed, final air permit issued by FDEP in 2010 (FDEP 2010-TN2970)
Treasure Coast Energy Center	300 MW natural-gas power plant	35 mi E of the Okeechobee alternative site	Operational (FMPA 2014-TN3029)
Vero Beach Municipal Power Plant	Five-unit, 155 MW gas- and oil-fired plant	43 mi NE of the Okeechobee alternative site	Operational (EPA 2014-TN3030)
INEOS New Planet Bioenergy Center	6.3 MW bioenergy facility	36 mi NE of the Okeechobee alternative site	Operational (EPA 2014-TN3032)

Table 9-16. (contd)

Project Name	Summary of Project	Location	Status
Okeechobee Landfill Energy	Waste-to-energy facility	16 mi NE of the Okeechobee alternative site	Operational (Waste Management 2014-TN3034)
Mining Projects			
Five Stone mining	Stone/quarry mining	29 mi SE of the Okeechobee alternative site	Operational (EPA 2013-TN2959)
Daniel Shell Pit, Phase 6	Stone/quarry mining	4 mi SE of the Okeechobee alternative site	Operational (EPA 2013-TN2956)
E R Jahna Industries, Inc – Ortona Mine	Stone/quarry mining	37 mi SW of the Okeechobee alternative site	Operational (EPA 2013-TN2958)
Florida Rock Industries/Fort Pierce	Stone/quarry mining	25 mi E of the Okeechobee alternative site	Operational (EPA 2014-TN3038)
Hammond Sand Mine	Sand/quarry mining	41 mi NE of the Okeechobee alternative site	Operational (EPA 2014-TN3044)
Various other mine and quarry projects	Stone/quarry mining	Throughout region	Operational (FDEP 2010-TN2966)
Transportation Projects			
Various transportation projects	Road, traffic, pedestrian projects	Throughout region	Ongoing (FDOT 2014-TN4014)
Parks and Aquaculture Facilities			
Dupuis Wildlife and Environmental Area	Activities include bicycling, camping, hunting, fishing, and hiking	27 mi SE of the Okeechobee alternative site	Development likely limited within this area (FFWCC 2014-TN2977)
Okeechobee Battlefield State Park	Hiking, camping	9 mi SE of the Okeechobee alternative site	Development likely limited within this area (FDEP 2010-TN2971)
Archbold Biological Station	Ecological research station and preserve, organization owns and protects a 5,193 ac globally significant Florida scrub preserve located on the southern end of the Lake Wales Ridge	26 mi SW of the Okeechobee alternative site	Development likely limited within this area (Archbold Biological Station 2014-TN2954)
Lake Okeechobee	730 mi^2 freshwater lake, restoration and protection plan	7-37 mi S and SW of the Okeechobee	Ongoing, Florida Legislature in 2007 expanded the Lake

Table 9-16. (contd)

Project Name	Summary of Project	Location	Status
		alternative site	Okeechobee Protection Act (SFWMD 2014-TN2988)
Savannas Preserve State Park	Activities include bicycling, boating, horseback riding, picnicking, fishing, and hiking	38 mi E of the Okeechobee alternative site	Development likely limited within this area (FPS 2014-TN3050)
Fort Pierce Inlet State Park	Activities include bicycling, camping, boating, swimming, picnicking, fishing, and hiking	41 mi NE of the Okeechobee alternative site	Development likely limited within this area (FSP 2014-TN3053)
Pepper Beach State Recreation Area	Activities include swimming, picnicking, fishing, and hiking	41 mi NE of the Okeechobee alternative site	Development likely limited within this area (St. Lucie County 2014-TN3054)
St. Sebastian River Preserve State Park	Activities include bicycling, camping, boating, picnicking, fishing, and hiking	42 mi NE of the Okeechobee alternative site	Development likely limited within this area (FSP 2014-TN3055)
Hobe Sound National Wildlife Refuge	Activities include fishing, and hiking	49 mi NE of the Okeechobee alternative site	Development likely limited within this area (FWS 2013-TN3056)
Big Cypress National Preserve	Backcountry access plan to provide off-road vehicle secondary trails, non-motorized trails, and a camping management to the backcountry	31 mi NE of the Okeechobee alternative site	Proposed, backcountry access plan and EIS being developed by the NPS (NPS 2014-TN3754)
Kissimmee Prairie Preserve State Park	Activities include bicycling, horseback riding, camping, wildlife viewing, and hiking	21 mi NW of the Okeechobee alternative site	Development likely limited within this area (FSP 2201-TN3196)
Other State nature preserves and wildlife management areas	Public recreational activities	Throughout region	Development likely limited within these areas (FFWCC 2014-TN2981)
Comprehensive Everglades Restoration Plan Projects			
Indian River Lagoon -South	Project purpose is to improve surface-water management in the C-23/C-24, C-25, and C-44 basins for habitat improvement in the Saint Lucie River Estuary and southern portions of the	41 mi NE of the Okeechobee alternative site	Proposed, project in preconstruction, engineering and design phase (USACE and SFWMD 2014-TN3013)

Table 9-16. (contd)

Project Name	Summary of Project	Location	Status
	Indian River Lagoon.		
Everglades Agricultural Area Storage Reservoirs	The purpose of this project is to improve the timing of environmental deliveries to the Water Conservation Areas, including reducing damaging flood releases from the Everglades Agricultural Area to the Water Conservation Areas.	Throughout region	Proposed, Final Project Implementation Report submitted 2012 (USACE and SFWMD 2014-TN3011)
Lake Okeechobee Aquifer Storage and Recovery	A series of aquifer storage and recovery wells adjacent to Lake Okeechobee	6 mi SE of the Okeechobee alternative site	Proposed, project in preconstruction, engineering and design phase (USACE and SFWMD 2014-TN3014)
Lake Okeechobee Watershed Project	Project to increase aquatic and wildlife habitat, regulate extreme highs and lows in lake staging, reduce phosphorus loading, and reduce damaging releases to the surrounding estuaries	Throughout Okeechobee County	Proposed, project in preconstruction, engineering and design phase (USACE and SFWMD 2014-TN3015)
Melaleuca Eradication and other Exotic Plants	The project includes (1) upgrading and retrofitting the current quarantine facility in Gainesville, and (2) large-scale rearing of approved biological control organisms for release at multiple sites within the South Florida ecosystem to control Melaleuca, Brazilian pepper, Australian pine, and Old World climbing fern.	Throughout region	Operational, facility completed in 2013 (USACE and SFWMD 2014-TN3020)
Palm Beach County Agriculture Reserve Aquifer Storage and Recovery	Supplement water supplies for central and southern Palm Beach County by capturing and storing excess water currently discharged to	35 mi SE of the Okeechobee alternative site	Proposed, project in preconstruction, engineering and design phase (USACE and SFWMD 2014-TN3019)

Table 9-16. (contd)

Project Name	Summary of Project	Location	Status
	the Lake Worth Lagoon.		
Other Actions/Projects			
Herbert Hoover Dike Major Rehabilitation Project	Rehabilitation Project and Dam Safety Modification Study	3-40 mi S of the Okeechobee alternative site	Proposed, Notice of Intent to file EIS submitted by USACE in Feb. 2013 (78 FR 1164) (TN2991)
Comprehensive Shoreline Stabilization Project in Palm Beach County	Discharge fill for the purpose of shoreline stabilization	Shoreline of Palm Beach County	USACE submitted Notice of Intent in 2013 (78 FR 40128) (TN3059)
Kissimmee River Restoration	When restoration is completed in 2017, more than 40 mi^2 of river-floodplain ecosystem will be restored, including almost 20,000 ac of wetlands and 44 mi of historic river channel.	Along Kissimmee River	Ongoing (USACE 2014-TN3061)
Atlantic Sugar Association	Sugar manufacturing	41 mi SE of the Okeechobee alternative site	Operational (FDEP 2013-TN2964)
Southern Gardens Citrus Processing Corp.	Food production/distribution	37 mi S of the Okeechobee alternative site	Operational (FDEP 2013-TN2969)
United States Sugar Corporation Clewiston	Sugar manufacturing	35 mi S of the Okeechobee alternative site	Operational (EPA 2014-TN2963)
Harbor Branch Oceanographic Institute	Oceanic Science and Research	41 mi NE of the Okeechobee alternative site	Operational (EPA 2014-TN3071)
Pratt & Whitney	Aircraft engine and engine parts manufacturing	45 mi SE of the Okeechobee alternative site	Operational (EPA 2014-TN3062)
Maverick Boat Company	Fiberglass boat manufacturing	39 mi NE of the Okeechobee alternative site	Operational (EPA 2014-TN3063)
Tropicana Products, Inc.	Citrus and animal feed	34 mi NE of the Okeechobee alternative site	Operational (EPA 2014-TN3068)
S2 Yachts, Inc.	Fiberglass boat manufacturing	39 mi NE of the Okeechobee alternative site	Operational (EPA 2013-TN3069)

Table 9-16. (contd)

Project Name	Summary of Project	Location	Status
Twin Vee, Inc.	Fiberglass boat manufacturing	39 mi NE of the Okeechobee alternative site	Operational (EPA 2013-TN3070)
Avon Park Air Force Range	Military training facility	25 mi NW of the Okeechobee alternative site	Operational (APAFR 2014-TN3195)
Various wastewater-treatment plant facilities	Sewage treatment	Throughout region	Operational
Various hospitals using nuclear material	Medical and other industrial isotopes	Throughout region	Ongoing
Various water/ flood-management projects	Water and flood management	Throughout region	Ongoing (USACE 2012-TN1133)
Future urbanization	Construction of housing units and associated commercial buildings; roads, bridges, and rail; construction of water- and/or wastewater-treatment and distribution facilities and associated pipelines, as described in local land-use planning documents.	Throughout region	Construction would occur in the future, as described in State and local land-use planning documents

9.3.4.1 Land Use

The following analysis includes land-use impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable future actions that affect land use, including other Federal and non-Federal projects listed in Table 9-16. For the analysis of land-use impacts at the Okeechobee 2 site and the area within the transmission line corridors, the review team determined that a 10 mi radius, similar to that used for the proposed Turkey Point plant site, would encompass an effective geographic area of interest for cumulative impact assessment for land use. It would include the site and associated facilities and the city of Okeechobee 8 mi to the east. In evaluating the land-use impacts of using the Okeechobee 2 site, the review team used in addition to the project application, readily obtainable data from the Internet or published sources, including aerial photographs of the site and vicinity, USDA soils information, local zoning and planning documents, and FLUCFCS data. Impacts from both building and station operation are discussed.

Building and Operation Impacts

Okeechobee County is a rural county, largely devoted to agriculture and other rural land uses. Existing land uses in the vicinity of the Okeechobee 2 alternative site consist predominantly of agriculture. The nearest community is Okeechobee (2004 population under 5,500) (Okeechobee 2011-TN3308). the county seat of Okeechobee County, and the only incorporated city in Okeechobee County. The larger region is primarily devoted to agriculture, with scattered small rural communities. The closest population center with more than 25,000 population is Port St. Lucie, 80 mi to the east. The Okeechobee 2 alternative site is located approximately 2 mi east of the Kissimmee River and 7.6 mi northwest of Lake Okeechobee (Okeechobee 2011-TN3308).

Existing land uses at the Okeechobee 2 site consist of agriculture (FPL 2014-TN4058). No commercial mineral resources are identified in the site and vicinity (Calver 1956-TN3752; Spencer 1993-TN3753). No substantial areas of developed land uses occur on or within the vicinity of the site. Recreational areas, including the River Bluff Recreational Vehicle and Fishing Resort, are located to the west along the Kissimmee River. The Okeechobee County Comprehensive Plan identifies future land use on the FLUM (Okeechobee County 2012-TN3347) at and in the vicinity of the Okeechobee 2 alternative site as "Rural Estate" (1 unit per 5 ac) south of SR-70 and "Agriculture" north of SR-70.

A Rural Activity Center, the River Oaks Rural Activity Center, is identified on the Okeechobee County FLUM near the Okeechobee alternative site. The Okeechobee County Comprehensive Plan Future Land Use Element defines a Rural Activity Center as follows (Okeechobee County 2009-TN3348):

> Policy L1.4: **Rural Activity Center**: Rural Activity Centers accommodate low densities of development outside of the Urban Residential Mixed Use area. Public supply water and sewer facilities generally are not available, nor are they anticipated to be available during the planning period. Where appropriate or required, however, a developer may provide a package treatment plant or otherwise provide for adequate public supply potable water and sewage facilities. A Rural Activity Center generally acknowledges existing communities or subdivisions, and provides decentralized job creation and economic opportunities. A rural activity center can provide for self-supporting communities so as to reduce dependence on the one existing urban area in the County for all employment opportunities and goods and services. Accordingly, Rural Activity Centers allow for existing and future agricultural and residential uses, as well as for recreational, public, neighborhood commercial and light industrial uses that support or complement agricultural uses or residential and community development and that provide employment or economic opportunities. Specific locations of Rural Activity Centers are shown on the Future Land Use Map series and are intended to separate urban from non-urban uses. Additional Rural Activity Centers shall require an amendment to the Future Land Use Map series. The land uses and intensities of development permissible within a Rural Activity Center must meet the requirements of concurrency.

> A Rural Activity Center provides for agricultural, recreational, residential, neighborhood commercial and certain light industrial uses, subject to compatibility and buffering criteria provided in local land development regulations. Neighborhood commercial uses and, where permissible, light industrial uses, shall constitute no more than the greater of 30 acres or 5 percent of the total area of a Rural Activity Center; shall not exceed a floor area ratio of 1.0; and shall not exceed impervious surface coverage of 70 percent. Subject to density and intensity criteria as established by this Policy.

The Okeechobee County Comprehensive Plan provides for the following for the River Oaks Rural Activity Center:

> **River Oaks (J):** Residential development not to exceed a density of 1 unit per gross acre, agricultural, recreational and public uses.

The River Oaks Rural Activity Center would encompass the existing River Oaks development, through which roadways associated with the Okeechobee 2 alternative site would run, and for that reason, use of the Okeechobee 2 alternative site for a power plant may not be compatible with the Okeechobee County FLUM. For the other areas designated for rural residential land uses in the vicinity of the alternative site, the power plant use could be compatible, based on site design, but would represent a change of land use for the site and vicinity.

None of the soils on the plant site are considered by USDA to be Prime farmlands (USDA 2014-TN3349). Most of the soils in the vicinity of the plant site are not considered by USDA to be Prime farmlands, but small areas of soils in the vicinity are considered to be Unique farmlands (USDA 2014-TN3350). Unique farmland is defined in Section 2(c) of the Farmland Protection Policy Act (7 USC 4201 et seq.) (TN708) as "land, other than Prime farmland, that has combined conditions to produce sustained high quality and high yields of specialty crops, such as citrus, nuts, fruits, and vegetables when properly managed." Therefore, no Prime farmland soils and only a minimal amount of Unique farmland soils would be lost. No part of the site or vicinity falls within the Coastal Zone (FPL 2014-TN4058). As FPL states in its ER (FPL 2014-TN4058) and as shown on the Okeechobee County FIRM map Panel 175 of 275 dated February 4, 1981, portions of the plant site fall within the 100-year flood zone, and as FPL states in its ER (FPL 2014-TN4058) some areas would require unspecified amounts of fill.

Building and operation of the project at the Okeechobee 2 alternative site would result in the conversion of existing land uses, including approximately 149 ac from agriculture (on non-Prime farmlands) to power-generation uses as shown in Table 9-17 below. The new plant would also convert approximately 354 ac of other undeveloped lands to power-generation use. Roadways would run through approximately 40 ac of existing developed lands associated with the existing River Oaks housing and airport development (AirNav 2014-TN3309). The total land conversion on the site would be approximately 543 ac.

Table 9-17. Okeechobee 2 Alternative Site Land-Use Impacts (acres)

	Agricultural Lands (FLUCFCS 200 Land Use Series)	Urban Developed Lands (other than roads and pipelines)	Other Non-Agricultural Lands (all other FLUCFCS designations)	Total
Plant Site	45	0	275	320
Access Roads	50	40	22	112
Rail Corridor	35	0	12	47
Intake Pipeline Corridor	16	0	2	19
Makeup Pipeline Corridor	3	0	0.4	4
Stormwater-Retention Ponds	0	0	42	42
Total[(a)]	149	40	354	543
Transmission-Line Corridor	2,431	0	592	3,022
Grand Total	2,580	40	945	3,566

(a) Totals may not add due to rounding

Sources: FPL 2011-TN59 and FPL 2014-TN4058

Additional land-use impacts include possible additional growth and land conversions in the vicinity to accommodate new workers and services. Because the workforce would be dispersed over larger geographic areas in the labor supply region, the impacts from land conversion for residential and commercial buildings induced by new workers relocating to the local area can be absorbed in the wider region. Therefore, the review team concludes that such impacts would be minimal.

Approximately 38 mi of new transmission lines would have to be built to serve the plant. FPL states in its application (FPL 2014-TN4058) that some of the transmission lines would pass through the Coastal Zone. Approximately 3,022 ac of land would be at least temporarily affected. Of this land, approximately 2,431 ac are agricultural land, and the remainder is primarily open lands and roadways. The agricultural land within the transmission line corridors would be converted from agricultural use to transmission line use, although FPL states in its ER (FPL 2014-TN4058) that agriculture could continue within and along the transmission line rights-of-way.

Under the Florida Site Certification application process explained in Chapter 4.1, the State approves a corridor and the applicant chooses a specific right-of-way within the approved corridor. The objective of this process, as stated in the electrical power plant and transmission line statute (Fla. Stat. 29-403.501 2011-TN1068) is "that the location of transmission line corridors and the construction, operation, and maintenance of electric transmission lines produce minimal adverse effects on the environment and public health, safety, and welfare" and "to fully balance the need for transmission lines with the broad interests of the public in order to effect a reasonable balance between the need for the facility as a means of providing reliable, economical, and efficient electric energy and the impact on the public and the environment resulting from the location of the transmission line corridor and the construction, operation, and maintenance of the transmission lines." FPL states in its application that, in its development of the conceptual transmission line corridor for the Okeechobee 2 alternative site, it attempted to select corridors that would allow collocation with existing transmission line corridors and avoided populated areas or residential land uses to some extent (FPL 2014-TN4058). The State certification review process also includes a determination of land-use consistency with local land-use plans and zoning ordinances (Fla. Stat. 29-403.50665-TN1470).

The review team concludes that the land-use impacts from building and operating two new nuclear units at the Okeechobee 2 alternative site would noticeably change the predominantly rural and agricultural character of the surrounding landscape and potentially result in conflicts with nearby rural residential and recreational areas, especially those associated with the River Oaks Rural Activity Center.

Cumulative Impacts

The review team expects that the principal contribution to cumulative land-use impacts in the geographic area of interest defined for the Okeechobee 2 site would be from the two subject nuclear units. There are no other reasonably foreseeable projects in the geographic area of interest with the potential to substantially contribute to cumulative land-use impacts. The Okeechobee County FLUM designates the land surrounding the Okeechobee 2 site for activities typical of rural areas. Other linear projects are proposed for lands near the proposed conceptual corridors for the transmission lines, including the Florida Gas Transmission Phase VIII Expansion Project. However, the review team expects that these corridors would have only a minimal cumulative land-use impact.

Summary Statement

Based on the information provided by FPL and the review team's independent review, the review team concludes that the cumulative land-use impacts of building and operating the power plant at the Okeechobee 2 alternative site would be MODERATE. Building and operating the proposed nuclear units at the Okeechobee 2 site would be a significant, and the principal, contributor to these impacts.

9.3.4.2 Water Use and Quality

The following impact analysis includes impacts from building and operating two new nuclear units at the Okeechobee 2 site. The analysis also considers other past, present, and reasonably foreseeable future actions that affect water use and quality, including the other Federal and non-Federal projects listed in Table 9-17. The Okeechobee 2 site is located in rural Okeechobee County in Florida near the Kissimmee River, which flows into Lake Okeechobee.

The geographic area of interest for surface water at the Okeechobee 2 site is the Kissimmee-Okeechobee-Everglades watershed because this is the resource that would be affected if the proposed project were located at the Okeechobee 2 site. The Kissimmee-Okeechobee-Everglades watershed includes an area of about 9,000 mi^2 (McPherson and Halley 1996-TN98). For groundwater, the ROI includes 1) the surficial aquifer and the Upper Floridan aquifer at the site, 2) the APPZ of the Middle Floridan aquifer upgradient and downgradient of the site for water withdrawals, and 3) and the Boulder Zone of the Lower Floridan aquifer upgradient and downgradient of the site for disposal of blowdown water.

Building Impacts

Water use for building activities at the Okeechobee 2 site would be comparable to proposed water use for building activities for the Turkey Point site. During building, the peak water use is estimated to be 565 gpm (0.8 Mgd) (see Table 3-4). The review team assumes that water for building the two units at the Okeechobee 2 site would come from a combination of surface water and groundwater. Surface water from the Kissimmee River may be available for building purposes during times of high river flows. The peak water-use rate of 0.8 Mgd during the building phase is inconsequential when compared to the historic average monthly flow in the Kissimmee River; the water use rate is less than 1 percent of the river discharge for even the lowest month reported (January 1963). Surface water from onsite stormwater ponds and groundwater from excavation dewatering may also be used, when available, for building purposes. Groundwater from the surficial aquifer would be used for building purposes when excess surface water is not available. The SFWMD would regulate any use of surface or shallow groundwater for plant construction.

The review team concludes that the impact of using surface-water and groundwater for building the proposed units at the Okeechobee 2 site would be minimal for the following reasons:

- Withdrawal is inconsequential compared to the water resources in the Lake Okeechobee watershed.
- Any use of surface water or shallow groundwater would be regulated by SFWMD and limited to time periods when there would not be a negative impact on the Lake Okeechobee system or shallow aquifers.
- Water use for building would be limited to the building period and the peak use of 0.8 Mgd is much less than the average 46.51 Mgd groundwater withdrawal rate reported for Okeechobee County in 2005 (Marella 2009-TN1521).

The review team assumes that the impact of dewatering the excavations needed for building two units at the site would be managed through the installation of diaphragm walls and grouting as proposed for the Turkey Point site. Therefore, because groundwater withdrawal caused by dewatering would be controlled, the review team determined that there would be little or no impact on groundwater resources.

Surface-water quality would potentially be affected by surface-water stormwater runoff during site preparation and the building of the facilities. The FDEP would require FPL to develop an erosion and sediment control plan before initiation of site-disturbance activities (SWPPP) (FPL 2014-TN4058).

The plans would identify BMPs to control the impacts on surface-water quality caused by stormwater runoff. The review team anticipates that FPL would construct new detention/infiltration ponds and drainage ditches to control delivery of sediment from the disturbed area to onsite waterbodies. Sediment carried with stormwater from the disturbed area would settle in the detention ponds and the stormwater would infiltrate into the shallow aquifer. Implementation of BMPs should minimize impacts on surface waterbodies near the Okeechobee 2 site. Therefore, the surface-water−quality impacts near the Okeechobee 2 site would be temporary and minimal.

While building new nuclear units at the Okeechobee 2 site, groundwater quality may be affected by leaching of spilled effluents into the subsurface. The review team assumes that the BMPs FPL has proposed for the Turkey Point site would be in place during building activities and therefore the review team concludes that any spills would be quickly detected and remediated. In addition, groundwater impacts would be limited to the duration of these activities, and therefore, would be temporary. The review team reviewed the general BMPs that could be expected to be required at such a site (State of Florida 2014-TN3637). Because any spills related to building activities would be quickly remediated under BMPs, and the activities would be temporary, the review team concludes that the groundwater-quality impacts on the surficial aquifer from building at the Okeechobee 2 site would be minimal.

Wastewater streams from building activities could be injected to the Boulder Zone of the Lower Floridan aquifer as planned at Turkey Point (FPL 2014-TN4058). Construction and operation of the disposal wells would be performed under the conditions of a UIC permit issued by the FDEP, with the objective of protecting water quality within the APPZ and overlying aquifers.

Operations Impacts

FPL (2014-TN4058) indicates that the water needed to operate two units would be approximately 50,000 gpm or 72.7 Mgd. As indicated in Chapter 3, evaporative losses from cooling two units would be approximately 28,800 gpm (41.5 Mgd).

The review team assumed that the two units at the Okeechobee 2 site would primarily use brackish groundwater from the APPZ within the Avon Park formation for makeup-cooling water. This relatively permeable zone is considered part of the Middle Floridan aquifer and is more than 1,000 ft below the ground surface near the Okeechobee 2 site. The SFWMD has informed the NRC that consumptive use of surface water from Lake Okeechobee or its tributaries would be limited (SFWMD 2012-TN3814). Use of water from the Lake Okeechobee or the Kissimmee River would also have to avoid any negative impact on restoration projects including the Kissimmee River Restoration Project. Surface water could potentially be used only at times of excess surface-water flow that typically occur during the wet season.

The APPZ aquifer is not generally used because of the salinity of its water (FPL 2013-TN3052). Therefore, current impacts of using this water for power production are minor. Because brackish or saline groundwater is not in demand, use of this resource would not result in water-use conflicts. However, groundwater in the Middle Floridan aquifer at this site is a potential source of brackish water for desalinization. If demand for desalinization source water increases, water for the plant may be obtained from deeper, more saline formations.

Blowdown discharge and other wastewater streams would be pumped into the Boulder Zone of the Lower Floridan aquifer. The Boulder Zone is isolated from the Avon Park permeable zone by low-permeability units. Additional low-permeability confining units separate the Avon Park permeable zone from the overlying Upper Floridan aquifer. Construction and operation of the disposal wells would be performed under the conditions of a UIC permit issued by the FDEP.

As indicated in Chapter 3, the consumptive water use due to evaporative losses from cooling two units would be approximately 28,800 gpm (41.5 Mgd). However, the review team assumed that surface water would only be consumed during periods of excess flow, thereby precluding water-use conflicts.

During the operation of two new nuclear units at the Okeechobee 2 site, impacts on surface-water quality would be minimal because wastes would be injected into the Boulder Zone and not released to the surface water. FPL has also indicated it would capture rainfall runoff to use in the cooling-water system (FPL 2013-TN3052), thereby minimizing the amount of discharge to surface water from stormwater runoff. The FDEP would require FPL to develop a SWPPP (FPL 2014-TN4058). These plans would identify measures to be used to control stormwater runoff. All discharges to surface waterbodies would be required to comply with limits established by FDEP in a NPDES permit.

During the operation of the two units at the Okeechobee 2 site, impacts on groundwater quality could result from potential spills. Spills that might affect the quality of groundwater would be prevented and mitigated by BMPs. Like the proposed site, any wastewater at this inland alternative site would be combined with cooling-tower blowdown and discharged into the Boulder Zone with no loss of beneficial uses of the water resource.

Cumulative Impacts

In addition to water-use and water-quality impacts from building and operations activities, cumulative analysis considers past, present, and reasonably foreseeable future actions that affect the same water resources.

For the cumulative analysis of impacts on surface water and groundwater at the Okeechobee 2 site, the geographic area of interest is the same as what was considered for building and operational impacts, and was defined earlier in this section.

Actions that have past, present, and future potential impacts on water supply and water quality near the Okeechobee 2 site include existing agriculture and existing and future urbanization in the region.

<u>Cumulative Impacts on Water Use</u>

The impacts of the other projects listed in Table 9-17 are considered in the analysis included above or would have little or no adverse impact on surface-water use. The projects believed to have little impact are excluded from the analysis either because they are too distant from the Okeechobee 2 site, use relatively little or no surface water, or have little or no discharge to surface water. Some projects (for example park and forest management) are ongoing, and changes in their operations that would have large impacts on surface-water use appear unlikely.

In 2000, the Florida Legislature passed the Lake Okeechobee Protection Act to establish a restoration and protection program for the lake (SFWMD et al. 2011-TN3087; SFWMD 2010-TN3086). Part of the focus of this act was to restore the natural hydrology of the system after years of altering the natural drainage around the lake to permit development of the land and to reduce flood damage. The State of Florida and the Federal government are spending hundreds of millions of dollars to restore the Lake Okeechobee and other water resources in the watershed; therefore, the review team concluded that the cumulative impact on surface-water use would be MODERATE.

Surface-water use during the building and operation of two units at the Okeechobee 2 site would consist of occasional water use for building and operations. As discussed above, surface water would only be withdrawn during periods of excess flow, such as storm runoff. Therefore, the review team concluded that building and operating the proposed units at the Okeechobee 2 site would not be a significant contributor to the MODERATE impacts on surface-water use.

As stated above, the review team assumed that any use of shallow groundwater to build the units at the Okeechobee 2 site would be regulated by the SFWMD. If this source is not available in sufficient quantity for building activities, brackish groundwater from the APPZ could be used for some building activities. Groundwater impacts from dewatering would be controlled with diaphragm walls and grouting. Brackish groundwater from the APPZ would be used to operate the plant except when excess surface water is available. The APPZ aquifer is not generally used because of the salinity of its water (FPL 2013-TN3052). Because brackish or saline groundwater is not in demand, use of this resource would not result in water-use conflicts.

The impacts of the other projects listed in Table 9-17 are considered elsewhere in this analysis or else would have little or no adverse impact on groundwater use. The projects believed to have little impact are excluded from the analysis either because they are too distant from the Okeechobee 2 site, or use relatively little or no groundwater. Some projects (for example park and forest management) are ongoing, and changes in their operations that would have large impacts on groundwater use appear unlikely. Therefore, the review team concludes that cumulative impacts on groundwater use would be SMALL.

Cumulative Impacts on Water Quality

Point and non-point discharges have affected the surface-water quality of the Lake Okeechobee watershed and the Kissimmee River upstream and downstream of the site. Water-quality information presented above for the impacts of building and operating the proposed new units at the Okeechobee 2 site would also apply to evaluation of cumulative impacts. The Kissimmee River appears on Florida's list of impaired waters because of the presence of nutrients, fecal coliform, depressed dissolved oxygen, copper, and mercury in fish tissue (FDEP 2014-TN4139). Lake Okeechobee has been the target of extensive efforts to reduce nutrient loading and improve water quality (SFWMD et al. 2011-TN3087). Therefore, the review team concluded that the cumulative impact on surface-water quality of the receiving waterbody would be MODERATE. During the operation of two new nuclear units at the Okeechobee 2 site, impacts on surface-water quality from the units would be minimal because plant discharges would be injected into the Boulder Zone and not released to the surface water. The State of Florida requires an applicant to develop a SWPPP (FPL 2014-TN4058) and all discharges to surface waterbodies would be required to comply with limits established by FDEP in a NPDES permit. Such permits are designed to protect water quality. The SWPPP would identify measures to be used to control stormwater runoff (FPL 2014-TN4058).

The review team concluded that building and operating the proposed units at the Okeechobee 2 site would not be a significant contributor to the MODERATE impacts on surface-water quality, because industrial and wastewater discharges from the proposed units would be discharged directly to the Boulder Zone and any stormwater runoff from the site during operations would be managed in compliance with the SWPPP (FPL 2014-TN4058).

The APPZ aquifer is not generally used due to the salinity of the water (FPL 2013-TN3052). Because brackish or saline groundwater is not in demand, use of this resource would not result in water-use conflicts. The review team also concludes that with the implementation of BMPs, the impacts on shallow groundwater quality from building and operating two new nuclear units at the Okeechobee 2 site would likely be minimal. Therefore, the cumulative impact on groundwater quality would be SMALL. The impacts of other projects listed in Table 9-17 are either considered in the analysis included above or would have little or no impact on surface-water and groundwater quality.

9.3.4.3 Terrestrial and Wetland Resources

The following section addresses potential impacts on terrestrial resources from siting two new nuclear units on the Okeechobee 2 site and a conceptual transmission line corridor. A new corridor would have to be built crossing Okeechobee and St. Lucie Counties that would tie into an existing corridor that crosses Martin and Palm Beach Counties. Most of the Okeechobee 2 site has been disturbed and is primarily used for pasture. Primary land-cover classes include improved pasture, unimproved pasture, woodland pasture, wet prairie, freshwater marsh, mixed wetland hardwoods, and citrus groves. These major land-cover classes compose most of the proposed footprint for the plant, access road, rail corridor, and pipeline corridor as well as most of the new portion of the conceptual transmission line corridor (FPL 2011-TN59).

Information from the FWS indicates Okeechobee County hosts 11 terrestrial species listed as Federally endangered or threatened. Additional listed species occur in St. Lucie, Martin, and Palm Beach Counties through which the transmission line would pass. Surveys were not conducted at the Okeechobee 2 site or within conceptual transmission line corridors to determine the presence and distribution of listed species. To develop Table 9-18, the review team determined the likelihood of occurrence of listed species based on the habitat preferences of each species and the land-cover types expected. Habitat preferences for Audubon’s crested caracara, the Florida grasshopper sparrow, Everglade snail kite, Florida scrub jay, ivory-billed woodpecker, red-cockaded woodpecker, wood stork, whooping crane, Florida panther, and eastern indigo snake were discussed in the Glades alternative site section. Therefore only Florida bonneted bat (*Eumpos floridanus*) habitat preferences are discussed below.

Relatively little is known about habitat preferences of the Florida bonneted bat. This bat species roosts in both natural and artificial structures including hollow trees, palm leaves, rock crevices, and artificial bat houses (78 FR 61004) (TN2659). They forage for flying insects high over freshwater wetlands, streams, and ponds. They are generally associated with pinelands, but have been observed in forested, suburban, and urban landscapes in South Florida.

Recreationally important species observed on the nearby Kissimmee River Public Use Area and expected to occur on the Okeechobee 2 site include white-tailed deer, feral hog, raccoon, turkey, opossum (*Didelphis virginiana*), gray squirrel (*Sciurus carolinensis*), armadillo (*Dasypus novemcinctus*), beaver (*Castor canadensis*), coyote, bobcat, mourning dove, and bobwhite quail (FFWCC 2014-TN3004). Numerous waterfowl species would also be expected to occur in suitable habitats on the Okeechobee 2 site.

Table 9-18. Federally Listed Terrestrial Species that May Occur on the Okeechobee 2 Site or within the Conceptual Transmission-Line Corridor

Scientific Name	Common Name	Federal Status
Birds		
Polyborus plancus audubonii	Audubon's crested caracara	Threatened
Ammodramus savannarum floridanus	Florida grasshopper sparrow	Endangered
Rostrhamus sociabilis plumbeus	Everglade snail kite	Endangered
Aphelocoma coerulescens	Florida scrub jay	Threatened
Campephilus principalis	Ivory-billed woodpecker	Endangered
Picoides borealis	Red-cockaded woodpecker	Endangered
Mycteria americana	Wood stork	Threatened
Grus americana	Whooping crane	Endangered
Dendroica kirdlandii	Kirtland's warbler[(a)]	Endangered
Charadrius melodus	Piping plover[(a)]	Threatened
Calidris canutus rufa	Red knot[(a)]	Proposed Threatened
Mammals		
Eumops floridanus	Florida bonneted bat	Endangered
Puma concolor coryi	Florida panther	Endangered
Peromyscus polionotus niveiventris	Southeastern beach mouse[(a)]	Threatened
Reptiles		
Drymarchon corais couperi	Eastern indigo snake	Threatened
Invertebrates		
Cyclargus thomasi bethunebakeri	Miami blue[(a)]	Endangered
Strymon acis bartrami	Bartram's scrub-hairstreak[(a)]	Proposed Endangered
Anaea troglodyte floridalis	Florida leafwing[(a)]	Proposed Endangered
Plants		
Jacquemontia reclinata	Beach jacquemontia[(a)]	Endangered
Asimina tetramera	Four-petal pawpaw[(a)]	Endangered
Cucurbita okeechobeensis ssp. okeechobeensis	Okeechobee gourd[(a)]	Endangered
Polygala smallii	Tiny polygala[(a)]	Endangered
Cladonia perforata	Florida perforate cladonia[(a)]	Endangered

(a) Additional listed species occurring in Palm Beach County (FWS 2014-TN3759).

Building Impacts

Typical impacts from building nuclear units include permanent and temporary habitat loss from development, habitat fragmentation and degradation, disturbance and displacement of individuals, exposure of wildlife to increased noise levels and human presence, and increased risk of vehicle collision mortality. The conversion of fully developed and stable plant communities to earlier successional communities dominated by lower growing vegetation during development of linear transmission or pipeline corridors often results in a high degree of habitat fragmentation within the landscape.

FPL assumed a 362 ac area within the Okeechobee 2 site for evaluating potential impacts of building two new nuclear power reactors and associated stormwater ponds and other infrastructure plus an additional 3,000 ac for a cooling-water storage reservoir (FPL 2014-TN4058). The review team determined, however, that cooling water could be obtained from groundwater beneath the Okeechobee 2 site and that the cooling-water storage reservoir was unnecessary. FPL stated offsite facilities and development would also be required to construct and operate nuclear power plants at the Okeechobee 2 site. These include a 9.3 mi access road, 3.9 mi rail line, and pipeline corridors connecting the Kissimmee River to the site. The access road would add approximately 112 ac to the project footprint, the rail line would add approximately 47 ac, and the intake/makeup pipeline corridors would add approximately 23 ac. Because impacts from the plant area, access road, rail line, pipeline corridors, and stormwater-retention ponds result in permanent habitat loss they are discussed first.

Plant Facilities

If the plant facilities, access road, rail line, and pipelines were built within the proposed footprint, FPL estimated 543 ac would be affected (Table 9-19). Most of the affected habitat consists of wet prairie, improved pasture, and freshwater marsh (FPL 2011-TN59).

Table 9-19. Acreage within the Conceptual Footprint at the Okeechobee 2 Site

FLUCFCS Code	Description	Site and Non-Transmission (ac)	Transmission (ac)
200-series	Agriculture	190	2,431
300-series	Uplands	5	22
400-series	Forest	1	25
500-600 series	Water and Wetlands	306	545
100, 700, and 800 series	Developed	40	0
Total		542	3,023

Source: FPL 2011-TN59

Surveys of the occurrence, abundance, and distribution of Federally listed species have not been performed for the Okeechobee 2 site. Most of the listed species that occur in Okeechobee County could potentially occur on the Okeechobee 2 site, because suitable habitats are likely present. The exception is the ivory-billed woodpecker because there are no large tracts of old-growth forested wetlands present. The Federally listed species that could be affected most by the building of two nuclear plants at the Okeechobee 2 site are Audubon's crested caracara, Florida grasshopper sparrow, and the whooping crane because of the loss of a combined 403 ac of wet prairie and improved pasture. However, the Florida grasshopper sparrow is only known to occur in Okeechobee County at the Kissimmee Prairie Preserve State Park approximately 20 mi north of the Okeechobee 2 site, so this species may not be affected by habitat loss at the site (FWS 2008-TN2516). Loss of freshwater wetlands could reduce foraging habitat for the wood stork because the Okeechobee 2 site lies within the core foraging area of an active wood stork colony (FWS 2014-TN3732). Loss of freshwater wetlands could also reduce the amount of habitat available to the Everglade snail kite, whooping crane, and the

Florida bonneted bat. Dry prairies in the vicinity are interspersed with oak and could be suitable habitat for the Florida scrub jay, but only 2.1 ac of dry prairie would be lost (FPL 2011-TN59). Eastern indigo snakes are habitat generalists, are widely distributed, and likely occur on the Okeechobee 2 site. They would be prone to increased mortality from land clearing and increased traffic during construction and operation. As with use of the Turkey Point site, mitigation requirements by the FFWCC, including staff awareness training and reporting, would minimize negative impacts on the eastern indigo snake. Habitat loss would also affect local populations of wildlife expected to occur within the region in suitable habitat that are not Federally listed. However, these effects are not expected to be noticeable and would not destabilize even local populations of any of these animals.

Transmission Lines

FPL assumed a new 38 mi long conceptual transmission line corridor from the Okeechobee 2 site to an existing corridor would be necessary to service power plants at the Okeechobee 2 site. FPL estimated this corridor would occupy 3,022 ac of additional land (Table 9-19). The conceptual transmission line corridor is dominated by pasture cover; over half is improved pasture, which covers 1,611 ac. Unimproved pasture covers an additional 302 ac, and woodland pastures cover another 281 ac. The sum of these pasturelands is almost 73 percent of the corridor. The remaining area includes additional uplands as well as wetlands. Uplands that are currently used for agriculture include 122 ac of citrus groves, 79 ac of field crops, and 36 ac of dairies. Undeveloped uplands within the corridor include 22 ac of dry prairie, 17 ac of live oak forest, 10 ac if hydric pine flatwoods, 6 ac of hardwood-coniferous forest, 2 ac of pine flatwoods, and a minor amount shrub and brushland. Wetland cover within the corridor includes 196 ac of freshwater marsh, 91 ac of wet prairie, 50 ac of mixed forested wetlands, 13 ac of cypress, and minor amounts of small waterways (ditches and streams). Impacts of the transmission line corridor on habitat are mostly alteration and fragmentation. Trees would be removed from at least 558 ac of forest cover within the corridor and replaced with low-growing vegetation, including 244 ac of various forested wetland cover types (FPL 2011-TN59).

Because the conceptual transmission line corridor passes through a portion of St. Lucie, Martin, and Palm Beach Counties as well as Okeechobee County, the review team also considered impacts on Federally listed species and those species proposed for Federal listing known to occur in either county. The piping plover, red knot, Florida grasshopper sparrow, southeastern beach mouse, Miami blue butterfly, Bartram's scrub-hairstreak butterfly (*Strymon acis bartrami*), Florida leafwing butterfly (*Anaea troglodyte floridalis*), beach jacquemontia, Florida perforate cladonia, four-petal pawpaw, tiny polygala, and the Florida prairie-clover are not expected to occur near the conceptual transmission line corridor and would not be affected.

Although a substantial portion of the conceptual transmission line corridor is likely suitable habitat for Audubon's crested caracara, the installation and operation of transmission lines would not result in the permanent loss of all of the pasturelands. Habitat within the footprint of the tower pads and access road would be permanently lost but represents a small portion of the actual corridor. The likelihood of non-native plants being accidentally introduced would also increase and could result in habitat alteration. Approximately 196 ac of the corridor would be freshwater marsh, the primary habitat for the Everglade snail kite and whooping crane that is also used by wood storks (FPL 2011-TN59). Building a transmission line and access road through marsh habitat could lower habitat value by altering surface-water flow and increasing potential erosion. Removal of trees from the corridor could reduce nest sites within the freshwater marsh habitat for these three species. Elimination of trees from the live oak cover would measurably degrade the value of oak habitat to the Florida scrub jay, but this would only affect 17 ac (FPL 2011-TN59). The removal of trees from 18 ac of hardwood-coniferous forest, hydric pine flatwoods, and pine flatwoods could also lower the value of these habitats for the red-cockaded woodpecker. Removal of trees from the landscape could also result in less roosting habitat for the Florida bonneted bat. The Corbett substation is located southeast of Lake Okeechobee within a FWS Florida panther management zone. The landscape immediately around the substation and toward Lake Okeechobee appears to be used almost exclusively for agriculture. The installation of transmission lines here would likely not fragment potential panther habitat because the land-cover information within the corridor indicated it would not pass through the DuPuis Wildlife and Environmental Area, J.W. Corbett Wildlife Management Area, or the Arthur R. Marshall Loxahatchee National Wildlife Refuge. The eastern indigo snake inhabits many upland habitats. Conversion of habitats from forest to low-growing vegetation would not necessarily decrease habitat suitability for this species, and increased heterogeneity within the landscape may actually increase habitat quality. FPL stated field surveys would be conducted for Federally listed and State-protected species as part of the permitting process before any preconstruction activities would occur at the Okeechobee 2 site (FPL 2014-TN4058). Site-preparation activities would be conducted in accordance with all Federal and State regulations, permit conditions, and BMPs, including the use of directed drainage ditches and silt fencing. Acreage within the conceptual transmission line corridor was minimized to the extent possible by using the most direct route while avoiding areas with important resources and high biological value. FPL also stated that any wetland functions affected within the transmission line corridor would be replaced or restored.

Operations Impacts

Operation of two nuclear units at the Okeechobee 2 site would create noise, fogging and dissolved solid deposition from cooling towers, runoff from increased impermeable surfaces, light pollution, and increased vehicle collision mortality for local wildlife populations. Operation of transmission lines could increase the risk of collision and electrocution mortality, especially for whooping cranes and wood storks.

The review team assumed the facility configuration would be similar to building at the Turkey Point site. Operational noise from the cooling towers may displace individual animals from the immediate vicinity of the cooling towers. Salinity within cooling water obtained from groundwater beneath the Okeechobee 2 site is assumed by the staff to be equal to seawater. Vapor leaving a cooling tower contains dissolved solids including salt, and some vegetation can be sensitive to salt deposition. The review team also assumed salt deposition from cooling-tower drift at the Okeechobee 2 site would be similar in scale and intensity to deposition at the Turkey Point site. Most of the salt would likely be deposited on developed land near the cooling towers, and concentrations as high as 10 kg/ha/mo that have resulted in observable effects on sensitive plant species could be expected as far as 1.25 mi from the cooling towers. Unlike Turkey Point, the Okeechobee 2 site is located inland, and vegetation growing there would not be expected to be as tolerant to atmospheric-deposited salt. Some sensitive vegetation could be affected by salt drift, but the spatial extent would be limited and the climate of South Florida would quickly dissipate salt deposited in the landscape.

The creation of impermeable surfaces and a stormwater runoff management system at the Okeechobee 2 site would likely result in changes in the surface-water flow pattern. Increases or decreases in the amount and timing of flow could result in changes in vegetative cover but would be limited to areas immediately surrounding developed areas. There is little relief at the site, so the potential for erosion and siltation of surrounding wetlands would be low. However, pollutants could be transported by runoff into the surrounding wetlands.

Light pollution during facility operation could affect wildlife residing on or migrating through the Okeechobee site. Design criteria could include minimization of upward lighting, turning off unnecessary lighting between 11 p.m. and sunrise, and luminary selection and mounting to provide light only where needed (FPL 2014-TN4058). If these actions are taken, the review team expects that impacts from light pollution on wildlife would be minimal.

A nonmigratory population of endangered whooping cranes has been established at the Kissimmee Prairie in central Florida approximately 20 mi north of the Okeechobee 2 site (58 FR 5647–5658) (TN3324). This population is officially designated as an experimental nonessential population. The Chassahowitzka National Wildlife Refuge approximately 140 mi northwest of the Okeechobee 2 site also supports migratory whooping cranes during the winter. Whooping cranes travel long distances and the conceptual transmission line corridor supporting the Okeechobee 2 site contains suitable whooping crane habitat. Transmission lines connecting the site to the Corbett substation in Palm Beach County would have to pass through core foraging areas of multiple wood stork nesting colonies (FWS 2014-TN3732). However, like the whooping crane, the risk of collision and electrocution mortality for the wood stork increases if transmission lines are operated within their range and there is suitable habitat within the transmission right-of-way. The level of risk is commensurate with the location of the transmission lines and wood stork nesting colonies, foraging habitat, and travel corridors. The review team assumed the FWS would regulate wire installation near wood stork colonies, foraging habitat, and flight corridors as it would at the Turkey Point site, but it could still affect local wood stork and snail kite populations. Operational effects on other important species would be minimal.

EMFs are unlike other agents that have an adverse impact (e.g., toxic chemicals and ionizing radiation) in that dramatic acute effects cannot be demonstrated and long-term effects, if they exist, are subtle (NRC 2013-TN2654). A careful review of biological and physical studies of EMFs did not reveal consistent evidence linking harmful effects with field exposures (NRC 2013-TN2654). The impacts of EMFs on terrestrial flora and fauna are of small significance at operating nuclear power plants, including transmission systems with variable numbers of power lines and lines energized at levels less than 765 kV (NRC 2013-TN2654). Since 1997, more than a dozen studies have been published that looked at cancer in animals that were exposed to EMFs for all or most of their lives (Moulder 2005-TN1329). These studies have found no evidence that EMFs cause any specific types of cancer in rats or mice (Moulder 2005-TN1329). Therefore, the incremental EMF impact posed by operation of existing transmission lines and the addition of new lines for two new nuclear units would be negligible at the Okeechobee 2 alternative site.

Transmission-line corridor vegetation-management activities (cutting and herbicide application) and related impacts on floodplains and wetlands in transmission line corridors are of minor significance at operating nuclear power plants, including those with transmission line corridors of variable widths (NRC 2013-TN2654). Consequently, the incremental effects of transmission line corridor maintenance and associated impacts on floodplains and wetlands for two new nuclear units would be negligible at the Okeechobee 2 site.

Cumulative Impacts

The geographic area of interest for the assessment of the potential cumulative impacts of building and operating a new reactor at the Okeechobee 2 site and other past, present, and reasonably foreseeable future actions on terrestrial resources and wetlands is defined as being the 50 mi radius around the Okeechobee 2 site. A list of past, present, and reasonable foreseeable actions within 50 mi of the Okeechobee 2 site is presented in Table 9-16. This list includes a variety of energy-production projects, mining, manufacturing, transportation and infrastructure-development projects, set-aside areas for recreation and conservation, CERP-related projects, and other miscellaneous activities that could affect terrestrial and wetland resources.

Past land use in South Florida, especially agriculture and more recently urbanization, has greatly affected the distribution and abundance of unfragmented plant and wildlife habitats still remaining. Development and urbanization of higher elevation lands has further reduced the amount of valuable upland habitats remaining in the landscape. Ditching and draining created more dry land, reducing the amount of wetlands available as habitat and fragmenting the natural landscape. The continued operation and maintenance of existing facilities would likely not exacerbate the current situation with respect to terrestrial and wetland ecosystems. Mining activities have the potential to expand their footprint and development in general on the landscape, as does continued human population growth in South Florida. Lands set aside for recreation and conservation provide buffers against development, provide habitat for plants and animals, and serve to preserve the ecosystem remaining in South Florida. Projects that continue to incrementally reverse changes in land cover due to man-made changes in surface-water flow, including CERP-related activities, would continue to benefit the terrestrial and wetland ecology of the region.

As described in Chapter 7, terrestrial and wetland environments in South Florida may also be affected by continued population growth and related development. The overall impact from past, present, and reasonably foreseeable future activities on regional terrestrial and wetland ecology is substantial.

Summary Statement

Fragmentation and loss of natural habitats from agriculture and urbanization have changed and will continue to change the ecology of South Florida. Although much of the landscape around the Okeechobee 2 site has already been converted to pastures, the Okeechobee 2 site is still dominated by wetland habitats. Habitats of significant ecological value in South Florida that would be affected by the construction and operation of new nuclear units at the Okeechobee 2 site include freshwater marsh, wet prairie, and bay swamp. Based on the information provided by FPL and the review team's independent evaluation, the review team concludes that the cumulative impacts on terrestrial and wetland resources of building and operating two new nuclear units at the Okeechobee 2 alternative site, including impacts attributable to permanent conversion of habitat for the facility footprint as well as operation of the cooling tower and transmission lines, would be MODERATE. The incremental effect of the building and operation of two new nuclear units at the Okeechobee 2 site would be a significant contributor to this impact primarily because of the impacts on wetlands and intact upland habitat.

9.3.4.4 Aquatic Resources

What follows is an assessment of the potential impacts on aquatic resources that may occur if the two nuclear units described in FPL (2014-TN4058) were constructed and operated at the Okeechobee 2 site. Based on a review of potential cooling-water sources discussed in Section 9.3.4.2, the review team assumes no cooling ponds or reverse osmosis facilities would be required for the Okeechobee 2 site.

Okeechobee 2 is a 3,000 ac site is located in Okeechobee County approximately 8 mi west of the town of Okeechobee (Figure 9-17). The property is not owned by FPL, and is currently used to support cattle and dairy operations, and citrus production. The Kissimmee River is 2 mi west of the site, and Lake Okeechobee is approximately 8 mi southeast. As described by FPL, the proposed facility would occupy approximately 362 ac, and the conceptual transmission line corridor would extend 38 mi and encompass approximately 3,022 ac. The site would also require approximately 112 ac for access roads, 47 ac for a rail line, and 23 ac for a pipeline extending from the plant to the Kissimmee, where cooling water would be withdrawn from a surface-water intake during high-flow events. Groundwater would be used for reactor cooling at other times. Several hundred additional acres may be required to support construction activities, including laydown areas, batch plants, and fill or spoil areas.

As described elsewhere in this draft EIS, South Florida has undergone significant development and channelization to enable development and industry. Beginning in the 1960s and early 1970s, the Kissimmee River was channelized and two-thirds of its floodplain was drained, and excavation of the canal and spoils disposal destroyed one-third of the river channel. These actions degraded the natural environment, significantly affected ecosystem function, and resulted in declines of waterfowl, wading birds, and fish. Subsequently, restoration actions by the USACE and others are occurring, with the goal of reestablishing the river's historical hydrological patterns, creating more natural fluctuations of water levels, and enhancing fish and wildlife habitat.

Commercial and Recreational Species

Given its hydrological connection to Lake Okeechobee, aquatic species found in the Kissimmee River in the vicinity of the Okeechobee 2 site will likely be similar to those of the lake. Thus, aquatic species the Kissimmee River would likely include smaller bait fish and larger piscivores, including crappie, catfish, and bream, which have recreational and commercial importance. As described above, the goal of current and future restoration actions is to reestablish the river's natural hydrologic patterns to enhance aquatic resource populations.

Important Species

Based on the hydraulic connections described above, the important species present in Lake Okeechobee are likely present in the portion of the Kissimmee River near the lake. These would include a variety of forage fish like Threadfin Shad and Inland Silversides, and larger predators like the Largemouth Bass and Black Crappie (USACE 2013-TN2847; Zhang and Sharfstein 2013-TN2894). Important species are similar to those listed for Glades in Section 9.3.2.4.

Non-Native or Nuisance Species

As noted in the above summaries for the Glades and Martin sites, Lake Okeechobee and the connecting canal and river systems contain a variety of non-native and nuisance species. Many of these species would likely be present in the Kissimmee River near the Okeechobee 2 site.

Federally and State-Listed Species and Critical Habitats

Based on a FNAI search conducted by the review team, the only Federal and State-listed species likely to occur near the Okeechobee 2 site are the American alligator and the Florida manatee (FNAI 2013-TN2901). As described in Section 2.4.2, American alligators are found in swamps, rivers, streams, lakes, and ponds throughout the southeastern United States where fresh or brackish water is present. Florida manatee are found in shallow rivers, bays, estuaries and coastal waters, and have been observed in Lake Okeechobee. No designated critical habitat for either species is found near the Okeechobee 2 site, but the manatee consultation area includes Lake Okeechobee (FWS 2003-TN2916).

Construction Impacts

Based on information provided by FPL, the 362 ac required for the plant would primarily affect the existing farmland and agriculture present in the area. Some existing drainage ditches that support a seasonal population of some of the fish species listed above may be adversely affected. Construction of the surface-water intake on the C-43 Channel may result in short-term increases in water turbidity, and some disturbance of the shoreline area. Impacts would be temporary, largely mitigable, and minor. Construction of the surface-water intake on the Kissimmee River would result in temporary displacement of aquatic biota in the immediate area, and likely short-term increases in water turbidity. Construction of water pipelines would likely occur in previously disturbed areas, or locations where aquatic resources are not present. Construction of the proposed transmission lines would affect approximately 3,022 ac that would include previously disturbed areas, existing rights-of-way, forests, and agricultural land. FPL has indicated field surveys for Federally or State-listed species would be conducted prior to construction at the site or within transmission line corridors. Impacts would be the same as those described for the Glades site in Section 9.3.2.4.

Operations Impacts

As described in Section 9.3.4.2, the review team assumes groundwater would be the primary source of cooling water, with supplemental water from Lake Okeechobee or the Kissimmee River available intermittently when excess surface water is available typically during the wet season. Thus, the effects of impingement and entrainment of aquatic biota would be reduced. Assuming the intake conforms to current EPA standards, through-screen velocities are expected to be protective of the aquatic environment and any impingement or entrainment that does occur should not result in noticeable changes to aquatic biota species composition or abundance. It is assumed impingement and entrainment of biota from the river would not result in a noticeable impact on aquatic resources. Because cooling-tower blowdown would be discharged into the Boulder Zone of the Lower Floridan aquifer, surface-water resources would not be adversely affected. There is no available information about biological communities that may be present in Bounder Zone formations near the Okeechobee 2 site, so it is not possible to determine whether a complete exposure pathway is present or assess potential biological effects. Thus, the potential risk of chemical exposure to aquatic resources resulting from the discharge of cooling-tower blowdown cannot be determined

Based on an NRC assessment of a similar cooling system proposed at the Levy site in western Florida using brackish saltwater for cooling-tower makeup water (NRC 2012-TN1976), cooling-tower drift impacts on aquatic resources would likely be minimal, because deposition would be expected to occur primarily on plant property or adjacent agricultural lands. Impacts would be the same as those described for the Glades site in Section 9.3.2.4. No detectable increase in surface-water salinity resulting from salt-drift deposition is anticipated.

Cumulative Impacts

Table 9-16 summarizes the past, present, and reasonably foreseeable projects and other actions in the vicinity of the Okeechobee 2 site. As previously noted, these activities include existing and proposed energy projects, rock-mining activities, transportation projects, parks and aquaculture facilities, and restoration activities funded by CERP or others. Existing or potential energy projects near the Okeechobee 2 site include one nuclear plant (St. Lucie), and a variety of others using fossil fuels, biofuels, or solar technologies. The area also supports numerous general aviation airports that may require limited expansion in response to population increases. Rock mining also occurs within 50 mi of the Okeechobee 2 site and is expected to continue. This area of South Florida also includes dozens of parks, scenic trails, wildlife refuges, preserves, and environmental areas, which protect natural resources and provide a variety of recreational opportunities. This area will also benefit from a variety of existing or proposed restoration projects that focus on improving surface-water management and water quality, and those enhancing efforts to control invasive species. Ongoing restoration projects on the Kissimmee River north of the Okeechobee 2 site will provide a positive cumulative effect by restoring natural river flow and function that benefit aquatic and terrestrial resources.

In addition to the projects described above that may result in negative, positive, or neutral cumulative impacts on aquatic biota, this part of South Florida will continue to experience increased population growth and development. Overall the review team concludes that the cumulative impacts on aquatic resources in the vicinity of the Okeechobee 2 site would be MODERATE.

Summary Statement

Based on a review of the information provided by FPL and the review team's independent assessment, it is likely the construction and operation of a nuclear power-generating station, as described above for the Okeechobee 2 site, would contribute only minimally to the cumulative effects likely to occur in that portion of South Florida. Although the construction of nuclear units at the Okeechobee 2 site would affect existing agricultural and farm land, adverse effects on aquatic resources would be unlikely. Construction of the surface-water intake on the Kissimmee River may result in temporary, localized impacts that would not adversely affect aquatic resources in the river. The use of water from the Kissimmee River during high-flow events may relieve some of the flooding concerns associated with Lake Okeechobee and the connecting canals, and result in lower discharges into these systems to maintain lake level and protect the Herbert Hoover dike system. Some impingement and entrainment losses are expected, but assuming a closed-cycle cooling system and compliance with the EPA's 316(b) Phase I requirements for intake structures (66 FR 65256) (TN243), the intake is considered protective of aquatic life the anticipated impacts due to impingement and entrainment are considered minimal. Furthermore, the intakes would likely be only operated intermittently throughout the year when surface water is available. Impingement or entrainment that does occur should not result in noticeable changes in aquatic biota species composition or abundance. Thus, the review team concludes that the cumulative impacts of building and operation of two new nuclear reactors at the Okeechobee 2 site, combined with the other past, present, or reasonably foreseeable activities on aquatic resources would be MODERATE, but building and operating two new nuclear units at the Okeechobee 2 site would not be a significant contributor to the MODERATE impact.

9.3.4.5 Socioeconomics

The following impact analysis includes impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable future actions that affect socioeconomics, including other Federal and non-Federal projects listed in Table 9-16. For the analysis of socioeconomic impacts at the Okeechobee 2 site, the geographic area of interest is considered to be the 50 mi region centered on the Okeechobee 2 site with special consideration of Okeechobee, Glades, Highlands, Palm Beach, Indian River, Martin and St. Lucie Counties because that is where the review team expects socioeconomic impacts to be the greatest. In evaluating the socioeconomic impacts of site development and operation at the Okeechobee 2 site near Okeechobee in Okeechobee County, the review team used readily obtainable data from the Internet or published sources. Impacts from both building and station operation are discussed.

Physical Impacts

People who work or live around the site would be exposed to noise, fugitive dust, and gaseous emissions from building and operations activities. Noise, dust, and air-pollution emissions generated within the boundaries of the Okeechobee 2 site would be expected to be similar to those at the Turkey Point site. Because the surrounding site is rural and sparsely populated and because noise and air-pollution impacts are attenuated by distance, members of the surrounding population exposed would be relatively few and the impacts would be expected to be negligible. Best practices and applicable regulations would be expected to protect building workers and personnel working onsite. Truck and vehicle traffic related to building and operations would generate noise, fugitive dust, and gaseous emissions offsite. In addition, offsite structures include an access road (and widening of a portion of SR-70), a railway, a transmission line, and intake/makeup pipelines (FPL 2014-TN4058). Because the area affected by offsite structures and traffic would also be rural and sparsely populated and because FPL would be expected to implement a dust-control plan similar to that for the Turkey Point site, noise and air-pollution impacts from these offsite activities would be expected to be minor.

Based on FPL's conceptual site layout for the Okeechobee 2 site (FPL 2011-TN59) and on aerial photography, there is one structure within the boundaries of the proposed site. There are also pastures that would be lost. Offsite project-related building activities include construction of a 9.3 mi access road (and widening of a portion of SR-70), a 3.9 mi railway, a 38 mi transmission line, and intake/makeup pipelines (FPL 2014-TN4058). The conceptual design of these activities routes them, to the extent possible, along existing rights-of-way and avoids populated areas and residences (FPL 2014-TN4058). The physical impacts on existing structures and crops within the proposed site and offsite areas for supporting infrastructure would be minor.

The area around the site is relatively flat, sparsely populated, and is used mainly as farmland. Building would use cranes (which could exceed 400 ft in height) and would alter the regional viewscape. Construction of the transmission lines would pose similar impacts. The power plant and water-intake facilities would likely be visible from several angles and contrast highly with the present viewscape. Building and operation would noticeably alter the aesthetics of the area. Because of the sparse population, the negative impact would likely not interfere with the daily routine of local public around the Okeechobee 2 site and would not destabilize the aesthetic characteristics of the area.

Based on the information provided by FPL (2014-TN4058) and the review team's independent analysis, the review team concludes that the overall physical impacts of building activities and operations would be minor, with the exceptions of noticeable but not destabilizing impacts on roads and aesthetics near the Okeechobee 2 site.

Demography

The Okeechobee 2 site is located in Okeechobee County, 1.5 mi west of Okeechobee (2012 population 5,632) and 30 mi west of Port St. Lucie (2012 population 163,748), the closest population center with more than 25,000 residents (FPL 2014-TN4058; USCB 2012-TN4098). The population distribution within and around the Okeechobee 2 site is typically rural with low population densities. There are 14 counties within the 50 mi area, but the review team estimates the areas in which workers would most likely live and from which they would commute are within Okeechobee, St. Lucie, Palm Beach, Highlands, Indian River, Martin, Glades, Broward and Miami-Dade Counties, based on current commuter patterns.[26] For the purposes of assessing potential socioeconomics impacts, the review team excluded Broward and Miami-Dade Counties as potential areas of residence for construction and operation workers: these

(26) Over 80 percent of the workers in Okeechobee County currently reside in one of these nine counties (USCB 2011-TN4078).

two counties are outside of the 50 mi region at driving distances approaching 2 hours or more and would be less likely to accommodate workers than closer communities. Because the population of Broward and Miami-Dade Counties would be over 60 percent of the population of the nine counties together, the impacts would be distorted by the inclusion of Broward and Miami-Dade Counties in the potential area of residence. The remainder of the analysis focuses on the seven-county area of Okeechobee, St. Lucie, Palm Beach, Highlands, Indian River, Martin and Glades.

FPL estimated the peak number of workers during building would be 3,983, including 33 operation workers. The review team assumed that the share of construction and operation workers relocating from outside the seven-county area would be 66 percent of the estimated peak number of workers. This assumption was reached by using the assumption made for the proposed Turkey Point site as a reference and assuming that the share of workers that would come from outside the region is inversely proportional to the population of the region.(27) As in Section 4.4, 70 percent of the construction workforce and 100 percent of the operation workforce that moved into the area were assumed to bring their families. Based on these assumptions, a peak of 2,607 construction and 22 operation workers would relocate to the area during the project construction phase, and 1,847 of these workers would bring their families. Based on an average household size of 3.25 people, the total increase in population attributable to the peak total workforce at the Okeechobee 2 site would be 6,036 people. An influx of 6,036 people represents a 0.3 percent increase in the seven-county 2012 population of 2,038,496.

FPL estimated the total onsite operations workforce to be 806 workers. As explained above, the review team assumed that 66 percent of these workers (532) would relocate from outside the seven-county area. For this analysis, the review team assumed that 100 percent of operation workers who relocate will bring their families. Based on an average household size of 3.25 people, the total population increase attributable to project operations is 1,729 (532 x 3.25) people. This represents less than a 0.1 percent increase in the seven-county area.

The review team concluded that the impact on local demography would not be noticeable.

Economic Impacts on the Community

Economy

FPL estimated the peak number of workers during building would be 3,983, including 33 operation workers. Employment of 3,983 construction and operation workers would have positive economic impacts in the seven-county area. Based on a multiplier of 1.6260 jobs (direct and indirect) for every construction job and 2.4679 for every operation job, 3,983 new construction and operation jobs would create 2,522 indirect jobs, for a total of 6,505 new jobs in the seven-county area during peak employment (3,950 x 1.6260 + 33 x 2.4679) (FPL 2011-

(27) The proposed Turkey Point site analysis assumed 50 percent of the peak workers would come from outside the 50-mi region and that 83.3 percent of those would reside in Miami-Dade County; i.e., 41.65 percent (0.5 x 0.833) of the peak workers would migrate into Miami-Dade County. Because the population of the seven-county area is approximately 81 percent of that of Miami-Dade County (USCB 2012-TN4098), the review team assumed the share of peak workers migrating into the seven-county area would be 1-(0.81 x 0.4165) ≈ 66 percent.

TN56).[28] This represents a 0.7 percent increase in the total employment in the seven-county area.[29] Peak employment would last 1 month and the average employment generated during the 10-year building period would be about half of that of peak employment. This added employment would generate added earnings to the economy of the seven-county area, but the added employment and earnings would not be noticeable to most of those living or working in the area.

An estimated 806 workers would be required for the operation of two nuclear power facilities. Based on a multiplier of 2.4679 jobs (direct and indirect) for every operations job at the new units (FPL 2011-TN56), an influx of 806 workers would create 1,183 indirect jobs for a total of 1,989 new jobs in the region. This represents a 0.2 percent increase in the total employment in the seven-county area. This added employment would also generate added earnings to the economy of the seven-county area, but the added employment and earnings would not be noticeable to most of those living or working in the area.

Taxes

State corporate income taxes and sales and use taxes paid at the Okeechobee 2 site during construction and operations of the proposed units would be similar to those paid by the same units at the proposed Turkey Point site. As discussed in Sections 4.4 and 5.4, State taxes paid by the proposed units would not exceed 2 percent of the annual collected State corporate income and sales and use taxes. The impact would be minor and beneficial. County sales surtax rates in the seven-county area for the 2014 calendar year are zero percent for Martin and Palm Beach Counties, one-half percent for St. Lucie, and 1 percent for the remaining four counties (FDOR 2014-TN3393). County surtax collections from the proposed units would be highest during construction when annual expenses related to the proposed units would be estimated to reach up to $1.56 billion (Section 4.4). A 1 percent sales surtax would generate $15.6 million in revenues for the seven-county area.[30] This would correspond to less than 1 percent of total county revenues in the seven-county area for 2014.[31] The impact would be minor and beneficial. County and school district governments in Florida may levy taxes up to 10 mills each (1 percent) in property taxes (FDOR 2012-TN459). If the value of property taxes for the two nuclear reactors at the Okeechobee site were the same as the value estimated for Units 6 and 7 at the Turkey Point site in Section 5.4.3.2, FPL would pay $20 million in property taxes to the Okeechobee School District and $20 million to Okeechobee County. These payments would correspond to 46.6 percent the Okeechobee School District 2011-12 total revenues ($20 million compared $42.9 million)[32] and 42.6 percent the Okeechobee County 2011-12 total revenues ($20 million compared to $46.9 million).[33] Because property taxes paid to school districts are reallocated through Florida's Education Finance Program, the benefit to the

(28) Multipliers are for a four-county area (excluding Martin, Indian River, and Palm Beach Counties) and are used as an approximation.
(29) Employment of 892,793 (BLS 2013-TN4085).
(30) To the extent that some of the expenditures would be made in Martin, Palm Beach, and St. Lucie Counties, and assuming the sales surtax rates are unchanged, the total sales surtax collected would be smaller.
(31) $3412 million (FLDFS 2013-TN3392).
(32) FLDOE 2012-TN3391.
(33) FDOR 2014-TN3393.

Okeechobee School District would be diluted to some extent, and the exact amount distributed to each school district is not known at this time. Because of the value of project-related property tax payments relative to current property taxes, the review team considers the impacts on tax revenues to both the Okeechobee School District and Okeechobee County to be substantial and beneficial.

The review team concluded that the economic impact would not be noticeable and would be beneficial, with the exception of property tax revenues to Okeechobee County and to the Okeechobee School District, which would be beneficial and substantially alter current property tax levels in Okeechobee County and the Okeechobee School District.

Infrastructure and Community Service Impacts

Traffic

Workforce access to the Okeechobee 2 site would occur through SR-70 coming from the east and the west. The review team estimated the current LOS (Level of Service) of these roads at two FDOT traffic-monitoring sites based on the peak hour directional traffic and FDOT LOS thresholds. Peak hour directional traffic information was obtained from FDOT Florida Traffic Online (FDOT 2013-TN3558) and consists of the AADT at each traffic-monitoring site, a Standard Peak Hour Factor (K) and a Directional Distribution Factor (D). The multiplication of these three elements (AADT x K x D) provides an estimate of the current peak hour directional traffic volume. The LOS was determined comparing this peak hour directional traffic volume with the maximum thresholds for each LOS in Table 9 (areas less than 5,000 population) of FDOTs Generalized Service Volume Tables (FDOT 2013-TN3297). The review team used FDOT's 2011 LOS Reports by County (FDOT 2011-TN3557) to determine the correct classification of each road for the purposes of identification of the appropriate threshold in the Generalized Service Volume Tables (e.g., whether the road should be considered highway or a freeway; whether the area should be considered rural developed or rural undeveloped). Based on this procedure, the LOS at both traffic-monitoring sites would be B. To estimate the project impact on traffic LOS during the project's peak workforce building period, the review team followed a methodology similar to that described in Section 4.4: The peak workforce of 3,983 construction and operation workers were divided into two shifts; 70 percent were assigned to shift 1 (6:00 a.m. to 4:30 p.m.) and 30 percent to shift 2 (5:00 p.m. to 3:00 a.m.). The hour of peak commute would be 4:30 p.m. to 5:30 p.m. The review team also assumed up to 36 trucks per hour. The project-related directional traffic during the peak commute hour would be 2,824 vehicles (70 percent x 3,983 + 36). The review team assumed that half of the project-related traffic would come from each direction, east and west.([34]) The results of this analysis are presented in Table 9-20. The additional building traffic would drop the LOS classification at both traffic-monitoring sites to F. The proposed widening of SR-70 would bring the LOS classification to a C.

(34) Based on U.S. Census Bureau commuter patterns (USCB 2011-TN4078) it was not possible to determine the likely direction of outgoing project-related traffic.

Table 9-20. Peak Workforce Traffic LOS Analysis for the Okeechobee 2 Site

Traffic-Monitoring Site	Baseline Peak Hour Directional Traffic	Baseline LOS	Distribution of Project-Related Peak Traffic	Added Peak Hour Directional Traffic	Peak hour Directional Traffic with Project	LOS with Project
SR-70 west of site	246	B	0.50	1,412	1,658	F (C)[(a)]
SR-70 east of site	393	B	0.50	1,412	1,805	F (C)[(a)]

(a) LOS classification after widening of SR-70.

Source: Review team calculations based on FDOT 2011-TN3557; FDOT 2013-TN3558; and USCB 2011-TN4078

FPL estimated the total onsite operations workforce to be 806 workers. If access of this workforce to the Okeechobee 2 site were distributed among the two directions equally, the LOS at each of the two monitoring sites would drop to C.

Based on the above analysis, the review team concludes that the impact of building and operations of the proposed nuclear reactors at the Okeechobee 2 site would be noticeable during building, although not destabilizing, after widening of SR-710.

Recreation

The Okeechobee 2 site is located approximately 4 mi from Lake Okeechobee and the Lake Okeechobee Scenic Trail that circles the lake. The lake is used for boating, fishing, and duck hunting, and the scenic trail is used for hiking and bird watching (PBC 2013-TN3298). The Taylor Creek/Nubbins Slough Water Conservation Area is located approximately 2 mi from the site. To the east, several recreational areas exist at approximately 2 mi along the Kissimmee River. During building, access to these sites from some directions could be affected by increased traffic. Other parks and recreational areas exist within the county. The influx of project-related population to the seven-county area would increase the number of local users of recreational facilities. Because the in-migrating population would be less than 1 percent of the local population, the review team expects the impact on current recreational infrastructure to be negligible.

Housing

The review team estimates that 2,629 construction and operation workers would into the seven-county area, and each of these workers would need a place to live. Based on American Community Survey 2008-2012 5-Year estimates, within the seven-county area there are 1,035,416 housing units of which 232,194 are vacant (22.4 percent). This includes housing that is designated as seasonal, recreational, or occasional use (USCB 2012-TN4089). The review team estimates that, in absolute numbers, the available housing would be sufficient to house the construction workforce. The in-migrating construction and operation workforce would occupy no more than 1.2 percent of vacant housing units in the seven-county area. FPL estimated that approximately 806 workers would be needed for operation of two nuclear power facilities at the Okeechobee 2 site, and the review team assumed that 66 percent of these workers (532) would relocate from outside the region and would settle in the seven-county area. Based on these assumptions, the entire operations workforce would occupy no more than 0.3 percent of vacant housing units in the seven counties. The review team concludes that impact on housing would be minor.

Public Services

In-migrating construction workers and plant operations staff would also likely affect local municipal water, wastewater-treatment facilities, police, and fire-protection services and other public services in the region. These impacts would be expected to be in proportion with the demographic impacts experienced in the region. In-migration to the seven-county area would represent an estimated 0.3 percent of the local population (less during operations). The review team concludes that the impact on public services would be minor.

Education

Based on data for the 2011-12 school year, there are approximately 269,566 full-time equivalent students in public schools in the seven-county area (FLDOE 2013-TN3299).[35] The review team estimated that 2,629 construction and operation workers would migrate into the area, and that 1,847 workers would bring their families. Based on an estimate of 0.8 school-aged children per family (Malhotra and Manninen 1981-TN1430), an estimated 1,478 (1,847 x 0.8) school-aged children would be migrating into the seven-county area. This would yield a 0.5 percent increase in the student population. During operations, the review team assumed that 532 operation workers and their families would relocate from outside the region. This would include an estimated 426 (532 x 0.8) children in the PK-12 school range. This influx of students would increase the student population in the seven-county area by 0.2 percent. The review team concludes that the impact on education would be minor.

Based on the information provided by FPL (2014-TN4058) and the review team's independent analysis, the review team concludes that the overall infrastructure and community service impacts of building activities and operations at the Okeechobee 2 site would be minor except for noticeable, but not destabilizing, adverse impacts on traffic.

Cumulative Impacts

In addition to the socioeconomic impacts from building and operations of the proposed project at the Okeechobee 2 site, the cumulative analysis also considers other past, present, and reasonably foreseeable future actions that could have socioeconomic impacts.

The socioeconomic impacts of past and present actions in the affected area are largely captured by the current baseline conditions used for analysis above of project impacts. For example, the impacts of past and present actions on the demography and economy of the area are largely captured by current baseline data on population, employment, and tax revenues and are incorporated in the baseline and trend assessments of the RIMS II multipliers.

Reasonably foreseeable future actions are listed in Table 9-16. Future actions that would be expected to have cumulative socioeconomic impacts with the proposed project at the Okeechobee 2 site would be several that would generate additional employment and earnings in the area. These include the Herbert Hoover Dike Rehabilitation Project and Dam Safety Modification Study, the Florida Southeast Connection pipelines proposed through Highlands,

(35) FTE is a measure of enrollment based on the number of full-time students that it would take to fill the number of classes offered.

Okeechobee and Martin Counties (construction 2016-2017, FSC 2014-TN3301), the Floridian Natural Gas Storage Facility in Martin County, and various proposed CERP water projects.

Based on the location of the identified future projects and their magnitudes, the cumulative socioeconomic impacts of the projects identified above with the proposed project at the Okeechobee 2 site would be expected to be SMALL, with the exception of MODERATE and adverse physical impacts on roads and aesthetics, MODERATE adverse impacts on traffic, and LARGE and beneficial impacts of property tax revenues to Okeechobee County and to the Okeechobee School District. Building and operating two new nuclear units at the Okeechobee 2 alternative site would be a significant contributor to the MODERATE adverse impacts.

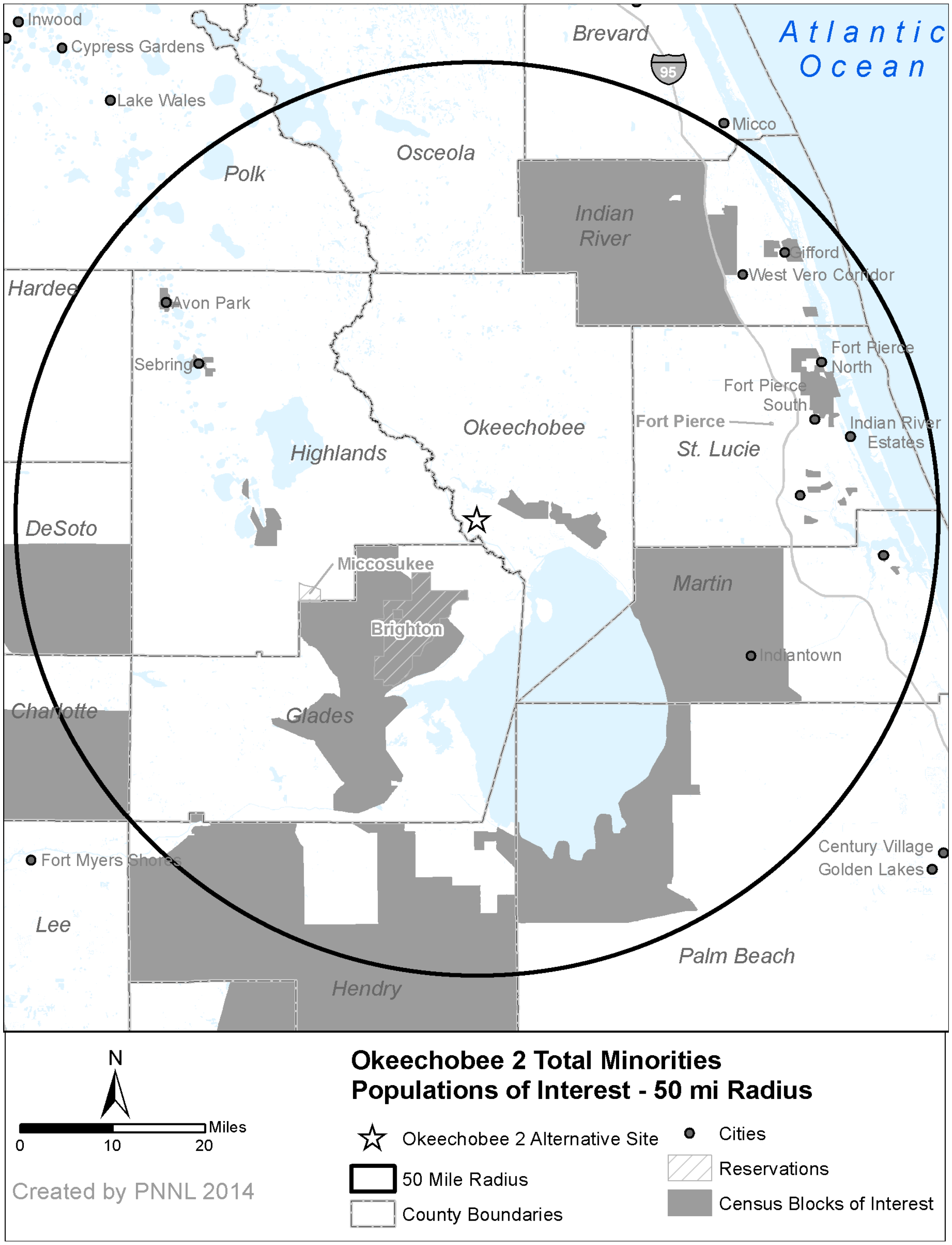
9.3.4.6 Environmental Justice

The following impact analysis includes impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable future actions that impact EJ, including other Federal and non-Federal projects listed in Table 9-16.

The 2008-2012 American Community Survey block groups were used to identify minority and low-income population distributions in the area (USCB 2012-TN4098). The census data for Florida characterizes 15.9 percent of the population as Black; 0.3 percent as American Indian or Alaskan Native; 2.5 percent as Asian; 0.1 percent as Native Hawaiian or other Pacific Islander; 2.6 percent as other single minorities; 2.2 percent as multiracial; 22.5 percent as Hispanic ethnicity; and 42.2 percent as aggregate minority. There are 526 block groups within 50 mi of the Okeechobee 2 site. Following the criteria described in Section 2.6.1, Black minority populations exist in 57 block groups; American Indian or Alaskan Native minority populations exist in 2 block groups; other race minority populations exist in 12 block groups; multiracial minority populations exist in 2 block groups; Hispanic ethnicity minority populations exist in 38 block groups; and aggregate minority populations exist in 116 block groups. There are no block groups containing Asian minority populations or Native Hawaiian or other Pacific Islander minority populations within 50 mi of the Okeechobee 2 site. The Brighton Seminole Indian Reservation is approximately 10 mi southwest of the Okeechobee 2 site. The locations of the minority populations within 50 mi of the Okeechobee 2 site and the Brighton Seminole Indian Reservation are shown in Figure 9-19. The locations of Hispanic minority populations and Black minority populations within the 50 mi of the Okeechobee 2 site are shown in Figure 9-20 and Figure 9-21, respectively.

The USCB data characterize 15.3 percent of Florida residents as low income (USCB 2012-TN4098). Out of a possible 526 block groups, 69 block groups contain low-income populations. The locations of the low-income populations within 50 mi of the Okeechobee 2 site are shown in Figure 9-22.

The analyses of the impacts of building and operating new nuclear reactors at the Okeechobee 2 site identified noticeable impacts on land use, terrestrial and wetland ecosystems, aesthetics, and traffic. The review team did not identify any special pathways through which these noticeable impacts would disproportionately affect EJ populations of interest. Therefore, the review team concluded there would be no disproportionately high and adverse impacts on EJ populations of interest.



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2 **Figure 9-19. Aggregate Minority Populations in Block Groups that Meet the**
3 **Environmental Justice Selection Criteria within 50 mi of the Okeechobee 2**
4 **Alternative Site**

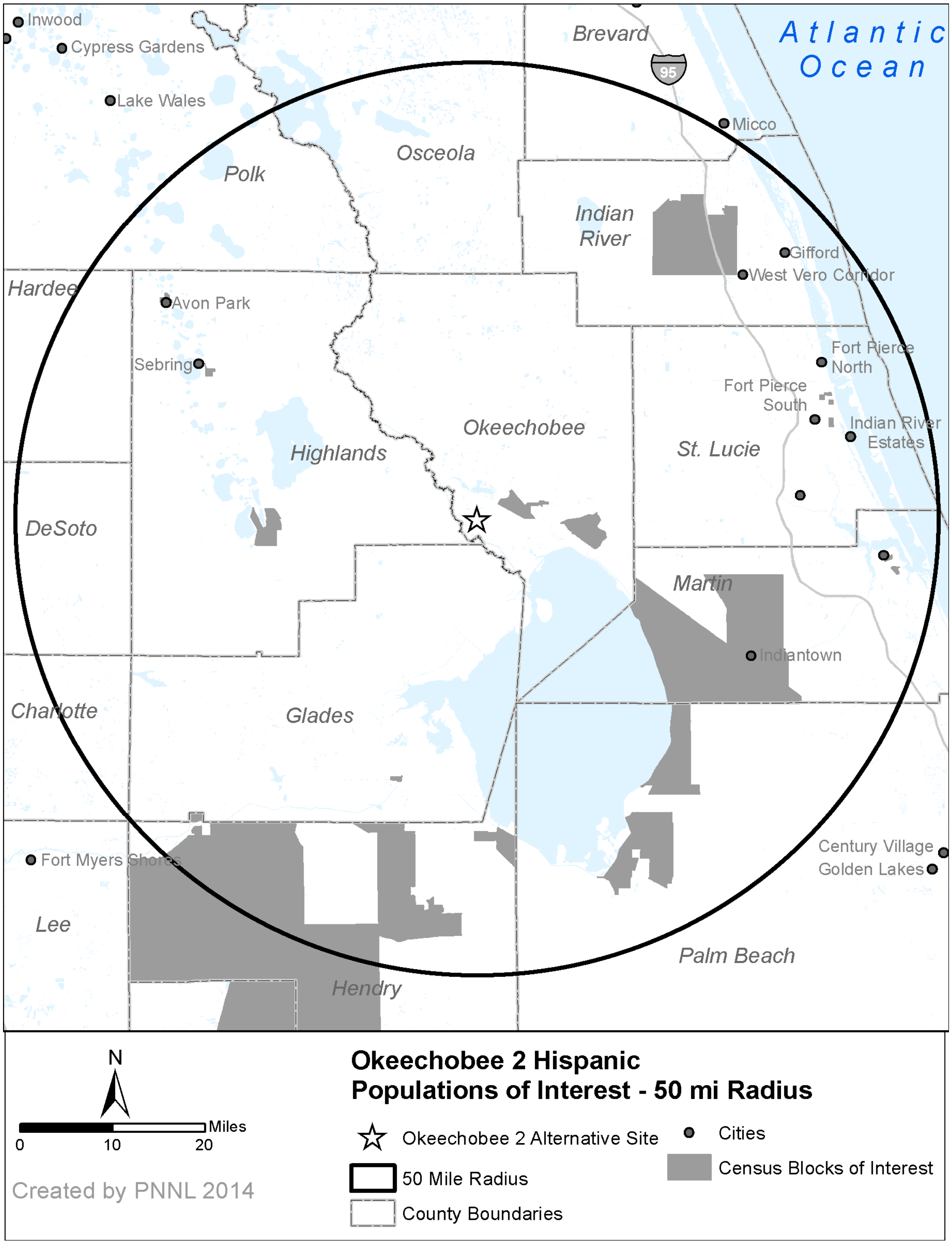


Figure 9-20. Hispanic Populations in Block Groups that Meet the Environmental Justice Selection Criteria within 50 mi of the Okeechobee 2 Alternative Site

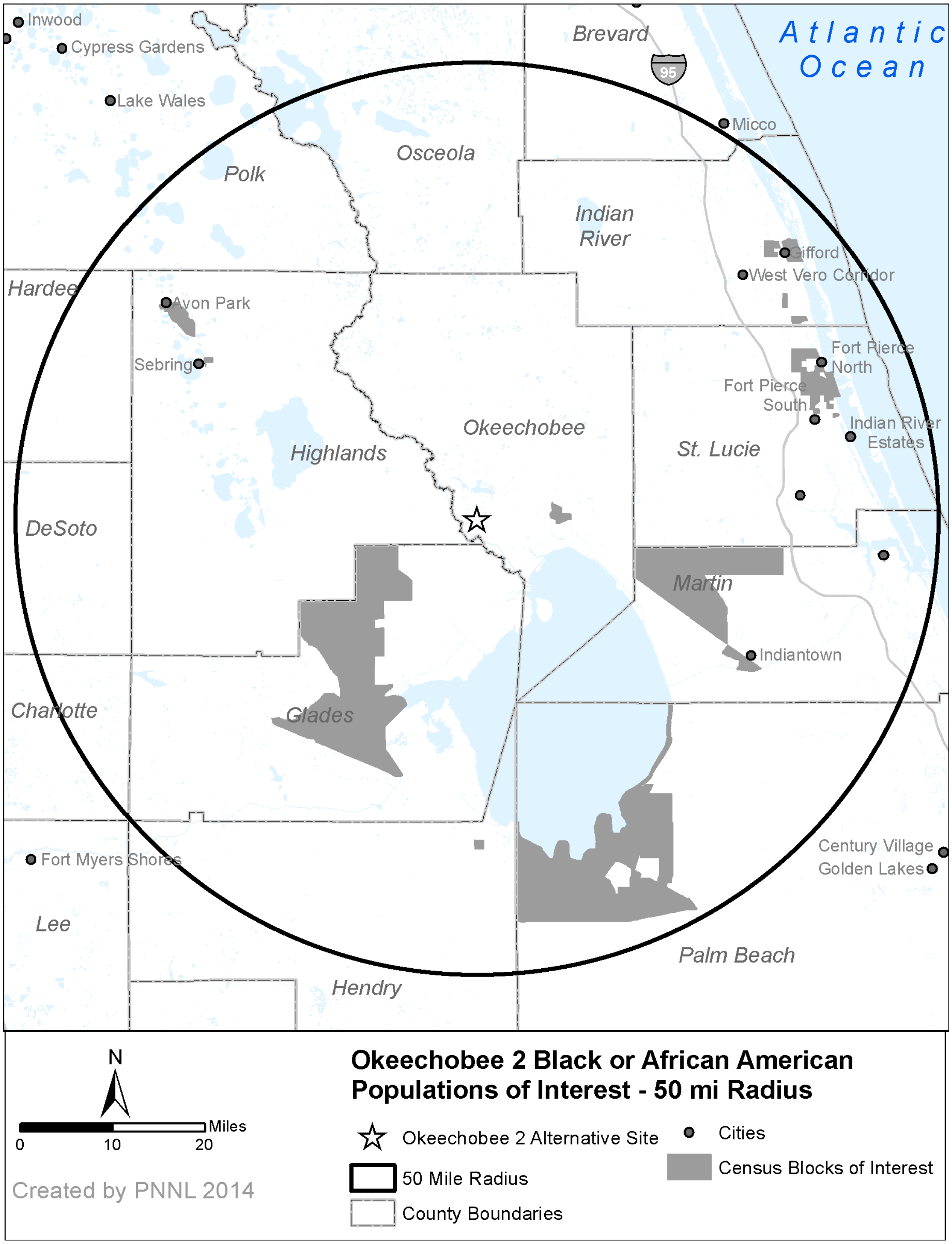


Figure 9-21. African American Populations in Block Groups that Meet the Environmental Justice Selection Criteria within 50 mi of the Okeechobee 2 Alternative Site

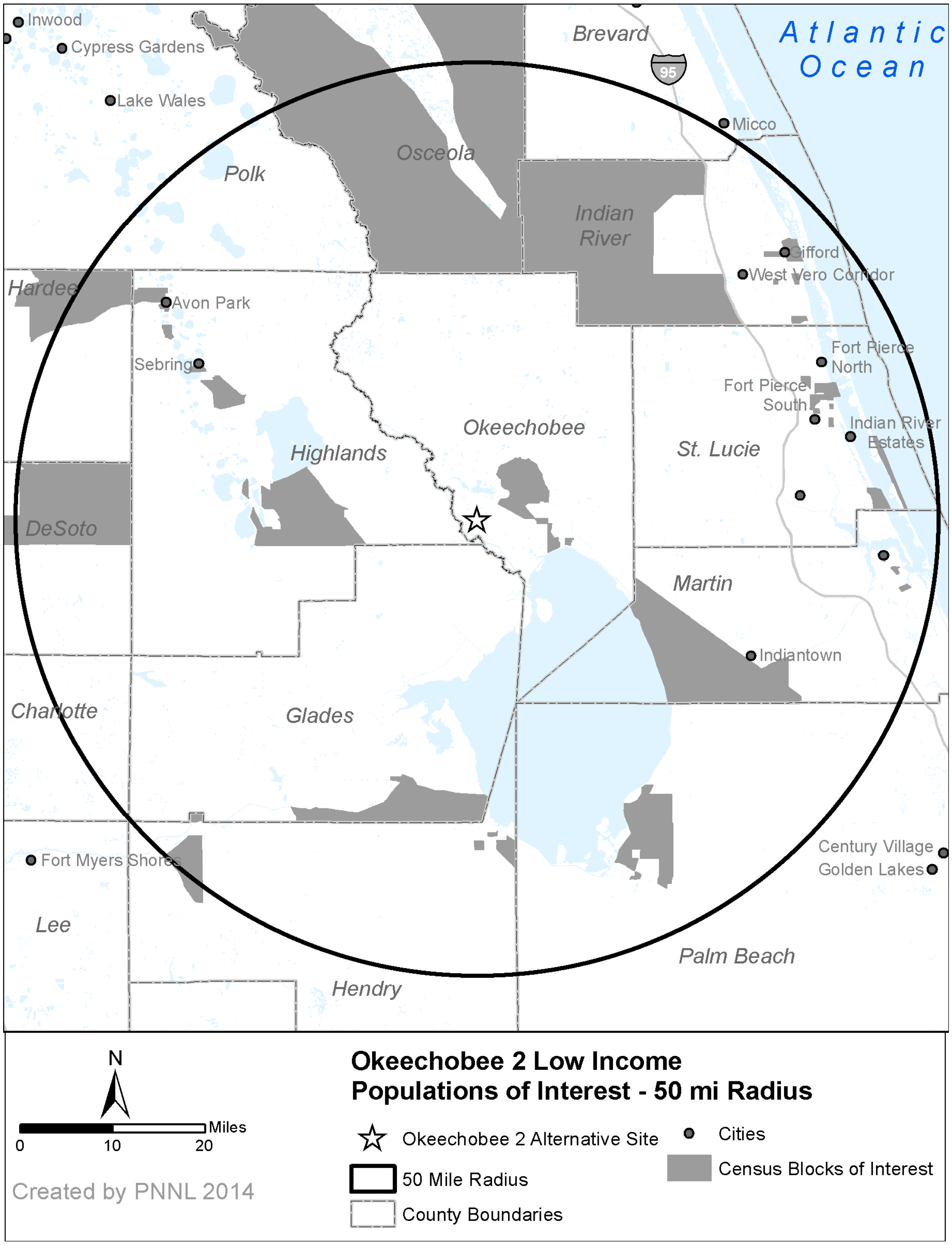


Figure 9-22. Low-Income Populations in Block Groups that Meet the Environmental Justice Selection Criteria within 50 mi of the Okeechobee 2 Alternative Site

The NRC's EJ methodology includes an assessment of affected populations of particular interest or with unusual circumstances, such as minority communities that are exceptionally dependent on subsistence resources or identifiable in compact locations (e.g., Native American reservations) and those that have a high density of minority or low-income groups. Based on a literature research, the review team did not identify high-density minority or low-income presence in the proximity of the site, nor differentiated subsistence consumption of natural resources by EJ populations of interest.

Cumulative Impacts

In addition to the EJ impacts from building and operations of the proposed project at the Okeechobee 2 site, the cumulative analysis also considers other past, present, and reasonably foreseeable future actions that could have EJ impacts. Based on a literature review of past and present actions in the affected area, and based on the reasonably foreseeable actions listed in Table 9-16, the review team found no evidence that the cumulative effects would disproportionately affect EJ populations of interest.

9.3.4.7 Historic and Cultural Resources

The following cumulative impact analysis addresses building and operating two new nuclear generating units at the Okeechobee 2 site. The analysis also considers other past, present, and reasonably foreseeable future actions that could affect cultural resources, including the other Federal and non-Federal projects listed in Table 9-16. For the analysis of cultural impacts at the Okeechobee 2 site, the geographic area of interest is considered to be the APE that would be defined for this site. This includes the direct effects APE, defined as the area physically affected by the site-development and operation activities at the site and within transmission line corridors. The indirect effects APE is defined as the area visually affected and includes an additional 0.5 mi radius APE around the transmission line corridors and a 1 mi radius APE around the cooling towers.

Reconnaissance activities in a cultural resource review have particular meaning. Typically, the activities include preliminary field investigations to confirm the presence or absence of cultural resources. However, in developing this EIS, the review team relied upon reconnaissance-level information to perform its alternative site evaluation in accordance with ESRP 9.3 (NRC 2000-TN614). Reconnaissance-level information consists of data that are readily available from agencies and other public sources. It can also include information obtained through visits to the site area. The following information was used to identify the historic and cultural resources at the Okeechobee 2 site:

- NRC Alternative Sites Visit, July 2010 (NRC 2010-TN3304)
- FPL ER Revision 6 (FPL 2014-TN4058)
- Florida Historical Markers Program (FDHR 2014-TN3877)
- National Register of Historic Places database (NPS 2014-TN3881).

The approximately 3,000 ac Okeechobee 2 site occurs in predominantly agricultural land that is used for cattle, dairy, and citrus operations. Historically, the Okeechobee 2 site and vicinity were largely undeveloped and likely contained intact archaeological sites associated with the past 10,000 years of human settlement. Over time, the area has been disturbed by low-impact development including agriculture, roadways, and low-density rural development. A search of the National Register shows that two significant historic properties are located within 10 mi of the Okeechobee 2 site (FPL 2014-TN4058; NPS 2014-TN3881), as well as several archaeological resources. The two historic properties are the Freedman-Raulerson House and the Okeechobee Battlefield site. The Okeechobee Battlefield is also a National Historic

Landmark. A total of 34 properties were found in the four counties in the vicinity of the Okeechobee 2 site (Okeechobee, Glades, Highlands, and St. Lucie Counties). A National Register search of the indirect effects APE for the transmission lines shows that, while no properties are recorded within the APE, these same two historic properties, the Freedman-Raulerson House and the Okeechobee Battlefield site, are located roughly 4 mi and 7 mi to the south, respectively, from the corridor. In addition, the Brighton Seminole Indian Reservation is located roughly 7 mi to the south of the Okeechobee 2 site.

A search of the Florida Historical Markers Program (FDHR 2014-TN3877) by the review team revealed that there is one historic marker in Okeechobee County—a marker near the courthouse in the city of Okeechobee commemorating the founding of the county. The marker is not near the Okeechobee 2 site.

While there are no known historic properties located within the direct effects APE of the Okeechobee 2 site, reconnaissance-level information shows that there are historic properties in the general vicinity of the site, including potentially significant archaeological resources associated with Lake Okeechobee. No archaeological or architectural surveys have been conducted at the Okeechobee 2 site, and locating the nuclear plants there would require formal cultural resources survey and consultation with SHPO, Tribes, and other interested parties. If any significant cultural, historic, or archaeological resources are identified, those resources could be adversely affected and appropriate mitigation measures would need to be put in place before construction and operation.

Building Impacts

To accommodate the building of two nuclear units and associated facilities at the Okeechobee 2 site, FPL estimates that the total area of land that would be disturbed would be approximately 362 ac for the facility. In addition, a 9.3 mi long road and a 3.9 mi long railroad spur would need to be constructed in the predominantly agricultural land. A portion of SR-70 would need to be widened. An additional 22.5 ac would be disturbed for pipelines and associated facilities (FPL 2014-TN4058). If the Okeechobee 2 site were chosen for the proposed project, identification of cultural resources would be accomplished through additional cultural resource surveys and consultation with the SHPO, Tribes, and interested parties. The results would be used in the site-planning process to address cultural resources impacts. If significant cultural resources were identified by these surveys, the review team assumes that FPL would use the same protective measures used at the Turkey Point site, and therefore the impacts would be minimal. If direct effects on significant cultural resources could not be avoided, land-clearing, excavation, and grading activities could potentially destabilize important attributes of historic and cultural resources.

There are no existing transmission line corridors connecting to the Okeechobee 2 site. Section 9.3.4.1 describes the proposed transmission line corridors, which would consist of new transmission lines extending a total of 38 mi before connecting to an existing network. FPL has stated that consideration would be given to sensitive environmental and built resources in determining a route for the transmission lines (FPL 2014-TN4058), but visual impacts from transmission lines may result in significant alterations to the visual setting of cultural and historic resources within the geographic area of interest, particularly in undeveloped portions of the project area around the nuclear power-generating facility and around the transmission lines in the vicinity of the city of Okeechobee. These indirect effects would be particularly noticeable given that the setting around the Okeechobee 2 site is largely undeveloped, without existing industrial development. If the Okeechobee 2 site were chosen for the proposed project, the review team assumes that FPL would conduct its transmission line−related cultural resource surveys and procedures in a manner similar to that for the Turkey Point site. In addition, the review team assumes that the State of Florida's Final Order on Certification (State of Florida 2014-TN3637) regarding transmission line siting and building activities would also apply, and therefore impacts would be minimal. If direct effects on significant cultural resources could not be avoided, land-clearing, excavation, and grading activities could potentially destabilize important attributes of historic cultural resources. Similarly, both the transmission lines and nuclear power-generating units could indirectly effect cultural and historic resources through visual impacts on the setting of the resources.

Operations Impacts

Impacts on historic and cultural resources from operation of two new nuclear generating units at the Okeechobee 2 site include those associated with the operation of new units and maintenance of transmission lines. The review team assumes that the same procedures developed by FPL for the Turkey Point site, as well as the State of Florida's Final Order on Certification, would be used for onsite and offsite maintenance activities. Consequently, the incremental effects of the maintenance of transmission line corridors and operation of the two new units and associated impacts on the cultural resources would be negligible for the direct and indirect effects APEs. However, the indirect visual impacts would continue throughout the life of the transmission lines.

Cumulative Impacts

Past actions in the geographic area of interest that have similarly affected historic and cultural resources include rural and agricultural development and activities associated with these land-disturbing activities such as road development. Table 9-16 lists past, present, and reasonably foreseeable projects and other actions that may contribute to cumulative impacts on historic and cultural resources in the geographic area of interest. Projects from Table 9-16 that are relevant to the cultural resources cumulative analysis include the Florida Gas Transmission project, the Highlands Ethanol Facility, the High Speed Intercity Passenger Rail, the Lake Okeechobee Watershed project, and future urbanization, such as new or expanded roads.

Long linear projects such as new or expanded roads, pipelines, and railway lines may intersect the proposed transmission line corridors. Because cultural resources can likely be avoided by long linear projects, impacts on cultural resources would likely be minimal. If building associated with such activities results in significant alterations of cultural resources in the transmission line corridors, either physical or visual, then cumulative impacts on cultural and historic resources would be greater.

Cultural resources are nonrenewable. Therefore, the impact of the destruction of cultural resources is cumulative. Based on the information provided by FPL and the review team's independent evaluation, the review team concludes that the cumulative impacts from building and operating two new nuclear generating units on the Okeechobee 2 site would be MODERATE. The impacts of building and operating the project at the Okeechobee 2 site would be a significant contributor to the MODERATE impact due primarily to indirect viewshed impacts from the nuclear power-generating plant and transmission lines on historic properties, though direct impacts could occur as well. This impact-level determination is based on reconnaissance-level information and reflects the fact that there are no known cultural resources on the proposed site. It also assumes that, if the Okeechobee 2 site were to be developed, cultural resource surveys and evaluations would be conducted and FPL, in consultation with SHPO, Tribes, and interested parties, would assess and resolve any adverse effects of the undertaking. If cultural or historic resources are present, and if there are adverse effects on those resources, the project could result in greater cumulative impacts.

9.3.4.8 Air-Quality Impacts

The following impact analysis includes impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable actions that affect air quality, including other Federal and non-Federal projects listed in Table 9-16. As described in Section 9.3.4, Okeechobee 2 is a greenfield site; there are currently no nuclear facilities on the site. The geographic area of interest for the Okeechobee 2 site is Okeechobee County, which is in the Southeast Florida Intrastate Air Quality Control Region (40 CFR 81.49) (TN255).

Sections 4.7 and 5.7 discuss air-quality impacts during building and operation. The emissions related to building and operating a nuclear power plant at the Okeechobee 2 alternative site would be similar to those at the Turkey Point site. The air-quality attainment status for Okeechobee County, as set forth in 40 CFR Part 81 (TN255), reflects the effects of past and present emissions from all pollutant sources in the region. Okeechobee County is in attainment of all National Ambient Air Quality Standards.

As described in Chapters 4 and 5, the criteria pollutants from building and operation were found to have a SMALL impact on air quality. In Chapter 7, the cumulative impacts of criteria pollutants were evaluated and also determined to be SMALL to MODERATE. Reflecting on the projects listed in Table 9-16, the most significant is the nearby proposed landfill gas-to-energy project (Okeechobee Landfill) because of its proximity to the Okeechobee 2 site. Emissions from a facility such as this are released through stacks and with significant momentum and buoyancy. Other industrial projects listed in Table 9-16 would likely have de minimis impacts due to their distance from the site. Given that these projects are subject to Clean Air Act permitting requirements, it is unlikely that the air quality in the region would degrade to the extent that the region would be in nonattainment of the National Ambient Air Quality Standards.

The air-quality impact from development of the Okeechobee 2 site would be local and temporary. The applicant would develop a dust-control plan that identifies specific measures to minimize fugitive dust emissions during building activities. The distance from building activities to the site boundary would be sufficient to generally avoid significant air-quality impacts. There are no land uses or projects in Table 9-16, including the aforementioned source, that would have emissions during site development that would, in combination with emissions from the Okeechobee 2 site, result in degradation of air quality in the region. Emissions from operation of two new nuclear units at the Okeechobee 2 site would be intermittent and made at low levels with little or no vertical velocity, similar to operational impacts at the Turkey Point site as discussed in Section 5.7. The air-quality impacts of the Okeechobee Landfill Gas-to-Energy project would be similar to the air-quality impacts of a landfill gas facility discussed in Section 9.2.2.8, which would be noticeable but not destabilizing. The cumulative impacts from emissions of effluents from the Okeechobee 2 site and the aforementioned source would be noticeable but not destabilizing.

The cumulative impacts of GHG emissions related to nuclear power are discussed in Section 7.6. The impacts of the emissions are not sensitive to the location of the source. Consequently, the discussion in Section 7.6 is applicable to a nuclear power plant located at the Okeechobee 2 site. The review team concludes that the national and worldwide cumulative impacts of GHG emissions are noticeable but not destabilizing. The review team further concludes that the cumulative impacts would be noticeable but not destabilizing, with or without the GHG emissions of two new nuclear units at the Okeechobee 2 site.

The review team concludes that cumulative impacts from other past, present, and reasonably foreseeable future actions on air-quality resources in the geographic areas of interest would be SMALL to MODERATE for criteria pollutants and MODERATE for GHG emissions. The incremental contribution of impacts on air-quality resources from building and operating two units at the Okeechobee 2 site would not be a significant contributor to the MODERATE impacts for GHG emissions.

9.3.4.9 Nonradiological Health

The following analysis considers nonradiological health impacts from building and operating two new nuclear units at the Okeechobee 2 site. The analysis also includes past, present, and reasonably foreseeable future actions that could contribute to cumulative nonradiological health impacts on site workers (construction and operation workers) and members of the public, including other Federal and non-Federal projects and the projects listed in Table 9-16 within the geographic area of interest. Nonradiological health impacts at the Okeechobee 2 site are estimated based on information provided by FPL and the review team's independent evaluation. For the analysis of nonradiological health impacts at the Okeechobee 2 site, the geographic area of interest is the site and the immediate vicinity (~2 mi radius) and the associated road and transmission line corridors. This geographic area of interest is based on the localized nature of nonradiological health impacts and is expected to encompass all nonradiological health impacts.

Building activities with the potential to affect the health of members of the public and workers at the Okeechobee 2 site include exposure to dust and vehicle exhaust, occupational injuries, noise, and increased traffic associated with the transport of construction materials and personnel to and from the site. The operations-related activities that have the potential to affect the health of members of the public and workers include exposure to etiological (disease-causing) agents, noise, EMFs, occupational injuries, and impacts from the transport of workers to and from the site.

Building Impacts

Nonradiological health impacts on construction workers and members of the public from building two new nuclear units at the Okeechobee 2 site would be similar to those evaluated in Section 4.8 for the Turkey Point site. During the site-preparation and building phase, FPL would comply with applicable Federal and State regulations on air quality and noise (FPL 2014-TN4058). The Okeechobee 2 site is a greenfield site located in a rural area, and building impacts would likely be negligible on the surrounding populations, which are classified as medium- and low-population areas. The incidence of construction worker accidents would be the same as that for the Turkey Point site.

The review team concludes that nonradiological health impacts on construction workers and the public from building two new nuclear units and associated transmission lines at the Okeechobee 2 site would be minimal. Nonradiological health impacts associated with traffic accidents during building activities at the Okeechobee 2 alternative site were evaluated in Section 4.8.3 and the review team concludes that the impacts would be minimal.

Operations Impacts

Nonradiological health impacts on operation workers and members of the public would include those associated with the operation of cooling towers and transmission lines as described in Section 5.8. Based on the configuration of the proposed new units at the Okeechobee 2 site (see Chapter 3 for a detailed site layout description), etiological agents would not be an issue with regard to members of the public because cooling-tower blowdown would be discharged into deep-injection wells not into surface waters. Impacts on workers' health from occupational injuries, noise, and EMFs would be similar to those described in Section 5.8 for the Turkey Point site. Noise and EMF exposure would be monitored and controlled in accordance with applicable OSHA regulations. Although no detailed noise modeling has been performed for the Okeechobee 2 site, it is likely that noise impacts would be similar to those predicted for operations at the Turkey Point site. The effects of EMFs on human health would be controlled and minimized by conformance with National Electrical Safety Code criteria and adherence to the standards for transmission systems regulated by the FDEP.

The review team concludes that nonradiological health impacts on workers and the public from operating two new nuclear units and associated transmission lines at the Okeechobee 2 site would be minimal. Impacts associated with traffic accidents during operations at the Okeechobee 2 alternative site were evaluated in Section 5.8.6 and the review team concludes that the impacts would be minimal.

Cumulative Impacts

There are no past or present projects within the geographic area of interest that could affect nonradiological human health in a way similar to the building of two nuclear units at the Okeechobee 2 site identified in Table 9-16. All of the projects that could apply are more than 10 mi from the Okeechobee 2 site.

Reasonably foreseeable projects that could affect nonradiological human health in a way similar to the building of two nuclear units at the Okeechobee 2 site identified in Table 9-16 include various transportation (roads, traffic, pedestrian) and mining/quarry projects that are planned throughout the region.

There are no past, present, or reasonably foreseeable projects planned within the geographic area of interest that would affect nonradiological human health in a way similar to operating two nuclear units at the Okeechobee 2 site.

The review team concludes that the cumulative impacts on nonradiological health from building and operating two new nuclear units and associated road and transmission lines at the Okeechobee 2 site would be minimal.

Summary Statement

Impacts on nonradiological health from building and operation of two new units at the Okeechobee 2 site are estimated based in the information provided by FPL and the review team's independent evaluation. Although there could be some future activities in the geographical area of interest that could affect nonradiological health in ways similar to the building and operation of two new units at the Okeechobee 2 site and associated offsite facilities, those impacts would be localized and managed through adherence to existing regulatory requirements. The review team concludes that nonradiological health impacts on workers and the public resulting from the building of two new nuclear units and associated road and transmission lines at the Okeechobee 2 site would be minimal. The review team expects that the nonradiological health impacts on the operations employees and the public of two new nuclear units at the Okeechobee 2 site would be minimal. Finally, the review team concludes that cumulative impacts on nonradiological health from past, present, and reasonably foreseeable actions in the geographic area of interest would be SMALL.

9.3.4.10 Radiological Impacts of Normal Operations

The following impact analysis includes impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable actions that affect radiological health, including other Federal and non-Federal projects listed in Table 9-16. As described in Section 9.3.4, Okeechobee 2 is a greenfield site; there are currently no nuclear facilities on the site. The geographic area of interest is the area within a 50 mi radius of the Okeechobee 2 site. St. Lucie Units 1 and 2 (i.e., two nuclear power plants) are the only major facilities within this geographic area of interest that potentially affect radiological health within the 50 mi radius of the Okeechobee 2 site. In addition, there are likely to be medical, industrial, and research facilities within 50 mi of the Okeechobee 2 site that use radioactive materials.

The radiological impacts of building and operating the two proposed Westinghouse AP1000 nuclear power units at the Okeechobee 2 site include doses from direct radiation and liquid and gaseous radioactive effluents. These pathways would result in low doses to people and biota offsite that would be well below regulatory limits. These impacts are expected to be similar to those estimated for the Turkey Point site.

The radiological impacts of St. Lucie Units 1 and 2 include doses from direct radiation and liquid and gaseous radioactive effluents. These pathways result in low doses to people and biota offsite that are well below regulatory limits as demonstrated by the ongoing radiological environmental monitoring program conducted around St. Lucie Units 1 and 2. The NRC staff concludes that the dose from direct radiation and effluents from hospitals and industrial facilities that use radioactive material would be an insignificant contribution to the cumulative impact around the Okeechobee 2 site. This conclusion is based on data from the radiological environmental monitoring programs conducted around currently operating nuclear power plants.

Based on the information provided by FPL and the NRC staff's independent analysis, the NRC staff concludes that the cumulative radiological impacts from building and operating the two proposed Westinghouse AP1000 nuclear power units and other existing and planned projects and actions in the geographic area of interest around the Okeechobee 2 site would be SMALL.

9.3.4.11 Postulated Accidents

The following impact analysis includes radiological impacts from postulated accidents from the operation of two nuclear units at the Okeechobee 2 alternative site. The analysis also considers other past, present, and reasonably foreseeable actions that affect radiological health from postulated accidents, including other Federal and non-Federal projects and the projects listed in Table 9-16. As described in Section 9.3.4, the Okeechobee 2 site is a greenfield site; there are currently no nuclear facilities at the site. The geographic area of interest considers all existing and proposed nuclear power plants that have the potential to increase the probability-weighted consequences (i.e., risks) from a severe accident at any location within 50 mi of the Okeechobee 2 alternative site. Facilities potentially affecting radiological accident risk within this geographic area of interest are the existing two units of St. Lucie, Units 1 and 2.

As described in Section 5.11.1, the NRC staff concludes that the environmental consequences of DBAs at the Turkey Point site would be minimal for AP1000 reactors. DBAs are addressed specifically to demonstrate that a reactor design is robust enough to meet NRC safety criteria. The environmental consequences of DBAs depend on the plant design and the atmospheric dispersion. The AP1000 design is independent of site conditions and the differences in meteorology of the Okeechobee 2 alternative and Turkey Point sites are not significant with regard to the conditions that are important to assessing DBAs. Therefore, the NRC staff concludes that the environmental consequences of DBAs at the Okeechobee 2 alternative site would be minimal.

With a lower population density and land-use values for the Okeechobee 2 alternative site, the NRC staff expects the risks from a severe accident for an AP1000 reactor located at the Okeechobee 2 alternative site to be similar to or lower than those analyzed for the proposed Turkey Point site. The risks for the proposed Turkey Point site were presented in Tables 5-19 and 5-20 and are well below the median value for current-generation reactors. In addition, as discussed in Section 5.11.2, estimates of average individual early fatality and latent cancer fatality risks are well below the Commission's safety goals (51 FR 30028) (TN594). For existing plants within the geographic area of interest (St. Lucie Units 1 and 2), the Commission has determined that the probability-weighted consequences of severe accidents are small (10 CFR 51 [TN250], Appendix B, Table B-1). On this basis, the NRC staff concludes that the cumulative risks from severe accidents at any location within 50 mi of the Okeechobee 2 alternative site would be SMALL.

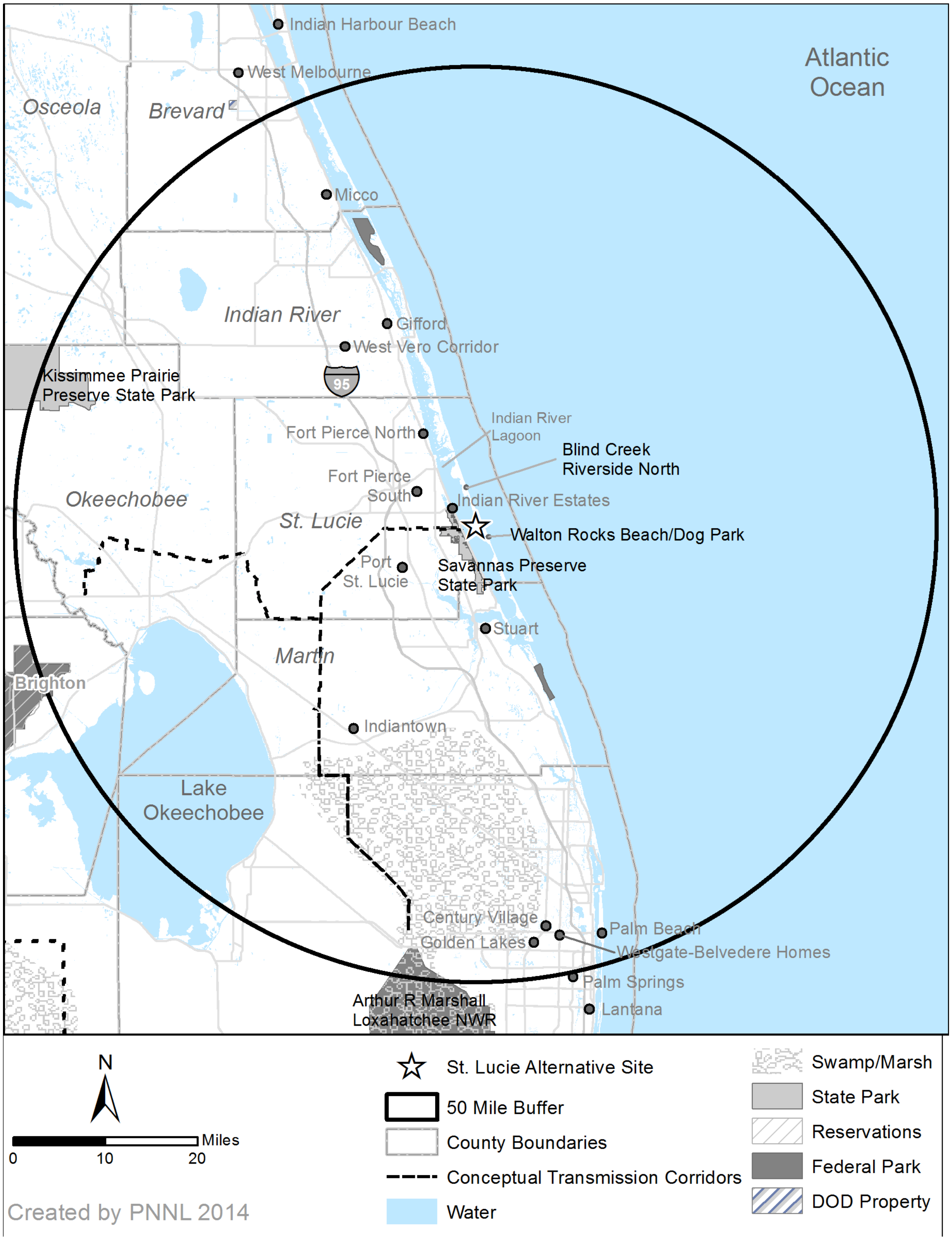
9.3.5 St. Lucie Site

This section covers the review team's evaluation of the potential environmental impacts of siting a new two-unit nuclear power plant at the St. Lucie alternative site on the eastern coast of central Florida. The site is bordered by the Atlantic Ocean to the east and the Indian River Lagoon to the west. The nearest municipalities are Fort Pierce, approximately 7 mi northwest; Port St. Lucie, approximately 4.5 mi to the west; and Stuart, approximately 8 mi to the south. The nominal site elevation is 0 to 5 ft above sea level, which falls within the 100-year floodplain. The 1,130 ac St. Lucie site is an FPL-owned nuclear power-generation station on Hutchinson Island in St. Lucie County. St. Lucie Units 1 and 2 and associated support facilities occupy less than half of the 1,130 ac site (FPL 2014-TN4058). The location of the St. Lucie site is shown in Figure 9-23.

FPL assumed the facility footprint, including the power units, support buildings, switchyard, storage areas, stormwater-retention ponds, and other structures, would require an estimated 357 ac. Building at the St. Lucie site would also require the creation of a transmission line corridor of approximately 63 mi (2,187 ac), widening of 22 mi of SR-A1A (266.8 ac [a two-lane roadway parallel to the dunes on the barrier island]), a heavy-haul road 0.5 mi (6.3 ac), and an intake/makeup pipeline (10.5 ac), Figure 9-24. Additional area would be temporarily disturbed for activities such as laydown areas, a batch plant, and for fill and spoil deposition (FPL 2014-TN4058).

The following sections include a cumulative impact assessment conducted for each major resource area. The specific resources and components that could be affected by the incremental effects of the proposed action if implemented at the St. Lucie site and other actions in the same geographic area were considered. This assessment includes the impacts of NRC-authorized construction and operations and impacts of preconstruction activities. Also included in the assessment are past, present, and reasonably foreseeable future Federal, non-Federal, and private actions that could have meaningful cumulative impacts when considered together with the proposed action if implemented at the St. Lucie site. Other actions and projects considered in this cumulative analysis are described in Table 9-21.

The geographic area of interest for cumulative impacts considers all existing and proposed nuclear power plants that have the potential to increase the probability-weighted consequences (i.e., risks) from a severe accident at any location within 50 mi of the St. Lucie site (Figure 9-23). An accident at a nuclear plant within 100 mi of the St. Lucie site could increase this risk. Other nuclear plants in Florida, Alabama, and Georgia are more than 100 mi from the St. Lucie site and are therefore not included in the cumulative impact analysis.



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2 **Figure 9-23. St. Lucie Site Region**

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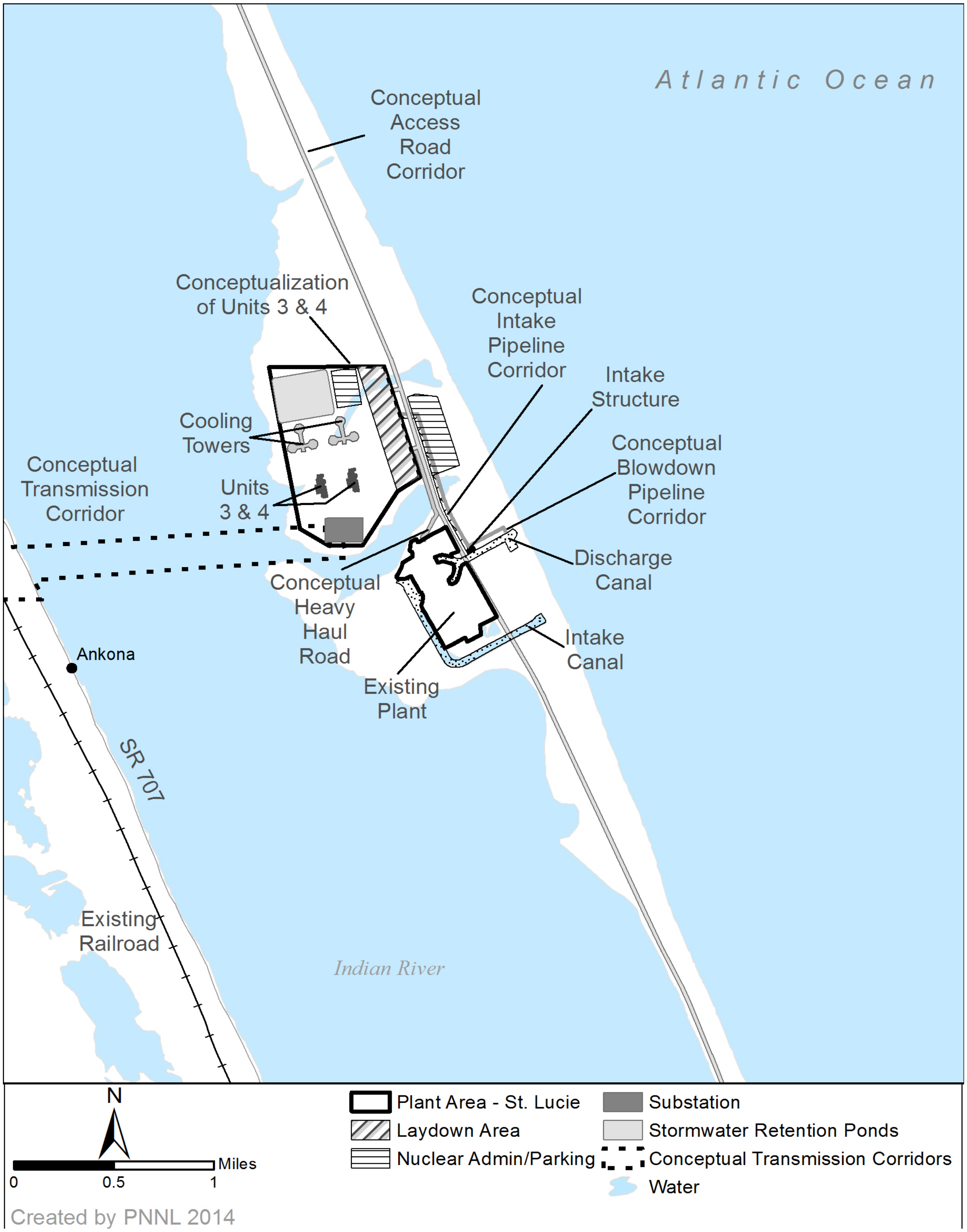
1 

2 **Figure 9-24. St. Lucie Site Footprint**

Table 9-21. Past, Present, and Reasonably Foreseeable Projects and Other Actions in the Vicinity of the St. Lucie Site

Project Name	Summary of Project	Location	Status
Energy Projects			
St. Lucie	Two 3,020 MW(t) nuclear power reactors	Adjacent	Operational, Units 1 and 2 underwent license renewal in 2003. Units 1 and 2 completed 320 MW(t) power uprate in 2013 (NRC 2012-TN1668; FPL 2014-TN3360)
West County Energy Center	Three 1,250 MW natural-gas–powered units	28 mi SW of the St. Lucie alternative site	Operational (FDEP 2013-TN2965)
Martin	Combined natural-gas/oil and solar power-generating station	46 mi SW of the St. Lucie alternative site	Operational (FPL 2014-TN2974)
Indiantown Cogeneration Company	330 MW coal-power plant	26 mi SW of the St. Lucie alternative site	Operational (FDEP 2013-TN2967)
FPL pipeline	126 mi pipeline from Sabal Trail's Central Florida Hub to FPL's Martin Clean Energy Center	Throughout region	Proposed, construction set to begin 2016 (FPL 2014-TN2975)
Floridian Natural Gas Storage Company - Natural Gas Storage Facility	Storage of natural gas	26 mi SW of the St. Lucie alternative site	Proposed, amendment to modify application sent to FERC in 2013 (78 FR 58529) (TN3002)
Treasure Coast Energy Center	300 MW natural-gas power plant	9 mi SW of the St. Lucie alternative site	Operational (FMPA 2014-TN3029)
Vero Beach Municipal Power Plant	Five-unit, 155 MW gas- and oil-fired plant	21 mi N of the St. Lucie alternative site	Operational (EPA 2014-TN3030)
INEOS New Planet Bioenergy Center	6.3 MW bioenergy facility	22 mi NW of the St. Lucie alternative site	Operational (EPA 2014-TN3032)
Riviera Beach Energy Center	1,250 MW gas-fired plant	41 mi S of the St. Lucie alternative site	Operational, completed in 2014 (FPL 2014-TN3360)
Okeechobee Landfill Energy	Waste-to-energy facility	27 mi W of the St. Lucie alternative site	Operational (Waste Management 2014-TN3034)

Table 9-21. (contd)

Project Name	Summary of Project	Location	Status
Sea Gen St. Lucie Project	A generation farm containing 20 to 40 submerged SeaGen twin rotor machine generating units having a total installed capacity of 20 to 40 MW	Offshore of St. Lucie County	Proposed, preliminary permit submitted to FERC in 2004. (69 FR 61829) (TN3097)
Mining Projects			
Five Stone mining	Stone/quarry mining	35 mi SW of the St. Lucie alternative site	Operational (EPA 2013-TN2959)
Daniel Shell Pit, Phase 6	Stone/quarry mining	41 mi W of the St. Lucie alternative site	Operational (EPA 2013-TN2956)
Florida Rock Industries/Fort Pierce	Stone/quarry mining	18 mi W of the St. Lucie alternative site	Operational (EPA 2014-TN3038)
Hammond Sand Mine	Sand/quarry mining	29 mi NW of the St. Lucie alternative site	Operational (EPA 2014-TN3044)
Various other mine and quarry projects	Stone/quarry mining	Throughout region	Operational (FDEP 2010-TN2966)
Transportation Projects			
Various transportation projects	Road, traffic, pedestrian projects	Throughout region	Ongoing (FDOT 2012-TN1132)
Parks and Aquaculture Facilities			
Dupuis Wildlife and Environmental Area	Activities include bicycling, camping, hunting, fishing, and hiking	33 mi SW of the St. Lucie alternative site	Development likely limited within this area (FFWCC 2014-TN2977)
Okeechobee Battlefield State Park	Hiking, camping	35 mi SW of the St. Lucie alternative site	Development likely limited within this area (FDEP 2010-TN2971)
Lake Okeechobee	730 mi^2 freshwater lake, restoration and protection plan	31−54 mi SW of the St. Lucie alternative site	Ongoing, Florida Legislature in 2007 expanded the Lake Okeechobee Protection Act (SFWMD 2014-TN2988)
Johnathan Dickinson State Park	Activities include bicycling, camping, boating, horseback riding, picnicking, fishing, and hiking	23 mi S of the St. Lucie alternative site	Development likely limited within this area (FPS 2014-TN3048)
Savannas Preserve State Park	Activities include bicycling, boating, horseback riding,	2 mi W of the St. Lucie alternative site	Development likely limited within this area (FPS 2014-TN3050)

Table 9-21. (contd)

Project Name	Summary of Project	Location	Status
	picnicking, fishing, and hiking		
Fort Pierce inlet State Park	Activities include bicycling, camping, boating, swimming, picnicking, fishing, and hiking	10 mi N of the St. Lucie alternative site	Development likely limited within this area (FSP 2014-TN3053)
Pepper Beach State Recreation Area	Activities include swimming, picnicking, fishing, and hiking	11 mi N of the St. Lucie alternative site	Development likely limited within this area (St. Lucie County 2014-TN3054)
St. Sebastian River Preserve State Park	Activities include bicycling, camping, boating, picnicking, fishing, and hiking	34 mi NW of the St. Lucie alternative site	Development likely limited within this area (FSP 2014-TN3055)
Hobe Sound National Wildlife Refuge	Activities include fishing, and hiking	16−26 mi NW of the St. Lucie alternative site	Development likely limited within this area (FWS 2013-TN3056)
John D. Macarthur Beach State Park	Activities include boating, swimming, picnicking, fishing, and hiking	38 mi NW of the St. Lucie alternative site	Development likely limited within this area (FPS 2014-TN3057)
Peanut Island Park	Activities include boating, picnicking, fishing, and hiking	41 mi NW of the St. Lucie alternative site	Development likely limited within this area (Palm Beach County 2014-TN3058)
Blue Cypress Conservation Area	Activities include boating, fishing, and wildlife viewing	37 mi NW of the St. Lucie alternative site	Development likely limited within this area (SJRWMD 2014-TN3100y
Pelican Island National Wildlife Refuge	Activities include boating, fishing, and wildlife viewing	33 mi NW of the St. Lucie alternative site	Development likely limited within this area (FWS 2011-TN3101)
Sebastian Inlet State Park	Activities include boating, swimming, picnicking, fishing, bicycling, camping, surfing, wildlife viewing, and hiking	37 mi N of the St. Lucie alternative site	Development likely limited within this area (FSP 2014-TN3102)
Archie Carr National Wildlife Refuge	Activities include Hiking, fishing, and wildlife viewing	40−50 mi N of the St. Lucie alternative site	Development likely limited within this area (FWS 2011-TN3103)
Indian River Lagoon Preserve State Park	Activities include hiking, swimming, picnicking, fishing, bicycling, and	43 mi N of the St. Lucie alternative site	Development likely limited within this area (FDEP 2014-TN3104)

Table 9-21. (contd)

Project Name	Summary of Project	Location	Status
	wildlife viewing		
Other State nature preserves and wildlife management areas	Public recreational activities	Throughout region	Development likely limited within these areas (FFWCC 2014-TN2981)
Comprehensive Everglades Restoration Plan Projects			
Indian River Lagoon - South	Project purpose is to improve surface-water management in the C-23/C-24, C-25, and C-44 basins for habitat improvement in the Saint Lucie River Estuary and southern portions of the Indian River Lagoon.	16 mi SW of the St. Lucie alternative site	Proposed, project in preconstruction, engineering and design phase (USACE and SFWMD 2014-TN3013)
Everglades Agricultural Area Storage Reservoirs	The purpose of this project is to improve the timing of environmental deliveries to the Water Conservation Areas, including reducing damaging flood releases from the Everglades Agricultural Area to the Water Conservation Areas.	Throughout region	Proposed, Final Project Implementation Report submitted 2012 (USACE and SFWMD 2014-TN3011)
Lake Okeechobee Aquifer Storage and Recovery	A series of aquifer storage and recovery wells adjacent to Lake Okeechobee	30 mi SW of the St. Lucie alternative site	Proposed, project in preconstruction, engineering and design phase (USACE and SFWMD 2014-TN3014)
Lake Okeechobee Watershed Project	Project to increase aquatic and wildlife habitat, regulate extreme highs and lows in lake staging, reduce phosphorus	Throughout Okeechobee County	Proposed, project in preconstruction, engineering and design phase (USACE and SFWMD 2014-TN3015)

Table 9-21. (contd)

Project Name	Summary of Project	Location	Status
	loading and reduce damaging releases to the surrounding estuaries.		
Melaleuca Eradication and other exotic plants	The project includes (1) upgrading and retrofitting the current quarantine facility in Gainesville, and (2) large-scale rearing of approved biological control organisms for release at multiple sites within the South Florida ecosystem to control Melaleuca, Brazilian pepper, Australian pine, and Old World climbing fern.	Throughout region	Operational, facility completed in 2013 (USACE and SFWMD 2014-TN3020)
Palm Beach County Agriculture Reserve Aquifer Storage and Recovery	Supplement water supplies for central and southern Palm Beach County by capturing and storing excess water currently discharged to the Lake Worth Lagoon.	Palm Beach County	Proposed, project in preconstruction, engineering and design phase (USACE and SFWMD 2014-TN3019)
Other Actions/Projects			
Herbert Hoover Dike Major Rehabilitation Project	Rehabilitation Project and Dam Safety Modification Study	30−60 mi W of the St. Lucie alternative site	Proposed, Notice of Intent to file EIS submitted by USACE in Feb. 2013 (78 FR 1164) (TN2991)
Comprehensive Shoreline Stabilization Project in Palm Beach County	Discharge fill for the purpose of shoreline stabilization	Shoreline of Palm Beach County	USACE submitted Notice of Intent in 2013 (78 FR 40128) (TN3059)

Table 9-21. (contd)

Project Name	Summary of Project	Location	Status
Lake Worth Inlet Project	Deepening and widening of the Lake Worth Inlet	41 mi S of the St. Lucie alternative site	USACE developed integrated feasibility report in 2013 (USACE 2014-TN4016)
Kissimmee River Restoration	When restoration is completed in 2017, more than 40 mi^2 of river-floodplain ecosystem will be restored, including almost 20,000 ac of wetlands and 44 mi of historic river channel.	Along Kissimmee River	Ongoing (USACE 2014-TN3061)
Harbor Branch Oceanographic Institute	Oceanic Science and Research	15 mi N of the St. Lucie alternative site	Operational (EPA 2014-TN3071)
Pratt & Whitney	Aircraft engine and engine parts manufacturing	30 mi SW of the St. Lucie alternative site	Operational (EPA 2014-TN3062)
Maverick Boat Company	Fiberglass boat manufacturing	12 mi N of the St. Lucie alternative site	Operational (EPA 2014-TN3063)
Tropicana Products, Inc.	Citrus and animal feed	10 mi W of the St. Lucie alternative site	Operational (EPA 2014-TN3068)
S2 Yachts, Inc	Fiberglass boat manufacturing	12 mi N of the St. Lucie alternative site	Operational (EPA 2013-TN3069)
Twin Vee, Inc.	Fiberglass boat manufacturing	7 mi N of the St. Lucie alternative site	Operational (EPA 2013-TN3070)
Various WWTP facilities	Sewage treatment	Throughout region	Operational
Various hospitals using nuclear material	Medical and other industrial isotopes	Throughout region	Ongoing
Various water/flood-management projects	Water and flood management	Throughout region	Ongoing (USACE 2012-TN1133)
Future Urbanization	Construction of housing units and associated commercial buildings; roads, bridges, and rail; construction of water-treatment and/or wastewater-	Throughout region	Construction would occur in the future, as described in State and local land-use planning documents

Table 9-21. (contd)

Project Name	Summary of Project	Location	Status
	treatment and distribution facilities and associated pipelines, as described in local land-use planning documents		

9.3.5.1 Land Use

The following analysis includes land-use impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable future actions that affect land use, including other Federal and non-Federal projects listed in Table 9-21. For the analysis of land-use impacts at the St. Lucie site and the area within the transmission line corridors, the review team determined that a 10 mi radius, similar to that used for the proposed Turkey Point plant site, would encompass an effective geographic area of interest for cumulative impact assessment for land use, because it would include the site and associated facilities and the nearby urban area surrounding the city of Port St. Lucie. In evaluating the land-use impacts of using the St. Lucie site, the review team used, in addition to the project application, readily obtainable data from the Internet or published sources, including aerial photographs of the site and vicinity, USDA soils information, local zoning and planning documents, and FLUCFCS data. Impacts from both building and station operation are discussed.

Building and Operations Impacts

The St. Lucie alternative site is the site of an existing nuclear power-generating station. Approximately 103.8 ac of the alternative plant site are currently devoted to developed uses associated with the existing electrical power-generation facility. FPL states in its application (FPL 2014-TN4058) that the undeveloped land area at the St. Lucie alternative site is adequate for construction and operation of another power plant, but that there would be site-planning constraints related to the site being located on a long and narrow island. In addition, widening of SR-A1A would be required, and as stated in Section 9.3.5.5, the conceptual design route of the access road and widening of SR-A1A would lead to the displacement of approximately 202 structures, based on aerial view of rooftops (FPL 2011-TN59). Thus, the road widening would have land-use impacts that would be noticeable and would alter considerably the physical attributes of the residential neighborhoods they cross.

Existing land uses in the vicinity of the St. Lucie alternative site, in addition to developed areas of the city of Port St. Lucie, consist predominantly of water, because it is adjacent to the Atlantic Ocean and Indian River Lagoon, mangrove swamps, and many State and Federal parks and preserves. The St. Lucie alternative site is located within the Coastal Zone (FPL 2014-TN4058). The closest population center with more than 25,000 population are Port St. Lucie, 4.5 mi to the west and Fort Pierce 7 mi northwest (FPL 2014-TN4058).

No soils classified as Prime or Unique farmlands are found at the site. Areas in agriculture in the vicinity of the site are classified as Unique farmlands (USDA 2014-TN3354; USDA 2014-TN3355). No commercial mineral resources are identified in the site and vicinity (Calver 1956-TN3752; Spencer 1993-TN3753). Many wildlife management areas and recreational areas are located in the vicinity of the alternative site, including the Savannas Preserve State Park, which is a 5,400 ac freshwater marsh preserve and park that includes multi-use recreational areas (FPS 2014-TN3050), Blind Creek Riverside North, a 50 ac wetland preserve on Indian River Lagoon (St. Lucie County 2014-TN4017), and Walton Rocks Beach/Dog Park, a 24 ac public park at the beach with multi-use recreational facilities (St. Lucie County 2014-TN4017).

The alternative site is located within the 100-year flood zone (St. Lucie County 2010-TN4020), and FPL states (FPL 2014-TN4058) that development of the site would require approximately 15 ft of fill to bring the site to 20 ft msl. The review team believes that such extensive fill could substantially alter localized coastal flooding patterns. The effect could be exacerbated by the substantial loss of tidal wetlands.

The St. Lucie County Comprehensive Plan Future Land Use Element refers to the St. Lucie alternative site as follows: "…two miles of oceanfront property are owned by the Florida Power & Light Company, and are to be maintained in their present natural state in conjunction with the operation of the St. Lucie Power Plant facilities." The Comprehensive Plan designates the site as Transportation/Utilities (T/U) and states that "the purpose of this district is to recognize the Transportation or Utility use of property."

Therefore, use of the St. Lucie alternative site for a power plant could be considered to be compatible with the St. Lucie County Comprehensive Plan designations for the site, if it did not interfere with the preservation of the oceanfront area identified by the Comprehensive Plan in a natural state. The review team expects that if built in accordance with FPL's present concept that the project would not interfere with ongoing preservation of the oceanfront area in a mostly natural state.

St. Lucie County zoning for the alternative plant site and some area to the north and south is U, Utilities. The St. Lucie County zoning code describes this zone as follows:

> U UTILITIES
>
> Purpose. The purpose of this district is to provide and protect an environment suitable for utilities, transportation, and communication facilities, together with such other uses as may be compatible with utility, transportation, and communication facility surroundings

The zoning designation for the lands to the north and south of the industrially zoned lands is R/C, Residential/Conservation. The St. Lucie County zoning code describes this zone as follows:

> R/C RESIDENTIAL/CONSERVATION.
>
> Purpose. The purpose of this district is to provide and protect an environment suitable for single-family dwellings at a maximum gross density of one (1)

dwelling unit per five (5) gross acres, together with such other uses as may be necessary for and compatible with low density residential surroundings.

Therefore, the use of the St. Lucie alternative site for a power plant would be compatible with the zoning for the site and nearby lands.

Building and operation of the project at the St. Lucie site would result in the conversion of approximately 536 ac of undeveloped land to power-generation uses (Table 9-22). It would also require the reuse of approximately 104 ac of existing developed land, for a total land commitment of approximately 640 ac for the new plant.

Table 9-22. St. Lucie Alternative Site Land-Use Impacts (Acres)

	Agricultural Lands (FLUCFCS 200 Land Use Series)	Urban Developed Lands (other than roads and pipelines)[a]	All Other non-Agricultural Lands (all other FLUCFCS designations)	Total
Plant Site	0	0	320	320
Access Roads	0	104	163	267
Rail Corridor	0	0.2	6	6
Intake Pipeline Corridor	0	0	4	4
Makeup Pipeline Corridor	0	0.1	6	6
Stormwater-Retention Ponds	0	0	37	37
Total[b]	0	104	536	640
Transmission-Line Corridor	507	20	2,167	2,187
Grand Total	507	124	2,704	2,827

(a) Includes power-generation uses
(b) Totals may not add due to rounding

Sources: FPL 2011-TN59 and FPL 2014-TN4058

Additional land-use impacts include possible additional growth and land conversions in the vicinity to accommodate new workers and services. Because the alternative site is located near the urban area of Port St. Lucie and other urban and suburban areas along the coast, and the workforce would be dispersed over larger geographic areas in the labor supply region, the impacts from land conversion for residential and commercial buildings induced by new workers relocating to the local area could be absorbed in the wider region. Therefore, the review team concludes that such impacts would be minimal.

Approximately 63 mi of new transmission system infrastructure would have to be built to serve the plant. Given the location of the alternative site, and as FPL states in its ER (FPL 2014-TN4058), the transmission lines would pass through the Coastal Zone. Approximately 2,187 ac of land would be at least temporarily affected. Of this land, approximately 507 ac are in agricultural uses, and 20 ac are currently devoted to urban uses, including electrical power generation, and the remainder is primarily open lands and roadways. The agricultural land within the transmission line corridors would be converted from agricultural use to transmission line use, although FPL states in its ER (FPL 2014-TN4058) that agriculture could continue within and along the transmission line rights-of-way. The land uses along the conceptual corridors for new transmission lines to serve the St. Lucie alternative site are identified in Table 9-22.

Under the Florida Site Certification application process explained in Chapter 4.1, the State approves a corridor and the applicant chooses a specific right-of-way within the approved corridor. The objective of this process, as stated in the electrical power plant and transmission line statute (FDEP 2013-TN2629) is "that the location of transmission line corridors and the construction, operation, and maintenance of electric transmission lines produce minimal adverse effects on the environment and public health, safety, and welfare" and "to fully balance the need for transmission lines with the broad interests of the public in order to effect a reasonable balance between the need for the facility as a means of providing reliable, economical, and efficient electric energy and the impact on the public and the environment resulting from the location of the transmission line corridor and the construction, operation, and maintenance of the transmission lines." FPL states in its application that, in its development of the conceptual transmission line corridor for the St. Lucie alternative site, it attempted to select corridors that would allow collocation with existing transmission line corridors and avoided populated areas or residential land uses to some extent (FPL 2014-TN4058). The State certification review process also includes a determination of land-use consistency with local land-use plans and zoning ordinances (Fla. Stat. 29-403.50665-TN1470).

The review team concludes that the land-use impacts from building and operating two new nuclear units at the St. Lucie alternative site would be noticeable, but not destabilizing.

Cumulative Impacts

Within the geographic area of interest, the only reasonably foreseeable activities shown on Table 9-21 that would have the potential to affect cumulative land-use impacts is future urbanization. The existing St. Lucie Units 1 and 2 contribute to the cumulative land-use impacts.

In the area affected by the transmission lines, other linear projects are proposed, including the Florida Gas Transmission Phase VIII Expansion Project, as shown on Table 9-21. The review team expects that these corridors, if combined with building and operating the proposed transmission lines for nuclear plants at the St. Lucie site, would have a minimal cumulative land-use impact on the local area.

Summary Statement

Based on the information provided by FPL and the review team's independent review, the review team concludes that the cumulative land-use impacts of building and operating the power plant at the St. Lucie alternative site would be MODERATE. This conclusion primarily reflects the project's use of the St. Lucie alternative site, specifically the extensive modification needed to a narrow barrier island setting subject to coastal flooding and the potential for site-planning constraints related to a major industrial development on a long and narrow island. The conclusion also reflects the need to widen a 22 mi segment of SR-A1A, a two-lane roadway parallel to the dunes on the barrier island, to provide access for building and operation of the subject nuclear plant. Past, present, and reasonably foreseeable urban development in relative confined yet environmentally sensitive barrier island setting also contribute to the MODERATE conclusion. The incremental effect of building and operating the new nuclear units at the St. Lucie site would however be a significant contributor to the MODERATE conclusion.

9.3.5.2 Water Use and Quality

The following impact analysis includes impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable future actions that could affect water use and quality, including the other Federal and non-Federal projects listed in Table 9-21. The St. Lucie site is located on Hutchinson Island in St. Lucie County.

The geographic area of interest for surface water at the St. Lucie site includes the Atlantic Ocean, Indian River watershed and the small watershed on Hutchinson Island in the vicinity of the site and for groundwater, the surficial aquifer at the site and the Upper Floridan aquifer within 20 mi of the site. These regions are of interest because they represent the water resource potentially affected by building and operating the proposed project at the St. Lucie site.

Building Impacts

Consistent with the proposed water use at the Turkey Point site, the review team assumed that no surface water would be used to build the units at the St. Lucie site. Therefore, the review team determined that there would be no impacts on surface-water use. Water for building activities would be obtained from the City of Fort Pierce and the Fort Pierce Utilities Authority. Potable water for service uses (totaling 131,500 gpd) at St. Lucie Units 1 and 2 currently comes from this source (FPL 2014-TN4058). The Fort Pierce Utilities Authority draws water from 41 wells completed in the surficial aquifer and 9 wells completed in the Floridan. The utilities authority has a water-use permit from the SFWMD district to withdraw up to 21.13 Mgd of groundwater (FPUA 2013-TN2978).

Groundwater use for building activities at the St. Lucie site would be similar to the proposed water use for building activities for the Turkey Point site. During building, water use is estimated to be 565 gpm (0.8 Mgd) (see Table 3-4). This would represent approximately 3 percent of the current capacity of the Fort Pierce Utilities Authority water-supply system.

Surface-water quality would most likely be affected by surface-water runoff during site preparation and the building of the facilities. The FDEP would require FPL to develop an erosion and sediment control plan and a SWPPP (FPL 2014-TN4058). These plans would be developed before initiation of site-disturbance activities and would identify measures to be used during site-preparation activities to mitigate erosion and control stormwater runoff (FPL 2014-TN4058).

The plans would identify BMPs to control the impacts of stormwater runoff. The review team anticipates that FPL would construct new detention/infiltration ponds and drainage ditches to control delivery of sediment from the disturbed area to onsite waterbodies. Sediment carried with stormwater from the disturbed area would settle in the detention ponds and the stormwater would infiltrate into the shallow aquifer. Implementation of BMPs should minimize impacts on surface waterbodies near the St. Lucie site. Therefore, the surface-water-quality impacts near the St. Lucie site would be temporary and minimal.

While building new nuclear units at the St. Lucie site, groundwater quality may be affected by leaching of spilled effluents into the subsurface. The review team assumes that the BMPs FPL has proposed for the Turkey Point site would be in place during building activities and therefore the review team concludes that any spills would be quickly detected and remediated. In addition, groundwater impacts would be limited to the duration of these activities, and therefore, would be temporary. The review team reviewed the general BMPs that could be expected to be required at such a site (State of Florida 2014-TN3637). Because any spills related to building activities would be quickly remediated under BMPs, and the activities would be temporary, the review team concludes that the groundwater-quality impacts from building at the St. Lucie site would be minimal.

Operations Impacts

FPL has indicated that a closed-cycle cooling system would be used for new units at the St. Lucie site. The system would use cooling towers with the makeup water coming from the Atlantic Ocean and blowdown water being returned to the Atlantic Ocean. The review team assumed that the makeup-water withdrawal rate and the blowdown discharge rate would be the same as that at the Turkey Point site when the proposed units at that site were operating on the backup water system, specifically 86,400 gpm (124 Mgd) and 58,922 gpm (85 Mgd), respectively.

Because the Atlantic Ocean is a virtually unlimited source of water, the review team determined that the use of Atlantic Ocean waters for cooling the additional units at the St. Lucie site would have a minimal impact. Therefore, the impact on surface-water resources due to plant use during operations would not be noticeable.

During operations of the new units at the St. Lucie site, potable water and water for service uses would come from the City of Fort Pierce and the Fort Pierce Utilities Authority. The review team assumed that the water consumed for the two new units would be equivalent to the amount used at the existing plants or 131,500 gpd. As mentioned above, this water comes from groundwater wells and the anticipated consumption is approximately 0.6 percent of the current authorized withdrawal for the Fort Pierce system. Therefore, the impact on groundwater resources due to plant use during operations would not be noticeable.

During the operation of the additional units at the St. Lucie site, impacts on surface-water quality could result from stormwater runoff, discharges of treated sanitary and other wastewater, and blowdown from cooling towers into the Atlantic Ocean. The FDEP would require FPL to develop a SWPPP (FPL 2014-TN4058). The plan would identify measures to be used to control stormwater runoff (FPL 2014-TN4058). The blowdown would be regulated by FDEP pursuant to 40 CFR Part 423 (TN253), and all discharges would be required to comply with limits established by FDEP in an NPDES permit.

During the operation of the additional units at the St. Lucie site, impacts on groundwater quality could result from accidental spills. Because BMPs would be used to quickly remediate spills and no intentional discharge to groundwater would occur, the review team concludes that the groundwater-quality impacts from operation of the additional units at the St. Lucie site would be minimal.

Cumulative Impacts

In addition to water-use and water-quality impacts from building and operations activities, cumulative analysis considers past, present, and reasonably foreseeable future actions that affect the same water resources.

The geographic area of interest for surface water includes the Atlantic Ocean in the vicinity of the St. Lucie site. The geographic area of interest for groundwater includes the surficial aquifer and the Upper Floridan aquifer in the region. These areas are of interest because they represent the water resource potentially affected by building and operating the additional units at the St. Lucie site. Key actions that have past, present, and future potential impacts on water supply and water quality near the St. Lucie site include the operation and decommissioning of the existing units at the St. Lucie site and existing and future urbanization in the region.

Cumulative Impacts on Water Use

The only surface-water−use impacts of building and operating the additional units at this site are the water demands occurring during operation. Because the Atlantic is a virtually unlimited source of water supply compared to the makeup-water requirements for additional units at the site and the makeup-water requirements for the other units at the St. Lucie site the review team determined that the use of water from the Atlantic Ocean would have essentially no impact on surface-water use. Therefore, the review team concludes that cumulative impacts on surface-water use would be SMALL.

Groundwater supplied by the City of Fort Pierce and the Fort Pierce Utilities Authority would be used during the building and operation of additional units at the St. Lucie site. Groundwater would continue to be used by the existing units at the site for potable and service-water systems. There is increasing demand for potable water in St. Lucie County because of continuing development, population growth, and urbanization. Most of the population growth is occurring along the coast and the I-95 corridor. To meet this demand, the County plans to build additional water treatment plants (St. Lucie County 2010-TN4020). Most of the potable water in the area has historically come from the surficial aquifer. However, brackish water from the deeper Floridan aquifer is now being withdrawn and desalinated to provide additional supplies of potable water. As mentioned above, the City of Fort Pierce and the Fort Pierce Utilities Authority currently have permits to withdraw 21.13 Mgd. Water use at the St. Lucie site while operating Units 1 and 2 (131,500 gpd or 0.13 Mgd) and building the two proposed units (565 gpm or 0.81 Mgd) would be 0.94 Mgd. This is less than 4.4 percent of the permitted withdrawal for the Fort Pierce Utilities Authority. Groundwater use with the existing and new units operating would be 263,000 gpd (0.26 Mgd), which is approximately 1 percent of the permitted withdrawal for the Fort Pierce Utilities Authority. Therefore, the review team concludes that cumulative impacts on groundwater use would be SMALL. The impacts of other projects listed in Table 9-21 are either considered in the analysis included above or would have little or no impact on surface-water and groundwater use.

Cumulative Impacts on Water Quality

As described above, the impacts from building and operating two additional units at the St. Lucie site on surface-water quality would be minimal. Other present and reasonably foreseeable future actions in the geographic area of interest of the St. Lucie site include the operation of existing units at the site. The areal extent of the influence of these facilities on water quality is small, and the influence of these facilities would be limited to Hutchinson Island. The FDEP, under the Clean Air Act Section 305(b) (33 USC 1251 et seq.) (TN662), prepares a statewide Water Quality Inventory. The FDEP also identifies impaired waterbodies during this process and lists them on the Clean Water Act 303(d) list impaired and threatened waters.

The Atlantic Ocean in areas of southern Florida has been listed on the 303(d) list as impaired because of the presence of mercury in fish, bacteria in shellfish and fecal coliform. Therefore, the review team concludes that past and present actions in the region have noticeably affected the water quality adversely. Based on its evaluation, the review team concludes that the cumulative surface-water−quality impacts would be MODERATE. Building and operating the proposed units at the St. Lucie alternative site would not be a significant contributor to these impacts on surface-water quality, because industrial and wastewater discharges from the proposed units would comply with NPDES permit limitations and any stormwater runoff from the site during operations would comply with the SWPPP (FPL 2014-TN4058). Like many areas of southeast Florida, groundwater quality in St. Lucie County has been affected by saltwater intrusion from the Atlantic because of 1) the channeling of surface runoff to the ocean through drainage canals, and 2) the pumping of groundwater. Water quality of the surficial aquifer in some areas of the county has also been degraded by the infiltration of brackish water used for irrigation (St. Lucie County 2010-TN4020). However, these issues are being addressed by service providers and local agencies, and would not make the cumulative impacts on groundwater greater than small. The review team also concludes that with the implementation of BMPs, the impacts on groundwater quality from building and operating two additional units at the St. Lucie site would likely be minimal, and therefore, the cumulative impact on groundwater quality would be SMALL. The impacts of other projects listed in Table 9-21 are either considered in the analysis included above or would have little or no impact on surface-water and groundwater quality.

9.3.5.3 Terrestrial and Wetland Resources

The following section addresses potential impacts on terrestrial and wetland resources from siting two new nuclear units at the St. Lucie site in South Florida and within a conceptual transmission line corridor, which begins in St. Lucie County and passes through portions of Martin and Palm Beach Counties. The St. Lucie site is an 1,130 ac site that already contains two operating nuclear power units. It is located on Hutchinson Island formed by the Atlantic Ocean to the east and the Indian River Lagoon to the west. The site lies within the 100-year floodplain and, other than sand dunes; topography does not vary considerably over the site (FPL 2014-TN4058).

Information from the FWS indicates St. Lucie County hosts species found in terrestrial habitats that are listed as Federally endangered or threatened and also species that are proposed for such listing (Table 9-23). Surveys were conducted in the past at the St. Lucie site in conjunction with license renewal activities (NRC 2003-TN3152). Although the eastern indigo snake was not observed on the site, it has been observed on Hutchinson Island and suitable habitat is present within site boundaries so it was assumed to be present. Wood storks have also been occasionally observed at the site (NRC 2003-TN3152). The Florida scrub jay is known to inhabit the existing transmission line corridor near Savannas State Preserve (on the mainland west of Hutchinson Island) and Audubon's crested caracara and the Everglade snail kite are suspected to occur there as well (NRC 2003-TN3152). Habitat preferences for all of the species except the fragrant prickly-apple (*Cereus eriphorus* var. *fragrans*) were discussed in previous alternative site sections, so habitat preferences for only this species are discussed here. The fragrant prickly-apple is a tree cactus that grows in coastal hammocks along the east side of the Atlantic Coastal Ridge (FWS 1999-TN136). It was listed as potentially occurring within the existing transmission line corridor (NRC 2003-TN3152) and is confirmed to occur in only 10 locations, 9 of which are in the Savannas Preserve State Park immediately across the Indian River Lagoon from the St. Lucie site (FWS 2010-TN3049). Although it is not known to occur on Hutchinson Island, future management actions call for surveys for it on the south part of the island. The four-petal pawpaw may also occur within the existing transmission line corridor (NRC 2003-TN3152).

Table 9-23. Federally Listed Terrestrial Species that May Occur on the St. Lucie Site or within the Conceptual Transmission-Line Corridor

Scientific Name	Common Name	Federal Status
Birds		
Polyborus plancus audubonii	Audubon’s crested caracara	Threatened
Rostrhamus sociabilis plumbeus	Everglade snail kite	Endangered
Aphelocoma coerulescens	Florida scrub jay	Threatened
Campephilus principalis	Ivory-billed woodpecker	Endangered
Dendroica kirtlandii	Kirtland’s warbler	Endangered
Charadrius melodus	Piping plover	Threatened
Picoides borealis	Red-cockaded woodpecker	Endangered
Calidris canutus rufa	Red knot[a]	Proposed Endangered
Mycteria americana	Wood stork	Threatened
Grus americana	Whooping crane	Endangered
Mammals		
Puma concolor coryi	Florida panther	Endangered
Peromyscus polionotus niveiventris	Southeastern beach mouse	Threatened
Reptiles		
Drymarchon corais couperi	Eastern indigo snake	Threatened
Invertebrates		
Cyclargus thomasi bethunebakeri	Miami blue	Endangered
Strymon acis bartrami	Bartram’s scrub-hairstreak[a]	Proposed Endangered
Anaea troglodyte floridalis	Florida leafwing[a]	Proposed Endangered
Plants		
Cereus eriphorus var. *fragrans*	Fragrant prickly-apple	Endangered
Decerandra immaculate	Lakela’s mint	Endangered
Polygala smallii	Tiny polygala	Endangered
Jacquemontia reclinata	Beach jacquemontia[a]	Endangered
Asimina tetramera	Four-petal pawpaw[a]	Endangered
Cucurbita okeechobeensis ssp. okeechobeensis	Okeechobee gourd[a]	Endangered

(a) Additional listed species occurring in Martin and/or Palm Beach County (FWS 2014-TN3731; FWS 2014-TN3759).

Source: FWS Natural Resources of Concern Information, Planning, and Conservation System Website (FWS 2014-TN3762).

FPL assumed the facility footprint, which would include the power units, support buildings, switchyard, storage areas, parking areas, water intake and discharge canals, and other structures, would require approximately 357 ac, mostly on the west side of SR-A1A (Table 9-22). Building at the St. Lucie site would also require approximately 267 ac to widen a stretch of SR-A1A 6.3 ac for a heavy-haul road from the barge slip, and 10.5 ac for intake/blowdown pipeline corridors. There is no current rail access to the St. Lucie site, but rail access would not be needed. Additional acreage would be temporarily required for laydown areas, a batch plant, and spoil deposition.

The conceptual transmission line corridor was assumed to be 63 mi long to connect the St. Lucie site with the Corbett substation in Palm Beach County. This corridor would vary from approximately 200−660 ft in width and require an additional 2,187 ac of land.

The following sections describe a cumulative impact assessment conducted for terrestrial and wetland resources. The review team assessed the specific resources that could be affected by the incremental effects of the proposed action if it were sited at the St. Lucie site as well as other actions in the same geographic area. This assessment includes the impacts from building activities and operations. Also included are other past, present, and reasonably foreseeable future Federal, non-Federal, and private actions that could have meaningful cumulative impacts along with the proposed action. Other actions and projects considered in this cumulative analysis are described in Table 9-21.

Most of the St. Lucie site that would be developed for new nuclear units is classified as either wetlands or previously developed lands. Mangrove swamp is the most abundant wetland type and the most predominant land cover found on the site. Embayments within the Indian River Lagoon are also a prominent land cover. Significant amounts of previously developed lands are also present. Land cover within the conceptual transmission line corridor differs from the site and includes more uplands than wetlands as well as lands used for agriculture.

Building Impacts

FPL estimated that 2,827 ac of land would be affected if two new nuclear units were built at the St. Lucie site (Table 9-24). Preconstruction and construction activities would include clearing, grading, excavation, and spoil deposition and dewatering. Typical impacts from nuclear unit preconstruction and construction to terrestrial resources and wetlands include permanent and temporary habitat loss from development, habitat fragmentation and degradation, disturbance and displacement of individual wildlife, and increased risk of vehicle collision mortality to local wildlife populations. The conversion of fully developed and stable plant communities to earlier successional communities dominated by lower growing vegetation during development of linear transmission or pipeline corridors often results in a high degree of habitat fragmentation within the landscape. FPL included 2,210 ac of land within a conceptual transmission line corridor, including 1,525 ac of uplands and 684 ac of wetlands. The conceptual transmission line corridor includes approximately 392 ac of dry prairie, 261 ac of pine flatwoods, and lesser amounts of shrub and brushland, mixed rangeland, hydric pine flatwoods, palmetto prairie, and woodland pasture. Wetlands within the conceptual transmission line corridor include approximately 283 ac of freshwater marsh, 157 ac of embayments, 78 ac of wet prairie, 63 ac of mixed wetland hardwoods, 41 ac of coastal scrub, 32 ac of emergent aquatic vegetation, and

15 ac of mangrove swamp. Impacts from transmission line corridor development and operation to habitat are mostly from alteration and fragmentation rather than complete and permanent loss and are discussed in a separate section below.

Table 9-24. Acreage within the Conceptual Footprint at the St. Lucie Site.

FLUCFCS Code	Description	Site and Non-Transmission (ac)	Transmission (ac)
200-series	Agriculture	0	507
300-series	Uplands	8	643
400-series	Forest	35	311
500-600 series	Water and Wetlands	478	684
100, 700, and 800 series	Developed	120	64
Total[(a)]		640	2,210

(a) The review team acknowledges a discrepancy of approximately 23 ac in the terrestrial versus land-use figures and has determined that this discrepancy is inconsequential to the analyses and conclusions.

Source: FPL 2011-TN59)

Plant Facilities

If the nuclear power units, access road, rail line, and pipeline were built within the proposed footprint, an estimated total of 640 ac would be affected (Table 9-24). Much of the area within the St. Lucie conceptual footprint is currently classified as mangrove swamp (FPL 2011-TN59). FPL anticipated 246 ac of mangrove swamp would be permanently developed by building within the plant area, and an additional 110 ac would be permanently developed by widening SR-A1A. Other wetlands affected include embayments and coastal scrub. The sum of lost wetland habitat from development of the plant area, immediate surrounding area, and the SR-A1A corridor is approximately 478 ac. Approximately 39 ac of upland cover would also be permanently lost, including 21 ac of upland hardwood forest and minor amounts of cabbage palm, dry prairie, and areas of non-native tree cover. Preconstruction activities would be conducted in accordance with all Federal and State regulations, permit conditions, and BMPs, including the use of directed drainage ditches and silt fencing. Acreage within the conceptual transmission line corridor was minimized to the extent possible by using the most direct route while avoiding areas with important resources and high biological value. FPL also stated that any wetland functions affected within the transmission line corridor would be replaced or restored (FPL 2014-TN4058).

The supplement for relicensing of the existing St. Lucie Nuclear Power Plant did not report the occurrence of Federally listed species on the site (NRC 2003-TN3152). The distribution and abundance of species on the site are unknown; however there may be Federally listed threatened or endangered species onsite (FPL 2014-TN3792). No part of Hutchinson Island has been designated as critical habitat for any listed species. The loss of mangrove swamps and embayments could eliminate stopover habitat used by the red knot during migration. Loss of upland habitats containing gopher tortoise (*Gopherus polyphemus*) burrows could eliminate eastern indigo snake habitat. The southeastern beach mouse (*Peromyscus polionotus niveiventris*) occurs in sand dune habitat. Although sand dune habitat is present at the St. Lucie site on the east side of SR A1A and elsewhere on Hutchinson Island, the southeastern beach mouse is not known to occur anywhere on Hutchinson Island and may have been locally extirpated (NRC 2003-TN3152). The nearest known population is at Fort Pierce Inlet State Park located roughly 9 mi north across Fort Pierce Inlet on North Hutchinson Island (FWS 2008-TN3073). The unique setting and habitats on a barrier island would preclude most of the other Federally listed species known to occur in St. Lucie County from actually occurring at the St. Lucie site or being noticeably affected by proposed actions at the site or immediate vicinity. However, impacts from the development and operation of a transmission line corridor could affect listed species.

Transmission Lines and Access Roads

Field surveys dated 2001 report the occurrence or expected occurrence of certain Federally listed species in the transmission line corridor for those units but not on the site (NRC 2003-TN3152). The new units may use this existing transmission line corridor. Approximately 720 ac of habitat potentially suitable to Audubon's crested caracara is contained within the conceptual transmission line corridor. Habitats preferred by the Everglade snail kite total almost 315 ac within the corridor. Approximately 169 ac of scrub habitat is also within the corridor. The Florida scrub jay thrives in scrub habitat, but it is not known whether the potentially affected scrub habitats also contain oak that is favored by this bird species. Kirtland's warbler uses scrub habitat in Florida, and the alteration of scrub within the corridor could result in less available habitat. Loss and degradation of mangroves, freshwater marsh, and embayments within the conceptual corridor could reduce the amount of migratory stopover habitat for the red knot. Wet prairie and freshwater marsh habitats frequented by whooping cranes total approximately 361 ac. Wood stork nesting colonies are located along the North Fork of the St. Lucie River and at Sewall's Point, approximately 7 mi southwest and 11 mi south-southeast from the St. Lucie site. Approximately 402 ac of land cover suitable for wood stork foraging exists within the conceptual transmission line corridor, and an unknown portion of this would lie within the 18.6 mi core foraging area of both of these colonies and possibly others (FWS 2010-TN3080). A considerable amount of upland cover would also be suitable to the eastern indigo snake, including more than 1,000 ac within the conceptual transmission line corridor. The existing corridor passes through portions of a red-cockaded woodpecker occurrence area (FWS 2014-TN3734). The removal of trees from a portion of the 544 ac of forested land cover within the corridor could result in the loss of red-cockaded woodpecker habitat. Changes in habitats within the conceptual transmission line corridor, including ground clearing, elimination of woody vegetation, and planting and maintenance of low-growing vegetation such as grass, would affect the habitat suitability of these areas to the aforementioned Federally listed species and could increase the likelihood of non-native plants being accidentally introduced.

Because the conceptual transmission line corridor also passes through Martin County and also a portion of Palm Beach County, the review team also considered impacts on additional Federally listed species and those species proposed for Federal listing known to occur in those counties. Bartram's hairstreak, the Florida leafwing, Florida perforate cladonia, Florida prairie-clover, four-petal pawpaw, and Okeechobee gourd would not be affected by the transmission line. Either they do not occur in the vicinity, or the habitats that they prefer are not represented in land-cover information FPL stated could be affected.

Increased traffic could also contribute to the spread of non-native plant or animal species within these habitats. Increased traffic could also increase the risk of vehicle strike mortality to the eastern indigo snake. The snake would be prone to increased mortality from off-road vehicle use during land clearing and increased traffic during construction and operation. As with construction and operation at the Turkey Point site, mitigation requirements by the FFWCC including staff awareness training and reporting would minimize negative impacts on the eastern indigo snake. Habitat fragmentation and loss would also affect local populations of plants and wildlife expected to occur within the region in suitable habitat that are not Federally listed. However, these effects are not expected to be noticeable and would not destabilize even local populations of any of these animals. The ivory-billed woodpecker, red-cockaded woodpecker, Miami blue butterfly, Florida panther, fragrant prickly-apple, Lakela's mint, and tiny polygala would not be affected. The St. Lucie site lies outside all designated management zones for the Florida panther. The Corbett substation is approximately 2 mi inside of the outermost management zone, and habitats between the substation and the zone boundary are either already developed or highly fragmented. Locations at which all of the other species are known to occur would not be affected.

Operations Impacts

Operation of two nuclear units at the St. Lucie site would create noise, fogging and dissolved solid deposition from cooling towers, runoff from increased impermeable surfaces, light pollution, and increased vehicle collision mortality to local wildlife populations. Operation of transmission lines could increase the risk of collision and electrocution mortality to nearby wood stork colonies, whooping cranes, and Everglade snail kites.

Operational noise from the cooling towers may displace individual animals from the immediate vicinity of the cooling towers. Salinity levels within cooling water would be equal to seawater. Vapor leaving a cooling tower contains dissolved solids including salt, and some vegetation can be sensitive to salt deposition. The review team assumed salt deposition from cooling-tower drift at the St. Lucie site would be similar in scale and intensity to deposition at the Turkey Point site. Most of the salt would likely be deposited on developed land near the cooling towers, and concentrations as high as 10 kg/ha/mo that have resulted in observable effects to sensitive plant species could be expected as far as 1.25 mi from the cooling towers. Like the Turkey Point site, the St. Lucie site is a coastal site and the vegetation in the vicinity would already be adapted to a high-salt environment, so the effects from additional salt deposition from the cooling towers on vegetation would likely not be noticeable beyond the boundaries of the site.

The creation of impermeable surfaces and a stormwater runoff management system at the St. Lucie site would likely result in changes to surface-water flow patterns into the Indian River Lagoon. Increases or decreases in the amount and timing of flow could result in changes in vegetative cover but would be limited to areas immediately surrounding developed areas. Erosion and sedimentation of wetlands could result during facility building activities. Pollutants could also be transported by runoff into the surrounding wetlands. BMPs would be expected to be followed with respect to protecting wetlands.

Light pollution during facility operation could affect wildlife residing on or migrating through the St. Lucie site. The St. Lucie site already has operating power units and the incremental increase in light would not be expected to noticeable alter local wildlife distribution or abundance.

EMFs are unlike other agents that have an adverse impact (e.g., toxic chemicals and ionizing radiation) in that dramatic acute effects cannot be demonstrated and long-term effects, if they exist, are subtle (NRC 2013-TN2654). A careful review of biological and physical studies of EMFs did not reveal consistent evidence linking harmful effects with field exposures (NRC 2013-TN2654). The impacts of EMFs on terrestrial flora and fauna are of small significance at operating nuclear power plants, including transmission systems with variable numbers of power lines and lines energized at levels less than 765 kV (NRC 2013-TN2654). Since 1997, more than a dozen studies have been published that looked at cancer in animals that were exposed to EMFs for all or most of their lives (Moulder 2005-TN1329). These studies have found no evidence that EMFs cause any specific types of cancer in rats or mice (Moulder 2005-TN1329). Therefore, the incremental EMF impact posed by operation of existing transmission lines and the addition of new lines for two new nuclear units would be negligible at the St. Lucie alternative site.

Transmission-line corridor vegetation-management activities (cutting and herbicide application) and related impacts on floodplains and wetlands in transmission line corridors are of minor significance at operating nuclear power plants, including those with transmission line corridors of variable widths (NRC 2013-TN2654). The presence of overhead wires above and guy wires within habitat potentially suitable for whooping cranes, wood storks, and Everglade snail kites could increase the risk of collision mortality. The existing transmission line corridor from the St. Lucie site exits the site westward across the Indian River Lagoon, the turns south and eventually southeast to the Corbett substation. The wood stork colony at Sewall's Point lies southwest between the St. Lucie site and the Corbett substation, but if the conceptual corridor follows the existing path, wires would not pass within approximately 5 mi of an existing wood stork colony. Transmission lines connecting the St. Lucie site to the Corbett substation would pass through core foraging areas of multiple wood stork colonies (FWS 2014-TN3732). The risk of collision and electrocution mortality for the wood stork increases if transmission lines are operated within their range and there is suitable habitat within the transmission right-of-way. The level of risk is commensurate with the location of the transmission lines and wood stork nesting colonies, foraging habitat, and travel corridors. The review team assumed the FWS would regulate wire installation in proximity to wood stork colonies, foraging habitat, flight corridors (Section 9.3.2.3), and important snail kite habitats as it does at the Turkey Point site, but wire installation could still affect local wood stork and snail kite populations. Operational effects on other important species would be minimal.

Cumulative Impacts

The geographic area of interest for the assessment of the potential cumulative impacts of building and operating a new reactor at the St. Lucie site and other past, present, and reasonably foreseeable future actions on terrestrial resources and wetlands is defined as a 50 mi radius around the St. Lucie site. A list of past, present, and reasonably foreseeable actions within 50 mi of the St. Lucie site is presented in Table 9-21. This list includes a variety of energy-production projects, mining, manufacturing, infrastructure-development projects, set-aside areas for recreation and conservation, CERP-related projects, and other water-management actions. Other miscellaneous activities that could affect terrestrial and wetland resources in the region include the creation of the 2,700 ac stormwater-treatment area 1E.

Past land use in South Florida, especially agriculture and more recently urbanization, has greatly affected the distribution and abundance of unfragmented plant and wildlife habitats still remaining. Development and urbanization of higher elevation lands has drastically reduced the amount of pine flatwoods and other remaining upland habitat. Ditching and draining created more dry land, reducing the amount of wetlands available as habitat. The continued operation and maintenance of existing facilities would likely not exacerbate the current situation with respect to terrestrial and wetland ecosystems. Numerous mining projects exist in the vicinity, and expansion of these as well as the creation of the Lake Point Mine has the potential to increase their footprint and development in general on the landscape, as does continued human population growth in South Florida. Lands set aside for recreation and conservation would continue to provide buffers against development, provide habitat for plants and animals, and serve to preserve the remaining ecosystem of South Florida. Projects that incrementally reverse changes in land cover due to man-made changes in surface-water flow, including CERP-related activities, would also continue to benefit both terrestrial and wetland ecology of the region.

As described in Chapter 7, terrestrial and wetland environments in South Florida have been affected by continued population growth and related development. The overall impact from past, present, and reasonably foreseeable future activities on regional terrestrial and wetland ecology is substantial.

Summary Statement

The loss of more than 600 ac of habitat, much of it mangrove forest, on the ecologically sensitive barrier island containing the St. Lucie site would be noticeable. Furthermore, the building and operation of a 63 mi long transmission line corridor to service two new units at the St. Lucie site would produce noticeable impacts on terrestrial ecological resources and wetlands both on the barrier island and on the mainland landscape to the east. Approximately 482 ac of wetland habitats including 405 ac of mangrove swamp and 39 ac of freshwater marsh would be permanently lost to build the transmission line. FPL included over 2,187 ac of land within a 63 mi long conceptual transmission line corridor that was 200−660 ft wide. The corridor contained 986 ac of uplands as well as 607 ac of forested cover. These figures do not account for uplands that have been developed or are currently used for agriculture or pasture. Although the entire corridor would not be developed and all lands would not be lost as habitat, some portion would be lost to pole installation, road development, or altered to low-growing vegetation. Habitats of significant ecological value in South Florida that could be affected include mangrove swamp, freshwater marsh, herbaceous prairie, and pine flatwoods. Impacts on Federally listed terrestrial species and their habitats would be noticeable and would require mitigation.

Based on the information provided by FPL and the review team's independent evaluation, the review team concludes that the cumulative impacts on terrestrial and wetland resources of building and operating two new nuclear units at the St. Lucie alternative site, including impacts attributable to permanent conversion of habitat for the facility footprint as well as operation of the cooling tower and transmission lines would be MODERATE. The incremental effect of the building and operation of two new nuclear units at the St. Lucie site would be a significant contributor to this impact, primarily because of effects on mangroves and the proposed transmission line corridor impacts on forest habitat.

9.3.5.4 Aquatic Resources

What follows is an assessment of the potential impacts on aquatic resources that may occur if the two nuclear units described by FPL (2014-TN4058) were constructed and operated at the St. Lucie alternative site. It is also assumed the existing infrastructure at the St. Lucie site, including the intake and discharge structures systems and components used by the existing nuclear units at this location, would have sufficient excess capacity support two additional closed-cycle cooling units. Unless otherwise noted, the information presented in this section was obtained from FPL's ER, Revision 6 (FPL 2014-TN4058).

The St. Lucie alternative site is an 1,130 ac industrial site owned by FPL and located on Hutchinson Island in St. Lucie County, Florida (Figure 9-24). The site currently supports two operating nuclear units that were relicensed in 2003 for an additional 20 years of operation after completion and publication of a supplemental environmental impact statement by the NRC (2003-TN3152). The site is situated between two major aquatic ecosystems: the Atlantic Ocean to the east and the Indian River Lagoon to the west. The site is approximately 7 mi southeast of Fort Pierce, and 4 mi east of the city of St. Lucie, and is situated on the west side of SR-A1A. Two county parks with beach access (Blind Creek Pass Park and Walton Rocks Park) are within the St. Lucie Units 1 and 2 property boundary. The Indian River Lagoon to the west of the St. Lucie site is a long, shallow estuary that extends along the central east coast of Florida. Near the St. Lucie site, the lagoon is approximately 7,200 ft wide. The Jensen Beach to Jupiter Island Aquatic Preserve is adjacent to the site. To the east, the ocean floor is composed of unconsolidated sediment containing quartz and calcareous sand, and shell fragments. Water depths approximately 1 mi from shore are less than 40 ft. A complete description of the existing units is found in NRC 2003 (TN3152). The existing Units 1 and 2 use a once-through cooling-water system that withdraws from and discharges into the Atlantic Ocean via offshore intake and discharge structures. The plant can withdraw water for station cooling from the Indian River Lagoon via Big Mud Creek under emergency conditions (NRC 2003-TN3152). For the purpose of this review, it is assumed that water for the closed-cycle cooling system proposed for the new reactors would use the existing intake and discharge canals that support Units 1 and 2. The review team also assumes the facility footprint would require 357 ac, and the conceptual transmission line corridor to support the new units would be 63 mi long and occupy 2,187 ac.

As described in NUREG–1437, Supplement 11 (NRC 2003-TN3152), extensive environmental studies were conducted in the Atlantic Ocean and the Indian River Lagoon near the St. Lucie site prior to construction and operation of Units 1 and 2. What follows is a brief description of the information presented by the NRC (NRC 2003-TN3152) and more recent studies conducted by FPL, as described in ER Revision 6 (FPL 2014-TN4058).

Commercial and Recreational Species

Based on the information presented by the NRC (NRC 2003-TN3152), invertebrate species with commercial or recreational value present in the Atlantic Ocean in the vicinity of St. Lucie included the Atlantic calico scallop (*Argopecten gibbus*), various shrimp of the family Penaeidae, and the blue crab (*Callinectes sapidus*). These species were generally collected infrequently and in small numbers. Fish species with commercial or recreational value included the Bluefish (*Pomatomus saltatrix*), Spanish Mackerel (*Scomberomorus maculatus*), and King Mackerel (*Scomberomorus cavalla*). These species are highly migratory, spawn in coastal waters from late summer into winter (depending on species), and migrate northward along the East Coast during the warmer season. Recreationally important fish species present near the St. Lucie site included Ladyfish (*Elops saurus*), Common Snook (*Centropomus undecimalis*) and various billfish species. As reported by FPL (2014-TN4058), tilefish (*Caulolatilus* spp.) and Swordfish (*Xiphias gladius*) are also present near the St. Lucie site.

Important Species

Atlantic Ocean

Extensive environmental baseline studies conducted at Atlantic Ocean sites near St. Lucie included surveys of zooplankton, phytoplankton, benthic invertebrates, and fish communities. The results of some of these studies are described in detail by the NRC (2003-TN3152), and additional discussion is provided by FPL (2014-TN4058). Initial baseline monitoring established that there were three subtidal microhabitats near the plant: shallow beach terrace, offshore shoal, with a deep trough between the two. These microhabitats contained different sediment composition, which influences invertebrate and fish abundance and diversity. Phytoplankton communities were dominated by diatoms; zooplankton communities were generally dominated by copepods and reflected species that spend their entire lifecycle in the water column. Baseline data described 127 species of arthropods and nearly 300 species of mollusks. As described above, the calico scallop, blue crab, and a variety of shrimp were of commercial value. Baseline studies also identified more than 900 taxa of benthic macroinvertebrates in ocean waters near St. Lucie. Fish sampling methods during baseline studies included bottom trawls and beach seines. Bottom trawls during early baseline studies were generally ineffective, catching fewer than 40 fish during one eight-month sampling effort. Beach seines collected over 11,500 fish in November 1971, with Cuban and Longnose Anchovies (*Anchoa cubana* and *A. nasuta*) dominating the samples. As noted by the NRC (2003-TN3152), offshore fish communities were generally transitional assemblages of temperate and tropical forms. To avoid affecting species attracted to reef structures, FPL sited the intake and discharge structures for St. Lucie Unit 1 and 2 in areas where reef systems were not present.

Indian River Lagoon

As described by the NRC (2003-TN3152), environmental studies were conducted in the Indian River Lagoon from the late 1960s to the 1980s near the site of St. Lucie Units 1 and 2. This portion of the estuary contains extensive growths of manatee grass (*Syringodium filiforme*) that supports a variety of species, including amphipods, shrimp, isopods, crab, and juvenile fish. A diverse assemblage of fish species are present in the area, including Red Drum, Spotted Seatrout, Common Snook, Sheepshead Minnows, and Gray Snapper.

Essential Fish Habitats

A variety of managed species under the jurisdiction of the South Atlantic Fishery Management Council (SAFMC) are present near the St. Lucie site (Table 9-25). Although there is no designated essential fish habitat (EFH) for Coastal Marine Pelagics near the St. Lucie site, SAFMC has identified habitats of particular concern (HAPCs) in the Atlantic Ocean and Indian River Lagoon near the site. Coral/Coral Reef EFH is identified in the Atlantic Ocean near the site, and HAPC is designated in ocean and lagoon areas near the site. Snapper-Grouper EFH and HAPC are present in both waterbodies, and Spiny Lobster EFH is also present at both locations. Shrimp EFH is designated in both Atlantic and Indian River Lagoon areas near the site, and HAPC is designated in the Indian River Lagoon.

Table 9-25. Essential Fish Habitat and Habitat Areas of Particular Concern Present Near the St. Lucie Site

	Atlantic Ocean		Indian River Lagoon	
Applicable Fishery Management Plan	**EFH**	**HAPC**	**EFH**	**HAPC**
Coastal Marine Pelagic	No	Yes	No	Yes
Coral/Coral Reef	Yes	Yes	No	Yes
Snapper/Grouper	Yes	Yes	Yes	Yes
Spiny Lobster	Yes	No	Yes	No
Shrimp	Yes	No	Yes	Yes

Source: SAFMC EFH Viewer (SAFMC 2014-TN2946)

Non-Native or Nuisance Species

Non-native or nuisance species that have been observed in the Indian River Lagoon near St. Lucie include the Brown Hoplo (*Hoplosternum littorale)* and green mussel (*Perna viridis*) (FISP 2009-TN3064). In addition, the FFWCC has identified the Lionfish (*Pterois volitans*), which is known to occur along the coast of Florida, as a threat to saltwater fish and wildlife (FFWCC 2014-TN3065).

Federally and State-Listed Species and Critical Habitats

Federal or State-listed species and Species of Concern that could be present near the St. Lucie site are listed in Table 9-26. Large whales are known to occur along the coast of South Florida, and may, on occasion, occur close to the St. Lucie facility. The five species of sea turtles listed in Table 9-26 have been reported on Hutchinson Island, where the loggerhead sea turtles is the most common. As described by the NRC (NRC 2003-TN3152), between 5,000 and 8,000 loggerhead nests have been reported on Hutchinson Island. Green and leatherback turtle nests have also been documented on the island. FPL (2014-TN4058) indicated Kemp's ridley and hawksbill sea turtle nests have not been reported near St. Lucie. The discovery of a Smalltooth Sawfish in the St. Lucie intake canal on May 16, 2005, during the course of normal sea turtle netting activities prompted the development of a biological assessment that was submitted to National Marine Fisheries Service (NMFS) in November 2005 (FPL 2005-TN3156). A biological assessment related to sea turtle capture during normal operations at St. Lucie was developed by the NRC in 2007 (NRC 2007-TN3074) and consultation with NMFS is still in progress. The NRC also provided an EFH assessment in 2012 related to the power uprate proposed by FPL for Units 1 and 2 (NRC 2012-TN3155). Additional information on the operation of St. Lucie Units 1 and 2 may be found in FPL 2014 (TN3917).

Table 9-26. Federally or State-Listed Species and Species of Concern Likely to Occur at or near the St. Lucie Site

Common Name	Scientific Name	Classification	Federal Designation	State Designation
Sei whale	*Balaenoptera borealis*	Mammal	Endangered(a)	Endangered(a)
Finback whale	*Balaenoptera phusalus*	Mammal	Endangered(a)	Endangered(a)
North Atlantic right whale	*Eubalaena glacialis*	Mammal	Endangered(a)	Endangered(a)
Humpback whale	*Megaptera novaeaniae*	Mammal	Endangered(a)	Endangered(a)
Sperm whale	*Physetercatodon*	Mammal	Endangered(a)	Endangered(a)
Florida manatee	*Trichechus manatus latirostris*	Mammal	Endangered(b)	Endangered(b)
Green sea turtle	*Chelonia mydas*	Reptile	Endangered(b)	Endangered(b)
Hawksbill sea turtle	*Eretmochlys imbricata*	Reptile	Endangered(b)	Endangered(b)
Kemp's ridley sea turtle	*Lepidochelys kempii*	Reptile	Endangered(b)	Endangered(b)
Loggerhead sea turtle	*Caretta caretta*	Reptile	Endangered(b)	Endangered(b)
Leatherback sea turtle	*Dermochelys coriacea*	Reptile	Endangered(b)	Endangered(b)
American alligator	*Alligator mississippiensis*	Reptile	Threatened(c) SOA(d)	Threatened(c) SOA(d)
Smalltooth Sawfish	*Pristis pectinata*	Fish	Endangered(c)	Endangered(c)
Mangrove Rivulus	*Rivulus marmoratus*	Fish	Species of Concern(b)	Species of Special Concern(b)
Johnson's Seagrass	*Halophila johnsonii*	Plant	Threatened(a)	-

(a) ML031360705, St. Lucie Relicensing SEIS (NRC 2003-TN3152)
(b) FNAI 2013-TN3066
(c) FFWCC 2013-TN3075
(d) SOA = similarity of appearance to American crocodile

Building Impacts

Based on the information provided by FPL, a total of 357 ac would be required for the main power plant site, and an additional 2,187 ac would be required to support transmission lines. The facility footprint would primarily affect mangrove swamp habitat, resulting in a permanent loss of resource. Transmission-line construction would likely affect existing agricultural activities, and would likely require water crossings that could temporarily affect aquatic resources during tower construction. Because the review team assumes that the existing intake and discharge canal structures used by St. Lucie Units 1 and 2 would support the cooling of the new units, building impacts on nearshore areas would be greatly reduced, and likely be primarily associated with stormwater management that would be mitigated through BMPs and compliance with NPDES permits. As noted by FPL, Coastal Zone Management certification would be required, given the proximity of the St. Lucie site to the Atlantic Ocean. Building activities would be mainly confined to the western portions of the existing site and are not expected to affect nesting turtles, or turtle movements in the Atlantic or Indian River Lagoon. FPL has indicated field surveys for Federally or State-listed species would be conducted prior to building activities at the site or within transmission line corridors.

Operations Impacts

Assuming the cooling systems used at the St. Lucie site for the new reactors would be similar to those described in Section 3.4.5 for proposed Units 6 and 7 at Turkey Point when saltwater is used, the maximum consumptive water use would be approximately 86,400 gpm and the maximum blowdown discharge would be approximately 58,922 gpm. The existing St. Lucie Units 1 and 2 once-through cooling system requires between 800,000 to 1,120,000 gpm, depending on condenser cleanliness (NRC 2003-TN3152), and these units received license renewals by the NRC on November 2, 2003 (NRC 2013-TN3079). The recent extended power uprate granted in 2012 for these units increased water discharge temperatures by approximately 3°C, but did not increase flow (NRC 2012-TN3153). Comparing the maximum consumptive water use for the proposed to units to the range of once-through water flow for the existing units shows the new units would increase the existing intake flow rate between 7.7 and 10.8 percent. This would likely result in some increase in impingement and entrainment losses related to the existing intake. Blowdown contributions to the existing discharge canal and outfall would represent increases in flow rates ranging from approximately 5 to 7 percent, depending on actual water flow of the Unit 1 and 2 cooling system. Blowdown discharges may contribute to both discharge water temperature and contaminant load, and would be subject to NPDES permitting. Assuming a closed-cycle cooling system and compliance with the EPA's 316(b) Phase I requirements for intake structures (66 FR 65256) (TN243), the intake is considered protective of aquatic life. The review team considers the anticipated impacts of impingement and entrainment to be minimal.

Also operation of the cooling towers may increase nearby salt deposition. The effects of additional salt deposition are likely not be significant for surface-water habitats near the area, because the salt content of the air is already high at this coastal location and biota are preadapted to high salt depositional rates.

Operational impacts associated with the St. Lucie site after Unit 1 and 2 license expiration (2036 and 2043, respectively) would likely decrease, because intake and discharge water volumes through the existing infrastructure would be significantly reduced when once-through cooling is no longer required. The review team assumed FPL would obtain a revised NPDES permit at that time for continued operation of the new units.

Cumulative Impacts

Table 9-21 presents past, present, and reasonably foreseeable projects and other actions in the vicinity of the St. Lucie alternative site. As described in previous sections, a variety of energy, transportation, mining, and infrastructure improvement projects are occurring or may occur. These projects may place increasing demands on groundwater and surface-water resources, temporarily or permanently alter wetland and surface-water habitats, or require additional protection from storm event or sea-level rise in the coming decades. Table 9-21 also provides a list of parks and preserves that will continue to exist during that time, providing protected habitat for terrestrial and aquatic biota, and recreational opportunities for residents of South Florida and visiting tourists. It is expected that limited development will occur near these protected areas, providing an overall positive cumulative ecological benefit. In addition, a variety of restoration projects are current under way or planned that are intended to restore historical hydrologic connectivity, enhance habitats that promote species diversity, improve water quality and water management, and control exotic or invasive species that threaten native plants and biota.

As discussed in Section 7.3.2, aquatic environments in this region of South Florida may also be affected by continued population growth. Overall the review team concludes that the cumulative impacts on aquatic resources in the vicinity of the St. Lucie site would be SMALL to MODERATE.

Summary Statement

Based on a review of the information provided by FPL and its independent assessment, the review team concludes that the operation of two nuclear units at the St. Lucie site, in addition to the existing units, would contribute minimally to adverse cumulative effects to aquatic resources. The presence of two new units will result in some detectable increases in impingement and entrainment, but would not result in a noticeable change in aquatic resources. Cooling-tower blowdown would contribute minimally to water temperature or contaminant levels of water discharged into the Atlantic Ocean, and would be regulated via an NPDES permit. Thus, the review team concludes that the cumulative impacts of building and operation of two new nuclear reactors at the St. Lucie site, combined with the other past, present, or reasonably foreseeable activities on aquatic resources would be SMALL to MODERATE. Building and operating two new nuclear units at the St. Lucie site would not be a significant contributor to the MODERATE impact.

9.3.5.5 Socioeconomics

The following impact analysis includes impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable future actions that affect socioeconomics, including other Federal and non-Federal projects listed in Table 9-21. For the analysis of socioeconomic impacts at the St. Lucie site, the geographic area of interest is considered to be the 50 mi region centered on the St. Lucie site with special consideration of St. Lucie, Martin, Indian River, and Palm Beach Counties, because that is where the review team expects socioeconomic impacts to be the greatest. In evaluating the socioeconomic impacts of site development and operation at the St. Lucie site near Port St. Lucie in St. Lucie County, the review team used readily obtainable data from the Internet or published sources.

Physical Impacts

People who work or live around the St. Lucie site would be exposed to noise, fugitive dust and gaseous emissions from building and operations activities. Noise, dust, and air-pollution emissions generated within the boundaries of the St. Lucie site would be expected to be similar to those for the Turkey Point site. The two closest residential areas lie to the west and south of the proposed location. The first is approximately 1.5 mi west of the proposed site across the

Indian River Lagoon, and the second is approximately 2 mi south of the proposed site boundary. Because noise and air-pollution impacts are attenuated by distance, the noise and air-pollution impacts would be minor. Best practices and applicable regulations would be expected to protect building workers and personnel working onsite. Offsite structures include an access road (and widening of a portion of SR-A1A), a heavy-haul road, a transmission line, and intake/makeup pipelines (FPL 2014-TN4058). Building of these offsite structures would generate noise, fugitive dust, and gaseous emissions. The impact would be temporary and best practices would minimize the impacts on the public. Truck and vehicle traffic related to building and operations would also generate noise, fugitive dust, and gaseous emissions offsite. Vehicle traffic would be concentrated during the commute hours of the day. Truck traffic would be up to 36 trucks per hour during the building period and would traverse urban residential areas to the north and south of the site. The review team expects best practices to keep emissions within regulations, which would result in minor impacts on the community.

The St. Lucie site is owned by FPL. Offsite project-related building activities include the widening of a 22 mi long portion of SR-A1A, a 0.5 mi heavy-haul road connecting the barge access location to the project site, a 63 mi transmission line, and intake/makeup pipelines (FPL 2014-TN4058). The conceptual design route of the access road and widening of SR-A1A would lead to the displacement of approximately 202 structures, based on aerial view of rooftops (FPL 2011-TN59). The physical impacts would be noticeable and would alter considerably the physical attributes of the residential neighborhoods they cross.

The new nuclear plants would be visible from the surrounding area, including recreational areas next to the site and the residential areas on the coast across from the Indian River Lagoon. However, because of the distance from the residential areas, and because of the already existing nuclear plants on the St. Lucie site, the new nuclear plants would not contrast with current viewscape, which would result in minor impacts on the community.

Based on the information provided by FPL (2014-TN4058) and the review team's independent analysis, the review team concludes that the overall physical impacts of building activities and would be minor, with the exceptions of noticeable and destabilizing impacts on roads and buildings at the St. Lucie site.

Demography

The St. Lucie site is located in St. Lucie County, 4.5 mi east of Port St. Lucie (2012 population 163,748) the closest population center with more than 25,000 residents (FPL 2014-TN4058; USCB 2012-TN4098). Fort Pierce, also with a population larger than 25,000, is 7 mi northwest of the site (2012 population 42,350, USCB 2012-TN4098). There are 10 counties within the 50 mi area, but the review team estimates the areas in which workers would most likely live and from which they would commute are within St. Lucie, Martin, Indian River, and Palm Beach, based on current commuter patterns of the FPL staff working on the existing St. Lucie nuclear power units 1 and 2.[36]

(36) Approximately 97 percent of the workforce of these power units lives in this four-county area (FPL 2014-TN4058).

FPL estimated the peak number of workers during building would be 3,983, including 33 operation workers. The review team assumed that the share of construction and operation workers relocating from outside the four-county area would be 69 percent of the estimated peak number of workers. This assumption was reached by using the assumption made for the proposed Turkey Point site as a reference and assuming that the share of workers that would come from outside the region is inversely proportional to the population of the region.[(37)] As stated in Section 4.4, 70 percent of the construction workforce and 100 percent of the operations workforce that moved to the area were assumed to bring their families. Based on these assumptions, a peak of 2,726 construction and 23 operation workers would relocate to the area during the project building phase, and 1,932 of these workers would bring their families. Based on an average household size of 3.25 people, the total increase in population attributable to the peak total workforce at the St. Lucie site would be 6,279 people. An influx of 6,279 people represents a 0.3 percent increase in the four-county 2012 population of 1,887,031.

FPL estimated the total onsite operations workforce to be 806 workers, and that 69 percent of these workers (557) would relocate from outside the four-county area. For this analysis, the review team assumed that 100 percent of operation workers who relocate would bring their families. Based on an average household size of 3.25 people, the total population increase attributable to project operations would be 1,811 (557 x 3.25) people. This represents less than a 0.1 percent increase in the four-county area.

Building and operations would require widening SR-A1A and would displace an approximate 202 structures located north of the site, approaching the town of Fort Pierce, and south of the site, approaching the town of Stuart (FPL 2014-TN4058). The presence of high-density dwellings suggests the number of households displaced would be considerably larger, because many buildings would house more than one household. Residential displacements would noticeably alter the affected residential neighborhoods.

The review team concluded that the impact on local demographic resources would not be noticeable and would be minor, except for the impact on the displaced residents along SR-A1A, which would have a noticeable and destabilizing effect on a substantial number of households.

Economic Impacts on the Community

Economy

FPL estimated the peak number of workers during building would be 3,983, including 33 operation workers. Employment of 3,983 construction and operation workers would have positive economic impacts in the four-county area. Based on a multiplier of 1.7136 jobs (direct and indirect) for every construction job and 2.2500 for every operation job, 3,983 new construction and operation jobs would create 2,860 indirect jobs, for a total of 6,843 new jobs in

(37) The proposed Turkey Point site analysis assumed 50 percent of the peak workers would come from outside the 50-mi region and that 83.3 percent of those would reside in Miami-Dade County, i.e., 41.65 percent (0.5 x 0.833) of the peak workers would migrate into Miami-Dade County. Because the population of the four-county area is approximately 75 percent of that of Miami-Dade County (USCB 2012-TN4098), the review team assumed the share of peak workers migrating into the four-county area would be 1-(0.75 x 0.4165) ≈ 69 percent.

the four-county area during peak employment (3,950 x 1.7136 + 33 x 2.2500) (FPL 2011-TN56). This represents a 0.8 percent increase in the total employment in the four-county area.[38] Peak employment would last 1 month and the average employment generated during the 10-year building period would be about half of that of peak employment. This added employment would generate added earnings to the economy of the four-county area, but the added employment and earnings would not be noticeable to most of those living or working in the area.

An estimated 806 workers would be required for the operation of two nuclear power facilities. Based on a multiplier of 2.2500 jobs (direct and indirect) for every operations job at the new units (FPL 2011-TN56), an influx of 806 workers would create 1,008 indirect jobs for a total of 1,814 new jobs in the region. This represents a 0.2 percent increase in the total employment in the four-county area. This added employment would also generate added earnings to the economy of the four-county area, but the added employment and earnings would not be noticeable to most of those living or working in the area.

Taxes

State corporate income taxes and sales and use taxes paid at the St. Lucie site during construction and operations of the proposed units would be similar to those paid by the same units at the proposed Turkey Point site. As discussed in Sections 4.4 and 5.4, State taxes paid by the proposed units would not exceed 2 percent of the annual collected State corporate income and sales and use taxes. The impact would be minor and beneficial. County sales surtax rates in the four-county area for the 2013 calendar year were zero percent for Martin and Palm Beach Counties, one-half percent for St. Lucie, and one-percent for Indian River County (FDOR 2014-TN3393). County surtax collections from the proposed units would be highest during construction when annual expenses related to the proposed units would be estimated to reach up to $1.56 billion (Section 4.4). A 1percent sales surtax would generate $15.6 million in revenues for the four-county area.[39] This would correspond to less than 1 percent of total county revenues in the four-county area for 2014.[40] The impact would be minor and beneficial. County and school district governments in Florida may levy taxes up to 10 mills each (1 percent) in property taxes (FDOR 2012-TN459). If the value of property taxes for the two nuclear reactors at the St. Lucie site were the same as the value estimated for Units 6 and 7 at the Turkey Point site in Section 5.4.3.2, FPL would pay $20 million in property taxes to the St. Lucie School District and $20 million to St. Lucie County. These payments would correspond to 7.6 percent the St. Lucie School District 2011-12 total revenues ($20 million compared $262.5 million)[41] and 6.3 percent of the St. Lucie County 2011-12 total revenues ($20 million compared to $320 million).[42] Because property taxes paid to school districts are reallocated through Florida's Education Finance Program, the benefit to the St. Lucie School District would be diluted to some extent, and the exact amount distributed to each school district is not known at this time. Because of the value of project-related property tax payments relative to current

(38) Employment of 834,072 (BLS 2013-TN4085).
(39) To the extent that some of the expenditures would be made in Martin, Palm Beach and St. Lucie Counties, and assuming the sales surtax rates are unchanged, the total sales surtax collected would be smaller.
(40) $3,598 million (FLDFS 2013-TN3392).
(41) FLDOE 2013-TN3299
(42) FLDFS 2013-TN3392

property taxes, the review team considers the impacts on tax revenues to both the St. Lucie School District and St. Lucie County to be minor and beneficial.

The review team concluded that the economic impact would not be noticeable and would be minor and beneficial.

Infrastructure and Community Service Impacts,

Traffic

Workforce access to the St. Lucie site would occur via SR-A1A coming from the north and the south. The review team estimated the current LOS (Level of Service) of these roads at two FDOT traffic-monitoring sites based on the peak hour directional traffic and FDOT LOS thresholds. Peak hour directional traffic information was obtained from FDOT Florida Traffic Online (FDOT 2013-TN3558) and consists of the AADT at each traffic-monitoring site, a Standard Peak Hour Factor (K) and a Directional Distribution Factor (D). The multiplication of these three elements (AADT x K x D) provides an estimate of the current peak hour directional traffic volume. The LOS was determined comparing this peak hour directional traffic volume with the maximum thresholds for each LOS in Table 7 (urbanized areas) of FDOTs Generalized Service Volume Tables (FDOT 2013-TN3297). Based on this procedure, the LOS at both traffic-monitoring sites is C. To estimate the project impact on traffic LOS during the project's peak workforce building period, the review team followed a methodology similar to that described in Section 4.4: The peak workforce of 3,983 construction and operation workers was divided into two shifts, with 70 percent assigned to shift 1 (6:00 a.m. to 4:30 p.m.) and 30 percent to shift 2 (5:00 p.m. to 3:00 a.m.). The hour of peak commute would be 4:30 p.m. to 5:30 p.m. The review team also assumed up to 36 trucks per hour. The project-related directional traffic during the peak commute hour would be 2,824 vehicles (70 percent x 3,983 + 36). The review team assumed that half of the project-related traffic would come from each direction, north and south.[43] The results of this analysis are presented in Table 9-27 below. The additional building traffic would drop the LOS classification at both traffic-monitoring sites to F. Widening of SR-A1A would bring the LOS classification to a C north of the site and to a D south of the site.

Table 9-27. Peak Workforce Traffic LOS Analysis for the St. Lucie Site

Traffic-Monitoring Site	Baseline Peak Hour Directional Traffic	Baseline LOS	Distribution of Project-Related Peak Traffic	Added Peak Hour Directional Traffic	Peak Hour Directional Traffic with Project	LOS with Project
SR-A1A north of site	562	C	0.50	1,412	1,974	F (C)[a]
SR-A1A south of site	811	C	0.50	1,412	2,223	F (D)[a]

(a) LOS classification after widening of SR-A1A

Source: Review team calculations based on FDOT 2013-TN3297 and FDOT 2013-TN3558

(43) Based on U.S. Census Bureau commuter patterns (USCB 2011-TN4078) it was not possible to determine the likely direction of outgoing project-related traffic.

FPL estimated the total onsite operations workforce to be 806 workers. If access of this workforce to the St. Lucie site were distributed among the two directions equally, the LOS at traffic-monitoring site north of the St. Lucie site would drop to D, and the LOS at the traffic-monitoring site south of the St. Lucie site would drop to E. Widening of SR-A1A would bring the LOS classification to C north and south of the site.

Based on the above analysis, the review team concludes that the impact of building and operations of the proposed nuclear reactors at the St. Lucie site would be noticeable during both building and operations, although not destabilizing, after widening of SR-A1A.

Recreation

Blind Creek Park, Big Mud Creek Park and the stretch of lagoon designated as the Jensen Beach to Jupiter Inlet Aquatic Preserve are adjacent to the site. The Savannas Preserve State Park is located approximately 2 mi west of the site, across the lagoon. Other parks and recreational areas exist within the county. The influx of project-related population to the four-county area would increase the number of local users of recreational facilities. Because the in-migrating population would be less than 1 percent of the local population, the review team expects the impact on current recreational infrastructure to be negligible.

Housing

The review team estimates that 2,749 construction and operation workers would migrate into the four-county area, and each of these workers would need a place to live. Based on American Community Survey 2008−2012 5-Year estimates, within the four-county area, there are 954,759 housing units of which 208,508 are vacant (21.8 percent). This includes housing that is designated as seasonal, recreational, or occasional use (USCB 2012-TN4089). The review team estimates that, in absolute numbers, the available housing would be sufficient to house the construction workforce. The in-migrating construction and operations workforce would occupy no more than 1.4 percent of vacant housing units in the four-county area. FPL estimated that approximately 806 workers would be needed for operation of two nuclear power facilities at the St. Lucie site, and assumed that 69 percent of these workers (557) would relocate from outside the region and would settle in the four-county area. Based on these assumptions, the entire operations workforce would occupy no more than 0.3 percent of vacant housing units in the four counties. The review team concludes that impact on housing would be minor.

Public Services

In-migrating construction workers and plant operations staff would also likely affect local municipal water, wastewater-treatment facilities, police and fire-protection services, and other public services in the region. These impacts would be expected to be in proportion with the demographic impacts experienced in the region. In-migration to the four-county area would represent an estimated 0.3 percent of the local population (less during operations). The review team concludes that the impact on public services would be minor.

Education

Based on data for the 2011-12 school year, there are approximately 249,523 full-time equivalent students in public schools in the four-county area[44] (FLDOE 2013-TN3299). The review team estimated that 2,749 construction and operation workers would migrate into the area, and that 1,932 workers would bring their families. Based on an estimate of 0.8 school-aged children per family (Malhotra and Manninen 1981-TN1430), an estimated 1,546 (1,932 x 0.8) school-aged children would be migrating into the four-county area. This would yield a 0.6 percent increase in the student population. During operations, the review team assumed that 557 operation workers and their families would relocate from outside the region. This would include an estimated 446 (557 x 0.8) children in the PK-12 school range. This influx of students would increase the student population in the four-county area by 0.2 percent. The review team concludes that the impact on education would be minor.

Based on the information provided by FPL (2014-TN4058) and the review team's independent analysis, the review team concludes that the overall infrastructure and community service impacts of building activities and operations at the St. Lucie site would be minor except for noticeable, but not destabilizing, adverse impacts on traffic.

Cumulative Impacts

In addition to the socioeconomic impacts from building and operations of the proposed project at the St. Lucie site, the cumulative analysis also considers other past, present, and reasonably foreseeable future actions that could have socioeconomic impacts.

The socioeconomic impacts of past and present actions in the affected area are largely captured by the current baseline conditions used for analysis above of project impacts. For example, the impacts of past and present actions on the demography and economy of the area are largely captured by current baseline data on population, employment, and tax revenues.

Reasonably foreseeable future actions are listed in Table 9-21. Several of these future actions would be expected to have cumulative socioeconomic impacts with the proposed project at the St. Lucie site. Other proposed projects that would generate employment and earnings during construction and operations include the proposed Floridian Natural Gas Storage Facility in Martin County, the Florida Southeast Connection pipelines proposed through Highlands, Okeechobee and Martin Counties, the Riviera Beach Next-Generation Clean Energy Center in Palm Beach County and several CERP Projects.

Based on the location of the identified future projects and their magnitudes, the cumulative socioeconomic impacts of the projects identified above with the proposed project at the St. Lucie site would be expected to be SMALL, with the exception of LARGE and adverse physical impacts on buildings and displaced residents due to the widening of SR-A1A, and MODERATE and adverse impacts on traffic. Building and operating two new nuclear units at the St. Lucie alternative site would be a significant contributor to the adverse impacts that are greater than SMALL.

(44) FTE is a measure of enrollment based on the number of full-time students that it would take to fill the number of classes offered.

9.3.5.6 Environmental Justice

The following impact analysis includes impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable future actions that affect EJ, including other Federal and non-Federal projects listed in Table 9-21.

The 2008-2012 American Community Survey block groups were used to identify minority and low-income population distributions in the area (USCB 2012-TN4098). The census data for Florida characterizes 15.9 percent of the population as Black, 0.3 percent as American Indian or Alaskan Native; 2.5 percent as Asian, 0.1 percent as Native Hawaiian or other Pacific Islander, 2.6 percent as other single minorities, 2.2 percent as multiracial, 22.5 percent as Hispanic ethnicity; and 42.2 percent as aggregate minority. There are 801 block groups within 50 mi of the St. Lucie site. Following the criteria described in Section 2.6.1, Black minority populations exist in 103 block groups, American Indian or Alaskan Native minority populations exist in 2 block groups; Asian minority populations exist in 2 block groups; other race minority populations exist in 9 block groups; multiracial minority populations exist in 2 block groups; Hispanic ethnicity minority populations exist in 66 block groups; and aggregate minority populations exist in 207 block groups. There are no block groups containing Native Hawaiian or other Pacific Islander populations within 50 mi of the St. Lucie site. A portion of the Brighton Seminole Indian Reservation is 50 mi west-southwest of the St. Lucie site. The locations of the minority populations within 50 mi of the St. Lucie site and the Brighton Indian Reservation are shown in Figure 9-25. The locations of Hispanic minority populations and Black minority populations within the 50 mi of the St. Lucie site are shown in Figure 9-26 and Figure 9-27, respectively.

The USCB data characterize 15.3 percent of Florida households as low income (USCB 2012-TN4098). Out of a possible 801 block groups, 72 block groups contain low-income populations. The locations of the low-income populations within 50 mi of the St. Lucie site are shown in Figure 9-28.

The analyses of the impacts of building and operating new nuclear reactors at the St. Lucie site identified noticeable adverse impacts on land use, terrestrial and wetland ecosystems, and traffic, and substantial adverse impacts on buildings and people through displacements. The review team did not identify any special pathways through which any impacts would disproportionately affect EJ populations of interest. Therefore, the review team concluded there would be no disproportionately high and adverse impacts on EJ populations of interest.

The NRC's EJ methodology includes an assessment of affected populations of particular interest or with unusual circumstances, such as minority communities that are exceptionally dependent on subsistence resources or identifiable in compact locations (e.g., Native American reservations) and those that have a high density of minority or low-income groups. Based on a literature research, the review team did not identify high-density minority or low-income presence in the proximity of the site, nor differentiated subsistence consumption of natural resources by EJ populations of interest.

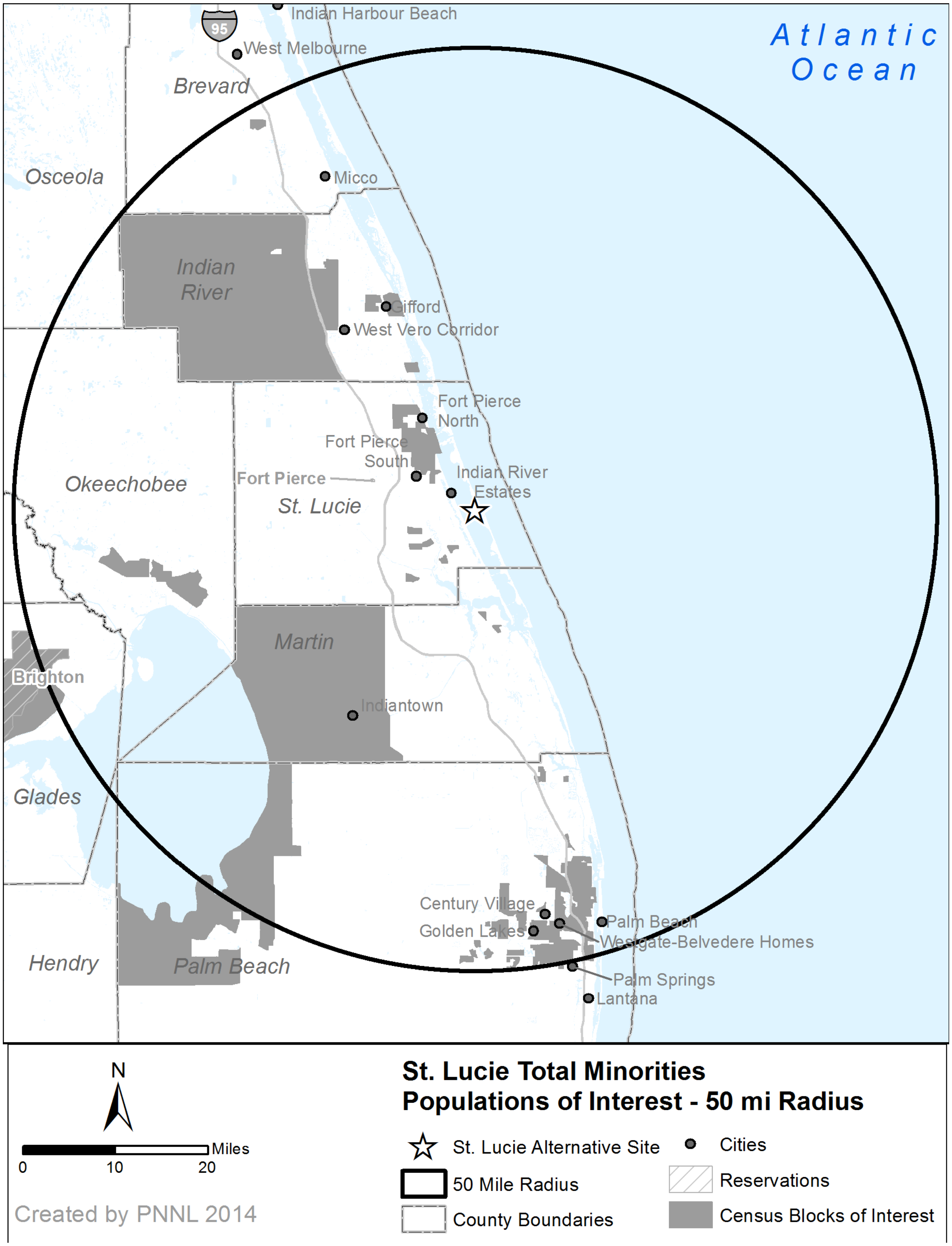


Figure 9-25. Aggregate Minority Populations in Block Groups that Meet the Environmental Justice Selection Criteria within 50 mi of the St. Lucie Alternative Site

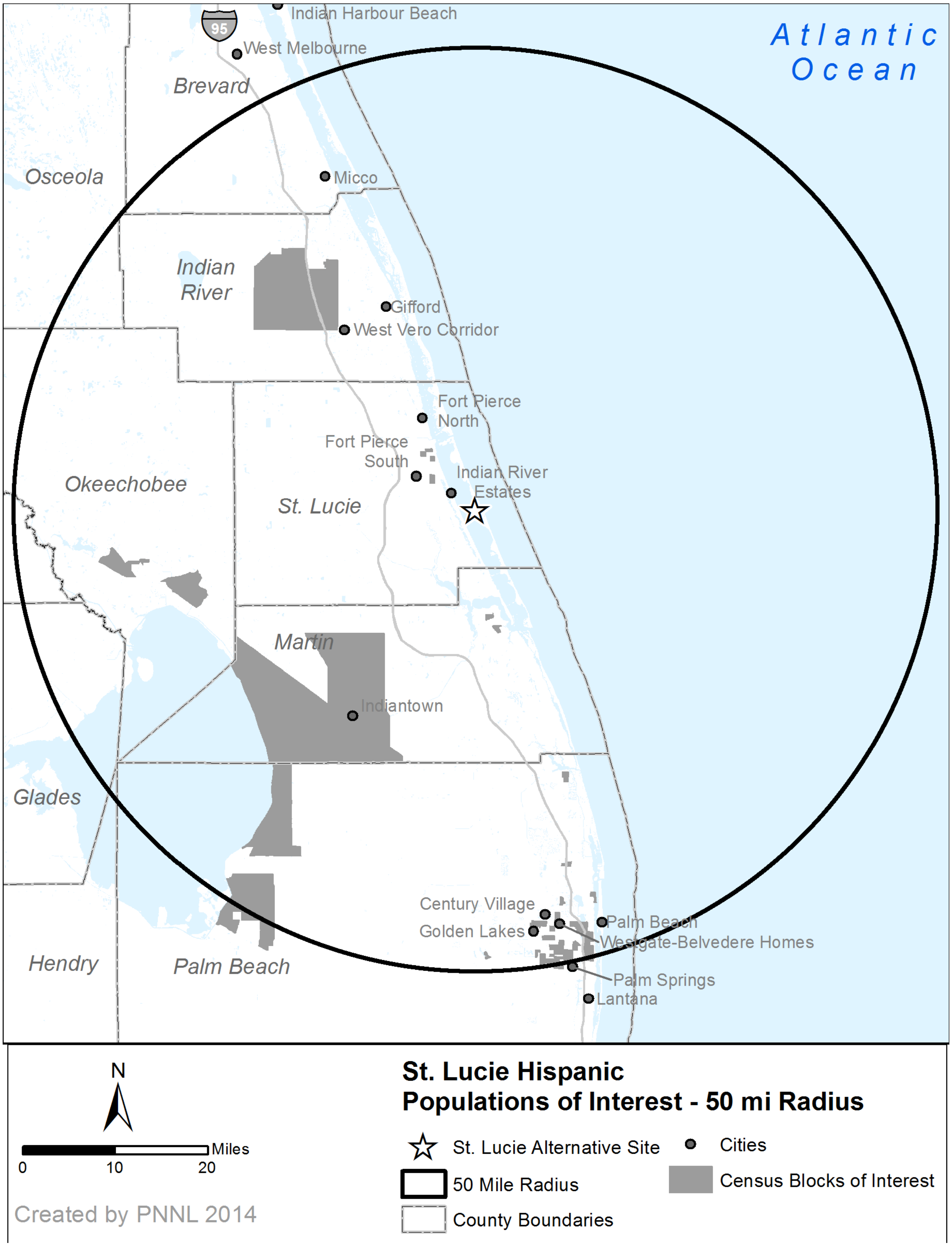


Figure 9-26. Hispanic Populations in Block Groups that Meet the Environmental Justice Selection Criteria within 50 mi of the St. Lucie Alternative Site

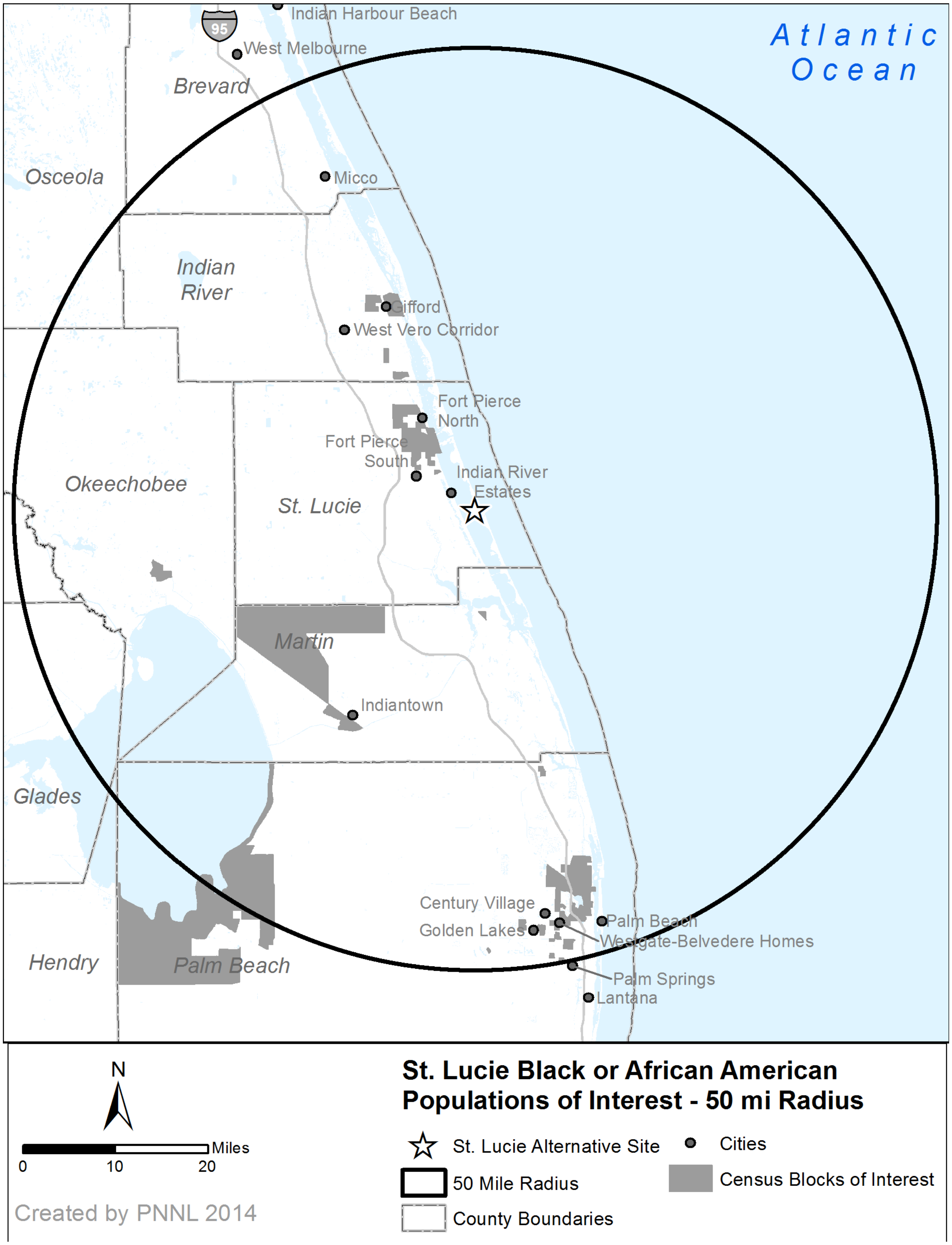


Figure 9-27. African American Populations in Block Groups that Meet the Environmental Justice Selection Criteria within 50 mi of the St. Lucie Alternative Site

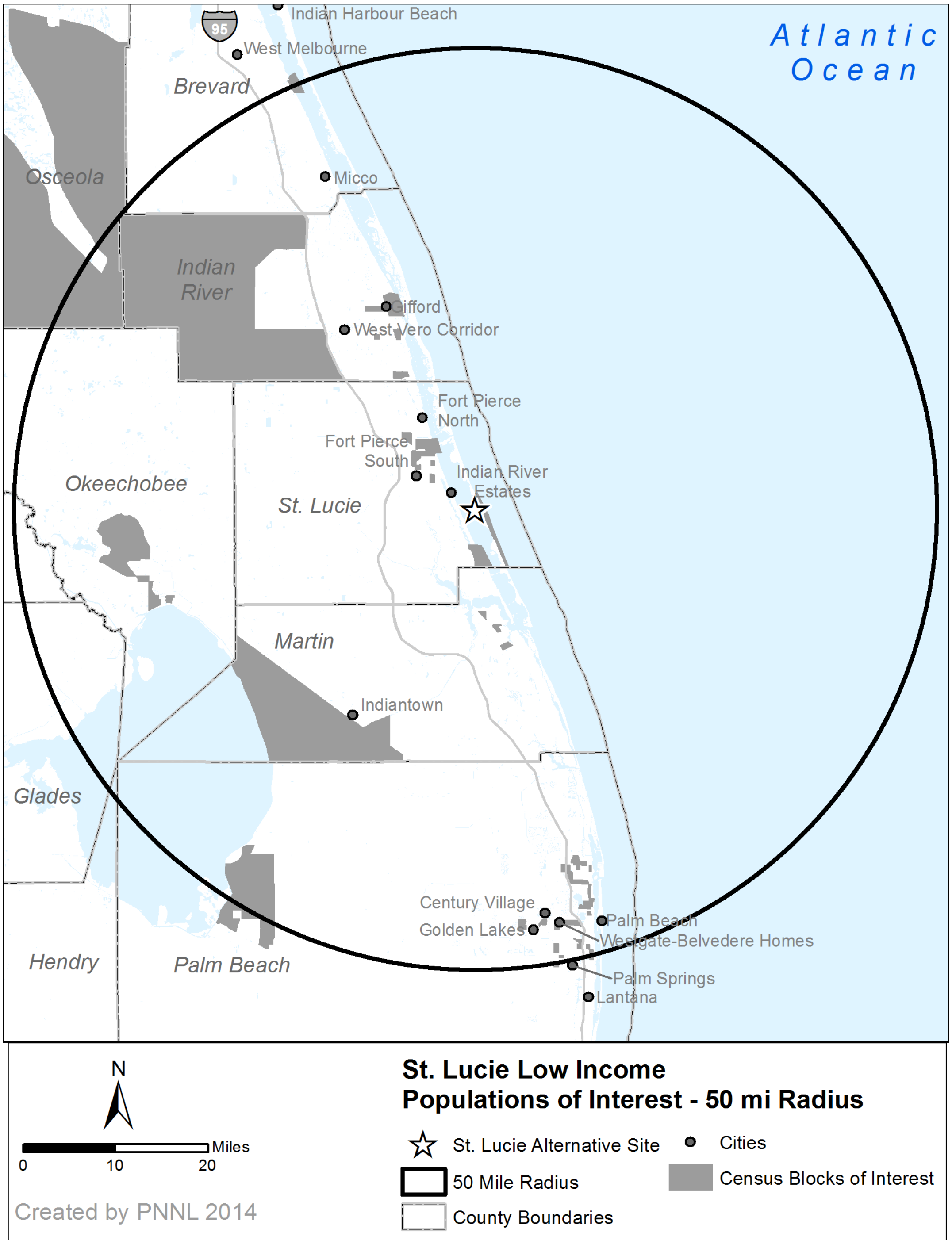


Figure 9-28. Low-Income Populations in Block Groups that Meet the Environmental Justice Selection Criteria within 50 mi of the St. Lucie Alternative Site

Cumulative Impacts

In addition to the EJ impacts from building and operations of the proposed project at the St. Lucie site, the cumulative analysis also considers other past, present, and reasonably foreseeable future actions that could have EJ impacts. Based on a literature review of past and present actions in the affected area, and based on the reasonably foreseeable actions listed in Table 9-21, the review team found no evidence that the cumulative effects would disproportionately affect EJ populations of interest.

9.3.5.7 Historic and Cultural Resources

The following cumulative impact analysis addresses building and operating two new nuclear generating units at the St. Lucie site. The analysis also considers other past, present, and reasonably foreseeable future actions that could affect cultural resources, including other Federal and non-Federal projects and the projects listed in Table 9-21. For the analysis of cultural impacts at the St. Lucie site, the geographic area of interest is considered to be the APE that would be defined for this site. This includes the direct effects APE, defined as the area physically affected by the site-development and operation activities at the site and within transmission line corridors. The indirect effects APE is defined as the area visually affected and includes an additional 0.5 mi radius APE around the transmission line corridors and a 1 mi radius APE around the cooling towers.

Reconnaissance activities in a cultural resource review have particular meaning. Typically, they include preliminary field investigations to confirm the presence or absence of cultural resources. However, in developing this EIS, the review team relied upon reconnaissance-level information to perform its alternative site evaluation in accordance with ESRP 9.3 (NRC 2000-TN614). Reconnaissance-level information consists of data that are readily available from agencies and other public sources. It can also include information obtained through visits to the site area. The following information was used to identify the historic and cultural resources at the St. Lucie site:

- NRC Alternative Sites Visit, July 2010 (NRC 2010-TN3304)
- FPL ER Revision 6 (FPL 2014-TN4058)
- Florida Historical Markers Program (FDHR 2014-TN3878)
- National Register of Historic Places database (NPS 2014-TN3882).

The approximately 1,130 ac St. Lucie site is an FPL-owned property with an existing nuclear power-generation station, located adjacent to the shoreline and a lagoon on Hutchinson Island. Two county parks are located within the property. The two existing units occupy less than half of the site. Historically, the St. Lucie site and vicinity were largely undeveloped and likely contained intact archaeological sites associated with human settlement dating back millennia. Over time, the area has been heavily disturbed by impacts related to industrial and urban development. In 2001, as part of the license renewal for the existing St. Lucie reactors, the Florida SHPO indicated that undeveloped portions of the plant site have a moderate to high probability for containing significant archaeological resources, particularly since there are known archaeological remains along the northern end of the facility property, approximately 1 mi from the St. Lucie site (FPL 2014-TN4058; NRC 2003-TN3152).

A search of the National Register shows that 15 significant historic properties are located within 10 mi of the St. Lucie site (FPL 2014-TN4058; NPS 2014-TN3882). None, however, occurs on Hutchinson Island, where the St. Lucie site is located. A total of 124 properties were found in the four counties in the vicinity of the St. Lucie site—St. Lucie, Palm Beach, Martin, and Indian River Counties.

A search of the Florida Historical Markers Program (FDHR 2014-TN3878) revealed that there is one historic marker in St. Lucie County—a marker in Fort Pierce commemorating the founding of the county and Fort Pierce, the county seat. The marker is not near the St. Lucie site.

A National Register search of the indirect effects APE for the proposed transmission line corridor shows that, while no historic properties occur within the APE, two fall within several miles (NPS 2014-TN3882). The Captain Hammond House, in White City, lies roughly 1 mi to the north of the transmission line corridor as it proceeds east from the St. Lucie site. The Seminole Inn, in Indiantown, lies approximately 4 mi to the east of the corridor as it passes southward through Martin County.

While reconnaissance-level information indicates that there are no known historic properties located within the physical APE of the new plant, reconnaissance-level information shows that historic properties within 10 mi of the site and within 1 mi of the transmission line corridor are listed in the National Register. From previous studies on plant property, archaeological resources are known to occur approximately 1 mi to the north of the site. That said, no archaeological or architectural surveys have been conducted at the St. Lucie site for the current project, and locating the nuclear plants there would require formal cultural resources survey and consultation with SHPO, Tribes, and other interested parties. If any significant cultural, historic, or archaeological resources were identified, appropriate mitigation measures would need to be put in place before construction and operation.

Building Impacts

To accommodate the building of two nuclear units and associated facilities at the St. Lucie site, FPL estimates that the total area of land that would be disturbed would be approximately 357 ac for the facility itself. Because the site is within the 100-year floodplain of the Indian River Lagoon, FPL assumed in its ER that it would be necessary to import fill material from offsite. In addition, a 0.5 mi long heavy-haul road would need to be constructed, and a 22 mi long portion of SR-A1A would need to be widened. Cooling water would be drawn from the Atlantic Ocean, adjacent to the property, and would require approximately 10.5 ac of disturbance for required facilities. If the St. Lucie site were chosen for the proposed project, identification of cultural resources would be accomplished through additional cultural resource surveys and consultation with the SHPO, Tribes, and interested parties. The results would be used in the site-planning process to address cultural resources impacts. If significant cultural resources were identified by these surveys, the review team assumes that FPL would use the same protective measures used at the Turkey Point site, and therefore the impacts would be minimal. If direct effects on significant cultural resources could not be avoided, land-clearing, excavation, and grading activities could potentially destabilize important attributes of historic and cultural resources.

Section 9.3.5.1 describes the proposed transmission line corridors, which will extend for a distance of 63 mi, following existing corridors whenever possible. FPL has stated that consideration would be given to sensitive environmental and built resources in determining a route for the transmission lines (FPL 2014-TN4058), but visual impacts from transmission lines may result in significant alterations of the visual setting of cultural and historic resources within the geographic area of interest. Two properties listed in the National Register fall along the proposed transmission line corridor, though none occurs within the indirect effects APE. The Captain Hammond House lies roughly 1 mi from the transmission line corridor and the Seminole Inn lies roughly 4 mi from the corridor. In both of these areas, the proposed transmission line follows an existing transmission line corridor and any impacts stemming from the addition of another transmission line likely would be minor. If the St. Lucie site were chosen for the proposed project, the review team assumes that FPL would conduct its transmission line-related cultural resource surveys and procedures in a manner similar to that for the Turkey Point site. In addition, the review team assumes that the State of Florida's Final Order on Certification (State of Florida 2014-TN3637) regarding transmission line siting and building activities would also apply, and therefore impacts would be minimal. If direct effects on significant cultural resources could not be avoided, land-clearing, excavation, and grading activities could potentially destabilize important attributes of historic cultural resources. Similarly, both the transmission lines and nuclear power-generating units could indirectly affect cultural and historic resources through visual impacts on the setting of the resources. However, because the St. Lucie site is an existing power plant in an urban setting, and the transmission line corridor would follow an existing corridor where possible, construction of the new units at the St. Lucie site would not alter land use and likely would have a minimal impact on the industrial and urban character of the immediate area. While an estimated 202 structures would be displaced for the widening of SR-A1A, as discussed in Section. 9.3.5.5, none of these structures has been identified as a significant historic resource based on reconnaissance-level data.

Operations Impacts

Impacts on historic and cultural resources from the operation of two new nuclear power-generating units at the St. Lucie site include those associated with the operation of new units and maintenance of transmission lines. The review team assumes that the same procedures developed by FPL for the Turkey Point site, as well as the State of Florida's Final Order on Certification, would be used for onsite and offsite maintenance activities. Consequently, the incremental effects of the maintenance of transmission line corridors and operation of the two new units and associated impacts on the cultural resources would be negligible for the direct and indirect effects APEs.

Cumulative Impacts

Past actions in the geographic area of interest that have similarly affected historic and cultural resources include rural and agricultural development and activities associated with these land-disturbing activities such as road development. Table 9-21 lists past, present, and reasonably foreseeable projects and other actions that may contribute to cumulative impacts on historic and cultural resources in the geographic area of interest. Projects from Table 9-21 that are relevant to the cultural resources cumulative analysis include the High Speed Intercity Passenger Rail and future urbanization, such as new or expanded roads. These projects may significantly affect historic and cultural resources in a manner similar to those associated with the building and operation of two new nuclear power-generating units.

Long linear projects such as new or expanded roads and railway lines may intersect the proposed transmission line corridors. Because cultural resources can likely be avoided by long linear projects, impacts on cultural resources would likely be minimal. If building associated with such activities results in significant alterations of cultural resources in the transmission line corridors, either physical or visual, then cumulative impacts on cultural and historic resources would be greater.

Summary Statement

Cultural resources are nonrenewable. Therefore, the impact of the destruction of cultural resources is cumulative. Based on the information provided by FPL, and the review team's independent evaluation, the review team concludes that the cumulative impacts from building and operating two new nuclear generating units on the St. Lucie site would be SMALL. This impact-level determination is based on reconnaissance-level information and reflects the fact that there are no known cultural resources on the proposed site, and that the proposed transmission line corridor would follow an existing corridor, meaning indirect impacts on the visual setting would be negligible. It also assumes that, if the St. Lucie site were to be developed, cultural resource surveys and evaluations would be conducted and FPL, in consultation with SHPO, Tribes, and interested parties, would assess and resolve any adverse effects of the undertaking. If cultural or historic resources are present, including any of the buildings that would be removed by the widening of SR-A1A, and if there are adverse effects on those resources, the project could result in greater cumulative impacts.

9.3.5.8 Air Quality Impacts

The following impact analysis includes impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable actions that affect air quality, including other Federal and non-Federal projects listed in Table 9-21. As described in Section 9.3.5, the St. Lucie site area includes two current nuclear power plants—St. Lucie Units 1 and 2). The geographic area of interest for the St. Lucie site is St. Lucie County, which is in the Southeast Florida Intrastate Air Quality Control Region (40 CFR 81.49) (TN255).

Section 4.7 and 5.7 discuss air-quality impacts during building and operations. The emissions related to building and operating an additional nuclear power plant at the St. Lucie alternative site would be similar to those at the Turkey Point site. The air-quality attainment status for St. Lucie County, as set forth in 40 CFR Part 81 (TN255), reflects the effects of past and present emissions from all pollutant sources in the region. St. Lucie County is in attainment of all National Ambient Air Quality Standards.

As described in Chapters 4 and 5, the criteria pollutants from building and operation were found to have a SMALL impact on air quality. In Chapter 7, the cumulative impacts of criteria pollutants were evaluated and also determined to be SMALL to MODERATE. Reflecting on the projects listed in Table 9-21 the most significant is the 300 MW natural-gas−fired plant (Florida Municipal Power – Treasure Coast Energy Center) operating 9 mi to the southwest of the St. Lucie alternative site. Emissions from power plants such as these are released through stacks and with significant momentum and buoyancy. Other industrial projects listed in Table 9-21 would likely have de minimis impacts because of their distance from the site. Given that these projects are subject to Clean Air Act permitting requirements, it is unlikely that the air quality in the region would degrade to the extent that the region would be in nonattainment of the National Ambient Air Quality Standards.

The air-quality impact from development of the St. Lucie site would be local and temporary. The applicant would develop a dust-control plan that identifies specific measures to minimize fugitive dust emissions during building activities. The distance from building activities to the site boundary would be sufficient to generally avoid significant air-quality impacts. There are no land uses or projects in Table 9-21, including the aforementioned sources, that would have emissions during site development that would, in combination with emissions from the St. Lucie site, result in degradation of air quality in the region. Emissions from operation of two new nuclear units at the St. Lucie site would be intermittent and made at low levels with little or no vertical velocity, similar to operational impacts at the Turkey Point site, as discussed in Section 5.7. The air-quality impacts of the Florida Municipal Power natural-gas−fired plant are included in the baseline air-quality status. The cumulative impacts from emissions of effluents from the St. Lucie site and the aforementioned sources would be noticeable but not destabilizing.

The cumulative impacts of GHG emissions related to nuclear power are discussed in Section 7.6. The impacts of the emissions are not sensitive to the location of the source. Consequently, the discussion in Section 7.6 is applicable to a nuclear power plant located at the St. Lucie site. The review team concludes that the national and worldwide cumulative impacts of GHG emissions are noticeable but not destabilizing. The review team further concludes that the cumulative impacts would be noticeable but not destabilizing, with or without the GHG emissions of two new nuclear units at the St. Lucie site.

The review team concludes that cumulative impacts from other past, present, and reasonably foreseeable future actions on air-quality resources in the geographic areas of interest would be SMALL to MODERATE for criteria pollutants and MODERATE for GHG emissions. The incremental contribution of impacts on air-quality resources from building and operating two units at the St. Lucie site would not be a significant contributor to the MODERATE impacts.

9.3.5.9 Nonradiological Health

The following analysis considers nonradiological health impacts from building and operating two new nuclear units at the St. Lucie site. The analysis also includes past, present, and reasonably foreseeable future actions that could contribute to cumulative nonradiological health impacts on site workers (construction and operation workers) and members of the public, including other Federal and non-Federal projects and the projects listed in Table 9-21 within the geographic area of interest. Nonradiological health impacts at the St. Lucie site are estimated based on information provided by FPL and the review team's independent evaluation. For the analysis of nonradiological health impacts at the St. Lucie site, the geographic area of interest is the site and the immediate vicinity (~2 mi radius) and the associated road and transmission line corridors. This geographic area of interest is based on the localized nature of nonradiological health impacts and is expected to encompass all nonradiological health impacts.

Building activities that have the potential to affect the health of members of the public and workers at the St. Lucie site include exposure to dust and vehicle exhaust, occupational injuries, noise, and increased traffic associated with the transport of construction materials and personnel to and from the site. The operations-related activities that have the potential to affect the health of members of the public and workers include exposure to etiological (disease-causing) agents, noise, EMFs, occupational injuries, and impacts from the transport of workers to and from the site.

Building Impacts

Nonradiological health impacts on construction workers and members of the public from building two new nuclear units at the St. Lucie site would be similar to those evaluated in Section 4.8 for the Turkey Point site. During the site-preparation and building phase FPL would comply with applicable Federal and State regulations on air quality and noise (FPL 2014-TN4058). The St. Lucie site is located in the vicinity of residential and commercial area. The distance between the site activities and the nearest residences (Section 9.3.5.5) is great enough that there should be no nonradiological health impacts from building and operating the units. The incidence of construction worker accidents would be the same as that for the Turkey Point site.

The review team concludes that nonradiological health impacts on construction workers and the public from building two new nuclear units and associated transmission lines at the St. Lucie site would be minimal. Nonradiological health impacts associated with traffic accidents during building activities at the St. Lucie alternative site were evaluated in Section 4.8.3 and the review team concludes that the impacts would be minimal.

Operations Impacts

Nonradiological health impacts on operation workers and members of the public would include those associated with the operation of cooling towers and transmission lines. Based on the configuration of the proposed new unit at the St. Lucie site (see Section 9.3.5), etiological agents may increase in the thermal plume area. The blowdown would be regulated by FDEP pursuant to 40 CFR Part 423 (TN253), and all discharges would be required to comply with limits established by FDEP in an NPDES permit. Impacts on workers' health from occupational injuries, noise, and EMFs would be similar to those described in Section 5.8 for the Turkey Point site. Noise and EMF exposure would be monitored and controlled in accordance with applicable OSHA regulations. Although no detailed noise modeling has been performed for the St. Lucie site, it is likely that noise impacts would be similar to those predicted for operations at the Turkey Point site. Effects of EMFs on human health would be controlled and minimized by conformance with National Electrical Safety Code criteria and adherence to the standards for transmission systems regulated by the FDEP.

The review team concludes that nonradiological health impacts on workers and the public from operating two new nuclear units and associated transmission lines at the St. Lucie site would be minimal. Impacts associated with traffic accidents during operations at the St. Lucie alternative site were evaluated in Section 5.8.6 and the review team concludes that the impacts would be minimal.

Cumulative Impacts

The past project within the geographic area of interest that could affect nonradiological human health in a similar way to the building of two nuclear units at the St. Lucie site that was identified in Table 9-21 is the two existing nuclear power reactors located adjacent to the proposed St. Lucie alternative site. There are no current construction projects occurring within the geographical area of interest that would affect nonradiological human health in a similar way to the building of two new nuclear units.

Reasonably foreseeable projects that could affect nonradiological human health in a way similar to the building of two nuclear units at the St. Lucie site identified in Table 9-21 include various transportation (roads, traffic, pedestrian) projects that are planned throughout the region.

The past and present project within the geographic area of interest that could affect nonradiological human health in a way similar to operating two nuclear units at the St. Lucie site that was identified in Table 9-21 is the two existing and operational nuclear power reactors located adjacent to the proposed St. Lucie alternative site. There are no reasonably foreseeable future projects planned within the geographic area of interest that would affect nonradiological human health in a similar way to the operation of two new nuclear units at the St. Lucie site.

The review team concludes that the cumulative impacts on nonradiological health from building and operating two new nuclear units and associated road and transmission lines at the St. Lucie site would be minimal.

Summary Statement

Impacts on nonradiological health from the building and operation of two new units at the St. Lucie site are estimated based on the information provided by FPL and the review team's independent evaluation. Although there could be some future activities in the geographical area of interest could affect nonradiological health in ways similar to the building and operation of two new units at the St. Lucie site and associated offsite facilities, those impacts would be localized and managed through adherence to existing regulatory requirements. The review team concludes that nonradiological health impacts on workers and the public resulting from the building of two new nuclear units and associated transmission lines at the St. Lucie site would be minimal. The review team expects that the nonradiological health impacts on the operations employees and the public of two new nuclear units at the St. Lucie site would be minimal. Finally, the review team concludes that cumulative impacts on nonradiological health from past, present, and reasonably foreseeable actions in the geographic area of interest would be SMALL.

9.3.5.10 Radiological Impacts of Normal Operations

The following impact analysis includes impacts from building activities and operations. The analysis also considers other past, present, and reasonably foreseeable actions that affect radiological health, including other Federal and non-Federal projects listed in Table 9-21. As described in Section 9.3.5, St. Lucie is a nuclear power plant site; St. Lucie 1 and 2 are currently the two nuclear facilities (i.e., nuclear power plants) on the site. The geographic area of interest is the area within a 50 mi radius of the St. Lucie site. St. Lucie Units 1 and 2 are the only major facilities within this geographic area of interest that potentially affect radiological health within the 50 mi radius of the St. Lucie site. However, there are likely to be medical, industrial, and research facilities within 50 mi of the St. Lucie site that use radioactive materials.

The radiological impacts of building and operating the two proposed Westinghouse AP1000 nuclear power units at the St. Lucie site include doses from direct radiation and liquid and gaseous radioactive effluents. These pathways would result in low doses to people and biota offsite that would be well below regulatory limits. These impacts are expected to be similar to those estimated for the Turkey Point site.

The radiological impacts of St. Lucie Units 1 and 2 include doses from direct radiation and liquid and gaseous radioactive effluents. These pathways result in low doses to people and biota offsite that are well below regulatory limits as demonstrated by the ongoing radiological environmental monitoring program conducted around St. Lucie Units 1 and 2. The NRC staff concludes that the dose from direct radiation and effluents from hospitals and industrial facilities that use radioactive material would be an insignificant contribution to the cumulative impacts around the St. Lucie site. This conclusion is based on data from the radiological environmental monitoring programs conducted around currently operating nuclear power plants.

Based on the information provided by FPL and the NRC staff's independent analysis, the NRC staff concludes that the cumulative radiological impacts from building and operating the two proposed Westinghouse AP1000 nuclear power units and other existing and planned projects and actions in the geographic area of interest around the St. Lucie site would be SMALL.

9.3.5.11 Postulated Accidents

The following impact analysis includes radiological impacts from postulated accidents from the operation of two nuclear units at the St. Lucie alternative site. The analysis also considers other past, present, and reasonably foreseeable actions that affect radiological health from postulated accidents, including other Federal and non-Federal projects and the projects listed in Table 9-21. As described in Section 9.3.5, the St. Lucie site is a brownfield site; two nuclear units are currently located at the site. The geographic area of interest considers all existing and proposed nuclear power plants that have the potential to increase the probability-weighted consequences (i.e., risks) from a severe accident at any location within 50 mi of the St. Lucie alternative site. Facilities potentially affecting radiological accident risk within this geographic area of interest are the existing two units—St. Lucie Units 1 and 2.

As described in Section 5.11.1, the NRC staff concludes that the environmental consequences of DBAs at the Turkey Point site would be minimal for AP1000 reactors. DBAs are addressed specifically to demonstrate that a reactor design is robust enough to meet NRC safety criteria. The environmental consequences of DBAs depend on the plant design and the atmospheric dispersion. The AP1000 design is independent of site conditions and the meteorology of the St. Lucie alternative and Turkey Point sites are similar; therefore, the NRC staff concludes that the environmental consequences of DBAs at the St. Lucie alternative site would be minimal.

Because the meteorology, population density, and land values for the St. Lucie alternative site are similar to those of the proposed Turkey Point site, risks from a severe accident for an AP1000 reactor located at the St. Lucie alternative site are expected to be similar to those analyzed for the proposed Turkey Point site. The risks for the proposed Turkey Point site were presented in Tables 5-19 and 5-20 and are well below the median value for current-generation reactors. In addition, as discussed in Section 5.11.2, estimates of average individual early fatality and latent cancer fatality risks are well below the Commission's safety goals (51 FR 30028) (TN594). For existing plants within the geographic area of interest (St. Lucie Units 1 and 2), the Commission has determined that the probability-weighted consequences of severe accidents are small (10 CFR 51) (TN250), Appendix B, Table B-1). On this basis, the NRC staff concludes that the cumulative risks from severe accidents at any location within 50 mi of the St. Lucie alternative site would be SMALL.

9.3.6 Comparison of the Impacts of the Proposed Action and the Alternative Sites

This section summarizes the review team's characterization of the cumulative impacts related to locating a two-unit AP1000 nuclear power facility at the proposed Turkey Point site and at each alternative site. The four sites selected for detailed review as part of the alternative sites environmental analysis included the Glades site in Glades County, the Martin site in Martin County, the Okeechobee 2 site in Okeechobee County, and the St. Lucie site in St. Lucie County. Comparisons are made between the proposed site and alternatives to evaluate whether one of the alternative sites is environmentally preferable to the proposed site. The NRC's determination is independent of the USACE's determination under the 404 Guidelines of whether the Turkey Point site is the least environmentally damaging practical alternative (LEDPA). The USACE will conclude its analysis of both offsite and onsite alternatives in its Record of Decision. The need to compare the proposed site with alternative sites arises from the requirement in NEPA Section 102(2)(C)(iii) (42 USC 4332 et seq.) (TN661) that EISs include an analysis of alternatives to the proposed action. The NRC criterion to be used in assessing whether a proposed site is to be rejected in favor of an alternative site is based on whether the alternative site is "obviously superior" to the site proposed by the applicant (NRC 1977-TN3867). An alternative site is "obviously superior" to the proposed site if it is "clearly and substantially" superior to the proposed site (NRC 1978-TN2636). The standard of obviously superior "...is designed to guarantee that a proposed site will not be rejected in favor of an alternate unless, on the basis of appropriate study, the Commission can be confident that such action is called for" (NECNP v. NRC 1978-TN2632).

The "obviously superior" test is appropriate for two reasons. First, the analysis performed by the NRC in evaluating alternative sites is necessarily imprecise. Key factors considered in the alternative site analysis, such as population distribution and density, hydrology, air quality, aquatic and terrestrial ecological resources, aesthetics, land use, and socioeconomics are difficult to quantify in common metrics. Given this difficulty, any evaluation of a particular site must have a wide range of uncertainty. Second, the applicant's proposed site has been analyzed in detail, with the expectation that most of the adverse environmental impacts associated with the site have been identified. The alternative sites have not undergone a comparable level of detailed study. For these reasons, a proposed site may not be rejected in favor of an alternative site when the alternative site is marginally better than the proposed site, but only when it is obviously superior (NRC 1978-TN2636). NEPA does not require that a nuclear plant be constructed on the single best site for environmental purposes. Rather, "...all that NEPA requires is that alternative sites be considered and that the effects on the environment of building the plant at the alternative sites be carefully studied and factored into the ultimate decision" (NECNP v. NRC 1978-TN2632).

Section 9.3.6.1 discusses the process the review team used to compare cumulative impacts of the alternative sites to the proposed Turkey Point site and provides the final cumulative impact for each resource category. Cumulative impact levels from Chapter 7 (for the Turkey Point site), and the four alternative sites (from Sections 9.3.2 through 9.3.5) are listed in Table 9-28. Section 9.3.6.2 discusses the cumulative impacts of the proposed project located at the Turkey Point site and at the alternative sites as they relate to a determination of environmental preference or obvious superiority.

9.3.6.1 Comparison of Cumulative Impacts at the Proposed and Alternative Sites

The following section summarizes the review team's independent assessment of the proposed and alternative sites. The team characterized the expected cumulative environmental impacts of building and operating two new units at the Turkey Point site and alternative sites; these impacts are summarized by category in Table 9-28. Full explanations for the specific impact characterizations are provided cumulatively in Chapter 7 for the proposed site and in Sections 9.3.2, 9.3.3, 9.3.4, and 9.3.5 for each of the alternative sites. The review team's impact category levels are based on professional judgment, experience, and consideration of controls likely to be imposed under Federal, State, or local permits that would be acquired throughout the course of the COL application and review process. The considerations and assumptions were similarly applied at each of the alternative sites to provide a common basis for comparison. In the following discussion, the review team compares the impact levels between the proposed site and each alternative site.

The cumulative environmental impact areas listed in the table have been evaluated using the NRC's three-level standard of significance: SMALL, MODERATE, or LARGE. These levels were developed using CEQ guidelines and are set forth in the footnotes to Table B-1 of 10 CFR Part 51 (TN250), Subpart A, Appendix B:

- SMALL – Environmental effects are not detectable or are so minor that 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.

9.3.6.2 Environmentally Preferable Sites

As shown in Table 9-28, the cumulative impacts of building and operating two new units at the proposed site and the alternative sites are characterized as SMALL for many resource areas. The resource areas for which the impact level at an alternative site is the same as that for the proposed site do not contribute to the alternative site being judged to be environmentally preferable to the proposed site. Therefore, these resource areas are not discussed further in

1 **Table 9-28. Comparison of Cumulative Impacts at the Turkey Point and Alternative Sites**

Resource Category	Turkey Point Site	Glades	Martin	Okeechobee 2	St. Lucie
Land Use	MODERATE	MODERATE	MODERATE	MODERATE	MODERATE
Water-Related					
Surface-water use	SMALL	MODERATE	MODERATE	MODERATE	SMALL
Groundwater use	SMALL	SMALL	SMALL	SMALL	SMALL
Surface-water quality	SMALL	MODERATE	MODERATE	MODERATE	MODERATE
Groundwater quality	SMALL	SMALL	SMALL	SMALL	SMALL
Ecology					
Terrestrial and wetland ecosystems	MODERATE to LARGE	MODERATE	MODERATE	MODERATE	MODERATE
Aquatic ecosystems	MODERATE	MODERATE	MODERATE	MODERATE	SMALL to MODERATE
Socioeconomics					
Physical impacts	SMALL adverse except for MODERATE beneficial impacts on roads	SMALL except for MODERATE impacts on roads and aesthetics	SMALL except for MODERATE impacts on roads and aesthetics	SMALL except for MODERATE impacts on roads and aesthetics	SMALL except for a LARGE impact on buildings and roads
Demography	SMALL	SMALL	SMALL	SMALL	SMALL, except for LARGE residential displacement impacts
Economic impacts on the community	SMALL and beneficial	SMALL and beneficial, except for LARGE and beneficial property tax revenues for Glades County and School District	SMALL and beneficial, except for LARGE and beneficial property tax revenues for Martin County and School District	SMALL and beneficial, except for LARGE and beneficial property tax revenues for Okeechobee County and School District	SMALL and beneficial
Infrastructure and community services	SMALL except for MODERATE adverse impacts on traffic.	SMALL except for MODERATE adverse impacts on traffic.	SMALL except for MODERATE adverse impacts on traffic.	SMALL except for MODERATE adverse impacts on traffic.	SMALL except for MODERATE adverse impacts on traffic.
Environmental Justice	None[(a)]	None[(a)]	None[(a)]	None[(a)]	None[(a)]
Historic and Cultural Resources	MODERATE	MODERATE	SMALL	MODERATE	SMALL
Air Quality					
Criteria pollutants	SMALL to MODERATE	SMALL	SMALL TO MODERATE	SMALL to MODERATE	SMALL TO MODERATE
Greenhouse gas emissions	MODERATE	MODERATE	MODERATE	MODERATE	MODERATE
Nonradiological Health	SMALL	SMALL	SMALL	SMALL	SMALL
Radiological Health	SMALL	SMALL	SMALL	SMALL	SMALL
Postulated Accidents	SMALL	SMALL	SMALL	SMALL	SMALL

(a) A determination of “NONE” for Environmental Justice analyses does not mean there are no adverse impacts to minority or low-income populations from the proposed project. Instead, an indication of “NONE” means that while there are adverse impacts, those impacts do not affect minority or low-income populations in any disproportionate manner, relative to the general population.

determining whether an alternative site is environmentally preferable to the proposed site. The resource areas for which an alternative site has a different impact level than the proposed site are discussed further to determine whether an alternative site is environmentally preferable to the proposed site. Where there is a range of impacts for a resource, the upper value of the impacts is used for the comparison. In addition, for the cases in which the cumulative impacts for a resource are greater than SMALL, consideration is given to those cases in which the impacts of the project at the specific site do not make any significant contribution to the cumulative impact level. As shown in Table 9-28, there are some differences in impacts among the sites.

Glades Site

The cumulative impacts of building and operating two new nuclear units at the Glades site shown in Table 9-28 are similar to those for the Turkey Point site with five exceptions. The cumulative impacts for surface-water use and quality are MODERATE at the Glades site, and SMALL at the Turkey Point site. However, building and operating new nuclear units at the Glades site would not be a significant contributor to the cumulative surface-water use and quality impacts. Regarding the impacts on terrestrial ecology and wetlands, the impacts at the Glades site are shown as MODERATE, while the impacts at the Turkey Point site are shown as MODERATE to LARGE. However, the impacts directly attributable to the new plants at the Turkey Point site would be MODERATE. LARGE impacts, if they occur, would be as a result of impacts from other projects, and would occur regardless of whether Units 6 and 7 are built. Aesthetic impacts would be MODERATE at the Glades site because of the contrast with the surrounding environment, but they would be SMALL at the Turkey Point site. Regarding economic impacts on the community, the impacts at the Glades site are shown as SMALL and beneficial in the region, but LARGE and beneficial for the county and school district. For the Turkey Point site, the impacts are shown as SMALL and beneficial. The amount of taxes contributed by the new plants at the two sites would be the same and the difference occurs because the beginning tax base in Glades County is much smaller than in Miami-Dade County. Regarding the impacts of criteria pollutants, the impacts at the Glades site are shown as SMALL, while the impacts at the Turkey Point site are shown as SMALL to MODERATE. But the potential MODERATE impacts at the Turkey Point site are related to the existing gas-fired Unit 5, and are not related to the new nuclear units. Based on all of the information above, the NRC staff concludes that the differences between the two sites do not support a determination that the Glades site is environmentally preferable to the Turkey Point site. As discussed in Section 9.3.1.7, if it turns out that a water-storage reservoir would be required at the Glades site, then the impacts on some resources, particularly land use and terrestrial ecology, would be increased.

Martin Site

The cumulative impacts of building and operating two new nuclear units at the Martin site shown in Table 9-28 are similar to those for the Turkey Point site with six exceptions. The cumulative impacts for surface-water use and quality are MODERATE at the Martin site, and SMALL at the Turkey Point site. However, building and operating new nuclear units at the Martin site would not be a significant contributor to the cumulative surface-water use and quality impacts and, therefore, there is little real difference between these sites for these two resource areas.

Regarding the impacts on terrestrial ecology and wetlands, the impacts at the Martin site are shown as MODERATE, while the impacts at the Turkey Point site are shown as MODERATE to LARGE. However, the impacts directly attributable to the new plants at the Turkey Point site would be MODERATE. LARGE impacts, if they occur, would be a result of impacts from other projects and would occur regardless of whether Units 6 and 7 are built. Aesthetic impacts would be MODERATE at the Martin site because of the contrast with the surrounding environment, but they would be SMALL at the Turkey Point site. Regarding economic impacts on the community, the impacts at the Martin site are shown as SMALL and beneficial in the region, but MODERATE and beneficial for the county and school district. For the Turkey Point site, the impacts are shown as SMALL and beneficial. The amount of taxes contributed by the new plants at the two sites would be the same and the difference occurs because the beginning tax base in Martin County is much smaller than in Miami-Dade County. The impacts of traffic at the Martin site are MODERATE to LARGE (depending on the timing of other projects in the area), while the impacts at the Turkey Point site are MODERATE because of visual impacts along the eastern corridor, while the impacts at the Martin site are SMALL because the new transmission lines are expected to follow the path of existing lines. Finally, impacts on cultural and historic resources at the Turkey Point site are MODERATE because of visual impacts along the eastern corridor, while the impacts at the Martin site are SMALL because the new transmission lines are expected to follow the path of existing lines. Based on all of the information above, the NRC staff concludes that the differences between the two sites do not support a determination that the Martin site is environmentally preferable to the Turkey Point site. As discussed in Section 9.3.1.7, if it turns out that a water-storage reservoir would be required at the Martin site, then the impacts on some resources, particularly land use and terrestrial ecology, would be increased.

Okeechobee 2 Site

The cumulative impacts of building and operating two new nuclear units at the Okeechobee 2 site shown in Table 9-28 are similar to those for the Turkey Point site with five exceptions. The cumulative impacts for surface-water use and quality are MODERATE at the Okeechobee 2 site, and SMALL at the Turkey Point site. However, building and operating new nuclear units at the Okeechobee 2 site would not be a significant contributor to the cumulative surface-water use and quality impacts and, therefore, there is little real difference between these sites for these two resource areas. Regarding the impacts on terrestrial ecology and wetlands, the impacts at the Okeechobee 2 site are shown as MODERATE, while the impacts at the Turkey Point site are shown as MODERATE to LARGE. However, the impacts directly attributable to the new plants at the Turkey Point site would be MODERATE and would occur regardless of whether Units 6 and 7 are built. LARGE impacts, if they occur, would be a result of impacts from other projects. Aesthetic impacts would be MODERATE at the Okeechobee 2 site because of the contrast with the surrounding environment, but they would be SMALL at the Turkey Point site. Regarding economic impacts on the community, the impacts at the Okeechobee 2 site are shown as SMALL and beneficial in the region, but LARGE and beneficial for the county and school district. For the Turkey Point site, the impacts are shown as SMALL and beneficial. The amount of taxes contributed by the new plants at the two sites would be the same and the difference occurs because the beginning tax base in Okeechobee County is much smaller than in Miami-Dade County. Based on all of the information above, the NRC staff concludes that the differences between the two sites do not support a determination that the Okeechobee 2 site is environmentally preferable to the Turkey Point site. As discussed in

Section 9.3.1.7, if it turns out that a water-storage reservoir would be required at the Okeechobee 2 site, then the impacts on some resources, particularly land use and terrestrial ecology, would be increased.

St. Lucie Site

The cumulative impacts of building and operating two new nuclear units at the St. Lucie site shown in Table 9-28 are similar to those for the Turkey Point site with five exceptions. The cumulative impacts for surface-water quality are MODERATE at the St. Lucie site, and SMALL at the Turkey Point site. However, building and operating new nuclear units at the St. Lucie site would not be a significant contributor to the cumulative surface-water quality impacts and, therefore, there is little real difference between these sites for these two resource areas. Regarding the impacts on terrestrial ecology and wetlands, the impacts at the St. Lucie site are shown as MODERATE, while the impacts at the Turkey Point site are shown as MODERATE to LARGE. However, the impacts directly attributable to the new plants at the Turkey Point site would be MODERATE and would occur regardless of whether Units 6 and 7 are built. LARGE impacts, if they occur, would be a result of impacts from other projects. Aquatic ecology impacts at the Turkey Point site would be MODERATE in comparison to the SMALL to MODERATE determination at St. Lucie. This primarily reflects the uncertainty related to the magnitude and extent of coastal environmental stressors that may occur in the future. All of the impacts that are greater than SMALL for these resource areas are a result of building and operating new units at these sites and so reflect a real difference in impacts. Regarding economic impacts on the community, the impacts at the St. Lucie site are shown as SMALL and beneficial in the region, but LARGE and beneficial for the county and school district. For the Turkey Point site, the impacts are shown as SMALL and beneficial. The amount of taxes contributed by the new plants at the two sites would be the same and the difference occurs because the beginning tax base in St. Lucie County is much smaller than in Miami-Dade County. Finally, the impacts on cultural and historic resources at the Turkey Point site are MODERATE because of visual impacts along the eastern corridor, while the impacts at the St. Lucie site are SMALL because the new transmission lines are expected to follow the path of existing lines. Based on all of the information above, the NRC staff concludes that the differences between the two sites do not support a determination that the St. Lucie site is environmentally preferable to the Turkey Point site.

9.3.6.3 Obviously Superior Sites

Because NRC staff determined that none of the alternative sites is environmentally preferable to the proposed site, none could be obviously superior, and no additional evaluations in that regard are required.

9.4 System Design Alternatives

The review team considered a variety of heat-dissipation systems and circulating-water system (CWS) alternatives. While other heat-dissipation systems and water systems are part of a nuclear power plant, the largest and most capable of causing environmental impacts is the CWS that cools and condenses the steam for the turbine generator. Other water systems, such as the service-water system, are much smaller than the CWS. As a result, the review team only considers alternative heat-dissipation and water-treatment systems for the CWS. The proposed CWS for Turkey Point Units 6 and 7 is a closed-cycle system that uses mechanical draft cooling towers for heat dissipation (FPL 2014-TN4058). The proposed system is discussed in detail in Chapter 3.

9.4.1 Heat-Dissipation Systems

About two-thirds of the heat from a commercial nuclear reactor is rejected as heat to the environment. The remaining one-third of the reactor-generated heat is converted into electricity. Normal heat-sink cooling systems transfer the rejected heat load into the atmosphere and/or nearby waterbodies, primarily as latent heat exchange (evaporating water) or sensible heat exchange (warmer air or water). Different heat-dissipation systems rely on different exchange processes. The following sections describe alternative heat-dissipation systems considered by the review team for proposed Turkey Point Units 6 and 7.

In its ER, FPL considered a range of CWS heat-dissipation systems, including a once-through cooling system and several closed-cycle cooling systems. In addition to the closed-cycle mechanical draft cooling towers selected, FPL considered natural draft cooling towers, once-through cooling into Biscayne Bay, cooling ponds, spray ponds, dry cooling towers, fan-assisted natural draft cooling towers, and a hybrid (combination wet-dry) cooling-tower system (FPL 2014-TN4058). In addition, the review team considered mechanical draft cooling towers with plume abatement.

9.4.1.1 Natural Draft Cooling Towers

Natural draft cooling towers, which use about the same amount of water as the proposed mechanical draft cooling towers, induce airflow up through large (e.g., 600 ft tall and 400 ft in diameter) towers by cascading warm water downward in the lower portion of the cooling tower. As heat transfers from the water to the air in the tower, the air becomes more buoyant and rises. This buoyant circulation induces more air to enter the tower through its open base. The environmental aspects of natural draft cooling towers and mechanical draft cooling towers are very similar (FPL 2014-TN4058). Because both rely on evaporation to dissipate the heat, water use is similar between natural and mechanical draft cooling towers; therefore, intake and discharge effects on aquatic biota would be similar. Notable differences include the fact that the natural draft cooling towers can be seen from a great distance and that the additional height increases the potential for avian collisions and bat collisions (NRC 2013-TN2654). It is unclear whether salt deposition from natural draft cooling towers would be greater than the deposition from mechanical draft cooling towers. However, the review team expects that all or most of the deposition would take place over nearby mangrove forests, which are adapted to high levels of sea spray. Therefore, the review team has determined that it is unlikely that the terrestrial impacts would be noticeably different.

Turkey Point Units 6 and 7 would be located adjacent to Biscayne National Park and natural draft cooling towers would impose a greater aesthetic impact. Also, the energy savings from using natural draft versus mechanical draft cooling towers are minimal. Therefore, the review team determined that natural draft cooling towers would not be an environmentally preferable alternative for the Turkey Point site.

9.4.1.2 *Fan-Assisted Natural Draft Cooling Towers*

Fan-assisted natural draft cooling towers are smaller than natural draft cooling towers but are designed to obtain a natural draft effect. The movement of air through the water being cooled is enhanced by fans arranged around the circumference of the cooling-tower shell. FPL indicates that for the Turkey Point site, fan-assisted natural draft cooling towers are a feasible alternative to the proposed design, although the power consumption to operate the towers would be higher and the noise levels generated would be slightly higher (FPL 2014-TN4058). Notable differences include the fact that the natural draft cooling towers can be seen from a greater distance and that the additional height increases the potential for avian collisions and bat collisions (NRC 1996-TN288). It is unclear whether salt deposition from fan-assisted natural draft cooling towers would be greater than the deposition from mechanical draft cooling towers. However, the review team expects that all or most of the deposition would take place over nearby mangrove forests, which are adapted to high levels of sea spray. Therefore the review team has determined that it is unlikely that the terrestrial impacts would be noticeably different. The review team concludes that, because the impacts of mechanical draft and fan-assisted natural draft cooling towers are similar, fan-assisted natural draft cooling towers would not be an environmentally preferable alternative for the Turkey Point site.

9.4.1.3 *Once-Through Cooling*

Once-through cooling systems withdraw water from the source waterbody and return virtually the same volume of water to the receiving waterbody at an elevated temperature. Typically the source waterbody and the receiving waterbody are the same body, and the intake and discharge structures are separated to limit recirculation. While there is essentially no consumptive use of water in a once-through heat-dissipation system, the elevated temperature of the receiving waterbody would result in some induced evaporative loss that decreases the net water supply. The elevated temperature can also adversely affect the biota of the receiving waterbody. The large intake flows would result in impingement and entrainment losses. Based on recent changes to implementation plans to meet Section 316(b) of the Clean Water Act (33 USC 1344 et seq.) (TN1019), the review team has determined that once-through cooling systems for new nuclear reactors are unlikely to be permitted in the future, except in rare and unique situations.

If proposed Turkey Point Units 6 and 7 were to use once-through cooling with two AP1000 reactors, the review team determined that the water-supply needs for the two units would be approximately 1,700,000 gpm (FPL 2014-TN4058). FPL has determined that the only waterbody in the vicinity of Units 6 and 7 that could supply this quantity of water is Biscayne Bay, which is a National Park and has been designated as an aquatic preserve. For this reason, in addition to the Clean Water Act 316(b) considerations (33 USC 1251 et seq.) (TN662), the review team determined that once-through designs were not a feasible alternative design and eliminated them from further consideration as part of the Turkey Point Units 6 and 7 cooling system.

9.4.1.4 Cooling Pond

Existing Units 1 through 4 at the Turkey Point site use cooling canals to meet condenser cooling needs. The existing canals cover 5,900 ac. A pond approaching the size of the existing canals would be needed to support the proposed units (FPL 2014-TN4058). The dedication of an area of this size was weighed against the environmental impact from the selected design of the Turkey Point Units 6 and 7 cooling system. The review team determined that because of the impact of the loss of land and natural habitat, including designated critical habitat, associated with development of additional cooling ponds, a cooling system using a recirculating cooling pond was not an environmentally preferable alternative at the Turkey Point site.

9.4.1.5 Spray Ponds

Spray-pond cooling systems use manufactured ponds to cool water and enhance evaporative cooling by spraying water into the atmosphere. In addition to evaporation, heat transfer from the spray ponds to the atmosphere occurs through black-body radiation and conduction. A spray-pond system alternative was evaluated for cooling proposed Turkey Point Units 6 and 7, and it would require a 160 ac pond (FPL 2014-TN4058). Based on the additional land and natural habitat, including designated critical habitat, requirements to build the spray pond and the possible impact from spray drift, the review team concludes that use of a spray pond would not be an environmentally preferable alternative for the Turkey Point site.

9.4.1.6 Dry Cooling Towers

Dry cooling towers have never been used to cool nuclear or fossil-fuel facilities of this size (i.e., approximately 2,400 MW(e). Dry cooling towers would eliminate virtually all water-related impacts from the cooling-system operation. No makeup water would be needed for cooling, and no blowdown water would be generated. This alternative could reduce water-use impacts. Dry cooling systems would be larger than the proposed cooling-tower systems, and would require more onsite land to accommodate the large dry cooling structures. Dry cooling systems can result in a significant loss of dependable electrical generation capacity, particularly during higher ambient temperature conditions, because the theoretical approach temperature is limited to the dry-bulb temperature and not the lower wet-bulb temperature. In other words, the temperature of the cooling water going back to the condenser can be no lower than the ambient air temperature. The review team determined that historical local air temperatures would result in the loss of generation at critical times of high demand for electricity due to the loss of sufficient condenser vacuum. The dry cooling-system design would not allow the plant to meet its stated goal as a baseload power source. Additional electrical losses occur with dry cooling because of the parasitic energy requirements of the large array of fans involved. This loss in generation efficiency translates into increased impacts on the fuel cycle. The review team therefore determined that building and operation of dry cooling towers would not be an environmentally preferable alternative for the Turkey Point site because of the loss of dependable electrical generation capacity, particularly during higher ambient temperature conditions and reduced capacity, as well as inefficiencies in energy-production resulting in higher fuel-cycle impacts.

9.4.1.7 Combination Wet/Dry Cooling-Tower System

Combination wet/dry hybrid cooling towers have never been used to cool nuclear or fossil-fuel facilities of the size proposed by FPL (i.e., approximately 2,400 MW(e)). A mechanical draft wet/dry hybrid cooling-tower system uses both wet and dry cooling cells to limit consumption of cooling water, often with the added benefit of reducing plume visibility. Water used to cool the turbine generators generally passes first through the dry portion of the cooling tower where heat is removed by drawing air at ambient temperature over tubes through which the water is moving. Cooling water leaving the dry portion of the tower then passes through the wet tower where the water is sprayed into a moving air stream and additional heat is removed through evaporation and sensible heat transfer. When ambient air temperatures are low, the dry portion of these cooling towers may be sufficient to meet cooling needs. The use of the dry portion of the system would result in a loss in generating efficiency that would translate to increased impacts on the fuel cycle. As discussed in Chapter 5, the impacts of operating the proposed cooling system (mechanical draft tower) for aquatic ecology, water use, and water quality are SMALL. While a combination wet/dry cooling system would reduce water use, there would be an increase in fuel-cycle impacts because of the increased use of resources to generate electricity. Therefore, the review team concludes that the building and operation of a combined wet/dry cooling-tower system would not be an environmentally preferable alternative for the Turkey Point site.

9.4.1.8 Mechanical Draft Towers with Plume Abatement

Adding additional heat to a saturated cooling-tower exhaust, without adding additional water, would result in subsaturated water vapor. Subsaturated water vapor reduces the potential for a visible plume. The concept behind a mechanical draft cooling tower with plume abatement is similar to the wet/dry hybrid cooling system described above; the design parameters are focused on reducing the visual plume. Such designs may also result in slightly less consumptive water use. However, there is sufficient water at Turkey Point site for use of a mechanical draft cooling system without plume abatement. The aesthetic impacts at the Turkey Point site with a mechanical draft cooling tower without plume abatement were determined to be SMALL; therefore, a mechanical draft tower with plume abatement offers no significant advantage. These towers often have a larger footprint and require additional energy to operate, resulting in a net loss of energy available to meet the demand for power. For these reasons, the review team concludes that the building and operation of mechanical draft cooling towers with plume abatement would not be an environmentally preferable alternative for the Turkey Point site.

9.4.2 Circulating-Water Systems

The review team also evaluated alternatives to the proposed intakes and discharges for the normal heat-sink cooling system, based on the proposed heat-dissipation system water requirements. The capacity requirements of the intake and discharge system are defined by the proposed heat-dissipation system. For Turkey Point Units 6 and 7, the proposed heat-dissipation system is a closed-loop system that uses mechanical draft cooling towers for heat dissipation.

As indicated in Table 3-5, the maximum makeup water taken from the South District Wastewater Treatment Plant (SDWWTP) for two AP1000 units at the site would be 50,481 gpm

(112 cfs) if reclaimed water is used (FPL 2014-TN4058) and the maximum makeup water withdrawn from radial collector wells would be 86,400 gpm (193 cfs) if saltwater is used (FPL 2014-TN4058).

9.4.2.1 Water Supplies

The proposed water supplies for Turkey Point Units 6 and 7 are described in detail in Chapter 3. Reclaimed water from the Miami-Dade Water and Sewer Department (MDWASD) would provide raw water to the CWSs of the proposed units under normal conditions. Saltwater obtained through radial collector wells with laterals extending beneath Biscayne Bay would provide raw water when water of sufficient quantity or quality is not available from the MDWASD (FPL 2014-TN4058). The impacts associated with the proposed water sources are discussed in Sections 4.2, 4.3, 5.2, and 5.3. As discussed in these sections, the overall impacts of the selected water-supply options would be SMALL.

Alternatives to the Primary Cooling-Water Supply

As mentioned above, reclaimed water from the MDWASD would provide raw water to the CWSs of the proposed units under normal conditions. In addition to the MDWASD, a broad range of water sources have been considered including marine sources, other surface-water sources, and groundwater sources.

Withdrawal of water from marine sources, including Biscayne Bay, Card Sound, and the Atlantic Ocean (including locations such as the barge-turning basin or Card Sound Canal), using conventional intake structures would result in some impingement and entrainment of aquatic species. In addition, activities associated with building a surface-water intake including dredging would also result in environmental disturbance and would be in conflict with Rule 62-4.242, “Antidegradation Permitting Requirements; Outstanding Florida Waters; Outstanding National Resource Waters; Equitable Abatement,” of the Florida Administrative Code (Fla. Admin. Code 62-4 -TN1084). As a result, the review team determined that these water sources are not environmentally preferable to the selected water source for the primary cooling-water supply.

Other surface-water sources, including the cooling canals of the industrial wastewater facility (IWF), and offsite sources such as a new freshwater reservoir were also considered. Withdrawal of cooling water from the cooling canals would induce groundwater from the Biscayne aquifer to flow into the cooling canals (FPL 2014-TN4058). In addition this would likely be considered to be in violation of Miami-Dade County Resolution Z-56-07, which requires that the operation of the proposed units does not withdraw any water from the Biscayne aquifer (Miami-Dade County 2007-TN1085). Use of fresh surface water from a new offsite reservoir or existing freshwater sources would likely have a greater environmental impact than the proposed alternative and is unlikely because SFWMD plans and Comprehensive Everglades Restoration Projects require use of freshwater for public water supply and environmental restoration. As a result it is unlikely that the required water volume would be permitted for industrial use. Therefore, the review team determined that there were no alternative fresh surface-water sources that would be environmentally preferable to the proposed primary cooling-water source.

The review team considered several groundwater sources, including the Biscayne aquifer, the Upper Floridan aquifer, and the zone of the Lower Floridan aquifer that is commonly referred to as the Boulder Zone. Withdrawal of the large volumes of water needed to meet primary cooling-water needs for the proposed units from either the Biscayne aquifer or the Upper Floridan aquifer would certainly have an impact on water supply available to local users of these two resources and could potentially affect the quality of water in these aquifers. These impacts would exceed the impacts associated with the proposed primary cooling-water source and would be in violation of Miami-Dade County Resolution Z-56-07, which requires that the operation of the proposed units does not withdraw any water from the Biscayne aquifer or affect current users of the Floridan aquifer (Miami-Dade County 2007-TN1085).

The APPZ is a productive aquifer over 500 ft thick in some parts of Florida. However, the APPZ is thinner and less permeable near Turkey Point, where Reese and Richardson (2008-TN3436) show the APPZ being less than 100 ft thick and pinching out to the east. Therefore, the APPZ does not appear to be a viable option as a water source at the Turkey Point site.

The Boulder Zone is a zone of highly transmissive, cavernous limestone and dolomites located approximately 3,000 ft below land surface at the Turkey Point site. Water in the Boulder Zone has a salinity near that of seawater and approximately 37,000 mg/L total dissolved solids. FPL indicates that a well field would be constructed adjacent to the nuclear island if this alternative were selected (FPL 2014-TN4058).

The high transmissivities and cavernous nature of Boulder Zone indicate that 100 percent of the cooling-tower makeup water could be obtained from this source. No other withdrawals are made from this zone within 5 mi of the Turkey Point site, but this zone is used for wastewater disposal by the SDWWTP located 9 mi north of the site (FPL 2014-TN4058). Because FPL is planning to dispose of blowdown water to the Boulder Zone, sufficient separation between the deep-injection UIC wells and the withdrawal wells would need to be considered to prevent drawing the wastewater into the cooling-water intake wells. The construction of the pipelines needed to provide that separation and the disturbance of the land surface to construct either the UIC or withdrawal well field some distance from the site of Units 6 and 7 would have an environmental impact that would need to be considered. Use of the Boulder Zone as the primary water source would eliminate the environmental benefit of reducing direct ocean discharge that comes with the use of water from the MDWASD. Use of water from the Boulder Zone as the primary source of cooling water would be in violation of Miami-Dade County Resolution Z-56-07, which requires that the primary source of cooling water for the proposed units be reclaimed water from the MDWASD (Miami-Dade County 2007-TN1085). There is also a strong likelihood of recirculation occurring between the UIC wells used for disposal of blowdown and water-supply wells in the Boulder Zone and a likelihood of extracting water from the Boulder Zone containing contaminants injected through other UIC wells in the vicinity (FPL 2011-TN52). Withdrawal of water from either of these sources would be problematic for the cooling-water system. Therefore, the review team determined that there were no alternative groundwater sources that would be environmentally preferable to the proposed primary cooling-water source.

Alternatives to the Backup Cooling-Water Supply

As mentioned above, saltwater obtained through radial collector wells with laterals (horizontal collector lines) extending beneath Biscayne Bay would provide raw water when sufficient water is not available from the MDWASD. The review team considered a broad range of sources for water including marine sources, other surface-water sources, and groundwater sources. Based on the analysis presented above for the primary cooling-water sources, the only sources identified for further consideration as backup water sources are the Boulder Zone and alternative locations for radial collector wells. Alternative locations of radial collector wells would require installation of a longer pipeline to transport cooling water to Units 6 and 7 with the associated environmental impacts. Neither of these options was identified by the review team as environmentally preferable to the use of radial collector wells as a backup water supply.

9.4.2.2 Intake Alternatives

The proposed systems to supply raw water for Turkey Point Units 6 and 7 are described in detail in Section 3.2.2.1. Reclaimed water from the MDWASD would provide raw water to the CWSs of the proposed units under normal conditions. Saltwater obtained through radial collector wells with laterals extending beneath Biscayne Bay would provide raw water when water of sufficient quality or quantity is not available from the MDWASD (FPL 2014-TN4058). These proposed raw water sources do not require cooling-water intake structures as defined by 40 CFR 125.83 (TN254). The environmental impacts of installing and operating these systems are discussed in Chapters 4 and 5.

Surface-Water Intake Structures

In addition to the radial collector well system selected by FPL, two alternative intake systems were considered: a shoreline intake structure and a passive offshore intake.

Shoreline Intake Structure

FPL identified the east bank of Card Sound Canal just south of the existing cooling canal system as a possible location for a conventional shoreline intake structure. The intake structure would be a conventional intake with a trash rack and traveling screens to keep material out of the pump forebays. The structure would include two forebays, each of which would contain three pumps. Two pumps from each set would supply water to one of the proposed units; the third pump in each bay would be on standby (FPL 2014-TN4058). Intake velocity would be less than 0.5 fps and the intake structure would have fish-return capability. The intake system would meet the requirements of Section 316(b) of the Clean Water Act related to impingement, entrainment, and aquatic monitoring (FPL 2014-TN4058). The structure would be approximately 60 ft wide and extend 50 ft back from the openings to Card Sound Canal (FPL 2014-TN4058). FPL indicates that excavation and installation of an intake structure at the Card Sound Canal location would affect wetlands (FPL 2014-TN4058).

Passive Offshore Intake

Generally, an offshore intake alternative has advantages if existing shoreline structures would conflict with a shoreline intake or if bathymetry or vegetation considerations make a shoreline intake less desirable. At the Turkey Point site, the conditions that would make an offshore intake advantageous in this way do not occur. However, the offshore intake design proposed by

FPL has certain advantages. FPL describes the proposed offshore intake system in the following way, “An alternate intake system on Card Sound Canal would consist of passive panel screens with polyhedron-shaped screens supported on a stainless steel frame and an air backwash unit. The polyhedron sides that are directed to the water surface are equipped with the screen panels made with special cling-free elements. The sides that are directed to the canal bed remain closed to avoid debris (sediment) ingress from the bed and for the optimum performance of air backwash. Air spray nozzles are arranged inside the polyhedron enabling a particularly effective screen backwash by pressurized air pulses” (FPL 2014-TN4058). Water would move from the offshore screen system to a wet well onshore that would house the pumps for pumping the water to proposed Turkey Point Units 6 and 7. The wet well structure would also contain the compressor for the air backwash system. The onshore structure associated with this intake design would be approximately the same size as the shoreline intake structure described above.

Environmental impacts from installation of the intakes and pipelines for the shoreline intake and the passive offshore intake would be equivalent because of the similar size of the onshore structure. Impacts on aquatic species due to entrainment and impingement may be less if the passive offshore intake were to be used, but in either case compliance with Section 316(b) of the Clean Water Act (33 USC 1251 et seq.) (TN662) related to impingement, entrainment, and aquatic monitoring would result in minor impacts because of operation of either of these designs. The review team determined that neither of these intake designs would be environmentally preferable to the radial collector well system proposed by FPL because the land disturbance required for the radial collector well system is less than the land disturbance required to build the pipelines and intake structures associated with either the shoreline intake or the passive offshore intake located on Card Sound Canal.

9.4.2.3 Discharge Alternatives

FPL proposes to discharge blowdown from Turkey Point Units 6 and 7 to the Boulder Zone of the Lower Floridan aquifer through a series of UIC wells. A detailed description of the proposed discharge system is presented in Section 3.2.2.2. The impacts associated with the proposed discharge system are discussed in Sections 4.2, 4.3, 5.2, and 5.3. As discussed in these sections, the overall impacts of the deep-well injection discharge option would be SMALL. A broad range of discharge alternatives for the cooling-water system have been considered including discharge to the Atlantic Ocean, Biscayne Bay, Card Sound, the barge-turning basin, Card Sound Canal, the cooling canals of the IWF, rehydration of wetlands, and returning the water to the SDWWTP for disposal. Alternatives including discharge to the Atlantic Ocean, Biscayne Bay, and Card Sound are not considered environmentally preferable because of the anticipated environmental impacts of building and operating discharge facilities in these environments including the disturbance to the seafloor required to build the discharge facilities. In addition, Rule 62-4.242 of the Florida Administrative Code (Fla. Admin. Code 62-4 -TN1084) prohibits activities such as the dredging required to construct a shoreline or offshore diffuser that would degrade the water quality of Outstanding Florida Waters. Discharge to Card Sound Canal and the barge-turning basin are not considered environmentally preferable to the selected alternative because these waterbodies discharge directly to Card Sound or Biscayne Bay and the discharge of heated water to these waterbodies would likely have a greater environmental impact than the selected alternative. When saline water from the radial collector wells is used for cooling, the blowdown water would also have a salinity higher than the receiving water which would likely contribute to a higher environmental impact than the selected alternative. Blowdown water would likely not meet acceptance criteria for rehydration of wetlands or return of the water to the SDWWTP, especially when saltwater was being used as the source of cooling water (FPL 2014-TN4058).

Discharge of cooling water to the cooling canals of the IWF would contribute to existing concerns that hypersaline water from the cooling canals is degrading water quality in the Biscayne aquifer in the vicinity of the Turkey Point site. Therefore, the review team determined that there were no alternative discharge designs that would be environmentally preferable to the proposed discharge design.

9.4.2.4 Water Treatment

Both inflow and effluent water may require treatment to ensure that they meet plant water needs and effluent water standards. As described in Section 3.4.2.2, FPL proposes to add chemicals to plant water to meet appropriate water-quality process needs. Deep-injection well discharge would be subject to the provisions of the UIC Rule in 62-528 of the Florida Administrative Code (Fla. Admin. Code 62-528 -TN556) and the conditions of the UIC permit (FPL 2014-TN4058).

The largest chemical inputs are required to maintain the appropriate chemistry in the cooling towers to preclude biofouling. Mechanical treatment is generally not a viable option in cooling-tower designs. Other alternatives to preclude biofouling, such as ultraviolet treatment, are feasible, but would not eliminate the need for some chemical treatment. Chemical treatment is a reliable and well-established engineering practice that has been shown to provide minimal impacts in a variety of settings. The review team identified no environmentally preferable alternative to FPL’s proposed chemical water treatment.

9.4.3 Summary Statement

The review team considered various alternative systems designs, including eight alternative heat-dissipation systems and multiple alternative intake, discharge, and water-supply systems. The review team identified no alternatives that were environmentally preferable to the proposed Turkey Point Units 6 and 7 plant systems design.

9.5 U.S. Army Corps of Engineers Alternatives Evaluation

The 404(b)(1) Guidelines (40 CFR Part 230) (TN427) require that no discharge of dredged or fill material into waters of the United States (including jurisdictional wetlands) shall be permitted if there is a practicable alternative that would have a less adverse impact on the aquatic environment, as long as the alternative does not have other significant adverse environmental consequences. An alternative is practicable if it is available and capable of being implemented after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the applicant that could reasonably be obtained, used, expanded, or managed in order to fulfill the basic purpose of the proposed activity may be considered. Thus, this analysis is necessary to determine which alternative is the LEDPA (least environmentally damaging practicable alternative) that meets the project purpose and need. Even if an applicant’s proposed alternative is determined to be the LEDPA, the USACE must still determine whether the LEDPA is contrary to the public interest. The USACE Public Interest Review, described in 33 CFR 320.4 (TN424) (and further discussed in Appendix I), directs the USACE to consider a number of factors in a balancing process to determine whether a proposed project is contrary to the public interest. A permit would not be issued for an alternative that is not the LEDPA, nor would a permit be issued for an activity that is determined to be contrary to the public interest. The USACE will conclude its Clean Water Act Section 404(b)(1) Guidelines and public interest analyses in its Record of Decision.

10.0 Conclusions and Recommendations

By letter dated June 30, 2009 (FPL 2009-TN1229), as supplemented by a letter dated August 7, 2009 (FPL 2009-TN1230), the Florida Power and Light Company (FPL) applied to the U.S. Nuclear Regulatory Commission (NRC or the Commission) for two combined construction permits and operating licenses (combined licenses or COLs) for the proposed Turkey Point Units 6 and 7 (COL application). The NRC review team's evaluation of the environmental impacts of the proposed action is based on the October 29, 2014 revision of the COL application (FPL 2014-TN4102), including the Environmental Report (ER) (FPL 2014-TN4058), responses to requests for additional information, and supplemental information. Documents supporting the review team's evaluation are listed as references where appropriate.

The site proposed by FPL for the two new nuclear units is the Turkey Point site in southeastern Miami-Dade County, Florida. The Turkey Point site is an approximately 9,640 ac site that includes five existing power plants. Units 1 and 2 have been operated as natural-gas/oil steam-generating units. Unit 2 was recently converted to operate in synchronous condenser mode. Unit 1 will be converted to operate in synchronous condenser mode in 2016 (FPL 2014-TN3360). In the synchronous condenser mode, the generators help stabilize and optimize grid performance but do not generate power. Units 3 and 4 are nuclear pressurized water reactors, and Unit 5 is a natural-gas combined-cycle steam-generating unit. The proposed plant area is south of Turkey Point Units 3 and 4 on approximately 218 ac of the Turkey Point site property (FPL 2014-TN4058). The proposed Turkey Point Units 6 and 7 would be owned by FPL (2014-TN4058). With the exception of the transmission systems needed to route power from the proposed units, and the pipelines needed to bring reclaimed water to the Turkey Point site, all of the construction and operation related to proposed Turkey Point Units 6 and 7 would be completely within the confines of the Turkey Point site (FPL 2014-TN4058).

On June 30, 2009, the U.S. Army Corps of Engineers (USACE) received a Department of the Army (DA) permit application from FPL to construct the proposed Turkey Point Units 6 and 7, reclaimed-water facility, access roads, radial collector wells, pipelines, transmission lines, and other related infrastructure. The proposed work would result in the alteration of waters of the United States, including wetlands. The USACE is participating as a cooperating agency with the NRC in preparing this environmental impact statement (EIS). The USACE expects to publish a public notice of FPL's DA permit application within 30 days of the publication of this draft EIS.

On June 30, 2009, FPL submitted a Site Certification Application (SCA) to the State of Florida Department of Environmental Protection for the proposed Turkey Point Units 6 and 7 and ancillary facilities (FPL 2010-TN1231). The SCA process provides a Certification that encompasses all licenses and permits needed for affected Florida State, regional, and local agencies. It also includes any regulatory activity that would be applicable under these agencies' regulations for proposed Turkey Point Units 6 and 7 (FDEP 2013-TN2629). On May 19, 2014, the State of Florida issued final Conditions of Certification to FPL authorizing construction, operation, and maintenance of proposed Turkey Point Units 6 and 7 and associated facilities (State of Florida 2014-TN3637). The final Conditions of Certification issued are binding and subject to the requirements listed in State of Florida (2014 TN3637).

Section 102 of the National Environmental Policy Act of 1969, as amended (NEPA) (42 USC 4321 et seq.) (TN661) directs that an EIS is required for a major Federal action that significantly affects the quality of the human environment. Section 102(2)(C) of NEPA requires that an EIS include information about the following:

- the environmental impact of the proposed action
- any adverse environmental effects that cannot be avoided should the proposal be implemented
- alternatives to the proposed action
- the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity
- irreversible and irretrievable commitments of resources that would be involved if the proposed action is implemented.

NRC has included regulatory provisions for meeting NEPA in Title 10 of the *Code of Federal Regulations* (CFR) Part 51. In 10 CFR 51.20 (TN250), the NRC requires preparation of an EIS for issuance of a COL. Subpart C of 10 CFR Part 52 (TN251) contains the NRC regulations related to COLs.

The proposed actions related to the Units 6 and 7 application are (1) the NRC issuance of COLs for construction and operation of two new nuclear units at the Turkey Point site in Miami-Dade County, Florida, and (2) DA authorization pursuant to Section 404 of the Federal Water Pollution Control Act (Clean Water Act), as amended (33 USC Section 1344) (TN662), Section 10 of the Rivers and Harbors Act of 1899 (33 USC Section 403) (TN660), and Section 14 of the Rivers and Harbors Act of 1899 (33 USC Section 408) (Section 408) (TN660). The DA permit application requests authorization to discharge fill into approximately 1,000 ac of jurisdictional wetlands, to construct structures beneath navigable waters of the United States such as radial collector wells, and to expand the existing barge unloading area in navigable waters of the United States. The environmental review described in this EIS was conducted by a review team consisting of NRC staff, its contractor's staff, and staff from the USACE. During the course of preparing this EIS, the review team reviewed the Environmental Report (ER) submitted by FPL (FPL 2014-TN4058) and supplemental documentation; consulted with Federal, State, Tribal, and local agencies; and followed the guidance set forth in NUREG–1555, *Environmental Standard Review Plans* (NRC 2000-TN614), and NUREG–0800, *Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants* (NRC 2007-TN613). In addition, the NRC considered the public comments related to the environmental review received during the scoping process. The public comments are provided in Appendix D.

Included in this EIS are (1) the results of the NRC staff's preliminary analyses, which consider and weigh the environmental effects of the proposed action and of constructing and operating two new nuclear units at the Turkey Point site; (2) mitigation measures for reducing or avoiding adverse effects; (3) the environmental impacts of alternatives to the proposed action; and (4) the NRC staff's recommendation regarding the proposed action based on its environmental review. The COL application references a specific reactor design.

The USACE is a cooperating agency with the NRC, which is serving as the lead agency in the development of this EIS. The USACE has participated as a member of the review team. In carrying out its regulatory responsibilities, the USACE will complete an independent evaluation of the applicant's DA permit application to determine whether to issue, issue with modifications, or deny a DA permit for this project. This decision will be documented in the USACE's Record of Decision (ROD). The decision about whether to issue a DA permit will be based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity and its intended effect on the public interest. Evaluation of the probable impacts that the proposed activities may have on the public interest requires a careful weighing of all of the factors relevant in each particular case. A decision by the USACE to authorize this proposal, and if so, the conditions under which it will be allowed to occur, are therefore determined by the outcome of this general balancing process.

By acting as a cooperating agency on the development of the EIS, USACE plans to adopt the EIS in its ROD. USACE will also include any additional information and analyses required to support its permit decision to issue the DA permit, deny the DA permit, or issue the DA permit with modifications. The USACE's role as a cooperating agency in the preparation of this EIS is to ensure to the maximum extent practicable that the information presented is adequate to fulfill the requirements of USACE regulations. The Clean Water Act, Section 404(b)(1) "Guidelines for Specification of Disposal Sites for Dredged or Fill Material" (40 CFR Part 230) (TN427), contains the substantive environmental criteria used by USACE in evaluating proposed discharges of dredged or fill material into waters of the United States. USACE's Public Interest Review (PIR) (33 CFR Part 320.4) (TN424) directs the USACE to consider a number of factors as part of a balanced evaluation process in order to determine whether the proposed project is contrary to the public interest. USACE's PIR will be part of its ROD and will not be addressed in this EIS. The following general criteria are considered in the evaluation of every application:

- the relative extent of the public and private need for the proposed structure or work;
- where there are unresolved conflicts about resource use, the practicability of using practicable and reasonable alternative locations and methods to accomplish the objective of the proposed structure or work; and
- the extent and permanence of the beneficial and/or detrimental effects that the proposed structure or work is likely to have on the public and private uses to which the area is suited.

As part of the USACE public comment process, USACE will publish a public notice within 30 days of the publication of the draft EIS, to solicit comments from the public regarding FPL's DA permit application for proposed work at the Turkey Point site.

Environmental issues are evaluated using the three-level standard of significance—SMALL, MODERATE, or LARGE—developed by the NRC based on the Council on Environmental Quality (CEQ) guidelines (40 CFR 1508.27) (TN428). Table B-1 of 10 CFR Part 51 (TN250), Subpart A, Appendix B, provides the following definitions of the three significance levels:

> SMALL – Environmental effects are not detectable or are so minor that they would 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.

Mitigation measures were considered for each environmental issue and are discussed in the appropriate sections. During its environmental review, the review team considered planned activities and actions that FPL indicates it and others would likely take if FPL receives the COLs. In addition, FPL provided estimates of the environmental impacts resulting from the building and operation of two new nuclear units on the Turkey Point site.

10.1 Impacts of the Proposed Action

In a final rule dated October 9, 2007 (72 FR 57416) (TN260), the Commission limited the definition of "construction" to those activities that fall within its regulatory authority (10 CFR 51.4) (TN250). Many of the activities undertaken to build a nuclear power plant do not have any effect on nuclear safety issues, are not within the NRC's licensing authority over nuclear power reactors and, therefore, are not part of the NRC action to license the plant Turkey Point Units 6 and 7. The activities associated with building the plant that are not within the purview of the NRC are grouped under the term "preconstruction." Preconstruction activities include clearing and grading, excavating, erection of support buildings and transmission lines, and other associated activities. To at least some extent, these activities would be necessary to build any thermal power plant. Because preconstruction activities are not part of the NRC action, their impacts are not reviewed as a direct effect of the NRC action. Rather, the impacts of the preconstruction activities are considered in the context of cumulative impacts. Although the preconstruction activities are not part of the NRC action, certain preconstruction activities require permits from the USACE, as well as other Federal, State, and local agencies.

Chapter 4 describes the relative magnitude of impacts related to preconstruction and construction activities with a summary of impacts in Table 4-19. Impacts associated with operation of the proposed facilities are discussed in Chapter 5 and are summarized in Table 5-24. Chapter 6 describes the impacts associated with the fuel cycle, transportation, and decommissioning. Chapter 7 describes the impacts associated with preconstruction and construction activities and operation of Turkey Point Units 6 and 7 when considered along with the cumulative impacts of other past, present, and reasonably foreseeable future projects in the geographical region around the Turkey Point site.

10.2 Unavoidable Adverse Environmental Impacts

Section 102(2)(C)(ii) of NEPA (42 USC 4321 et seq.) (TN661) requires that an EIS include information about any adverse environmental effects that cannot be avoided if the proposal is implemented. Unavoidable adverse environmental impacts are the potential impacts of the NRC and USACE actions that cannot be avoided and for which no practical means of mitigation are available.

The unavoidable adverse environmental impacts associated with the granting of the COLs for Turkey Point Units 6 and 7 would include impacts of both construction and operation.

10.2.1 Unavoidable Adverse Impacts During Construction and Preconstruction Activities

Chapter 4 discusses in detail the potential impacts from construction and preconstruction of the proposed Units 6 and 7 at the Turkey Point site and presents mitigation and controls intended to lessen the adverse impacts. Table 10-1 presents adverse impacts associated with construction and preconstruction activities to each of the resource areas evaluated in this EIS as well as the mitigation measures that would reduce the impacts. The impacts remaining after mitigation has been applied are identified in the table as the unavoidable adverse impacts. Unavoidable adverse impacts are the result of both construction and preconstruction activities, unless otherwise noted. The impact determinations in Table 10-1 are for the combined impacts of construction and preconstruction, but the impact determinations for NRC-regulated construction are the same for water use, water quality, aquatic ecology, socioeconomic and environmental justice, air quality, and nonradiological and radiological health resource areas. The impact determinations for preconstruction activities and NRC-related construction are different for land use, terrestrial and wetland ecosystems, and historic and cultural resources. For the impact determinations that differ for the NRC-regulated activities, the impacts from the NRC-regulated activities are discussed below the table.

The unavoidable adverse impacts are primarily attributable to preconstruction activities due to the initial land disturbance from clearing the land, land use, excavation, excavation dewatering, filling wetlands and waterways, adding impervious surfaces, and dredging. NRC-authorized construction activities partially contribute to most of the unavoidable adverse impacts. Approximately 585 ac within the Turkey Point Unit 6 and 7 project boundary would be permanently disturbed. Areas disturbed to build these project features would be permanently converted to structures, pavement, and intensively maintained exterior grounds. These onsite disturbances would be in close proximity to, and visible from, portions of Biscayne National Park. Building and operating offsite facilities such as transmission lines, pipelines, and access roads would require the loss and fragmentation of mangrove forests, pine rocklands, and other natural habitats offsite, and these linear facilities could interfere with urban land uses adjacent to or traversed by the rights-of-way.

Unavoidable adverse impacts on terrestrial resources and wetlands include permanent loss of wetlands and uplands. Both Federally and State-listed species would be affected, in addition to other important species such as wading birds. Transmission-line construction would fragment habitat and permanently affect pine rocklands that are designated as critical habitat for listed species. Preconstruction surveys would be conducted to determine final effects as well as to support appropriate minimization and avoidance activities.

Adverse impacts on aquatic resources are generally minor with exceptions of noticeable changes in the critical habitat of the American crocodile. Additional crocodile takes also could occur during preconstruction and construction. All other adverse impacts, such as noise and vibration affecting sea turtles, would likely be undetectable, temporary, or so minor that they would not noticeably alter the resource. Mitigation would likely be required by other State and Federal agencies.

Table 10-1. Unavoidable Adverse Environmental Impacts from Construction and Preconstruction Activities

Resource Area	Impacts	Mitigation Measures	Unavoidable Adverse Impacts
Land Use	MODERATE (NRC-authorized construction impact level is SMALL)	Comply with requirements of applicable Federal, State, and local permits and the State final Conditions of Certification.	The project would require a permanent commitment (through decommissioning) of approximately 585 ac of land on the Turkey Point site. Additional areas of land offsite would be occupied by rights-of-way accommodating various pipelines, transmission lines, and access roads. Land uses not related to facility operation (e.g., agriculture) in the rights-of-way would be limited but not necessarily precluded.
Water Use	SMALL	Comply with requirements of applicable Federal, State, and local permits and the State final Conditions of Certification.	Limited withdrawal of small amounts of groundwater from the Biscayne aquifer from excavation dewatering when building the plants.
Water Quality	SMALL	Comply with requirements of applicable Federal, State, and local permits and the State final Conditions of Certification.	
Ecological (Terrestrial)	MODERATE (NRC-authorized construction impact level is SMALL)	Compensatory mitigation for unavoidable wetland impacts through Federally approved mitigation bank, in-lieu fee program, or permittee responsible mitigation. Additional mitigation measures tailored to specific species listed under the Endangered Species Act are expected to be required by the US Fish and Wildlife Service.	Permanent loss of mangroves and other wetland habitats and pine rockland and other upland habitats, habitat fragmentation by pipelines and transmission lines, and increased mortality risk to certain listed species.
Ecological (Aquatic)	SMALL to MODERATE	Follow FPL and other agency protocols and requirements for protecting American crocodile, Smalltooth Sawfish, Nassau Grouper, manatees, and sea turtles	Permanent loss of some onsite aquatic environments, some disturbance, and possible disturbance of manatees, Smalltooth Sawfish, Nassau Grouper, and sea turtles. 270 ac of permanent critical habitat loss and 211 ac that would be adversely affected for resident American crocodiles.

Table 10-1. (contd)

Resource Area	Impacts	Mitigation Measures	Unavoidable Adverse Impacts
Socioeconomics			
Physical Impacts	SMALL (adverse) to MODERATE (beneficial)	Physical impacts attenuate rapidly with distance, intervening foliage, and terrain. No mitigation beyond that identified by the applicant is warranted.	All adverse physical impacts are minor.
Demography	SMALL	Impacts are minor and no mitigation is warranted.	Minor impacts on the demographics of Miami-Dade County, and the communities of Homestead and Florida City.
Economic Impacts on Community	SMALL	None.	None.
Infrastructure and Community Services	SMALL to MODERATE	Road improvements will mitigate but not eliminate adverse traffic-related impacts during construction. Those impacts will stop when construction is complete, so no further mitigation beyond that identified by the applicant is warranted.	Noticeable but not destabilizing impacts to traffic near the plant during construction. All other infrastructure impacts are minor.
Environmental Justice	NONE[a]	Mitigation is not warranted, given the lack of environmental justice impacts.	There are no pathways by which minority or low-income populations would receive a disproportionately high and adverse impact.
Historic and Cultural Resources	MODERATE (NRC-authorized construction impact level is SMALL)	Construction-related impacts on cultural resources likely will consist of indirect visual impacts on historic built resources within the APEs for the transmission line corridors. The USACE will develop mitigation measures in consultation with the Florida (FL) SHPO. Further, in consultation between FPL and the FL SHPO, FPL has agreed to develop a work plan for additional cultural resources studies that are required for the transmission line corridors and other offsite facilities.	Based on NRC's evaluation, it is anticipated that there will be indirect visual impacts on National Register-eligible built resources in the transmission line corridor. Specific impacts are to be determined, based on USACE evaluation of impacts of transmission lines on cultural resources.

Table 10-1. (contd)

Resource Area	Impacts	Mitigation Measures	Unavoidable Adverse Impacts
		Prior to construction, FPL has also agreed to develop an unanticipated discovery plan for the treatment of cultural resources inadvertently discovered during construction or maintenance.	
Meteorology and Air Quality	SMALL	Implement a dust-control plan prior to site preparation. Obtain required air-quality permits.	None
Nonradiological Health	SMALL	Comply with Federal, State, and local regulations governing construction activities and construction vehicle emissions; comply with Federal and local noise-control ordinances; comply with Federal and State occupational safety and health regulations; and implement traffic management plan.	Dust emissions, noise, occupational injuries, traffic accidents.
Radiological Health	SMALL	Maintain doses to construction workers below NRC public dose limits.	Small doses to construction workers that would be less than NRC public dose limits.
Nonradioactive Waste	SMALL	Manage hazardous and nonhazardous solid wastes according to county, State, and Federal handling and transportation regulations; implement recycling and BMPs to minimize waste generation.	Minor decrease in available capacity of waste treatment and disposal facilities. Minor stormwater, wastewater, and atmospheric discharges.

APE = Area of Potential Effect
SHPO = State Historic Preservation Office.
SWPPP = Stormwater Pollution Prevention Plan.
(a) A determination of “NONE” for Environmental Justice analyses does not mean there are no adverse impacts to minority or low-income populations from the proposed project. Instead, an indication of “NONE” means that while there are adverse impacts, those impacts do not affect minority or low-income populations in any disproportionate manner, relative to the general population.

Adverse socioeconomic impacts are generally minor for all categories, with the exceptions of noticeable but not destabilizing traffic-related impacts near the site (primarily at construction worker shift change). Traffic impacts without mitigation as described by the applicant would be destabilizing. The review team identified no pathways by which any minority or low-income populations would experience a disproportionately high and adverse impact, so there are no environmental justice impacts warranting mitigation.

Anticipated impacts on cultural resources would likely result from indirect visual impacts on above-ground resources within or within the vicinity of the transmission lines corridors. Because building of transmission lines is not an NRC-regulated activity, and because no cultural resources have been identified with the Units 6 and 7 plant area, impacts on historic and cultural resources from NRC-regulated activities would be small, and no mitigation beyond FPL's commitment to develop an unanticipated discoveries plan would be warranted.

Air-quality impacts include temporary degradation due to vehicle emissions and fugitive dust emissions during ground clearing, grading, excavation activities, and operation of other temporary sources. Fugitive dust from land disturbances and building activities would be mitigated by the dust-control plan.

10.2.2. Unavoidable Adverse Impacts During Operation

Chapter 5 provides a detailed discussion of the potential impacts from operation of proposed Units 6 and 7 at the Turkey Point site and presents anticipated mitigation and controls intended to lessen the adverse impacts. Table 10-2 presents the adverse impacts on each of the resource areas evaluated in this EIS associated with operation of the two proposed units, and the anticipated mitigation measures that would reduce the impacts. The impacts remaining after mitigation is applied are identified in the table as the unavoidable adverse impacts.

The unavoidable adverse impacts from operation for land use would be minimal and are associated with making land unavailable for other uses until after decommissioning of the two proposed units.

Unavoidable adverse impacts on land use resulting from operation of proposed Turkey Point Units 6 and 7 would be minimal because the land to be used for operations is land that has been previously disturbed and established for power-generation purposes and associated activities. Operation and maintenance of permanent site-access roadways and pipelines would be compatible with the current land uses and would not affect any existing or planned land uses.

Operation and maintenance of transmission lines would also be generally compatible with the current land uses and would not substantially affect any existing or planned land uses. However, Miami-Dade County and cities within the county have raised issues related to the aesthetic compatibility of parts of the proposed new transmission lines with some urban areas. In addition, the National Park Service (NPS) has raised compatibility questions regarding where parts of the proposed transmission lines would be situated adjacent to Everglades National Park.

Table 10-2. Unavoidable Adverse Environmental Impacts from Operation

Resource Area	Impacts	Mitigation Measures	Unavoidable Adverse Impacts
Land Use	MODERATE	Comply with requirements of applicable Federal, State, and local permits and the State final Conditions of Certification.	Transmission lines in urban areas and near the Everglades National Park could conflict with existing land uses. Onsite facilities would be in close proximity to Biscayne National Park.
Water Use	SMALL	Comply with requirements of applicable Federal, State, and local permits and the State final Conditions of Certification.	Additional demand for potable water from the Miami-Dade Water and Sewer Department. Limited withdrawal of small amounts of groundwater from the Biscayne aquifer when radial collector wells are operated.
Water Quality	SMALL	Comply with requirements of applicable Federal, State, and local permits and the State final Conditions of Certification.	Cooling-tower drift deposition of small amounts of chemical contaminants on portions of Biscayne Bay.
Ecological (Terrestrial)	MODERATE	Prescribed listed species-specific management. Transmission-line marking and wood stork behavioral observation.	Right-of-way maintenance activities in or near proposed critical habitat. Increased vehicle collision risk mortality to the Florida panther, vegetation-control effects on listed plants, and transmission system impacts on wood storks and Everglade snail kites.
Ecological (Aquatic)	SMALL	Comply with requirements, including those for protected species and habitats, of applicable Federal, State, and local permits and the State final Conditions of Certification.	During radial collector well operation, there would be noticeable increases in salinity above normal background variation, but would be offset by increases in freshwater sheet flow. Additional crocodile takes may occur, and cooling-tower drift deposition effects are expected to be minor.
Socioeconomic			
Physical impacts	SMALL	Physical impacts attenuate rapidly with distance, intervening foliage, and terrain. No mitigation beyond that which the applicant has identified is warranted.	All adverse physical impacts are minor.
Demography	SMALL	Impacts are minor and no mitigation is warranted.	Minor impacts on the demographics of Miami-Dade County, and the communities of Homestead, and Florida City.

Table 10-2. (contd)

Resource Area	Impacts	Mitigation Measures	Unavoidable Adverse Impacts
Economic Impacts on Community and Taxes	SMALL	None	None
Infrastructure and Community Services	SMALL to MODERATE	Road improvements would mitigate but not eliminate adverse traffic-related impacts during operations.	All infrastructure and community service impacts are minor during operations, except for noticeable impacts on traffic.
Environmental Justice	NONE[(a)]	Mitigation is not warranted, given the lack of environmental justice impacts.	There are no pathways by which minority or low-income people would receive a disproportionately high and adverse impact.
Historic and Cultural	SMALL	Operation-related impacts on cultural resources likely would consist of inadvertent discoveries during maintenance activities. The USACE will develop mitigation measures in consultation with the FL SHPO. Further, in consultation between FPL and the FL SHPO, FPL has agreed to develop an unanticipated discovery plan for the treatment of cultural resources inadvertently discovered during construction or maintenance.	None
Meteorology and Air Quality	SMALL	Compliance with Federal, State, and local air-quality permits and regulations.	Slight increases in certain criteria pollutants and greenhouse gas emissions due to plant auxiliary combustion equipment (e.g., standby diesel generators), and plumes and drift deposition from cooling towers.
Nonradiological Health	SMALL	Monitor chemical and etiological agents in cooling tower and condenser, maintain reclaimed water (i.e., tertiary) -treatment facility, use physical and administrative controls on exposure to cooling system discharge, comply with Federal and local	Cooling tower and pump noise, minor increases in the potential for occupational injuries and traffic accidents.

Table 10-2. (contd)

Resource Area	Impacts	Mitigation Measures	Unavoidable Adverse Impacts
		noise regulations, comply with OSHA standards for Turkey Point operational workers, and transmission line design would be compliant with Electric Safety Code standards.	
Radiological Health	SMALL	Doses to members of the public would be maintained below NRC and EPA standards; worker doses would be maintained below NRC limits and ALARA; doses to biota other than humans would be maintained below NCRP and IAEA guidelines.	Small radiation doses to members of the public, below NRC and EPA standards; ALARA doses to workers; and biota doses less than NCRP and IAEA guidelines.
Fuel cycle, Transportation, and Decommissioning	SMALL	Comply with the NRC and DOT regulations.	Small impacts from fuel cycle as presented in Table S-3, 10 CFR Part 51 (TN250). Small impacts from carbon dioxide, radon, and technetium-99. Small radiological doses that are within the NRC and DOT regulations for transportation of fuel and radioactive waste. Small impacts from decommissioning as presented in NUREG–0586 (NRC 2002-TN665).
Nonradioactive Waste	SMALL	Manage all waste in compliance with applicable Federal, State, and local requirements. Implement recycling and waste minimization program.	Minor decrease in the available capacity of waste treatment and disposal facilities. Minor discharges to atmosphere and minor impacts on groundwater from UIC discharges.

ALARA = as low as is reasonably achievable
DOT = U.S. Department of Transportation
EAB = exclusion area boundary
EPA = U.S. Environmental Protection Agency
IAEA = International Atomic Energy Agency
NCRP = National Council on Radiation Protection and Measurements
OSHA = Occupational Safety and Health Administration
SHPO = State Historic Preservation Office
SWPPP = Stormwater Pollution Prevention Plan
(a) A determination of “NONE” for Environmental Justice analyses does not mean there are no adverse impacts to minority or low-income populations from the proposed project. Instead, an indication of “NONE” means that while there are adverse impacts, those impacts do not affect minority or low-income populations in any disproportionate manner, relative to the general population.

Unavoidable, but small, adverse impacts on groundwater users would occur from additional demand for potable water from the Miami-Dade Water and Sewer Department (MDWASD). The increased demand would be about 1.5 Mgd based on normal use of 936 gpm with an occasional maximum use of 2,553 gpm for operating the proposed units (FPL 2014-TN4069). Nearly all of this water comes from the Biscayne aquifer in Miami-Dade County. Use of reclaimed water from the MDWASD for cooling makeup water would cause no new withdrawals from groundwater, so there would be no impact on groundwater users from the use of reclaimed water. Operation of the radial collector wells would also result in withdrawal of small amounts of groundwater from the Biscayne aquifer. However, based on the staff's evaluation of the reliability of the reclaimed-water system, the radial collector wells are expected to be used infrequently as a backup water supply and for durations much shorter than the 60 days allowed per year by the FDEP final Conditions of Certification (State of Florida 2014-TN3637). Therefore, the impact on groundwater users would be minor.

Unavoidable adverse impacts on terrestrial ecology resources would include increased risks of bird collisions with structures and transmission lines—notably wood storks, Everglade snail kites, and wading birds. Other impacts of operations would include reduced wildlife use or avoidance of some habitats due to noise and disturbance, and vegetation-control effects on listed plants. Increased vehicle collision risk mortality to the Florida panther is anticipated. Post-construction research, monitoring, and mitigation would be conducted to determine final effects and to offset adverse impacts.

Adverse impacts on aquatic resources would be generally minor. However, additional crocodile takes could occur during operation. All other adverse impacts, such as cooling-tower drift deposition, are so minor that they would not create unsuitable aquatic habitat or noticeably affect populations. Mitigation and monitoring could be required by other State and Federal agencies.

Adverse socioeconomic impacts during operations are generally minor for all categories, with the exceptions of a noticeable but not destabilizing impacts on traffic near the site. The review team identified no pathways by which any minority or low-income populations would experience a disproportionately high and adverse impact, so there are no environmental justice impacts warranting mitigation.

Unavoidable adverse impacts from operation for cultural resources likely would involve the inadvertent discovery of cultural resources during maintenance activities. For other potential operation-related impacts, FPL has agreed to develop an unanticipated discovery plan for the treatment of cultural resources inadvertently discovered during construction or maintenance, thereby providing mitigation to avoid adverse impacts.

Air-quality impacts are expected to be negligible, and pollutants emitted during operations would be insignificant. Nonradiological and radiological health impacts would be minimal. Nonradiological health impacts on members of the public from operation, including etiological agents, noise, electromagnetic fields, occupational health, and transportation of materials and personnel would be minimal because FPL would apply controls and measures to ensure compliance with Federal and State regulations. Radiological doses to members of the public from operation of the proposed Turkey Point Units 6 and 7 would be below annual exposure limits set to protect the public. Doses to biota other than humans would be maintained below National Council on Radiation Protection and Measurements and International Atomic Energy Agency guidelines.

10.3 Relationship Between Short-Term Uses and Long-Term Productivity of the Human Environment

Section 102(2)(C)(iv) of NEPA (42 USC 4321 et seq.) (TN661) requires that an EIS include information about the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity.

The local use of the human environment by the proposed project can be summarized in terms of the unavoidable adverse environmental impacts of construction and operation and the irreversible and irretrievable commitments of resources. With the exception of the consumption of depletable resources as a result of plant construction and operation, these uses may be classified as short term. The principal benefit of the plant is represented by the production of electrical energy. The benefit of electricity production would be significantly greater than the benefits of agriculture or other probable uses for the site.

Most long-term impacts resulting from land-use preemption by plant structures can be eliminated by removing these structures or by converting them to other productive uses. Once the plants are shut down, they would be decommissioned according to NRC regulations. Once decommissioning is complete and the NRC licenses are terminated, the site would be available for other uses. The greatest adverse impact on productivity would result between plant closure and the completion of decommissioning, when the land occupied by the plant structures would not be available for any other use.

The review team concludes that the positive long-term enhancement of regional productivity through the generation of electrical energy would outweigh any negative aspects of plant construction and operation as they affect the human environment.

10.4 Irreversible and Irretrievable Commitments of Resources

Section 102(2)(C)(v) of NEPA (42 USC 4321 et seq.) (TN661) requires that an EIS include information about any irreversible and irretrievable commitments of resources that would occur if the proposed actions are implemented. The term “irreversible commitments of resources” refers to environmental resources that would be irreparably changed by the new units and that could not be restored at some later time to the resource’s state before the relevant activities. “Irretrievable commitments of resources” refers to materials that would be used for or consumed by the new units in such a way that they could not, by practical means, be recycled or restored for other uses. The resources discussed in this section are the environmental resources discussed in Chapters 4, 5, and 6.

10.4.1 Irreversible Commitments of Resources

Irreversible commitments of environmental resources resulting from Turkey Point Units 6 and 7, in addition to the materials used for the nuclear fuel, are described below.

10.4.1.1 Land Use

Although the review team's analysis considers land uses attributable to Units 6 and 7 to be effectively permanent for the foreseeable time horizon, none of the land used for Units 6 and 7 is irreversibly committed because once the units cease operations and are decommissioned in accordance with NRC requirements, the land could be returned to other industrial and non-industrial uses.

10.4.1.2 Water Use

Because the water in the Biscayne aquifer is replenished by infiltration of precipitation, the withdrawals of groundwater from the aquifer are reversible.

10.4.1.3 Ecological Resources

Construction activities would cause temporary and long-term changes to both the aquatic and terrestrial biota at the plant site and facilities.

10.4.1.4 Socioeconomic Resources

The NRC staff expects no irreversible socioeconomic commitments would be made because resources would be reallocated for other purposes once the plant is decommissioned.

10.4.1.5 Historical and Cultural Resources

There are no known irreversible commitments of historical or cultural resources due to the building and operation of Turkey Point Units 6 and 7. Visual impacts could be reversed if the intrusive visual elements (e.g., transmission lines) were removed.

10.4.1.6 Air and Water

Dust and other emissions such as vehicle exhaust would be released to the air during construction and preconstruction. During operations, vehicle exhaust emissions would continue and other air pollutants and chemicals, including very low concentrations of radioactive gases and particulates, would be released from the facility to the air and surface water. The review team expects no irreversible commitment to air or water resources because all proposed releases at Turkey Point Units 6 and 7 would be made in accordance with duly issued permits.

10.4.2 Irretrievable Commitments of Resources

FPL states in Table 10.2-1 of its ER that construction of the proposed two new units at Turkey Point would involve 154,400 cubic yards of concrete, 22,000 tons of rebar, 12,800 tons of structural steel, 1.6 million feet of power cable, 460,000 feet of small (less than 3 inches in diameter) piping, and 136,000 feet of large bore piping (FPL 2014-TN4058). Construction would also use large quantities of aluminum, copper, other metals and alloys, and quarry materials (nuclear and construction grade fill material, aggregate, sand, etc.). The review team expects that the use of construction materials in the quantities associated with those expected for Turkey Point Units 6 and 7, while irretrievable, would be of small consequence with respect to the availability of such resources.

The main resource that would be irretrievably committed during operation of the new nuclear units would be uranium, which FPL states would amount to about 25.35 tons per year, or 1,014 tons over the life of the permit. The World Nuclear Association claims the world's known and recoverable stockpile of uranium is over 5.3 million tons (WNA 2012-TN1498). Given a current world-wide consumption of uranium of about 68,000 tons per year and known reserves, there is about 80 years-worth of uranium available. Therefore, the review team concludes that while irreversible, the consumption of uranium for the proposed Units 6 and 7 at Turkey Point would have a negligible impact on known reserves.

10.5 Alternative to the Proposed Actions

Alternatives to the proposed action are discussed in Chapter 9 of this EIS. Alternatives considered include the no-action alternative, energy alternatives that do not require additional generating capacity, energy production alternatives, system design alternatives, and alternative sites. For the purposes of evaluation undertaken by USACE, possible alternative facility layouts on the proposed site also are addressed.

The no-action alternative, described in Section 9.1, refers to a scenario in which the NRC would deny the request for COLs or USACE would deny FPL's permit request. In either case, construction of the two new units would not proceed as proposed. If no other power plants were built or electrical power supply strategy was implemented to replace the proposed action, the electrical capacity to be provided by the project would not become available. In that case, the need for power would not be met, the benefits (electricity generation) associated with the completed project would not occur, and the Florida Reliability Coordinating Council region would become vulnerable to grid instability, brownouts, and blackouts. Failure to supply the needed electricity would have significant adverse impacts within the region of interest and the staff expects that the Florida Public Service Commission would take steps to confirm that the need for power would be met.

Alternative energy sources are described in Section 9.2 of this EIS. Alternatives not involving additional generating capacity are described in Section 9.2.1. Alternatives requiring new generating capacity, including detailed analyses of coal-fired and natural-gas-fired alternatives, are provided in Section 9.2.2. Other energy sources, including renewable energy sources, are discussed in Section 9.2.3, and a combination of energy alternatives (involving a combination of fossil fuel and renewable energy generation sources) is discussed in Section 9.2.4. The review team concluded by comparative analysis presented in Section 9.2.5 that none of the alternative power production options are environmentally preferable to the proposed action.

Alternative sites are discussed in Section 9.3 of this EIS. Cumulative impacts in the vicinity of the Turkey Point site, including the proposed Turkey Point Units 6 and 7, are compared with the cumulative impacts from building and operating the same physical facilities and adequate support facilities at each of the alternative sites. Section 9.3.6 (Table 9-28) summarizes the NRC staff's characterization of cumulative impacts at the proposed and alternative sites. Based on this review, the NRC staff concludes that none of the alternative sites is environmentally preferable or obviously superior to the Turkey Point site. The NRC's determination is independent of USACE's determination of whether there is a least environmentally damaging practicable alternative pursuant to Clean Water Act Section 404(b)(1) Guidelines. USACE will conclude its analysis of both offsite and onsite alternatives in its ROD.

Alternative system designs, focusing on alternative cooling-system designs, are discussed in Section 9.4 of this EIS. The staff determined that none of the alternative system designs is environmentally preferable to the proposed design.

10.6 Benefit-Cost Balance

NEPA requires that all agencies of the Federal Government prepare detailed environmental statements on proposed major Federal actions that can significantly affect the quality of the human environment. A principal objective of NEPA is to require each Federal agency to consider, in its decision-making process, the environmental impacts of each proposed major action and the available alternative actions. In particular, Section 102 of NEPA (42 USC 4321 et seq.) (TN661) requires all Federal agencies to the fullest extent possible:

> (B) identify and develop methods and procedures, in consultation with the Council on Environmental Quality established by Title II of this Act, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decision making along with economic and technical considerations. (42 USC 4321 et seq. [TN661]; CEQ 1997-TN452)

However, neither NEPA nor CEQ requires the costs and benefits of a proposed action be quantified in dollars or any other common metric.

The purpose of this section is not to identify and quantify all of the potential societal benefits of the proposed actions and compare these to the potential costs of the proposed actions. Instead, this section focuses on only those benefits and costs of such magnitude or importance that their inclusion in this analysis can inform the decision-making process. This section compiles and compares the pertinent analytical conclusions reached in earlier chapters of this EIS. It gathers all of the expected impacts from building and operations of the proposed Turkey Point Units 6 and 7 and aggregates them into two final categories: (1) the expected environmental and economic costs and (2) the expected benefits to be derived from approval of the proposed action. As such, costs and benefits include the costs and benefits of preconstruction activities and NRC-authorized construction and operations activities.

Although the analysis in this section is conceptually similar to a purely economic benefit-cost analysis, which determines the net present dollar value of a given project, the purpose of this section is to identify all potential societal benefits of the proposed actions and compare them to the potential internal (i.e., private) and external (i.e., societal) costs of the proposed actions. The purpose of this assessment is to generally inform the COL process by gathering and reviewing information that demonstrates the likelihood that the benefits of the proposed actions outweigh the aggregate costs.

Whether FPL is profitable and other similar issues are outside NRC's mission and authority and, thus, would not be considered in this EIS. Issues related to the financial qualifications of FPL, however, will be addressed in the NRC staff's Safety Evaluation Report. It is not possible to quantify and assign a value to all benefits and costs associated with the proposed action. This analysis, however, attempts to identify, quantify, and provide monetary values for benefits and costs when reasonable estimates are available.

Section 10.6.1 discusses the benefits associated with the proposed action. Section 10.6.2 discusses the costs associated with the proposed action. A summary of benefits is shown in Table 10-3. Section 10.6.3 provides a summary of the impact assessments, bringing previous sections together to establish a general impression of the relative magnitude of the proposed actions' costs and benefits.

10.6.1 Benefits

The most apparent benefit from a power plant is that it generates power and provides thousands of residential, commercial, and industrial consumers with electricity. Maintaining an adequate supply of electricity in any given region has social and economic importance because adequate electricity is the foundation for economic stability and growth and fundamental to maintaining our current standard of living. Because the focus of this EIS is on the proposed expansion of Turkey Point's generating capacity, this section focuses primarily on the relative benefits of the Turkey Point option rather than the broader, more generic benefits of electricity supply.

10.6.1.1 Societal Benefits

For the production of electricity to be beneficial to a society, there must be a corresponding demand, or "need for power," in the region. Chapter 8 defines and discusses the need for power in more detail. From a societal perspective, nuclear power offers two primary benefits relative to most other generating systems: (1) long-term price stability and (2) energy security through fuel diversity. These benefits are described in this subsection.

Long-Term Price Stability

Because of its relatively low and nonvolatile fuel costs, nuclear energy is a dependable generator of electricity that can provide electricity to the consumer at relatively stable prices over a long period of time. Unlike some other energy sources, nuclear energy is generally not subject to unreliable weather or climate conditions, unpredictable cost fluctuations, and is less dependent on potentially unstable foreign suppliers than other energy sources. Nuclear power plants are generally not subject to fuel price volatility like natural gas and oil power plants. In addition, uranium fuel constitutes only 3 percent to 5 percent of the cost of a kilowatt-hour of nuclear-generated electricity. Doubling the price of uranium increases the cost of electricity by about 9 percent; while doubling the price of gas would add about 66 percent to the price of electricity, and doubling the cost of coal would add about 31 percent to the price of electricity (WNA 2014-TN4111).

Energy Security Through Fuel Diversity

Currently, more than 70 percent of the electricity generated in the United States is generated with fossil-based technologies; thus, non-fossil-based generation, such as nuclear generation, is essential to maintaining diversity in the aggregate power-generation fuel mix (DOE/EIA 2006-TN718). Nuclear power contributes to the diverse U.S. energy mix, hedging the risk of shortages and price fluctuations for any one power-generation system and reducing the nation's dependence on imported fossil fuels.

1 **Table 10-3. Summary of Benefits of the Proposed Action**

Benefit Category	Description	Monetized Value or Impact Assessment
	Benefits	
Electricity generated	16,400,000 to 17,900,000 MWh/yr for the 40-year life of the plant (assuming capacity factors in the range of 85–93 percent).	
Generating capacity	2,200 MW(e) (two units at 1,100 MW(e) each).	
Employment	At peak employment, the review team estimates there would be 3,290 new workers moving into the local area and would generate economic activity that would support an additional 3,137 indirect jobs during the entire building period. Of the 806 operations workers, 671 would move into the local area and support an additional 1,456 indirect jobs in their communities.	
Electricity price reduction	The variable costs of a nuclear power plant are among the lowest of all large-scale electricity generating units. Consequently, adding 2,200 MW(e) to the relevant market will cause the average price of electricity to fall. While the staff cannot predict the exact value of such a price reduction, it should be noted that even a small electricity price reduction would result in a significant savings to the FPL customer base. For example, Table 8-1 indicates FPL sold 105,502 GWh of electricity in 2011. If the price to all customers fell by just one cent per kWh, the total savings in 2011 would have been more than a billion dollars.	
Fuel diversity and energy security	Nuclear power provides diversity to the FRCC inventory, which consists primarily of fossil-fuel-powered baseload generation. Reduces exposure to supply and price risk associated with reliance on any single fuel source.	
Tax revenues	FPL will pay corporate income taxes to the State of Florida upon operation of Turkey Point Units 6 and 7. In addition, the State and Miami-Dade County will collect sales and use taxes on locally purchased goods and services during construction and from construction and operations worker purchases. Finally, units 6 and 7 will generate property taxes over the 40-year life of the plant, which would be paid to Miami-Dade County, the Mimi-Dade Public School District and possibly to special taxing units.	Approximately $50 million in property taxes annually (Miami-Dade County would receive the majority of this tax revenue); $12.5 million in sales taxes statewide annually over a 12-year licensing and construction period.
Local economy	Building the two proposed units would require the short-term addition of up to 3,983 workers (3,950 construction workers and 33 operations workers) and a 40-year operations workforce of 806 workers. The increase in local indirect jobs created by the presence of these workers and the contribution of these workers to the tax base of Miami-Dade County and the local school district and communities would benefit the area economically and stimulate the economy of the region (see Sections 4.4.3.1 and 5.4.3.1).	806 operations workers and over 1,456 indirect jobs added over 40-year life of plant; $140 million income per year in the region during 40-year life of plant.
Price volatility	Nuclear power has the lowest portion of its variable cost attributed to fuel costs. In addition, nuclear fuel has the most stable long-term price. In combination, these characteristics would help stabilize the market price of electricity and mitigate future electricity price volatility.	
Electrical reliability	Nuclear power plants provide the most power per unit of any baseload unit and run at some of the highest capacity factors. These characteristics enhance the stability and reliability of the electricity supply.	

FRCC = Florida Reliability Coordinating Council

A diverse fuel mix helps to protect consumers from contingencies such as fuel shortages or disruptions, price fluctuations, and changes in regulatory practices. FPL's 2006 fuel mix was made up of 50 percent natural gas, 21 percent nuclear power, and 18 percent coal (FPL 2014-TN4058). Chapter 8 of this EIS discusses the State of Florida's finding that a need exists for Units 6 and 7 as proposed by FPL. The proposed Turkey Point Units 6 and 7 would generate approximately 2,200 MW(e) net, which would help meet this baseload need in the region. Assuming a reasonably low capacity factor of 85 percent, the plant's average annual electrical energy generation would be about 16,400,000 MWh. A reasonably high-capacity factor of 93 percent would result in slightly more than 17,900,000 MWh of electricity.

10.6.1.2 Regional Benefits

Regional benefits of the proposed construction and operation of Units 6 and 7 include enhanced tax revenues, regional productivity, and community impacts.

Tax Revenue Benefits

As discussed in Section 4.4.3.2, the staff determined that the annual sales and use taxes for local purchases of nonexempt materials for use in the construction of Turkey Point Units 6 and 7 for the State of Florida and Miami-Dade County would be about $12.5 and $2.1 million, respectively. These revenues would not be expected to provide significant local revenues in the affected region. Florida does not collect income taxes.

As discussed in Section 5.4.3.2, the staff also determined that once both units become operational, Miami-Dade County would receive approximately $50 million in property tax revenues collected annually over the 40-year license period, and an additional $1.5 million to $2 million in sales and use taxes from FPL for operations related materials and supplies annually. This stream of revenue represents a less than 1 percent increase over recent Miami-Dade County total revenue levels.

Regional Productivity and Community Impacts

The new units would employ an operating workforce of 806; 671 of whom would reside in Miami-Dade County and support 1,456 indirect jobs (Section 5.4) within the local area that would be maintained throughout the life of the plant. The economic multiplier effect of the increased spending by the direct and indirect workforce created as a result of two new units would increase the economic activity in the region, most noticeably in the communities near the proposed site. Sections 4.4.3.1 and 5.4.3.1 provide additional information about the economic impacts of constructing and operating proposed Turkey Point Units 6 and 7.

10.6.2 Costs

Internal costs to FPL of proposed Units 6 and 7 as well as external costs to the surrounding region and environment would be incurred during the construction, preconstruction, and operation of two new units at the site. A summary of the costs is shown in Table 10-4.

1 **Table 10-4. Summary of Costs of Preconstruction, Construction, and Operation**

Cost Category	Description	Impact Assessment[a]
	Internal Costs[b]	
Overnight Cost of Construction[c]	\$7.9 to \$11.4 billion (2012\$)	NA
Total Estimated Project Cost[c]	\$12.8 to \$18.7 billion (2012\$)	NA
Operating cost	\$743.8 to \$994.7 million per year (8.3 to 11.1 cents per kWh levelized cost of electricity in 2007\$ Includes fuel cost at about 0.7 cents per kWh)[d]	NA
Spent fuel management[e]	\$8.9 million per year	NA
Decommissioning[f]	\$8.9 to \$17.9 million per year Approximately one- to two-tenths of one cent per kWh	NA
	External Costs	
Land use	Approximately 585 ac of land on a site already established for the purpose of accommodating electric generation facilities would be occupied on a long-term basis. Additional offsite lands would be occupied on a long-term basis as rights-of-way for transmission lines, pipelines, and access roads. While the land-use impacts from building the proposed facilities on the Turkey Point site would generally be minimal and compatible with FPL's existing and other reasonably foreseeable uses of property on the site, some of the proposed associated offsite work may noticeably affect adjoining land uses. In particular, new transmission lines built in the East corridor would traverse densely developed urban areas, and new transmission lines built in the West corridor come close to the eastern boundary of Everglades National Park. In addition, Miami-Dade County has expressed concern that new or upgraded roads needed to transport fill from the proposed FPL Homestead fill source to the plant site could induce additional development in a predominantly agricultural part of the county.	MODERATE
Air quality	Emissions from diesel generators, auxiliary boilers and equipment, cooling towers, and vehicles to the air would have a small impact on workers and local residents. With the exception of the cooling towers, emissions sources would be operated intermittently. Emissions from all sources would be within Federal, State, and local air-quality limits. Negligible impacts of sulfur dioxide, nitrogen oxide, carbon monoxide, carbon dioxide, and particulate emissions relative to other baseload fossil-fired generation (see Sections 4.7 and 5.7).	SMALL

2

Table 10-4. (contd)

Cost Category	Description	Impact Assessment[a]
Terrestrial Ecology	Construction and preconstruction activities would noticeably affect wetlands, wildlife, and Federally and State-listed plant and animal species at the Turkey Point site, in the vicinity of the site, and at or in the vicinity of all associated offsite facilities. Operation of Units 6 and 7 may increase vehicle collision mortality to the Florida panther, vegetation-control effects on listed plants, and transmission system impacts on wood storks and Everglade snail kites.	MODERATE
Aquatic Ecology	Construction and preconstruction activities would result in permanent loss of and impact on critical habitat for the American crocodile; possible takes of American crocodile and may affect manatees, Smalltooth Sawfish, and sea turtles. During radial collector well operation, there would be minor salinity fluctuations at nearshore areas immediately north of the Turkey Point site but would not be noticeable above normal background variation.	SMALL to MODERATE
Socioeconomics	Most adverse socioeconomic impacts from the proposed Units 6 and 7 would be minor, with the exception of traffic-related noticeable impacts during construction and operations.	SMALL to MODERATE
Environmental Justice	The review team identified no pathways by which a minority or low-income population would receive a disproportionately high and adverse impact	NONE[g]
Nonradioactive waste	Minor, localized, and temporary air emissions from construction equipment and temporary stationary sources. Creation of solid wastes, causing minor consumption of local or regional landfill space, offset by payment of tipping fees for waste disposal. Generation of small amounts of hazardous and mixed wastes leading to minor consumption of regional hazardous waste treatment or disposal capacity, offset by treatment, recycling, and disposal costs (see Sections 4.10 and 5.10)	SMALL
Uranium fuel cycle	Minor impacts distributed across multiple locations throughout the United States from the mining, milling, and enrichment of uranium, from fuel fabrication, from transportation of radioactive material, and from management of radioactive wastes (see Chapter 6).	SMALL

Table 10-4. (contd)

Cost Category	Description	Impact Assessment[(a)]
Historic and cultural resources	Construction of offsite transmission lines will result in potential visual impacts on National Register-eligible built resources, including buildings and historic districts. The impact of operation would be SMALL	MODERATE
Health impacts (nonradiological and radiological)	Radiological doses and nonradiological health hazards to the public and occupational workers would be monitored and controlled in accordance with regulatory limits (see Sections 4.8, 4.9, 5.8, and 5.9).	SMALL
Materials, energy, and uranium	Irreversible and irretrievable commitments of materials and energy, including depletion of uranium. Construction materials include concrete, aggregate, rebar, conduit, cable, piping, building supplies, and tools. Equipment needs include cranes, cement trucks, excavation equipment, dump trucks, and graders.	SMALL
Hazardous and radioactive waste	Mixed waste stored, transported, treated, and disposed in compliance with both NRC and EPA regulations would consume some regional or national waste treatment or disposal capacity, offset by treatment and disposal costs (see Sections 4.10 and 5.10).	SMALL
Water use and water quality	Water usage during construction and operations would have a minor impact on the availability and quality of the water resources in the area. Reclaimed water from the Miami-Dade Water and Sewer Department would be used as cooling water for normal operations. Approximately 29,230 gpm would be lost through evaporation and drift. An additional 12,461 gpm would be discharged to the Boulder Zone as blowdown from the cooling system. Onsite groundwater withdrawals would be limited to temporary dewatering during construction. Water for potable and sanitary uses would be from a municipal supply (see Sections 4.2 and 5.2).	SMALL

(a) Impact assessments are listed for all impacts evaluated in detail as part of this EIS. The details on impact assessments are found in the indicated sections of this EIS.
(b) Internal costs are those incurred by FPL to implement proposed building and operation of the Turkey Point site. Note that no impact assessments are provided for these private financial impacts.
(c) FPL 2014-TN4058; overnight construction costs include transmission line construction costs; total project costs include finance costs
(d) Review team calculation of price per kWh based on MIT 2009-TN448.
(e) The U.S. used-fuel program is funded by a 0.1 cent/kWh charge.
(f) USA experience (WNA 2014-TN4111).
(g) A determination of "NONE" for Environmental Justice analyses does not mean there are no adverse impacts to minority or low-income populations from the proposed project. Instead, an indication of "NONE" means that while there are adverse impacts, those impacts do not affect minority or low-income populations in any disproportionate manner, relative to the general population.

Internal costs include all of the costs included in a total capital cost assessment—the direct and indirect cost to physically build the power plant (capital costs), plus the annual costs of operation and maintenance, fuel costs, waste disposal, and decommissioning costs. In accordance with the NRC staff's guidance in NUREG–1555 (NRC 2000-TN614), the internal costs of the proposed project are presented in monetary terms. External costs include all costs imposed on the environment and region surrounding the plant that are not internalized by the company and may include such things as a loss of regional productivity, environmental degradation, or loss of wildlife habitat. The external costs listed in Table 10-4 summarize environmental impacts on resources that could result from preconstruction, construction, and operation of the proposed Units 6 and 7.

10.6.2.1 Internal Costs

The most substantial monetary cost associated with nuclear energy is the cost of capital. Nuclear power plants have relatively high capital costs for building the plant but low operating costs relative to alternative power-generation systems. Fluctuations in the real prices of key heavy construction commodities, such as cement, steel, and copper, can have a significant impact on nuclear plant capital costs (although it should be noted that these price changes would change construction costs for non-nuclear power plants as well). Construction delays can add significantly to the cost of a plant. Because of the large capital costs for nuclear power, and the relatively long construction period before revenue is returned, servicing the capital costs of a nuclear power plant also is a key factor in determining the economic competitiveness of nuclear energy. Because a power plant does not yield profits during construction, longer construction times mean a longer time before any costs can be offset by revenues. Furthermore the longer it takes to build the plant, the higher would be the interest expenses on borrowed construction funds.

Construction Costs

In evaluating monetary costs related to constructing proposed Units 6 and 7, FPL reviewed recent published literature, vendor information, internally generated financial information, and internally generated, site-specific information. The review team also compared recent cost estimates with FPL's. These estimates are based on a number of studies that were conducted by government agencies, universities, and other entities; the estimates include a significant contingency to account for uncertainty. Capital costs are costs incurred during construction, including preconstruction, when the actual outlays for equipment and construction and engineering are made. "Overnight capital costs" include engineering, procurement, and construction costs; however, it is presumed that the plant is constructed overnight; thus, interest is not included. FPL based its estimates of overnight capital costs for construction and preconstruction on analysis of four comprehensive studies of nuclear plant costs (University of Chicago 2004-TN719; MIT 2003-TN720; Dominion et al. 2004-TN721; OECD 2005-TN722), in which estimates ranged from $1,100 per kilowatt to $2,500 per kilowatt (in 2002 dollars). FPL estimates that the overnight cost range to be $3,570 to $5,190 per kilowatt in 2012 dollars. On this basis, FPL estimates an overnight capital cost for the two Turkey Point units of between $7.9 billion and $11.4 billion in 2012 dollars (FPL 2014-TN4058). In addition to the studies FPL used, the review team also considered more recent studies: construction costs from other applicants and a 2009 update to the 2003 Massachusetts Institute of Technology (MIT) study on the cost of nuclear power (MIT 2009-TN448).

- Tennessee Valley Authority estimated its per kilowatt cost of construction for two new proposed AP1000 units at its Bellefonte site in Alabama between $2,850 and $3,200/kW (TVA 2008-TN4140), which if applied to proposed Units 6 and 7 at FPL (installed capacity of 2,200 MW(e)), would yield an overnight capital cost of $6.2 to $7 billion.
- Southern Nuclear Operating Company estimated the overnight cost of construction for two AP1000 units at its Vogtle site in Georgia to be between $3,200 and $3,500/kW (SNC 2008-TN4141), which if applied to proposed Units 6 and 7 at FPL would yield an overnight capital cost of $7 billion to $7.7 billion.
- The MIT Update (MIT 2009-TN448) estimated the overnight construction cost at $4,000/kW in 2007 dollars or about $8.8 billion for 2,200 MW(e) in 2008 dollars.

Except for the Keystone study, the general studies do not present the total cost of construction (i.e. overnight costs do not include interest expense). Keystone presented a range of approximately $4,300 to $4,800/kW in 2007 dollars (Keystone 2007-TN724). FPL's estimated "all-in" construction cost for Units 6 and 7 ranges from $5,823 to $8,497/kW in 2012 dollars leading to total construction costs of $12.8 to $18.7 billion (FPL 2014-TN4058).

Operation Costs

Operation costs are frequently expressed as levelized cost of electricity, which is the lowest price per kilowatt-hour of producing electricity that covers operating costs, maintenance costs, fuel expenditures, and annualized capital costs over the life of the project. For nuclear power plants, overnight capital costs typically account for a third of the levelized cost, and interest costs on the overnight costs account for another 25 percent (University of Chicago 2004-TN719). FPL noted that the four studies mentioned above estimate levelized cost for Turkey Point Units 6 and 7 to be in the range of $36 to $83/MWh (3.6 to 8.3 cents/kWh) (FPL 2014-TN4058; University of Chicago 2004-TN719; MIT 2003-TN720; Dominion et al. 2004-TN721; OECD 2005-TN722). In addition, the review team examined the update to the MIT study (MIT 2009-TN448) which re-evaluated the overnight levelized cost of electricity at 8.4 cents/kWh (2007$). However, the Keystone study estimates the levelized cost for their low and high construction-cost estimates to range from $0.083 to $0.111/kWh (Keystone 2007-TN724). 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 or more in the future, decommissioning costs have relatively little effect on the levelized cost.

Fuel Costs

The cost of fuel is included in the calculation of levelized cost. Based on the 2009 MIT study (MIT 2009-TN448), the review team estimates nuclear fuel costs to be 0.7 cents/kWh.

Waste Disposal

The back-end costs of nuclear power contribute a very small share of the total cost because of both the long lifetime of a nuclear reactor and the fact that provisions for waste-related costs can be accumulated over that time. Spent fuel management costs are estimated to be one-tenth of a cent per kilowatt-hour (WNA 2014-TN4111; DOE 2008-TN725). It should be recognized, however, that radioactive nuclear waste poses unique disposal challenges for long-term management. While spent fuel and radioactive nuclear waste are being stored successfully in onsite facilities, the United States has yet to implement final disposition of spent fuel or high-level radioactive waste streams created at various stages of the nuclear fuel cycle.

Decommissioning

The NRC has requirements for licensees at 10 CFR 50.75 (TN249) to provide reasonable assurance that funds would be available for the decommissioning process. 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 of electricity generated by a nuclear power plant. Decommissioning costs are about 9 to 15 percent of the initial capital cost of a nuclear power plant. However, when discounted, they contribute only a few percent to the investment cost and even less to generation cost. In the United States, these costs account for one to two tenths of a cent per kilowatt-hour (WNA 2014-TN4111).

10.6.2.2 External Costs

External costs are related to the social and/or environmental effects that would be caused by the construction of and generation of power by two new reactors at the Turkey Point site. This EIS includes the review team's analysis that considers and weighs the environmental impacts of building and operating new nuclear units at the Turkey Point site or at alternative sites and mitigation measures available for reducing or avoiding these adverse impacts. It also includes the NRC staff's recommendation to the Commission regarding the proposed action.

Environmental and Social Costs

Chapter 4 describes the impacts of building proposed Units 6 and 7 on the environment with respect to the land, water, ecology, socioeconomics, radiation exposure to construction workers, and measures and controls to limit adverse impacts during building of the proposed new units at the Turkey Point site. Chapter 5 examines environmental issues associated with operation of the proposed new nuclear Units 6 and 7 for an initial 40-year period. Potential operational impacts on land use, air quality, water, terrestrial and aquatic ecosystems, socioeconomics, historic and cultural resources, environmental justice, nonradiological and radiological health effects, postulated accidents, and applicable measures and controls that would limit the adverse impacts of station operation during the 40-year operating period are considered. In accordance with 10 CFR Part 51 (TN250), all impacts identified in Chapters 4 and 5 have been analyzed, and a significance level of potential adverse impacts (i.e., SMALL, MODERATE, or LARGE) has been assigned.

Chapter 6 addresses the environmental impacts from (1) the uranium fuel cycle and solid waste management, (2) the transportation of radioactive material, and (3) the decommissioning of nuclear units at the Turkey Point site. Chapter 9 includes the review team's review of alternative sites and alternative power-generation systems.

Unlike generation of electricity from coal and natural gas, normal operation of a nuclear power plant does not result in any emissions of criteria (e.g., oxides of nitrogen or sulfur dioxide), methyl mercury, or greenhouse gases associated with global warming and climate change. Chapter 9 analyzes coal-fired and natural-gas-fired alternatives to the building and operation of proposed Turkey Point Units 6 and 7. Air emissions from these alternatives and nuclear power are summarized in Chapters 5 and 9 of this EIS.

10.6.3 Summary of Benefits and Costs

FPL's business decision to pursue generating capacity by adding two nuclear reactors at the Turkey Point site is an economic decision based on private financial factors subject to regulation by the Florida Public Utility Commission. Florida Public Utility Commission's issuance of a determination of need provides great weight to the NRC's decision regarding whether there is a need for the power that would be generated by the construction and operation of the two proposed units at the Turkey Point site. The internal costs to construct additional units appear to be substantial; however, FPL's decision to pursue this expansion implies that it has concluded that the internal benefits of the proposed facility (production of 16,400,000 to 17,900,000 MWh/yr for the 40-year life of the plant and 2,200 MW of baseload capacity) outweigh the internal costs. In comparison, the external socio-environmental costs imposed on the region appear to be relatively minor. Although no specific monetary values could reasonably be assigned to the identified societal benefits, the review team determined it is not unreasonable to assume that the potential societal benefits of the proposed Units 6 and 7, including the primary benefit of the generated power and baseload capacity, outweigh the potential social and private costs of the proposed action I.

Table 10-4 includes a summary of both internal and external costs of the proposed activities at the Turkey Point site for Units 6 and 7, and Table 10-3 identifies the benefits. The tables include a reference to other sections of this EIS where more detailed analyses and impact assessments are available for specific topics.

On the basis of the assessments summarized in this EIS, the review team concludes that building and operating the proposed Units 6 and 7, with the anticipated mitigation measures identified by the review team, would have accrued benefits that most likely would outweigh the economic, environmental, and social costs. For the NRC-proposed action (NRC-authorized construction and operation) the accrued benefits would also outweigh the costs of construction and operation of Units 6 and 7.

10.7 NRC Staff Recommendation

The NRC staff's preliminary recommendation to the Commission related to the environmental aspects of the proposed action is that the COLs should be issued. The NRC staff's evaluation of the safety aspects of the proposed action will be addressed in the Safety Evaluation Report that is anticipated to be published in October 2016.

The staff's preliminary recommendation is based on (1) the ER submitted by FPL (2014-TN4058); (2) consultation with Federal, State, Tribal, and local agencies; (3) the review team's own independent review; (4) the staff's consideration of public scoping comments; and (5) the assessments summarized in this EIS, including the potential mitigation measures identified in the ER and the EIS. In addition, in making its preliminary recommendation, the NRC staff determined that none of the alternative sites assessed is obviously superior to the Turkey Point site.

The NRC's determination is independent of the USACE's permit decision, which will be documented in the USACE's ROD.

11.0 References

In this reference list, references that begin with numerical designations (e.g., 10 CFR Part 20, 40 FR 44149) are presented first in numerical order. The ensuing references are listed in alphabetical order by author name(s)—including author surname(s), company name(s), or the company abbreviation(s) used in the citations in the narrative—and their chronological year of publication. The associated Tracking Numbers (e.g.,TN3792) that appear at the end of each reference are assigned to each reference in numerical order within the publication year of the source (to account for numerous references by a source within a given year). All links in this list are subject to change over time.

10 CFR Part 20. 2011. *Code of Federal Regulations*, Title 10, *Energy*, Part 20, "Standards for Protection Against Radiation." Washington, D.C. TN283.

10 CFR Part 50. 2012. *Code of Federal Regulations*, Title 10, *Energy*, Part 50, "Domestic Licensing of Production and Utilization Facilities." Washington, D.C. TN249.

10 CFR Part 51. 2011. *Code of Federal Regulations*, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions." Washington, D.C. TN250.

10 CFR Part 52. 2012. *Code of Federal Regulations*, Title 10, *Energy*, Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants." Washington, D.C. TN251.

10 CFR Part 71. 2011. *Code of Federal Regulations*, Title 10, *Energy*, Part 9671, "Packaging and Transportation of Radioactive Material." Washington, D.C. TN301.

10 CFR Part 73. 2011. *Code of Federal Regulations*, Title 10, *Energy*, Part 73, "Physical Protection of Plants and Materials." Washington, D.C. TN423.

10 CFR Part 100. 2010. *Code of Federal Regulations*, Title 10, *Energy*, Part 100, "Reactor Site Criteria." Washington, D.C. TN282.

10 CFR Part 961. 2002. *Code of Federal Regulations*, Title 10, *Energy*, Part 961, "Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste." Washington, D.C. TN300.

24 CFR Part 51. 2003. *Code of Federal Regulations*, Title 24, *Housing and Urban Development*, Part 51, "Environmental Criteria and Standards." Washington, D.C. TN1016.

29 CFR Part 1910. 2012. *Code of Federal Regulations*, Title 29, *Labor*, Part 1910, "Occupational Safety and Health Standards." Washington, D.C. TN654.

33 CFR Part 320. 2004. *Code of Federal Regulations*, Title 33, *Navigation and Navigable Waters*, Part 320, "General Regulatory Policies." Washington, D.C. TN424.

33 CFR Part 332. 2012. *Code of Federal Regulations*, Title 33, *Navigation and Navigable Waters*, Part 332, "Compensatory Mitigation for Losses of Aquatic Resources." Washington, D.C. TN1472.

33 CFR Parts 320–332. 2014. *Code of Federal Regulations*, Title 33, *Navigation and Navigable Waters*, Part 320, "General Regulatory Policies" through Part 332, "Compensatory Mitigation for Losses of Aquatic Resources." Washington, D.C. TN4127.

36 CFR Part 800. 2012. *Code of Federal Regulations*, Title 36, *Parks, Forests, and Public Property*, Part 800, "Protection of Historic Properties." Washington, D.C. TN513.

40 CFR Part 50. 2012. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 50, "National Primary and Secondary Ambient Air Quality Standards." Washington, D.C. TN1089.

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Appendix A

Contributors to the Environmental Impact Statement

Appendix A

Contributors to the Environmental Impact Statement

The overall responsibility for the preparation of this environmental impact statement was assigned to the Office of New Reactors, U.S. Nuclear Regulatory Commission (NRC). The statement was prepared by members of the Offices of New Reactors with assistance from other NRC organizations, the U.S. Army Corps of Engineers, the National Park Service - Biscayne Bay and Everglades National Park, Pacific Northwest National Laboratory, and Information Systems Laboratories.

Name	Education/Expertise	Contribution
Nuclear Regulatory Commission		
Alicia Williamson	B.S. Biology and Chemistry; M.S. Environmental Science; 12 years relevant experience	Environmental Project Manager
Andrew Kugler	B.S., Mechanical Engineering; M.S. Technical Management; 14 years relevant experience	Alternatives, Environmental Project Manager
Tomeka Terry	M.S. Civil Engineering; 12 years relevant experience	Assistant Project Manager
Stacey Imboden	B.S. Meteorology; M.S. Environmental Engineering and Science; 13 years relevant experience	Meteorology , Air Quality, Climate Change
Kevin Quinlan	B.S. Meteorology; M.S. Atmospheric Science; 6 years relevant experience	Meteorology, Air Quality
Mohammad Haque	M.S. Civil Engineering; 35 years relevant experience	Surface Water Hydrology
Daniel Barnhurst	B.S. Environmental Geology; M.S. Geology 11 years relevant experience	Groundwater Hydrology, Geology
Michael Masnik	B.S. Conservation; M.S. and Ph.D. Zoology, 42 years relevant experience	Aquatic Ecology; Essential Fish Habitat
Robert Schaaf	B.S. Mechanical Engineering; 24 years relevant experience	Fuel Cycle
Peyton Doub	B.S. Plant Sciences; M.S. Plant Physiology; Professional Wetland Scientist; 27 years relevant experience	Terrestrial Ecology, Land Use, Transmission Lines
Daniel Mussatti	B.A. Economics; M.S. Natural Resource and Environmental Economics; 24 years relevant experience	Socioeconomics, Environmental Justice, Benefit-Cost, Need for Power
Jack Cushing	B.S. Marine Engineering; 30 years relevant experience	Archaeologist Historic and Cultural, Nonradiological Health and Waste

Name	Education/Expertise	Contribution
Donald Palmrose	M.S. and Ph.D. Nuclear Engineering; 30 years relevant experience	Radioactive Waste Management, Health Physics, Decommissioning, Fuel Cycle, Postulated Accidents, Transportation
Malcolm Patterson	B.S. Systems Engineering; 39 years relevant experience	Severe Accidents
Seshagiri Tammara	M.S. Chemical and Environmental Engineering; 40 years relevant experience	Demography, Transportation, Postulated Accidents
Charles Hinson	M.S. Nuclear Engineering / Health Physics; 40 years relevant experience	Construction Worker Dose, Radioactive Waste Management
Michelle Hart	B.S. Physics; M.S. Nuclear Engineering; 18 years relevant experience	Postulated Accidents
Zachary Gran	B.S. Physics; M.S. Radiological Health Physics; 5 years relevant experience	Radiological Health
Stephen Giebel	B.S. Health Physics; 31 years relevant experience	Decommissioning
U.S. Army Corps of Engineers		
Megan Clouser	B.S. Marine Science and Biology; 18 years relevant experience	Senior Project Manager
David Pugh	M.A. Historic Archaeology / History; 20 years relevant experience	Historic and Cultural Resources
National Park Service		
Elsa Alvear	M.S. Biology; 22 years relevant experience	Natural Resources; Environmental Impact Analysis
Sarah Bellmund	B.S. Biochemistry; M.A. Marine Sciences; 31 years relevant experience	Natural Resources; Environmental Impact Analysis; Ecology; Hydrology
Tylan Dean	B.S. Fishery and Wildlife Management; M.S. Wildlife Ecology and Conservation; 21 years relevant experience	Natural Resources; Ecology
Bryan Faehner	B.S. Environmental Policy; M.S. Environmental Studies; 10 years relevant experience	Natural Resources; Environmental Impact Analysis
Vanessa McDonough	Ph.D. Biology; 14 years relevant experience	Ecology
David Rudnick	Ph.D. Oceanography; 30 years relevant experience	Hydrology; Environmental Impact Analysis
Erik Stabenau	B.A. Chemistry; Ph.D. Marine and Atmospheric Chemistry; 16 years relevant experience	Climate Science
Pacific Northwest National Laboratory[(a)]		
Robert Bryce	B.S. Geology; M.S. Hydrology/ Hydrogeology; 36 years relevant experience	Task Leader
Sandra McInturff	B.S. Business; 35 years of relevant experience	Deputy Task Leader

Name	Education/Expertise	Contribution
Carmen Arimescu	B.S. and M.S. Computer Science; 30 years relevant experience	Comment Database
Terri Miley	B.S. and M.S. Mathematics; 27 years relevant experience	Comment Database
Tom Anderson	B.S. Botany; 41 years relevant experience	Alternatives
Jeffrey Ward	B.A. Zoology; M.S., Environmental Engineering; 25 years relevant experience	Aquatic Ecology
Corey Duberstein	B.S. Wildlife; M.S. Natural Resource Science; 20 years relevant experience	Terrestrial Ecology
Lara Aston	B.S. and M.S. Environmental Science; 15 years relevant experience	Nonradiological Health; Terrestrial Ecology
Michelle Niemeyer	B.S. and M.S. Agricultural Economics; 8 years relevant experience	Need for Power, Benefit Cost
Paul Thorne	B.S. Chemistry/Math; M.S. Hydrology; 34 years relevant experience	Groundwater Use, Hydrology
Steve Breithaupt	B.S. Aquatic Biology; M.S. Environmental Science; Ph.D., Water Resource Engineering; 34 years relevant experience	Surface Water Use, Hydrology
Lance Vail	B.S. Environmental Systems Engineering; M.S. Civil Engineering; 35 years relevant experience	Surface Water Use, Hydrology
Nancy Kohn	B.S. Freshwater Studies; 6 years relevant experience	Site Layout and Plant Description
Philip Daling	B.S. Physical Metallurgy; 33 years relevant experience	Transportation
Susan Loper	B.S. Biology; 13 years relevant experience	Geographic Information Systems
Susan Ennor	B.A. Journalism; 35 years relevant experience	Technical Editing and Text Processing
Cary Counts	B.S. Ceramic Engineering; M.S. Environmental Systems Engineering; 42 years relevant experience	Technical Editing and Text Processing
Mike Parker	B.A. English; 16 years relevant experience	Technical Editing and Text Processing
Heather Culley	B.S. Biology and Philosophy; M.A. Medical History and Ethics; 8 years relevant experience	Technical Editing and Text Processing
Christine Ross	A.A. Microcomputer Management/ Multimedia Specialist; B.A., Social Sciences; 19 years relevant experience	References, EARRTH
Susan Gulley	B.A. English/Library Science; 15 years relevant experience	References
Joanne Duncan	B.A. Biology; 15 years relevant experience	Reference Coordinator
Information Systems Laboratories		
Ali Azarm, IESS Corp[(b)]	B.S. Electrical Engineering; Ph.D. Nuclear Engineering; 15 years relevant experience	Severe and Design Basis Accidents
Alex Uriarte, ICF International[(b)]	M.S. Economics; PH.D. Development Studies; 15 years relevant experience	Socioeconomics, Environmental Justice

Name	Education/Expertise	Contribution
Ralph Grismala, ICF International[b]	M.S. Civil Engineering; 37 years relevant experience	Nonradioactive Waste, Fuel Cycle
Gregory Hofer, SC&A[b]	M.S. Physics; M.S. Nuclear Engineering; 33 years relevant experience	Health Physics, Radioactive Waste Management
Rose Gogliotti, SC&A[b]	B.S. Radiological Health; 6 years relevant experience	Health Physics
Abe Zeitoun, SC&A[b]	B.S. Chemistry and Zoology; M.S. Fisheries; Ph.D. Environmental Sciences; 40 years relevant experience	Radioactive Waste Management
Sally Zeff, ICF International[b]	M.A. Urban Planning; 30 years relevant experience	Land Use, Transmission Lines
Edward Carr, ICF International[b]	M.S. Atmospheric Science; 33 years relevant experience	Meteorology, Air Quality
Michael Bever, ICF International[b]	Ph.D. Anthropology; 20 years relevant experience	Historic and Cultural Resources
U.S. Geological Survey		
Gary Patterson		Hydrology

(a) Pacific Northwest National Laboratory is operated by Battelle for the U.S. Department of Energy.
(b) ICF International, Sandy Cohen & Associates (SC&A), and Innovative Engineering and Safety Solutions, LLC (IESS Corp) are subcontractors to Information Systems Laboratories (ISL).

Appendix B

Organizations Contacted

Appendix B

Organizations Contacted

The following Federal, State, regional, Tribal, and local organizations were contacted during the course of the U.S. Nuclear Regulatory Commission staff's independent review of potential environmental impacts from the construction and operation of two new nuclear units, Turkey Point Units 6 and 7, at the Turkey Point site in Miami-Dade County, Florida:

Organization Name, City, State

Advisory Council on Historic Preservation, Washington, D.C.

Archaeological and Historical Conservancy, Inc., Davie, Florida

Asian American Advisory Board

Assistant Director, Community Redevelopment Agency, City of Homestead, Florida

Centro Campesino, Florida City, Florida

City of Florida City, Florida City, Florida

City of Homestead, Homestead, Florida

City of Miami, Office of the City Attorney, Miami, Florida

City of South Miami, South Miami, Florida

Department of Health, Bureau of Radiation Control, Tallahassee, Florida

Director of Planning and Zoning, City of South Miami, Florida

Fish and Wildlife Services, South Florida Ecological Services Office, Vero Beach, Florida

Florida Department of Environmental Protection, Tallahassee, Florida

Florida Department of Environmental Protection, West Palm Beach, Florida

Florida International University, Miami, Florida

Florida Keys Aqueduct Authority, Key West, Florida

Florida State Historic Preservation Officer (SHPO), Tallahassee, Florida

Florida State House of Representatives, Tallahassee, Florida

Florida State Senate, Tallahassee, Florida

Florida Wildlife and Fisheries Conservation Commission, South Region Office, West Palm Beach, Florida

Historic Preservation Administrator, City of Coral Gables, Florida

Historic Preservation Officer, City of Miami, Florida

Homestead Housing Authority, Homestead, Florida

Miami-Dade County Community Action Agency, Miami, Florida

Miami-Dade County Department of Planning and Zoning, Miami, Florida

Miami-Dade County Department of Regulatory and Economic Resources, formerly DERM, Miami, Florida

Miami-Dade County Office of Historic and Archaeological Resources, Miami, Florida

Miami-Dade County Permitting, Environment, and Regulatory Affairs, Miami, Florida

Miami-Dade County Planning, Miami, Florida

Miami-Dade County Public Schools, Miami, Florida

Miami-Dade Office of Community Advocacy, Miami, Florida

Miami-Dade Water and Sewer Department, Miami, Florida

Miccosukee Tribe of Indians of Florida, Miami, Florida

Monroe County, Key West, Florida

Muscogee (Creek) Nation, Okmulgee, Oklahoma

NGO Sembrando Flores, Homestead, Florida

NMFS, Southeast Regional Office, Saint Petersburg, Florida

South Florida Water Management District, Hydrogeology Section, Water Supply, Palm Beach, Florida

Stephen P. Clark Center, Miami, Florida

Town of Cutler Bay, Cutler Bay, Florida

Tribal Historic Preservation Officer (THPO), Poarch Band of Creek Indians, Atmore, Alabama

Tribal Historic Preservation Officer (THPO), Seminole Nation of Oklahoma, Wewoka, Oklahoma

Tribal Historic Preservation Officer (THPO), Seminole Tribe of Florida, Clewiston, Florida

U.S. Department of Homeland Security, Federal Emergency Management Agency, Region IV, Atlanta, Georgia

U.S. Environmental Protection Agency, Region 4, Atlanta, Georgia

U.S. Geological Survey, Fort Lauderdale, Florida

U.S. House of Representatives, Washington, D.C.

U.S. Interior Fish and Wildlife Services, South Florida Ecological Services Office, Vero Beach, Florida

U.S. National Marine Fisheries Services, Southeast Regional Office, St. Petersburg, Florida

U.S. National Park Service, Biscayne National Park, Homestead, Florida

U.S. National Park Service, Everglades National Park, Homestead, Florida

U.S. Senate, Washington, D.C.

Village of Pinecrest, Pinecrest, Florida

Appendix C

NRC and USACE Environmental Review Correspondence

Appendix C

NRC and USACE Environmental Review Correspondence

This appendix contains a chronological list of correspondence between the U.S. Nuclear Regulatory Commission (NRC) or the U.S. Army Corps of Engineers (USACE) and Florida Power and Light Company (FPL). Other correspondence related to the environmental review of FPL's application for combined construction permits and operating licenses (COLs) and a USACE permit at the Turkey Point Nuclear site in Miami-Dade County, Florida, is also included.

All documents, with the exception of those containing proprietary information, are available electronically from the Public Electronic Reading Room found on the Internet at the following web address: www.nrc.gov/reading-rm.html. From this website, the public can gain access to the NRC's Agencywide Documents Access and Management System (ADAMS), which provides text and image files of NRC's public documents. The ADAMS accession number or *Federal Register* citation for each document is included within the parenthesis following the reference.

November 10, 2008	NRC trip report for readiness assessment (C-1) visit for a future combined license application at the Turkey Point site (ML082880307).
April 15, 2009	NRC trip report for readiness assessment (C-2/C-3) visit for a future combined license application at Turkey Point site (ML090850294).
May 15, 2009	NRC trip report for readiness assessment (C-2) visit for a future combined license application at Turkey Point site (ML091320137).
June 4, 2009	NRC trip report for pre-application visit with regulatory agencies related to a future combined license application at the Turkey Point site (ML091470726).
June 30, 2009	FPL letter submitting an application for a combined license for Units 6 and 7 at the Turkey Point site (ML091830589).
July 23, 2009	Letter from NRC to FPL acknowledging receipt of the COL application for Turkey Point Units 6 and 7 (ML091890130).
August 3, 2009	Federal Register notice of receipt and availability of application for a combined license for Turkey Point (ML092590051).
August 7, 2009	Letter from FPL to NRC providing meteorological information for the Turkey Point COL application (ML092250585).
September 4, 2009	Letter from NRC to FPL accepting for docketing the COL application for Turkey Point Units 6 and 7 (ML092380248).

September 16, 2009	Letter from the County of Monroe, Florida, requesting NRC to keep it informed of activities related to the NRC staff's review of the COL application for Turkey Point Units 6 and 7 (ML092750383).
October 1, 2009	FPL letter to NRC providing schedule for response to NRC staff's requests for additional information (ML092810318).
October 7, 2009	Federal Register notice of acceptance for docketing of an application for a combined license for Turkey Point Units 6 and 7 (ML092860057).
November 10, 2009	FPL letter to NRC withdrawing the request for a limited work authorization (ML093170513).
November 25, 2009	Letter from NRC to Ms. Susan Grimsley, Assistant County Attorney, County of Monroe, Florida, Acknowledging Receipt of the Letter from County of Monroe Proposal (Accession No. ML092960671).
November 25, 2009	Letter from NRC to Mr. David S. Hobbie, Chief Regulatory Division, U.S. Army Corps of Engineers, NRC's Environmental Impact Statement for FPL Combined License Application for Turkey Point, units 6 and 7 (ML092610207).
December 10, 2009	Letter from Mr. Donald Kinard, Chief Regulatory Division, U.S. Army Corps of Engineers, agreeing to become a cooperating agency for the environmental impact statement for FPL combined license application for Turkey Point, Units 6 and 7 (ML093520690).
January 4, 2010	Letter from NRC to Ms. Zelda Ryles, Manager, South Dade Regional Library, Regarding Maintenance of Document at the South Dade Regional Library Related to Combined License Application for Turkey Point, Units 6 and 7 (ML092610278).
January 4, 2010	Letter from NRC to Ms. Pamela Hogue, Manager, Homestead Branch Library, Regarding Maintenance of Document at the Homestead Branch Library Related to Combined License Application for Turkey Point, Units 6 and 7 (ML092610521).
May 28, 2010	Letter from NRC to Mr. M. Nazar, FPL, Providing the Turkey Point Units 6 and 7 Nuclear Power Plants Combined License Application Review Schedule (ML101310404).
June 9, 2010	Letter from NRC to Mr. W. Maher, FPL, Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Related to a Combined License Application for Turkey Point, Units 6 and 7 (ML101580552).

June 14, 2010	Letter from NRC to Mr. M. Nazar, FPL, Florida Power & Light – Application for a Combined License for the Turkey Point Nuclear Power Plant Units 6 and 7; the Notice of Hearing, Opportunity to Petition for Leave to Intervene, and Associated Order (ML101400547).
June 18, 2010	Federal Register Notice, Florida Power & Light Company, Combined License Application for the Turkey Point Units 6 and 7, Notice of Hearing, Opportunity to Petition for Leave to Intervene and Associated Order Imposing Procedures for Access to Sensitive Unclassified Non-Safeguards Information and Safeguards Information for Contention Preparation (ML102370715).
June 18, 2010	Letter from NRC to Ms. N. Linehan, Florida Wildlife and Fisheries Conservation Commission, Request for Participation in the Scoping Process and List of State Listed Protected Species for the Environmental Review for the Turkey Point Units 6 and 7 Combined License Application Review (ML101610556).
June 23, 2010	Letter from NRC to Mr. R. Nelson, Advisory Council on Historic Preservation, Request for Participation in the Scoping Process for the Turkey Point Units 6 and 7 Combined License Application Review (ML101610537).
June 23, 2010	Letter from NRC to Mr. P. Souza, U.S. Fish and Wildlife Service, Notification and Request for Consultation and Participation in the Environmental Scoping Process and a List of Protected Species within the Area Under Evaluation for the Turkey Point Units 6 and 7 Combined License Application Review (ML101610560).
June 23, 2010	Letter from NRC to Dr. R. Crabtree, National Marine Fisheries Service, Notification and Request for Consultation and Participation in the Environmental Scoping Process and a List of Protected Species within the Area Under Evaluation for the Turkey Point Units 6 and 7 Combined License Application Review (ML101610565).
June 24, 2010	Letter from NRC to Those on the Attached List, Request for Participation in the Scoping Process for the Turkey Point Units 6 and 7 Combined License Application Review (ML101610568).
June 24, 2010	Letter from NRC to Mr. S. Terry, Miccosukee Tribe of Indians of Florida, Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the Turkey Point Units 6 and 7 Combined License Application (ML101690501).

June 24, 2010	Letter from NRC to Ms. J. Bear, Muscogee (Creek) Nation, Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the Turkey Point Units 6 and 7 Combined License Application (ML101690496).
June 24, 2010	Letter from NRC to Mr. R. Thrower, Poarch Band of Creek Indians, Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the Turkey Point Units 6 and 7 Combined License Application (ML101690503).
June 24, 2010	Letter from NRC to Mr. W. Steele, Seminole Tribe of Florida, Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the Turkey Point Units 6 and 7 Combined License Application (ML101690499).
June 24, 2010	Letter from NRC to Ms. N. Deere, Seminole Nation of Oklahoma, Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the Turkey Point Units 6 and 7 Combined License Application (ML101690497).
June 29, 2010	Letter from NRC to Ms. L. Kammerer, Florida Deputy State Historic Preservation Officer, Notification and Request for Consultation and Participation in the Environmental Scoping Process for the Environmental Review of the Turkey Point Units 6 and 7 Combined License Application (ML101690480).
June 29, 2010	Notice of Public Scoping Meeting for the Turkey Point Units 6 and 7 Combined License (ML101690484).
July 1, 2010	Letter from NRC to Mr. R. Carr, Archaeological and Historical Conservancy, Inc., Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the Turkey Point Units 6 and 7 Combined License Application (ML101690462).
July 1, 2010	Letter from NRC to Ms. K Kauffman, Miami-Dade Office of Historic & Archaeological Resources, Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the Turkey Point Units 6 and 7 Combined License Application (ML101690468).
July 1, 2010	Letter from NRC to Ms. E. Uguccioni, Historic Preservation Officer, City of Miami, Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the Turkey Point Units 6 and 7 Combined License Application (ML101690472).

July 1, 2010	Letter from NRC to Ms. S. Chin, Historic Preservation Administrator, City of Coral Gables, Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the Turkey Point Units 6 and 7 Combined License Application (ML101730494).
July 1, 2010	Letter from NRC to Mr. D. Wick, Assistant Director of Community Redevelopment Agency, City of Homestead, Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the Turkey Point Units 6 and 7 Combined License Application (ML101730511).
July 1, 2010	Letter from NRC to Mr. S. Youkilis, Director of Planning and Zoning, City of South Miami, Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the Turkey Point Units 6 and 7 Combined License Application (ML101730515).
July 1, 2010	Letter from NRC to Those on the Attached List, Invitation to a Government-to-Government Meeting for the Turkey Point Units 6 and 7 Combined License Application Environmental Review (ML101800575).
July 8, 2010	Letter from Ms. C. Hall, Advisory Council on Historic Preservation, to NRC, Regarding Florida Power and Light’s Application for Two New Nuclear Power Plants, Turkey Point Site, Homestead, Florida (ML101900325).
July 28, 2010	Letter from Ms. L. Kammerer, Florida Division of Historical Resources, to NRC, Providing Scoping Comments Regarding Cultural Resources (ML102220345).
August 5, 2010	Letter from Mr. M. Croom, National Marine Fisheries Service, to NRC, Providing Scoping Comments and Information Supporting Consultation Under the Endangered Species Act and the Magnuson-Stevens Act (ML102320025).
August 12, 2010	Letter from Ms. K. Kauffman, Miami-Dade Office of Historic & Archaeological Resources, to NRC, Providing Scoping Comments and Accepting the NRC Invitation to Consult (ML102390102).
August 16, 2010	Letter from Ms. M. Poole, Florida Fish and Wildlife Conservation Commission, to NRC, Providing Scoping Comments and a List of Species (ML102280488).

August 30, 2010	Memorandum, Summary of July 22, 2010, Category 1 Public Teleconference with the Florida Power and Light Company to Discuss Environmental Information Needs for the Turkey Point Units 6 and 7 Combined License Application (ML102150618).
August 31, 2010	Memorandum, Summary of July 15, 2010, Public Meetings to Support the Review of the Turkey Point Units 6 and 7 Combined License Application (ML102080607).
August 31, 2010	Letter from NRC to Mr. W. Maher, FPL, Turkey Point Units 6 and 7 Combined License Application Online Reference Portal (ML102320391).
September 3, 2010	Letter from Mr. M. Nazar, FPL, to NRC, Submittal of Annual Update to the COL Application – Revision 1, and the Semiannual Update of the Departures Report (ML102570371).
September 14, 2010	Letter from Ms. A. Mullins, Seminole Tribe of Florida, to NRC, Assessment of Effects for the Proposed Construction of Two Additional Nuclear Reactors at Turkey Point, Miami-Dade County, Florida (ML102660296).
September 21, 2010	Memorandum, Summary of the Environmental Site Audit Related to the Review of the Combined License Application for Turkey Point Units 6 and 7 (ML101880784).
October 21, 2010	Memorandum, Summary of the Environmental Alternative Sites Audit Related to the Review of the Combined License Application for Turkey Point Units 6 and 7 (ML102660659).
November 1, 2010	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, NRC June 2010 Environmental Audit, Supplemental Information Request Response 1 (ML103080837).
November 1, 2010	Summary of September 29, 2010, Teleconference Between NRC and the Miami-Dade Water and Sewer Department Regarding Use of Treated Wastewater for Turkey point Units 6 and 7 (ML103490981).
November 5, 2010	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Combined License Application Online Reference Portal (ML103130133).
November 16, 2010	Memorandum, Summary of the November 2, 2010, Teleconference between NRC and EPA Regarding Emerging Pollutants of Concern in Cooling Water (ML110050170).
December 1, 2010	Memorandum, Scoping Summary Report Related to the Environmental Scoping Process for the Turkey Point Units 6 and 7 Combined License Application (ML103130609).

December 8, 2010	Summary of the October 20, 2010, Meeting between the Seminole Tribe of Florida, the U.S. Army Corps of Engineers, and the NRC to Discuss Issues Related to Cultural Resources (ML103420623).
December 15, 2010	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, NRC June 2010 Environmental Audit, Supplemental Information Request Response 2, Part 1 (ML103540248).
December 15, 2010	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, NRC June 2010 Environmental Audit, Supplemental Information Request Response 2, Part 2 (ML103560533).
December 21, 2010	Letter from Mr. M. Nazar, FPL, to NRC, Early Submittal of Annual Update to the COL Application – Revision 2, and the Semiannual Update of the Departures Report (ML103630059).
January 11, 2011	Memorandum, Summary of October 26, 2010, Teleconference with Dr. G. Rand, Florida International University, Regarding Reclaimed Water Quality and Toxicology Testing (ML110200187).
February 1, 2011	Email Forwarding U.S. Army Corps of Engineers Request for Additional Information Related to Site Selection (ML110330126).
February 28, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, NRC June 2010 Environmental Audit, Submittal of Groundwater Model Development and Analysis: Units 6 and 7 Dewatering and Radial Collector Well Simulations, Revision 1 (ML110610723).
March 1, 2011	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 1102231 Related to ESRP Section 2.7, Cultural Resources, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML110601020).
March 1, 2011	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 1102232 Related to ESRP Section 9.3.1, Site Selection Process, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML110601062).
March 1, 2011	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 1102233 Related to ESRP Section 3.1, External Appearance and Plant Layout, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML110601071).

March 7, 2011	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 1103071 Related to ESRP Section 5.7, Meteorological and Air Quality Impacts, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML110660019).
March 9, 2011	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 1103091 Related to ESRP Section 5.3.4, Non-Radiological Health, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML110680020).
March 9, 2011	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 1103092 Related to ESRP Section 3.4.4, Nonradioactive Waste Systems, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML110680022).
March 9, 2011	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 1103093 Related to ESRP Section 2.2, Land Use, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML110680053).
March 9, 2011	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 1103094 Related to ESRP Section 9.3, Alternative Sites, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML110680062).
March 10, 2011	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 1103101 Related to ESRP Section 2.4.1, Terrestrial and Wetlands Ecology, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML110690002).
March 10, 2011	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 1103102 Related to ESRP Section 2.5, Socioeconomics, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML110690003).
March 11, 2011	Letter from NRC to Mr. D. Vela, National park Service, Invitation to Become a Cooperating Agency for the U.S. Nuclear Regulatory Commission’s Environmental Impact Statement for the Florida Power and Light Company Combined License Application for Turkey Point Units 6 and 7, Miami-Dade County, Florida (ML102030501).
March 14, 2011	Memorandum, Summary of February 24, 2011, Category 3 Public Meeting with the Florida Power and Light Company to Discuss the Revised Groundwater Model for the Turkey Point Units 6 and 7 Combined License Application (ML110620735).

March 14, 2011	Letter from NRC to Mr. M. Nazar FPL Environmental Request for Additional Information Letter 120316 Related to ESRP Section 9.3-US Army Corps of Engineers, For the Combined License Application Review for Turkey Point, Units 6 and 7 (ML12074A005).
March 17, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information eRAI 5340, Revision 1, U.S. Army Corps of Engineers for Application Section 9.3 (ML110820044).
March 17, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, NRC June 2010 Environmental Audit, Submittal of Groundwater Flow Model (MODFLOW) Calculation Revision 4 Input/Output Files (ML110830787).
April 6, 2011	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 1104071 Related to ESRP Section 9.3.1, Site Selection Process, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML110960520).
April 6, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1103094 (RAI 5563), Environmental Standard Review Plan Section 9.3, Alternative Sites (ML110980612).
April 12, 2011	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 1104121 Related to ESRP Section 9.3, Alternative Sites, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML111010357).
April 15, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1102231 (RAI 5480), Environmental Standard Review Plan Section 2.7, Cultural Resources (ML111090274).
April 15, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1102232 (RAI 5481), Environmental Standard Review Plan Section 9.3.1, Site Selection Process (ML111080761).

April 15, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1102233 (RAI 5482), Environmental Standard Review Plan Section 3.1, External Appearance and Plant Layout (ML11108A146).
April 20, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1103071 (RAI 5498), Environmental Standard Review Plan Section 5.7, Meteorological and Air Quality Impacts (ML111170331).
April 21, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1103092 (RAI 5595), Environmental Standard Review Plan Section 3.4.4, Non-Radioactive Waste Systems (ML11122A054).
April 22, 2011	Letter from Mr. D. Vela, National Park Service, Southeast Regional Office, to Mr. S. Flanders, NRC, Accepting the NRC Invitation to Become a Cooperating Agency on the Turkey Point, Units 6 and 7, Environmental Impact Statement (ML111160378).
April 25, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1103093 (RAI 5561), Environmental Standard Review Plan Section 2.2, Land Use (ML11116A160).
April 25, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1103091 (RAI 5594), Environmental Standard Review Plan Section 5.3.4, Non-Radiological Health (ML11116A161).
April 26, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1103102 (RAI 5570), Environmental Standard Review Plan Section 2.5, Socioeconomics (ML11118A177).
April 26, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1103101 (RAI 5562), Environmental Standard Review Plan Section 2.4.1, Terrestrial and Wetlands Ecology (ML111180713).

April 27, 2011	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 1104271 Related to ESRP Section 1.5, Compliance and Consultations, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML111170533).
May 4, 2011	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 1105042 Related to ESRP Section 2.4.2, Aquatic Ecology, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML111240011).
May 4, 2011	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 1105043 Related to ESRP Section 4.3.2, Aquatic Impacts, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML111240013).
May 4, 2011	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 1105041 Related to ESRP Section 9.3, Alternative Sites, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML111230733).
May 5, 2011	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 1105051 Related to ESRP Section 8.4, Assessment of Need for Power, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML111240406).
May 18, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Audit Data and Information Needs AQ-4, H-13, H-23, H-31, H-34, H-35, H-38, H-40, NR-6 (ML11143A090).
May 23, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, First (Partial) Response to NRC Environmental Request for Additional Information Letter 1104071 (RAI 5588), Environmental Standard Review Plan Section 9.3.1, Alternative Site Selection Process (ML11145A041).
May 27, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, First (Partial) Response to NRC Environmental Request for Additional Information Letter 1104121 (RAI 5589), Environmental Standard Review Plan Section 9.3.1, Alternative Site Selection Process (ML11151A198).
June 3, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1104271 (RAI 5699), Environmental Standard Review Plan Section 1.5, Compliance and Consultations (ML11157A123).

June 10, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1105041 (RAI 5708), Environmental Standard Review Plan Section 9.3, Alternative Sites (ML11165A034).
June 13, 2011	Email from NRC to Mr. W. Maher, FPL, Turkey Point Environmental – Final RAI EIS 9.4 (RAI No. 5770) – System Design Alternatives (ML11175A140).
June 14, 2011	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 110614 Related to ESRP Section 3.2.2, Structures with a Major Environmental Interface, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML111650769).
June 14, 2011	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 110614 Related to ESRP Section 2.3, Water, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML111650597).
June 14, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1105042 (RAI 5704), Environmental Standard Review Plan Section 2.4.2, Aquatic Ecology (ML11168A043).
June 20, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1105043 (RAI 5707), Environmental Standard Review Plan Section 4.3.2, Aquatic Impacts (ML11172A285).
June 20, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1105051 (RAI 5565), Environmental Standard Review Plan Section 8.4, Assessment of Need for Power (ML11178A015).
July 7, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1103101 (RAI 5562), Environmental Standard Review Plan Section 2.4.1, Terrestrial and Wetlands Ecology (ML11195A164).

July 7, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1103093 (RAI 5561), Environmental Standard Review Plan Section 2.2, Land Use (ML11192A042).
July 11, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Revised Schedule for Response to NRC Environmental Request for Additional Information Letter 1104071 (RAI 5588), Environmental Standard Review Plan Section 9.3.1, Alternative Site Selection Process (ML11194A007).
July 27, 2011	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 1107271 Related to ESRP Section 5.2, Water Related Impacts, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML112081475).
July 28, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 2011001 (RAI 5770), Environmental Standard Review Plan Section 9.4, System Design Alternatives (ML11213A095).
July 29, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 110614 (RAI 5764), Environmental Standard Review Plan Section 3.2.2, Structures with a Major Environmental Interface (ML11214A031).
July 29, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 110614 (RAI 5763), Environmental Standard Review Plan Section 2.3, Water (ML11214A032).
August 8, 2011	Letter from Mr. P. Kruger, U.S. Army Corps of Engineers, to Ms. F. Braun, Florida Power & Light Company, Regarding an Alternative to the Western Transmission Line Corridor (ML112690006).
August 17, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Revised Schedule for Response to NRC Environmental Request for Additional Information Letter 1104121 (RAI 5589), Environmental Standard Review Plan Section 9.3, Alternative Sites (ML11231A239).

August 30, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 110614 (RAI 5763), Environmental Standard Review Plan Section 2.3, Water (ML11243A165).
September 1, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1104071 (RAI 5588), Environmental Standard Review Plan Section 9.3.1, Alternative Site Selection Process (ML11250A130).
September 2, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information RAI 5340 Revision 1 Standard Review Plan Section: EIS USACE – U.S. Army Corps of Engineers for Application Section: 9.3 (ML11250A052).
September 2, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1103094 (RAI 5563), Environmental Standard Review Plan Section 9.3 - Alternative Sites (ML11251A209).
September 6, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 110614 (RAI 5763), Environmental Standard Review Plan Section 2.3, Water (ML11251A168).
September 12, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1107271 (RAI 5767), Related to ESRP Section 5.2, Water Related Impacts (ML11257A133).
September 13, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Revised Schedule for Response to NRC Environmental Request for Additional Information Letter 1104121 (RAI 5589), Environmental Standard Review Plan Section 9.3, Alternative Sites (ML11258A158).
September 13, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 110614 (RAI 5763), Environmental Standard Review Plan Section 2.3, Water (ML11258A156).

September 13, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1104071 (RAI 5588), Environmental Standard Review Plan Section 9.3.1, Alternative Site Selection Process (ML11258A155).
September 30, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1104121 (RAI 5589), Environmental Standard Review Plan Section 9.3, Alternative Sites (ML11276A099).
October 27, 2011	Letter from NRC to Mr. M. Nazar, FPL, Issuance of a Revised Review Schedule for the Combined License Application Review for Turkey Point, Units 6 and 7 (ML111040122).
November 10, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information RAI 5340, Standard Review Plan Section: EIS USACE – US Army Corps of Engineers, Application Section 9.3 (ML113190089).
November 10, 2011	Letter from Mr. W. Maher, FPL, to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Revised Schedule for Response to NRC Environmental Request for Additional Information Letter 110614 (RAI 5763) Environmental Standard Review Plan Section 2.3 - Water (ML11318A323).
December 8, 2011	Letter from NRC to Mr. M. Nazar, FPL Environmental Request for Additional Information Letter 1112081 Related to ESRP Section 4.2. Water-Related Impacts, for the Combined License Application Review for Turkey Point, Units 6 and 7 (ML113420010).
December 14, 2011	Letter from Mr. W. Maher, FPL to NRC eRAI Letter 1112081 Related to ESRP Section 4.2, Water-related Impacts, For the COL application review for Turkey Point, Units 6 and 7 (ML11350A197).
January 23, 2012	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter 1112082 (RAI 5769) Related to ESRP Section 9.3 – Alternative Sites (ML12025A266).
January 23, 2012	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter 1112081 (RAI 5765) Related to ESRP Section 4.2 – Water-Related Impacts (ML12025A263).

March 7, 2012	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter 110614, ESRP Section 2.3, Water
March 13, 2012	Letter from NRC, NRC to Mr. M.K. Nazar, FPL, Environmental Request for Additional Information Letter 120316 Related to ESRP Section 9.3 -US Army Corps of Engineers, for the Combined License Application Review for Turkey Point, Units 6 and 7 (ML12074A005).
March 21, 2012	Letter from NRC to Mr. M.K. Nazar, FPL, Environmental Request for Additional Information Letter 122103 Related to ESRP Section 5.2, Water Related Impacts for Combined License Application Review for Turkey Point, Units 6 and 7 (ML12081A068).
March 22, 2012	Letter from NRC to Mr. M.K. Nazar, FPL, Environmental Request for Additional Information Letter 122203 Related to Environmental Standard Review Plan Section 7.2, Water Use and Quality, for the Combined License Application Review for Turkey Point, Units 6 and 7 (ML12081A238).
April 3, 2012	Letter from NRC to Mr. M. K. Nazar, FPL, Environmental Request for Additional Information Letter 120329 Related to Environmental Standard Review Plan Section 2.3.1 Hydrology, for the Combined License Application Review for Turkey Point, Units 6 and 7 (ML12089A145).
April 4, 2012	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 120403 Related to Environmental Standard Review Plan Section 5.8.1 Etiological Agents, for the Combined License Application Review for Turkey Point, Units 6 and 7 (ML1209A302).
April 26. 2012	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company, Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter 120316 (RAI 6347 Rev.1) Related to ESRP Section 9.3- US Army Corps of Engineers (ML12121A365).
May 4, 2012	Letter from NRC to Mr. M.K Nazar, FPL, Turkey Point Units 6 and 7 Combined License Application Review Schedule (ML120740390).
May 7, 2012	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company Proposed Turkey Point Units 6 and 7, Response Schedule for NRC Request for Additional Information Letter 122103 (RAI 5766 Rev. 2) Related to ESRP Section 5.2 - Water Related Impacts (ML1213A166).

May 10, 2012	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 120510 Related to Environmental Standard Review Plan Section 5.2 Water Related Impacts for the Combined License Application Review for Turkey Point, Units 6 and 7 (ML12122A886).
May 11, 2012	Letter from Mr. M. Nazar, FPL, Florida Power and Light Company, Response to NRC COLA Review Schedule Letter dated May 4, 2012 (ML12156A420).
May 21, 2012	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter 122103 (RAI 5766 Rev. 2) Related to ESRP Section 5.2 - Water Related Impacts (ML1214A357).
May 21, 2012	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company Proposed Turkey Point Units 6 and 7, 10 CFR 52.3 Response to NRC Request for Additional Information Letter 120403 (RAI 6350 Rev. 1) Related to ESRP Section 5.8.1 - Etiological Agents (ML12143A356).
June 25, 2012	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company Proposed Turkey Point Units 6 and 7, 10 CFR 52.3 Response to NRC Request for Additional Information Letter 120510 (RAI 6384 Rev. 1) Related to ESRP Section 5.2 - Water Related Impacts (ML12178A552).
June 25, 2012	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company Proposed Turkey Point Units 6 and 7, NRC June 2010 Environmental Audit Revised Supplemental Information Request Response 2 Part 2 (ML12178A553).
June 29, 2012	Letter from Mr. R. Braun, South Florida Water Management District to NRC, Florida Power and Light Combined License Application for Turkey Point Units 6 and 7 – Water Availability at Alternative Sites (ML1219A171).
July 12, 2012	Notice of Forthcoming Public Teleconference to Discuss the Environmental Review Related to Florida Power and Light's Turkey Point Units 6 and 7, Combined License Application (ML12194A143).
July 18, 2012	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter 120329, Related to ESRP Section 2.3.1-Hydrology (ML12202A068).
July 30, 2012	Memorandum, Summary Meeting with South Florida Water Management District Related to the Alternative Sites for the Proposed Turkey Point Units 6 and 7 Environmental Review (ML12205A348).

August 18, 2012	Memorandum, Summary of Meeting with Florida Power and Light to Discuss the Environmental Review Related to Turkey Point Units 6 and 7 Combined License Application – Socioeconomics (ML12221A192).
August 20, 2012	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter 120329, Related to ESRP Section 2.3.1-Hydrology (ML12234A549).
August 30, 2012	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 120830 Related to Environmental Standard Review Plan Section 9.3.1 Alternative Site Selection, for the Combined License Application Review for Turkey Point, Units 6 and 7 (ML12242A329).
October 17, 2012	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company Proposed Turkey Point Units 6 and 7, Supplemental Response to NRC Request for Additional Information Letter 120329 Related to ESRP Section 2.3.1- Hydrology (ML12293A236).
November 14, 2012	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 121114 Related to the Environmental Standard Review Plan Section 9.3.1 Alternative Site Selection, for the Combined License Application Review for Turkey Point, Units 6 and 7 (ML12346A225).
November 15, 2012	Notice of Forthcoming Public Meeting to Discuss Environmental Requests for Additional Information Draft Responses Relating to the Alternative Sites Selection Process for Florida Power and Light's Turkey Point Units 6 and 7 Combined License Application (ML12310A157).
December 12, 2012	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter 120830, Related to ESRP Section 9.3.1-Alternative Site Selection (ML12349A243).
January 3, 2013	Memorandum, Summary of the Public Meeting to Discuss Environmental Requests for Additional Information Draft Responses Relating to the Alternative Site Selection Process For Florida Power and Light's Turkey Point Units 6 and 7 Combined License Application (ML12352A203).
January 10, 2013	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter 120830, eRAI 6353 Rev 2, Related to ESRP Section 9.3.1-Alternative Site Selection (ML13011A348).

January 17, 2013	Notice of Forthcoming Public Teleconference to Follow up on Action Items from the December 7, 2012, Public Meeting Relating to the Alternative Sites Selection Process for Florida Power and Light's Turkey Point Units 6 and 7 Combined License Application (ML13002A490).
February 6, 2013	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter 120830, Related to ESRP Section 9.3.1-Alternative Site Selection (ML13039A018).
February 12, 2013	Letter from Mr. W. Maher, FPL to NRC, Florida Power and Light Company Proposed Turkey Point Units 6 and 7, Status of Actions to Address NRC COLA Review Schedule Letter dated May 4, 2012 (ML13044A567).
February 13, 2013	Letter from NRC to Mr. M. Nazar, FPL, Follow-up Questions to Environmental Requests for Additional Information 6353 Question 3 Related to ESRP Section 9.3.1 Alternative Site Selection, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML13042A155).
February 25, 2013	Memorandum, Summary of Public Teleconference to Discuss Environmental Requests for Additional Information Draft Responses Relating to the Alternative Site Selection Process for Florida Power and Light's Turkey Point Units 6 and 7 Combined License Application (ML13051A425).
February 28, 2013	Letter from NRC to Mr. M.K Nazar, FPL, Turkey Point Units 6 and 7 Combined License Application Review of Alternative Sites (ML13036A340).
March 13, 2013	Letter from NRC to Mr. M. Nazar, FPL, Environmental Requests for Additional Information Letter 120316 Related to ESRP Section 9.3-US Army Corps of Engineers, for the Combined License Application Review for Turkey Point Units 6 and 7 (ML12074A005).
March 26, 2013	Letter from Mr. R. Orthen, FPL to NRC Florida Power and Light Company Proposed Turkey Point Units 6 and 7, Supplemental Response to NRC Request for Additional Information Letter 120329, Related to ESRP Section 2.3.1- Hydrology (ML13127A052).
April 2, 2013	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company Proposed Turkey Point Units 6 and 7, Relocation Changes for the Combined License Application, Part 3 Environmental Report, Subsection 3.9, Preconstruction and Construction Activities (ML13093A409).

April 18, 2013	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company Proposed Turkey Point Units 6 and 7, Supplemental Response to NRC Request for Additional Information Letter 120830, Related to ESRP Section 9.3.1- Alternative Site Selection Process (ML13109A431).
May 10, 2013	Notice of Forthcoming Meeting to Discuss Environmental Requests for Additional Information Draft Responses Relating to the Alternative Sites Selection Process for Turkey Point Units 6 and 7 Combined License Application (ML13130A327).
June 19, 2013	Memorandum, Summary of Public Meeting to Discuss the Environmental Review for Florida Power and Light's Turkey Point Units 6 and 7 Combined License Application (ML13158A220).
July 8, 2013	Letter from Mr. W. Maher, FPL to NRC, Florida Power and Light Company Proposed Turkey Point Units 6 and Supplemental Response to NRC Request for Additional Information Letter 120830, Related to ESRP Section 9.3.1- Alternative Site Selection (ML13196A063).
July 8, 2013	Letter from Mr. W. Maher, FPL to NRC, Florida Power and Light Company Proposed Turkey Point Units 6 and Supplemental Response to NRC Request for Additional Information Letter 121114, Related to ESRP Section 9.3.1- Alternative Site Selection (ML13196A064).
September 11, 2013	Letter from Mr. M. Raffenberg, FPL to US Army Corps of Engineers, Regarding Requests for Additional Information for a Department of the Army Permit, Assigned Number SAJ-2009-02417, Turkey Point Units 6 and 7 Project (ML15037A237).
October 9, 2013	Letter from NRC to Mr. M. Nazar, FPL, Environmental Request for Additional Information Letter 131009 Related to the Environmental Standard Review Plan Section 9.3.1 Alternative Site Selection, for the Combined License Application Review for Turkey Point, Units 6 and 7 (ML13280A543).
November 1, 2013	Notice of Forthcoming Public Meeting to Discuss the Alternative Sites Selection Analysis for Florida Power and Light's Turkey Point Units 6 and 7 Combined License Application (ML13301A630).
November 25, 2013	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter 131009, Related to ESRP Section 9.3-Alternative Site Selection Process (ML13330B668).
December 13, 2013	Memorandum, Summary of Public Meeting Discussing the Alternative Sites Selection Process for Florida Power and Light's Turkey Point Units 6 and 7 Combined License Application (ML13343A323).

April 17, 2014	Letter from NRC to Mr. M.K Nazar, FPL, Turkey Point Units 6 and 7 Combined License Application Environmental Review of Alternative Sites and Schedule Updates (ML14065A577).
June 4, 2014	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company Proposed Turkey Point Units 6 and 7, Supplemental Response to NRC Request for Additional Information Letter No. 72, Liquid Waste Management Systems (ML14156A393).
June 12, 2014	Notice of Forthcoming Public Teleconference to Discuss Potential Construction Noise Impacts to Aquatic Ecology Relating to the Florida Power and Light Turkey Point Units 6 and 7 Combine License Application (ML14163A426).
June 18, 2014	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company Proposed Turkey Point Units 6 and 7, Supplemental Response to NRC Request for Additional Letter No .080, Related to SRP Section 20.01.03 Population Density (ML14188C484).
July 22, 2014	Memorandum, Summary of the June 23, 2014, Public Teleconference to Discuss Potential Aquatic Ecology Construction Impacts as a Result of the Florida Power and Light's turkey Point Units 6 and 7 Combined License Application (ML14211A534).
August 12, 2014	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company Proposed Turkey Point Units 6 and 7, Construction Noise and Vibration Aquatic Impacts Assessment Report for the Combined License Application Part 3, Environmental Report (ML14226A013).
October 22, 2014	Letter from Mr. W. Maher, FPL to NRC, Florida Power & Light Company Proposed Turkey Point Units 6 and 7, Supplemental Response to NRC Request for Additional Information Letter No. 031, Standard Review Plan Section 12.03-12.04, Radiation Protection Design Features (ML14303A671).
November 14, 2014	Memorandum, Supplemental Site Audit Summary Related to the Environmental Review of the Proposed Turkey Point Nuclear Power Plant Units 6 and 7 (ML14311A792).

Appendix D

Scoping Comments and Responses

Appendix D

Scoping Comments and Responses

On June 15, 2010, the U.S. Nuclear Regulatory Commission (NRC) published a Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process in the *Federal Register* (75 FR 33851) (TN511). The Notice of Intent notified the public of the staff's intent to prepare an environmental impact statement (EIS) and conduct scoping for the applications for combined construction permits and operating licenses (COLs) received from Florida Power & Light Company (FPL) for two units, identified as Units 6 and 7, to be located at the Turkey Point site. The Turkey Point Nuclear Generating Station site is located approximately 4.5 mi east of Homestead Florida and approximately 25 mi south of the City of Miami, Florida. The NRC invited the applicant; Federal, Tribal, State, and local government agencies; local organizations; and individuals to participate in the scoping process by providing oral comments at the scheduled public meeting and/or submitting written suggestions and comments no later than August 16, 2010.

D.1 Overview of the Scoping Process

The scoping process provides an opportunity for public participants to identify issues to be addressed in the EIS and highlight public concerns and issues. The Notice of Intent identified the following objectives of the scoping process:

- Define the proposed action that is to be the subject of the EIS.
- Determine the scope of the EIS and identify significant issues to be analyzed in depth.
- Identify and eliminate from detailed study those issues that are peripheral or that are not significant.
- Identify any environmental assessments and other EISs that are being prepared or will be prepared that are related to, but not part of, the scope of the EIS being considered.
- Identify other environmental review and consultation requirements related to the proposed action.
- Identify parties consulting with the NRC under the National Historic Preservation Act, as set forth in Title 36 of the Code of Federal Regulations (CFR) 800.8(c)(1)(i) (TN513).
- Indicate the relationship between the timing of the preparation of the environmental analyses and the Commission's tentative planning and decision-making schedule.
- Identify any cooperating agencies and, as appropriate, allocate assignments for preparation and schedules for completing the EIS to the NRC and any cooperating agencies.
- Describe how the EIS will be prepared and include any contractor assistance to be used.

Two public scoping meetings were held at the Homestead Young Men's Christian Association facility located at 1034 Northeast 8th Street, Homestead, Florida, on July 15, 2010. Approximately 150 to 200 people attended each scoping meeting session. The scoping meetings began with NRC staff members providing a brief overview of NRC's review process for COL applications and the National Environmental Policy Act of 1969, as amended (NEPA) process (42 USC 4321 et seq.) (TN661). In addition, a representative of the U.S. Army Corps of Engineers (USACE) discussed the USACE regulatory role and authority and permitting decisions. After the NRC's and USACE's prepared statements, the meeting was opened for public comments. Forty six attendees provided either written statements or oral comments that were recorded and transcribed by a certified court reporter. In addition to the oral and written statements provided at the public scoping meetings, 10 letters and 32 emails were received during the scoping period.

Transcripts for both the afternoon and evening scoping meetings can be found in the NRC Agencywide Document Access and Management System (ADAMS) under accession numbers ML102150591 (NRC 2010-TN518) and ML102150597 (NRC 2010-TN519), respectively. ADAMS is accessible from the NRC website at http://www.nrc.gov/reading-rm/adams.html#web-based-adams (in the Public Electronic Reading Room; note: the URL is case-sensitive). Additional comments received later in letters or emails are also available. A meeting summary memorandum (ML102170529, NRC 2010-TN514) was issued August 31, 2010.

At the conclusion of the scoping period, the NRC staff reviewed the scoping meeting transcripts and all written material received during the comment period and identified individual comments. These comments were organized according to topic within the proposed EIS or according to the general topic if they were outside the scope of the EIS. Once comments were grouped according to subject area, the staff determined the appropriate response for the comment. The staff made a determination on each comment that it was one of the following:

- a comment that was actually a question and introduced no new information
- a comment that was either related to support or opposition of combined licensing in general (or specifically the Turkey Point COL) or made a general statement about the COL process. In addition, it provided no new information and did not pertain to 10 CFR Part 52 (TN251).
- a comment about an environmental issue that
  - provided new information that would require evaluation during the review
  - provided no new information.
- a comment that was outside the scope of the COL, which included, but was not limited to
  - a comment about the safety record of the applicant.

Preparation of the EIS has taken into account the relevant issues raised during the scoping process. The comments received on the draft EIS will be considered in the preparation of the final EIS. The final EIS, along with the staff's Safety Evaluation Report (SER), will provide much of the basis for the NRC's decision on whether to grant the Turkey Point COLs.

The comments related to this environmental review are included in this appendix. They were extracted from the *Turkey Point Nuclear Plant Combined License Scoping Summary Report* (ML103130610 [NRC 2010-TN515] and ML103130612 [NRC 2010-TN516]) and are provided for the convenience of those interested specifically in the scoping comments applicable to this environmental review. The comments that are outside the scope of the environmental review for the proposed Turkey Point site are not included in this appendix. These include comments related to the following:

- safety
- emergency preparedness
- NRC oversight for operating plants
- security and terrorism
- support or opposition to the licensing action, licensing process, nuclear power, hearing process, or the applicant.

More detail regarding the disposition of general or out-of-scope comments can be found in the Scoping Summary Report. To maintain consistency with the Scoping Summary Report, the comment source identification (ID) and comment number along with the name of the commenter used in that report are retained in this appendix.

Table D-1 identifies, in alphabetical order, the individuals who provided comments during the scoping period, their affiliation (if given), and the ADAMS accession number that can be used to locate the correspondence. Although all commenters are listed, the comments presented in this appendix are limited to those within the scope of the environmental review. Table D-2 lists the comment categories in alphabetical order and commenter names and comment numbers for each category. Table D-3 lists the comment categories in the order they are presented in this appendix. The balance of this appendix presents the comments themselves with NRC staff responses organized by topic category.

1 **Table D-1. Individuals Providing Comments During the Scoping Comment Period**

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession #	Correspondence ID
Anonymous		Letter (ML102100532)	0011
Accursio, James	Capri Restaurant, Inc.	Meeting Transcript (ML102090730)	0003-4
Alexander, William	Latin Chamber of Commerce	Meeting Transcript (ML102150597)	0002-10
Amor, Valerie		Meeting Transcript (ML102150591)	0001-11
Bass, Ken		Email (ML102000006)	0005
Burris, Jessica		Email (ML102000003)	0007
Cornick, Lance	National Parks Conservation Association	Meeting Transcript (ML102150591)	0001-15
Croom, Miles	NOAA	Email (ML102320025)	0033
Daley, Dennis	Self	Meeting Transcript (ML102150591)	0001-20
De Villiers, Elena	Self	Letter (ML102370766)	0031
del Cid, Victor	Self	Meeting Transcript (ML102150597)	0002-4
Diggs, Bill	Miami-Dade Chamber of Commerce	Meeting Transcript (ML102150591)	0001-17
DiNuzzo, Laura	Self	Email (ML102310004)	0028
Eney, Douglas	Self	Meeting Transcript (ML102150597)	0002-17
Espinosa, Carlos	Department of Environmental Resources Management	Letter (ML102370765)	0015
Fessler, Greg	Self	Meeting Transcript (ML102150591)	0001-28
Finlan, Mary	Great Homestead/Florida City Chamber of Commerce	Meeting Transcript (ML102150597)	0002-15
Flinn, Eugene	Village of Palmetto Bay	Meeting Transcript (ML102150591)	0001-22
Garcia, Maria	Self	Meeting Transcript (ML102150591)	0001-27
Garcia, Preston		Email (ML102000004)	0008
Golden, James	Self	Letter (ML102370759)	0032
Grosso, Richard	Everglades Law Center	Meeting Transcript (ML102150597)	0002-6
Guendelsberger, Debra	Self	Letter (ML102300037)	0029
Gustave, Unito	Board of County Commissioners, Miami-Dade County	Meeting Transcript (ML102150591)	0001-26
Hamilton, Karen	Self	Email (ML102280577)	0019

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Table D-1. (contd)

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession #	Correspondence ID
Hancock, Mandy	Southern Alliance for Clean Energy	Meeting Transcript (ML102150591)	0001-14
Hancock, Mandy	Southern Alliance for Clean Energy	Meeting Transcript (ML102150597)	0002-18
Harris, Walter	South Miami	Meeting Transcript (ML102150591)	0001-2
Harum-Alvarez, Albert	Self	Meeting Transcript (ML102150591)	0001-24
Hogsed, Daniel		Email (ML102000002)	0009
Horton, Richard	Economic Development Council, South Miami-Dade	Meeting Transcript (ML102150591)	0001-25
Jacobs, Jeanne	Miami-Dade College Homestead	Meeting Transcript (ML102150591)	0001-4
Johnson, Barry	Greater Miami Chamber of Commerce	Meeting Transcript (ML102150591)	0001-5
Johnson, Michael	Florida Carpenter's Regional Council	Meeting Transcript (ML102150591)	0001-8
Kammerer, Laura	Florida Division of Historical Resources	Letter (ML102220345)	0013
Kauffman, Kathleen	Miami-Dade County Department of Planning and Zoning	Email (ML102290548)	0026
Kiley, Mike	Turkey Point	Meeting Transcript (ML102150591)	0001-3
Kiley, Mike	Turkey Point	Meeting Transcript (ML102150597)	0002-5
Kimball, Dan	National Park Service	Email (ML102290549)	0025
Kipnis, Daniel	Self	Email (ML102320036)	0034
LaFerrier, Marc		Email (ML102290222)	0023
Landeta, Hector		Meeting Transcript (ML102150591)	0001-18
Lee, Nancy		Email (ML102070008)	0010
Lee, Nancy	Urban Environment League	Meeting Transcript (ML102150591)	0001-12
Lerner, Cindy	Village of Pinecrest	Meeting Transcript (ML102150591)	0001-21
Lewis, Mark	National Park Service	Email (ML102290549)	0025
MacLaren, Kaitlin	Tropical Audubon Society	Meeting Transcript (ML102150591)	0001-7
Marinelli, Francis J.	Self	Meeting Transcript (ML102150591)	0001-10
Martinelli, Tom	Clean and Safe Energy Coalition	Meeting Transcript	0001-9

Table D-1. (contd)

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession #	Correspondence ID
		(ML102150591)	
Martinelli, Tom	Clean and Safe Energy Coalition	Meeting Transcript (ML102150597)	0002-9
McHugh, John	Self	Meeting Transcript (ML102150597)	0002-12
Meerbott, Tim	Cutler Bay	Meeting Transcript (ML102150597)	0002-2
Miller, Lloyd		Meeting Transcript (ML102150591)	0001-6
Moses, Dorothy	Self	Email (ML102300015)	0027
Mueller, Heinz	EPA	Letter (ML102250207)	0014
Mulkey, Cindy	Self	Email (ML102280580)	0020
O'Katy, Jessica	Self	Meeting Transcript (ML102150597)	0002-8
Payne, Nkenga	City of South Miami	Letter (ML102160400)	0012
Poole, Mary Ann	Florida Fish and Wildlife Conservation Commission	Email (ML102280488)	0018
Reynolds, Laura	Self	Email (ML102290221)	0022
Roff, Rhonda		Meeting Transcript (ML102150597)	0002-11
Ryan, Megan	Self	Meeting Transcript (ML102150591)	0001-19
Schwartz, Matthew	Broward Group of the Sierra Club	Meeting Transcript (ML102150597)	0002-14
Shlackman, Mara	Self	Meeting Transcript (ML102150597)	0002-16
Showen, Steve	Citizens Alliance for Safe Energy	Meeting Transcript (ML102150591)	0001-16
Simpson, Roce	South Florida Building and Construction Trades and International Brotherhood of Electrical Workers,	Meeting Transcript (ML102150597)	0002-13
Singer, Craig		Email (ML102000005)	0004
Smilan, Stan	Self	Meeting Transcript (ML102150591)	0001-13
Snelson, Richard	Self	Meeting Transcript (ML102150597)	0002-7
Sorenson, Katy	Self	Meeting Transcript (ML102150597)	0002-1
Troner, Susannah	Self	Email (ML102280487)	0017
Vrooman, Paul	Cutler Bay	Meeting Transcript	0001-23

Table D-1. (contd)

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession #	Correspondence ID
		(ML102150591)	
Walker, Tom	Florida Keys Aqueduct Authority	Email (ML102290224)	0024
Walker, Tom	Florida Keys Aqueduct Authority	Meeting Transcript (ML102150597)	0002-3
Wallace, Otis	Florida City	Meeting Transcript (ML102150591)	0001-1
Weins, Brian		Email (ML102000007)	0006
White, Barry	Citizens Allied for Safe Energy, Inc.	Email (ML102280490)	0016
White, Barry	Citizens Allied for Safe Energy, Inc.	Meeting Transcript (ML102090730)	0003-2
Wilansky, Laura	Self	Email (ML102290220)	0021

Table D-2. Comment Categories with Associated Commenters and Comment IDs

Comment Category	Commenter (Comment ID)
Accidents-Severe	• Hancock, Mandy (0001-14-9)
Alternatives-Energy	• Amor, Valerie (0001-11-7) (0001-11-8) (0001-11-11) • Burris, Jessica (0007-7) • De Villiers, Elena (0031-6) • DiNuzzo, Laura (0028-3) (0028-4) (0028-6) • Finlan, Mary (0002-15-4) • Guendelsberger, Debra (0029-2) • Hancock, Mandy (0001-14-3) (0001-14-4) (0001-14-7) (0002-18-3) • Harum-Alvarez, Albert (0001-24-4) • Hogsed, Daniel (0009-2) (0009-4) • Kiley, Mike (0001-3-3) • Lerner, Cindy (0001-21-5) • Mueller, Heinz (0014-16) • O'Katy, Jessica (0002-8-3) (0002-8-9) • Payne, Nkenga (0012-2) (0012-15) (0012-18) • Ryan, Megan (0001-19-4) • Schwartz, Matthew (0002-14-3) • Shlackman, Mara (0002-16-4) • Showen, Steve (0001-16-8) • Smilan, Stan (0001-13-8) • Sorenson, Katy (0002-1-4) • Troner, Susannah (0017-3) (0017-5) • Weins, Brian (0006-4) • White, Barry (0016-12) • Wilansky, Laura (0021-12) (0021-20)
Alternatives-Sites	• Cornick, Lance (0001-15-1) • Kimball, Dan (0025-1-6) (0025-1-7) (0025-1-8) (0025-1-9) (0025-1-10) • Lerner, Cindy (0001-21-6) • Lewis, Mark (0025-1-6) (0025-1-7) (0025-1-8) (0025-1-9) (0025-1-10) • Meerbott, Tim (0002-2-1) • Miller, Lloyd (0001-6-9) • Moses, Dorothy (0027-2) • Ryan, Megan (0001-19-3) • Sorenson, Katy (0002-1-1)
Alternatives-System Design	• Kimball, Dan (0025-2-12) (0025-3-22) (0025-3-47) • LaFerrier, Marc (0023-1-25) (0023-1-49) (0023-2-7) (0023-3-48) • Lewis, Mark (0025-2-12) (0025-3-22) (0025-3-47) • Poole, Mary Ann (0018-9) (0018-14)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
Benefit-Cost Balance	• De Villiers, Elena (0031-4) • Grosso, Richard (0002-6-8) • Hamilton, Karen (0019-8) (0019-11) • Hancock, Mandy (0001-14-2) • Harum-Alvarez, Albert (0001-24-1) (0001-24-3) • Payne, Nkenga (0012-14) • Reynolds, Laura (0022-2-10) (0022-3-16) • Ryan, Megan (0001-19-5) • Showen, Steve (0001-16-5) (0001-16-6) • Singer, Craig (0004-2) • Troner, Susannah (0017-1) • White, Barry (0003-2-2) (0016-7) • Wilansky, Laura (0021-15) (0021-18)
Cumulative Impacts	• Espinosa, Carlos (0015-5) • Golden, James (0032-28) • Hamilton, Karen (0019-3) • Harris, Walter (0001-2-3) • Kimball, Dan (0025-1-12) (0025-1-15) (0025-2-13) • Kipnis, Daniel (0034-1) (0034-2) (0034-3) (0034-4) (0034-5) • LaFerrier, Marc (0023-1-10) • Lerner, Cindy (0001-21-3) • Lewis, Mark (0025-1-12) (0025-1-15) (0025-2-13) • MacLaren, Kaitlin (0001-7-1) (0001-7-2) (0001-7-4) (0001-7-8) (0001-7-9) • Miller, Lloyd (0001-6-5) • Mueller, Heinz (0014-7) (0014-14) • Payne, Nkenga (0012-6) (0012-9) • Reynolds, Laura (0022-1-9) (0022-2-17) (0022-4-17) • Shlackman, Mara (0002-16-1) (0002-16-2) • Sorenson, Katy (0002-1-2) • White, Barry (0016-5) (0016-6) (0016-14) • Wilansky, Laura (0021-4)
Decommissioning	• Reynolds, Laura (0022-4-14) • Wilansky, Laura (0021-6)
Ecology-Aquatic	• Amor, Valerie (0001-11-10) • Croom, Miles (0033-1) (0033-2) (0033-3) (0033-4) (0033-7) (0033-9) (0033-10) • Golden, James (0032-9) • Grosso, Richard (0002-6-7) • Kimball, Dan (0025-1-11) (0025-1-14) (0025-3-17) (0025-3-18) (0025-3-19) (0025-3-29) (0025-3-30) • LaFerrier, Marc (0023-1-18) (0023-1-36) (0023-1-64) (0023-2-14) (0023-2-15)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• Lewis, Mark (0025-1-11) (0025-1-14) (0025-3-17) (0025-3-18) (0025-3-19) (0025-3-29) (0025-3-30) • Mulkey, Cindy (0020-2) • Poole, Mary Ann (0018-2) (0018-4) (0018-6) (0018-8) (0018-10) • Reynolds, Laura (0022-2-6) (0022-2-7) (0022-3-1) (0022-3-18) (0022-3-21)
Ecology-Terrestrial	• Amor, Valerie (0001-11-3) • Burris, Jessica (0007-1) (0007-3) • Croom, Miles (0033-11) • Espinosa, Carlos (0015-3) (0015-4) • Garcia, Preston (0008-2) • Golden, James (0032-12) (0032-14) (0032-16) (0032-17) (0032-19) (0032-25) (0032-27) (0032-35) (0032-36) • Grosso, Richard (0002-6-5) • Kimball, Dan (0025-2-6) (0025-2-11) (0025-2-18) (0025-3-31) (0025-3-32) (0025-3-33) (0025-3-34) (0025-3-43) • LaFerrier, Marc (0023-1-17) (0023-1-19) (0023-1-22) (0023-1-46) (0023-1-50) (0023-1-62) (0023-1-63) (0023-1-71) (0023-2-5) (0023-2-8) (0023-2-9) (0023-2-10) (0023-2-11) (0023-2-12) (0023-2-13) (0023-2-16) (0023-2-17) (0023-2-30) (0023-2-31) (0023-2-32) (0023-3-18) (0023-3-22) (0023-3-23) (0023-3-24) (0023-3-25) (0023-3-51) (0023-3-53) (0023-3-69) (0023-4-5) (0023-4-9) (0023-4-14) (0023-4-15) (0023-4-16) (0023-4-18) (0023-4-20) • Lewis, Mark (0025-2-6) (0025-2-11) (0025-2-18) (0025-3-31) (0025-3-32) (0025-3-33) (0025-3-34) (0025-3-43) • MacLaren, Kaitlin (0001-7-3) • Miller, Lloyd (0001-6-4) • Mueller, Heinz (0014-10) (0014-15) (0014-17) (0014-18) • Payne, Nkenga (0012-7) • Poole, Mary Ann (0018-3) (0018-5) (0018-16) • Reynolds, Laura (0022-1-16) (0022-1-17) (0022-1-19) (0022-2-3) (0022-2-21) • Schwartz, Matthew (0002-14-10) • Simpson, Roce (0002-13-7)
Geology	• Reynolds, Laura (0022-1-14)
Health-Nonradiological	• Burris, Jessica (0007-4) • De Villiers, Elena (0031-3) • Hamilton, Karen (0019-6) • Kimball, Dan (0025-3-28) • LaFerrier, Marc (0023-1-11) (0023-3-35) • Lewis, Mark (0025-3-28) • O'Katy, Jessica (0002-8-6) • Reynolds, Laura (0022-1-15) (0022-1-18) (0022-1-20) (0022-2-2) • Schwartz, Matthew (0002-14-7)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• White, Barry (0003-2-1) (0016-3)
Health-Radiological	• , Anonymous (0011-1) • Burris, Jessica (0007-5) • O'Katy, Jessica (0002-8-8) • Payne, Nkenga (0012-8) • Reynolds, Laura (0022-4-8) (0022-4-10) (0022-4-11) (0022-4-12) (0022-4-15) • Showen, Steve (0001-16-3) (0001-16-4) • Smilan, Stan (0001-13-6) • Walker, Tom (0002-3-7) (0024-4) • Wilansky, Laura (0021-9) (0021-14) (0021-19)
Historic and Cultural Resources	• Kammerer, Laura (0013-1) • Kauffman, Kathleen (0026-1) (0026-2) • Kimball, Dan (0025-3-41) • LaFerrier, Marc (0023-2-1) (0023-3-32) (0023-3-33) • Lewis, Mark (0025-3-41)
Hydrology-Groundwater	• Croom, Miles (0033-5) (0033-6) (0033-8) • De Villiers, Elena (0031-7) • DiNuzzo, Laura (0028-2) • Espinosa, Carlos (0015-2) • Golden, James (0032-7) (0032-8) (0032-11) (0032-29) (0032-30) (0032-31) (0032-32) • Grosso, Richard (0002-6-9) • Kimball, Dan (0025-1-4) (0025-1-5) (0025-1-13) (0025-2-1) (0025-3-1) (0025-3-2) (0025-3-3) (0025-3-4) (0025-3-5) (0025-3-6) (0025-3-7) (0025-3-8) (0025-3-9) (0025-3-10) (0025-3-11) (0025-3-12) (0025-3-13) (0025-3-14) (0025-3-16) (0025-3-21) • LaFerrier, Marc (0023-1-1) (0023-1-2) (0023-1-3) (0023-1-4) (0023-1-7) (0023-1-9) (0023-1-14) (0023-1-15) (0023-1-29) (0023-1-31) (0023-1-32) (0023-1-33) (0023-1-34) (0023-1-35) (0023-1-37) (0023-1-38) (0023-1-39) (0023-1-40) (0023-1-41) (0023-1-42) (0023-1-44) (0023-1-47) (0023-1-66) (0023-1-67) (0023-1-68) (0023-1-70) (0023-3-13) (0023-3-38) (0023-3-40) (0023-3-47) (0023-4-10) • Lerner, Cindy (0001-21-2) • Lewis, Mark (0025-1-4) (0025-1-5) (0025-1-13) (0025-2-1) (0025-3-1) (0025-3-2) (0025-3-3) (0025-3-4) (0025-3-5) (0025-3-6) (0025-3-7) (0025-3-8) (0025-3-9) (0025-3-10) (0025-3-11) (0025-3-12) (0025-3-13) (0025-3-14) (0025-3-16) (0025-3-21) • MacLaren, Kaitlin (0001-7-10) • McHugh, John (0002-12-1) (0002-12-6) (0002-12-9) (0002-12-10) • Miller, Lloyd (0001-6-3) (0001-6-6) • Moses, Dorothy (0027-6) (0027-7) • Mueller, Heinz (0014-5) (0014-6) • Mulkey, Cindy (0020-1)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• O'Katy, Jessica (0002-8-4) • Poole, Mary Ann (0018-1) • Reynolds, Laura (0022-1-1) (0022-1-21) (0022-2-8) (0022-2-9) (0022-2-13) (0022-2-20) (0022-3-2) (0022-3-3) (0022-3-8) (0022-3-9) (0022-4-6) (0022-4-7) • Walker, Tom (0002-3-1) (0002-3-2) (0002-3-3) (0002-3-5) (0024-1) (0024-2) (0024-3) (0024-5) (0024-6) • White, Barry (0016-8)
Hydrology-Surface Water	• Burris, Jessica (0007-6) • Cornick, Lance (0001-15-2) (0001-15-3) • Croom, Miles (0033-12) (0033-13) • Eney, Douglas (0002-17-6) • Espinosa, Carlos (0015-6) • Golden, James (0032-2) (0032-3) (0032-4) (0032-5) (0032-6) (0032-10) (0032-13) (0032-23) (0032-26) (0032-34) • Grosso, Richard (0002-6-1) (0002-6-2) • Hancock, Mandy (0001-14-6) • Kimball, Dan (0025-2-4) (0025-2-15) (0025-2-17) (0025-3-15) (0025-3-35) (0025-3-36) • LaFerrier, Marc (0023-1-13) (0023-1-48) (0023-2-20) (0023-3-26) (0023-3-27) (0023-3-39) (0023-3-43) (0023-3-59) (0023-3-60) (0023-4-1) (0023-4-11) • Lewis, Mark (0025-2-4) (0025-2-15) (0025-2-17) (0025-3-15) (0025-3-35) (0025-3-36) • McHugh, John (0002-12-4) • Meerbott, Tim (0002-2-3) • Moses, Dorothy (0027-5) • O'Katy, Jessica (0002-8-5) • Payne, Nkenga (0012-10) • Poole, Mary Ann (0018-7) (0018-11) (0018-12) • Reynolds, Laura (0022-1-4) (0022-1-8) (0022-2-19) • Ryan, Megan (0001-19-2) • Schwartz, Matthew (0002-14-14) • Walker, Tom (0002-3-4) (0002-3-6) • White, Barry (0016-9) (0016-11)
Land Use-Site and Vicinity	• Burris, Jessica (0007-2) • Golden, James (0032-21) (0032-24) (0032-33) (0032-37) (0032-38) • Gustave, Unito (0001-26-3) • Hamilton, Karen (0019-4) (0019-12) (0019-13) • Kimball, Dan (0025-3-27) • LaFerrier, Marc (0023-1-30) (0023-3-2) (0023-3-54) • Lewis, Mark (0025-3-27) • Miller, Lloyd (0001-6-7) • Moses, Dorothy (0027-3)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• Mueller, Heinz (0014-12)
Land Use-Transmission Lines	• Cornick, Lance (0001-15-4) • De Villiers, Elena (0031-2) • Flinn, Eugene (0001-22-1) (0001-22-2) (0001-22-3) (0001-22-4) • Garcia, Preston (0008-3) • Golden, James (0032-22) • Hamilton, Karen (0019-5) (0019-7) (0019-9) (0019-10) • Harum-Alvarez, Albert (0001-24-6) • Horton, Richard (0001-25-5) • Kimball, Dan (0025-2-5) (0025-2-7) (0025-2-8) (0025-2-9) (0025-2-10) (0025-3-37) • LaFerrier, Marc (0023-3-19) (0023-3-20) (0023-3-31) (0023-3-37) (0023-3-52) (0023-3-62) (0023-3-63) • Lerner, Cindy (0001-21-1) (0001-21-4) • Lewis, Mark (0025-2-5) (0025-2-7) (0025-2-8) (0025-2-9) (0025-2-10) (0025-3-37) • MacLaren, Kaitlin (0001-7-5) • Meerbott, Tim (0002-2-2) • Miller, Lloyd (0001-6-8) • Reynolds, Laura (0022-1-6) (0022-1-7) (0022-4-5) • Schwartz, Matthew (0002-14-9) • Sorenson, Katy (0002-1-5) • Vrooman, Paul (0001-23-1) (0001-23-2) (0001-23-3) • Wallace, Otis (0001-1-3)
Meteorology and Air Quality	• Kimball, Dan (0025-2-3) (0025-3-25) (0025-3-45) • LaFerrier, Marc (0023-1-16) (0023-1-26) (0023-1-28) (0023-3-16) (0023-4-7) (0023-4-8) • Lewis, Mark (0025-2-3) (0025-3-25) (0025-3-45) • MacLaren, Kaitlin (0001-7-7) • Mueller, Heinz (0014-21) • Reynolds, Laura (0022-2-1) (0022-2-16) (0022-2-18) (0022-4-2) (0022-4-3) (0022-4-4) • White, Barry (0016-2) • Wilansky, Laura (0021-11)
Need for Power	• Eney, Douglas (0002-17-2) • Hancock, Mandy (0001-14-5) • Horton, Richard (0001-25-2) • Johnson, Barry (0001-5-2) • Martinelli, Tom (0001-9-3) • O'Katy, Jessica (0002-8-1) • Reynolds, Laura (0022-1-5) (0022-3-4) (0022-3-5) (0022-3-6) (0022-4-24) • Schwartz, Matthew (0002-14-1) (0002-14-2)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• Snelson, Richard (0002-7-2) • Weins, Brian (0006-5) • Wilansky, Laura (0021-3)
Nonradiological Waste	• LaFerrier, Marc (0023-1-8) (0023-1-60)
Process-ESP-COL	• Kimball, Dan (0025-1-2) (0025-3-20) • LaFerrier, Marc (0023-1-59) (0023-3-42) (0023-3-50) (0023-3-64) (0023-3-66) (0023-4-21) • Lee, Nancy (0001-12-1) • Lewis, Mark (0025-1-2) (0025-3-20) • Miller, Lloyd (0001-6-10) • Mueller, Heinz (0014-3) (0014-4) • Ryan, Megan (0001-19-10) • Singer, Craig (0004-3)
Process-NEPA	• Kimball, Dan (0025-2-19) • Lewis, Mark (0025-2-19)
Related Federal Projects	• Golden, James (0032-1) (0032-15) (0032-18) (0032-20) • Grosso, Richard (0002-6-4) • Kimball, Dan (0025-1-1) (0025-2-14) (0025-2-16) (0025-3-42) (0025-3-44) • LaFerrier, Marc (0023-1-51) (0023-3-3) (0023-3-7) (0023-3-8) (0023-3-9) (0023-3-10) (0023-3-11) (0023-3-12) (0023-3-15) (0023-3-17) (0023-3-21) (0023-3-28) (0023-3-45) (0023-3-46) • Lewis, Mark (0025-1-1) (0025-2-14) (0025-2-16) (0025-3-42) (0025-3-44) • MacLaren, Kaitlin (0001-7-6) • Reynolds, Laura (0022-1-13)
Site Layout and Design	• Amor, Valerie (0001-11-4) • Kimball, Dan (0025-1-3) (0025-3-24) (0025-3-26) • LaFerrier, Marc (0023-1-20) (0023-1-21) (0023-1-23) (0023-1-24) (0023-1-27) (0023-1-43) (0023-1-52) (0023-1-54) (0023-1-55) (0023-1-56) (0023-1-61) (0023-1-65) (0023-1-69) (0023-2-6) (0023-2-18) (0023-2-19) (0023-2-21) (0023-2-22) (0023-2-33) (0023-2-34) (0023-2-35) (0023-2-36) (0023-2-37) (0023-2-38) (0023-2-39) (0023-2-40) (0023-2-41) (0023-3-4) (0023-3-5) (0023-3-6) (0023-3-14) (0023-3-29) (0023-3-30) (0023-3-41) (0023-3-44) (0023-3-57) (0023-3-65) (0023-3-67) (0023-4-2) (0023-4-3) (0023-4-6) (0023-4-12) (0023-4-13) (0023-4-19) • Lewis, Mark (0025-1-3) (0025-3-24) (0025-3-26) • Mueller, Heinz (0014-8) (0014-20) • Poole, Mary Ann (0018-13) (0018-15) • Reynolds, Laura (0022-2-4) (0022-2-5) (0022-2-11) (0022-2-12) (0022-2-14) (0022-2-15) (0022-3-7) (0022-3-10) (0022-3-11) (0022-3-12)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	(0022-3-13) (0022-3-14) (0022-3-17) (0022-3-20) (0022-4-1)
Socioeconomics	• Accursio, James (0003-4-4) (0003-4-5) • Alexander, William (0002-10-1) (0002-10-3) (0002-10-4) • Daley, Dennis (0001-20-5) • Diggs, Bill (0001-17-1) (0001-17-2) • Grosso, Richard (0002-6-3) • Hamilton, Karen (0019-1) (0019-2) • Harum-Alvarez, Albert (0001-24-5) • Jacobs, Jeanne (0001-4-2) • Johnson, Barry (0001-5-3) (0001-5-4) • Johnson, Michael (0001-8-3) • Kiley, Mike (0001-3-1) (0002-5-4) • Kimball, Dan (0025-3-38) (0025-3-39) (0025-3-40) (0025-3-46) • LaFerrier, Marc (0023-1-53) (0023-2-2) (0023-2-3) (0023-2-4) (0023-2-23) (0023-2-24) (0023-2-25) (0023-2-26) (0023-2-27) (0023-2-28) (0023-2-29) (0023-3-1) (0023-3-34) (0023-3-36) • Landeta, Hector (0001-18-2) (0001-18-3) (0001-18-5) • Lerner, Cindy (0001-21-7) • Lewis, Mark (0025-3-38) (0025-3-39) (0025-3-40) (0025-3-46) • Marinelli, Francis J. (0001-10-2) • Martinelli, Tom (0001-9-2) (0002-9-3) • McHugh, John (0002-12-5) • Reynolds, Laura (0022-4-16) • Ryan, Megan (0001-19-7) (0001-19-8) • Schwartz, Matthew (0002-14-4) • Shlackman, Mara (0002-16-3) • Simpson, Roce (0002-13-3) (0002-13-4) (0002-13-5) • Snelson, Richard (0002-7-3) (0002-7-4) • Wallace, Otis (0001-1-5)
Uranium Fuel Cycle	• Amor, Valerie (0001-11-5) • Bass, Ken (0005-2) • DiNuzzo, Laura (0028-5) • Guendelsberger, Debra (0029-3) • Hancock, Mandy (0001-14-8) • Harris, Walter (0001-2-4) • Marinelli, Francis J. (0001-10-1) • O'Katy, Jessica (0002-8-2) (0002-8-7) • Payne, Nkenga (0012-13) • Reynolds, Laura (0022-4-13) • Schwartz, Matthew (0002-14-8) (0002-14-13) • Shlackman, Mara (0002-16-5) • Weins, Brian (0006-2) • Wilansky, Laura (0021-10) (0021-21)

Table D-3. Comment Categories in Order as Presented in this Report

D.1.1 Comments Concerning Process – COL
D.1.2 Comments Concerning Process – NEPA
D.1.3 Comments Concerning Site Layout and Design
D.1.4 Comments Concerning Land Use – Site and Vicinity
D.1.5 Comments Concerning Land Use – Transmission Lines
D.1.6 Comments Concerning Geology
D.1.7 Comments Concerning Hydrology – Surface Water
D.1.8 Comments Concerning Hydrology – Groundwater
D.1.9 Comments Concerning Ecology – Terrestrial
D.1.10 Comments Concerning Ecology – Aquatic
D.1.11 Comments Concerning Socioeconomics
D.1.12 Comments Concerning Historic and Cultural Resources
D.1.13 Comments Concerning Meteorology and Air Quality
D.1.14 Comments Concerning Health – Nonradiological
D.1.15 Comments Concerning Health – Radiological
D.1.16 Comments Concerning Nonradiological Waste
D.1.17 Comments Concerning Accidents – Severe
D.1.18 Comments Concerning the Uranium Fuel Cycle
D.1.19 Comments Concerning Decommissioning
D.1.20 Comments Concerning Related Federal Projects
D.1.21 Comments Concerning Cumulative Impacts
D.1.22 Comments Concerning the Need for Power
D.1.23 Comments Concerning Alternatives – Energy
D.1.24 Comments Concerning Alternatives – System Design
D.1.25 Comments Concerning Alternatives – Sites
D.1.26 Comments Concerning Benefit-Cost Balance

D.1.1 Comments Concerning Process – COL

Comment: Having these meetings out in one corner of the County is not fair to the rest of the County because this affects the entire County. All our commissioners vote on this and yet, you'll have it in one commission district. It's all our Bay. The water which you are going to bring in to cool the plants is all our water. The power lines are going throughout all our neighborhoods. This is not just a Homestead issue; it's not a local issue; it's a Countywide issue. And I would say it's a regional issue because I think Monroe County should be part of the plan, too. I think there should be meetings held all over the County. The scoping meeting out to Homestead, I had to drive an hour-and-a-half to get here and I'm just on the other side of the County. So the Urban Environment League calls for scoping meetings throughout the County because this empty room should tell you something. (**0001-12-1** [Lee, Nancy])

Response: *Public meetings are generally held in the community located geographically closest to the proposed project location. Interested parties that are unable to attend the public meetings in person are also afforded the opportunity to submit written comments. This comment expresses opposition to the NRC's scoping process, but provides no specific information on the*

NRC's environmental review of the Turkey Point Units 6 and 7 COL application. Therefore, this comment will not be addressed in the environmental impact statement (EIS).

Comment: I just want to make is that I that I think we should be evaluating environmental impacts and safety on the same plane and not rank safety above environmental. Because if you neglect the environmental impacts of building these reactors, you are putting the safety of my generation and the future generation at risk. (**0001-19-10** [Ryan, Megan])

Comment: I have little faith in what might happen here. As you have heard, they have never and can't find any instance in which they have refused a nuclear power plant. They've always managed to find ways to accommodate it. (**0001-6-10** [Miller, Lloyd])

Response: *The NRC takes seriously its responsibility under the Atomic Energy Act to protect the health and safety of the public and the environment in regulating the U.S. nuclear power industry. More information about NRCs roles and responsibilities is available on the NRCs website at http://www.nrc.gov/about-nrc.html. NRC approval of an application for a COL is not a foregone conclusion. Environmental issues, as well as safety issues, will be evaluated before a decision on an application is reached. As described in the regulations, the NRC can deny an application based on the finding of its review.*

Comment: In my opinion there should be one universal standard design, agreed upon by a panel of experts, and built to exacting standards so it becomes cheaper and less time consuming. (**0004-3** [Singer, Craig])

Response: *This comment did not provide information related to the environmental effects of the proposed action and will not be addressed in the EIS.*

Comment: The Draft EIS should discuss the status and any issues/concerns associated with the following approvals: Approval of the application to the NRC for a COL; Approval of the application to the State of Florida for site certification; Approval of any required National Pollutant Discharge Elimination Permit(s) (NPDES) for water discharge; Approval of the Prevention of Significant Deterioration (PSD) air permit; Approval of a 316(b) demonstration for the proposed cooling water intake; Approval of the U.S. Army Corps of Engineers (USACE) Section 404 and Section 10 permits to construct structures in wetlands and regulated waterways; Approval of hazardous waste management and disposal plans; Approval of the "determination of consistency" under the requirements of the Coastal Zone Management Act to ensure the expanded plant is consistent with existing federal and state coastal zone management plans. (**0014-4** [Mueller, Heinz])

Comment: Four (4) sixty thousand gallon above ground diesel fuel tanks, four (4) 1300 gallon diesel generator day tank, and two (2) diesel driven fire pumps are mentioned. No details and specification were provided to establish compliance with Chapter 24 and FAC 62-762 or obtain the necessary approval of the Director of DERM or his designee. (**0023-1-59** [LaFerrier, Marc])

Comment: The expiration date on the copies of USFWS permits No. MB697722-0, MB697722-1 and MB1335540-0, included in Appendix 10.2.10 indicate that these permits expired on March 31, 2009. The applicant shall provide copies of the current permits. (**0023-3-64** [LaFerrier, Marc])

Comment: In Section 5.12, the application states that No variances from applicable regulatory standards are being sought for construction of the Project. In Section 4.5.5, however, the application states that a variance is needed. (**0023-3-66** [LaFerrier, Marc])

Comment: The application states that FPL will prepare and submit an earthwork and materials disposal plan prior to the start of construction. (**0023-4-21** [LaFerrier, Marc])

Comment: The COL application proposes the discharge of cooling tower blowdown from Units 6&7 to underground injection wells within the Boulder Zone of the Lower Floridan Aquifer. FPL makes the assumption that a Class I Underground Injection Control permit will be issued by FDEP. However, a FDEP permit has not been acquired for this action, to date. (**0025-3-20** [Kimball, Dan] [Lewis, Mark])

Response: *An appendix of the EIS will contain a list of environmental-related authorizations, permits, and certifications potentially required by FPL from Federal, State, regional, local, and affected Native American Tribal agencies related to the COLs for proposed Turkey Point Units 6 and 7.*

Comment: DERM has determined that the proposed work or activity may result in adverse environmental impacts as defined in Section 24-5 of the Code of Miami-Dade County. The application does not contain sufficient information to evaluate the project's environmental impacts, benefits, and detriments with regard to assessment points numbers 1 thru 6 as defined in Section 24-5 of the Code of Miami-Dade County under Comprehensive Environmental Impact Statement. (**0023-3-42** [LaFerrier, Marc])

Response: *This comment refers specifically to the Site Certification Application (SCA) submitted to the State of Florida by FPL, but it indicates an interest in the potential impacts of the proposed plant on the environment. The potential impacts of building and operating the proposed plant on the environment will be addressed in Chapters 4, 5, and 7 of the EIS, based on the affected environment described in Chapter 2.*

Comment: Please clarify mitigation success criteria for the proposed mitigation plans. What are the projected goals? What will constitute success? Please include details of the routine monitoring and maintenance plans designed to achieve planned success levels that are required in order to evaluate the adequacy of the proposed mitigation. (**0023-3-50** [LaFerrier, Marc])

Response: *This comment refers to the SCA submitted to the State of Florida by FPL, but it indicates an interest in mitigation of the impacts of proposed Turkey Point Units 6 and 7 on wetlands. The potential impacts of building and operating the proposed plant on wetlands and potential mitigation of those impacts will be discussed in Chapters 4 and 5 of the EIS, based on the affected environment that will be described in Chapter 2. A wetland mitigation plan is included in the Clean Water Act (CWA) Section 404 permit application submitted to the U.S. Army Corps of Engineers (USACE or Corps). Monitoring plans during building and operating the proposed plant will be presented in Chapters 4 and 5.*

Comment: The Draft EIS should discuss any plans by the applicant to seek a Limited Work Authorization (LWA). On similar projects an LWA was sought prior to certain environmental permits being obtained. EPA understands that an LWA could potentially authorize site development and deep/shallow foundation construction. (**0014-3** [Mueller, Heinz])

Comment: The parks encourage the NRC to carefully analyze the activities which would be permitted as Preconstruction Activities and/or Limited Work Authorization Construction. This project is located in a highly sensitive, wetlands coastal environment, immediately adjacent to a national park, and components of the COL are proposed to run through or adjacent to a second national park. This permit evaluation will examine the environmental impacts of roads, bridges, facility location, transmission lines, cooling water pipelines (radial collector wells), and other issues. Although these non-safety related components may frequently be allowed as Preconstruction Activities and/or Limited Work Authorization Construction, the parks believe many of these activities present the potential for cumulative impacts to this sensitive ecosystem and require a greater amount of environmental review than the LW A process provides. (**0025-1-2** [Kimball, Dan] [Lewis, Mark])

Response: *Cumulative impacts are the impacts that result from the combination of the proposed action and past, present, and reasonably foreseeable actions, regardless of who takes the actions. The cumulative impacts associated with building and operating proposed Units 6 and 7, including those actions identified as preconstruction, will be evaluated for each affected resource. The results of cumulative impact analyses will be presented in Chapter 7 of the EIS. FPL withdrew its request for a limited work authorization (LWA) in a letter to the NRC dated November 10, 2009.*

D.1.2 Comments Concerning Process – NEPA

Comment: NPS urges a comprehensive evaluation, additional documentation, and consultation with respect to potential impacts of the Turkey Point 6 & 7 Project and other power plant and transmission corridor site alternatives. NPS concerns should be addressed in the EIS process in order to avoid and minimize potential adverse impacts to the resources and values of Biscayne and Everglades National Parks and conflicts with CERP goals and projects. (**0025-2-19** [Kimball, Dan] [Lewis, Mark])

Response: *The potential impacts of building and operating the proposed units at the alternative sites will be discussed in Chapter 9 of the EIS. The alternative sites will be compared against the proposed site to determine whether any of the alternative sites are environmentally preferable to the proposed site. The environmental impacts of building and operating the proposed transmissions lines will be addressed in Chapters 4, 5 and 7. Alternative transmission corridors would not typically be considered within the context of an NRC EIS for a proposed nuclear power plant. However, the Corps of Engineers, and perhaps the National Park Service, will be cooperating with the NRC on the EIS. To the extent that a cooperating agency addresses such alternatives for its NEPA analysis, those alternatives would likely be included in this EIS in order to support the cooperating agency's environmental review.*

D.1.3 Comments Concerning Site Layout and Design

Comment: We also know through many studies by scientists that the sea level waters are rising and that I have been told through a presentation through an environmental group that I'm a part of and on committees with different towns -- I'm on a lot of different groups -- that they're going to raise their plant, I thought it was 28 feet; Lloyd said 24. The reality is they know that it's a problem. (**0001-11-4** [Amor, Valerie])

Comment: Please publish a map showing new and existing canals, pipelines, STAs, pump locations, and pump capacities associated with the water management feature(s). (**0022-3-10** [Reynolds, Laura])

Comment: Please state the specific material that will be used to line the water management feature(s) and state the minimum thickness of the lining. (**0022-3-11** [Reynolds, Laura])

Comment: Please state whether the lining of the water management feature(s) will be impervious to the flow of groundwater. (**0022-3-12** [Reynolds, Laura])

Comment: Please state how the lining of the water management feature(s) will be stabilized knowing that groundwater continually flows through the Biscayne Aquifer. (**0022-3-13** [Reynolds, Laura])

Comment: Please state the number of times the water management feature(s) can be drained and refilled while retaining its structural integrity. (**0022-3-14** [Reynolds, Laura])

Comment: Please state how long the applicant plans to own and operate the water management feature(s). (**0022-3-17** [Reynolds, Laura])

Comment: Please state the dimensions, capacities, and location(s) of the water management feature(s) resulting from excavations of the FPL-Owned fill source (rockmines). (**0022-3-7** [Reynolds, Laura])

Comment: Provide a process flow with description of the proposed FPL reclaim treatment plant & plant effluent. (**0023-1-27** [LaFerrier, Marc])

Comment: [P]lease provide a detailed map of all FPL land holdings within the Biscayne Coastal Wetlands and Model Lands Basins. Please identify on the map which areas are proposed for development and which are proposed for mitigation. (**0023-4-3** [LaFerrier, Marc])

Comment: If the water reservoir for Units 6&7 is unlined, the seepage of wastewater constituents, including EPOCs, will occur to the Biscayne Aquifer and cause uptake to adjacent wetlands; migration of these contaminants will be transported subsequently to the bay. The ecological impacts associated with an unlined reservoir should be evaluated. (**0025-3-26** [Kimball, Dan] [Lewis, Mark])

Response: *A description of the FPL site layout, the reactor type, and the cooling-water systems for proposed Turkey Point Units 6 and 7 will be provided in Chapter 3 of the EIS. Offsite features associated with the proposed units will also be described in Chapter 3.*

Comment: Please provide plans for the handling and disposal of the spoils generated from demucking of the Units 6 & 7 site. (**0023-1-20** [LaFerrier, Marc])

Comment: Please submit evaluation criteria for non-acceptable vs. acceptable material that would be used for common or structural backfill and demonstrate how the criteria for material that would be used for common or structural backfill meet the clean fill requirements of Section 24-48, Miami-Dade Code. (**0023-1-21** [LaFerrier, Marc])

Comment: Please identify temporary vs. permanent impacts expected to result from the proposed work within the barge unloading area, and provide a detailed description of these impacts. (**0023-1-23** [LaFerrier, Marc])

Comment: The application did not provide sufficient information to fully evaluate work proposed in the barge area. Please submit detailed plans, including but not limited to applicable site surveys, site plan and cross sectional views with mean high water and mean low water lines, existing depth and proposed resulting depth of the turning basin, details of any proposed alteration of the existing shoreline inclusive of complete designs for creating any vessel notches or bays, as well as detailed stabilization methodology for any portion of the shoreline that is to be modified as a result of the proposed expansion of the Barge Turning Basin. (**0023-1-24** [LaFerrier, Marc])

Comment: [I]nclude sufficient information for the radial collection wells, specifically the spacing between the well screen laterals and the maximum distance that the well screen laterals will extend under Biscayne Bay. Please .... show the boundaries of sovereign submerged lands and the extent to which the radial collection wells would be located within sovereign submerged lands. (**0023-1-43** [LaFerrier, Marc])

Comment: Pipe installation and canal crossing details were not provided. (**0023-1-54** [LaFerrier, Marc])

Comment: Table 4.5-1 (Stream Number 36) lists the reclaimed water volume to FPL as 72.7 MGD (50,481 gpm) and Appendix 10.9, Section 2.0 states Turkey Point Units 6 & 7 will require 55.3 million gallons per day (MGD) if supplied from reclaimed water. The discrepancy in the reclaimed water volume is not addressed. (**0023-1-65** [LaFerrier, Marc])

Comment: The quantity of fill needed for Unit 6&7 and associated facility construction, the quantity of fill to be extracted at this site, the dimensions of the rock pit. Commitment approved by MDC CAO that no fill will be sold. (**0023-3-4** [LaFerrier, Marc])

Comment: Geologic cross section of the proposed excavation (including the amount of water storage above- and below-ground, detailed information on the depth of the area to be mined) (**0023-3-6** [LaFerrier, Marc])

Comment: The application states that muck removed from several construction sites will be stored in the spoil disposal site. (**0023-4-13** [LaFerrier, Marc])

Comment: Application does not provide information on demolition or renovation that may occur as part of this project. (**0023-4-6** [LaFerrier, Marc])

Response: *These comments refer specifically to the SCA submitted to the State of Florida by FPL, but they indicate an interest in the activities that will occur to build proposed Turkey Point Units 6 and 7. Chapter 3 of the EIS will describe the activities that will be taken to build the proposed units. The review team will assess the potential impacts of building the proposed units in Chapter 4 of the EIS.*

Comment: Are there any roads, whether for plant access or associated with the transmission lines that are being proposed as temporary roads? If so, please identify them and provide a map of their locations. (**0023-1-52** [LaFerrier, Marc])

Comment: No data is provided indicating which roads are temporary, which roads are to be left as-built, and which roads are to be reduced after construction of power generation units and supporting facilities. (**0023-2-22** [LaFerrier, Marc])

Comment: The application does not adequately depict property ownership in areas surrounding proposed linear features such as access roads, including Miami-Dade County Environmentally Endangered Lands (EEL) Program projects that have been at least partially acquired. (**0023-2-6** [LaFerrier, Marc])

Comment: Information including but not limited to depth, slope, deep cut lines, levee height, etc. for the water management feature and rock mining activities proposed for the FPL owned fill source are not provided in the application. (**0023-3-14** [LaFerrier, Marc])

Comment: No sketches are provided clearly denoting if rights-of-way shown are FPL right-of-way, road right-of-way or other right-of-way. (**0023-3-29** [LaFerrier, Marc])

Comment: No data is provided describing the existing available right-of-way and ownership thereof. Provide clear maps denoting the aforementioned. (**0023-3-30** [LaFerrier, Marc])

Comment: The applicant shall provide detailed information on the elevation of all project features that is sufficient to determine whether this requirement has been met. (**0023-3-44** [LaFerrier, Marc])

Comment: Detailed information on the proposed excavation including the exact proposed location not provided. (**0023-3-5** [LaFerrier, Marc])

Comment: The application does not provide sufficient information to determine whether all construction operations involving earthwork, including disposal, are limited to clean fill. (**0023-4-12** [LaFerrier, Marc])

Response: *These comments refer specifically to the SCA submitted to the State of Florida by FPL, but they indicate an interest in the layout of the proposed plant. The layout of features associated with proposed Turkey Point Units 6 and 7 will be described in Chapter 3 of the EIS. The review team will assess the potential impacts of building the proposed units in Chapter 4.*

Comment: The project's draft PSD permit incorporates the use of reclaimed water as the primary source of cooling water for the cooling towers as well as the use of salt water from radial collector wells as a backup source or some combination of the two as necessary. As presented in the PSD emissions calculations, particulate emissions are highly dependent on the source of the cooling water. The Draft EIS should discuss: impacts related to particulate emissions with respect to the-source of the cooling water; anticipated availability of reclaimed water to support the new units in addition to existing units; recordkeeping and monitoring plans to assess water flow rates and the ratio of reclaimed to salt water used; and any salinity changes outside of the range used for the emissions calculations. (**0014-20** [Mueller, Heinz])

Comment: As mentioned previously, FPL apparently proposes that Units 6 and 7 will have their cooling water needs provided by cooling towers as opposed to the existing canal system. The Draft EIS should discuss the wastewater-to-reclaimed water process, including describing the processes to remove debris, sand, sediment, and other large solids. The Draft EIS should discuss use of any microorganisms to break down organic materials, proposed clarifiers to remove microorganisms and remaining solids, filtering processes, and what type of disinfection (chlorine?) will be used to kill microorganisms. The monitoring of the re-use facilities and processes should be discussed in order that only high-quality reclaimed water is distributed and that it is clear and free of pathogens. (**0014-8** [Mueller, Heinz])

Comment: Please provide a schedule of radial collector well operation including initial operation and all planned subsequent events, as well as monitoring protocol for the above-mentioned resources. (**0018-15** [Poole, Mary Ann])

Comment: Please state the maximum pressure the deep well injection pumps will generate. Please state the maximum water temperatures of the wastes that will be deep well injected. (**0022-2-11** [Reynolds, Laura])

Comment: Please state the affects of the geologic fracturing that will occur as a result of pressure, temperature, exotic chemicals, and oxygen from deep well injections. (**0022-2-12** [Reynolds, Laura])

Comment: Please state the amount of heat that will be discharged into the atmosphere from units 6&7 and state the temperature differential between the discharged heat and the ambient temperature. Please state the amount of water vapor that will be discharged into the atmosphere from units 6&7 and state the moisture differential between the discharged water vapor and the ambient humidity. (**0022-2-15** [Reynolds, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to varieties and concentrations of pathogenic waste, toxic waste, EPOCs, chemical waste, and radioactive waste that will be disposed by deep well injection, please provide them. (**0022-2-4** [Reynolds, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to the ultimate location(s) of the deep well injected wastes, please provide them. (**0022-2-5** [Reynolds, Laura])

Comment: Please state, specifically, which wastewater batches will be deep well injected and which wastewater batches will be released into the unlined cooling canal system for both construction activities and normal operation activities. (**0022-3-20** [Reynolds, Laura])

Comment: Please state, specifically, all additives and all additive quantities, injected into the cooling water, such as solvents, detergents, biocides, corrosion inhibitors, lubricants, scale inhibitors, oxygen removing agents, foam removing agents, salts, and any other chemicals. (**0022-4-1** [Reynolds, Laura])

Comment: Pretreatment of the wastewater reuse source water to include treatment of EPOCs should be evaluated, considering Biscayne National Park's status as an Outstanding Florida Water Body with a no degradation standard under Florida Statutes. (**0025-3-24** [Kimball, Dan] [Lewis, Mark])

Response: *The proposed design for Turkey Point Units 6 and 7, including cooling tower and injection well performance, will be addressed in Chapter 3 of the EIS. The review team will assess the potential impacts of operating the proposed plant in Chapter 5, based on the affected environment described in Chapter 2. The EIS will include citations for documents used in its preparation.*

Comment: Based on the review of the Environmental Report, Part 3, submitted as pat1 of the Nuclear Regulatory Commission (NRC) Combined Operating License (COL), several inconsistencies have been noted when compared to the State of Florida Site Certification Application (SCA). The COL and the State of Florida SCA should contain the same design specifications and construction elements. For example, the FPL-owned fill source (rock mine) has been removed from the State of Florida SCA and the Army Corps of Engineers permit application. Without the Florida and ACOE permit approvals, the excavation cannot proceed. (**0025-1-3** [Kimball, Dan] [Lewis, Mark])

Response: *The NRC process is to review the license application and prepare an EIS based on the actions proposed in that application. Information to be used during the review will include documents obtained from State and Federal agencies, including the SCA, to the extent necessary to characterize the Turkey Point site. The FPL-owned fill source remains in the COL application at this time and a review of the environmental impacts of obtaining fill material will be presented in Chapter 4 of the EIS.*

Comment: Not enough information provided to assess water supply alternatives. Appendix 10.9 is a summary of alternative water supply study conducted by FPL. MDWASD has not received the reports cited in the Appendix (Analysis of Baseline Water Source, HDR Dec. 2007; Task 1 Initial Water Source Alternative Screening, HDR March 2008; Task 2 and 3 Water Source Alternative Characterization and Scope, HDR March 2008; Conceptual Engineering of Cooling Water supply and Disposal for Turkey Point Units 6 & 7, HDR, June 2008; Cooling Water Supply and Disposal Conceptual Design Report, HDR, March 2009). (**0023-1-56** [LaFerrier, Marc])

Comment: Condition 5 of Z-56-07 requires FPL to provide an alternative water source plan that will outline all sources of water not supplied by WASD through reuse. (**0023-3-41** [LaFerrier, Marc])

Comment: Please provide additional information on the quality, quantity, timing and reliability of the proposed reclaimed water for hydrologic improvements. (**0023-4-2** [LaFerrier, Marc])

Response: *These comments are directed at the applicant and refer specifically to the SCA submitted to the State of Florida by FPL, but they indicate an interest in the cooling water supply for the proposed units. The cooling-water source for proposed Turkey Point Units 6 and 7 will be described in Chapter 3 of the EIS. Alternative water supplies will be considered in Chapter 9.*

Comment: Most of the lands adjacent to the proposed roadway segment improvements occur within the boundaries of the Biscayne Bay Coastal Wetlands CERP Project, and several segments would be located where this CERP project proposes infrastructure for restoration of the surrounding wetlands and Biscayne Bay. These road improvements would directly interfere with CERP features associated with the Biscayne Bay Coastal Wetlands Project, including pumps and spreader canals. (**0023-2-18** [LaFerrier, Marc])

Comment: Please address how the proposed roadway features would be constructed to be consistent with the proposed CERP features. (**0023-2-19** [LaFerrier, Marc])

Comment: The applicant must provide a detailed map identifying areas where roads or road improvements would not be completely contained within the boundaries of either FPL-owned land or an existing public right-of-way. The applicant must also identify adjacent property owners whose land may need to be obtained to accommodate the road or road improvements, including but not limited to the Miami-Dade Environmentally Endangered Lands Program, and explain the process by which the additional property will be obtained. (**0023-2-21** [LaFerrier, Marc])

Response: *These comments refer specifically to the SCA submitted to the State of Florida by FPL, but they indicate an interest in the proposed road improvements associated with building and operating Turkey Point Units 6 and 7. The EIS will describe the proposed road improvements in Chapter 3 of the EIS. The impacts of these road improvements will be presented in Chapters 4 and 5. The cumulative impacts of road improvements and CERP actions will be presented in Chapter 7 of the EIS.*

Comment: Please state the locations and extents of permitted ASR wells sites within 25 miles of units 6&7. Please state the capacity of each of the permitted ASR well sites within 25 miles of units 6&7. (**0022-2-14** [Reynolds, Laura])

Response: *The cumulative impact of the operation of proposed Turkey Point Units 6 and 7 and existing facilities that impact groundwater, such as the aquifer storage and recovery wells located in the vicinity of the Turkey Point site, will be addressed in Chapter 7 of the EIS.*

Comment: Flow rate used to calculate water demands on Table 4.5-1 not provided. Not clear on how water demands for potable water use were calculated. (**0023-1-55** [LaFerrier, Marc])

Comment: No information was provided to show that the facility will be in compliance with the Flood Plain Management requirements including flood proofing as may be required. Please explain why existing runoff from pre-development conditions results in more runoff volume than post development conditions, despite the fact that the pre-development plant site is mostly undeveloped and should have no runoff volume to be pre-treated. (**0023-1-61** [LaFerrier, Marc])

Comment: Details for road improvements list"...NHW Elevation to be provided by DERM. Please provide further explanation as to what is expected. (**0023-1-69** [LaFerrier, Marc])

Comment: Pursuant to Condition 9 of Z-56-07, Planned restoration features such as, but not limited to, pump PU-M3 (BBCW proposed project feature] and downstream hydrologic restoration shall not be compromised or constrained by the roadway(s). The application does not contain sufficient information to determine whether the requirements of Condition 9 of Z-56-07 have been met. (**0023-2-33** [LaFerrier, Marc])

Comment: Pursuant to Condition 9 of Z-56-07, Sheet flow shall be maintained across roadway alignments by elevating portions of the roadway and through the installation of culverts in other areas. The application does not contain sufficient information to determine whether the requirements of Condition 9 of Z-56-07 have been met. (**0023-2-34** [LaFerrier, Marc])

Comment: Roads are to be constructed to comply with Flood Criteria requirements, at a minimum. Assess impact on a larger study area. (**0023-2-35** [LaFerrier, Marc])

Comment: No data is provided describing the existing available right-of-way and ownership thereof. Provide clear maps denoting the aforementioned. Clearly denote which roadways are to be public and which are to be private. Provide clear maps denoting the aforementioned. All roads to be dedicated as public right-of-way (arterials-section lines and half-section lines) should include the following: dedication of the zoned right-of-way for future widening and no easements within said right-of-way. Any utilities within the right-of-way will be allowed to be installed by permit only. No sketches are provided clearly denoting if right-of-way shown are FPL right-of-way, road right-of-way or other right-of-way. (**0023-2-36** [LaFerrier, Marc])

Comment: The traffic studies provided in Appendices 1 0.7.4.1 and 1 0.7.4.2 do not demonstrate the need for construction vehicle traffic access to the power plant site from SW 359 Street. (**0023-2-37** [LaFerrier, Marc])

Comment: [T]he traffic studies presented in Appendices 10.7.4.1 and 10.7.4.2 do not provide sufficient data to demonstrate the need for the proposed roadway improvements. (**0023-2-38** [LaFerrier, Marc])

Comment: Assumptions: Substantiate the following assumptions: maximum work-force of 3,650 construction workers and vehicle occupancy of 1.0 worker per vehicle. Study Area. Given the amount of vehicular traffic likely to be generated, the number of employees and the size of project, the study area to be analyzed shall include all roadway facilities where traffic generated by the proposed project is equal to or greater than five (5) percent of the maximum service volume at the adopted level of service standard applicable to the roadway facility. Trip Generation. Given the unique characteristics of the use proposed, the trip generation shall include the following information: average daily, AM peak hour and PM peak hour. Consider car pooling, van pooling or employer-based car pooling. Analysis Period. Consider three analysis periods: Short-term (Concurrency Analysis for 3 years; construction is estimated to begin in

2011); and long-term (Years 2016 and 2020). Peak construction employment for the project is estimated for 2016; Project construction is estimated to conclude in 2020. Trip Distribution. For the Concurrency Analysis use the Cardinal Directional Trip Distribution from Zone 1401 and Year 2015, and the computerized travel demand forecasting (FSUTMS) model, refined where needed, for Years 2016 and 2020. (**0023-2-39** [LaFerrier, Marc])

Comment: Future Conditions Analyses. Perform an assessment of future conditions on the study area roadways for the long-term planning horizons without the impacts of the application-generated traffic; perform other assessment of future conditions on study area roadway and intersections with the impacts of the application-generated traffic. Incorporate programmed and planned roadway improvements consistent with Adopted Plans and Programs above. Mitigation Analysis. If the application causes the study area roadways to fall below their adopted LOS standards, recommend mitigation through physical or operational improvements, travel demand management strategies, fair-share contributions, or a combination of these or other strategies. (**0023-2-40** [LaFerrier, Marc])

Comment: Provide detailed supporting documents for trip generation of 3,650 construction peak period employees. Document all the growth rates and estimate growth factors values for different analysis years. Since there are different peak hours for construction (5:00 AM to 6:00 AM) and regular employees arrival (6:00 AM to 7.00 AM), traffic volumes for these two hours should not be combined in the analysis. Future roadway improvements in TIP, LRTP and Comprehensive Plans of effected jurisdictions should be investigated and listed in the report. Potential improvements may include bike trails, greenways and roadways etc. Potential improvements such as bike trails, greenways and roadway improvements, etc. Provide detailed supporting documents for trip generation of 36 construction-related trucks per hour. The existing truck volumes should also be included in the traffic data collection. This data can provide more accurate operational analysis as well as pavement design. To ease the review process, please provide traffic counts in the form of maps. Provide detailed supporting documents for trip generation of 806 and 2000 employees in normal traffic operational analysis for Scenario 1 and 2, respectively. Presence of only 940 employees during data collection period while 1,467 employees work. Therefore, trips should be adjusted, or it should be documented that only 940 employees are usually present. Please note that traffic data should be adjusted for all types of seasonal variations. (**0023-2-41** [LaFerrier, Marc])

Comment: Parking demand and supply analysis should be included in the report. Regional traffic impact analysis should also be conducted because of the anticipated high peak-hour volumes generated during peak periods. Different access routes should be explored to the site, such as through SW 328 Street. (**0023-3-57** [LaFerrier, Marc])

Comment: Pursuant to Condition 21 of Z-56-07, FPL has agreed to allow water level increases on the project site on the order of one foot or more, pursuant to regional restoration projects, and will design the project to accommodate these water level increases at FPL's expense. Information in the application is not sufficient to determine whether the requirements of this condition have been met. (**0023-3-65** [LaFerrier, Marc])

Comment: Further elaboration is needed on item 49 on Table 4.5-1 and noted in Figure 4.5-1 (Effluent from FPL Reclaimed TP to Future FPL Users = 9,739 gallons per minute). (**0023-3-67** [LaFerrier, Marc])

Comment: Please submit the earthwork and materials disposal plan required under Condition 7 of Z-56-07. The plan should include, but not be limited to plans and sketches pertaining to the proposed Spoil Areas including elevation details and slope stabilization. The applicant should also provide the management plan for listed species required under Condition 2 of Z-56-07, which should include but not be limited to identifying the plans established to protect endangered or threatened species from impacts resulting from the proposed work. (**0023-4-19** [LaFerrier, Marc])

Response: *These comments are directed at the applicant and refer specifically to the SCA submitted to the State of Florida by FPL, but they indicate an interest in site layout and design. The review team will describe the layout of proposed Turkey Point Units 6 and 7 and support features in Chapter 3 of the EIS. The potential impacts of building the proposed units will be presented in Chapter 4, and the potential impacts of operating the proposed units in Chapter 5.*

Comment: Under what circumstances would the radial collector wells be required to be used and at what capacities? Under what specific anticipated circumstance would radial collector wells constitute 100% of water source composition? (**0018-13** [Poole, Mary Ann])

Response: *The proposed cooling-water source for proposed Turkey Point Units 6 and 7, including operational information provided by FPL, will be described in Chapter 3 of the EIS.*

D.1.4 Comments Concerning Land Use – Site and Vicinity

Comment: The Miami-Dade Board of County Commissioners, where Dennis C. Moss sits as the Chairman, recently approved a land use change in order to accommodate the expansion plan, which is the subject of the request that is before you today. (**0001-26-3** [Gustave, Unito])

Comment: The proposed expansion by Florida Power and Light involves the land use of 38,607 acres composed of wetlands, agricultural land, barren land, and water. Less than 5% of the proposed expansion involves the use of pre-established urban or built up land [1]. (**0007-2** [Burris, Jessica])

Comment: The project should be consistent with the Goal, Objectives, and Policies of the Miami-Dade County Master Development Comprehensive Plan and its corresponding land development regulations. It is important for the applicant to coordinate permits with all governments of jurisdiction. (**0019-12** [Hamilton, Karen])

Comment: Council staff recommends that the Goals and Policies of the Strategic Regional Policy Plan for South Florida (SRPP) related to protecting and enhancing South Florida's natural resources should be observed (**0019-13** [Hamilton, Karen])

Comment: Consider the full the impacts of construction of the plant, and related facilities as they relate to rights-of way issues, relocation of facilities and infrastructure, and provide the appropriate mitigation strategies. (**0019-4** [Hamilton, Karen])

Comment: The plant site is located in Environmental Protection Subarea F, and is consistent only if the use is deemed consistent with the goals, objectives and policies of the Comprehensive Development Master Plan (CDMP). (**0023-1-30** [LaFerrier, Marc])

Comment: Potential viewshed impacts may increase over current levels in Biscayne National Park from the construction of Units 6&7 and non-transmission facilities. This will impact visitor use and experience within the park and should be evaluated. (**0025-3-27** [Kimball, Dan] [Lewis, Mark])

Comment: The scope of this project (adding two new reactors) is extraordinarily large. It will more than double the size of the existing plant. It requires changes in land use designations, unbelievable amounts of fill, building heavy duty roads, modifying shorelines, destroying wetlands and hammocks, digging a very large hole in South Dade for fill, (not to be restored), digging radial and injection wells, installing a wastewater treatment plant, installing a water treatment plant, installing miles of transmission lines, installing miles of pipelines, changing the horizon, and in effect building a small industrial city, yet FPL insists in their license application that this project in its entirety will have small to no impact. Amazing. Of course there will be an environmental impact and a big one. (**0027-3** [Moses, Dorothy])

Comment: Identify specific measures that will be adopted to protect the environmentally sensitive lands south of Palm Drive (S.W. 3 4 4th Street) from illegal access and activities such as dumping, use of all-terrain vehicles, and poaching. The new roadways proposed south of Palm Drive will increase opportunities for illegal access to environmentally sensitive lands, including those in the Model Lands Basin area. (**0032-38** [Golden, James])

Response: *Land-use impacts of building and operating proposed Turkey Point Units 6 and 7 and associated offsite facilities and transmission lines will be presented in Chapters 4 and 5 of the EIS, and cumulative land-use impacts will be presented in Chapter 7. The analysis of land-use impacts will address the general consistency of the proposed new facilities with applicable zoning regulations and land-use plans. Many of the land-use issues raised in this set of comments overlap with ecological issues, which will also be addressed in Chapters 4, 5, and 7.*

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Electrical Transmission Lines - The potential for adverse impacts to the SFWMD's L-30 and L-31N Canal levees, which are located within the West Preferred Corridor. FPL is proposing use the existing access roads on the canal levees for construction and maintenance purposes; however, portions of the levees have not been designed to accommodate the heavy equipment proposed to be used by FPL; therefore, the levees will need to be enhanced and widened. The SFWMD advised FPL that any proposed levee enhancements will need to meet USACE design specifications, compaction, and side slope stabilization (grass/sod) requirements. (**0032-21** [Golden, James])

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Electrical Transmission Lines - The potential for adverse impacts to wetlands that are part of northeastern Shark River Slough, within the boundaries of Everglades National Park, and wetlands within Water Conservation Area 3B, associated with the West Secondary Corridor. Both of these areas are part of the Everglades Protection Area as defined in the Everglades Forever Act and are targets for restoration under CERP. FPL has not provided adequate information on potential impacts from the construction, operation, and maintenance of the proposed transmission lines and related access (fill) roads through these areas. Currently, there are no existing access roads in this area other than the L-30 and L-31 N levee roads. New road construction would result in long-term impacts to wetland habitat, disrupt existing hydrologic flows, and impact water quality. New road construction would potentially conflict with future CERP project restoration efforts related to the relocation of the S-356 pump station and the promotion of wetland sheet flow. Vehicles (other than airboats) moving over the wetlands (without roads) would also result in major disturbance to existing wetlands by compacting soils, disrupting existing hydrologic flows, and impacting habitat for listed species. (**0032-24** [Golden, James])

Response: *Environmental impacts associated with planned new transmission corridors, as well as potential impacts associated with upgrades to the existing lines, if required, will be addressed in Chapters 4, 5, and 7 of the EIS. The analysis will consider possible effects on canals, levees, and other existing facilities in the affected areas as well as planned future Everglades' restoration projects.*

Comment: Then there's a plan to put those two nukes on a pile of dirt 24 feet high, about 10 million cubic yards. The bulk of this would come from a piece of property that FPL owns back from the edge of the Bay. That will take a very large hole, very deep. (**0001-6-7** [Miller, Lloyd])

Comment: The Draft EIS should discuss sources of limestone rock proposed for use in the construction of Units 6 and 7. Any impacts from required mining should be discussed, particularly the impacts on Biscayne National Park or U.S. Air Force lands. (**0014-12** [Mueller, Heinz])

Comment: The allowance of rock mining in agricultural areas is subject to approval of an amendment to the Comprehensive Development Master Plan. FPL has filed an amendment; however no action will be taken by local government until October 2009. Approval of this amendment is subject to extensive informational requests which have not been provided through this application. Therefore land use/zoning consistency cannot be determined at this time. (**0023-3-2** [LaFerrier, Marc])

Response: *The impacts of the proposed offsite fill-source operation as a part of building proposed Turkey Point Units 6 and 7 will be considered in Chapters 4 and 7 of the EIS. The analysis of land-use impacts in Chapters 4 and 7 will address the general consistency of the proposed fill-source operation with applicable land use plans and regulations.*

Comment: Please verify whether all proposed road construction, including stabilization slopes, will fall within the road ROW's. How will proposed impacts, either direct or secondary, adjacent to private property and areas held under conservation easement be addressed? (**0023-3-54** [LaFerrier, Marc])

Response: *Environmental impacts associated with planned new roadways, as well as potential impacts associated with upgrades to the existing roadways, if required, will be addressed in Chapters 4, 5, and 7 of the EIS.*

Comment: Indicate which roadway improvements will be temporary and which will be permanent and specify the time-frames when each temporary roadway improvement will be restored to its previous, or better, condition. Although the applicant, FPL, indicates that all of the roadway improvements will be temporary, the County's Supplement to the Initial Recommendations Report for Application 6 states, "The [Miami-Dade County Planning] Department favors the dedication of the proposed roadway improvements as permanent facilities". Without clear identification of temporary and permanent roadway improvements, the District cannot identify all potential impacts. (**0032-33** [Golden, James])

Comment: Include the additional roadway improvements proposed under the Additional Access Option in the plan. The plan only addresses the roadway improvements proposed by FPL. It should be modified to include the additional roadway improvements under consideration that are referred to in the County's Supplement to the Initial Recommendations Report as the Additional Access Option. (**0032-37** [Golden, James])

Response: *Potential impacts associated with roadways will be addressed in Chapters 4, 5, and 7 of the EIS. The analysis will distinguish temporary from permanent roadway improvements. The review team does not advise the applicant on alternative roadway improvement plans; these decisions are made by the applicant and State regulatory bodies. Therefore, the choice of roadway improvements will not be addressed in the EIS.*

D.1.5 Comments Concerning Land Use – Transmission Lines

Comment: I'm mindful of the concern of many of my fellow cities north of us with the transmission line issue. Those issues do not pertain to the City of Florida City at all. However, I believe that it's good for us to understand, and I believe this is the fact, that with regard to transmission lines, it doesn't matter what kind of power source we eventually construct at the Turkey Point site. If we construct fossil fuel plants, a fossil fuel plant, that power will still have to be transmitted. Hence, the transmission lines will be necessary no matter the type of generation system we have there. So the transmission line issue is not a child of the nuclear reactor request. And I think we are going to have to figure out a way to take care of transmission regardless of the power source. (**0001-1-3** [Wallace, Otis])

Comment: Lastly, the plan calls for nearly 90 miles of new transmission corridors. NPCA is particularly opposed to the western corridor proposal which calls for the construction of more than 50 miles of power lines either within or adjacent to Everglades National Park. FP&L hasn't given any alternative plans that are acceptable with respect to the placement of these power lines, which are bad for migratory birds, parklands, and wetlands alike.
(**0001-15-4** [Cornick, Lance])

Comment: The impact that we are most immediately dealing with is the Florida Power and Light's transmission line process that they have undertaken from -- as a result of the Florida statutory framework. We are participating within that administrative hearing. And as a result of the environmental study indicating that you are also going to be looking at that as an indicator, we will be giving you some very specific information about the incompatibility and very adverse impact of the proposed alternate corridor along US-1. We have a process that we are a part of where we will be submitting an alternate corridor outside of the US-1 corridor for the siting of the transmission lines. (**0001-21-1** [Lerner, Cindy])

Comment: In addition, the US-1 corridor, as I said, is our only commercial area. And we are working towards plans -- you'll hear from my colleagues about the plans they have already implemented for the ability to take the US-1 corridor, which is our major transit, transportation, and commercial corridor, and over the course, the vision for Miami-Dade County for the future of the US-1 corridor is to create the opportunity for in-fill by having mixed use development along that corridor, encouraging people to move along the corridor and use the transit that is there as opposed to going out and having the sprawl that we are all fighting against. And preserving the urban development boundaries would require that we focus on mixed use development along US-1. Placing the power lines along that US-1 corridor would absolutely not only inhibit, it would destroy any commercial interest or developer in coming along and complying with that. (**0001-21-4** [Lerner, Cindy])

Comment: We're here to talk jobs. Just as the discussion is jobs in regards to the nuclear power plant such as with the siting lines, we're here to present a pro-business, a pro-job argument for why we need the least intrusive siting of these lines. Now, to a large degree we've been powerless in this regard because with the state statutes that govern siting, there's really no discretion that has been allowed within the different municipalities. In essence, we've been preempted and it's a state matter that will eventually go before the Cabinet if we get in front of the Administrative Law Judge. For the record, what I would like to bring and present to you on DVD's are the legislative actions that the various three municipalities have taken in regards to the US-1 Business District and the transmission sitings. And what these are are the resolutions as well as some of the charrette plans and the other actions that we've taken. Now, I would like to make that part of the record on behalf of the Village of Palmetto Bay, the town of Cutler Bay, and the Village of Pinecrest. (**0001-22-1** [Flinn, Eugene])

Comment: Why that's important -- and Mayor Vrooman will discuss in more detail those charrettes that he's been involved in, that we've been involved in in regards through Chambers South, a very important community partner, and the different cities, is one of the first things the Village of Palmetto Bay did in incorporating in 2002, was to attempt to put a rudder on an otherwise local economic area that was adrift. And we are attempting to bring jobs; we are attempting to bring sustainable development. And we believe that the record evidence from an economist and from our engineers, who is going to show that these siting lines have a severe risk in actually forcing sprawl. Why is that? Because they're going to render commercially useless some areas where significant work was done. What I would like to show as our first board here, is this is the Franjo Triangle Commercial Island charrette. And it is a wonderful vision for the community. And I think if you will take a look at this, this is primarily an economic center. It is a mixed use; it does include residential. But you're going to have quite a few jobs, small businesses, which is a huge component of our Miami-Dade County economy here. These lands will be rendered, from some of the information we've received, will be severely impacted by the siting of these lines basically going through them. These lines are incompatible. From what we've seen, these lines are more appropriate what you would see driving down Krome

Avenue and those areas that weren't seen fit to put through the areas 30 years ago, they're less fit to put through here now. (**0001-22-2** [Flinn, Eugene])

Comment: We are attempting to work with FP&L. It is an adversarial proceeding but we're attempting to work together. We have just passed resolutions, Pinecrest and Palmetto Bay, in regards to engaging an engineer to get us to the first section of this process and have our input. Because we believe there are better locations for these lines without adversely affecting the hard work that's been going on. You have three municipalities here that have done outstanding work since they're been incorporated. And Paul Vrooman, I don't -- maybe I should just yield the floor to you at this point. But our position at this time is that they are incompatible with the area. They could be rendered more compatible if we undergrounded them, which we understand the issues on that. But we're not sure we're getting the feedback or the recognition as to what our issues are. We do not want to render these plans obsolete. If you render these plans obsolete you are going to see no net gain in jobs for the South Dade area; you're going to see no net gain improvement; and the only thing you're going to see coming out of here is power for other areas. (**0001-22-3** [Flinn, Eugene])

Comment: Now, we have an opportunity to properly site these areas but that's not the plan on the board here. We have two other boards here. These are not from Palmetto Bay, Pinecrest, or Cutler Bay. But just to show you the charrettes that the South Dade area have been involved in in trying to revision this area, the Leisure City Naranja Lake charrette area plan. And, Paul, if you could talk about the goals and come up with your plan and the South Dade, too. Because we're trying to put together a comprehensive vision for South Dade. This is not a single city issue; this is a regional issue that affects the entire county. And we need to work together to find the least intrusive solution to this problem. And right now we're in a position to where we have to take this head on and try to get a result in the best interest of South Dade. And that's why we're opposing this at this time. (**0001-22-4** [Flinn, Eugene])

Comment: I'm proud to be here with my colleagues from Palmetto Bay and Pinecrest and to speak in opposition to the transmission line on US-1. I am not here to speak -- and my mind is not made up -- on the wisdom of the additional reactors. That is not the issue that I am authorized to bring here on behalf of my Town Council. However, I am authorized -- we do have a Resolution on our record that Mayor Flinn turned in that said that we do not feel that it is in the public interest to do transition -- transmission lines up US-1. (**0001-23-1** [Vrooman, Paul])

Comment: And the reason why I want to discuss that is an environmental factor. What is environmental impact? Is it just the impact that happens on the site; is it what happens adjacent to the plant; is it the footprint of the plant; or is it broader policy? Well, we've had discussions in this community on a regional basis about suburban sprawl, and about sprawl going out into places like the Everglades; something that our country is spending billions of dollars to try to mitigate and try to repair. So, if we are creating policies or -- that respond to that as our in-fill policies and our smart growth policies have done on a regional basis to combat that, which essentially means adding mixed use, urban in-fill, transit-friendly development on the US-1 corridor, and this plant results in a transmission line gutting that plan by running up US-1, then I see that as a very definite environmental impact. The impact of that transmission line won't be -- you won't be able to identify that on US-1 specifically. But I can tell you that when the next ring of homes and the next ring of development goes out into the Everglades because we have not provided an alternative to that on US-1, that will be directly because of these decisions that are going to be made, vis-a-vis this application. (**0001-23-2** [Vrooman, Paul])

Comment: I think that we've said that enough times but I do want to reflect that I do see this as an environmental issue. I do see this as effectively gutting the regional response from the county and all the municipalities up and down US-1 to come up with a response to suburban sprawl that is economic friendly. I think if you look at the boards around me, it's not hard to imagine the number of jobs that that will create that will come from that construction, that will come from the businesses that will be there, and it is much, much Greener, environmental friendly alternative growth patterns. And this will be very, very detrimental to our ability to make that come true. (**0001-23-3** [Vrooman, Paul])

Comment: I want to agree with the mayors of Palmetto Bay, Cutler Bay, and Pinecrest. We've done some incredible things on walkable areas along US-1. We should protect those and I do believe that should be in the scope. (**0001-24-6** [Harum-Alvarez, Albert])

Comment: Additional environmental destruction would involve their desire to put the transmission lines through Everglades National Park, because all the towns up US-1 don't want any more transmission lines. So where else do you put them? Well, you go tear up the Everglades and put them out there. (**0001-6-8** [Miller, Lloyd])

Comment: FPL's proposed transmission corridor will impact upon lands within Everglades National Park and the footprint of BBCW and seek to fill more than 300 acres of wetlands. In addition, the other proposed sites for these transmission lines is along the US-1 corridor which is very important for nodal growth as this is an area where public transportation exists. And if we don't develop along these nodal corridors, then this encourages sprawl which will, of course, affect Everglades and other wetlands. (**0001-7-5** [MacLaren, Kaitlin])

Comment: In closing, I also want to join the voices of the Mayors from Cutler Bay, Palmetto Bay, South Miami and Pinecrest, who object to the environmental impact of power lines along the US-1 corridor, which would destroy the plans of mixed use pedestrian and transit oriented development, compact urban form that holds the line on urban sprawl, and which in turn protects our Everglades and environmentally sensitive areas. (**0002-1-5** [Sorenson, Katy])

Comment: Power lines through Everglades National Park. That's another part of this licensing thing. The land that was purchased by the people of the United States in a place called the East Everglades Expansion Area, was purchased for one particular reason; the protection and restoration of that section of the Everglades, the Shark River Slough, the heart of the Everglades ecosystem. Now FP&L is planning to put three power lines through that National Park, the iconic National Park in Florida; 150 feet tall, 500,000 kilovolts each. And they're demanding that the Park turn over the eastern edge to them so they can put this thing in there. How do they get away with that? I looked at the documents at the beginning when that expansion area first came through. NPS looked at that corridor that they owned. They said, well, we valued the land, we can give you 100, $200,000 for it. When could you turn it over? That was 20 years ago, and now they're on the verge -- National Park Service is on the verge of turning this corridor, on the eastern edge of our Park, over to them. Not only is it going to create an industrial landscape for Everglades National Park, which will happen. 150 foot tall towers would be visible from Shark River Slough. (**0002-14-9** [Schwartz, Matthew])

Comment: The transmission lines along the US-1 corridor is a direct contradiction of what we, the leaders of these cities, have envisioned for an improved US-1 corridor which will allow us to go ahead and develop our communities in smart ways rather than going further into the Everglades. (**0002-2-2** [Meerbott, Tim])

Comment: Do not allow transmission lines to be run down US 1. This is a primary federal highway that runs directly through many south Florida cities. Please run these down our expressways and railway right of ways to prevent aesthetic loss of property values along our cities. (**0008-3** [Garcia, Preston])

Comment: Consider the full the impacts of construction of the transmission lines and related facilities as they relate to rights-of way issues, relocation of facilities and infrastructure, and provide the appropriate mitigation strategies. (**0019-5** [Hamilton, Karen])

Comment: Ensure the proposed transmission lines are compatible with existing and future uses in terms of mass, scale and height. (**0019-7** [Hamilton, Karen])

Comment: Consider how the placement of transmission lines along the more urbanized areas of the two proposed corridors will affect future opportunities to provide new transit features, the South Miami-Dade Busway or Metrorail expansion, greenways and pedestrian features, redevelopment projects, and scheduled roadway improvements (**0019-9** [Hamilton, Karen])

Comment: Provide contextual perspectives for both existing and proposed electric poles and supporting infrastructure to demonstrate that chosen technology and structures will be compatible with the surrounding land uses. (**0023-3-31** [LaFerrier, Marc])

Comment: Please provide a detailed description of the construction methodology that will be used to limit secondary impacts, especially along the linear infrastructure features. (**0023-3-52** [LaFerrier, Marc])

Comment: Potential impacts from the construction and operation of transmission lines and access roads in either the West Preferred or West Secondary Corridors include disruption of hydrologic flows; wildlife and habitat disruption; wetland plant community destruction; reduction of native plant species populations; adverse effects on threatened and endangered species and migratory birds; introduction of non-native, invasive species; air and water pollution; noise; impacts to cultural resources, adverse impacts to viewsheds and wilderness character; and degradation of park visitor experiences. A cultural resources survey should be performed to identify cultural resources in the two corridors and measures to avoid and minimize potential impacts. (**0025-2-10** [Kimball, Dan] [Lewis, Mark])

Comment: The EIS should evaluate the direct, indirect and cumulative effects of the transmission lines and related facilities needed to connect Units 6 & 7 to FPL's electric transmission system. (**0025-2-5** [Kimball, Dan] [Lewis, Mark])

Comment: The Western Transmission Line Corridor includes two options, a West Preferred Corridor option and a West Secondary Corridor option. Either option would include the installation of two 500 kV transmission lines, one 230 kV transmission line and related towers, guy wires, ground wires, fill pads, and access roads. Both corridors are partially located within the boundaries of Everglades National Park Expansion Area as shown in Fig 9.4-13 of the COLA Environmental Report. (**0025-2-7** [Kimball, Dan] [Lewis, Mark])

Comment: The NPS is conducting a wilderness study for the 109,500 acre ENP Expansion Area. This study evaluates lands for possible recommendation to Congress for inclusion in the national wilderness preservation system as required by the Wilderness Act of 1964. Construction of transmission structures and access roads in the West Secondary Corridor would result in 320 acres of lands not being eligible for wilderness designation. FPL's West Preferred Corridor runs through lands within the Expansion Area that may also be eligible for wilderness designation. The eligibility of lands adjacent to either corridor would be adversely affected by introducing visible man-made structures (such as transmission facilities), and introducing noise (from construction/operation/maintenance activities) that would adversely affect opportunities for solitude. (**0025-3-37** [Kimball, Dan] [Lewis, Mark])

Comment: Kingston Square Condominium is located at 9300 -9430 SW 77th Avenue and our street is the preferred route for FPL to erect 80 -100 foot transmission lines of 230 volts. This is an outrage! Ours is a quiet residential street of homes, condominiums, a Baptist Church with orphanage, and small businesses. (**0031-2** [De Villiers, Elena])

Response: *Environmental impacts associated with the planned new transmission corridors and roadways will be addressed in Chapters 4, 5, and 7 of the EIS, as will potential impacts associated with upgrades to the existing lines if required. The land-use impact analyses sections in Chapters 4, 5, and 7 will consider the compatibility of the proposed transmission lines and other offsite facilities with existing and proposed land uses in the affected areas and with land-use plans under consideration by State and local governments. The analyses will also consider potential impacts from the transmission lines and other offsite facilities on Everglades National Park, Biscayne National Park, and other affected public lands. The impacts of power lines on human health will be addressed in Chapter 5.*

Comment: FPL owns, and has owned since the 1960's and early 1970's, approximately 320 acres of undeveloped land within the Expansion Area (part of the West Secondary Corridor). Since the FPL Property is currently undeveloped and is needed for the restoration and enhancement of the ecosystem through improvement of natural hydrologic conditions, the NPS intends to acquire the FPL property and manage it as part of ENP and to maintain the FPL Property in its undeveloped natural condition. The NPS began negotiations with FPL in 1996 but to date the federal government and FPL have been unable to reach an agreement on the direct acquisition of FPL's property by the United States. (**0025-2-8** [Kimball, Dan] [Lewis, Mark])

Comment: As noted, in Section 9.4.3.1 of the COLA Environmental Report, the Omnibus Public Land Management Act of 2009 authorized the Secretary of the Interior to exchange 260 acres of NPS property within and along the eastern edge of the Expansion Area (part of FPL's West Preferred Corridor) for FPL's 320-acre property within the Expansion Area (part of FPL's West Secondary Corridor). The NPS lands being considered for exchange were acquired

by the NPS for the purpose of restoring the hydrology and ecology of the park. The exchange decision is left to the Secretary's discretion subject to conditions necessary for protection of resources, equalization of land values and evaluation of potential environmental impacts pursuant to the National Environmental Policy Act (NEPA). The NPS is currently preparing an environmental assessment regarding the potential exchange. At the conclusion of the NEPA process, the NPS will decide whether to exchange lands with FPL or to acquire the FPL property by direct purchase/eminent domain. There are many uncertainties regarding the exchange, and it is not a foregone conclusion that the NPS will decide to exchange lands. An NPS decision to acquire FPL's property, rather than exchange lands, would result in neither corridor within the Park being available for placement of transmission lines.
(**0025-2-9** [Kimball, Dan] [Lewis, Mark])

Response: *Potential land-use impacts of building and operating proposed Turkey Point Units 6 and 7 on the Everglades National Park, Biscayne National Park, and other parks and preserves, including impacts on wetlands within those areas and on threatened or endangered species, will be evaluated in Chapters 4, 5, and 7 of the EIS.*

Comment: The applicant must provide details on what other parties are filing alternate transmission line corridors, along with an explanation of how the process for approving transmission line corridors differs, including but not limited to obligations of other parties to meet applicable Conditions in Z-56-07, when FPL is not the applicant. (**0023-3-19** [LaFerrier, Marc])

Comment: The map series showing the transmission corridor locations do not differentiate between existing rights-of-way/easements and areas proposed. (**0023-3-20** [LaFerrier, Marc])

Comment: Maps and narratives do not demonstrate existing rights-of-way or existing certified corridors along the proposed east and west transmission corridor alignments.
(**0023-3-37** [LaFerrier, Marc])

Comment: Location of greenways/trails are not shown in map series showing preferred corridors or secondary corridors although the criteria in Tables W 9.3.1-4 and E 9.3.1-4 specifically state that the acquisition status of existing and proposed greenways was included in the Alternative Route Qualitative Evaluation Criteria. Please provide mapping of existing and proposed greenways. The Application does not address the Parks and Open Space System Master Plan prepared in compliance with Policy ROS-4 of the Recreation and Open Space Element of the CDMP and as approved by the Board of County Commissioners.
(**0023-3-62** [LaFerrier, Marc])

Comment: Materials provided are not sufficient to determine whether corridor alignments, construction techniques, and proposed pole designs will ensure protection of future inland wetlands, wellfield areas, and Natural Forest Communities from incompatible land use.
(**0023-3-63** [LaFerrier, Marc])

Response: *These comments refer specifically to the SCA submitted to the State of Florida by FPL, but they indicate an interest in the potential impacts of the proposed transmission lines. The review team will assess the potential impacts of the proposed transmission lines in Chapters 4 and 5, based on the affected environment described in Chapter 2.*

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of the Turkey Point FPL power station and its transmission lines on the environment, including any cost-benefit analyses, please provide them. (**0022-1-6** [Reynolds, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of construction and operation of the proposed Eastern Transmission Corridor and the proposed Western Transmission Corridor, on the environment, including any cost-benefit analysis, please provide them. (**0022-1-7** [Reynolds, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of construction or operation of the Clear Sky switchyard, the Davis substation, the Miami substation, the Pennsuco substation or the Levee substation in the future, including any cost-benefit analysis, please provide them. (**0022-4-5** [Reynolds, Laura])

Response: *The potential impacts of building and operating proposed Turkey Point Units 6 and 7 and associated offsite facilities, including transmission lines, on the environment will be addressed in Chapters 4, 5, and 7 of the EIS, based on the affected environment described in Chapter 2. The EIS will include citations for documents used in its preparation.*

Comment: We are limited in what we can do with underground lines, or overhead poles, or all of the things that are needed to get the transmission of the power to all of our communities. (**0001-25-5** [Horton, Richard])

Comment: Explore the alternatives of undergrounding and co-locating transmission lines with Metrorail. (**0019-10** [Hamilton, Karen])

Response: *The environmental impacts of building and operating the proposed transmission lines will be addressed in Chapters 4, 5, and 7 of the EIS. However, the review team does not advise the applicant on alternative designs of transmission facilities; these decisions are made by the applicant and State regulatory bodies. Therefore, issues related to possible underground transmission lines would ordinarily not be addressed in the EIS. However, the Corps of Engineers, and perhaps the National Park Service, will be cooperating with the NRC on the EIS. To the extent that a cooperating agency addresses such alternatives for its NEPA analysis, those alternatives would likely be included in this EIS in order to support the cooperating agency's environmental review.*

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Electrical Transmission Lines - The potential for the Preferred Corridors to adversely impact SFWMD-owned communications towers and radio matrix sites. In particular, the West Preferred Corridor is located very close to various SFWMD communications towers and radio matrix sites. Although FPL has indicated that they will work with the SFWMD to resolve any unlikely interference issues, they have not provided the SFWMD with adequate information to determine if or to what extent critical SFWMD-owned communications facilities may be impacted by the proposed transmission line facilities. The SFWMD advised FPL that it is unacceptable to wait until impacts have occurred to identify, design, permit, construct, and implement solutions, since this could substantially impact the SFWMD's ability to use these facilities to meet SFWMD flood protection and other critical emergency management responsibilities. (**0032-22** [Golden, James])

Response: *The impacts of operating proposed Turkey Point Units 6 and 7, including the impacts of the associated transmission lines, on community services, will be addressed in Chapter 5 of the EIS. The potential impact of transmission lines on radio signals used by local and regional agencies to perform their missions will be considered in preparing that chapter.*

D.1.6 Comments Concerning Geology

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of operation of the rock mining associated with the Turkey Point FPL power station on the environment in the past, currently, and in the future, please provide them. (**0022-1-14** [Reynolds, Laura])

Response: *Available information about the fill source will be provided in Chapter 3 of the EIS. The potential impacts of obtaining fill material on water resources will be presented in Chapter 4 of the EIS, based on baseline information on the affected environment described in Chapter 2. The cumulative impacts of the actions proposed by FPL to build and operate proposed Turkey Point Units 6 and 7 along with other past, present, and reasonably foreseeable future actions will be presented in Chapter 7.*

D.1.7 Comments Concerning Hydrology – Surface Water

Comment: And the one last thing I keep wondering about is, the nuclear power plants generate hot water; correct? What about desalinization, especially in areas like South Florida, to take that hot water and use it as part of a desalinization solution? (**0002-17-6** [Eney, Douglas])

Response: *The impact of effluents discharged from proposed Turkey Point Units 6 and 7 on water resources and ecological resources will be discussed in Chapter 5 of the EIS. The NRC does not advise the applicant on alternative uses of waste heat from a power plant; these decisions are made by the applicant and State regulatory bodies. Therefore, the comment related to alternative use of waste heat will not be discussed in the EIS.*

Comment: We also continue to be concerned about the saltwater intrusion into the Biscayne Bay that is being facilitated by the current cooling canals. The effects of the increased salinity are negatively impacting Biscayne Bay restoration efforts. (**0001-15-3** [Cornick, Lance])

Response: *The review team will assess and discuss baseline water-quality conditions within the affected environment in Chapter 2 of the EIS. The team will assess the impacts of building and operating proposed Turkey Point Units 6 and 7 on water resources in Chapters 4 and 5, respectively. The cumulative impact of the proposed action and other past, present, and reasonably foreseeable actions that have the potential to affect water resources will be discussed in Chapter 7.*

Comment: Water impact and the saltwater intrusion has been coming to Dade County -- I used to swim right there before the plant was built. I used to crab right there -- just south of there. I was a human bobber. My dad used to pull me behind the boat and used to go and dive and get crabs and all kind of fish. You don't see a lot of that now. But, is it the plant's fault? No. It's because Dade County has gone from 100,000 people to 1 million 9, or whatever our current is. And that impact is going to continue. It's not the plant that's causing the problem. Our water situation, with that mitigation of fresh water flowing out to the ocean, now you're going to have saltwater coming in; it's not the plant's fault. (**0002-12-4** [McHugh, John])

Response: *This comment refers to changes in baseline water quality and aquatic ecology in Biscayne Bay in the vicinity of the proposed units. The review team will present baseline water-quality conditions within the affected environment in Chapter 2 of the EIS. Predicated on this information, the team will assess the impacts of the proposed action on water resources in Chapters 4 and 5 for building and operating proposed Turkey Point Units 6 and 7, respectively. The cumulative impact of the proposed action and other past, present, and reasonably foreseeable actions that have the potential to affect water resources will be discussed in Chapter 7.*

Comment: Growing up in Florida I have seen firsthand our issue with water consumption and lack of water. Lately, reports of clean water becoming scarce is an issue being talked about by many world leaders. Half of the world's schools do not have access to clean water and 1.5 billion people do not have access to clean water either. We're taking water, one of our most precious natural resources, for granted by consuming so much through nuclear energy. Conserving water and our incredible ecosystems in Florida should be a main priority and a main influence for FP&L decisions. Nuclear power is very water-intensive and we'll only have problems in the future. It is not efficient as other options that Florida should be considering, such as solar and wind. (**0001-19-2** [Ryan, Megan])

Comment: But we also need to consider that the water they're going to be using, the 90 million gallons of water that they want to use to cool these plants, is about one-third of our grey water, and there are other alternatives that we could use for that. We could be using irrigation and other areas rather than just turning it over to FP&L. So I want them to consider the use of the water along with the impact it will have on the development of the US-1 quarter. (**0002-2-3** [Meerbott, Tim])

Comment: As a result, we request that the scoping that you're providing in the EIS present a very high level of detail in the water resource mass balance of both the hydrology and the water chemistries that we have in South Dade County to prohibit any negative impacts. We already have enough negative impacts, and last year was a good example. We had a drought that brought the surface water of the Biscayne aquifer down to zero, and as you know we can't keep it at zero too long with the saltwater head pushing inland. So, we need to do everything we can to protect our water resources and our water supply for our citizens. (**0002-3-4** [Walker, Tom])

Comment: What are the cumulative effects of radial collector wells on water conditions in Biscayne Bay, including salinity, flushing, clarity, water quality, localized temperatures, etc.? Further, what are the anticipated effects at increments of 25%, 50% and 100% of full implementation of this proposal? (**0018-12** [Poole, Mary Ann])

Comment: Radial Collector Wells: The application does not provide enough information on this technology and the current conditions at the locations of the radial collector wells for us to assess whether their construction or operation would have an impact on fish and wildlife resources. We wish to point out the highest priority for recovering the ecosystem health of Biscayne Bay is on addressing the negative impacts that water resource development and water management have had on the salinity regime of the Bay and its associated coastal wetlands, which provide important habitat for fish and wildlife resources. If radial collector wells, which are vertical wells that then discharge laterally via a series of pipes underground, would disrupt the groundwater system, which is closely tied to surface water (which in turn supports fish and wildlife resources) in this extremely porous karst area, this proposal would seem to be contrary to commitments made by the Governor's Office and U.S. Congress, which signed into law authorizations to restore Biscayne Bay (Water Resources Development Act of 2000 -see http://www.fws.gov/habitatconservation/omnibus/wrda2000. pdf). (**0018-7** [Poole, Mary Ann])

Comment: Whether the extraction of water from the Biscayne Bay system will change or reduce the freshwater inflow to the bay and/or increase salinity at least seasonally shall be examined through additional modeling as part of the application. (**0023-1-48** [LaFerrier, Marc])

Response: *The review team will assess the impacts of building and operating proposed Turkey Point Units 6 and 7 on the water quantity and quality of both local and regional water resources and identify mitigation measures proposed by the applicant to reduce adverse impacts. This assessment will consider current and future conditions, including changes in water demands to serve the needs of the future population, and changes in water supply. The review team will present baseline water quality conditions in the environment around the proposed site in Chapter 2 of the EIS. The impacts of building and operating the proposed units on water resources will be presented in Chapters 4 and 5 of the EIS, respectively. Cumulative water-use impacts will be addressed in Chapter 7 and cooling-water alternatives in Chapter 9.*

Comment: Florida Power and Light refers to plans to fill at least 70 acres of existing wetlands in the Miami Dade region surrounding Turkey Point. This fill could have devastating impacts on the surrounding environment and economy, as it would eliminate 70 acres of existing flood water storage during intense rainfall or hurricane. Filled wetlands can cause both on-site and off-site flooding [2], damaging the plant itself on property owned by Florida Power and Light, and also causing possible devastating damage to the surrounding communities, even possible loss of life. (**0007-6** [Burris, Jessica])

Response: *The environmental impacts of building and operating proposed Turkey Point Units 6 and 7, including the infilling of wetlands, on local hydrology and terrestrial ecology will be evaluated in Chapters 4 and 5 of the EIS. Safety issues related to potential floods are outside the scope of the environmental review, but will be evaluated by the NRC staff in its SER.*

Comment: If the scientists are correct, and they keep moving that global warming -- not global warming, but global sea level change up more and more because the glaciers of Greenland, of Antarctica, are melting. They are melting. You don't have to believe it or not. Look at the photos and look at it, look at the measurements and look at it. (**0002-14-14** [Schwartz, Matthew])

Comment: Sea level rise is a real and ongoing interesting element that we haven't had to deal with before that is going to be causing major challenges to our infrastructure. We would hope that FPL's proposed facility do not add any unintended consequences by moving millions of tons of dirt and moving waters around that could increase the potential impacts as a result of the already impacting sea level rise. (**0002-3-6** [Walker, Tom])

Comment: [L]ook ahead through the expected life of the new facilities, and should consider potential future conditions in the analysis, including a change in sea level. Sea level has been rising in this region since records were established, and could ultimately affect how the plant and associated facilities interact with the surrounding environment. Miami-Dade County recommends that the time period for projections of future conditions include the potential that the license would be renewable for a second operational period. This has been the case for the existing Units 3 and 4. Given FPL's operational record, there is no reason to assume otherwise for the proposed Units 6 and 7. (**0015-6** [Espinosa, Carlos])

Comment: A further 2-foot sea level rise by the end of the century, as projected in the 2001 IPCC report, would make life in south Florida very difficult for everyone. Spring high tides would be +4.5 to 5 feet above present mean sea level 3 q; storm surges would be higher; barrier islands, fill islands and low-lying mainland areas would be frequently flooded; salt water intrusion would restrict available freshwater resources; drainage would be more sluggish; Turkey Point would be an offshore island; and so on. (**0016-9** [White, Barry])

Comment: Please state all the projections for sea level rise used by the NRC. (**0022-1-4** [Reynolds, Laura])

Comment: No identification of sea level rise projections used to model the water management project provided. (**0023-3-59** [LaFerrier, Marc])

Comment: Other specific issues NMFS recommends for evaluation in the EIS or EFH assessment: 5. *Sea level rise*. Please include information in the EIS that evaluates potential seal level rise scenarios and how the project is being designed to mitigate these effects. (**0033-13** [Croom, Miles])

Response: *The review team will assess the impacts of building and operating proposed Turkey Point Units 6 and 7 on local and regional water resources and aquatic and terrestrial ecology. This assessment will consider both current and future conditions that affect the environment including sea level rise and mitigation measures identified by the applicant that could reduce adverse impacts. Impacts on water and ecological resources from building and operating the units will be discussed in EIS Chapters 4 and 5, respectively. Cumulative impacts will be addressed in Chapter 7 and plant design alternatives in Chapter 9. The period of consideration for environmental impacts is over the 40-year license period; under the NRCs environmental protection regulations (Title 10 of the Code of Federal Regulations [CFR] Part 51), which implement Section 102(2) of the National Environmental Policy Act of 1969, as amended (NEPA), if renewal of the operating license is requested, preparation of an EIS would again be required. Because license renewal is not certain to occur (or even to be requested), to include that extended period for environmental impacts would be speculative and outside the bounds of*

NEPA. Therefore, the assertion that the time period for projection of future considerations should include a second operational period is out of scope for this EIS.

Comment: Please state the amount of disruption to sheetflow of wetlands that the construction of units 6 & 7 will make including the plant site, all support facilities, all structures, all borrow pits (including rockmines) all fencing, all roads, all berms, all pipelines, all transmission lines, all basins, all parking lots, and all vehicle usage. (**0022-2-19** [Reynolds, Laura])

Comment: The application does not provide a description of the specific upgrades FPL proposes to satisfy this condition. A complete and detailed description shall be provided. In addition, FPL shall describe what sheet flow improvements, if any, are proposed within transmission corridors for which mitigation lift is being sought. (**0023-3-26** [LaFerrier, Marc])

Comment: Please resolve the apparent conflict between this condition and the stated intent to install roads in the transmission line corridors where no impediments to sheetflow currently exist, such as the portion of the West transmission corridor in Section 31 T57S R39E. (**0023-3-27** [LaFerrier, Marc])

Comment: The construction of proposed access roads to the new reactor facility will also impact the Biscayne Bay Coastal Wetlands Project by altering sheet flow that is important to the success of the Project. (**0025-2-17** [Kimball, Dan] [Lewis, Mark])

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Electrical Transmission Lines - The potential for adverse impacts to existing wetland slough systems, located within the vicinity of U.S. Highway 1, from new and/or improved fill roads associated with the West Preferred Corridor. East of U.S. 1, under the CERP Biscayne Bay Coastal Wetlands Project, additional surface water flows are to be diverted southward, through existing wetland slough systems in this area, to hydrate wetlands to the south, including wetlands in the SFWMD's Model Lands Basin area, and possibly the SFWMD's Southern Glades Basin area. The SFWMD is a partner with the USACE in this project. Even if culverts are installed, they are very poor at maintaining low head flows (i.e., sheetflow). West of U.S. 1, the corridor crosses the SFWMD's Southern Glades Save Our Rivers Parcel GR701-025. (**0032-23** [Golden, James])

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Electrical Transmission Lines - Regarding Water Conservation Area 3B, there are potential impacts related to the construction, operation, and maintenance of the proposed transmission line with respect to the SFWMD's legally mandated responsibilities for managing its lands within Water Conservation Area 3B. These lands were specifically acquired for water management-related purposes (i.e., flood control, water supply, conservation, reclamation, and other allied purposes) and are managed by the SFWMD and other agencies, including the U.S. Fish and Wildlife Service and the Florida Fish and Wildlife Conservation Commission, through special agreements for those purposes. (**0032-26** [Golden, James])

Response: *The review team's assessment of the impacts of building proposed Turkey Point Units 6 and 7 on the environment, including impacts on sheetflow associated with building* *roads, transmission lines, and other linear features, will be presented in Chapter 4 of the EIS. Cumulative impacts will be addressed in Chapter 7. The EIS will include citations for documents used in its preparation.*

Comment: Simulation should cover, at a minimum, the area bounded by SW 344th St in the north, Old Card Sound Road in the west, and the coastline in the south and east. The EPA-SWMM and XP-SWMM are recommended models to simulate the variety of structures within the area, in order to obtain hydrographs and pollutographs at selected points. The model should also simulate contaminant transport and dilution effect. Event simulations should be run to obtain the conditions before and after the proposed development, including the new inflow and loads from the proposed Administrative/Training Buildings, Parking area, and Reclaimed Water Treatment Facility. (**0023-1-13** [LaFerrier, Marc])

Response: *This comment refers specifically to the SCA submitted to the State of Florida by FPL, but it indicates an interest in the potential impacts of the building of the proposed units on local and regional water supply and water quality. Modeling data provided by the applicant will be reviewed and evaluated in the course of the development of the assessment. The assessment of the impacts on water resources from building proposed Turkey Point Units 6 and 7 will be presented in Chapter 4 of the EIS, based on information describing the affected environment in Chapter 2.*

Comment: Please provide drainage plans and associated calculations for the proposed access roads. (**0023-2-20** [LaFerrier, Marc])

Comment: The mitigation plan proposes to discharge wastewater into the Model Lands and to seek mitigation credit for this discharge. Since the area proposed for discharge is a sawgrass wetland, pollutant levels, including but not limited to nutrient levels, would need to be very low (e.g. less than 10 ppb phosphorous). The application, however, provides insufficient information on the treatment methodology, the resulting quality, volume, and timing of the discharge. The applicant shall provide complete and detailed water quality information for the proposed discharge water that is sufficient to determine whether the water quality of the proposed discharge water is sufficient to prevent degradation of the receiving wetlands. (**0023-3-43** [LaFerrier, Marc])

Comment: In order to have hydrologic improvements, with the exception of reclaimed water, water must be captured or diverted from other areas. Please describe in detail how the redirection of water will affect those donor areas, such as Biscayne Bay. Is there a loss of function from some areas associated with the diversion of water for the proposed hydrologic improvements? (**0023-4-1** [LaFerrier, Marc])

Comment: [T]he application does not provide sufficient information to evaluate the impact of these discharges on water quality of adjacent surface. (**0023-4-11** [LaFerrier, Marc])

Response: *These comments refer specifically to the SCA submitted to the State of Florida by FPL, but they indicate an interest in the potential impacts of the operation of proposed Turkey Point Units 6 and 7 on water availability, water quality, and terrestrial ecology. The review team's assessment of impacts on local and regional water resources and terrestrial ecology* *from building the proposed units will be presented in Chapter 4 of the EIS. Impacts from operation of the proposed units will be presented in Chapter 5. Cumulative impacts will be addressed in Chapter 7 and plant effluent discharge alternatives in Chapter 9.*

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of utilizing reclaimed water as supplied by M-D County to the Turkey Point FPL power station in the future, including any cost-benefit analyses please provide them. (**0022-1-8** [Reynolds, Laura])

Comment: [T]he COL proposes the use of tertiary treated wastewater as the primary cooling water supply source for Units 6&7.] Biscayne Bay is designated an Outstanding Florida Water and as such has a no degradation standard. The use of tertiary treated wastewater for cooling water would indirectly introduce PPCPs, surfactants, biocides, and EDCs into southern Biscayne Bay that were not present at the time of designation. (**0025-2-4** [Kimball, Dan] [Lewis, Mark])

Response: *These comments refer to the impacts of using treated wastewater as the primary cooling water supply for proposed Turkey Point Units 6 and 7. The impacts of the proposed units on local and regional water resources, including impacts related to using reclaimed water on water quality in Biscayne Bay, will be presented in Chapter 5 of the EIS, based on information describing the affected environment in Chapter 2 and plant design and operations discussed in Chapter 3. The EIS will include citations for documents used in its preparation.*

Comment: A lot has changed since this facility was originally sited here. You are about to undertake an analysis of a proposal to place two nuclear reactors on the shores of a bay that is the subject of a major Federal multi-billion dollar restoration project. The nature of the impacts that this project will have; water consumption, wetland loss that is sort of off the charts in terms of modern wetland permitting in Southeast Florida; habitat loss; impacts to hydrology in the way water moves, are the types of impacts that that multi-billion dollar Federal project is trying to reverse. And so the notion of coming in and bringing about water use impacts, that are unlike anything else known in South Florida, and wetland impacts that are kind of off the charts, just fundamentally is a major problem and doesn't really add up. The exacerbation of things that one arm of the Federal Government is trying to fix, doesn't make sense in the modern world. (**0002-6-1** [Grosso, Richard])

Comment: Will this project potentially interfere with the goals of the Biscayne Bay Coastal Wetlands Project (BBCW)? Please indicate how the applicant is coordinating with the BBCW team to ensure that the use of the radial collector wells will not hinder the success of the BBCW project. (**0018-11** [Poole, Mary Ann])

Comment: The application predicts the potential for additional salinization throughout the area as a result of the project by drawing salty water landward via the radial collector wells and from deposition of salts as a result of cooling tower operations. In contrast, the CERP BBCW project seeks to reduce salinity levels in and adjacent to Biscayne Bay to restore more natural estuarine conditions. No documentation is provided to examine the specific impacts to the area from additional salinization generally and for CERP consistency specifically. A study is needed that includes a salt budget and an examination of the cumulative effects of existing and proposed operations at Turkey Point including but not limited to the existing chloride plume created by the cooling canal system and the additional salts that would be added to the area as a result of the proposed project. The study shall also be sufficient to determine the extent to which the radial collector wells would capture, redirect, or otherwise affect groundwater from the existing plume emanating from FPL's Cooling Canal System. (**0023-3-39** [LaFerrier, Marc])

Comment: Narrative description of the timing and the approval process of the FPL water management project and the Alternative "O" CERP project, to ensure that both can and will likely be accomplished. Analysis by FPL, with cooperation from the SFWMD, on whether the incorporation of the water management project into the CERP process will alter or jeopardize the potential approval and funding of the CERP project not provided. (**0023-3-60** [LaFerrier, Marc])

Comment: The groundwater modeling is currently insufficient to effectively simulate impacts to the bay, or even to determine the percentage of fresh water from the aquifer, which would be removed from the ecosystem by the RCWs. Until it can be satisfactorily determined that the RCW system will not remove aquifer water, this plan appears to conflict with the CERP Biscayne Bay Coastal Wetlands project. (**0025-2-15** [Kimball, Dan] [Lewis, Mark])

Comment: Construction of infrastructure associated with transmission lines and access roads in either corridor would result in the permanent filling of over 100 acres of wetlands. Direct and indirect effects of filling need to be included in the evaluation of impacts resulting from this project. In particular, installation of additional access roads in either corridor would create new barriers to flow in a critical portion of northeast Shark River Slough. This area is a focal point of Modified Water Deliveries (MWD) and CERP restoration projects designed to restore natural flow to that area. In addition, modification of the existing L-31 N levee in the western preferred corridor to provide access to proposed transmission lines would create an impediment to the natural north to south flow of water in the area. Access roads, even if culverted, will result in reduction of surface water flow critical to maintenance of ENP wetlands. This is in direct conflict with one of the critical components of hydrological restoration under CERP. The impacts of this flow reduction on park wetland resources and on MWD and CERP restoration projects that are underway or planned needs to be evaluated. (**0025-3-35** [Kimball, Dan] [Lewis, Mark])

Comment: Construction, maintenance and vegetation management in either transmission line corridor identified by FPL would result in impacts to ENP water quality through soil disturbance and/or the introduction of chemical pesticides. These impacts need to be evaluated. (**0025-3-36** [Kimball, Dan] [Lewis, Mark])

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Radial Wells and Construction Dewatering Withdrawals at Power Plant Site - The potential for the proposed withdrawals to adversely impact the CERP Biscayne Bay Coastal Wetlands project. (**0032-10** [Golden, James])

Comment: Proposed Project may result in adverse impacts to: The Biscayne Bay Coastal Wetlands CERP Project -This project will replace lost overland fresh water flow and partially compensate for the reduction in groundwater seepage by redistributing, through a spreader system, available surface water entering the area from regional canals. The goal of this project is to improve the ecological health of Biscayne Bay (including freshwater wetlands, tidal creeks and near-shore habitat) by adjusting the quantity, quality, timing, and distribution of freshwater entering Biscayne Bay and Biscayne National Park. Redistribution of freshwater flow and the expansion and restoration of wetlands will help to restore or enhance freshwater wetlands, tidal wetlands, and near shore bay habitat. The project, located in southeastern Miami-Dade County, includes pump stations, spreader swales, stormwater treatment areas, flowways, levees, culverts, and backfilled canals. The project covers 13,600 acres along the L-31 E Canal. The purpose of the project is to capture, treat, and redistribute freshwater runoff from the watershed going into Biscayne Bay, creating more natural water deliveries and expanding the spatial extent and connectivity of coastal wetlands and improving recreational opportunities. (**0032-2** [Golden, James])

Comment: Proposed Project may result in adverse impacts to: The L31 N (L-30) Seepage Management Pilot CERP Project -This project, located along a portion of the L-30 levee north of U.S. Highway 41 in Miami-Dade County, will help resolve critical uncertainties associated with seepage management, including the characterization of the Biscayne aquifer hydrodynamics, constructability in south Florida geology, reliability of materials and technologies, feasibility of implementing a seasonally flexible operating system, appropriateness of monitoring to evaluate effects on seepage, and cost and time requirements necessary for implementation. The recommended plan will test two structural seepage reduction technologies (steel sheet pile and slurry wall), and will test the ability to seasonally manage seepage flows through pumping operations with the use of extraction and injection wells. Field tests, seepage reports, and historical data independently show that this is one of the most transmissive parts of the Biscayne aquifer. (**0032-3** [Golden, James])

Comment: Provide assurance that the proposed roadway improvements will be designed to be compatible with CERP Biscayne Bay Coastal Wetlands Project Alternative "O". The amendment does not demonstrate how the proposed roadway improvements will be designed to be compatible with CERP Biscayne Bay Coastal Wetlands Project Alternative O. Under Alternative O, additional surface water flow :(sheetflow) is to be diverted southward, through existing wetland slough systems, into environmentally sensitive lands located south of Palm Drive (S.W. 344th Street), generally between the District's L-31E Canal and U.S. Highway 1. Under this amendment, several new roadway improvements are proposed that could interfere with the proposed sheetflow. Prior, to adoption, the amendment should be revised to include policies, strategies, and commitments to ensure that the appropriate engineering analyses are conducted and any proposed drainage features, including culverts, be designed, sized, and spaced to handle existing and proposed flows. (**0032-34** [Golden, James])

Comment: Proposed Project may result in adverse impacts to: The South Dade C-111 Project and Modified Water Delivery Project to Everglades National Park (Modwaters) -This project will modify the existing water management infrastructure to improve water deliveries to Everglades National Park (ENP). Changes are being made to Water Conservation Area 3A/3B levees and canals to redirect water flow into Northeast Shark River Slough in and around the proposed new Florida Power and Light (FPL) Turkey Point Units 6 & 7 transmission line corridors. Current water management actions focus on re-establishing sheet flow into ENP by removing barriers such as the Tamiami Trail road and replacing it with a bridge. Future water management changes will increase the volume of water introduced and distributed into Northeast Shark River

Slough. Additional changes are being implemented along the Lower C-1 11 Canal to promote rehydration of Taylor Slough and northern Florida Bay in the southern limits of ENP. A series of detention areas are being constructed west of the L31N Canal to provide storm water detention and create a hydrologic barrier between the managed canal levels and the Everglades marsh. Water levels will be managed at higher levels within the detention areas to create a positive hydrologic head and reduce seepage from ENP. (**0032-4** [Golden, James])

Comment: Proposed Project may result in adverse impacts to: Decompartmentalization of Water Conservation Area 3A/3B -This is a CERP project and a companion to the South Dade C-1 11/Modwaters Project promoting removal of existing levees and canals impacting sheet flow into ENP. Future changes include removal of existing canals, levees, and structures separating WCA 3A/3B and ENP, such as removal of the Miami Canal within WCA 3A, removal of the L-67A/C levee segments, and additional bridging of Tamiami Trail together with the removal of the L-29 containment levee. (**0032-5** [Golden, James])

Comment: In addition to the potential for significant adverse impacts to specific restoration projects, the SFWMD is concerned about the potential for significant adverse impacts that relate to its overall mission to manage the water resources of the State located within the SFWMD's geographic boundaries. (**0032-6** [Golden, James])

Comment: Other specific issues NMFS recommends for evaluation in the EIS or EFH assessment: 4. *Biscayne Bay Coastal Wetlands (BBCW)*. Please describe any potential conflicts this project may have with the restoration goals of BBCW. Please indicate how FPL and NRC are working with the BBCW team to ensure that any expansion at Turkey Point will not hinder the success of the BBCW project. (**0033-12** [Croom, Miles])

Response: *These comments refer to interactions between the proposed action and regional projects, including CERP projects. The review team will assess the impact of proposed Turkey Point Units 6 and 7 on local and regional water resources and aquatic and terrestrial ecology. Assessment of the impacts of building and operating the proposed units on water quality and ecological resources will be presented in Chapters 4 and 5 of the EIS, respectively. Cumulative impacts, including interactions with CERP and other restoration efforts, will be addressed in Chapter 7.*

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Additional Construction Impacts at Power Plant Site - The potential for adverse impacts to Biscayne Bay associated with the proposed barge canal dredging. (**0032-13** [Golden, James])

Response: *The impacts of the proposed action on hydrology and water quality in Biscayne Bay, specifically the impacts related to dredging of the barge canal (barge-turning basin and barge-unloading area), will be presented in Chapter 4 of the EIS. The impact assessment in Chapter 4 will be based on information describing the affected environment in Chapter 2 and plant design and operations discussed in Chapter 3.*

Comment: The NRC needs to acknowledge that this area is an extremely sensitive hydrological environment. The history of the Everglades and the current costly restoration projects illustrate the long-term shortsightedness that has scarred Florida's waterways. (**0001-14-6** [Hancock, Mandy])

Comment: The new reactors will require more fresh water for cooling and there's already a shortage of water in the natural system. So, although the comprehensive Everglades Restoration Plan plans to provide reused water to help restore Biscayne Bay, the two new reactors would require additional water as well. This plan puts Florida Power and Light development in competition with Everglades Restoration and we think restoration has had enough competition already. (**0001-15-2** [Cornick, Lance])

Comment: The water use is massive. Biscayne Bay restoration is all about fixing the problem that we don't get enough fresh water into the bay anymore. So the notion that you would add this type of fresh water consumptive use right there at that same location, is incredibly troubling. We haven't figured out how we're going to get the amount of fresh water back into the bay that we need to make it work again. This water demand could absolutely preclude ever getting that done. (**0002-6-2** [Grosso, Richard])

Comment: Sixty billion gallons of water is the last statistic that I heard that would be needed per day. That's way too much water. And I also heard that it would be warmer after use, going into the cooling and going back into our water. And just a small degree change can definitely affect all of our wetlands and things here. (**0002-8-5** [O'Katy, Jessica])

Comment: [T]he new nuclear power plants will require more than ninety million gallons of fresh water a day to cool the reactors, causing severe problems to the already water restricted Southeast Florida. (**0012-10** [Payne, Nkenga])

Comment: THERE IS NOT ENOUGH WATER IN THE AREA TO SUPPORT TP 6&7! (**0016-11** [White, Barry])

Comment: The required amounts of water needed to operate the reactors is beyond the capability of the water supply in South Florida. I am presently restricted from certain water use. What will be my future if these reactors are allowed to be built? How much potable water will be needed to support the doubling of the plant without the reactors? (**0027-5** [Moses, Dorothy])

Response: *The impacts of building and operating proposed Turkey Point Units 6 and 7 on consumptive water use and cooling water discharge for both local and regional water resources will be presented in Chapters 4 and 5 of the EIS. Cumulative water-use impacts will be addressed in Chapter 7 and cooling water alternatives in Chapter 9.*

Comment: Table 4.6-1 states that occasional surface water overflow/run-off from deep well injection wells would be directed to the Cooling Canal System. This would cause infiltration of wastewater constituents, including EPOCs, to the Biscayne Aquifer and subsequently to Biscayne Bay via subsurface flow. Wastewater migration to the bay would negatively impact the flora and fauna of the nearshore habitat due to the release of nutrient and microconstituents (i.e., EPOCs), which requires further consideration. (**0025-3-15** [Kimball, Dan] [Lewis, Mark])

Response: *Table 4.6-1 indicates "The deep injection wells and the required monitoring wells would be installed in accordance with an FDEP injection well permit and any local permit* *requirements. During the construction of the injection wells and associated equipment, any surface water runoff would be directed to the cooling canals of the industrial wastewater facility." During construction, wastewater constituents will not be present at the well sites and so would not be discharged to the Cooling Canal System. The impacts of constructing the injection wells will be presented in Chapter 4 of the EIS.*

D.1.8 Comments Concerning Hydrology – Groundwater

Comment: As Mayor of the Village of Pinecrest and a former legislator, when I did serve in the House of Representative in the Florida Legislature, I had an opportunity to learn about and really come to grips with some of the potential for contamination and impact on the Floridan aquifer and the Biscayne aquifer, and I've been very attentive to that ever since, the concept of placing deep well injection. And back in the year 2001, there was an effort by the State and the Legislature and the Water Management Districts, to inject untreated storm water into the aquifer, and that actually passed the Florida Senate. We had to go back and undo it and we killed that legislation. I have been very involved in supporting the sustainability and the comprehensive Everglades Restoration Project ever since. (**0001-21-2** [Lerner, Cindy])

Comment: And what will 70 million gallons of hot water do each day that they will have to get rid of? Where do you put 70 million gallons of water each day? You can't pump it down into the same place you're getting your cooling water from. If they got their cooling water from the sewage treatment plant then they would want to dump the hot water down into the boulder zone. Nobody has any idea what that would mean. We know that with sewage we pump way down deep into there offshore is now coming back up in Biscayne Bay and elsewhere. Also, that hot water is slightly radioactive. (**0001-6-6** [Miller, Lloyd])

Comment: FPL proposes to inject 40 million gallons a day of waste in the boulder zone, a layer of the lower Floridan aquifer. And we are -- as the previous speaker mentioned, we are really unclear what the effects of this might be. (**0001-7-10** [MacLaren, Kaitlin])

Comment: Please state the amount of waste seepage, by volume, into drinking water aquifers from deep well injection for units 6&7. (**0022-2-13** [Reynolds, Laura])

Comment: To the extent that you are aware of any of any consent decrees or administrative orders or settlements concerning underground injection control wells in Florida, please provide them. (**0022-2-8** [Reynolds, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of operation of underground injection control wells in the South Florida area, please provide them. (**0022-2-9** [Reynolds, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of the deep well injection of wastes exceeding the capacity of the wastes reservoir, please provide them. (**0022-4-6** [Reynolds, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to the maximum geographical extent of the deep well injected waste reservoir for the duration of the operating license, please provide them. (**0022-4-7** [Reynolds, Laura])

Comment: The application does not address any proposed treatment of biocide additive in the cooling waters, and how biocides are removed before reinjection into the proposed deep wells. (**0023-1-15** [LaFerrier, Marc])

Comment: Given the high evaporation rate, the concentrations of the analytes leaving the cooling tower system will be significantly higher that the concentration of those analytes entering the system. Considering that the final discharge point of the cooling system blowdown water is proposed to be the boulder zone (via underground injection wells), projected water quality characteristics for the blowdown must be provided. (**0023-1-7** [LaFerrier, Marc])

Comment: The application proposes the discharges of industrial wastes from several sources to injection wells. No information was provided to ascertain compliance with the applicable discharge standards. No information was provided to show that no treatment is necessary or that contamination will not result from such discharges. (**0023-1-9** [LaFerrier, Marc])

Comment: The primary source of cooling water is supposedly reclaimed water from Miami-Dade Water & Sewer Authority. The daily flow rate for cooling is supposedly 60mgd. The EIS should confirm that the cooling water concentrate from the reclaimed water source will be disposed of in the boulder zone through a class one deep injection well. Similarly, if the Floridian Aquifer water is used for cooling, concentrated brine reject should be disposed of in the deep well injection system in the boulder zone. (**0024-6** [Walker, Tom])

Comment: Current hydrologic knowledge regarding underground injection into the Boulder Zone suggests that the porosity and permeability in the Floridan can vary greatly depending on the location and formation. A history of dual zone groundwater monitoring results from the Miami-Dade County South District Wastewater Treatment Plant shows evidence of wastewater contaminant migration into the Upper Floridan. Upon the submittal of the pending USGS groundwater underground injection investigation for this region, it may be soon proven that the geology of the injection zone is incapable of confining the volume of injected sewage. These same concerns seem applicable to this project and the very large amount of discharged fluids intended to be injected. The Upper Floridan supplies make-up cooling water for existing Unit 5. Based on the above discussion, a similar breach of the Boulder Zone is possible and would compromise the water supply quality of Unit 5. (**0025-3-21** [Kimball, Dan] [Lewis, Mark])

Comment: An even more frightening scenario is FPL's intention of using injection wells for radioactive wastewater. I do not believe this has ever been done before. Can the NRC guarantee these waters will not percolate back up into our water supply or into our coral reefs or marine environments or national parks or my backyard? Does anyone know with complete certainty where this radioactive waste may end up? (**0027-7** [Moses, Dorothy])

Response: *The impacts on the Biscayne and Floridan Aquifers from deep well injection to the Boulder Zone will be assessed by the team and discussed in Chapter 5 of the EIS. The* *cumulative impacts of the proposed injection and other past, present, and reasonably foreseeable actions will be presented in Chapter 7.*

Comment: Secretary of Interior, Stewart Udall, took the federal court -- took FPL to federal court and forced them to construct an enormous cooling canal system, closed circuit cooling canal system. It's so big it can be seen from space. And it now contains super saline water and it has now penetrated and started to move in toward the farmlands and the tree farms. (**0001-6-3** [Miller, Lloyd])

Comment: The Draft EIS should disclose/summarize results from all recent hydrologic studies and on-going assessments of the existing cooling canal system being utilized by Florida Power & Light Company's (FPL) for Turkey Point. EPA has met with National Park Service (NPS) officials from the Biscayne National Park regarding their concerns with the existing cooling canal system and its contribution to salt water intrusion in the South Miami-Dade area. NPS is concerned that the planned increased electric output from the existing units and the construction of two new nuclear reactors may exacerbate the salt water intrusion. This has raised concerns about adversely affecting local potable water supplies and the on-going Everglades restoration efforts. (**0014-5** [Mueller, Heinz])

Comment: The Draft EIS should address concerns by agencies that the canal system has created a very warm and "hypersaline" water that sinks and spreads into the Biscayne Aquifer below. (**0014-6** [Mueller, Heinz])

Comment: Water quality data summarized in Table 3.3.4-2 is not sufficient to fully assess the hydrologic characteristics of the cooling canal system. Cooling canal system is complex hydrology and includes interaction with Bay and groundwater (Section 3.3.2.1), and as such may have temporal and spatial variability. (**0023-1-67** [LaFerrier, Marc])

Comment: Data indicate that migration of the cooling canal system water is impacting adjoining surface and groundwater in the vicinity of the cooling canal system. (**0023-4-10** [LaFerrier, Marc])

Comment: [The Florida Keys Aqueduct Authority has] concerns for any potential impacts to our water supply. As the proposed project is significant in size and nature, conducting a comprehensive EIS to address key concerns and impacts to the natural resources is a necessary part of the evaluation process. It is our understanding that FPL's existing cooling water canal system, located west and south of the power plant contains high salinity concentrations. This high salinity is derived from evaporation of natural sea water discharged within these cooling water canals. As the highly concentrated seawater enters the groundwater along the bottom and the sides of the canals, the receiving groundwater becomes more saline. Without adequately operating system controls, this hydrogeological process can continue with a resultant salt load into a fresher groundwater aquifer. The higher saline groundwater with a higher specific gravity can increase the rate and amount of salt water intrusion from east to west in the Biscayne Aquifer and toward the FKAA wellfield. (**0024-1** [Walker, Tom])

Response: *The impacts of the cooling canals of the existing Turkey Point units on groundwater near the plant are in general outside the scope of the current EIS, which will assess the impact* *of building and operating proposed Turkey Point Units 6 and 7. To the extent that the building and operation of the proposed units interact with the cooling canals, the building impacts will be presented in Chapter 4 and the operations impacts will be presented in Chapter 5 of the EIS. The cumulative impacts of the proposed units and the existing units, to the extent that they impact the same resources, will be presented in Chapter 7.*

Comment: We have an impact for water, we have an impact for saltwater intrusion. But don't we have that naturally? (**0002-12-1** [McHugh, John])

Comment: When I moved out to my house -- I live west of Krome Avenue -- I could drink the water right out of my well, and that was fine for over 20 years. And then about 10 years ago they decide -- I used to have 4 houses to my block, okay, about 1 square mile. Now I have about 50 or 60 houses to my block. My water supply is not the same now. The quality of water is not the same as it was 10 years ago before those houses were built. See? And it's not any difference except now there's 40 or 50 more people in the area drawing off that same aquifer that there was only 4 before. (**0002-12-6** [McHugh, John])

Comment: The agriculture out there uses massive amounts of water. Okay. When I lived out there for 20 years agriculture used massive amounts of water. We didn't have bad quality of water. Okay. The water was there, it was used, reached right under the ground. (**0002-12-9** [McHugh, John])

Response: *The impacts of saltwater intrusion on baseline water quality in the vicinity of the proposed plant will be discussed in Chapter 2 of the EIS. The impacts of the proposed action on water resources will be discussed in Chapters 4 and 5 for building and operating the units, respectively. Projects that have the potential to interact cumulatively with the operations of the proposed units and affect water resources will be discussed in Chapter 7.*

Comment: The Florida Keys primary water supply comes from a well field that is within ten miles of the proposed project. That's the well field itself. The actual aquifer that draws water into the well field is all around where we are. It's a very open, porous, surficial aquifer that's very vulnerable, very sensitive to wants and needs and with water chemistry in and about the land uses in South Dade County. Not just our well fields, there's well fields for Florida City, Homestead, and many other private and public systems in South Dade County that are within this region, some closer, some further away than ours, to the proposed project. (**0002-3-1** [Walker, Tom])

Comment: Saltwater intrusion is a real issue to the Biscayne aquifer. We've seen the saltwater front line move over time inland. We have a huge number of monitoring wells as sentinels to help keep an eye and monitor the chemistries in the Biscayne aquifer. We have seen the intrusion exacerbated by existing operation at the existing FPL facility. One of the prior speakers mentioned high density saline water from the cooling canals. And that's been studied to some degree, however, the transparency of seeing the data is not as good as we would like from the applicant. (**0002-3-2** [Walker, Tom])

Comment: We understand also that the proposal included potentially huge amounts of borrow excavation in and around the facility. Also, a huge amount of reclaimed water to be used as cooling. Both of these elements are going to change potentially the hydrology and the water chemistry in and around the area. (**0002-3-3** [Walker, Tom])

Comment: And the final point I'll make is about saltwater impacts. One aspect of Everglades and Biscayne Bay restoration is about ecology. The other aspect is about South Florida's drinking water supply. We've had major drinking water crises. We've had development moratoriums because of a lack of drinking water. Saltwater intrusion is a major problem. Saltwater intrusion, if it contaminates drinking water is not just an environmental problem, but it's a sound growth into the future development problem for South Florida. It's not a risk that a place like South Florida that already has major droughts and already has major drinking water shortages can afford to take. So, that's an unacceptable risk. The unacceptability of that risk ought to be considered strongly. (**0002-6-9** [Grosso, Richard])

Comment: I'd like to ask that you please look at the protection of our wetlands and our national parks, and be careful of saltwater intrusion in our aquifers. It doesn't seem like that when we're going to be drilling for more fresh water that we need here, as well as filling acres, what we have wetland restorations for now. (**0002-8-4** [O'Katy, Jessica])

Comment: Water resources issues associated with this project include protection of water quality and the Biscayne Aquifer. The Biscayne Aquifer is a sole source aquifer providing high quality drinking water throughout Miami-Dade and Monroe Counties. Protection of this aquifer from contamination by chlorides and sodium from saline water sources is key to ensuring the continued ability to deliver safe drinking water from public well fields in Florida City and Homestead as well as from the Florida Keys Aqueduct Authority Navy Wells facility. The EIS should include an assessment of the potential impact of the project on water resources in this area. (**0015-2** [Espinosa, Carlos])

Comment: There is already salt water intrusion into the area to the west of TP. Not only is this a threat to the rock in the area, you cannot use rock for building if it has salt water in it, but to the water supply. TP 3&4 have already increased the salinity in the area; the cooling canals are twice the density of sea water. Any operation of TP 6&7 which will increase salinity could force the need for desalinization to produce potable water. (**0016-8** [White, Barry])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of the Turkey Point FPL power station on groundwater (quality or quantity), please provide them. (**0022-1-1** [Reynolds, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of operation of the Turkey Point FPL power station on the Biscayne Aquifer, in the past, currently, and in the future, please provide them. (**0022-1-21** [Reynolds, Laura])

Comment: Please state the amount of disruption to groundwater flow and the salt front that the construction of units 6&7 will make including the plant site, all support facilities, all structures, all borrow pits (including rockmines,) all fencing, all roads, all berms, all pipelines, all transmission lines, all basins, all parking lots, and all vehicle usage. (**0022-2-20** [Reynolds, Laura])

Comment: Please state the worst case scenario and the worst timeline projection, as a result of hydrologic changes from units 6&7 for salt water intrusion affecting the municipal wellfields of Miami- Dade County, the City of Homestead, the City of Florida City, the Florida Keys Aqueduct Authority, and private well users. (**0022-3-2** [Reynolds, Laura])

Comment: Please state what protective measures will be taken to prevent salt water intrusion, as a result of hydrologic changes from units 6&7, to the municipal wellfields of Miami-Dade County, the City of Homestead, the City of Florida City, the Florida Keys Aqueduct Authority, and private well users. (**0022-3-3** [Reynolds, Laura])

Comment: [T]he effect that the proposed facility would have on surface and groundwater quality, and groundwater table elevation within the C111 Basin (Model Land Area). Furthermore, any model used for evaluation of this project should be able to predict changes, if any, in the contaminant concentrations; in the water table elevations; and in the salinity wedge movement under different scenarios (baseline and post-construction conditions, for a wet, dry, and average year, etc). Models should combine groundwater with surface water and contaminant transport, and shall include the effect of the difference in densities between salt and fresh water. In addition, the area in the model should be large enough to avoid any boundary-induced bias; boundary conditions could be taken from South Florida Water Management District regional models. EPA authorized models, such as MODFLOW, MODPATH, and FEMWATER should be considered for use in this study. Another possible model would be the FEFLOW, which combines the groundwater contaminant transport (MODFLOW and MODPATH capabilities) with the two density fluids wedge salinity difference (FEMWATER capability). (**0023-1-14** [LaFerrier, Marc])

Comment: [A] DERM approved hydrologic study and its results shall be provided that evaluates all impacts to surface and groundwater. This study should include consideration of seasonal differences in groundwater flow cited in Section 3.3.3.2 and determine the extent to which these differences are due to current operations at Turkey Point. (**0023-3-47** [LaFerrier, Marc])

Comment: The FKAA requests that additional ground water modeling and monitoring be presented at the current salt/fresh water interface of the Biscayne Aquifer. As you see in the attached ground water monitoring plan, a trend has been shown and interface presented in collaboration with the USGS and Miami-Dade County to demonstrate the current interface location and its movement. For the EIS, modeling of potential changes to the interface position of this salt/fresh interface resulting from the proposed impacts from the construction and operation of the facility is requested. (**0024-3** [Walker, Tom])

Comment: A robust, peer-reviewed hydrologic modeling analysis is essential to fully incorporate regional and site specific conditions in the vicinity of Turkey Point. The Biscayne Aquifer has a unique lithology and consists of a karst substrate with very high transmissivity. This surficial aquifer is hydraulically connected to nearby man-made surface water bodies, which has a profound impact on model construction. FPL's current groundwater model fails to simulate actual or planned conditions that include: seasonal and temporal variability, hypersaline plume migration, Biscayne Aquifer heterogeneity, and CERP project implementation. NPS does not believe the COL sufficiently analyzes or evaluates these hydrological and estuarine issues. (**0025-2-1** [Kimball, Dan] [Lewis, Mark])

Comment: Given the sensitive designation of the adjacent surface water body, Biscayne National Park, a horizontal pilot test, including a tracer study, should be considered as a critical design feature and would be more representative of actual full-scale RCW operation than a limited scope vertical pump test. (**0025-3-1** [Kimball, Dan] [Lewis, Mark])

Comment: The new hypersaline plume delineation and hydrogeologic data collected as part of the well drilling and logging for the Uprate Project for Turkey Point Units 3 & 4 should be incorporated in the groundwater modeling and planning for evaluation of the effects of the RCWs. (**0025-3-10** [Kimball, Dan] [Lewis, Mark])

Comment: The groundwater model should reflect implementation of CERP project features. (**0025-3-11** [Kimball, Dan] [Lewis, Mark])

Comment: The Biscayne Aquifer is an unconfined surficial aquifer that has a fragile karst macroporosity substrate. A comprehensive geological survey should be performed for the proposed locations of the RCWs (Turkey Point peninsula) to identify voids or cavities in the aquifer substrate. Soil borings that were performed as part of the 2009 pump test are not aerially sufficient to represent a known dual porosity karst limestone aquifer. (**0025-3-12** [Kimball, Dan] [Lewis, Mark])

Comment: Contingency plans should be established should a karst fracture occur during the construction or operation of the RCWs. (**0025-3-13** [Kimball, Dan] [Lewis, Mark])

Comment: Even based on the rather dubious groundwater modeling provided, FPL is proposing to remove 8% of the total withdrawal from the aquifer, which equals approximately 10 million gallons of groundwater daily. Pursuant to the Resolution (No. Z-56-07, conditions 4 & 5) of the Board of County Commissioners of Miami-Dade County, FPL shall not apply for any water withdrawals from the Biscayne Aquifer as a source of cooling water for the proposed facilities, and shall use reclaimed or reuse water to the maximum extent possible. This consumptive water use conflict must be resolved. (**0025-3-14** [Kimball, Dan] [Lewis, Mark])

Comment: The effects of dewatering on the Biscayne Aquifer (e.g., hypersalinity plume migration, salt water intrusion, etc.) during plant construction were based on the dubious current model, and warrants further evaluation. (**0025-3-16** [Kimball, Dan] [Lewis, Mark])

Comment: Drilling through karst limestone can cause a bay bottom collapse or a cavity could be encountered that would be significantly closer to the surface than anticipated. A structural collapse due to macroporosity features of the Biscayne Aquifer (i.e., dual porosity) or drilling through existing touching-vug preferential flow zones or large karst features would alter the potential velocity of flow through the RCW. Flow in this case would be substantially higher than anticipated. These types of macrokarst features have been found in drilling the wells for the Units 3 & 4 Uprate project, and should be reflected in the groundwater model. (**0025-3-2** [Kimball, Dan] [Lewis, Mark])

Comment: The groundwater model (FSAR Section 2.4-12 Appendix 2CC) utilizes a constant density groundwater model with a reference value of seawater. Average salinity values are not appropriate since Biscayne Bay is an estuarine environment with seasonal salinity variability, which is not equivalent to an ocean salinity pattern. In addition, shallow groundwater salinity observed during the 2009 pump test in MW-I SS (20 avg psu) is not representative of seawater. Also, the groundwater in the vicinity of the Industrial Waste Facility exhibits hypersaline concentrations (68 avg psu). A groundwater salinity range of 48 psu on average is not indicative of a constant density groundwater profile. The constant density assumption cannot adequately determine the effects of the hypersaline plume eastern migration and bay salinity impacts due to the operation of the RCWs and dewatering activities. (**0025-3-3** [Kimball, Dan] [Lewis, Mark])

Comment: A coupled surface water and groundwater hydrologic model, including a separate solute transport module, is necessary to fully evaluate all the associated impacts to Biscayne Bay. (**0025-3-4** [Kimball, Dan] [Lewis, Mark])

Comment: The model input parameters (e.g., hydraulic conductivity, boundary inflow values, etc.) should be based on site specific conditions and data, when available, and be consistent with the calibrated results. Please note that the model calibration results in Table 2CC-205 of the COL, FSAR, Part 2, do not correspond to the calibration results provided in the State of Florida SCA. This discrepancy between the two applications should be rectified. Furthermore, the hydraulic conductivities listed in Table 2CC-205 for the different stratigraphic units of the aquifer do not appear to correspond to site-specific hydraulic conductivity values obtained from on-site pump tests nor published values. This flaw seriously affects the results and validity of the groundwater model. (**0025-3-5** [Kimball, Dan] [Lewis, Mark])

Comment: The margin of error associated with the groundwater model simulation results should be provided. This information is necessary to ascertain the value of the model and how realistic the model output is. 5. Seasonal variability (i.e., rainfall, water levels, surface water flow, salinity, etc.) is inherent to South Florida and cannot be sufficiently reflected in a steady state model. (**0025-3-6** [Kimball, Dan] [Lewis, Mark])

Comment: There are significant temporal differences between the cooling canals, Biscayne Aquifer, and the bay that will affect the water source pathway for the RCWs, which cannot be evaluated with a constant density, steady state model. (**0025-3-7** [Kimball, Dan] [Lewis, Mark])

Comment: An equivalent porous media value was utilized for the groundwater model, which does not reflect the Biscayne Aquifer. The Biscayne Aquifer is defined as a heterogeneous aquifer with documented dual porosity and preferential flow pathways. (**0025-3-8** [Kimball, Dan] [Lewis, Mark])

Comment: Should a preferential subsurface flow pathway be encountered through an RCW lateral, the water source intake will originate from the flow pathway of least resistance. This scenario should be accounted for in the groundwater modeling. (**0025-3-9** [Kimball, Dan] [Lewis, Mark])

Comment: Salt water intrusion is already a problem on our aquifer, anymore rock mining and water usage will cause further degradation of our fresh water supply. (**0027-6** [Moses, Dorothy])

Comment: Turkey Point is hastening saltwater intrusion into South Miami-Dade well fields that supply water to our nearby communities. (**0031-7** [De Villiers, Elena])

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Radial Wells and Construction Dewatering Withdrawals at Power Plant Site - The potential for adverse impacts to regional water resources, including public water supply wellfields, Biscayne National Park, the Biscayne Bay Aquatic Preserve, and the Florida Keys National Marine Sanctuary from induced seepage from the Turkey Point cooling canal system as a result of cumulative impacts, including additional loading from construction dewatering/wastewater discharges and runoff from stored muck, and reduced head in the vicinity of the power block construction dewatering withdrawals and the radial well withdrawals. The unlined cooling canal system contains hypersaline water overlying the highly permeable Biscayne Aquifer. The salinity of cooling canal system water is significantly greater than natural groundwater salinity in the area and the waters within adjacent Biscayne Bay; therefore, the presence of density driven seepage upgradient (to the west) and downgradient (to the east and south) is likely. Monitoring wells up to approximately three miles west of the cooling canal system have encountered groundwater with chemical constituents indicative of cooling canal system water, including hypersalinity and/or tritium. Constituents within the cooling canal system that have or may have the potential to degrade water resources include hypersaline water, radiological isotopes, nutrients, or other compounds that may be discharged into the cooling canal system from plant operations and/or muck storage adjacent to the cooling canal system. (**0032-11** [Golden, James])

Comment: Ground Water Modeling Summary - *Conceptualization and Configuration:* The entire model domain is assumed to be constant density and saline. Both of these assumptions are inconsistent with other submitted documentation. The simulation bounds of the model are neither all saline nor are they of the same density. FPL has asserted that the assumption is valid for the type of analyses (pump induced drawdown of flux) conducted. While this may be possible in the narrowest interpretation, it is likely that impacts of density dependent flow or temperature induced buoyancy may dominate in some areas; however, the modeling provided does not afford the SFWMD or FPL the opportunity to examine these situations. Also, it is unusual for a system that is made up of fresh, brackish, salt and hyper-saline water to be generically represented as sea water. While we understand an equivalent fresh water head was used, the impacts of this representation on gradients, stage (heads), simulated drawdown, and flows, as well as conclusions derived from these, need to be further explored and justified. (**0032-29** [Golden, James])

Comment: Ground Water Modeling Summary - *Boundary Conditions*: By utilizing a steady state simulation, the impact of selected boundary conditions will propagate over the entire model. By definition, a steady state is reached when all hydrologic drivers, including those specified at the boundaries, reach equilibrium. This assumption makes the specification of the model boundaries, such as head in the constant head cells that represent Biscayne Bay, very crucial. It is understood that for permitting purposes, non-exact simulations may be acceptable, if they are conservatively estimated; however, a non-conservative estimate (e.g., the water level in Biscayne Bay) could result in under-estimation or over-estimation of pumping rate necessary to achieve necessary drawdown during dewatering. Similarly, a non-conservatively selected stage in Biscayne Bay could overestimate the contribution of this boundary (source) to the radial collection well system. It is typical in these scenarios for extensive sensitivity analyses to be performed to establish the sensitivity of the outcome or conclusions, to erroneous or non-conservatively specified boundary conditions. FPL has applied an average value to the boundary representing Biscayne Bay. This may mask tidal or seasonal trends and is unlikely to represent the critical condition for dewatering or assessing the impacts of dewatering. (**0032-30** [Golden, James])

Comment: Ground Water Modeling Summary - *Parameterization:* In selecting model parameters and applying them to the model cells, FPL has used a homogeneous representation of aquifer parameters in a highly heterogeneous aquifer system. This representation is, along with some unusual layering in the model construct, suspect, and must be tested to ensure that it does not negate conclusions drawn from the model. Specific concerns include the representation of the vertical hydraulic conductivity of the top two layers in the model (1 to 1 ratio for Kh to Kv), the representations of those layers in locations where canals and other surface features intersect the conceptual (or physical) tops of the model layers, as well as the representation of the vertical connectivity in layers that were split for predictive simulations following the calibration. It is important for FPL to demonstrate that the conclusions and determinations based on modeling remain unchanged, with more correct representation of model parameters. (**0032-31** [Golden, James])

Comment: Ground Water Modeling Summary - *Calibration:* The model was calibrated to the results of on-site pump tests (quantitative) and to regional groundwater gradients and flow directions (qualitative). Both calibrations were based on steady state simulations. FPL justified these simulations by the rapid response of the system to the volumes extracted during the pump test. This was further justified by the intent to apply the tools also in steady state. While these justifications are understood, the calibration remains insufficient and does not represent stresses to the system similar in magnitude to the intended applications. In addition, the conditions used for calibration do not demonstrate the impact of the effect of boundary conditions on the simulation results. Lastly, the model does not include important on-site operations or features present during the pump test that could contribute to the observed data to which the model is calibrated. The foregoing notwithstanding, a review of the calibration results presented show a number of situations where multiple monitoring wells show exactly the same, response in the model while they vary in the measured data. This may be suggestive of impacts of a specified boundary or inadequately tuned model parameter. If the variability that is missing is important to the required outcome from the model, then the model may not be adequately calibrated for use. (**0032-32** [Golden, James])

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: The adequacy of the ground water modeling submitted by FPL. (**0032-7** [Golden, James])

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Radial Wells and Construction Dewatering Withdrawals at Power Plant Site - The potential for the proposed withdrawals to exacerbate saline water intrusion and ground water contamination due to the existence of preferential flow paths within the Biscayne aquifer. (**0032-8** [Golden, James])

Response: *The impacts of the proposed action on water resources, specifically the potential impacts to water availability and water quality in the Biscayne Aquifer, will be assessed by the review team and presented in Chapters 4 and 5 of the EIS for building and operating proposed Turkey Point Units 6 and 7, respectively. Modeling data provided by the applicant will be reviewed and evaluated in the course of developing this assessment. Cumulative water-use and water-quality impacts will be addressed in Chapter 7.*

Comment: FPL, just last year, negotiated a new groundwater monitoring plan with the South Florida Water Management District. However, there were compliance questions from the initial groundwater monitoring plan that had been issued 20 years ago, and there was, I think, a lack of some transparency of looking at the groundwater data. So I would request that that data be sought and included in your evaluation in the scoping process. (**0002-3-5** [Walker, Tom])

Comment: We understand that the FPL has negotiated a new ground water monitoring program with the South Florida Management District (SFWMD.) Unfortunately, the prior ground water monitoring plan has been questioned and from what we have understood, had compliance issues which were never quite resolved. Subsequently, a new monitoring plan was laid out and approved by the SFWMD; yet, much of the historic information may provide important trending information which would be helpful for the EIS to evaluate. We request that the NRC obtain the previous ground water monitoring information relative to these cooling canals and analyze their past and present impacts to the ground water in the adjacent aquifer. (**0024-2** [Walker, Tom])

Response: *The environmental monitoring data collected at the existing units for the current baseline water resources in the affected environment, including water quality and quantity, will be discussed in Chapter 2 of the EIS. Chapters 4 and 5 will include descriptions of environmental monitoring to be conducted at the units during building and operating, respectively. Cumulative impacts will be assessed in Chapter 7. The EIS will include citations for documents used in its preparation.*

Comment: Please state the distance between the water management feature(s) and the salt front at the land's surface and the distance between the water management feature(s) and the salt front at the base of the Biscayne Aquifer. (**0022-3-8** [Reynolds, Laura])

Comment: Please publish a vertical profile of the land showing 1. the surface of the water management feature(s), 2. the depth of the water management feature(s), 3. the location of the current salt front at the land surface, and 4. the location of the current salt front at the base of the Biscayne Aquifer. (**0022-3-9** [Reynolds, Laura])

Response: *These comments refer to the distance between proposed Turkey Point Units 6 and 7s water-management feature and the salinity intrusion front in the Biscayne Aquifer. A description of the affected environment, including local groundwater flow, water quality, and quantity, will be presented in Chapter 2 of the EIS. The plant layout, including the detailed locations of facilities and design specifications for the units, will be provided in Chapter 3.*

Comment: Miami-Dade County has previously provided the U.S. Nuclear Regulatory Commission with a copy of our comments on the State of Florida Site Certification Application for the Turkey Point Power Plant. The County would like to point out one discrepancy between the state and federal applications, the Florida Power and Light owned fill source was removed from the state application but remains part of the federal application. The proposed fill source may adversely impact groundwater, destroy wetlands and advance salt water intrusion closer to wellfields. Additional details on these concerns are provided in the attached table summarizing our initial comments on the state application. This table, as well as, the documents previously submitted to the NRC should be considered as part of the record for the scoping process. (**0023-1-1** [LaFerrier, Marc])

Response: *The NRC process is to review the COL application and prepare an EIS based on the actions proposed in the application. Information to be used during the review will include documents obtained from State and Federal agencies, including the SCA to the extent necessary to characterize the Turkey Point site. The FPL-owned fill source remains in the COL at this time and a review of the environmental impacts of obtaining fill material will be presented in Chapter 4 of the EIS.*

Comment: The application proposes to dewater up to 26 MGD of groundwater by discharging it to the cooling canals. Pursuant to Condition No. 15 of the Unusual Use Approval Resolution Z-56-07, a DERM approved hydrologic study is required. The study results are required to evaluate all impacts to surface and groundwater, including but not limited to all dewatering activities. The hydrologic study should include, but not be limited to providing data and modeling to show how the existing groundwater plume under the Cooling Canal System would respond to the dewatering activities. (**0023-1-2** [LaFerrier, Marc])

Comment: Sufficient information is not provided to make a determination of dewatering impacts. Please provide a description of all required dewatering activities and the techniques that will be used to ensure that all surface and groundwater quality standards will be met. (**0023-1-3** [LaFerrier, Marc])

Response: *These comments refer to the SCA submitted to the State of Florida by FPL, but they indicate an interest in the potential impacts of the proposed units on water quality and hydrology from the discharge of dewatering flows to the cooling-canal system during plant construction. The review team will assess the impact of proposed Turkey Point Units 6 and 7s dewatering at the site on water resources. The dewatering effluent produced by the proposed units will be described in Chapter 3 of the EIS. The impacts of building the proposed units on water resources will be presented in Chapter 4. Cumulative impacts will be addressed in Chapter 7. Modeling data provided by the applicant will be technically evaluated in the course of developing the EIS.*

Comment: Disposal of the facility's wastewater is proposed via deep well injection into the boulder zone. The application does not include an evaluation of the technical feasibility for reuse of the wastewater discharge for the benefit of the Biscayne Bay Coastal Wetlands Project as required pursuant to Z-56-07. (**0023-3-38** [LaFerrier, Marc])

Response: *This comment refers to the SCA submitted to the State of Florida by FPL, but it indicates an interest in alternative uses of blowdown water from the proposed units. Alternatives to deep-well injection for plant effluent discharges will be described in Chapter 9 of the EIS.*

Comment: [T]he application does not provide sufficient detail on what standard of reclaimed water quality is required. This information is necessary to evaluate the application (**0023-1-29** [LaFerrier, Marc])

Response: *This comment refers to the SCA submitted to the State of Florida by FPL, but it indicates an interest in the quality of reclaimed water to be used as cooling water at the proposed units. The water quality of the reclaimed water will be described in Chapter 3 of the EIS.*

Comment: Conditions outlined in Zoning Resolution Z-56-07 must be met to achieve land use/zoning consistency. This resolution stated that no water will be withdrawn from the Biscayne Aquifer (Condition 4) and that a hydrologic study (Condition 15) will be performed. The radial well component does not demonstrate consistency with these two conditions; therefore this component will be subject to a land use/zoning consistency determination. (**0023-1-31** [LaFerrier, Marc])

Comment: Selection of potential locations, idealized designs, number of wells, and even the pipe sizes of the radial lines of the collector wells should be based on hydrogeologic data within the areas Biscayne Bay that the wells will tap. (**0023-1-32** [LaFerrier, Marc])

Comment: Site specific aquifer characteristics have not been made available. (**0023-1-33** [LaFerrier, Marc])

Comment: Lithologic descriptions are contradictory. The observations from the site subsurface investigation (Section 3.3.2.2) contradict expectations that almost all the water withdrawn by the radial collector wells would be recharged from the Bay (Section 3.3.4.1). Therefore additional information is necessary to evaluate this aspect of the proposal. (**0023-1-34** [LaFerrier, Marc])

Comment: [D]etermine the impact of the radial collector well system on the fate and transport of the groundwater plume associated with the cooling canal system, the potential for and effect of the recharge of the radial collector well system through horizontal preferential flow zones in the aquifer, the impact of the radial collector well system on salt intrusion. (**0023-1-35** [LaFerrier, Marc])

Comment: [N]o information was found in the application discussing potential effects of inducing ground water flow towards the proposed withdrawal wells. (**0023-1-38** [LaFerrier, Marc])

Comment: Neither preferential vertical nor horizontal stratigraphic flow directions have been established. Vertical hydraulic conductivity data is not presented in the application, but it is needed to properly evaluate how the horizontal screens installed in the Fort Thompson Formation 30 to 35 feet below the shallow bay bottom are expected to preferentially draw water from the less transmissive Miami Limestone above instead of from the much more transmissive Fort Thompson. (**0023-1-39** [LaFerrier, Marc])

Comment: Cones of influence are not defined and aquifer pump-test data has not been presented to properly evaluate hydrologic conditions under which the collector wells would be operated. Neither has there been any data presented to indicate the potential cone of depression that pumping more than 120 million gallons a day from a wellfield located along the shoreline would have on the movement of the salt front line. (**0023-1-40** [LaFerrier, Marc])

Comment: The applicant has not provided sufficient geologic, hydrologic and water quality data to evaluate the application. (**0023-1-41** [LaFerrier, Marc])

Comment: The applicant has not provided sufficient information to evaluate the mixing chamber model that was used to project impacts from the radial collector wells. (**0023-1-42** [LaFerrier, Marc])

Comment: Adequate hydrogeologic data have not been presented and the application does not include sufficient information to determine whether the proposed withdrawals from the radial collector wells would meet the requirements of Section 24-43.2 Miami-Dade County Code. Selection of potential locations, idealized designs, number of wells, and even the pipe sizes of the radial lines of the collector wells should be based on hydrogeologic data within the areas under Biscayne Bay that the wells would tap. (**0023-1-44** [LaFerrier, Marc])

Comment: Please provide adequate analysis in support of the conclusion made that the Biscayne Aquifer is not affected by the Radial Collector wells. A fully three dimensional mathematical model should be used to determine the boundary conditions (influence cones) of the proposed radial collector well. (**0023-1-47** [LaFerrier, Marc])

Comment: Application does not adequately demonstrate that the proposed radial collector wells do not violate Condition 4 of Z-56-07 which prohibits withdrawal from the Biscayne Aquifer. (**0023-1-66** [LaFerrier, Marc])

Comment: Data presented for Groundwater Impact assessment is not sufficient. Visual MODFLOW data files are not provided for assessment. Not enough data provided to assess statement that radial collector wells are substratum collectors of saltwater that will recharge from below Biscayne Bay. The applicant states that almost all the water withdrawn by the proposed radial collectors will be recharged from the Bay; however, no data to support this statement is provided in the application. The applicant shall provide all relevant data relating to recharge of the Biscayne Aquifer that would be induced by operation of the radial collectors. Pursuant to Condition No. 4 of the Unusual Use approved but he BCC through resolution Z-56-07, FPL shall not apply for any withdrawals from the Biscayne Aquifer as a source of cooling water for the proposed facilities. (**0023-1-68** [LaFerrier, Marc])

Comment: The radial wells are located so as to draw from the easterly groundwater flow. Please resolve the apparent conflict between the location of the wells and the water from which they are drawing and Condition 4 of Z-56-07, which prohibits withdrawal from the Biscayne Aquifer. (**0023-1-70** [LaFerrier, Marc])

Comment: Condition 5 of Z-56-07 requires FPL to analyze the potential use of marine water as a secondary source of cooling water. Under this scenario, a directional bore would be used to construct a pipeline under the Florida Keys National Marine Sanctuary or under Biscayne National Park in order to obtain salt water from the ocean with limited or no permanent impacts to benthic resources. Provide a detailed analysis that documents the reasons why this potential secondary source of cooling water was not selected. (**0023-3-40** [LaFerrier, Marc])

Response: *These comments refer to the SCA submitted to the State of Florida by FPL, but they indicate an interest in impacts on the Biscayne Aquifer below Biscayne Bay from the withdrawal of cooling water using radial collector wells (RCW) at proposed Turkey Point Units 6 and 7. The impacts of these units consumptive use of water on local and regional water resources, including the Biscayne Aquifer, will be presented in Chapters 4 and 5 of the EIS for building and operating, respectively. Cumulative water-use impacts will be addressed in Chapter 7 and cooling-water alternatives in Chapter 9.*

Comment: The application does not provide information on how the water management project would operate, the water source for the feature, any related infrastructure, projected water quality of the completed feature, or information on best technology regarding a liner or other hydrologic isolation from surrounding ground and surface waters, the hydrologic impact of the feature on adjoining areas. (**0023-3-13** [LaFerrier, Marc])

Response: *Available information about the water-management feature will be provided in Chapter 3 of the EIS. The impacts of the water-management feature on water resources will be presented in Chapters 4 and 5 for building and operation, respectively, based on information about the affected environment provided in Chapter 2. Cumulative impacts will be presented in Chapter 7.*

Comment: And that's what they're trying to do on a couple of the different designs, is to pump the water back down into the ground. There have got to be some options. We have too much knowledge and too much in our industry to overcome these minor problems. (**0002-12-10** [McHugh, John])

Response: *The comment refers to the discharge of effluent from the plant, specifically the effluent sourced from reclaimed water to be used as cooling water at proposed Turkey Point Units 6 and 7. The proposed units effluent discharge locations, quantity, and quality will be described in Chapter 3 of the EIS. Alternative discharge locations will be discussed in Chapter 9.*

Comment: FPL recently proposed a restriction on using the RCWs to 90 days per year; this proposed restriction is not mentioned in the COLA. Such inconsistencies between the two separate applications should be resolved and the State of Florida SCA and NRC COL applications should be fairly uniform. (**0025-1-5** [Kimball, Dan] [Lewis, Mark])

Response: *The NRC process is to review the COL application, including revisions provided by the applicant, and prepare an EIS based on the actions proposed in the application. Information to be used during the review will include documents obtained from State and Federal agencies, including the SCA, to the extent necessary to characterize the Turkey Point site. A review of the environmental impacts of using RCWs to obtain cooling water will be presented in Chapter 5 of the EIS.*

Comment: To add insult to injury, these 2 dangerous nuclear plants are proposed to be over/around the only natural aquifer we have that provides clean water to millions of people! (**0028-2** [DiNuzzo, Laura])

Response: *The impacts of building and operating proposed Turkey Point Units 6 and 7 on the sustainability of local and regional water resources will be presented in Chapters 4 and 5 of the EIS, respectively. Cumulative water-use impacts will be addressed in Chapter 7.*

Comment: The CEIS should include, at minimum, an analysis of the water quality for the source water for each dewatering project, including radionuclides such as tritium. (**0023-1-4** [LaFerrier, Marc])

Response: *The CWA designated the Environmental Protection Agency (EPA) as the Federal agency with general responsibility for effluent discharges to the nation's waters. In Florida, the EPA has delegated this responsibility to the Florida Department of Environmental Protection (FDEP). Therefore, in Florida, the FDEP is the primary regulatory authority over water quality. While the NRC only regulates radiological effluents, the NRC does have the responsibility under NEPA to assess and disclose the expected impacts of the proposed action on water quality. The assessment of the radiological and nonradiological impacts on water quality from the operation of proposed Turkey Point Units 6 and 7 will be presented in Chapter 5 of the EIS.*

Comment: The proposed radial collector wells would be located within or adjacent to a groundwater plume emanating from FPL's Cooling Canal System, which contains high levels of chlorides. It also contains tritium, which may be used as a tracer. In addition, portions of this plume contain heated water, although underground directional travel of the heated water has not been established. No information regarding the delineation of this plume is contained within the application and the extent to which this plume would be affected by the proposed groundwater withdrawals is not documented. (**0023-1-37** [LaFerrier, Marc])

Response: *The impacts of the RCWs with respect to building and operating proposed Turkey Point Units 6 and 7 on Biscayne Bay and adjacent lands are part of the overall EIS analysis. The results of the analysis of impacts of proposed Turkey Point Units 6 and 7 operations on water quality, ecology, and aesthetics will be presented in Chapter 5 of the EIS, and the results of cumulative impact analyses will be presented in Chapter 7.*

Comment: The proposed project requires a significant amount of borrow material to build the platform for the new reactors. Such volumes of borrow in high quantities requires significant movement of material in and around the aquifers in such low lying areas as South Miami-Dade County. Such excavation can disturb the water resources. The EIS should do a quantification of the amount of material required and its potential impact to see if in fact such borrow material can be moved or can be excavated in the vicinity of the existing power plant and the FKAA well field. If not, material must be obtained elsewhere where such impacts are not detrimental to local well fields. (**0024-5** [Walker, Tom])

Response: *Available information about the fill source will be provided in Chapter 3 of the EIS. The impacts of obtaining fill material will be presented in Chapter 4; and the cumulative impacts of the proposed action by FPL to build and operate proposed Turkey Point Units 6 and 7, along* *with other past, present, and reasonably foreseeable future actions by other agencies, will be presented in Chapter 7.*

Comment: A major area of interest is whether operation of the radial collector wells would cause the karst Biscayne Aquifer to fracture (frac out), thereby altering the salinity of the Biscayne Bay and affecting the area's fish and wildlife resources. Staff from Florida Power and Light (FPL) believes that these radial collection wells will not be used for a substantial part of the time that the plant would be in operation, and consequently taken a conservative approach by modeling a scenario during which the radial collector wells would inject water laterally constantly. Other agencies participating in the review and whose staff has the expertise to test the model are doing so, and we are waiting for the results in order to determine the extent to which we may be concerned about the possibility of frac out actually occurring. (**0018-1** [Poole, Mary Ann])

Comment: Concerns still remain regarding unknowns related to the Radial Collector Well (RCW) System including, but not limited to: possible impacts to the Bay including benthic flora and fauna; salinity; and possible impacts of the radial collector wells on the freshwater input to the bay, flora and fauna. These issues and concerns will require further review and discussion. (**0020-1** [Mulkey, Cindy])

Comment: The operation of the RCWs would result in hydrologic impacts, including ... surface water, on Biscayne Bay due to geological disturbances, resulting in water volume and quality alterations ... [A] large portion of the nearly 124 million gallons of Biscayne Bay water will originate from within Biscayne National Park boundaries, which is a protected water body. (**0025-1-13** [Kimball, Dan] [Lewis, Mark])

Comment: The Florida Department of Environmental Protection (FDEP) is requiring a revised groundwater model due to many deficiencies, including the inability to effectively simulate impacts to Biscayne Bay; as a result, the SCA remains incomplete to date. Thus, a revised groundwater model is pending submittal to the State of Florida for the SCA process. The revised SCA groundwater model should be consistent with the groundwater model submitted as part of the COLA. A model that represents the Biscayne Aquifer and site specific hydrologic features is necessary to fully evaluate the impacts of the operation of the radial collector wells (RCWs) on the Biscayne Bay nearshore ecosystem function (see Attachment 1.B.). Therefore, the COLA groundwater model results that claim 92 to 100 percent of the intake water for the RCWs comes from the bay has not been substantiated. (**0025-1-4** [Kimball, Dan] [Lewis, Mark])

Comment: Other specific issues NMFS recommends for evaluation in the EIS or EFH assessment: 1.a *Radial wells*. Impacts to EFH associated with radial well construction and operation within Biscayne Bay should be fully evaluated. The evaluations should include detailed HDD routes and examinations of the potential for frac-outs. Monitoring and mitigation measures for frac-out detection and clean-up will also be needed. (**0033-5** [Croom, Miles])

Comment: Other specific issues NMFS recommends for evaluation in the EIS or EFH assessment: 1.b *Radial wells*. Impacts to EFH associated with radial well construction and operation within Biscayne Bay should be fully evaluated. The evaluations should include detailed explanations of the circumstances under which radial wells would be required and at what capacities. (**0033-6** [Croom, Miles])

Comment: Other specific issues NMFS recommends for evaluation in the EIS or EFH assessment: 1.d *Radial wells*. Impacts to EFH associated with radial well construction and operation within Biscayne Bay should be fully evaluated. The evaluations should include a more clear explanation of how use of the radial wells will affect salinity, including identification of the geographic area that would be affected and how that area would change seasonally and under various environmental conditions (such as tides and prevailing wind conditions). This analysis of effects on water quality also should include pH and temperature. (**0033-8** [Croom, Miles])

Response: *These comments indicate an interest in impacts on the Biscayne Aquifer below Biscayne Bay and on the Bay itself from the withdrawal of cooling water using RCW at the proposed units. The impacts of the plant's consumptive use of water on local and regional water resources, including the Biscayne Aquifer, will be presented in Chapters 4 and 5 of the EIS for building and operating, respectively. Cumulative water-use impacts will be addressed in Chapter 7 and cooling water alternatives in Chapter 9.*

D.1.9 Comments Concerning Ecology – Terrestrial

Comment: I was very disappointed to hear that the U.S. Army Corps of Engineers so casually referred to that almost all nuclear power plants are placed near wetlands. That, alone, to me is a concern. This one, too, would be the same. (**0001-11-3** [Amor, Valerie])

Comment: They [FPL] may need 90 million gallons of cooling water a day for these two new units. One plan would take that from a big sewage treatment plant to be built 25 miles up the road. How would they get 90 million gallons of water a day down here? That takes a big pipe and maybe some pumping stations. They're not going to get permission to run that down through Biscayne Bay so they'll have to put it in the wetlands, and there go the wetlands next to the Bay. (**0001-6-4** [Miller, Lloyd])

Comment: Besides fresh water loss the loss of wetlands is the other major thing we're trying to fix there. The numbers of wetland loss here are just astronomical, and they're not something that we really ought to be considering in modern 2010 times anymore. (**0002-6-5** [Grosso, Richard])

Comment: The planned expansion of Units 6&7 of Turkey Point requires the permanent destruction of untouched wetlands just off of the Biscayne Bay national park regions. (**0007-1** [Burris, Jessica])

Comment: In the West Preferred Corridor, additional access pads (approximately 79-170 ft long) are proposed east of the power line poled structures that would provide access from the structure pads to the existing L-31 North Levee Road (Figures 5A-5B). Additional wetland filling would be required to construct the proposed pads beneath the power line poled structures. Construction of the access roads/pad would require filling of more than 100 acres of wetlands within the West Preferred Corridor (that is currently within Everglades National Park) per the COLA/SCA. A perpetual 90 ft vegetation easement is proposed to extend from the westernmost portion of the West Preferred Corridor into ENP to allow FPL to manage non-native vegetation. (**0025-3-31** [Kimball, Dan] [Lewis, Mark])

Comment: Vegetation in the ENP portion of both transmission line corridors identified by FPL consists primarily of high quality, long and short hydroperiod native marsh and prairie communities. Direct impacts of the construction and maintenance of power line infrastructure on the natural abundance and distribution of these native plant communities need to be evaluated. 2. Limited information on the presence of state listed threatened and endangered plant species exists for either corridor identified by FPL. Nonetheless, preliminary surveys of the Western Preferred Corridor resulted in the identification of at least one state listed endangered plant species within the boundary of the corridor. Additional survey work is needed and the results of that survey work should be used to evaluate impacts on threatened and endangered plant species in both corridors. 3. The proposed exotic vegetation management easement associated with the Western Preferred Corridor will result in the modification and/or of native plant species by mechanical or chemical means within boundaries of ENP. The impacts of these actions on individual species native plant community composition need to be considered in this evaluation. 4. Soil disturbance and modification of natural elevations in either corridor identified by FPL has the potential to introduce new invasive plant species or exacerbate existing invasive plant species populations. These impacts need to be evaluated. (**0025-3-34** [Kimball, Dan] [Lewis, Mark])

Response: *The impacts on wetlands from building proposed Turkey Point Units 6 and 7, including water supply pipelines and transmission corridors, will be addressed in Chapter 4 of the EIS and the impacts of plant operation will be addressed in Chapter 5.*

Comment: I had fished, hunted and camped exactly where the power plants are before they were built. I could tell you, beyond a doubt right now, there's probably, in most instances, as many fish, deer, and other types of wildlife in that area now as there were when I was a kid. That hasn't been impacted all that greatly. (**0002-13-7** [Simpson, Roce])

Response: *The impacts of building and operating proposed Turkey Point Units 6 and 7 on fish and wildlife will be evaluated in Chapters 4 and 5 of the EIS, respectively.*

Comment: The second area of concern, of course, is Everglades impact. The expansion will impact hundreds of acres of wetlands which is contradictory to our very expensive and very important effort to restore the Everglades right now. (**0001-7-3** [MacLaren, Kaitlin])

Comment: It [the new transmission lines] also will create a corridor for invasive species; it will disrupt the water flow; birds run into power lines all the time, electrocutions, collisions. (**0002-14-10** [Schwartz, Matthew])

Comment: The largest percentage of this land, 61% of the 38,607 acres evaluated for this project are composed of wetlands bordering Biscayne National Park, Biscayne Bay Aquatic Preserve, Homestead Bayfront Park, the Model Lands Basin, and the Everglades Mitigation Bank as openly noted in the NRC environmental report concerning this expansion. The destruction of wetlands in the surrounding areas of national reserves has possible drastic results on the reserved area. In addition to destroying the ecological foundation for wildlife in the affected region itself, the permanent destruction of everglade wetlands surrounding the reserve equally affects the ecology of areas designated to remain untouched by U.S National Park service and the U.S department of the interior. (**0007-3** [Burris, Jessica])

Comment: The Draft EIS needs to fully address the alternative transmission line corridors and the environmental effects it may have on Everglades National Park. (**0014-15** [Mueller, Heinz])

Comment: The Turkey Point facility is located within the southeastern saline Everglades, which is a large, contiguous wetland system that consists of both freshwater and coastal wetlands. This area is strategically located in the watershed for the Florida Keys National Marine Sanctuary, Biscayne National Park, the Crocodile Lake National Wildlife Refuge, and the State of Florida's Card Sound Aquatic Preserve. In addition, the proposed transmission line corridor bisects this wetland system and continues westward into Everglades National Park, as well. This region provides habitat for many plant and animal species that are protected at the county, state and/or federal level, including the wood stork, Everglades snail kite, American crocodile, Florida panther, and Eastern indigo snake, among others. It is a known stop-over for migratory songbirds and waterfowl, and the proposed plant site provides significant shorebird habitat, as well. The EIS should also include an assessment of the impacts of the project on wetlands habitat and habitat for rare threatened and endangered species. (**0015-3** [Espinosa, Carlos])

Comment: Although the NRC does not directly regulate transmission lines, Miami-Dade County understands that the Army Corps of Engineers (ACOE) will be a cooperating agency for this EIS. Since the Army Corps will be using the EIS as the basis for their Section 404 permit decision as it relates to the wetland impacts that would be necessary to construct the proposed plant and associated facilities, including the transmission lines, we strongly recommend the NRC include a comprehensive impacts analysis of all features that will or could potentially impact environmental resources, including wildlife and jurisdictional wetlands to be affected by the proposed transmission corridors. (**0015-4** [Espinosa, Carlos])

Comment: Construction of roads and tower pads would likely result in soil disturbance and the colonization of exotic vegetation like Brazilian pepper if unchecked. The potential land exchange property is frequently used for exotic vegetation management and monitoring of wetlands in the project area. NPS staff would be required to monitor the impacts of FPL's exotic vegetation management practices on native vegetation in the vegetation management easement granted to FPL and adjacent natural vegetative communities within the park. (**0025-3-43** [Kimball, Dan] [Lewis, Mark])

Response: *The potential impacts of building and operating proposed Turkey Point Units 6 and 7 on Everglades National Park, Biscayne National Park, and other parks and preserves, especially on wetlands within those areas, will be evaluated in Chapters 4 and 5 of the EIS, respectively. The cumulative impacts on wetlands and other ecological resources in these areas will be evaluated in Chapter 7.*

Comment: [A]ny environmental mitigation should include purchasing large tracts of land south of the plant between Florida City and Key Largo and adding this acreage to Everglades National Park or Crocodile Lake National Preserve. Several endangered panthers have been hit by cars in this area, crocodiles and manatees use Turkey Point's warm water as mating and winter weather locations. The area south of the Nuclear plant is not a good location for homes or businesses due to proximity to the plant both for safety and security as well as environmentally sensitive lands. This land should be protected as part of the environmental mitigation and permitting. (**0008-2** [Garcia, Preston])

Response: *The potential mitigation for wetland impacts and impacts on Federally and State-listed threatened or endangered species will be discussed in Chapters 4, 5, and 7 of the EIS. Evaluation of the impacts of building and operating proposed Turkey Point Units 6 and 7 on regional land use will also be included in those chapters.*

Comment: [T]he planned use of SW 359 Street as a service road through wetlands for Turkey Point 6 & 7 will compromise a $135 Million CERP/Comprehensive Everglades Restoration Project. (**0012-7** [Payne, Nkenga])

Comment: Road construction will also cause direct wetland loss and fragmentation. (**0025-2-18** [Kimball, Dan] [Lewis, Mark])

Response: *The potential impacts of proposed Turkey Point Units 6 and 7 transmission line and access road construction and operation on regional wetlands, including those involved in the CERP, as well as potential mitigation actions, will be evaluated in Chapters 4, 5, and 7 of the EIS.*

Comment: The Draft EIS should discuss how the construction of Units 6 and 7 would impact sensitive coastal. wetlands and any mangrove protected areas along Biscayne Bay and adjacent to Biscayne National Park. The Draft EIS should also address any issues related to the Florida Everglades Mitigation Bank. (**0014-10** [Mueller, Heinz])

Response: *The impacts of building proposed Turkey Point Units 6 and 7 on coastal wetlands and mangrove-protected areas along Biscayne Bay will be evaluated in Chapter 4 of the EIS. The possible role of the Florida Everglades Mitigation Bank, and other wetland mitigation banks in the region, in the mitigation of wetland losses will also be evaluated in Chapter 4.*

Comment: The Draft EIS needs to provide information on measures that have been taken to avoid and minimize wetland impacts. According to the Clean Water Act (CWA) Section 404(b)(1) Guidelines, an applicant must demonstrate avoidance and minimization of wetland impacts before compensatory mitigation can be considered. Specifically, no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem. Practicable alternatives include activities which do not involve the discharge of dredged or fill material into waters of the United States. (**0014-17** [Mueller, Heinz])

Response: *Wetland mitigation measures, as applicable to CWA Section 404 compliance, including avoidance and minimization efforts, will be discussed in Chapter 4 of the EIS.*

Comment: List of potentially occurring State-listed fish and wildlife species

Common name	Scientific name	State-listing status
Atlantic sturgeon	*Acipenser oxyrinchus*	Species of special concern

American alligator	*Alligator mississippiensis*	Species of special concern
American crocodile	*Crocodylus acutus*	Endangered
Eastern indigo snake	*Drymarchon corais couperi*	Threatened
Least tern	*Sterna antillarum*	Threatened
Limpkin	*Aramus guarauna*	Species of special concern
Snail kite	*Rostrhamus sociabilis plumbeus*	Endangered
Everglades mink	*Mustela vison evergladensis*	Threatened
Florida manatee	*Trichechnus manatus latirostris*	Endangered

(**0018-3** [Poole, Mary Ann])

Comment: The site has nesting habitat for the least tern. Least terns are listed as threatened by the FWC and may potentially be nesting on the cleared gravel upland portions of the site. Please provide least tern nesting surveys and address the loss of potential nesting habitat. (**0018-5** [Poole, Mary Ann])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of airborne pathogens from the Turkey Point FPL power station on state or federal endangered or threatened species, as a result of using reclaimed wastewater for cooling purposes, please provide them. (**0022-1-16** [Reynolds, Laura])

Comment: Please state the amount of disruption to listed species that the construction of units 6&7 will make including the plant site, all support facilities, all structures, all borrow pits (including rockmines) all fencing, all roads, all berms, all pipelines, all transmission lines, all basins, all parking lots, and all vehicle usage. (**0022-2-21** [Reynolds, Laura])

Response: *The potential impacts of building and operating proposed Turkey Point Units 6 and 7 and associated facilities on Federally and State-listed threatened or endangered species will be addressed in Chapters 4 and 5 of the EIS, based on the affected environment described in Chapter 2. The analysis will consider possible impacts resulting from airborne pathogens. The EIS will include citations for documents used in its preparation.*

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts on farm crops, wetlands, wildlife, and marine areas from airborne pathogens, as a result of using reclaimed wastewater for cooling purposes, please provide them. (**0022-1-17** [Reynolds, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts from airborne toxic matter on farm crops, wetlands, and marine areas, as a result of using reclaimed water for cooling purposes, please provide them. (**0022-1-19** [Reynolds, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts from airborne EPOCs on farm crops, wetlands, wildlife, and marine areas, as a result of using reclaimed water for cooling purposes, please provide them. (**0022-2-3** [Reynolds, Laura])

Response: *The potential impacts of building proposed Turkey Point Units 6 and 7 on ecological resources, including the impacts of airborne releases, will be addressed in Chapters 4, 5, and 7 of the EIS, based on the affected environment described in Chapter 2. The analysis will consider possible impacts to species and habitats resulting from airborne pathogens and contaminants. The EIS will include citations for documents used in its preparation.*

Comment: The applicant should also provide the management plan for listed species required under Condition 2 of Z-56-07, which should include but not be limited to identifying the plans established to protect endangered or threatened species from impacts resulting from the proposed work. (**0023-1-19** [LaFerrier, Marc])

Comment: The application states, "Due to the limited amount of upland habitat, mammalian wildlife species are relatively uncommon in the vicinity of the Site" and fails to acknowledge that there is a possibility for Florida panther in the vicinity. It should be noted that there have been three documented vehicle strikes of Florida Panthers in this region, including two road kills in the recent past. In addition, there have been recent agency reports of additional animals in the area, including a panther/cub pair. The application does not provide sufficient information to evaluate potential impacts to ecological resources including but not limited to rare threatened and endangered species resulting from the installation and use of the proposed access roads. [Same statement for T-Lines] (**0023-2-13** [LaFerrier, Marc])

Comment: The application notes that the Eastern indigo snake has been observed both within and adjacent to the boundaries of the site. Please provide a Comprehensive Environmental Impact Statement that includes, but is not limited to, the potential effects of the construction and operation of the plant and its associated non-linear and linear features on the Eastern indigo snake. [Same statement for T-Lines] (**0023-2-16** [LaFerrier, Marc])

Comment: Please provide documentation that demonstrates that critical habitat for threatened and endangered species will not be degraded and/or destroyed, as required pursuant to the Miami-Dade County CDMP. (**0023-4-9** [LaFerrier, Marc])

Response: *These comments refer to the SCA submitted to the State of Florida by FPL, but they indicate an interest in the potential impacts of the proposed units on Federally and State-listed threatened or endangered species. The potential impacts of building and operating proposed Turkey Point Units 6 and 7 on Federally and State-listed threatened or endangered species will be discussed in Chapters 4, 5, and 7 of the EIS, based on the affected environment described in Chapter 2.*

Comment: High quality coastal wetlands exist on the shoreline along the proposed area of work. (**0023-1-46** [LaFerrier, Marc])

Comment: Pursuant to Condition 1 of Z-56-07, the applicant shall submit a wetlands mitigation plan for the Units 6 and 7 Site. .... Pursuant to Condition 1 of Z-56-07, the plan shall identify the specific mitigation that is for the Units 6 and 7 Site. (**0023-1-62** [LaFerrier, Marc])

Comment: It is unclear from the application whether the proposed rock mines will impact existing wetland restoration areas associated with previous unauthorized impact to wetlands on FPL property in this location. (**0023-3-18** [LaFerrier, Marc])

Response: *These comments refer to the SCA submitted to the State of Florida by FPL, but they indicate an interest in the potential impacts of proposed Turkey Point Units 6 and 7 on wetlands. The potential impacts of building and operating the proposed units on wetlands will be discussed in Chapters 4, 5, and 7 of the EIS, based on the affected environment described in Chapter 2.*

Comment: The CEIS should include, at a minimum, a comprehensive species survey that utilizes professionally-accepted sampling standards to survey plants and animals at multiple locations in the mudflat at least quarterly for a minimum of one year. Sampling should include, but not be limited to algae, vascular plants, insects, birds, reptiles, amphibians, fish, aquatic invertebrates, and mammals. (**0023-1-22** [LaFerrier, Marc])

Comment: The application does not address biological, hydrological, and ecological impacts resulting from road construction and operation. Impacts that shall be addressed include but are not limited to disruption of ecological corridors, altered hydrology in surrounding wetlands (e.g. via barriers to sheetflow), increased invasion rate of non-native species, increased road-kill, impacts to listed species and their habitat, including but not limited to Florida panthers and Eastern indigo snakes, and increased access that may facilitate illegal dumping, ATV riding, poaching, and other activities that may directly or indirectly impact surrounding wetlands. (**0023-1-50** [LaFerrier, Marc])

Comment: [P]lease provide locations, details and descriptions of all wildlife protection features, including but not limited to wildlife fencing and panther underpasses. (**0023-2-17** [LaFerrier, Marc])

Comment: Application is incomplete and includes incorrect characterization of the vegetation adjacent to the site. Corrected and missing information is needed to determine the potential impacts of the application, especially on state and federally protected species. Vegetation adjacent to the site and located along the transmission line corridors includes freshwater communities, and the coastal vegetation communities are more diverse than characterized. Please provide a complete vegetation survey for all transmission line corridors, including but not limited to complete species lists for each community type and identification and location of state and federally protected species. Please also provide a complete analysis of utilization of these vegetation communities by fauna, including but not limited to insects, birds, fish, aquatic invertebrates, reptiles, amphibians, and mammals, and including but not limited to season of use, use by state or federally protected species, and nature of use. (**0023-3-22** [LaFerrier, Marc])

Comment: The application provides insufficient information on the potential effects of the transmission line corridors on state and federally protected species, designated EEL sites, Natural Forest Communities, and tree resources protected. (**0023-3-23** [LaFerrier, Marc])

Comment: The application states that new rights-of-way will need to be obtained for the east transmission line corridor. Please provide details on where new rights of way will be obtained, and whether there are state or federally protected plant or animal species, designated EEL sites, Natural Forest Communities, or tree resources that could be impacted by the work within these proposed new rights-of-way. (**0023-3-24** [LaFerrier, Marc])

Comment: Any improvements to the transmission corridors, including but not limited to the installation of power poles and lines must avoid/minimize impacts to Natural Forest Communities. A survey of all Natural Forest Communities, within and adjacent to the transmission corridors, is required and all proposed impacts to Natural Forest Communities must be identified. (**0023-3-25** [LaFerrier, Marc])

Comment: Please submit plans for the protection of Endangered and Threatened Species both during construction and for the temporary and long term use of the proposed roads and facilities. (**0023-3-51** [LaFerrier, Marc])

Comment: [T]he referenced location will be permanent or temporary, final slopes and elevations for the piles, what measures will be taken to address stormwater runoff from the spoil piles, characterization of the material including but not limited to contamination levels, potential impacts to threatened and endangered species including but not limited to potential impacts to critical habitat, and potential impacts to surrounding coastal wetlands. (**0023-4-14** [LaFerrier, Marc])

Response: *These comments refer to the SCA submitted to the State of Florida by FPL, but they indicate an interest in the potential impacts of proposed Turkey Point Units 6 and 7 on Federally and State-listed threatened or endangered species, wetlands, and other terrestrial resources. The potential impacts of building and operating the proposed units on terrestrial ecological resources will be discussed in Chapters 4, 5, and 7 of the EIS, based on the affected environment described in Chapter 2.*

Comment: Construction and use of new access or improved access roads will provide a conduit for introduction of invasive exotic species on adjacent lands, including but not limited to, EEL conservation lands. (**0023-2-5** [LaFerrier, Marc])

Comment: Chapter 24 and the Landscape Code of Miami-Dade County require that all invasive/exotic plant species be removed prior to site development, even outside of mitigation areas. Please address exotic plant management for all parcels where impacts will occur. (**0023-3-53** [LaFerrier, Marc])

Response: *These comments refer to the SCA submitted to the State of Florida by FPL, but they indicate an interest in the potential impacts of the proposed units and transmission lines on habitat quality on adjacent lands. The potential impacts of building and operating proposed Turkey Point Units 6 and 7 and transmission corridors on terrestrial ecological resources will be addressed in Chapters 4, 5, and 7 of the EIS, based on the affected environment described in Chapter 2. The analysis will consider the potential impacts from invasive and exotic plant species.*

Comment: Please provide in the Draft EIS a proposed mitigation plan to offset unavoidable wetland impacts. The mitigation plan should be in compliance with Federal Compensatory Mitigation Rule, dated April 10, 2008. (**0014-18** [Mueller, Heinz])

Comment: [T]he applicant shall submit a wetlands mitigation plan for the areas impacted by the construction of the access roads. (**0023-2-10** [LaFerrier, Marc])

Comment: A substantial proportion of the access road network passes through and, if approved, will impact the South Dade Wetlands and South Dade Wetlands Addition, both of which are projects designated for acquisition by Miami-Dade County's Environmentally Endangered Lands (EEL) Program. The applicant must provide information on the ultimate disposition of all proposed access roads that occur within the boundaries of these EEL projects, including but not limited to identifying roads that will be downgraded or removed, and which rights of way or road corridors could potentially be transferred or dedicated to the EEL program at the completion of the construction phase of the project after road remediation has been completed. (**0023-2-11** [LaFerrier, Marc])

Comment: Please submit information demonstrating that impacts to wetlands within and adjacent to the proposed roadway expansion area have been avoided and minimized to the maximum extent possible. (**0023-2-12** [LaFerrier, Marc])

Comment: Environmentally Endangered Lands (EEL) owned and/or managed conservation lands exist along proposed access roads. The application has not detailed the potential impacts to EEL land from any work related to the roads. The application should provide information on which roads are proposed as temporary, the ultimate disposition of the access road network, and an analysis of options for remediation of temporary roads after the project has been completed, including but not limited to road removal, restoration of impacted natural areas, and dedication of the restored land to the EEL Program. (**0023-2-8** [LaFerrier, Marc])

Comment: The EEL Program owns additional land in other areas in which project features occur, so changes to roads and rights-of-way may impact publicly-held and managed lands beyond the proposed project areas. (**0023-2-9** [LaFerrier, Marc])

Comment: Please provide additional documentation to describe the time associated with the proposed functional gain, especially in areas where the ecology, including change in the floral and faunal composition, is projected to recover based on relatively minor changes in hydroperiod and/or hydropattern. (**0023-4-5** [LaFerrier, Marc])

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Wetland Mitigation Proposals - The potential benefits and/or adverse impacts related to FPL's wetland mitigation proposals. Limited information has been provided to date by FPL regarding potential wetland mitigation options. (**0032-27** [Golden, James])

Response: *These comments refer to the SCA submitted to the State of Florida by FPL, but they indicate an interest in the potential impacts of the proposed units and ancillary linear corridors on wetlands and other environmentally sensitive lands. The potential impacts of building and operating proposed Turkey Point Units 6 and 7 and ancillary corridors on wetlands* *and other sensitive areas and potential mitigation of those impacts will be discussed in Chapters 4, 5, and 7 of the EIS, based on the affected environment described in Chapter 2. FPL will be required to submit a wetland mitigation plan as part of the CWA Section 404 permit application submitted to the USACE.*

Comment: The NPS is particularly concerned about the potential harm to water-dependent birds, including endangered wood storks, snail kites and a host of migratory bird species that nest, forage and feed within or near the West Preferred and West Secondary corridors. Potential effects include degradation or fragmentation of valuable wetlands habitat, disturbance of birds during construction, and the permanent risk of avian injuries and death from electrocution or collisions with the transmission lines, towers, and guy wires. This area is the focus of a number of important ecosystem restoration projects that specifically seek to increase the wetland function in these areas and provide improved habitat suitability for a variety of wetland-dependent species, particularly water-dependent birds. The construction of a large complex of transmission lines in this area creates a perpetual risk to birds that is inconsistent with the goals of Everglades restoration projects. The EIS should assess the impacts of the proposed transmission infrastructure on all avian species known to use the area with particular emphasis on state- and Federally-listed threatened and endangered and migratory bird species. A risk assessment should be performed that outlines specific methods that will be employed to avoid and minimize impacts to avian species. (**0025-2-11** [Kimball, Dan] [Lewis, Mark])

Comment: The Eastern Preferred Transmission Line Corridor should be evaluated for impacts to migratory, roosting, and nesting birds. State-listed wading birds (e.g., white ibis) have nightly roosts in islands of Biscayne National Park, and they fly to the mainland daily crossing over proposed Eastern transmission lines. In addition, bald eagles, ospreys, and State-listed wading birds also have active nests within Biscayne National Park boundaries. A risk assessment should be performed that outlines specific methods that will be employed to minimize impacts to roosting and nesting birds. (**0025-2-6** [Kimball, Dan] [Lewis, Mark])

Comment: The proposed corridors are located adjacent to multiple wading bird colonies containing federal and state-listed species including the wood stork (*Mycteria americana*), snowy egret (*Egretta thula*), little blue heron (*Egretta caerulea*), tricolored heron (*Egretta tricolor*), and white ibis (*Eudocimus albus*). More than 30 other avian species of concern (federal and/or state listed) are known to, or have the potential to, occur in the corridors and habitats. 2. The endangered Everglade snail kite (*Rostrhamus sociabilis plumbeus*) forages and nests directly within the footprint of the proposed West Preferred Corridor. 3. Listed avian species are at risk of injury/mortality from collisions and electrocutions with the proposed power lines. Both corridors cross known flight pathways of the endangered wood stork and the Everglade snail kite. The West Preferred Corridor crosses flight pathways of other protected migratory species, such as waterfowl, that use the Atlantic Flyway during seasonal migrations. 4. Based on their sheer abundance, including juveniles within the area, proximity to the power line, frequent flights across the West Preferred Corridor, and morphology, listed wading birds meet many of the risk factors known to affect avian mortality rates caused by transmission power lines. 5. The endangered wood stork may be at highest risk of injury/mortality from the proposed powerlines of all avian species due to its limited population size, body form, nocturnal foraging behavior, flight patterns, and abundance of juveniles in the area. 6. Implementation of the proposed transmission lines would result in filling of over 100 acres of habitat within

Everglades National Park that includes wood stork and Everglade snail kite foraging habitat as well as Everglade snail kite nesting habitat. 7. Florida panthers have been documented in and around both corridors within ENP. Suitable panther habitat within the park would be reduced by over 100 acres as wetlands are filled for tower pads and access roads. Potential effects to panthers would include temporary disturbance during construction. (**0025-3-32** [Kimball, Dan] [Lewis, Mark])

Comment: More than 200 avian species are at risk of increased injury/mortality resulting from potential electrocutions and collisions with the proposed power lines. Species known to produce streamers, such as raptors, vultures, and herons, are at risk of injury/mortality from electrocution with the proposed power lines. 2. Besides the previously mentioned listed and special status species, other non-listed avian species that nest within colonies adjacent to the proposed corridors include great egrets (*Ardea alba*), great blue herons (*Ardea herodias*), cattle egrets (*Bub ulcus ibis*), anhingas (*Anhinga anhinga*), black-crowned night herons (*Nycticorax nycticorax*), and yellow-crowned night herons (*Nyctanassa violacea*). 3. More than 40 bird species that are not threatened, endangered, or special status species are anticipated to nest within the proposed corridors or adjacent habitats. 4. Implementation of the proposed transmission lines would result in filling of over 100 acres of habitat used by more than 200 avian species. (**0025-3-33** [Kimball, Dan] [Lewis, Mark])

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Electrical Transmission Lines - Another area of concern is specific to tree islands, which are commonly used as bird rookeries. Islands in or adjacent to this corridor have been Wood Stork rookeries in recent years. Given that Wood Storks are an endangered species and that restoration of the Wood Stork population, along with other Everglades wading bird populations, is a primary CERP target, the construction and presence of electrical transmission lines that could impact these tree islands and their fauna should be avoided. Please note that there may also be potential adverse impacts to the Wood Stork population and other Everglades wading bird populations from the West Preferred Corridor. (**0032-25** [Golden, James])

Response: *The potential impacts of building and operating the proposed new transmission lines on migratory, roosting, and nesting birds, including those that are Federally or State-listed as threatened or endangered will be addressed in Chapters 4, 5, and 7 of the EIS, based on the affected environment described in Chapter 2.*

Comment: Eliminate or reduce the direct and secondary wetland impacts and impacts to wetland-dependent listed species. The amendment does not demonstrate elimination or reduction of direct and secondary wetland impacts and impacts to wetland-dependent listed species. Please provide alternative analyses to document elimination or reduction of direct and secondary wetland impacts for all potential roadway corridors. Potential secondary impacts include habitat fragmentation, other induced development, and habitat alteration related to opportunistic undesirable (or exotic) vegetation. (**0032-35** [Golden, James])

Comment: Revise the habitat assessment to better reflect the actual habitat values. Provide mitigation adequate to offset the proposed wetland impacts. (**0032-36** [Golden, James])

Response: *These comments refer to the SCA submitted to the State of Florida by FPL, but they indicate an interest in the potential impacts of the proposed units and ancillary facilities on wetlands and habitat degradation. The potential impacts of building and operating proposed Turkey Point Units 6 and 7 and ancillary facilities and corridors on wetlands and habitat degradation will be discussed in Chapters 4, 5, and 7 of the EIS, based on the affected environment described in Chapter 2.*

Comment: These sections characterize the plant site as sparsely-vegetated hypersaline mud flats which provide limited habitat for aquatic biota due to fluctuations in water levels and salinity associated with the cooling canal system, DERM staff observations of the plant site during site visits, however, indicated that the site was heavily vegetated during the early wet season 2009, A Comprehensive Environmental Impact statement is needed pursuant to Chapter 24 of the Miami-Dade Code that addresses this and other issues. CEIS should include, at a minimum, a complete seasonally-based biological surveys for the proposed facility site that includes, but is not limited to birds, insects, fish, reptiles and amphibians, mammals, and aquatic invertebrates. (**0023-1-17** [LaFerrier, Marc])

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Radial Wells and Construction Dewatering Withdrawals at Power Plant Site - The potential for adverse impacts to wetlands and listed species. (**0032-12** [Golden, James])

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Additional Construction Impacts at Power Plant Site - The potential for adverse impacts to wetlands and listed species. (**0032-14** [Golden, James])

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Temporary Roadway Improvements for Construction of Units 6 & 7 - The potential for adverse impacts to environmentally sensitive lands within the Model Land Basin. (**0032-16** [Golden, James])

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Reclaimed Water Pipeline - The potential for adverse impacts to wetlands and listed species. (**0032-17** [Golden, James])

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Electrical Transmission Lines - The potential for adverse impacts to wetlands and listed species. (**0032-19** [Golden, James])

Response: *The potential impacts of building and operating proposed Turkey Point Units 6 and 7 and ancillary facilities and corridors on wetlands, Federally and State-listed species, and other terrestrial important resources will be addressed in Chapters 4, 5, and 7 of the EIS, based on the affected environment described in Chapter 2.*

Comment: The application does not include the listed species management plan, as required under Condition 2 of Z-56-07. Please provide the required plan. (**0023-1-63** [LaFerrier, Marc])

Comment: A plan is needed for in-kind, in-situ mitigation for impacts to existing wetlands related to the Radial Collection Well Area and Radial Collector Well Delivery Pipeline. Please include planting scheme, success criteria, monitoring and maintenance schedules. High quality coastal wetlands exist on the shoreline along the proposed area of work. (**0023-1-71** [LaFerrier, Marc])

Comment: The application does not provide a complete and detailed exotic vegetation management plan as required by Condition 12 of Z-56-07. (**0023-2-30** [LaFerrier, Marc])

Comment: The application fails to provide sufficient information to determine whether it is in compliance with the tree protection provisions of Section 24-49 of the Miami-Dade Code. (**0023-2-31** [LaFerrier, Marc])

Comment: The application does not include the management plan for all federal and state listed threatened and endangered species documented within the proposed access area, as required under Condition 11 of Z-56-07. (**0023-2-32** [LaFerrier, Marc])

Comment: Please submit a proposed schedule for long term monitoring, maintenance and financial assurances for all proposed mitigation areas. Please submit more detailed information about the location and types of anticipated impacts associated with the secondary Impacts. Please submit a detailed assessment of the time lag and risk associated with the restoration of the temporary impacts. (**0023-3-69** [LaFerrier, Marc])

Comment: It was stated that the Basis of Review and ratios were used to determine the mitigation credits necessary in the HID. According to the Basis of Review, the ratios should be 1.5/1 to 4/1. How was the proposed 1/1 determined and how is it consistent with the Basis of Review and the agency decisions used for other wetland impacts in the area? (**0023-4-15** [LaFerrier, Marc])

Comment: The HID Mitigation Bank has a finite amount of mitigation that they can perform annually and receives funding from other impact associated with private development. Please provide evidence that the large amount of mitigation, as proposed, can be accomplished in the projected time frame. (**0023-4-16** [LaFerrier, Marc])

Comment: The application does not provide the planting plan required under Condition 13 of Z-56-07 for material that will not be planted at the proposed plant site. (**0023-4-18** [LaFerrier, Marc])

Comment: The application does not include the listed species management plan, as required under Condition 2 of Z-56-07. Please provide the required plan. Pursuant to Condition 2 of Z-56-07, the plan shall include but not be limited to identification, location, and description of features such as permanent physical barriers, visual buffers, and the establishment of development setbacks necessary to prevent both direct and indirect impacts to adjacent critical habitat and disruption of sensitive behaviors such as breeding, nesting and foraging within the adjacent critical habitat. (**0023-4-20** [LaFerrier, Marc])

Response: *These comments are directed at the applicant and refer specifically to the SCA submitted to the State of Florida by FPL, but they indicate an interest in the impacts of building* *and operating proposed Turkey Point Units 6 and 7 on terrestrial resources. The potential terrestrial impacts of building the units will be presented in Chapter 4 of the EIS and the potential terrestrial impacts of operating the units will be presented in Chapter 5. Cumulative terrestrial impacts will be presented in Chapter 7.*

Comment: What impact will salt deposition from the cooling towers have on freshwater wetlands in the area? What are the cumulative impacts of salt deposition from Units 3 and 4 in addition to those from the proposed Units 6 and 7? (**0018-16** [Poole, Mary Ann])

Comment: Other specific issues NMFS recommends for evaluation in the EIS or EFH assessment: 3. *Cooling towers*. Please evaluate potential impacts to wetlands from salt deposition from the cooling towers. (**0033-11** [Croom, Miles])

Response: *The potential impacts of operating proposed Turkey Point Units 6 and 7 on terrestrial ecological resources, including the impact of salt deposition from drift, will be discussed in Chapters 5 and 7 of the EIS, based on the affected environment described in Chapter 2.*

D.1.10 Comments Concerning Ecology – Aquatic

Comment: The reason they want to stay in that spot is because they're going to use the ocean water to cool the reactors. That hot water goes somewhere. It has been shown over and over again it produces algae blooms; it affects the pH around there; it kills the fish; it changes it. We have a fragile coral reef that runs along us. We are in a fragile environmental area. It is an environmental impact. (**0001-11-10** [Amor, Valerie])

Response: *The potential impacts from cooling water, including the use of reclaimed water from Miami-Dade County, use of water obtained from RCWs located at Turkey Point, and discharge of heated water to the Boulder Zone, will be discussed in Chapter 5 of the EIS.*

Comment: I haven't even begun to talk about fish and wildlife, road impacts, exotic species, and all of that. But there's a lot of information out there from the State Siting Act process that you should look at. (**0002-6-7** [Grosso, Richard])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of the biological forms that will be affected by deep well injected wastes, please provide them. (**0022-2-6** [Reynolds, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to the geographical extent of the biological forms that will be affected by the deep well injected wastes, please provide them. (**0022-2-7** [Reynolds, Laura])

Response: *A variety of sources of information will be used during the development of the EIS, including information associated with the Florida SCA. The EIS will include citations for documents used in its preparation.*

Comment: List of potentially occurring State-listed fish and wildlife species

Common name	Scientific name	State-listing status
Atlantic sturgeon	*Acipenser oxyrinchus*	Species of special concern
American alligator	*Alligator mississippiensis*	Species of special concern
American crocodile	*Crocodylus acutus*	Endangered
Eastern indigo snake	*Drymarchon corais couperi*	Threatened
Least tern	*Sterna antillarum*	Threatened
Limpkin	*Aramus guarauna*	Species of special concern
Snail kite	*Rostrhamus sociabilis plumbeus*	Endangered
Everglades mink	*Mustela vison evergladensis*	Threatened
Florida manatee	*Trichechnus manatus latirostris*	Endangered

(**0018-2** [Poole, Mary Ann])

Response: *The potential impacts on Federally and State-listed threatened and endangered species, including those listed in the comment, from building and operating proposed Turkey Point Units 6 and 7 will be discussed in Chapters 4 and 5 of the EIS.*

Comment: Please state the amount of disruption to the biota of Biscayne National Park and adjacent bodies of Outstanding Florida Waters that the construction of units 6&7 will make including the plant site, all support facilities, all structures, all borrow pits (including rockmines,) all fencing, all roads, all berms, all pipelines, all transmission lines, all basins, all parking lots, and all vehicle usage. (**0022-3-1** [Reynolds, Laura])

Response: *The EIS will discuss the aquatic resources in the vicinity of Turkey Point in Chapter 2 of the EIS and will consider potential impacts from building proposed Turkey Point Units 6 and 7 in Chapter 4. Chapter 7 will evaluate cumulative aquatic impacts.*

Comment: Please show the barge routes and state the number of barge trips for each route for units 6&7 that traverse the waters of Biscayne National Park and other protected waters. Please state the sizes and drafts of the barges. Please state the average speed and maximum speed of the barge trips. Please state the increased damage to the benthic communities due to physical contact, turbidity, silt deposition, and wake disruptions. Please state the amounts of cumulative damage to the benthic communities resulting from historic barge trips and the increased barge trips due to units 6&7. Please state the plan for preventing barge collisions with manatees, turtles, and other protected species. Please state the plan for minimizing the number of barge trips for units 6&7. Please state the mitigation for damage to the benthic communities of Biscayne National Park and other protected waters. (**0022-3-18** [Reynolds, Laura])

Comment: The application does not provide sufficient information to demonstrate how manatees will be protected during construction of the barge slip improvements. (**0023-1-64** [LaFerrier, Marc])

Comment: Potential impacts to other key resources in Biscayne National Park - 4. FPL should clarify how they would transport construction supplies and equipment to the worksite, including via marine pathways, and evaluate any additional impacts on the marine environment. (**0025-3-30** [Kimball, Dan] [Lewis, Mark])

Response: *The potential impacts of increased barge traffic associated with building proposed Turkey Point Units 6 and 7 and the potential impacts of altering the barge slip will be discussed in Chapter 4 of the EIS.*

Comment: Surveys: Detailed surveys of all fish and wildlife resources in the vicinity of each proposed component of this project, to include laydown areas for construction equipment; areas that will be temporarily disturbed by excavations; and areas that may potentially be affected by changes in salinity, turbidity and sedimentation due to the operations of project. Please include, but do not limit to: benthic species and habitats (seagrasses, hardbottom, reefs, and associated reef resources), plankton, mangroves, and protected species (both Federally and State-listed). The design of all survey methodologies should be coordinated with the FWC. Provide a map of delineated habitat types (including mangroves and submerged habitats such as seagrasses and hardbottoms) with an overlay of the project component footprints. (**0018-4** [Poole, Mary Ann])

Comment: Surveys: For the 60-foot x 100-foot x 9-foot deep barge unloading area expansion, please provide fish and wildlife resource surveys and sea grass surveys. With regard to the potential for manatees to occur in the barge unloading expansion area during construction, the applicant should provide information detailing how observers will be selected, whether they have any previous experience observing for manatees, how many observers will be assigned to the construction areas, and how many hours per day each observer will be assigned to work. (**0018-6** [Poole, Mary Ann])

Comment: Please state the plan for protecting benthic communities for all alterations to the plant site affecting the marine environment. Please state the plan for protecting manatees, turtles, dolphins, sawfish, and other protected species from non-explosive dredging activities. Please state the plan for protecting manatees, turtles, dolphins, sawfish, and other protected species from explosive activities. (**0022-3-21** [Reynolds, Laura])

Comment: The application proposes several wildlife underpasses to facilitate movement of crocodiles under construction roads within the plant boundary. Please provide a detailed analysis of how the specified locations were selected and how crocodiles that may occur outside the plant near linear features (such as the transmission lines, access roads and spoil disposal routes) will also be protected from disturbance. [Same statement for T-Lines] (**0023-2-15** [LaFerrier, Marc])

Comment: Seasonal patterns of behavior of threatened and endangered species occupying Biscayne National Park, such as West Indian Manatees and American crocodiles, may occur if water salinity, temperature or quality changes as a result of construction or operation of Units 6&7 and non-transmission facilities. These impacts should be evaluated. (**0025-3-29** [Kimball, Dan] [Lewis, Mark])

Response: *The EIS will discuss the aquatic resources in the vicinity of Turkey Point in Chapter 2 and will consider potential impacts to benthic communities, fish, manatees, and sea turtles in Biscayne Bay and American crocodiles from building and operating proposed Turkey Point Units 6 and 7 (and planned mitigation) in Chapters 4 and 5.*

Comment: Impacts to submerged aquatic vegetation: Please submit a description of expected short term and long term anticipated impacts resulting from the proposed scope of work. (**0023-1-18** [LaFerrier, Marc])

Response: *The nature and extent of submerged aquatic vegetation will be discussed in Chapter 2 of the EIS. Potential impacts to submerged vegetation of building and operating proposed Turkey Point Units 6 and 7 will be discussed in Chapters 4 and 5, respectively. Cumulative impacts of operating the proposed units and other past, present, and reasonably foreseeable future actions that impact the same resources will be discussed in Chapter 7.*

Comment: Please provide documentation in support of this statement, including but not limited to a copy of the cited report with current data on nesting activity, nest success, hatchling sex ratios and survivorship, and survivorship to adulthood of juveniles hatched at Turkey Point over the period of record during which crocodile monitoring has been occurring at the Turkey Point power plant. [Same statement for T-Lines] (**0023-2-14** [LaFerrier, Marc])

Response: *The past and current populations of the American crocodile will be characterized and a description of the recent monitoring program for this species will be provided in Chapter 2 of the EIS.*

Comment: The cumulative effects of the proposed Units 6&7 plants and non-transmission facilities will place considerable stress on an already vulnerable ecosystem and potentially cause harm to Biscayne Bay and adjacent coastal wetlands. Disturbances to estuarine, marine, and terrestrial habitats are likely to result from proposed Units 6&7 construction and operation. (**0025-1-11** [Kimball, Dan] [Lewis, Mark])

Response: *The potential impacts associated with building and operating proposed Turkey Point Units 6 and 7 will be discussed in Chapters 4 and 5 of the EIS, respectively. A discussion of the cumulative impacts associated with the proposed units will appear in Chapter 7.*

Comment: The operation of the RCWs would result in ... water volume and quality alterations posing a threat to ecosystem function of the nearshore habitats of Biscayne Bay. (**0025-1-14** [Kimball, Dan] [Lewis, Mark])

Comment: The operation of the RCWs could potentially change sediment oxidation-reduction potential in seagrass beds and benthic communities, which should be considered an ecological impact. (**0025-3-17** [Kimball, Dan] [Lewis, Mark])

Comment: The net reduction in positive groundwater flux to the benthic ecosystem will occur due to the operation of the RCW. Groundwater is an important source of freshwater for benthic communities and any reduction should evaluated for its associated impact. (**0025-3-18** [Kimball, Dan] [Lewis, Mark])

Comment: Although the radial collector wells will be physically placed in the underlying aquifer and the laterals are not expected to extend into park boundaries, the primary source intake water is Biscayne Bay. Based on the design feature of horizontal production wells and preliminary hydrologic modeling, the cone of influence includes Biscayne National Park waters. The application design is for up to 124 million gallons per day to be withdrawn from these surface waters. The groundwater modeling which predicts minimal impacts to the benthic organisms of the bay appears to consider the subsurface as a singular uniform, non-karst feature, which is not accurate. The groundwater modeling does not provide the degree of detail needed to determine impacts to the benthic organisms of the bay and Biscayne National Park, when the RCW system is operated. (**0025-3-19** [Kimball, Dan] [Lewis, Mark])

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Radial Wells and Construction Dewatering Withdrawals at Power Plant Site - The potential for the proposed withdrawals to adversely impact the ecology of Biscayne Bay. (**0032-9** [Golden, James])

Response: *The potential impacts of RCW operations will be discussed in Chapter 5 of the EIS.*

Comment: *Essential Fish Habitat within the Project Area* - Mangrove: The South Atlantic Fishery Management Council (SAFMC) designates mangroves as EFH for juvenile gray snapper (Lutjanus griseus), dog snapper (L. jocu), bluestriped grunt (Haemulon sciurus), spiny lobster (Panulirus argus), and pink shrimp (Farfantepenaeus duorarum). Mangrove habitats are ecologically important coastal ecosystems (Lugo and Snedaker 1974). At a recent meeting, FPL suggested that the mangrove habitat that would be impacted by the water treatment facility (approximately 50 acres) is composed of dwarf red mangroves (Rhizophora mangle) with hypersaline conditions and lack of direct connection to other wetlands or water bodies. These types of mangrove wetlands still provide ecological services including as a buffer against storm surges, they reduce shoreline erosion and turbidity, and absorb and transform nutrients. While this mangrove system may not be inhabited to a large degree by various life stages of federally managed fisheries, they may contribute dissolved and particulate organic detritus to estuarine food webs. They help shape local geomorphic processes and are important in the heterogeneity of landforms which provide shelter, foraging grounds and nursery areas for terrestrial organisms (e.g., through bird use as a rookery and feeding on fish). The root system binds sediments thereby contributing to sedimentation and sediment stabilization. (**0033-1** [Croom, Miles])

Comment: Seagrass and Unconsolidated Bottom: SAFMC also designates seagrass as EFH. Species associated with seagrass include pink shrimp, spiny lobster, and estuarine life stages of various species within the snapper/grouper complex including adult white grunt (Haemulon plumieri); juvenile and adult gray snapper (Lutjanus griseus); juvenile mutton snapper (Lutjanus analis). Any bottom-disturbing activities within areas that are seagrass habitat must include best management practices to avoid impacting this habitat. SAFMC also designates soft bottom habitat as EFH because it plays an important role in the ecological function of coastal ecosystems by controlling fluxes of nutrients between the sediment and the water column. Shallow water, unconsolidated bottom also provides EFH by serving as nursery grounds for early life stages of benthic-oriented, estuarine-dependent species; refuges and feeding grounds for forage species and juvenile fishes (SAFMC 2009) and feeding grounds for specialized predators, including adult white grunts (Potts and Manooch 2001). (**0033-2** [Croom, Miles])

Comment: *Habitat Area of Particular Concern within the Project Area* - SAFMC also identifies mangroves and seagrass as a Habitat Area of Particular Concern (HAPC) for several species within the snapper/grouper complex. HAPCs are subsets of EFH that are either rare, particularly susceptible to human-induced degradation, especially important ecologically, or located in an environmentally stressed area. Federal actions with potential adversely impacts HAPCs will be more carefully scrutinized during the consultation process and subject to more stringent conservation recommendations. In addition, Biscayne Bay is an EFH-HAPC for spiny lobster. Biscayne Bay and the Biscayne National Park are also an EFH-HAPC for coral, coral reefs, and hardbottoms (SAFMC 1998). (**0033-3** [Croom, Miles])

Comment: *Essential Fish Habitat Consultation Requirements* - The Magnuson-Stevens Act directs federal agencies to consult with NMFS when the agency's activities may have an adverse affect on EFH. We recommend that the NRC coordinate closely with the NMFS Habitat Conservation Division to ensure the EFH assessment and NEPA documents contain sufficient detail, 50 CFR 600.10 to 600.920 describes the content required of an EFH assessment. Specifically, the components of an EFH assessment can be found at 50 CFR 600.920(e)(3) and (4) and are listed below (additional comments are provided in parentheses). The EFH assessment can be incorporated into the EIS or provided to NMFS under separate cover.

<u>Components of an EFH Assessment:</u>

1. Description of the action. (This section can reference relevant portions of the EIS.)
2. Analysis of the potential adverse effects of the action on EFH and the managed species.
3. Federal agency's conclusions regarding the effects of the action on EFH.
4. Proposed mitigation. (Unavoidable direct and indirect impacts to EFH will require compensatory mitigation.)
5. Results of an on-site inspection to evaluate the habitat and the site-specific effects of the project.
6. Views of recognized experts on the habitat or species that may be affected.
7. Review of pertinent literature and related information.
8. An analysis of alternatives to the proposed action. (This section can reference relevant portions of the EIS alternatives analysis.)

(**0033-4** [Croom, Miles])

Response: *Essential fish habitat (EFH) and mangrove habitats near Turkey Point will be described in Chapter 2 of the EIS. The review team will also assess potential impacts on EFH, including mangrove resources, from building and operating proposed Turkey Point Units 6 and 7 in an EFH assessment that will be forwarded to the National Marine Fisheries Service (NMFS) for review. The EFH assessment will be included in an Appendix of the EIS.*

Comment: [Determine] the impact on wetlands and nearshore surface and groundwater water quality in Biscayne Bay, including as it relates to CERP efforts to promote estuarine conditions in nearshore areas. (**0023-1-36** [LaFerrier, Marc])

Response: *The impacts of building and operating proposed Turkey Point Units 6 and 7 on wetlands and nearshore surface-water and groundwater quality will be discussed in Chapters 4 and 5 of the EIS. Chapter 7 of the EIS will evaluate cumulative impacts, and include a discussion of how the proposed action might affect current or planned restoration activities in the vicinity of Turkey Point.*

Comment: Other specific issues NMFS recommends for evaluation in the EIS or EFH assessment: 1.c *Radial wells*. Impacts to EFH associated with radial well construction and operation within Biscayne Bay should be fully evaluated. The evaluations should include an evaluation of impacts associated with extended use of the radial well system to include an evaluation of impacts to groundwater that is closely tied to surface water in this porous karst area and thereby supports fish and wildlife resources. (**0033-7** [Croom, Miles])

Comment: Other specific issues NMFS recommends for evaluation in the EIS or EFH assessment: 1.e *Radial wells*. Impacts to EFH associated with radial well construction and operation within Biscayne Bay should be fully evaluated. The evaluations should include a survey and monitoring plan that would enable FPL to determine impacts from radial wells to localized habitats and the fish and wildlife that depend on them. (**0033-9** [Croom, Miles])

Response: *The potential impact of building and operating radial wells on aquatic resources will be discussed in Chapters 4 and 5 of the EIS, respectively. The review team will also assess potential impacts on EFH in an EFH assessment that will be forwarded to the NMFS for review. The EFH assessment will be included in an Appendix of the EIS. FPL's proposed monitoring program will be discussed in Chapters 2, 4, and 5.*

Comment: Other specific issues NMFS recommends for evaluation in the EIS or EFH assessment: 2. *Deep-well injection*. Please provide an evaluation of effects to fish and wildlife resources from proposed deep-well injection activities. The evaluation should describe the fate (location and concentration over time), of any nuclides injected into the well. (**0033-10** [Croom, Miles])

Response: *The potential ecological impacts associated with deep-well injection of cooling tower blowdown will be discussed in Chapter 5 of the EIS.*

Comment: We would like to see a baseline survey and monitoring information for the radial collector wells, caissons, and lateral arms, with preferably a minimum of two years of data. This data should include sampling prior to, during, and at least one month after all radial collector well events. Identify and commit to modeling environmental responses such as water quality and fish and wildlife species that depend on seagrass and hard-bottom habitats. FWC staff can work with the applicant to identify species of interest. How will noise from well/pump operation affect fish and wildlife resources (particularly listed species) in the area of the lateral arms and the well caissons? Our staff is concerned that there might be a delayed impact on fish and wildlife resources if phenomena such as "frac-out" or subsidence of the bay bottom should impact on the radial collector wells and their associated lateral arms. Is this a possibility? If so, how will this possibility be avoided, and what contingencies will be in place if "frac-out" or subsidence does occur? Also, since radial collector wells have not yet been used in a saltwater environment, we suggest that FPL anticipate the potential for indirect impacts on fish and wildlife resource needs in the case where there might be a potential failure of the wells due to corrosion. (**0018-10** [Poole, Mary Ann])

Comment: How will fish and wildlife resources over the lateral arms of the radial collector wells be affected by the construction of the wells? How will the lateral arms be "advanced from the caissons"? We would like to see a survey and monitoring program that specifically enables FPL to determine the contribution of this part of the proposal to any impacts on the surrounding ecosystem, localized habitats and the fish and wildlife that depend on them. (**0018-8** [Poole, Mary Ann])

Comment: FPL's response [to FDEP's SCA review] does not adequately address how benthic resources in the footprint of the RCWs and adjacent areas will not be significantly affected given the fact that at least 3% of the water will come from the Biscayne Aquifer, a source of freshwater inputs to the bay bottom, helping to support the benthic community. (**0020-2** [Mulkey, Cindy])

Response: *These comments refer to the Florida SCA, but express a concern that there is the potential for impact to benthic organisms in the vicinity of the RCWs. The potential impact of building and operating the RCWs on benthic resources will be discussed in Chapters 4 and 5 of the EIS, respectively.*

D.1.11 Comments Concerning Socioeconomics

Comment: Additionally, as Mayor of Florida City, I'm concerned about our economy. And the building of these two power plants in our area will be an immensely beneficial operation as far as spurring our economy. Safety first along with environmental protection; those are the first issue. Even with the economic benefit, if we can't guarantee safety and protection of the environment, we'll have to get jobs elsewhere. But once those two criteria are met, then the job creation becomes immensely important to me. People with jobs don't care about that aspects of it; but people without jobs simply do. (**0001-1-5** [Wallace, Otis])

Comment: Also, the gentleman that spoke before from the Chamber of Commerce, which I was a member of, stated that 4,000 jobs would be available for five years. And the gentleman who was just here before me said that 800 permanent jobs would be established. I would like to recall 1970 when Aerojet promised Florida City and Homestead that jobs would be created in the development of the Aerojet canal. Contractors were brought in from out of State and they got the jobs; nothing was done for the benefit of Florida City or Homestead, as you can see. I don't want to see this happen again if they decide to go ahead and approve nuclear plant 6 and 7. (**0001-10-2** [Marinelli, Francis J.])

Comment: When I look at this opportunity for growth and expansion in an area that truly needs it, I, because of not just what someone has told me or what someone has talked about, but it is something that I've lived, I see the benefits of it. I see kids being able to get jobs and come back home to a community that they're so very proud of. I see adults being able to take care of their elderly family members because of the amount of revenue and commerce that is being sparked. So with some of you I agree and others I vehemently disagree. And I say that this is about jobs, but it is about lifestyle, it's about living, and it's about opportunity. (**0001-17-1** [Diggs, Bill])

Comment: We are at a difficult time in our history in this country. Jobs are hard to come by; college kids that you've spent your life savings to send to school are having difficult time finding opportunities. I submit to you this: They'll either find it here or somewhere else. But at the end of the day this is our community. And I stand, if nothing else, but an example of what can happen when community and business works together, because it's not just about jobs. It's about lifestyle; it's about faith; it's about hope. (**0001-17-2** [Diggs, Bill])

Comment: Data shows that the nuclear power plants contribute significantly to local economies. These are averages. The creation of a nuclear power plant will result in a creation of 1400 to 1800 jobs during the construction, with peak employment at 2400. As we can see in the back, FP&L has 3600, so the numbers are better. Operating a nuclear power plant generates from 400 to 700 permanent jobs and these jobs pay 36 percent more than average salaries in the local area. Again, FP&L has 800 permanent jobs. These permanent jobs create an equivalent number of additional jobs in the local area and provide goods and services necessary to support the nuclear workforce such as grocery stores, dry cleaners, et cetera. We're looking forward to that. (**0001-18-2** [Landeta, Hector])

Comment: Each year an average nuclear plant generates approximately 430 million in sales, goods, and services in the local community and nearly 40 million in total labor income. Again, they have better numbers. They see -- they have 6 billion -- 6 billion in economic benefits to local economy over the next decade. (**0001-18-3** [Landeta, Hector])

Comment: We need jobs. My generation is coming into this hard economic times and we need jobs. You're promising 800 full-time jobs for South Florida for these two reactors. I graduated in a class of 935 students in Palm Beach County. That doesn't cover those people. That's about 135 less jobs than there are people who graduated in my class. There are 23 high schools in Palm Beach County; there are 32 high schools in Miami-Dade. Do you think 800 jobs is going to make a dent in the number of young people looking to enter the work force in South Florida? (**0001-19-7** [Ryan, Megan])

Comment: [T]here are 800 full-time employees at the site and approximately an equivalent number of contractors of the site. Now, those 1600 people, they're members of the community; they buy their gas in the gas stations; they go to the supermarkets; their children go to the schools. (**0001-3-1** [Kiley, Mike])

Comment: We have to look at jobs. We have to build our economy back, a new economy that relies on growth. And the good news is that from this project it's anticipated that as many as 4,000 or more jobs will be added through the construction phase which will last five to seven years. That would be a rich addition to the workforce in South Florida, which will benefit all of us in so many, many ways, but most importantly for those people who are out of work and looking for jobs. And we have so many people in the construction industry who have been hit hard by the downturn in the economy. (**0001-5-3** [Johnson, Barry])

Comment: When the project is completed it will include 800 jobs -- 800 more jobs in South Dade; 800 more families in South Dade contributing to the growth of our community. And these are high-skilled well-paying jobs that our community needs. Those are the jobs that will build our future. (**0001-5-4** [Johnson, Barry])

Comment: As the previous speakers have said, 4,000 jobs can be created by having Units 6 and 7 built, and 800 permanent jobs -- not just any regular jobs, but high-paying engineering jobs and the like, can be provided by having 6 and 7 built. (**0001-9-2** [Martinelli, Tom])

Comment: We are here because of the proposed plans to build two atomic plants that will afford us the opportunity, after they are built at Turkey Point, to have a flourishing economy in the area. (**0002-10-1** [Alexander, William])

Comment: The Chamber also sees with sympathy all the efforts surrounding the industry, the generating industry, and the production of electricity and energy. We also see that it will provide around 3,000 jobs, which is very, very important to us. We also are considering not just those 3,000 temporary jobs, but also the 800 permanent jobs that would be left here in this region that sorely needs it right now. (**0002-10-4** [Alexander, William])

Comment: What these jobs will do -- there's a long-term effect from these two plants. Not only are they going to provide thousands of jobs as they're being built here locally, these jobs are jobs that give a sufficient rate of pay, a living wage. And in addition to that, most of the workers that work on these projects will either receive some type of pension benefits or health and welfare. (**0002-13-3** [Simpson, Roce])

Comment: One of the things you'll also notice when you come to the site is that there's 800 full-time employees, and there's an additional 800 contractors that work at the site and call this community their home. They buy their gas in town, they go food shopping in this town, they use the local restaurants, their children go to the schools. (**0002-5-4** [Kiley, Mike])

Comment: And you have to understand the economic impact and the economic value of a restored Biscayne Bay to the industries that are populated by a lot of folks who probably aren't here tonight; fisherman, recreational users, people that make their money off of that Bay. Those are jobs too, and those have major implications for what happens here in the future. (**0002-6-3** [Grosso, Richard])

Comment: We need these new power plants. It provides jobs for honest people. You look at it. A lot of people -- to get in at a nuclear power plant you got to take a 500 question site [psych?] test, plus pass a background check. You are attracting a good crowd of people in this area, which is good economically, not to mention -- I believe there's one other nuclear power plant being built right now, which is Plant Vogtle, I believe in Georgia. And we can lead the way to supplying our power demands. (**0002-7-3** [Snelson, Richard])

Comment: You look at it as far as local impact; the people, the training programs and stuff like that, it's going to provide a lot of permanent jobs for people. You look at all the foreclosures and the people that have lost their jobs. I think it's a win-win situation. (**0002-7-4** [Snelson, Richard])

Comment: Nuclear energy is also a smart economic choice. Constructing plants has the ability to employ about 4,000 people at its highest rate of construction, and then it employs about 500 specialized jobs, like Victor's, who came to the Pipeline Program at Miami-Dade. (**0002-9-3** [Martinelli, Tom])

Comment: Another great reason to consider building two new reactors would be to imagine just how many jobs it would create. In a downed economy such as this, jobs are a hard thing to come by; but upon the unveiling of two nuclear reactors, a significant job growth is to be expected -good jobs to boot, not just a medley of entry level positions. This will in turn spike the cash flow in the South Florida area and analogously pass on to corporate and private businesses alike. (**0003-4-4** [Accursio, James])

Comment: In addition to jobs, it will also stimulate the economy by commencing the required construction spending to the county which thusly stimulates millions of dollars in property tax. These taxes are passed on to schools, colleges, educational institutions, economic growth firms, and many other governmental organizations; giving them the financial injection they need in these hectic times. (**0003-4-5** [Accursio, James])

Comment: Ensure the full scope of the proposed project's fiscal impacts is calculated. The location of the plant; transmission lines and associated facilities; the rate increase, which is proposed to precede the actual construction phase of the project; and additional direct costs that will be incurred by Miami-Dade County and its municipalities (including but not limited to fire, police; etc) over the life of the project should be taken into account and be incorporated into economic and fiscal analyses. (**0019-1** [Hamilton, Karen])

Comment: Ensure the economic benefits of the proposed expansion project, such as employment and capital expenditures, are realized by the residents of South Florida. (**0019-2** [Hamilton, Karen])

Response: *The expected socioeconomic impact of building and operating proposed Turkey Point Units 6 and 7, including impacts on local employment and earnings, local tax revenues, in-migration, local infrastructure, and public services will be presented in Chapters 4 and 5 of the EIS. The cumulative impacts of the proposed action and other past, present, and reasonably foreseeable actions will be presented in Chapter 7.*

Comment: So what that means is, that we're not going to have massive amounts of people, like we do now, going to Jackson Hospital and other community hospitals that have no health insurance, putting the burden back on the taxpayers to be able to furnish health insurance for these people. There is an endless line of people who are retired that have no income, waiting on Section 8 housing and other types of housing that they can get into and live in the twilight of their years. This will, in a lot of cases, prevent that from happening. (**0002-13-4** [Simpson, Roce])

Response: *The expected impact of building and operating proposed Turkey Point Units 6 and 7 on the capacity use of local medical services will be evaluated in Chapters 4, 5, and 7 of the EIS.*

Comment: To be more specific to the lodging industry, which I'm part right now, this power plant would produce a stabilizing effect on the local economy. It will compliment the tourism industry. And as maybe you know this, especially people from FP&L, refueling takes place every 18 to 24 months for each reactor and brings several hundred workers from outside the local area who stay in the hotels, motel, and eat in our local restaurants. Each reactor alternates its refueling schedule, usually resulting in at least one refueling or significant equipment installation per year, typically for us during a slack part of the tourist season. (**0001-18-5** [Landeta, Hector])

Response: *The impacts on the economy and infrastructure, including recreation and housing, will be addressed in Chapters 4, 5, and 7 of the EIS.*

Comment: You say that tourism is going to be affected because people coming to work here are going to need hotels and restaurants. But I thought you said that you wanted to create jobs for people who already live here, so we should not be talking about tourism because it's already affected enough by the Gulf oil spill. (**0001-19-8** [Ryan, Megan])

Response: *The impacts of building and operating proposed Turkey Point Units 6 and 7 on both local and in-migrating labor and indirect impacts of job creation on the local economy will be addressed in Chapters 4, 5, and 7 of the EIS.*

Comment: Regarding the ability to have jobs and provide jobs for the area. Right now Miami-Dade College offers an internship program in nuclear power and practice. And interns right now from Miami-Dade College working at the FP&L Plant at Turkey Point are making $19 to $20 an hour as an intern before they even set foot on the property as a full-time licensed person. So, you know, what I think is marvelous is that they are a good partner; they run a very safe, very secure practice. And the expansion I think only solidifies our future as a great, great place to live, that being Homestead/Florida City down here. (**0001-20-5** [Daley, Dennis])

Comment: Turkey Point has had a growing demand for highly-skilled workers, and we understand that they could soon experience workforce shortages, largely due to retirements. As a result we, together, developed an Associate in Science Degree program in electrical power technology. And I would be here to tell you this today, that that program has been extremely successful. It was targeted for a very diverse population of incumbent workers at Florida Power and Light Turkey Point and our college students. Graduates from this program meet the qualifications to work in positions in nuclear and non-nuclear facilities. To date we have had 63 students to graduate from the program. And I might add that the program began in 2006. Of those 63 graduates, 36 are currently working at Turkey Point and 20 are in the process of being hired. This has truly been a success story for Florida Power and Light and Miami-Dade College. It has enriched our community. (**0001-4-2** [Jacobs, Jeanne])

Comment: Briefly I would like to discuss training with you. For this undertaking of the construction of Units 6 and 7, we're looking at jobs for over 4,000 building tradesmen. Building tradesmen within the State of Florida who are either licensed by their trade and/or have the training that is necessary to go out and build this facility correctly, on budget, and on time. I can speak on behalf of the Florida Carpenters, that we do not send a single person out to that plant for any piece of operation that is not properly credentialed and trained. And I can also tell you that the rest of the building trades, that's their same philosophy. (**0001-8-3** [Johnson, Michael])

Comment: Along with the fact that we're going to be able to provide these jobs for working men and women during the time of construction, a lot of young people will go out there on those particular projects and be trained with a skill in a technical high-level industry and be able to take those skills back out into the community and be able to work on other projects and sustain their families for the rest of their lives. And in addition to that, for those of you that don't realize it, once these plants are built that's not the end of it. People will go back on a regular basis to maintain, update, and upgrade these plants. It's a system that is good for the community, good for the workers. (**0002-13-5** [Simpson, Roce])

Response: *Impacts on local employment will be addressed in Chapters 4, 5, and 7 of the EIS.*

Comment: I do want to say that I think the whole discussion of the jobs that might be brought to this community, it is and should be irrelevant to an environmental study. I know that there is a socioeconomic aspect of it, and we're going to be addressing the socioeconomic, again very adverse impacts if the transmission lines were to go along the U.S. 1 corridor. (**0001-21-7** [Lerner, Cindy])

Comment: I can understand that folks in Florida City and Homestead may be interested in grabbing that relatively small amount of jobs that could come from an investment that's focused down here. But speaking regionally, of course, that's money that's taken out of the hides of everyone in the rate base. If it came right down to trying to make more jobs, well, with this amount of money I figure we could build about 50 new sports arenas for billionaire ball teams and the Heat, I think they deserve a new arena by now. That other one is getting old and they've got these three new players. It's not just about jobs. And I think in reality that should pretty much be out of scope for our discussion. (**0001-24-5** [Harum-Alvarez, Albert])

Response: *The Council on Environmental Quality guidance for implementing NEPA includes a discussion of economic or social effects when these are interrelated with natural or physical environmental effects. NRC guidance for implementing NEPA includes the analysis of employment impacts from construction and operation activities (including transmission lines) among the socioeconomic impacts to be analyzed in environmental reviews of nuclear power plants. The socioeconomic impacts of construction and operation of proposed Turkey Point Units 6 and 7 will be assessed in Chapters 4, 5, and 7 of the EIS.*

Comment: And, by the way, all the folks that are up here talking about jobs. I took a job about a month ago with a solar company installing solar installation panels on a ranger station in Biscayne National Park. That is as blue collar a job as any blue collar work I've ever done; it's construction work; it's electrical work; it's roofing; it's tiling. It's blue collar work, it produces lots of jobs. People sometimes think solar is people going up to a rooftop and meditating on the sun or something like that. It's nothing to do with that. It's the construction trades installing solar panels which are existing right now. The jobs that this plant will create are located in Homestead. If we did solar on rooftops throughout the service area of FP&L, we would be creating jobs throughout their entire service area. That's a big consideration. (**0002-14-4** [Schwartz, Matthew])

Response: *Alternative energy sources, including solar power, will be discussed in Chapter 9 of the EIS.*

Comment: People come to South Dade to go to Everglades National Park or Biscayne National Park. Business in the area benefit from that tourism and provide services to people who are going to visit those parks. So people will be affected and the locals in that way as well. (**0002-16-3** [Shlackman, Mara])

Comment: Construction of transmission towers and access roads in either corridor could impact visitor experiences. Heavy equipment including dump trucks, bulldozers, excavators and cranes would be used for construction of transmission lines. Qualities of the existing visitor experience such as primitiveness and solitude may be impacted. (**0025-3-38** [Kimball, Dan] [Lewis, Mark])

Comment: Natural vistas provide park visitors with an immediate and lasting sensory experience that strongly conveys the character of a national park. The proposed transmission lines, towers and associated roads could adversely affect the visitor's appreciation of the visual viewshed over large areas. The transmission lines and structures would be visible within the park for many miles away. Because of the flat topography and the broad unobstructed vistas, visitors on the Tamiami Trail, and to a lesser extent, visitors to Shark Valley and the Chekika areas, as well as visitors on airboat tours, would be able to see the transmission lines and structures. The transmission facilities would be an intrusion on the natural scenery of the Everglades and detract from the visitors' ability to appreciate the park. For visitors near the L 31-N canal, the towers and transmission lines would dominate the viewshed. These impacts would be permanent. A separate viewshed analysis should be prepared for scenic and visual impacts on the visitor experience. (**0025-3-39** [Kimball, Dan] [Lewis, Mark])

Comment: Similar impacts to viewsheds could occur elsewhere in the Western Transmission Corridor in Water Conservation Area 3B, north of the park, the Southern Glades Management Area, east of the park and in the Model Lands between U.S. 1 and the Turkey Point site. (**0025-3-40** [Kimball, Dan] [Lewis, Mark])

Comment: Short-term impacts would be expected from construction and maintenance activities and transmission line monitoring overflights. A corona effect from the proposed new lines (audible noise) may increase in the long-term. (**0025-3-46** [Kimball, Dan] [Lewis, Mark])

Response: *The expected impact of building and operating proposed Turkey Point Units 6 and 7 on local recreational areas, including Everglades National Park and Biscayne National Park, will be assessed in Chapters 4, 5, and 7 of the EIS.*

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of the creation of construction jobs, temporary jobs, and permanent jobs, please provide them. (**0022-4-16** [Reynolds, Laura])

Response: *This potential impacts of building and operating proposed Turkey Point Units 6 and 7 on employment and the effects of job creation on the local infrastructure and public services will be discussed in Chapters 4, 5, and 7, based on the affected environment described in Chapter 2. The EIS will include citations for documents used in its preparation.*

Comment: Transportation Subsection indicates that the Homestead Extension of Florida's Turnpike (SR 821) and South Dixie Highway (US 1/SR 5) are the major transportation corridors for north-south movement in Miami-Dade County. The traffic impact data and analyses presented in Appendices 10.7.4.1 (Traffic Study Peak Construction) and 10.7.4.2 (Traffic Study

Operations Analysis) does not consider the impact of the construction and operation of Units 6 and 7 on these two regional corridors. (**0023-2-23** [LaFerrier, Marc])

Comment: The assertion that the proposed access road from the Turkey Point Units 6 and 7 site to theoretical SW 137 Avenue along theoretical SW 359 Street will be improved within the transmission line right-of-way is premature. The traffic studies contained in Appendices 10.7.4.1 and 10.7.4.2 do not consider other alternative roadways such as SW 344 Street and transportation demand management strategies. (**0023-2-24** [LaFerrier, Marc])

Comment: [Miami-Dade County Planning and Zoning] staff have the following concerns regarding the traffic study: the assumptions; the methodology; the impact study area; the lack of consideration of alternative roadways including SW 328 Street and SW 344 Street; and the lack of consideration of transportation demand management programs to reduce the overall traffic demand and use of single occupant vehicles. (**0023-2-25** [LaFerrier, Marc])

Comment: The consultant should identify the programmed transportation projects located within the Study Area for roadways and intersections listed in the 2010 Transportation Improvement Program (TIP); and identify the planned transportation projects located within the Study Area listed in Priority I, II and III of the 2030 Long Range Transportation Plan. (**0023-2-26** [LaFerrier, Marc])

Comment: The expected increase in non-development traffic and traffic from other previously approved and unbuilt development should be accounted for in the future years. (**0023-2-27** [LaFerrier, Marc])

Comment: Prior to the assumption of new roadway construction (SW 359 Street), traffic impact analyses with the existing and improved existing roadways for concurrency year (usually 3 years in the future), construction opening year (2011), construction peak year (2016) and normal operational year (2020) should be provided. (**0023-2-28** [LaFerrier, Marc])

Comment: Please note that LOS standards for roadways outside UDB are different than within UDB (**0023-2-29** [LaFerrier, Marc])

Comment: Include bicycle facilities as part of the road construction. (**0023-2-4** [LaFerrier, Marc])

Comment: Options for shuttle service should be explored. (**0023-3-1** [LaFerrier, Marc])

Response: *These comments refer to the SCA submitted to the State of Florida by FPL, but they indicate an interest in the potential impacts of the proposed plant on transportation. The potential impacts of building and operating proposed Turkey Point Units 6 and 7 on transportation will be discussed in Chapters 4, 5, and 7, based on the affected environment described in Chapter 2.*

Comment: Application does not supply sufficient design and placement information on Eastern corridor and location-specific pole placement to determine whether this activity is well designed and conducive to both pedestrian and transit use, and architecturally attractive. (**0023-3-34** [LaFerrier, Marc])

Response: *This comment refers to the SCA submitted to the State of Florida by FPL, but it indicates an interest in the potential impacts of the proposed transmission lines on land use, transportation, and aesthetics. The potential impacts of building and operating the transmission lines on land use, transportation, and aesthetics will be discussed in Chapters 4, 5, and 7, based on the affected environment described in Chapter 2.*

Comment: The proposed access roads are outside the existing site of the FPL power plant and are therefore subject to land use/zoning consistency determinations. Such access roadways will be subject to amendments to the Comprehensive Development Master Plan (CDMP). (**0023-1-53** [LaFerrier, Marc])

Comment: Application fails to consider the County's Greenway Plans and Parks and Open Space System Master Plan. The County's Preferred Corridor for the proposed Biscayne Trail Segment D and a portion of the southern route of the Biscayne-Everglades Greenway is located along the north side of SW 328 St. (North Canal Dr.). (**0023-2-2** [LaFerrier, Marc])

Comment: The County's Preferred Corridor for the Biscayne Trail north-south leg is located along SW 137 Av. from SW 328 Av. to Card Sound Rd. The County's Preferred Corridor for the southeastern leg of the Biscayne Trail also extends southeast along the L-31 E canal from SW 328 St. to Card Sound Rd. (**0023-2-3** [LaFerrier, Marc])

Comment: Information is not provided on how activities will impact approved Urban Centers and their respective Regulating Plans and will be in compliance with the County's Urban Design Manual. (**0023-3-36** [LaFerrier, Marc])

Response: *These comments refer to the SCA submitted to the State of Florida by FPL, but they indicate an interest in the consistency of proposed Turkey Point Units 6 and 7 with existing zoning and land use plans. The general consistency of building and operating the proposed units with existing zoning and land-use plans will be discussed in Chapters 4, 5, and 7.*

Comment: [A]pparently this would represent for the economy, after the 40 years of the building when the two plants are finally working, savings in energy costs for about $90 million. So, we believe this is very important. We have analyzed the project and realize that when the two plants that will be built here at Turkey Point are finally constructed, this will afford us the things that we need in order to have a better future. We, thus, once again, applaud FPL for its vision and for the time that it has invested in providing us with a better opportunity for our future. (**0002-10-3** [Alexander, William])

Response: *This comment refers to savings in fuel costs projected for the life of the proposed project as part of the State of Florida's Determination of Need. Need for power will be addressed in Chapter 8 of the EIS. The expected socioeconomic impact of building and operating proposed Turkey Point Units 6 and 7, including impacts on local employment and earnings, local tax revenues, in-migration, local infrastructure, and public services, will be discussed in Chapters 4, 5, and 7.*

Comment: The plant is there. Fortunately we've had the plant. It's the Government's idea of trying to provide South Florida power has made us where we've grown to this point, where we have this power, where we have the development that we have. Okay. We have to keep going. It's not going to stop unless we put doors up there on the county line that says, we can't move anybody else in here. I don't see any difference between a plant down there and using the water, okay, or another 40,000 people moving into Dade County every two years. (**0002-12-5** [McHugh, John])

Response: *This comment suggests impacts on resources such as water would occur independently of the units. Impacts on water and other resources will be discussed in Chapters 4, 5, and 7 of the EIS.*

D.1.12 Comments Concerning Historic and Cultural Resources

Comment: This office reviewed the referenced project for possible impact to historic properties listed, or eligible for listing, in the National Register of Historic Places. The review was conducted in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, 36 CFR Part 800: Protection of Historic Properties and the National Environmental Policy Act of 1969, as amended. In October 2008, December 2008, March, 2009, and April 2009, Janus Research conducted an archaeological and historical Phase I survey of the proposed Turkey Point Units 6 & 7 site, associated non-linear facilities, and spoils areas on plat property on behalf of the Florida Power & Light Company. Janus Research identified no cultural resources within the project area during the investigation. Our office found the submitted report complete and sufficient in accordance With Chapter 1 A-46, Florida Administrative Code. Based on the information provided, it is the opinion of this office that the proposed development will have no effect on historic properties. However, we also concur with Janus Research that, prior to construction, an unanticipated finds plan should be developed to outline the procedures and identify personnel to be contacted if significant archaeological material or human remains are encountered during construction. In 2009, Janus Research conducted background research to identify previously recorded archaeological resources within 100 feet and historic cultural resources within 500 feet of the associated linear facilities, and to identify areas of high, medium, and low probability for the presence of unrecorded cultural resources. (**0013-1** [Kammerer, Laura])

Comment: Of particular concern would be design compatibility related to shadows, traffic, height, bulk and scale of architectural elements and how pole placement and design will address these standards. (**0023-3-32** [LaFerrier, Marc])

Comment: Design details, including proposed materials, visual buffering, complementary vegetation, and fencing must be addressed to determine consistency with LU-4D for each proposed new pole and corridor alignments generally. (**0023-3-33** [LaFerrier, Marc])

Comment: Archeological surveys of the entire West Transmission Corridor will be needed. An archeological survey conducted in 2009 in FPL's West Preferred Corridor within ENP found no evidence of prehistoric humans. (**0025-3-41** [Kimball, Dan] [Lewis, Mark])

Comment: Our utmost concern will be to ensure that areas of archaeological importance will be indentified and protected from any ground disturbing activities, and that all designated historic sites and structures, as well as those eligible for designation, will be identified, documented and protected from any new construction or view shed obstruction associated with both the new on-site structures and the transmission line corridors and related structures. (**0026-1** [Kauffman, Kathleen])

Response: *The potential impacts of building and operating proposed Turkey Point Units 6 and 7 on historic and cultural resources will be discussed in Chapters 4, 5, and 7, based on the affected environment as described in Chapter 2. The EIS will include citations for documents used in its preparation. As stated in the application, an unanticipated-finds plan will be developed.*

Comment: The application states that the Florida Master Site File forms (FMSF) maintained by the Bureau of Historic Preservation, Division of Historical Resources were reviewed to determine whether any historic or archaeological sites were in the areas of potential effects. However, the County's Office of Historic and Archaeological Resources was not given the opportunity to determine whether these areas impacted locally designated sites or sites which have been determined as eligible for designation. In addition, the application makes the assumption that the probability of impacts on undiscovered sites is considered extremely low. This conclusion is not supported without coordination with the Office of Historic and Archaeological Resources. Sites that the County has surveyed and identified, but may have not yet designated, would not necessarily be recorded in FMSF forms. (**0023-2-1** [LaFerrier, Marc])

Response: *The potential impacts of building and operating proposed Turkey Point Units 6 and 7 on historic and cultural resources will be discussed in Chapters 4, 5, and 7, based on the affected environment described in Chapter 2. The information sources from the Miami-Dade County Office of Historic and Archaeological Resources will be considered in this assessment. The EIS will include citations for documents used in its preparation.*

Comment: We are aware that the Department of State's Division of all Historical Resources has already made recommendations. We concur with those recommendations and also offer the following:

1. For all areas that have not been previously surveyed, our staff shall be notified once surveying has commenced. The County archaeologist will have the opportunity to comment on any new visual surveys performed to determine areas of high archaeological probability.
2. We concur with the development of an unanticipated finds plan, and request that the Office of Historic and Archaeological Resources be added to the contact list, should a find occur.
3. View sheds and view corridors shall be considered during the identification of the Area of Potential Effect as part of the surveys for potential impacts to historic sites and structures.
4. Copies of all new FMSF forms, created as a result of historic or archaeological resource surveys, shall be provided to our office.
5. The Office of Historic and Archaeological Resources shall have the opportunity to review and comment on any survey findings related to historic resources or eligible resources that are found within or in close proximity to the transmission line corridors.
6. The Office or Historic and Archaeological Resources shall be included in determining the Area of Potential Effect (APE) and shall be permitted to review and comment on any additional reconnaissance level historic resource surveys conducted in such areas.

(**0026-2** [Kauffman, Kathleen])

Response: *The potential impacts of building and operating proposed Turkey Point Units 6 and 7 on historic and cultural resources will be discussed in Chapters 4, 5, and 7, based on the affected environment described in Chapter 2. The EIS will include citations for documents used in its preparation. The Florida State Historic Preservation Office and Miami-Dade County will be consulted in accordance with the National Historic Preservation Act.*

D.1.13 Comments Concerning Meteorology and Air Quality

Comment: In addition, we would like you to consider in the environmental impact statement, the impacts that 30 million gallons a day of steam being released into the atmosphere could have on wildlife, Biscayne Bay, and, of course, agriculture (**0001-7-7** [MacLaren, Kaitlin])

Comment: According to FPL information, the six cooling towers for TP 6&7 will evaporate 41.5 MGD of water which will be .0005% particulates. That is 20,750 gallons of particulates 24/7. The FPL model diagram shows the dispersion of that vapor in a neat pattern around the plant assuming average wind conditions. However, the average does not fully reflect the many days down here when the wind blows from the SE at 15 to 25 MPH for hours on end. That would carry the now condensed and concentrated residue of TP over the people and the crops to the west and northwest. (**0016-2** [White, Barry])

Comment: [T]he effect of aerial dispersal of biocides from the cooling towers on surrounding areas, including surface and groundwater. (**0023-1-16** [LaFerrier, Marc])

Comment: The atmospheric deposition from the cooling towers is projected to extend into the surface waters of Biscayne National Park. Atmospheric deposition rates and for EPOCs from the proposed cooling towers should be quantified and include incremental projections over the life span of Units 6&7. (**0025-3-25** [Kimball, Dan] [Lewis, Mark])

Response: *The reactor cooling system including the water treatment, its operation and steam released to the atmosphere, and associated salt drift and other potential impacts of the cooling-system operation will be discussed in Chapter 5 of the EIS.*

Comment: Construction related emissions and other temporary or secondary emissions are not included in the PSD emissions analysis. The impacts from these activities on air quality should be discussed qualitatively in the Draft EIS. Air emissions of criteria and toxic pollutants should be addressed. A discussion of the designation status of the area in which the units will be built should also be included in the document. Finally, the Draft EIS should discuss any issues or concerns regarding obtaining the required Title V operating permit once the units are operational. (**0014-21** [Mueller, Heinz])

Comment: Please state the cumulative emissions of construction activities for each of the greenhouse gases including water vapor, carbon dioxide, methane, nitrous oxide, and ozone. (**0022-4-3** [Reynolds, Laura])

Comment: Please state the cumulative emissions of operation activities for each of the greenhouse gases including water vapor, carbon dioxide, methane, nitrous oxide, and ozone. (**0022-4-4** [Reynolds, Laura])

Response: *Environmental impacts associated with building and operating nuclear plants, including greenhouse gas emissions, will be addressed in EIS Chapters 4, 5, and 7, respectively. Greenhouse gas emissions associated with the fuel cycle will be presented in Chapter 6. A discussion of the status of air quality in the area will be presented in Chapter 2.*

Comment: Nuclear plants also do not operate well in hot conditions, as evidenced by recent instances in the US and France where nuclear plants shut themselves down, due to high temperatures in the environment. (**0021-11** [Wilansky, Laura])

Response: *The reactor cooling system, including the water-source treatment and heat dissipation during operation, will be discussed in Chapter 3 of the EIS. The potential impacts of the cooling-system operation will be addressed in Chapter 5 of the EIS. The existing climatological conditions and projected change in temperature over the licensing period will be discussed in Chapter 2.*

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to the varieties and concentrations of airborne "emerging pollutants of concern" (EPOCs) as a result of using reclaimed wastewater for cooling purposes, please provide them. (**0022-2-1** [Reynolds, Laura])

Comment: Please state, specifically, all additives and all additive quantities that will be released to the atmosphere in gaseous, particulate, or droplet form, from the cooling towers and cooling water (**0022-4-2** [Reynolds, Laura])

Comment: There is concern that constituents in the cooling water will be emitted in the aerosol/drift exhaust from the cooling towers.... (**0023-1-26** [LaFerrier, Marc])

Comment: Provide technical discussion and analysis of the effect that the cooling tower (heat transfer) process has on the reclaim water constituents and the facility's air emissions (both criteria and hazardous air pollutants). Source water analysis constituents to be addressed include: total dissolved solids, total suspended solids, salinity, organics, metals, and 'EPOCs' (emerging pollutants of concern) addressed in USGS 2006 Report identifying organic wastewater compounds, pharmaceutical compounds, antibiotic compounds, and hormones detected in effluent from the South District WW Treatment Plant). In addition to PM and PM10, provide emissions calculations for other criteria pollutants and hazardous air pollutants. (**0023-1-28** [LaFerrier, Marc])

Comment: The COL proposes the use of tertiary treated wastewater as the primary cooling water supply source for Units 6&7. The environmental risk associated with the aerial dispersal and possible subsurface release of micro-constituents, sometimes referred to as Environmental Pollutants of Concern (EPOCs), commonly associated with treated waste water requires further evaluation. Treated wastewater from municipal sewage commonly includes pharmaceuticals and personal care products (PPCPs), as well as various endocrine disrupter compounds (EDCs), and frequently heavy metals and other contaminates not normally removed in tertiary treatment. (**0025-2-3** [Kimball, Dan] [Lewis, Mark])

Response: *Potential impacts to the aquatic and terrestrial ecology environment, via the air pathway impacts associated with cooling tower "drift" as a result of using reclaimed water in the cooling towers, will be discussed in Chapters 5 and 7 of the EIS, based on the affected environment as described in Chapter 2.*

Comment: Please state the amount of heat that will be discharged into the atmosphere from units 6&7 and state the temperature differential between the discharged heat and the atmosphere. Please state the amount of water vapor that will be discharged into the atmosphere from units 6&7 and state the moisture differential between the discharged water vapor and the atmosphere. (**0022-2-16** [Reynolds, Laura])

Response: *The reactor cooling system, including the water-source treatment and heat dissipation, will be discussed in Chapter 3 of the EIS. The potential impacts of the cooling-system operation on the frequency of plume visibility will be addressed in Chapter 5 under meteorology and air quality. The affected atmospheric environment, including temperature and moisture, will be discussed in Chapter 2.*

Comment: Please state the amount of change units 6&7 will make to local weather conditions. Please state the amount of change units 6&7 will make to hurricane formation, intensity, and longevity. Please state the amount of change units 6&7 will make to tornado formation, intensity, and longevity. (**0022-2-18** [Reynolds, Laura])

Response: *The impacts of operating proposed Turkey Point Units 6 and 7 on local meteorology will be presented in Chapter 5 of the EIS. The staff will consider in its evaluation whether more remote potential meteorological impacts from the plant are likely. However, past experience with large power stations would indicate that there would be no impact to the formation, intensity, or longevity of tornados and hurricanes.*

Comment: The application does not provide sufficient information to determine facility emissions for the limestone mining operations and grading & fill activities. (**0023-3-16** [LaFerrier, Marc])

Response: *Environmental impacts associated with building proposed Turkey Point Units 6 and 7 will be addressed in Chapter 4 of the EIS. The impacts of building-related air emissions, including those from activities at FPL-owned fill sources and from grading and fill activities, will be estimated.*

Comment: Applicant needs to provide information sufficient to determine whether open burning operations would be consistent with the requirements of Chapter 24. (**0023-4-7** [LaFerrier, Marc])

Response: *Environmental impacts associated with building proposed Turkey Point Units 6 and 7 will be addressed in Chapter 4 of the EIS. The building-related air emissions and related impacts on air quality, as well as the emissions from any open burning of vegetation, will be estimated.*

Comment: The application provided insufficient details related to the General Purpose Diesel Engines on what equipment the engines are to service or what fuel tanks and day tanks will be associated with the engines. (**0023-4-8** [LaFerrier, Marc])

Comment: Construction and maintenance activities would impact air quality. (**0025-3-45** [Kimball, Dan] [Lewis, Mark])

Response: *Environmental impacts associated with building and operating proposed Turkey Point Units 6 and 7 will be addressed in EIS Chapters 4 and 5, respectively. Emissions associated with diesel fueled engines will also be discussed in Chapters 4 and 5.*

D.1.14 Comments Concerning Health – Nonradiological

Comment: These two gigantic, enormous 1,000 megawatt each nuclear generators are going to be cooled with recycled sewage. Let's say that, recycled sewage. That's what's going into these cooling towers. There's no way to get all the pharmaceuticals, all the chemicals that we flush down our toilets, out of that water that's going to be going through these plants. When that water goes through the cooling towers they're going to be released to steam, droplets are coming out with that water vapor, and lots of stuff is going to be in those droplets. Lots and lots of those chemicals are going to be in those droplets. And that's going to be sprayed out over Biscayne National Park, Biscayne Bay, and the City of Homestead, which already has extremely dubious air and water to begin with for many of the reasons people have talked about. (**0002-14-7** [Schwartz, Matthew])

Comment: And what about the workers at the plant who will have to breath that stuff 8 hours a day? What would OSHA say about that? And the particulates will be a concentration of every carcinogen known to man, having come originally from waste water. What TP 6&7 really is is the best still in the world for concentrating the highest amount of pollutants and efficiently distributing it over the land. (**0016-3** [White, Barry])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts on humans and/or the environment of airborne pathogens from the Turkey Point FPL power station as a result of using reclaimed wastewater for cooling purposes, please provide them. (**0022-1-15** [Reynolds, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to the number of fatal and non-fatal diseases from airborne toxic matter as a result of using reclaimed wastewater for cooling purposes, please provide them. (**0022-1-18** [Reynolds, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to the varieties and concentrations of known airborne toxic matter as a result of using reclaimed wastewater for cooling purposes, please provide them. (**0022-1-20** [Reynolds, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to the number of fatal and non-fatal diseases from airborne EPOCs as a result of using reclaimed wastewater for cooling purposes, please provide them. (**0022-2-2** [Reynolds, Laura])

Response: *These comments concern the impacts of chemicals in the cooling tower drift from proposed Turkey Point Units 6 and 7 on the public and workers. The planned reactor-cooling system, including the use of reclaimed water and saltwater, along with water treatment, the expected vapor and droplet release to the atmosphere and associated "drift," and associated potential impacts, will be discussed in Chapter 5 of the EIS. These impacts will be assessed within the context of the affected environment described in Chapter 2. Cumulative impacts from past, present, or reasonably foreseeable future actions will be discussed in Chapter 7, and alternatives to the proposed cooling system will be discussed in Chapter 9. The EIS will include citations for documents used in its preparation.*

Comment: I've also heard that transmission lines would buzz, cause radiation problems that may cause cancer, especially breast cancer, in a lot of people, as well as that it might go through our Everglades as well as down US-1. (**0002-8-6** [O'Katy, Jessica])

Comment: [CASE submitted an article titled, "Recent Biomedical Literature on Health Risks of Power Transmission Lines" by Philip Stoddard, Dept Biological Sciences, Florida International University. The article expressed concern about exposure to magnetic fields.] (**0003-2-1** [White, Barry])

Comment: Information on the potential degradation of health, safety, tranquility, character, and overall welfare of residential neighborhood conditions with respect to transmission line corridors has not been provided. Information should include recent academic studies regarding EMFs and high kV electrical transmissions. (**0023-3-35** [LaFerrier, Marc])

Comment: The health of our children and families will be in grave danger! Peer reviewed medical literature shows Alzheimer's and senile dementia rates are doubled in people living near power lines. (**0031-3** [De Villiers, Elena])

Response: *These comments concern the impacts of living near transmission line corridors. Health and/or other impacts from noise, electromagnetic fields, and/or land use associated with the planned upgrade and construction of transmission lines will be addressed in Chapters 4 and 5 of the EIS, based on the affected environment described in Chapter 2. Cumulative effects will be addressed in Chapter 7.*

Comment: Areas surrounding the Turkey Point nuclear power plant are at high risk for exposed pollutants, including asbestos, mercury, and 174 detected carcinogens including tritium which was found to be leaking from over a quarter of all nuclear plants in the United States. Expanding the ground that Turkey Point inhabits would bring these pollutants closer to the National Park reserve areas, bringing endangered and rehabilitated marine life and ecology into severe danger. (**0007-4** [Burris, Jessica])

Response: *This comment concerns the potential impacts on biota of pollutants released from proposed Turkey Point Units 6 and 7. The ecological health impacts of radiological and non-radiological releases from nuclear power plants during building and operating the proposed* *units will be discussed in Chapters 4 and 5 of the EIS, respectively, within the context of the affected environment described in Chapter 2. The cumulative impacts from the proposed action when added to those of past, present, or reasonably foreseeable future actions will be discussed in Chapter 7.*

Comment: Consider the full the impacts of noise and light pollution concerns to people, animals, native plants and wetlands, environmentally endangered lands, and provide the appropriate mitigation strategies. (**0019-6** [Hamilton, Karen])

Comment: Potential soundscape impacts may increase over current levels in Biscayne National Park from construction, operation and security (additional overflights by military jets). These impacts should be assessed and quantified. (**0025-3-28** [Kimball, Dan] [Lewis, Mark])

Response: *These comments concern the potential impacts of noise and light in the environs of proposed Turkey Point Units 6 and 7. The potential impacts of noise and light pollution on the public and the environment during the building and operating of the proposed units will be addressed in Chapters 4 and 5 of the EIS, respectively, within the context of the affected environment described in Chapter 2. Cumulative impacts from the proposed action when added to those of past, present, or reasonably foreseeable future actions will be discussed in Chapter 7.*

Comment: The generation of hazardous wastes (as defined in Section 24-5) and other regulated non-hazardous wastes is mentioned throughout the application. The size of tanks or containers is not specified nor their locations, nor details of the release detection methods or pollution prevention measures to be implemented. (**0023-1-11** [LaFerrier, Marc])

Response: *This comment concerns the management of hazardous and non-hazardous wastes for proposed Turkey Point Units 6 and 7. The impacts from the generation, handling, and disposal of hazardous and non-hazardous waste material from building and operating the proposed units will be addressed in Chapters 4 and 5 of the EIS, respectively, within the context of the affected environment described in Chapter 2. Cumulative impacts from the proposed action when added to those of past, present, or reasonably foreseeable future actions will be discussed in Chapter 7.*

D.1.15 Comments Concerning Health – Radiological

Comment: The NRC knows full well that in 1988 and 1990, Congress passed the Radiation Exposed Veterans Compensation Act and stipulated that 21 categories of cancer are attributable either as a causative or contributory factor to the exposure to ionizing radiation from radioactive fallout. The NRC knows full well that induced genetic damage and genetic mutations are precursors from manifesting over 21 categories of cancer as stipulated by the Congress. The NRC knows full well that cancer is a genetic process and that ionizing radiation causes genetic damage and that genetic damage and cancer are inextricably intertwined. You cannot separate the two. However, the NRC disingenuously avoided mention in its supplemental environmental impact statement of August 2007, in a Diablo Canyon license proceeding, that small children -- they omitted this -- that small children, pregnant women, women of childbearing age, and the elderly are seriously impacted and vulnerable to acquiring induced genetic damage from exposure to ionizing radiation of a magnitude as little as 5 rems. Now, because of the concerns linking ionizing radiation to genetic damage, the Atomic Energy Commission provided the initial funding for the Human Genome Project. Most people don't know that. That Project today is jointly funded by your parent organization, the Department of Energy, and the National Institutes of Health. (**0001-13-6** [Smilan, Stan])

Comment: The health effects on communities has not been adequately studied, and the presence of childhood leukemia clusters in the vicinity of nuke plants raises serious questions about the possible connections. It is to these curious questions about the environmental impacts on public health that I request that the NRC add to its scope of inquiry. (**0001-16-4** [Showen, Steve])

Comment: Public health is ultimately what you affect most in your decision-making. We can't go back to FPL, or the M. Dade Com. College Homestead, or your members in our Capitol in 10 years and say please cleanse out our circulatory systems of our bodies and replace them. Vulnerable people depend on your wisdom now in history to choose the safest path for the citizens. (**0011-1** [, Anonymous])

Comment: We should not create the GUARANTEED RISK of radiation, toxic waste, birth defects, cancers, fish kills, and all the other consequences which can and will result from building Turkey Point 6 and 7. (**0021-14** [Wilansky, Laura])

Comment: I ask you to include the true costs of nuclear plants throughout their entire life cycle in your environmental calculations, including the reality of enormous risks to health and life. (**0021-19** [Wilansky, Laura])

Response: *These comments concern possible health effects from radiation exposure. Chapter 5 of the EIS will address the potential radiation doses and the associated health effects from operation of proposed Turkey Point Units 6 and 7. The NRC's regulatory limits for radiological protection are set to protect workers and the public from the harmful health effects of radiation on humans. These radiation standards reflect extensive scientific study by national and international standard setting organizations and incorporate conservative assumptions and models to account for differences in gender and age so as to ensure that workers and all members of the public are adequately protected from radiation.*

Comment: In addition, the public is largely unaware that radioactive emissions are permitted legally in normal operations of nuclear plants. Also, a number of nuke plants have leaked radioactive effluent into underground drinking aquifers. (**0001-16-3** [Showen, Steve])

Comment: I was looking at some of the documents you left in the back of the room. And in terms of tritium your own periodical says, nuclear power plants have reported abnormal releases of water containing tritium resulting in groundwater contamination. This is spooky stuff. And we would hope that any such releases would not go anywhere outside the boundary if such releases actually occur, and that information, if it's out there, would be immediately released to agencies that deal with water resources so we can deal with the potential implications as a result of such potential contamination. (**0002-3-7** [Walker, Tom])

Comment: One function of wetlands is to filter water as it runs through its natural ecosystem before reaching primary waterways where it is likely to be ingested. In addition to adding pollutants to the Biscayne area outside of Turkey Point with this proposed expansion the reduction of wetlands in the area will cause further harm by the natural reduction of water filtration before entering the surrounding communities. This includes the reduction of a filtration system for radioactive leakage present in groundwater leakage that is normally released from all U.S nuclear power plants. The NRC permits up to 400 gallons per day of low level leakage to be deposited into the environment surrounding nuclear power plants. Without wetlands to filter this pollution, residents of the surrounding area are directly vulnerable to this waste. (**0007-5** [Burris, Jessica])

Response: *These comments concern the potential release of radioactive material to the environment by proposed Turkey Point Units 6 and 7. Chapter 5 of the EIS will address the expected releases of radioactive material in liquid and gaseous effluents, the impacts of those releases on humans and biota other than humans, and the applicant's effluent and environmental radiological monitoring systems. The results of a licensees radiological effluent and environmental monitoring systems are publicly available in the ADAMS Public Electronic Reading Room and are accessible at http://www.nrc.gov/reading-rm/adams.html.*

Comment: [A]lso just got my water report reading from Miami-Dade. And I found it interesting that not only was there uranium, which we don't have here in our water, but that the levels of it were much higher closer to Turkey Point than they were in Northern Miami. I thought that was very interesting. And when I read the reason for uranium being in the water, it said that it was from natural sources. So I found that to be extremely worrisome. (**0002-8-8** [O'Katy, Jessica])

Comment: Tritium and Strontium 90 are present in the area and research is currently being done to establish their levels and concentrations (**0012-8** [Payne, Nkenga])

Response: *These comments concern the presence of radioactive materials in the environment near proposed Turkey Point Units 6 and 7. Chapter 2 of the EIS will address the current radiological environment at the proposed site for the proposed units.*

Comment: Two new, unnecessary plants are guaranteed to bring more leaks and more radioactive waste to South Florida, and will endanger us that much more. (**0021-9** [Wilansky, Laura])

Comment: At the NRC scoping meeting held in July, a handout (USNRC BACKGROUNDER, February 2010) was available which stated that Nuclear power plants have reported abnormal releases of water containing Tritium, resulting in groundwater contamination. This is also discussed on your website under operating reactors. Obviously, the potential leakage of Tritium from the Turkey Point nuclear power plant is a concern to be analyzed. With this in mind, FKAA request that any Tritium test results from the existing cooling water canals and the aquifer system adjacent to these canals be released for review. If there has been leakage above the background levels in the existing system, continued rate of analysis should be required at more stations, and the source and remedy be found. Also, whether or not there is Tritium above background levels in the existing system, the EIS should include the requirement for continued measurements of Tritium at the interface of the reactors including water canals, strategic monitoring points, and downstream monitoring locations. (**0024-4** [Walker, Tom])

Response: *These comments concern potential groundwater contamination by inadvertent leaks of liquids containing tritium from the Turkey Point site. Chapter 2 of the EIS will address the current radiological environment at the proposed site for proposed Turkey Point Units 6 and 7. Chapter 5 of the EIS will discuss the applicant's effluent and environmental radiological monitoring systems for the proposed units.*

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of deep well injection of radioactive wastes including annual expected amounts and the expected cumulative amount of each isotope for the duration of the requested operating license, please provide them. (**0022-4-10** [Reynolds, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of airborne radioactive releases to the atmosphere including best practices, precautions, the cumulative number of expected non-lethal cancers, and the cumulative number of expected lethal cancers for the duration of the requested operating license, please provide them. (**0022-4-11** [Reynolds, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse radiological impacts of units 6 & 7 as a result of a sea level rise of 10 meters, please provide them. (**0022-4-12** [Reynolds, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of leaking buried pipes, please provide them. (**0022-4-15** [Reynolds, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of securing the storage of low-level solid radioactive wastes, including locations, structures, containers, damage from missiles, airborne solid wastes, water ingress and egress, fires, and cleanup, in the event of a tornado watch or warning is issued for the Turkey Point area, please provide them. (**0022-4-8** [Reynolds, Laura])

Response: *These comments concern the radiological impacts of operation of proposed Turkey Point Units 6 and 7, including storage of low-level wastes, release of liquid and gaseous effluents; and inadvertent pipe leaks. These impacts will be addressed in Chapter 5 of the EIS. The EIS will include citations for documents used in its preparation.*

D.1.16 Comments Concerning Nonradiological Waste

Comment: The use of hazardous materials (e.g. treatment chemicals, solvents, paints, lubricants, etc.) is mentioned throughout the application for maintenance operations, water and wastewater (influent and effluent) treatment systems. The size of tanks or containers is not specified nor are their locations identified. In addition, no details of the release detection methods or pollution prevention measures to be implemented are provided. (**0023-1-60** [LaFerrier, Marc])

Comment: Liquid waste other than domestic sewage will be generated, used, and handled at the proposed facility which is not connected to sanitary sewer. The application did not provide sufficient information to evaluate the project with regard to requirements of Section 24-43.1 of the code of Miami-Dade County. (**0023-1-8** [LaFerrier, Marc])

Response: *The generation, management, and treatment or disposal of nonradiological waste will be discussed in Chapters 4 and 5 of the EIS.*

D.1.17 Comments Concerning Accidents – Severe

Comment: Miami-Dade is an extremely population dense area with 1158 people per square mile. Although FP&L and Westinghouse state that the probability of a severe accident is very low for the AP1000, this reactor design has never been built or operated anywhere in the world. (**0001-14-9** [Hancock, Mandy])

Response: *This comment concerns the potential for severe accidents at proposed Turkey Point Units 6 and 7. The impacts of postulated accidents including severe accidents will be addressed in Chapter 5 of the EIS.*

D.1.18 Comments Concerning the Uranium Fuel Cycle

Comment: With the addition of the nuclear power plant 6 and 7, it will be doubling the waste that's being stored out at Turkey Point. I ask the Nuclear Regulatory Commission, what is being done nationally for the storage of nuclear power plant waste? I don't see enough being done nationally for the storage and safety of this nuclear waste. (**0001-10-1** [Marinelli, Francis J.])

Comment: Waste is contained and moved, a potential problem. It is moved to Yucca Mountain that's sitting on a fault line. We are saying it's safe for now but the safety has not been proven. (**0001-11-5** [Amor, Valerie])

Comment: As the NRC is aware, FPL already operates three reactors here in Florida and is proposing to build two more. FPL also proposes to build an onsite storage facility to deal with the high level radioactive waste already overflowing in the spent fuel pools. This amount of radioactivity clustered in such a population-dense, hurricane-prone area could create significant safety and health concerns for Floridians. The NRC must address these cumulative impacts. (**0001-14-8** [Hancock, Mandy])

Comment: Tons and tons of nuclear waste are already stockpiled at this plant right now. They were cited. They were fined recently by the Nuclear Regulatory Commission for failure to take care of that waste. There's no place to put it; by the way, there's no place to move it. (**0002-14-13** [Schwartz, Matthew])

Comment: I'd also like to say that from what I've learned at school, that uranium transportation and storage is very dangerous and not something that we should be risking people and the environment's well-being for. (**0002-8-2** [O'Katy, Jessica])

Comment: I am not a nuclear scientist, but my understanding at this time is that the main concern regarding nuclear energy is how to safely store the waste material. If there is a scientific answer to this problem that is safe, I think America would be wise to pursue increasing our use of nuclear energy. (**0005-2** [Bass, Ken])

Comment: [T]he economic and ecological risks associated with the entire nuclear power fuel cycle, are vast, including the long term of safeguarding nuclear waste produced at Turkey Point. (**0012-13** [Payne, Nkenga])

Comment: It is unacceptable to even think of disposing highly toxic and radioactive substances anywhere on or in our beautiful Earth as we do not know the consequences - and there is nothing to stopgap or in place in case these substances have a dire reaction on the earth. (**0028-5** [DiNuzzo, Laura])

Comment: On the surface, the "greener" than dirty coal theme sounds good. Given there are positives and negatives to most situations, this green theme would be the positive. However, all of us involved, including FP&L, would be remiss if we did not consider the negative. In this case, the negative is the stored, on site radioactive waste generated by the Turkey Point plant, and more reactors mean more radioactive waste. This negative must be factored into the greener theme to reflect the true cost of the nuclear facility. Has FP&L factored in this critical cost of how to dispose of radioactive nuclear waste, or will they just continue to store it on site (in a hurricane prone, sea level environment)? Will FP&L send it to an undetermined repository (if one is ever mandated) and at what cost? While the front end looks green, the back end looks dirty. Objectively, the big picture must be duly considered. Decisions that are narrow, short-sighted and reactionary lead to a vulnerable position that can escalate into insurmountable problems (think BP oil, Chernobyl, 3 Mile). Until the above mentioned negatives are resolved, expansion magnifies potential problems. (**0029-3** [Guendelsberger, Debra])

Response: *These comments concern the transportation and disposal of high-level radioactive waste, such as spent fuel. The impact of the uranium fuel cycle, including disposal of high-level radioactive waste and spent fuel, will be addressed in Chapter 6 of the EIS.*

Comment: That's just the tip of the iceberg. There are so many different aspects to a building of these two additional nuclear power plants at Turkey Point. When they built them in 1972 they had never heard of anything such as global warming, such as rising sea levels. Out of their consciousness. Presently, five miles from here is over 2 million pounds of nuclear waste. Five miles from here. As soon as the sea level covers all that up, God knows what's going to happen. (**0001-2-4** [Harris, Walter])

Comment: When sea level rises, what's that going to do to a nuclear plant built in the middle of Biscayne Bay, with storage -- with nuclear waste that cannot be moved because there's nowhere to put it. So this is an extreme danger to our community. (**0002-14-8** [Schwartz, Matthew])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse radiological impacts of spent fuel storage as a result of a sea level rise of 10 meter. (**0022-4-13** [Reynolds, Laura])

Response: *The environmental impacts of operating and decommissioning proposed Turkey Point Units 6 and 7, including potential impacts associated with sea level rise, will be considered in Chapters 5, 6, and 7 of the EIS.*

Comment: One thing we should consider is, this is not an energy source that gives so-called energy independence. The great bulk of the uranium comes from outside the United States, and there are greenhouse gas emissions in the process of the extraction and processing of that uranium. (**0002-16-5** [Shlackman, Mara])

Comment: In the big environmental picture, companies like FPL that want to build nuclear plants are trying to sell the idea that nuclear energy is a solution to global warming. In fact, the opposite is true. Nuclear energy is neither carbon-free nor emission-free throughout its entire life cycle, which includes a variety of wastes produced by mining uranium and making nuclear fuel, in addition to the aforementioned unsolved problem with spent fuel and other nuclear waste. This waste includes the plants themselves, which operate for a few decades, and then take, at a minimum, hundreds of years to be decommissioned. (**0021-10** [Wilansky, Laura])

Response: *These comments concern the greenhouse gas emissions of the entire fuel cycle and the operation of proposed Turkey Point Units 6 and 7. The impacts of greenhouse gas emissions from the life-cycle of fuel production, construction, operation, and decommissioning of the units will be presented in Chapters 4, 5, and 6 and an appendix of the EIS.*

Comment: We now have the technology to recycle spent nuclear rods. Look to France as a prime example as nuclear energy as a viable energy resource. (**0006-2** [Weins, Brian])

Response: *This comment concerns the potential for recycling spent nuclear fuel. The potential environmental impacts of the fuel cycle from recycling only the uranium from spent nuclear fuel will be addressed in Chapter 6 of the EIS. Recycling uranium and plutonium from spent nuclear fuel will not be addressed in the EIS. While Federal policy no longer prohibits recycling, additional research and development is needed before commercial recycling of spent fuel from U.S. nuclear power reactors would occur.*

Comment: I feel that uranium is not a long-term answer and so that expansion of Turkey Point would not start until a long term after we need it, and that it wouldn't last for that long because we do not have uranium here and we don't have enough of it. (**0002-8-7** [O'Katy, Jessica])

Response: *This comment concerns the availability of uranium to fuel proposed Turkey Point Units 6 and 7. The irretrievable and irreversible commitment of resources, such as uranium, will be addressed in the context of the resources availability in Chapter 10 of the EIS.*

Comment: I ask you to include the true costs of nuclear plants throughout their entire life cycle in your environmental calculations, including the cost of hundreds of years of plant decommissioning; and the cost of nuclear waste storage for thousands of years to come. (**0021-21** [Wilansky, Laura])

Response: *This comment concerns the cost of the entire fuel cycle including decommissioning and waste disposal. The costs of proposed Turkey Point Units 6 and 7 throughout their entire life cycle, including the costs of decommissioning and nuclear waste storage, will be discussed in Chapter 10 of the EIS.*

D.1.19 Comments Concerning Decommissioning

Comment: This site will also be under SEVERAL FEET of water if global warming continues as it has, or worsens, as scientists predict. If you think killing an oil well is difficult underwater, try decommissioning a nuclear plant! (**0021-6** [Wilansky, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse radiological impacts of decommissioning units 6&7 as a result of a sea level rise of 10 meters. (**0022-4-14** [Reynolds, Laura])

Response: *The potential environmental impacts of decommissioning proposed Turkey Point Units 6 and 7 will be addressed in Chapter 6 of the EIS. The EIS will include citations for documents used in its preparation.*

D.1.20 Comments Concerning Related Federal Projects

Comment: The Comprehensive Everglades Restoration Project is a major priority for the Federal and State Government. (**0002-6-4** [Grosso, Richard])

Comment: Models and study explaining how preliminary design of the water management project will tie to the CERP Environmental Restoration Project (Alternative O) missing. (**0023-3-9** [LaFerrier, Marc])

Comment: [The National Park Service has] identified a number of concerns regarding potential adverse impacts of the proposed facilities to the resources and values of Biscayne and Everglades National Parks, to regional water resources and to the Biscayne Bay Coastal Wetlands project, a component of the Comprehensive Everglades Restoration Plan (CERP). (**0025-1-1** [Kimball, Dan] [Lewis, Mark])

Comment: The CERP Biscayne Bay Coastal Wetlands preferred plan, Alternative 0, includes plans to rehydrate wetlands in the vicinity of the proposed Turkey Point power plant site and poses a conflict with the COL application proposal to extract up to 124 million gallons per day from Biscayne Bay. The restoration project objective is to re-establish both overland freshwater flow and subsurface flow, which is intended to improve ecosystem function by stabilizing seasonal salinity patterns. Therefore, it appears likely that the withdrawal of Biscayne Bay water for cooling water supply is incompatible with the restoration goals, since it will intercept a percentage of the freshwater intended for restoration. (**0025-2-14** [Kimball, Dan] [Lewis, Mark])

Comment: The SFWMD is currently reviewing a Site Certification Application (SCA) for this project, pursuant to the State of Florida's Power Plant and Electrical Transmission Line Siting Act (Sections 403.501-403.539, Florida Statutes). During the SCA review process, the SFWMD has identified a number of issues that have the potential to result in significant adverse regional water resource-related impacts, including potential impacts to specific CERP projects and related restoration initiatives. (**0032-1** [Golden, James])

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Reclaimed Water Pipeline - The potential for adverse impacts to the CERP Biscayne Bay Coastal Wetlands Project. (**0032-18** [Golden, James])

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Electrical Transmission Lines - The potential for adverse impacts to the construction schedule for the U.S. Army Corps of Engineers (USACE) Seepage Management Pilot Project, which is a component of the CERP Project. The work on the USACE project will take place within the western levees of the SFWMD's L-30 and L-31N Canals, which are located within the West Preferred Corridor. The SFWMD is a participating partner with the USACE in this project. Work is scheduled to begin soon and may still be ongoing when FPL commences construction of the proposed transmission lines. (**0032-20** [Golden, James])

Response: *The review team has been consulting with, and will continue to consult with, State and Federal agencies in preparing the EIS. The USACE is a cooperating agency on the development of the EIS and is a key agency in the implementation of the CERP. The cumulative impact of the proposed action when added to the impacts of other past, present, and reasonably foreseeable projects, including the CERP and proposed Turkey Point Units 6 and 7, will be considered in Chapter 7 of the EIS.*

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of operation of the Turkey Point FPL power station on Biscayne National Park, in the past, currently, and in the future, please provide them. To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of operation of the Turkey Point FPL power station on Everglades National Park, in the past, currently, and in the future, please provide them. To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of operation of the Turkey Point FPL power station on Comprehensive Everglades Restoration Plan (CERP) Projects and CERP related projects, in the past, currently, and in the future, please provide them. To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of operation of the Turkey Point FPL power station on the Everglades Mitigation Bank, in the past, currently, and in the future, please provide them. (**0022-1-13** [Reynolds, Laura])

Comment: Construction and operation of transmission lines, pads and access roads in either corridor within ENP is likely to adversely affect park operations such as fire management, exotic vegetation management and law enforcement. 2. Specific adverse effects to fire management would include increased fire activity due to the inherent threat of uncontrolled ignitions from transmission lines, limited accessibility to areas to engage in fire suppression activities due to gates and security issues on FPL land, and an increase in staffing levels based on fire danger rating. Transmission lines in either corridor would limit the park's ability to use aircraft for fire suppression in the area, especially along the eastern boundary. (**0025-3-42** [Kimball, Dan] [Lewis, Mark])

Comment: Inappropriate use of park lands could become an issue. Construction of access roads would introduce new areas for unauthorized all terrain vehicle use, dumping and other unforeseen uses which would result in adverse impacts to park law enforcement operations and sensitive natural resources. (**0025-3-44** [Kimball, Dan] [Lewis, Mark])

Response: *The potential impacts of building and operating the proposed units on nearby parks, the CERP, and the Everglades Mitigation Bank will be discussed in Chapters 4 and 5 of the EIS, respectively. The cumulative impacts of the proposed action when added to the impacts of other past, present, and reasonably foreseeable actions including those identified in this comment will be presented in Chapter 7. The EIS will include citations for documents used in its preparation.*

Comment: In addition the proposed rock mining project, which is planned within the Biscayne Bay Coastal Wetlands footprint, violates Miami-Dade County's comprehensive development master plan and interferes with the planned restoration project and could worsen saltwater intrusion and chloride contamination in Biscayne aquifer which is, of course, South Florida's primary drinking water supply. (**0001-7-6** [MacLaren, Kaitlin])

Comment: No data provided to assess groundwater Impact as a result of the fill extraction and construction of the water management feature. (**0023-3-11** [LaFerrier, Marc])

Comment: No mitigation plan found for possible salt front advancement as a result of rock pit mining. Planned fill source lies approximately 4 miles to the northeast of MDWASD Newton Wellfield. (**0023-3-12** [LaFerrier, Marc])

Comment: The application does not contain sufficient water quality and geotechnical information needed in order to evaluate the proposed FPL fill source. Given that the salt front exists at the proposed rockmining site, FPL must provide data including modeling under normal and drought conditions. (**0023-3-15** [LaFerrier, Marc])

Comment: The application does not provide sufficient information to determine that the proposed excavation will not extend into groundwater containing 250 mg/L or greater chloride. (**0023-3-17** [LaFerrier, Marc])

Comment: Application does not provide the following data/information related to the FPL-filed CDMP amendment application for rock mining in Agriculturally designated land: 1. Plan and data for the design of the leave-behind water management project, including technologies to be used during and after excavation to ensure that the project's waters are isolated from any present or future salt intruded groundwater. (**0023-3-3** [LaFerrier, Marc])

Comment: Sufficient water quality data for the site not provided. (**0023-3-7** [LaFerrier, Marc])

Comment: No studies provided to assess project's impact to surrounding agricultural wells or public wellfields under worst case conditions. (**0023-3-8** [LaFerrier, Marc])

Comment: The COLA proposes the excavation of fill material for the construction of the Units 6&7 Plant from a nearby FPL owned site behind the Homestead Air Force Base (HAFB) and adjacent to Biscayne National Park, although the FPL fill-source is no longer part of the State of Florida SCA. FPL intends to excavate a large amount of rock fill (approximately 300 acres) to elevate the proposed reactor construction site from approximately 1 foot above mean sea level to 26.5 feet above mean sea level. These activities will result in a large man-made lake, as a by-product of rock mining operations. The presence of this new lake would conflict with CERP design features planned for the Biscayne Bay Coastal Wetlands project because the lake would inhibit groundwater flow to the southeast and possibly exacerbate salt water intrusion inland. (**0025-2-16** [Kimball, Dan] [Lewis, Mark])

Response: *Available information about the fill source will be provided in Chapter 3 of the EIS. The impacts of obtaining fill material will be presented in Chapter 4; and the cumulative impacts of the proposed action by FPL to build and operate proposed Turkey Point Units 6 and 7, along with other past, present, and reasonably foreseeable future actions by other agencies, will be presented in Chapter 7, including the impacts associated with the CERP.*

Comment: Location and design approval from the Homestead Air Reserve Base for the project's conformance with AICUZ recommendations regarding bird strikes and other potential navigational hazards has not been provided. (**0023-3-10** [LaFerrier, Marc])

Response: *This comment refers to the SCA submitted to the State of Florida by FPL, but it indicates an interest in FPL's proposed plant design. A description of the site layout, the reactor type, and the cooling-water systems will be described in Chapter 3 of the EIS.*

Comment: The applicant shall also address how road construction and operation would compromise the ability of the EEL Program and other agencies to appropriately manage public lands. (**0023-1-51** [LaFerrier, Marc])

Comment: Please provide amended maps showing EEL projects, along with a complete analysis of the effects of linear feature construction and operation on nearby EEL Projects. (**0023-3-21** [LaFerrier, Marc])

Comment: Environmentally Endangered Lands (EEL) owned and/or managed preserves exist along proposed corridors. Please provide an analysis of the potential impacts to EEL Preserves from any work related to the transmission lines, including but not limited to development of corridors, acquisition to corridors, acquisition of additional easements, etc. (**0023-3-28** [LaFerrier, Marc])

Comment: Maps in the site certification application fail to depict conservation lands held and/or managed by the Environmentally Endangered Lands (EEL) Program. For example, the maps depicting jurisdictions fail to include MDC EEL holdings. Direct, indirect and cumulative impacts to these lands associated with any of the proposed work or changes in hydrology is not addressed and needs to be detailed. (**0023-3-45** [LaFerrier, Marc])

Comment: Permitted land use within EEL acquisition project areas must be compatible with the environment and objectives of the Comprehensive Everglades Restoration Plan (CERP) and shall not adversely affect the long-term viability, form or function of these ecosystems. Any land use or site alteration should be carefully evaluated on a case by case basis by federal, state, regional and county agencies for conformity with all prevailing environmental regulations and compatibility with the objectives of CERP. Land Use Element LU-3B states that all significant natural resources and systems shall be protected from incompatible land use. Conservation Objective CON-4 and Policy CON-4A of the CDMP recognize the importance of these wetlands for their aquifer recharge and storage capacity and states these values shall be maintained, enhanced or restored. Objective CON-7 and related policies state that Miami-Dade County shall protect and preserve the biologic and hydrologic functions of the Future Wetlands identified in the Land Use Element. (The Future Wetlands includes all of the South Dade Wetlands area). Some of the proposed features are within Environmental Protection Sub Areas E and F of the CDMP which both require that the approval of any use and access roads or easements should be conditioned on demonstrated consistency of that use with the adopted goals, objective and policies of the CDMP and conformity with all prevailing environmental regulations. (**0023-3-46** [LaFerrier, Marc])

Response: *These comments refer to the SCA submitted to the State of Florida by FPL but they indicate an interest in how activities associated with building and operating proposed Turkey Point Units 6 and 7 would affect efforts being taken under the Environmentally Endangered Lands (EEL) Program. The EIS will address the cumulative impacts from the combination of the proposed action and past, present, and reasonably foreseeable actions, regardless of who takes the actions. The cumulative impacts associated with building and operating the proposed units will be evaluated for each affected resource.*

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Temporary Roadway Improvements for Construction of Units 6 & 7 - The potential for adverse impacts to the CERP Biscayne Bay Coastal Wetlands Project. (**0032-15** [Golden, James])

Response: *The EIS will address the cumulative impacts from the combination of the proposed action and past, present, and reasonably foreseeable actions, regardless of who takes the actions. The cumulative impacts associated with building and operating the proposed units will be evaluated for each affected resource.*

D.1.21 Comments Concerning Cumulative Impacts

Comment: In addition to the ongoing problems from the existing facility, the combination of losing wetlands and worsening saltwater intrusion could significantly impact the habitats, water quality, surface flow, projected restoration of water levels, and groundwater hydrology functions that are the object of the Everglades restoration. Construction of the plant itself, as well as the operation of the facility, will have adverse impacts on water quality, ecology, and aesthetics of the Biscayne National Park. It will negatively impact the areas' protected species, wetlands, and much-needed fresh groundwater input into Biscayne Bay. (**0001-2-3** [Harris, Walter])

Comment: A final comment is that the -- the current -- the existing, in Units 4 and 5, as the previous speaker mentioned, are impacting our groundwater supply. And it is suspected that they are contributing to saltwater intrusion. And so we would like you to consider the cumulative effects of existing plants and then consider what additional impact a new plant will have. (**0001-7-8** [MacLaren, Kaitlin])

Comment: One of the most important things that the NRC can do as a function of the environmental review of this application is to evaluate the cumulative environmental impacts from all of these plants. After all, the reactors are called 6 and 7, not 1 and 2. Just evaluating this application as if the proposed plants exist in a vacuum, as the State is doing through their permitting process, would be a disservice to the community and to our environment. The NRC needs to evaluate the impacts of the two new reactors. Direct impacts like wetland losses, dredge fill pads, permanent onsite nuclear waste storage and temporary 20-year roads through an Everglades Restoration Project, in the context of the impact already caused by the existing power plant complex. (**0002-1-2** [Sorenson, Katy])

Comment: The Draft EIS should discuss the cumulative impacts to the environment associated with FPL's past, present, and future expansion in the south Florida region. (**0014-14** [Mueller, Heinz])

Comment: FPL has reportedly received all of the necessary approvals from FDEP to proceed with the uprate project. Construction activities for this project will occur primarily during two scheduled outages per unit, with each outage lasting approximately 50 days. Construction activities for Unit 3 and 4 are anticipated to conclude in the fall of 2011 and 2012, respectively. After completion, the cooling water flow rate will remain unchanged, although the temperature rise across the condensers is anticipated to increase by 2.5F. FPL proposes that Units 6 and 7 will have their cooling water needs provided by cooling towers as opposed to the existing canal system. Make-up for the towers is to be provided by reclaimed water. The Draft EIS should assess the cumulative effects of the uprated Units 3 and 4 combined with construction of new Units 6 and 7. Also, any increased removal of water from area basins as a result of operations of the interceptor ditch pumps should be discussed. (**0014-7** [Mueller, Heinz])

Response: *Cumulative impacts result from the combined effects of the proposed action and past, present, and reasonably foreseeable actions, regardless of who takes the actions. The appropriate geographic area and time period for considering cumulative impacts depend on the resource being affected and will be determined for each resource as part of the review team's evaluation. The impacts of building and operating proposed Turkey Point Units 6 and 7 on Biscayne Bay and adjacent lands will be added to other known or reasonably foreseeable actions and stressors within the defined geographic area of interest, including known or planned upgrades of other units on the Turkey Point site, if appropriate. The results of the analysis of impacts of the proposed units operations on water quality, ecology, and aesthetics will be presented in Chapter 5 of the EIS. The results of cumulative impact analyses will be presented in Chapter 7.*

Comment: What we are now finding in our communities is that there are significant risks to those of us who still have residents on well water. We have 1,000 homeowners, just in the Village of Pinecrest, still on well water. And we risk, with those residents on well water, the specter of saltwater intrusion at any time and the balance of what may happen as a result of the continued impositions of construction and what the nuclear plants would do, likely due to the balance and the risk that that would place. That all of our homes that are still on well water may be contaminated through saltwater intrusion is a very serious issue that we -- none of us have the financial wherewithal, nor does our county, who is facing a $400 million deficit, nor does the State of Florida which is facing an additional -- I think it is 3 to $6 billion deficit in the coming year, have any resources to come in and help put the infrastructure in place for those homes that are on -- continue to be on well water. (**0001-21-3** [Lerner, Cindy])

Comment: Another suggestion would be that they take the cooling water from deep within the bottom of Biscayne Bay and Card Sound, what they call the boulder zone. No one has the foggiest notion what that would do to the surface water. Would it create a cone of water? And if it did, how would that affect the inshore current that existed for thousands of years? (**0001-6-5** [Miller, Lloyd])

Comment: Our first major concern has to do with water impact. FPL proposes to place radial collector wells 40 feet below Biscayne Bay Aquatic Preserve in the upper levels of the Biscayne aquifer. And this step -- we hope you will consider whether this step may be within the take zone of the Biscayne aquifer. (**0001-7-1** [MacLaren, Kaitlin])

Comment: The Turkey Point expansion would require either 90 million gallons a day of reclaimed water, 124 million gallons a day from radial wells, or a combination of both. This is a huge amount of water and, as I'm going to discuss later, there are other better uses for this water. (**0001-7-2** [MacLaren, Kaitlin])

Comment: At least 3 percent of the water to be used in the radial collector wells will come from the Biscayne aquifer. This will result in a reduction of more than 3 million gallons a day of groundwater flow needed to support the flora and fauna of Biscayne Bay. (**0001-7-4** [MacLaren, Kaitlin])

Comment: This proposed expansion is in direct conflict with Biscayne Bay Coastal Wetland Project, which is part of the Everglades restoration. The availability of reused water to meet both the projected needs of FPL to operate the new plant and the needs of Everglades restoration is questionable. There was water, reused water earmarked for Biscayne Bay Coastal Wetlands Project that could be used for this project. (**0001-7-9** [MacLaren, Kaitlin])

Comment: Some of the other speakers have already talked about water. Nuclear plants consume more water and withdraw more water than coal plants, natural gas plants, and certainly far more so than wind or solar as forms of energy. As other speakers have alluded to, we already have water shortage issues with drinking water. (**0002-16-1** [Shlackman, Mara])

Comment: And we have to consider the socioeconomic impacts of this. The Redlands and Homestead are still an area that have agricultural businesses. There's been an effort to cultivate agritourism with such things as the Schnebly Winery, the Fruit and Spice Park, Paradise Farms. And if we have all of this water being withdrawn for the nuclear plant, these agricultural businesses will suffer that much more. (**0002-16-2** [Shlackman, Mara])

Comment: Miami-Dade County is on permanent water rationing; we are only permitted to water our lawns twice a week. In the winter, winter that can go down to zero. We do not flush our toilets after every use; if it's yellow, let in mellow, if it's brown, flush it down. 3,000,000 people in Miami-Dade County live like this and you are going to build a power plant here that uses 125,000,000 gallons of water per day????!!!!. (**0016-14** [White, Barry])

Comment: The drawdown of water will be a threat to our water supply, creating salt water intrusion, increased salinity, and challenge our continued existence on this endangered land not to mention the impact on the nearby national parks, their flora and fauna. (**0016-5** [White, Barry])

Comment: The proposed use of radial wells to draw water from 40 feet under Biscayne Bay is a major threat to the water supply of the area. There is lateral movement of water in the aquifer so that the water will be drawn from all of the surrounding area including the aquifer to the west, the source of the Florida Keys water. (**0016-6** [White, Barry])

Comment: We in Florida, where water is already scarce, and rationed many months of the year, cannot afford to give up the additional millions of gallons of water required for these new nuclear plants' operation. The existing plants at Turkey Point have already contaminated our groundwater, like nuclear plants have all over our country, and caused saltwater intrusion into our freshwater wetlands and drinking water sources. Please do not further risk our irreplaceable Florida water resources by allowing these new plants to be built. (**0021-4** [Wilansky, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of utilizing water from Radial Wells to the Turkey Point FPL power station in the future, including any cost-benefit analyses please provide them. (**0022-1-9** [Reynolds, Laura])

Comment: The operation of the RCWs would result in hydrologic impacts, including ground... water, on Biscayne Bay due to geological disturbances, resulting in water volume and quality alterations... The cone of influence during the operation of the RCWs extends into Biscayne National Park boundaries. Therefore, a large portion of the nearly 124 million gallons of Biscayne Bay water will originate from within Biscayne National Park boundaries, which is a protected water body. (**0025-1-12** [Kimball, Dan] [Lewis, Mark])

Response: *The impact of consumptive water use on both the local and regional water resources associated with building and operating proposed Turkey Point Units 6 and 7 will be presented in Chapters 4 and 5 of the EIS. Both current and future conditions, including changes in water demands to serve the needs of the future population and changes in water supply, will be considered. Cumulative impacts will be addressed in Chapter 7; and system design alternatives, including cooling water system designs and alternative cooling water sources will be presented in Chapter 9.*

Comment: Turkey Point is situated between two national parks and over the water supply for the entire Florida Keys and much on southern Miami-Dade County; and salt water intrusion and increased levels of water salinity from the operation of Turkey Point Reactors 3 & 4 are already major concerns in the area. (**0012-6** [Payne, Nkenga])

Comment: [T]he construction of the additional nuclear power plants, as well as the operation of the existing facilities, will have adverse impacts on water quality, ecology, farm lands, cause salt water intrusion, as well as adversely impact the habitat of protected species, wetlands and much needed fresh groundwater input to Biscayne Bay. (**0012-9** [Payne, Nkenga])

Response: *The impacts on water quality, including the effects of saltwater intrusion during building and operation of the proposed units will be discussed in Chapters 4 and 5 of the EIS. The impacts of the proposed actions on the local ecology and nearby farm land will also be addressed in Chapters 4 and 5. Saltwater intrusion resulting from the combined effects of the proposed action and past, present, and reasonably foreseeable actions will be addressed in Chapter 7.*

Comment: Ensure an analysis of the possible impacts of sea level rise on the proposed project with all of its associated facilities, consistent with the range of potential increases adopted by the Miami-Dade County Climate Change Advisory Task Force. FPL's assessment is based historical information on sea level rise in Miami-Dade County. Current discussions of sea level rise suggest that a much more significant rise could occur during the useful life of the proposed project, initially from 2020 to 2060, with a possible extension of 20 years, taking us out as far as 2080. (**0019-3** [Hamilton, Karen])

Comment: The impacts of sea level rise due to climate change should be addressed as they pertain to the operation and maintenance of the RCWs and the hydrologic modeling, which is being used to forecast the percentage of water derived from Biscayne Bay versus freshwater from the Biscayne Aquifer. The effects of climate change should also address major storm events and cooling canal functionality over the projected lifespan of Units 6&7. Peer reviewed and governmental references should be part of this analysis, including the [PCC Fourth Assessment Report: Climate Change 2007; the Miami-Dade Climate Change report; and the Army Corps of Engineers, engineering circular - sea level rise 1165-2-211. (**0025-2-13** [Kimball, Dan] [Lewis, Mark])

Comment: The SFWMD recommends that the following issues be addressed in the Environmental Impact Statement: Hurricanes/Climate Change/Sea Level Rise - The potential for adverse impacts related to the siting and design of the proposed plant and associated facilities directly on the coast in an area subject to the direct effects of hurricane tidal surge, climate change, and sea level rise. (**0032-28** [Golden, James])

Comment: The sighting of the proposed Florida Power and Light (FPL) nuclear reactors 6 and 7 adjacent to FPL's existing power plants on the sight abutting Biscayne Bay approximately 25 miles south of the city of Miami, is ill conceived and short sighted. According to the latest United Nations Intergovernmental Panel on Climate Change (IPCC) estimates, a sea level rise between 18 and 59 cm (7.1 to 23.2 inches) can be expected before the turn of the century. Unfortunately the IPCC did not factor in global land ice melt into this equation. The new IPCC report, due to be released in 2014, will include land ice melt sea level rise forcings. (**0034-1** [Kipnis, Daniel])

Comment: This scenario may not be the reality of the situation. Dr. Stefan Rahmstorf, a leading and respected authority on the subject notes that, “land ice (glacial melt) has, in fact, contributed 80 per cent of the observed sea level rise over the past five years”, and, “if two-thirds of glacier ice were lost, this would add 40 centimeters to the global sea level”, then, “The big ice sheets would then need to contribute only about 50 centimeters (19.7 inches) — corresponding to less than one per cent of their mass — to bring sea level rise up to 114 centimeters (44.9 inches)”. This does not include any thermal expansion of ocean water which the IPCC admits will increase due to rising global temperatures. The only debate among climate scientists is not if, but when these changes will occur. Additionally and closer to home, the Science Committee of the Miami Dade County Climate Change Advisory Task Force (CCATF), Co-chaired by Dr. Hal Wanless, Chairman of the University of Miami’s Geology Department and Dr. Stephen Leatherman, Director of the International Hurricane Center at Florida International University, have predicted that sea level rise will be between 91.4 cm and 152.4 cm (3 to 5 Feet) by the end of the century and possibly as early as 2070. (**0034-2** [Kipnis, Daniel])

Comment: It should be plain to see, especially when sighting a 23 billion dollar facility with a useful working life of up to 100 years, that the proposed site presents inherent risks that place not only the financial investment of FPL’s rate payers but also their safety in extreme jeopardy. A sea level rise of just one foot would inundate 17% of Miami Dade County’s land mass, most of which would be in south Dade, including the area around Turkey Point and the access road to the facility. A two foot rise covers 28% of Miami Dade County’s land mass. Turkey Point generating facility effectively becomes an island. The current cooling canals for the existing nuclear generating facility become unusable as they are breached by rising bay waters. (**0034-3** [Kipnis, Daniel])

Comment: At the full predicted 5 foot range of sea level rise, occurring sometime between 2070 and the turn of the century, only 54% of Miami Dade County remains high and dry. FPL’s proposed power lines running down the western side of the County’s Urban Development Boundary (UDB) are miles from dry land as that part of the Everglades is flooded with both fresh water, used to hold back the rising sea, and salt water which is fast encroaching. The coastal ridge is now divided by tidal channels into a series of independent islands displacing a million or more county residents. The effect of any hurricane storm surge will force an additional million or more residents to leave the county for higher ground as they have already had to do on the barrier islands of Miami Beach and Key Biscayne. Even as bad as this scenario seems, it will get worse. Sea levels are expected to continue to rise for centuries to come and if they reach historic levels of past melts, could exceed 20 meters (66.61 feet). This may happen faster than expected due to accelerated climate forcings as countries have not only failed to reduce greenhouse gas emissions, but actually have accelerated them. (**0034-4** [Kipnis, Daniel])

Comment: The bottom line, the Nuclear Regulatory Commission and the Army Corps of Engineers should withhold permitting for FPL’s proposed generating facilities 6 and 7 due to concerns that: (1) Predicted sea level rise would first, isolate the facility on an island, then (2) Cause the access road to be undermined and overrun by sea water causing it to become unstable and unusable, then (3) Overrun and alter the current cooling canals and possibly cause the proposed cooling-water radial wells to function differently than now proposed and possibly cease to function as planned, then (4) Increase the effects of storm surges from hurricanes and other tropical events on the facilities and access roads, then (5) Place maintenance constraints on power transmission lines that now will be water bound, then (6) Unfairly burden rate payers in funding a project that will not reach its projected life span, then (7) Have an insufficient client base to support the facilities operations when much of south Florida's population is forced to relocate due to sea level rise, tidal surge events, pollution concerns, altered wet and dry seasons, increased chance of tropical diseases and all the other predicted effects of climate change. (**0034-5** [Kipnis, Daniel])

Response: *The impact of sea level rise on the safe operation of the proposed units is considered in the NRC's safety review and is not within the scope of environmental review. Results of the safety review can be found in the Safety Evaluation Report (SER). However, sea level rise will be considered as one of the contributing factors to the cumulative impact of the proposed action and other past, present, and reasonably foreseeable actions in Chapter 7 of the EIS.*

Comment: The application proposed the discharges of potentially contaminated industrial waste from the maintenance of boiler, equipment closed cooling water system maintenance, and other areas to cooling canals. Although the use of oil-water separators is mentioned, no information was provided to allow for evaluation of potential impacts to sensitive ecological receptors, and surface and groundwater quality. No information was provided to show that no contamination will result from such discharges. (**0023-1-10** [LaFerrier, Marc])

Response: *This comment refers to the SCA submitted to the State of Florida by FPL, but it indicates an interest in the potential impacts of the proposed plant on Federally and State-listed endangered or threatened species and surface water and groundwater quality. The potential impacts of building and operating proposed Turkey Point Units 6 and 7 on Federally and State-listed endangered or threatened species and surface water and groundwater quality will be discussed in Chapters 4 and 5 of the EIS, based on the affected environment described in Chapter 2. The cumulative impacts of the proposed action and other past, present, and reasonably foreseeable future actions will be assessed in Chapter 7.*

Comment: The Summary of Measures and Controls to limit Adverse Impacts during Construction (Table 4.6-1, COL, Environmental Report, Part 3, Ch. 4) assesses the cumulative impacts to land use, hydrology, water use, subsurface flow, ecology, and socioeconomics, as a result of the construction of the entire Unit 6&7 plant (pre and post construction). FPL lists most impacts as small in this analysis, compared to moderate or large. Small is defined by FPL as Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute or resource. A striking aspect of this analysis is the incorporation of CERP features as either a contributable negative or positive impact to Units 6&7 construction. FPL appears to use benefits from the proposed Biscayne Bay Coastal Wetlands/CERP project to mitigate the environmental impacts of the Units 6&7 construction. This appears highly inappropriate in the determination of total impacts from the FPL project. Therefore, the NPS requests that this analysis be carefully evaluated to consider the impacts Unit 6&7 combined construction will have on Biscayne Bay Coastal Wetlands/CERP implementation, as well as, all other associated impacts to the environment.
(**0025-1-15** [Kimball, Dan] [Lewis, Mark])

Response: *Cumulative impacts result from the combined effects of the proposed action and past, present, and reasonably foreseeable actions, regardless of who takes the actions. The results of cumulative impact analyses will be presented in Chapter 7 of the EIS; and in that analysis the contribution of proposed Turkey Point Units 6 and 7 to the cumulative impact will be identified. In addition, the respective impacts of building and operating the proposed units will be presented in Chapters 4 and 5.*

Comment: Please state the amount of greenhouse gases units 6&7 will contribute to the atmosphere. Please state the amount of climate change units 6&7 will make to the environment. (**0022-2-17** [Reynolds, Laura])

Response: *The potential impacts of the airborne emissions from building and operating proposed Turkey Point Units 6 and 7 will be discussed in EIS Chapters 4 and 5, respectively. The potential cumulative impacts of the proposed nuclear power generation on climate change will be addressed in Chapter 7.*

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to adverse impacts of climate change as a result of direct heating of the atmosphere, please provide them. (**0022-4-17** [Reynolds, Laura])

Response: *The potential impacts of building and operating proposed Turkey Point Units 6 and 7 on climate change will be discussed in Chapters 4, 5, and 7 of the EIS, based on the affected environment described in Chapter 2. The EIS will include citations for documents used in its preparation.*

Comment: The proposed plant and associated facilities are located within project areas for the Comprehensive Everglades Restoration Plan (CERP), which proposes to restore regional wetland functions in the region, including functions that provide direct benefits to Miami-Dade County's population through protection of surface and groundwater resources. The EIS should examine the compatibility of the plant and associated facilities, including transmission lines, with CERP and CERP restoration goals for this area. (**0015-5** [Espinosa, Carlos])

Response: *The cumulative impacts associated with building and operating proposed Turkey Point Units 6 and 7 will be evaluated for each affected resource. Past, present, and reasonably foreseeable actions taken under the CERP will be considered in the cumulative impact analyses presented in Chapter 7 of the EIS.*

D.1.22 Comments Concerning the Need for Power

Comment: Like the previous speakers of the Greater Miami Chamber, the Mayor of the Florida City, Mr. Bill Diggs, efficient supply of power is essential to sustain economic growth and sustainability in South Florida. Business and industries is what we are predominantly, as an economic development council, concerned with. People that come to our community need to know that there is power provided by Florida Power and Light that is second to none, along with the infrastructure of roads, education, and other things that are climbing at an enormous rate in our community. Just the expansion of roads alone in the last two years is astronomical. Why?

Because there's a need. There's a lot of people coming into our communities. We need to keep up with that capacity, and that's what this is all about. As well, Barry Johnson, with the Greater Miami Chamber, talked about the fact that we've been accustomed to a quality of life, which is true. That quality dictates the need for additional infrastructure and utilities, power, all those things that we depend on in our daily lives. (**0001-25-2** [Horton, Richard])

Comment: The addition of the two new reactors to Turkey Point provide the energy which we will need in South Florida as our community continues to grow; 5, 6, 7 million people projected in the not too distant future. We've got to provide the kind of services that everyone expects and demands (**0001-5-2** [Johnson, Barry])

Comment: According to the Waxman-Markey Bill, we would probably need about 45 new nuclear reactors to meet the expectation, and I think 6 and 7 is the start of that. (**0001-9-3** [Martinelli, Tom])

Comment: I believe our electrical energy use is going to continue to grow in South Florida. I was walking the Hollywood Broadwalk this morning, and there were two large cranes I saw right at Sheridan Street and A1A. And what I found out they were doing is they were installing a new cellular tower on the top of the condominium building for wireless 4G/3G for the new smartphones. And we're more and more, as consumers, using electric. And to be competitive in this world we're not going to cut back on our electric use. However, there were some good points that were brought up, and it kind of ties into what I think is very important. (**0002-17-2** [Eney, Douglas])

Comment: If you look across the country, a lot of your nuclear power plants have reached the end of their life expectancy. Over the last, say, 10 years, America has been rebuilding, revamping them, making them capable of going on another 20, 30 years. You have a lot of coal fired power plants that have reached their life expectancy. As far as America as an industrial nation, we need this power to power our factories. Look at it. You go throughout the United States -- when you go to stores you don't see hardly anything made in America anymore. So if you look at it from an economic standpoint, if you see that these power plants have reached the end of their life expectancies, big industry is looking at this. (**0002-7-2** [Snelson, Richard])

Response: *These comments express agreement with the FPL application's assertion that the area needs additional power. The need-for-power analysis will be addressed in Chapter 8 of the EIS.*

Comment: FPL and Florida should be the leader in renewable and nuclear energy. So much that supply is greater than demand and we can sell it to other states. (**0006-5** [Weins, Brian])

Comment: Please state the "Need for Power" where units 6&7 is at the distant end of the electrical grid and is unable to send excess power to the east, the south, or the west. (**0022-3-6** [Reynolds, Laura])

Response: *The need-for-power evaluation will be presented in Chapter 8 of the EIS.*

Comment: If you Google FP&L, PSC -- Public Services Commission -- you'll find a lot of data, you'll find a lot of interesting articles. And I would direct you primarily to a writer for the Sun Sentinel in Fort Lauderdale called Julie Patel, for whom FP&L is her beat. And look at the long history of the relationship between PSC and FP&L. Why do I mention PSC at the beginning? Because they're the ones who did the needs analysis. Remember, this project starts with a needs analysis, where the PSC determined that there was a need for this power plant. Is there a need for this power plant? (**0002-14-1** [Schwartz, Matthew])

Response: *The need-for-power evaluation will be presented in Chapter 8 of the EIS. The determination of the need for power within a given area is not under the NRC's regulatory purview. However, for the purpose of its NEPA analysis, where another regulatory body has made a need-for-power determination, the NRC staff reviews the applicable regulators need-for-power analysis to determine if it is (1) systematic, (2) comprehensive, (3) subject to confirmation, and (4) responsive to forecasting uncertainty. If the need-for-power evaluation is found to be acceptable under these criteria, no additional independent review by the NRC is needed.*

Comment: Is the Florida population growing? Are we getting to the -- what was it, 15 million people we're going to have living in South Florida? Nowhere near there. In fact, population is not growing, it's static. There's a reason for that, there's a reason why the population isn't growing. But at any rate, this project does not take that into consideration. (**0002-14-2** [Schwartz, Matthew])

Comment: I'd first like to say that I know that we're saying there's a new need for energy. The last I've heard there's been a population decrease in this area. (**0002-8-1** [O'Katy, Jessica])

Comment: Please state the "Need for Power" in Florida in light of a population decrease of 58,294 from April 1, 2008 to April 1, 2009. (**0022-3-4** [Reynolds, Laura])

Response: *The need for power in light of population growth and electrical demand in the FPL service area will be analyzed and addressed in Chapter 8 of the EIS.*

Comment: The alternative analysis is based on an archaic assumption that base load power is needed. Last April, Federal Energy Regulatory Commission Chief Jon Wellington told the U.S. Energy Association that saying we need base load energy is like saying we need mainframe computers. The technology currently exists for distributed energy systems that negate the need for base load power. Further, the NRC must use updated information to reevaluate FPL's 2008 analysis for the new reactors in terms of the need for power given -- for the need for power, given the economic downturn and significant reduction in demand. (**0001-14-5** [Hancock, Mandy])

Comment: The electricity generated is not even needed in South Florida where the plants are proposed to be built, endangering all of us in this area for something we will neither use nor need. And the electricity these proposed plants could generate is not needed, period - this amount of energy and more could easily be saved by simply increasing conservation and efficiency, at a saving of billions of dollars to consumers, with NO risk to the environment whatsoever. (**0021-3** [Wilansky, Laura])

Response: *Decisions regarding which generation sources and alternatives to deploy are made by the applicant and regulatory bodies such as the public utility commission. The impacts of energy efficiency and demand-side management on the need for power and load forecasts will be addressed in Chapter 8 of the EIS. Alternative actions such as the no-action alternative, new generation alternatives, purchased electrical power, energy efficiency, alternative technologies (including renewable energy such as wind and solar), and the combination of alternatives will be considered in Chapter 9. The determination for the need for power is not under NRC's regulatory purview. However, for the purpose of its NEPA analysis, where another regulatory body has made a need-for-power determination, the NRC staff will review the applicable regulators need for power and determine if it is (1) systematic, (2) comprehensive, (3) subject to confirmation, and (4) responsive to forecasting uncertainty. If the need-for-power evaluation is found to be acceptable under these criteria, no additional independent NRC review is needed.*

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to the "50-year electrical demand projections for the FPL service area" considering various climate change and sea level rise scenarios, please provide them. (**0022-1-5** [Reynolds, Laura])

Comment: Please state the "Need for Power" in the light of sole source municipal wellfields being contaminated with salt water by a sea level rise of 1 foot or less. Please state the "Need for Power" in the light of large areas of infrastructure, residential and commercial real estate being flooded by a sea level rise of 1 foot or less. (**0022-3-5** [Reynolds, Laura])

Comment: To the extent that you are aware of any documents or reports by any federal, state, local or regional government agency, FPL or any of its employees or contractors that relate to the permanent closure of solid fueled electrical generating plants as a result of units 6 & 7 becoming operational, please provide. (**0022-4-24** [Reynolds, Laura])

Response: *The determination for the need for power within a given area is not under the NRC's regulatory purview. However, for the purpose of its NEPA analysis, where another regulatory body has made a need-for-power determination, the NRC staff reviews the applicable regulators need-for-power analysis to determine if it is (1) systematic, (2) comprehensive, (3) subject to confirmation, and (4) responsive to forecasting uncertainty. If the need-for-power evaluation is found to be acceptable under these criteria, no additional independent review by the NRC is needed. The need-for-power discussion will be included in Chapter 8 of the EIS. Chapter 8 will include a discussion of planned retirements of other generating facilities within the FPL service territory. The potential cumulative impacts associated with sea level rise will be discussed in Chapter 7.*

Comment: There is growing evidence that the thousands of acres of cooling canals designed for Turkey Point 3 and 4 are exacerbating saltwater intrusion in the area, and is believed to be impeding the flow of groundwater to Biscayne National Park. If no solutions to these impacts are addressed in this application review, then you will have contributed to the degradation of our national parks and our quality of life in Miami-Dade. (**0002-1-3** [Sorenson, Katy])

Response: *The purpose of the EIS is to disclose the environmental impacts of proposed Turkey Point Units 6 and 7. This comment addresses the impact of the existing power plants on* *the Turkey Point site which is outside the scope of the environmental review. The cumulative impact of the proposed action when added to the impact of past, present, and reasonably foreseeable future actions discussed in Chapter 7 of the EIS will consider the impact of the existing units on resources affected by the proposed units.*

D.1.23 Comments Concerning Alternatives – Energy

Comment: It is not okay to build a nuclear power plant. If Germany can take and stop with all their nuclear power plants, planned by the year 2020 because they have found solar to be that efficient, and they get 50 percent less sunlight per year than we do, then certainly we can come up and do the same thing. (**0001-11-11** [Amor, Valerie])

Comment: This is the Sunshine State. We should be using sunshine as our source of energy. This is almost Neanderthal that we're still considering building more nuclear power as a way to solve our energy crisis. We have not gone beyond this point and it's very disappointing. There have been studies done by Broward County, a targeted industry study that said, solar is to be the next industry. (**0001-11-7** [Amor, Valerie])

Comment: There are more affordable ways for FPL to meet energy demand while protecting the environment and tackling global warming. As SACE and the NRDC testified to the PSC in 2009, simply increasing energy efficiency goals by 1 percent could save enough energy to estimate the need -- to eliminate the need for new reactors, while saving ratepayers money. Additionally, investing more resources in solar and clean bio-energy, instead of costly new reactors, would benefit FPL and offer economic development opportunities for Florida, without draining our water resources or pocketbooks. The NRC must evaluate updated information using a combination of these sustainable energy choices, including energy efficiency, before allowing FP&L to commit billions of dollars, billions of gallons of water, and nearly an entire decade to building these reactors when that time and money could be better spent on less risky options. (**0001-14-3** [Hancock, Mandy])

Comment: Energy efficiency measures preserve our water resources, save customers money, and also pose no health or safety risks to the public. Florida utilities have significant resources to tap in these areas as outlined in a recent extensive report, Energy Efficiency in the South, by Georgia Tech and Duke University, and our report, Yes We Can: Southern Solutions for a National Renewable Standard. Renewable energy technologies, such as solar and wind, do not require extreme manipulation of our precious water resources. The environmental report overlooks the potential for FPL to pursue a combination of wind and solar resources within its service territory and states there is no renewable technology alternative that could mitigate the need for nuclear power (**0001-14-4** [Hancock, Mandy])

Comment: It's imperative that the U.S. invest in a safe, sustainable energy paradigm for the 21st Century that can also help revitalize our economy and create vastly more jobs than Turkey Point could ever dream of. The nuclear industry claims that it is a necessary piece of that energy future. On the contrary, studies indicate that the energy mix will not require a nuclear component. In the ten years it takes to bring a new plant online, we could've been developing a new truly Green energy technologies. Because the nuke industry cannot compete on its own without massive government subsidies, it threatens our bright Green future by drawing public investment away from it. (**0001-16-8** [Showen, Steve])

Comment: As Florida Power and Light staff was helping us build this house and advising us, my wife and I would say: Why are they helping you not pay them so much money? It doesn't quite make sense. So we asked them one time and the gentleman I asked said, Albert, you don't understand. If everyone built like this we would never need to build another nuclear power plant. (**0001-24-4** [Harum-Alvarez, Albert])

Comment: I know it isn't the Nuclear Regulatory Commission's place to determine need, but I do believe that there is a deep reservoir of available energy if we would only embrace energy efficiency. A recent report by Duke University and Georgia Tech concluded that the southern states could meet our future energy demand through aggressive energy conservation programs. There are a lot more jobs to be had putting people to work now, not 5, 10, or 15 years from now retrofitting homes and business throughout our community, and we don't have to pay for these jobs and reduced energy bills through an early cost recovery fee. (**0002-1-4** [Sorenson, Katy])

Comment: This project, from what I can see, it's about a $20 billion project. What's the problem with that? Because we are in an era where renewable, true renewable resources are now available to us; ocean power, solar, wind. Insolation is the measurement of how much sun reaches a given area of the earth. Florida is the Sunshine State for a reason. Look at insolation maps of the United States. South Florida is equivalent to parts of the Southwest; Arizona, New Mexico. We have the energy here, we are not using any of it. We are not making use of the solar. (**0002-14-3** [Schwartz, Matthew])

Comment: I think we keep looking at fossil fuel and I don't think we really understand how dependent we are on it and what a nasty thing it can be. And, yes, it would be wonderful and -- really wonderful. I don't think it's pie in the sky. I don't think that solar power is a magical thing. I think it's a coming thing, and I do think FP&L uses. I know they do. They use wind power. (**0002-15-4** [Finlan, Mary])

Comment: But solar installations on rooftops would create green jobs that would provide a viable alternative for the community. (**0002-16-4** [Shlackman, Mara])

Comment: Looking at reports that have been done in the name of efficiency, and we've heard a lot of about efficiency and renewables, there were a couple -- the Southern Alliance for Clean Energy and the Natural Resource Defense Council both testified to the Public Service Commission last year that simply increasing energy efficiency goals by 1 percent could negate the need for any nuclear power reactors. I think the NRC should really look at this option while they're doing the consideration of the scoping process. Obviously, renewables in conjunction with that would even further negate the need for new nuclear reactors. The NRC must evaluate updated information using a combination of this sustainable energy choices, including energy efficiency, before allowing FP&L to commit billions of dollars, billions of gallons of water, and nearly an entire decade to building these reactors when that time and money could be better spent on less risky options. (**0002-18-3** [Hancock, Mandy])

Comment: I, instead, would like to propose that we focus on truly renewable energy and clean energy answers as well as efficiency in Miami. (**0002-8-3** [O'Katy, Jessica])

Comment: So, I'd like to ask that we focus on truly clean and renewable energy sources like solar or wind, and most of all efficiency, and definitely take into consideration all of the environmental impacts that we can when making this decision. (**0002-8-9** [O'Katy, Jessica])

Comment: FPL should be exploring wind farms off the coast of Florida not oil drilling. Every new structure built should be required to use a minimum of 25% solar energy. (**0006-4** [Weins, Brian])

Comment: Opting to pursue energy resources that would not involve such irreversible damage to the surrounding environment is necessary to ensure the safety of the surrounding community. Renewable energy resources such as wind and solar power are a much wiser alternative for the State of Florida. (**0007-7** [Burris, Jessica])

Comment: Solar power is growing and Florida is known as the sunshine state. If we charged each homeowner for the installation and maintenance of the solar panels on their homes, then we could probably power the whole state. Also solar power does not emit green house gases or any other harmful side effects either. (**0009-2** [Hogsed, Daniel])

Comment: If we installed solar panels on every home in Florida we could generate more jobs than the nuclear power plant expansion would and inspire other countries to follow our lead. (**0009-4** [Hogsed, Daniel])

Comment: The City of South Miami supports energy policies based on investment in the rapid development of solar and wind energy, and all other proven renewable energy solutions, combined with a comprehensive program promoting energy efficiency and conservation. (**0012-18** [Payne, Nkenga])

Comment: South Miami supports energy policies based on investment in the rapid development of solar and wind energy, and all other proven renewable energy solutions, combined with a comprehensive program promoting energy efficiency and conservation. (**0012-2** [Payne, Nkenga])

Comment: The Draft EIS should discuss other alternative sources of energy that may available to serve the project purpose that would have less impact on sensitive wetland resources. (**0014-16** [Mueller, Heinz])

Comment: We can do better through major investments in energy efficiency, conservation, and renewables. No health risks involved if a solar panel breaks. (**0017-3** [Troner, Susannah])

Comment: I am fairly certain that FPL has done less than any other utility to try to curb electrical usage in our community through demand side management. They have no true incentive to do so. (**0017-5** [Troner, Susannah])

Comment: With so many truly clean, safe, renewable and sustainable technologies now available and in development, there is no reason to build new nuclear plants, which will only drain much-needed resources from full development of better, safer technologies. Florida in particular has abundant solar energy that is not being used. (**0021-12** [Wilansky, Laura])

Comment: Please STOP THIS DISASTEROUS AND GREEDY EXPANSION OF ELECTRIC COMPANIES AND OTHER BIG BUSINESSES SET ON 21ST CENTURY ABUSE OF OUR PLANET. Our government must not turn its back - and should immediately go in the green direction - so that Americans, and especially our children, can look back with pride on the governmental leaders with this kind of foresight that protected the earth for future generations instead of allowing greed to continue its destructive pattern. (**0028-6** [DiNuzzo, Laura])

Comment: What about solar and wind power as safe alternatives? (**0031-6** [De Villiers, Elena])

Response: *The EIS will be prepared in accordance with 10 CFR 51.75(c). Alternative energy sources, including energy conservation and renewable energy sources, will be considered in Chapter 9 of the EIS.*

Comment: I could say the same thing that's been said for this nuclear power plant: I can bring you 4,000 new jobs and I can build a solar power plant. Would you all still be so happy? And I hope you would because if there is a problem with a solar plant, millions of people will not die; or the water will not be contaminated; the air will not be jeopardized; we would not worry about our aquifers. (**0001-11-8** [Amor, Valerie])

Comment: Now, aside from saddling the taxpayers with extraordinary risks, the nuclear power will crowd out dramatically energy-efficient competition from decentralized co-generation such as the 21 megawatt plant that provides the entire campus at Massachusetts Institute of Technology with electricity, heating, and cooling by extracting twice as much useful energy and using half as much fuel as a conventional power plant. (**0001-13-8** [Smilan, Stan])

Comment: In light of the recent Gulf oil spill, which upsets me very much, do you think it's a good idea of taking more risks with new technologies? I don't and that's why I'm here today. Why risk so much when there is other, better technologies such as solar? Energy efficiency and clean renewable energy should be our main focus right now. It will save money in the long term so that future generations have a chance. (**0001-19-4** [Ryan, Megan])

Response: *The evaluation of potential health impacts of operating additional nuclear plants on the Turkey Point site will presented in Chapter 5 of the EIS. In addition, the applicants safety assessment for the proposed licensing action was provided as part of the application. The NRC is in the process of developing an SER that analyzes all aspects of construction and operational safety. The NRC will only issue a license if it can conclude that there is reasonable assurance that (1) the activities authorized by the license can be conducted without endangering public health and safety, and (2) such activities will be conducted in compliance with the rules and regulations of the NRC. In addition, energy efficiency and renewable energy alternatives to the proposed action will be evaluated in Chapter 9 of the EIS.*

Comment: When comparing energy types -- when comparing types of energy generation, nuclear power has higher rates of both water withdrawal and consumption than coal and natural gas and far more than renewable energy sources, such as wind and solar. The 2010 report I mentioned earlier by Georgia Tech and Duke University examined the energy efficiency in the South and it illustrated ways to substantially reduce energy needs, while simultaneously reducing water consumption. According to the report: In the North American Electric Reliability Council regions in the South, 8.6 billion gallons of freshwater could be conserved in 2020, which is 56 percent of the projected growth in cooling needs. And in 2030 this could grow to 20.1 billion gallons of conserved water, which is 45 percent of projected growth. Instead, we see FP&L projected figures for water demand in 2025 to include a 35 percent increase for public and commercial needs and a whopping 3,224 percent increase for thermoelectric power generation. The NRC needs to fully evaluate less water- intensive energy alternatives -- efficiency and renewables -- including using a combination of these energy sources. The NRC also needs to analyze the impacts such a drastic increase in water demand from the power sector could cause to this area. (**0001-14-7** [Hancock, Mandy])

Comment: As a mayor who has signed on the U.S. Conference of Mayors Climate Protection Agreement, I am committed to, as we all are -- we have major sustainable and clean energy initiatives that we are going forward with. But we don't see the cost benefit analysis that you are to do as one that could in any way sustain or support an additional nuclear power infrastructure being placed. We would love to see, as other speakers have said, additional solar manufacturing. We've got the land throughout South Florida to do the manufacturing of the solar panels, to see Florida Power and Light do what they've done in Arcadia, and put in more solar fields. But the adverse impact of the potential for bringing in additional nuclear power plants would interfere with residential, and commercial, and environmental interest to a significant degree. (**0001-21-5** [Lerner, Cindy])

Comment: Wouldn't any energy technology create jobs? Developing solar and wind energy systems would involve construction and permanent jobs. FP&L's job creation theme is an emotional ploy at best. Is enticement of jobs in trying economic times a good enough reason for expansion? We need direction from something much smarter and more thoughtful. That takes us to "greener" than coal fired plants. (**0029-2** [Guendelsberger, Debra])

Response: *Alternative energy sources, including coal, natural gas, energy conservation, and renewable-energy sources, will be considered in Chapter 9 of the EIS. The impact of consumptive water losses on the sustainability of both the local and regional water resources will be presented in Chapters 4, 5, and 7 for building and operation, respectively.*

Comment: I ask you to include the true costs of nuclear plants throughout their entire life cycle in your environmental calculations, including the diversion of resources from the desperately-needed development of truly safe and sustainable energy technologies.
(**0021-20** [Wilansky, Laura])

Response: *The assumptions of reactor life span and costs used in this analysis will be provided in Section 10 of the EIS. Costs for all phases of reactor building and maintenance will be discussed. The license period for a combined license is 40 years. A licensee can request renewal for an additional 20 years. The benefit-cost analysis is done for the license period of 40 years. It would not be appropriate to assume additional cost or benefit for an additional* 20 years *of license renewal when that action has not been requested or approved.*

Comment: As was said, we're referring to Units 6 and 7, because there are five operating units at the site. There are three fossil units and there's two nuclear units. So FPL has a well balance of fuel diversity but it's important that we increase, from a diversity standpoint, our reliance on nuclear energy and renewables. FPL currently is the largest generator of electricity from wind in the United States, and we have the largest solar power facility in the country. We're the third largest generator of electricity from nuclear in the United States currently today, without the addition of Units 6 and 7. (**0001-3-3** [Kiley, Mike])

Response: *This comment expresses support for the applicant's COL application. It does not provide specific information relating to the environmental effects of the proposed action and will not be evaluated in the EIS. It is listed to compile a complete record of comments received.*

Comment: [T]he estimated cost of thirty billion dollars or more which the public is expected to prepay, would be much better spent on creating and/or subsidizing an alternative energy industry. This industry will create many thousands of permanent jobs, as opposed to the relatively few which would be created by establishing new nuclear power plants. (**0012-15** [Payne, Nkenga])

Comment: The article [in the "Free Press"] mentioned that the nuclear plants rely almost 50% on natural gas - my question to you, Mayor, is why not go in the more "green" direction of "natural gas" for all future energy needs - which is abundant and cheap - I believe we are not even considering other alternatives because of the following: Big Business, FPL, and its well-trodden path of making the American people more and more electricity-, dependent (prices never going down or stabilizing to benefit the American people, even though FPL grows bigger and bigger every year) - and then - influencing our government by threatening loss of jobs = two ways coercing the American people/government into "feeding" this greedy monster AND IS NOT THE WAY TO GO IN THE 21ST CENTURY. (**0028-3** [DiNuzzo, Laura])

Comment: Regarding the coercing of the American people and our government by suggesting that thousands of jobs would be lost if the nuclear plants were not constructed, I propose the following green outlook: If, for instance, your office, Mayor, turned its back on FPL and our government refused to allow this typical example of Big Business 20th Century greed and inconsideration for the American people, and decided that America needs to be more self-sufficient and its individual homes more self-efficient - I can promise you with millions of homes proceeding in this Green Direction, thousands if no millions of jobs would be created by: Independent American-home generators, Independent American-home solar panels, Independent American-home, cistern-like water supplies. Thereby creating endless jobs in manufacturing, sales, installations, maintenances, repairs, and so many other job-related ramifications therewith - making Americans more dependent upon each other rather than big business and the world for our needs, and more importantly, moving in the right green direction to protect this planet from any further exploitation by big business. As far as fossil fuels are concerned: It is not the fossil fuels that have caused so many problems, it is Big Business Greed that has gotten out of control and must be stopped in the 21st Century. (**0028-4** [DiNuzzo, Laura])

Response: *The NRC does not establish public policy regarding electric power supply alternatives nor does it promote the use of nuclear power as a preferred energy alternative.*

Decisions regarding which generation sources and alternatives to generation to deploy are made by the applicant through least-cost planning and integrated resource plans. Additional regulatory purview is provided by bodies such as State energy planning agencies and commissions. However, the discussion of various alternatives to the proposed project is pertinent to the extent that an energy alternative must reasonably be expected to replace the base load energy supplied by the proposed project, whether individually or in combination. The alternatives must be technically viable, feasible, and competitive. Chapter 9 of the EIS will include the no-action alternative (energy efficiency and demand-side management), new generation alternatives, purchased electrical power, alternative energy technologies (including renewable energy such as wind and solar), and the combination of alternatives. For acceptable alternatives, the potential for environmental and economic impacts will be assessed against the proposed project. If one of the potentially viable alternatives is environmentally preferable to the proposed action, economic impacts will also be compared.

Comment: YOU HAVE THE OPTIONS OF DECIDING TO PUT TP 6&7 SOMEWHERE ELSE AND/OR TO SUGGEST THE USE OF ALTERNATIVE (AND DECENTRALIZED) ENERGY SOURCES AND PRODUCTION. FOR THE SAKE OF OUR GRANDCHILDREN, CHOOSE ONE OF THOSE OPTIONS. (**0016-12** [White, Barry])

Response: *The NRC staff carefully reviews each application it receives by using an acceptance review process to ensure all required components are provided by the applicant. Each application then receives additional scrutiny during the safety and environmental review processes. Examining alternative energy sources and alternative sites is a function of the environmental review process and these topics will be discussed in Chapter 9 of the EIS.*

D.1.24 Comments Concerning Alternatives – System Design

Comment: Application fails to provide an alternatives analysis for routing of the proposed reuse pipeline. Please provide an alternatives analysis that considers and compares the benefits and impacts of all feasible alternative routes for this pipeline, including but not limited to wetland impacts, impacts to state and federally protected species, impacts to existing water management features. Alternatives evaluated should include but not be limited to options that minimize wetland impacts. (**0023-1-25** [LaFerrier, Marc])

Comment: Application fails to provide an alternatives analysis for the proposed access road network, both for construction access to the plant and access to the transmission line corridors, and to adequately demonstrate that impacts to resources are minimized and avoided. Please provide an analysis of alternatives for the access roads that considers and compares the benefits and impacts of all feasible alternative routes for ingress-egress, and demonstrates minimization and avoidance of impacts including but not limited to wetlands, impacts to state and federally protected species, impacts to existing water management features, impacts to Environmentally Endangered Lands projects, Natural Forest Communities, and tree resources protected by Chapter 24, Miami-Dade Code. Alternatives evaluated for ingress-egress to Turkey Point should include but not be limited to utilization of the existing Palm Drive (SW 344 Street) corridor with and without shift change modifications, and alternative construction entrances including but not limited to utilizing the existing plant entrance with shift change modifications or making improvements to the L-31 East levee for use as a temporary construction entrance by backfilling a section of the L-31 E borrow canal. (**0023-2-7** [LaFerrier, Marc])

Comment: Should the NPS decided to acquire FPL's property within ENP and not exchange lands, it is assumed that FPL would not abandon its objective to obtain a western route from Turkey Point to the Levee substation. FPL would, therefore, likely resume investigation of alternate route(s). These new route(s) could affect the local socioeconomic environment including people, property values, employment, and construction-related expenditures in Miami-Dade County. These impacts should be evaluated in the EIS. (**0025-3-47** [Kimball, Dan] [Lewis, Mark])

Response: *The potential impacts of building and operating proposed Turkey Point Units 6 and 7 and ancillary facilities and corridors on wetlands, Federally and State-listed species, and other terrestrially important resources will be discussed in Chapters 4 and 5 of the EIS, based on the affected environment described in Chapter 2. However, alternatives to the roads, pipelines, and transmission corridors proposed by FPL will not be considered in the NRC staffs analysis in the EIS because they are not alternatives to the proposed action (issuance of combined licenses) before the NRC. However, the Corps of Engineers, and perhaps the National Park Service, will be cooperating with the NRC on the EIS. To the extent that a cooperating agency addresses such alternatives for its NEPA analysis, those alternatives would likely be included in this EIS in order to support the cooperating agency's environmental review.*

Comment: Given the value of utilizing the treated reclaimed water as a part of the cooling process, it seems beneficial to store or reroute this by-passed water for beneficial use rather than disposal. Where possible, recycling/reuse efforts should be utilized to maximize the use of the reclaimed waters to supplement operations that have traditionally utilized other surface water or groundwater as sources for cooling and/or for environmental enhancement. (**0023-3-48** [LaFerrier, Marc])

Comment: Hence, underground injection is not a proven, reliable method of wastewater disposal in southern Miami-Dade County, most likely due to differences in regional geology. Therefore, FPL should investigate alternative methods of cooling water blowdown and wastewater disposal. What is FPL's contingency should FDEP not approve a Class I underground injection control permit for Units 6&7 operation? A feasibility analysis of treating wastewater for the benefit of the Biscayne Bay Coastal Wetlands/CERP project should be performed. (**0025-3-22** [Kimball, Dan] [Lewis, Mark])

Response: *A description of the site layout, the reactor type, and the cooling-water systems will be included in Chapter 3 of the EIS. Alternatives to the proposed method of disposal of wastewater will be presented in Chapter 9.*

Comment: [T]he foregoing discussion, the NPS recommends that the EIS identify and evaluate alternative Western Transmission Corridors outside the existing boundary of Everglades National Park and connecting wetland habitats. The National Environmental Policy Act mandates that reasonable alternatives to a proposed action be evaluated. Consistent with this requirement, the EIS should evaluate other corridors that could be considered as reasonable alternatives to the segments of the West Preferred and West Secondary Corridors that run through Everglades National Park (and Water Conservation Area 3B). The NPS recommends this analysis focus on the zone between Krome Avenue and the Miami-Dade County Urban Development Boundary in order to identify potential corridors that would avoid and minimize adverse impacts to people, wildlife in the Everglades ecosystem, special status species and other natural and cultural resources. (**0025-2-12** [Kimball, Dan] [Lewis, Mark])

Response: *The potential impacts from building and operating transmission lines associated with proposed Turkey Point Units 6 and 7 will be addressed in the Chapters 4, 5, and 7 of the EIS. However, alternatives to the roads, pipelines, and transmission corridors proposed by FPL will not be considered in the NRC staffs analysis in the EIS because they are not alternatives to the proposed action (issuance of combined licenses) before the NRC. However, the Corps of Engineers, and perhaps the National Park Service, will be cooperating with the NRC on the EIS. To the extent that a cooperating agency addresses such alternatives for its NEPA analysis, those alternatives would likely be included in this EIS in order to support the cooperating agency's environmental review.*

Comment: What alternatives are being investigated to avoid use of radial collector wells, even as a backup system? In particular, we recommend that the applicant address the ability of the project to use reclaimed water technology either in part or in full. (**0018-14** [Poole, Mary Ann])

Comment: What contingency plans are considered for alternative water sources if fish and wildlife resources demonstrate negative responses to this technology? We would expect FPL to provide for a contingency plan in their Conditions-of-Certification, should monitoring indicate that this technology is counter-productive to the recovery of Biscayne Bay. (**0018-9** [Poole, Mary Ann])

Comment: Please provide a more detailed justification (including all supporting data and assumptions) in selecting the Biscayne Aquifer Radial Collector Well alternative instead of the Floridan Aquifer and offshore (marine surface) water alternatives as secondary. (**0023-1-49** [LaFerrier, Marc])

Response: *These comments are directed at the applicant and refer specifically to the SCA submitted to the State of Florida by FPL, but they indicate an interest in the cooling-water supply for proposed Turkey Point Units 6 and 7. The cooling-water source for the proposed units will be described in Chapter 3 of the EIS. Alternative water supplies will be considered in Chapter 9.*

D.1.25 Comments Concerning Alternatives – Sites

Comment: We are not opposed to nuclear energy but we don't support additional reactors next to the national parks that we're trying to restore and preserve. (**0001-15-1** [Cornick, Lance])

Comment: My next concern is the risk of building nuclear reactors so close to Miami and the Everglades. (**0001-19-3** [Ryan, Megan])

Comment: I understand there are alternate locations that are being looked at and considered. So I would implore the Regulatory Commission to come back with a recommendation that an alternate site that doesn't have the fragile environmental community that Turkey Point is faced with and all of the adverse impacts, take it somewhere else. (**0001-21-6** [Lerner, Cindy])

Comment: If they're sending this power north -- and somebody said we need this power here in Florida City. My God, we don't need two nuclear plants worth of power in Florida City. And if the power lines are going north, why don't they just leave them go up there and build a power plant up north instead of putting it down here? (**0001-6-9** [Miller, Lloyd])

Comment: Turkey Point is probably the most environmentally unlikely nuclear installation in the nation. If we had to do it all over again, would we really put a massive power plant complex on the border of a national park in the middle of sensitive wetlands and then convert thousands of acres of coastal mangroves into a giant radiator for two nuclear reactors? We may not have the chance to do it over, but we can certainly think better about making things worse. The environmental review of an expanding nuclear facility abutting a national park, in the middle of wetlands, that the Federal, State, and local governments have spent millions working to restore and protect, deserves extra scrutiny. (**0002-1-1** [Sorenson, Katy])

Comment: The EIS should include a comprehensive evaluation of the potential impacts of constructing and operating two nuclear power plants and related facilities at the four alternate sites located in Glades, Martin, Okeechobee and St. Lucie Counties. This analysis will enable the applicant, stakeholders, decisionmakers and the general public to identify the environmentally preferable alternative and if there is an obviously superior site for the construction and operation of the proposed facilities. (**0025-1-10** [Kimball, Dan] [Lewis, Mark])

Comment: A review of the Florida Power & Light Company Project Bluegrass Nuclear Power Plant Site Selection Study Report (summarized in COL Environmental Report, Section 9.3), leads the National Park Service (NPS) to question the adequacy of the site selection study. Please note that only excerpts from the site selection study report referenced above were included as pat1 of Section 9.3 of the COL Environmental Report. For instance, the Cooling Water Supply Criterion, PI, is based on an ocean intake water source (to avoid Biscayne Bay) approximately seven miles offshore as a back-up water supply source (Pages B-3, B-4, C- 93, and C-99). Therefore, it appears that the RCWs, proposed for use as a water source in the COL, may not have been evaluated as part of the site selection process. (**0025-1-6** [Kimball, Dan] [Lewis, Mark])

Comment: [T]he land use rating issued to Turkey Point was the highest (most favorable) among the eight site locations evaluated even though ecologically sensitive habitats were identified. The Report simply assumed that the Biscayne National Park would not be affected by the plant since land is owned by FPL and existing power plants/nuclear units are located there now (Page C-95). However, the RCW operation and use of the area for the CERP Biscayne Bay Coastal Wetlands project was not considered during that analysis. Furthermore, the Turkey Point location was issued the highest possible index score for possible risk of groundwater contamination, compared to the other locations evaluated (Page C-51). The Ecology/Federal RTE Species Criterion, P5, identified Turkey Point as having the highest number of threatened and endangered (T&E) species (Page B-19). The evaluation of disruption to important species was based on the Federally protected species list (22 aquatic and terrestrial species); this review did not consider State of Florida T&E species. If the NPS is to be a cooperating agency on the EIS, then impacts to state-listed and locally-listed species would need to be evaluated in this document as well (NPS Management Policies 2006 sec. 4.4.2.3). Moreover, the Wetlands Criterion, P6, did not include estuarine, marine, riverine, or freshwater pond wetland acreage in the evaluation (page B-21), all of which are required to be considered due to the potential impacts associated with the RCW operation. (**0025-1-7** [Kimball, Dan] [Lewis, Mark])

Comment: Of particular concern is the fact that the Turkey Point location received an average score during the initial screening site selection evaluation (Page 16), yet that score was changed to the highest favorable score in the final general criteria evaluation (Page 23). The reason for the increase in favorability is unclear. It appears that the Turkey Point location was given additional weight based on non-quantified socioeconomic factors. (**0025-1-8** [Kimball, Dan] [Lewis, Mark])

Comment: [T]he NPS recommends that the site selection process be re-evaluated, reflect the actual proposed features of the COL application, and consist of a more detailed and accurate comprehensive analysis that accounts for the RCW operation, state and federal T &E listed species and their habitats, conflicts with CERP Biscayne Bay Coastal Wetlands projects, and a quantifiable socioeconomic analysis. It is important that these factors be carefully considered in the process because they could significantly affect the results. (**0025-1-9** [Kimball, Dan] [Lewis, Mark])

Comment: It's location and proximity to Everglades National Park, Biscayne National Park, John Pennekamp Coral Reef State Park, and the Florida Keys National Marine Sanctuary makes it an eyesore on the coastline and a drain on the environment, not to mention the potentially catastrophic damage that would occur if there should be a radioactive release. (**0027-2** [Moses, Dorothy])

Response: *The alternative site-selection process will be reviewed to determine whether it is systematic, employs reasonable selection criteria, and constitutes an acceptable number of reasonable sites for consideration. The alternative sites will be compared against the proposed site to determine whether any of the alternative sites are environmentally preferable to the proposed site. The process and results will be provided in Chapter 9 of the EIS.*

Comment: The Mayors from our surrounding cities gathered and together put forth information about their concerns on the environmental impact, not just the site of the reactors, but also the transmission lines. I'm here this evening just so I can add my voice to their concerns. (**0002-2-1** [Meerbott, Tim])

Response: *The impacts of building proposed Turkey Point Units 6 and 7 and transmission lines will be considered in Chapter 4 of the EIS, and the impacts of operating the units and transmission lines will be considered in Chapter 5.*

D.1.26 Comments Concerning Benefit-Cost Balance

Comment: The NRC should be aware that FPL's ratepayers aren't happy about the tens of millions they have already been forced to pay in advance given the pre-payment scheme in place to finance new reactors in Florida. And FP&L is asking again the troubled Florida Public Service Commission for tens of millions more with hearings set for the end of August. (**0001-14-2** [Hancock, Mandy])

Comment: The FP&L has garnered several hundred millions from its ratepayers at this early stage through the Florida's Early Cost Recovery Program awarded by the Public Service Commission. Under the program, FP&L could conceivably recoup the cost of -- the entire cost of the plant, estimated to be between 14 and 30 billion, and may not actually be required to ever build that plant. (**0001-16-6** [Showen, Steve])

Comment: Determine how public investment costs will be equitably shared by all FPL rate holders, no matter what delivery system is ultimately constructed. (**0019-11** [Hamilton, Karen])

Comment: Outrageous monetary costs to rate payers. FPL is now collecting $18 billion from its 4.5 million customers to provide nuclear electricity for 750,000 homes. (**0031-4** [De Villiers, Elena])

Response: *The costs of power generation are passed on to customers. The NRC's responsibility is to regulate the nuclear industry to protect the public health and safety within existing policy. The NRC is not involved in establishing the rates paid by customers; therefore, these comments are outside the scope of the NRC's authority and will not be evaluated further.*

Comment: This should be our choice, the ratepayers. Me, my family, my neighbors, we have already seen an increase in our bills to start paying for these reactors. These risky projects have a history of going over budget and taking longer than promised. (**0001-19-5** [Ryan, Megan])

Comment: Are you aware that Wall Street will not finance nuclear power plants? TP will cost around $35,000,000,000. Divided by 4.4 million homes, that is $8,000 per home, and then FPL will own them and we will pay 10.5% annually on FPL's free asset until they are depreciated. No wonder they want to build them, on the public's money. It will more than triple their market cap. And before I will do that, I will put in solar and go off the grid and reduce my FPL bill to about $40 per month, and if enough people do that, who will pay for those carbuncles on the bay? Power companies have gone bankrupt. Or would Uncle Sam have to bail them out too? (**0016-7** [White, Barry])

Response: *Issues related to costs associated with previous projects are outside the scope of the proposed action and will not be addressed in the EIS. The estimated overall costs and environmental impacts of the proposed project will be addressed in Chapter 10 of the EIS. The benefit-cost balance for the project will rely on the best available estimate of project timing and duration, while noting possible uncertainties that may affect those estimates.*

Comment: In reality, nuclear energy is a dinosaur that would be extinct if left to market forces except for its resuscitation by huge infusions of public cash. Wall Street considers nuke power too risky to invest in and nuclear energy is the most expensive form of energy. It can't make it on its own. Hence, we see the political influence of the industry in the halls of government. (**0001-16-5** [Showen, Steve])

Comment: If nuclear energy was truly sustainable, cost-effective and truly a profitable business, the companies trying to build new nuclear plants would not have to keep going back to Congress for loan guarantees, liability insurance and tax breaks. The fact that this industry cannot obtain operating insurance by any means other than Congressional action is extremely telling! Nuclear plants are uninsurable!!!! Does that sound like an environmentally safe, economically sound business to you?! It surely doesn't to me! (**0021-15** [Wilansky, Laura])

Response: *The NRC is not involved in establishing energy policy. Rather, it regulates the nuclear industry to protect the public health and safety and the environment within existing policy. Determining whether nuclear power should be subsidized is outside of the NRCs mission and authority and will not be addressed in the EIS.*

Comment: I ask you to include the true costs of nuclear plants throughout their entire life cycle in your environmental calculations, including the guaranteed damage to Florida's environment. (**0021-18** [Wilansky, Laura])

Response: *The benefit-cost balance for proposed Turkey Point Units 6 and 7 will rely on the best available estimate of project timing and duration, with uncertainties noted. The estimated overall costs and environmental impacts of the proposed project during both building and the 40-year operations period will be discussed in Chapter 10 of the EIS.*

Comment: I am disheartened to see that a new facility can cost 10's of billions of dollars to build but we have sat around for the past 30 years so we must do something. (**0004-2** [Singer, Craig])

Response: *The costs and benefits of building and operating proposed Turkey Point Units 6 and 7 will be addressed in Chapter 10 of the EIS.*

Comment: I would like to first address the issue of jobs. If, in fact, the 15 to $30 billion that Steve mentioned were manna from heaven that we would only get if we built these power plants, then I think it's worthwhile to consider, in isolation, the construction jobs and the 800 jobs that would be ongoing. If not -- and of course it's not manna from heaven -- we have to compare what 15 to $30 billion could do spent in other ways. So I suggest that it's very much in scope to consider a cost benefit analysis that compares other ways of spending that money. (**0001-24-1** [Harum-Alvarez, Albert])

Comment: And so I would like to propose that the NRC include a cost benefit analysis that compares this proposed expansion of Turkey Point to distributed generation because, of course, that would get around the whole issue of transmission lines completely, including distribution of small nukes; building efficiency, which would create the largest number of jobs across the region; and finally, a no-build option which I suggest should always be in your comparisons because, of course, if we got to keep the 15 to $30 billion ourselves, we would find some way to spend it or invest it, and that would have an economic impact as well. Could very well give us our own efficiency by having us work on our houses individually. (**0001-24-3** [Harum-Alvarez, Albert])

Response: *Job creation during the building and operation of proposed Turkey Point Units 6 and 7 will be discussed in the socioeconomic sections of Chapters 4 and 5 of the EIS. The benefit-cost balance for the project will rely on the best available estimate of project timing and duration, while noting possible uncertainties that may affect those estimates. The NRC benefit-cost analysis in Chapter 10 is confined to an analysis of the as-proposed facilities at the proposed location. Alternatives will be considered in Chapter 9.*

Comment: The new reactors are too costly and will require too much water. (**0017-1** [Troner, Susannah])

Response: *This comment expresses opposition to the cost of the project. An evaluation of the benefit-cost balance of building proposed Turkey Point Units 6 and 7 will be discussed in Chapter 10 of the EIS. Water usage will be discussed in the hydrology sections of Chapters 4 and 5.*

Comment: [CASE submitted an article titled, "Proposed Turkey Point Nuclear Reactor Units 6 & 7 -Financially Prudent?" by George Cavros, Esq. The article expressed concerns about the benefit/cost balance of building nuclear reactors.] (**0003-2-2** [White, Barry])

Comment: The applicant should consider both monetary and societal costs when making decisions about infrastructure location and technology. Special attention should be given to limiting environmental, health, economic and social impacts to the surrounding communities. (**0019-8** [Hamilton, Karen])

Response: *The benefit-cost balance will be discussed in Chapter 10 of the EIS and will include environmental, health, social, and monetary costs along with benefits.*

Comment: [T]he two additional nuclear power plants: will take ten to fifteen years to become operational, which will make them technologically obsolete before completion. (**0012-14** [Payne, Nkenga])

Response: *The long-term benefits associated with the cost of building proposed Turkey Point Units 6 and 7 will be presented in Chapter 10 of the EIS.*

Comment: Please state the life-cycle costs of the water management feature(s). (**0022-3-16** [Reynolds, Laura])

Response: *Hydrology will be discussed in Chapters 4 and 5 of the EIS. The costs and benefits of building and operating proposed Turkey Point Units 6 and 7 will be addressed in Chapter 10.*

Comment: Please state the costs and benefits of constructing and operating Class I UIC wells for units 6&7. Please state the costs and benefits of constructing and operating Class V UIC wells for units 6&7 (**0022-2-10** [Reynolds, Laura])

Response: *Class I injection wells are used to inject wastewater below the lowermost underground source of drinking water and have been proposed for disposal of cooling-system blowdown water by FPL. The proposed system will be presented in Chapter 3 of the EIS. Alternatives for wastewater disposal will be presented in Chapter 9. Benefit-cost analysis for the proposed units will be presented in Chapter 10.*

Comment: Everglades Restoration, Biscayne Bay Restoration, is about restoring that area for its economic value, for its environmental value, and that has to be considered. This is two National Parks. Two National Parks that could be impacted by this. Biscayne Bay, and for the transmission siting aspect of it, Everglades National Park. Again, not one, but two National Parks that we're spending billions of dollars to restore because of their economic value, and the economic value of restoring them. So, again, that negative economic cost has to be considered in your analysis. (**0002-6-8** [Grosso, Richard])

Response: *Impacts on Biscayne National Park and Everglades National Park from building and operating proposed Turkey Point Units 6 and 7 will be discussed in Chapters 4, 5, and 7 of the EIS. The costs and benefits of the proposed project will be presented in Chapter 10.*

D.2 References

10 CFR Part 52. 2012. *Code of Federal Regulations*, Title 10, *Energy*, Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants." Washington, D.C. TN251.

36 CFR Part 800. 2012. *Code of Federal Regulations*, Title 36, *Parks, Forests, and Public Property*, Part 800, "Protection of Historic Properties." Washington, D.C. TN513.

75 FR 33851. June 15, 2010. "Florida Power & Light Company; Turkey Point, Units 6 and 7; Combined License Application, Notice of Intent To Prepare an Environmental Impact Statement and Conduct Scoping Process." *Federal Register*, Nuclear Regulatory Commission, Washington, D.C. TN511.

42 USC 4321 et seq. National Environmental Policy Act (NEPA) of 1969, as amended. TN661.

NRC (U.S. Nuclear Regulatory Commission). 2010. Staff Memorandum from T. Terry to R. Whited dated August 31, 2010, regarding "Summary of Public Meetings to Support the Review of the Turkey Point, Units 6 and 7, Combined License Application." Washington, D.C. Accession No. ML102170529. TN514.

NRC (U.S. Nuclear Regulatory Commission). 2010. Staff Memorandum from A.J. Kugler to R. Whited, dated December 1, 2010, regarding "Scoping Summary Report Related to the Environmental Scoping Process for the Turkey Point Units 6 and 7 Combined License Application." Washington, D.C. Accession No. ML103130610. TN515.

NRC (U.S. Nuclear Regulatory Commission). 2010. *Environmental Impact Statement Scoping Process Summary Report Turkey Point Units 6 and 7 Combined Licenses Miami-Dade County, Florida*. Rockville, Maryland. Accession No. ML103130612. TN516.

NRC (U.S. Nuclear Regulatory Commission). 2010. *Official Transcript of Proceedings for Turkey Point Site License Public Meeting: Afternoon Session*. Neal R. Gross and Co., Inc., Washington, D.C. Accession No. ML102150591. TN518.

NRC (U.S. Nuclear Regulatory Commission). 2010. *Official Transcript of Proceedings for Turkey Point Site License Public Meeting: Evening Session*. Neal R. Gross and Co., Inc., Washington, D.C. Accession No. ML102150597. TN519.

Appendix E

Draft Environmental Impact Statement Comments and Responses

Appendix E

Draft Environmental Impact Statement Comments and Responses

This appendix is intentionally left blank in the draft environmental impact statement (EIS). In the final EIS, this appendix will include comments and responses received on the draft EIS.

Appendix F

Key Consultation Correspondence

Appendix F

Key Consultation Correspondence

Table F-1 identifies correspondence received during the evaluation process for the combined construction permits and operating licenses (COLs) application for the siting of two new nuclear units, Turkey Point Nuclear Plant Units 6 and 7, in Miami-Dade County, Florida.

Table F-1. Key Combined License Consultation Correspondence

Source	Recipient	Date of Letter
U.S. Nuclear Regulatory Commission (Ms. Laurel Bauer)	Advisory Council on Historic Preservation (Mr. Reid Nelson)	June 23, 2010 (ML101610537)
U.S. Nuclear Regulatory Commission (Ms. Laurel Bauer)	Muscogee (Creek) Nation (Ms. Joyce Bear)	June 24, 2010 (ML101690496)
U.S. Nuclear Regulatory Commission (Ms. Laurel Bauer)	Poarch Band of Creek Indians (Mr. Robert Thrower, Tribal Historic Preservation Officer)	June 24, 2010 (ML101690503)
U.S. Nuclear Regulatory Commission (Ms. Laurel Bauer)	Seminole Nation of Oklahoma (Ms. Natalie Deere, Tribal Historic Preservation Officer)	June 24, 2010 (ML101690497)
U.S. Nuclear Regulatory Commission (Ms. Laurel Bauer)	Seminole Tribe of Florida (Mr. W.S. Steele)	June 24, 2010 (ML101690499)
U.S. Nuclear Regulatory Commission (Ms. Laurel Bauer)	Florida Deputy State Historic Preservation Officer (Ms. Laura Kammerer)	June 29, 2010 (ML101690480)
U.S. Nuclear Regulatory Commission (Ms. Laurel Bauer)	Archaeological and Historical Conservancy, Inc. (Mr. Robert Carr)	July 1, 2010 (ML101690462)
U.S. Nuclear Regulatory Commission (Ms. Laurel Bauer)	City of Coral Gables, Historic Preservation Administrator (Ms. Simone Chin)	July 1, 2010 (ML101730494)
U.S. Nuclear Regulatory Commission (Ms. Laurel Bauer)	City of Homestead Community Redevelopment Agency (Mr. Dan Wick)	July 1, 2010 (ML101730511)
U.S. Nuclear Regulatory Commission (Ms. Laurel Bauer)	City of Miami Historic Preservation Officer (Ms. Ellen Uguccioni)	July 1, 2010 (ML101690472)
U.S. Nuclear Regulatory Commission (Ms. Laurel Bauer)	City of South Miami (Mr. Sanford Youkilis)	July 1, 2010 (ML101730515)
U.S. Nuclear Regulatory Commission (Ms. Laurel Bauer)	Florida Office of Historic & Archaeological Resources (Ms. Kathleen Kauffman)	July 1, 2010 (ML101690468)
Advisory Council on Historic Preservation (Ms. Caroline Hall)	U.S. Nuclear Regulatory Commission (Ms. Laurel Bauer)	July 8, 2010 (ML101900325)

Source	Recipient	Date of Letter
Florida Deputy State Historic Preservation Officer (Ms. Laura Kammerer)	U. S. Nuclear Regulatory Commission	July 28, 2010 (ML102220345)
Miami-Dade County Historic Preservation Chief (Ms. Kathleen Kauffman)	U. S. Nuclear Regulatory Commission	August 12, 2010 (ML102390102)
Seminole Tribe of Florida (Mr. Willard Steele)	U.S. Nuclear Regulatory Commission (Mr. Andrew Kugler)	September 14, 2010 (ML102660296)
U.S. Nuclear Regulatory Commission (Mr. Andrew Kugler)	U.S. Nuclear Regulatory Commission (Mr. Ryan Whited)	September 21, 2010 (ML101880786)
U.S. Nuclear Regulatory Commission (Mr. Andrew Kugler)	Seminole Tribe of Florida (Mr. W.S. Steele)	December 8, 2010 (ML103420623)
U.S. Nuclear Regulatory Commission (Ms. Jennifer Dixon-Herrity)	Advisory Council on Historic Preservation (Mr. Reid Nelson)	October 23, 2014 (ML14269A049)
U.S. Nuclear Regulatory Commission (Ms. Jennifer Dixon-Herrity)	Archaeological and Historical Conservancy, Inc. (Mr. Robert Carr)	October 23, 2014 (ML14269A067)
U.S. Nuclear Regulatory Commission (Ms. Jennifer Dixon-Herrity)	City of Coral Gables (Ms. Dona Spain)	October 23, 2014 (ML14283A127)
U.S. Nuclear Regulatory Commission (Ms. Jennifer Dixon-Herrity)	City of Homestead Community Redevelopment Agency (Mr. Rick Ammirato)	October 23, 2014 (ML14281A316)
U.S. Nuclear Regulatory Commission (Ms. Jennifer Dixon-Herrity)	City of Miami Preservation Officer (Ms. Megan Cross Schmitt)	October 23, 2014 (ML14283A175)
U.S. Nuclear Regulatory Commission (Ms. Jennifer Dixon-Herrity)	City of South Miami Planning Director (Mr. Christopher Brimo)	October 23, 2014 (ML14283A124)
U.S. Nuclear Regulatory Commission (Ms. Jennifer Dixon-Herrity)	Cultural and Historical Programs Compliance Review Supervisor (Dr. Tim Parsons)	October 23, 2014 (ML14296A592)
U.S. Nuclear Regulatory Commission (Ms. Jennifer Dixon-Herrity)	Florida Division of Historical Resources (Mr. Robert F. Bendus)	October 23, 2014 (ML14269A082)
U.S. Nuclear Regulatory Commission (Ms. Jennifer Dixon-Herrity)	Florida Office of Historic & Archaeological Resources (Ms. Kathleen Kauffman)	October 23, 2014 (ML14281A278)
U.S. Nuclear Regulatory Commission (Ms. Jennifer Dixon-Herrity)	Muscogee (Creek) Nation Tribal Historic Preservation Officer (Mr. Emman Spain)	October 23, 2014 (ML14283A151)
U.S. Nuclear Regulatory Commission (Ms. Jennifer Dixon-Herrity)	Seminole Tribe of Florida Tribal Historic Preservation Officer (Dr. Paul Backhouse)	October 23, 2014 (ML14283A141)

Appendix F-2
The U.S. Nuclear Regulatory Commission (NRC) has not reproduced the “Biological Assessment for the U.S. Fish and Wildlife Service” in the paper reproduction of the Draft Environmental Impact Statement for Combined Licenses (COLs) for Turkey Point Units 6 and 7, Draft Report for Comment. This document can be found in the Agencywide Documents Access and Management System (ADAMS) electronic public reading room accessible at http://www.nrc.gov/readingrm/adams.html, using accession number ML15028A372. If you encounter issues accessing ADAMS, call the NRC at 1800-397-4209 or 301-415-4737, or send an e-mail to pdr.resource@nrc.gov.

Appendix F-3
The U.S. Nuclear Regulatory Commission (NRC) has not reproduced the “Biological Assessment for the National Marine Fisheries Service” in the paper reproduction of the Draft Environmental Impact Statement for Combined Licenses (COLs) for Turkey Point Units 6 and 7, Draft Report for Comment. This document can be found in the Agencywide Documents Access and Management System (ADAMS) electronic public reading room accessible at http://www.nrc.gov/readingrm/adams.html, using accession number ML15028A378. If you encounter issues accessing ADAMS, call the NRC at 1800-397-4209 or 301-415-4737, or send an e-mail to pdr.resource@nrc.gov.

Appendix F-4
The U.S. Nuclear Regulatory Commission (NRC) has not reproduced the “Comment Draft Essential Fish Habitat Assessment for the National Marine Fisheries Service” in the paper reproduction of the Draft Environmental Impact Statement for Combined Licenses (COLs) for Turkey Point Units 6 and 7, Draft Report for Comment. This document can be found in the Agencywide Documents Access and Management System (ADAMS) electronic public reading room accessible at http://www.nrc.gov/readingrm/adams.html, using accession number ML15028A395. If you encounter issues accessing ADAMS, call the NRC at 1800-397-4209 or 301-415-4737, or send an e-mail to pdr.resource@nrc.gov.

Appendix G

Supporting Documentation

Appendix G

Supporting Documentation

G.1 Supporting Socioeconomic Documentation

Workforce estimates reflect direct labor estimated by the applicant to be employed in preconstruction, construction, and operations of the Turkey Point Nuclear Power Plant (Turkey Point) Units 6 and 7. In Table G-1, months are numbered starting from the beginning of the construction phase, with negative numbers indicating preconstruction, and the peak workforce is expected to occur in month 42.

Table G-1. Estimated Workforce by Month During Preconstruction, Construction, and Operation of Proposed Turkey Point Units 6 and 7 (FPL 2014-TN4058)

	Number of Employees				
		Operations			
Month	Construction	Unit 6	Unit 7	Total	Total
Preconstruction Activities					
-39	40	-	-	-	40
-38	45				45
-37	55				55
-36	60	-	-	-	60
-35	70	-	-	-	70
-34	75	-	-	-	75
-33	90	-	-	-	90
-32	100	-	-	-	100
-31	110	-	-	-	110
-30	130	-	-	-	130
-29	150	-	-	-	150
-28	180	-	-	-	180
-27	230	-	-	-	230
-26	280	-	-	-	280
-25	320	-	-	-	320
-24	390	-	-	-	390
-23	465	-	-	-	465
-22	540	-	-	-	540
-21	575	-	-	-	575
-20	650	-	-	-	650
-19	740	-	-	-	740
-18	825	-	-	-	825
-17	900	-	-	-	900
-16	1,000	-	-	-	1,000
-15	1,020	-	-	-	1,020
-14	1,090	-	-	-	1,090

Table G-1. (contd)

	Number of Employees				
		Operations			
Month	Construction	Unit 6	Unit 7	Total	Total
-13	1,180	-	-	-	1,180
-12	1,200	-	-	-	1,200
-11	1,220	-	-	-	1,220
-10	1,240	-	-	-	1,240
-9	1,300	-	-	-	1,300
-8	1,320	-	-	-	1,320
-7	1,340	-	-	-	1,340
-6	1,350	-	-	-	1,350
-5	1,375	-	-	-	1,375
-4	1,400	-	-	-	1,400
-3	1,425	-	-	-	1,425
-2	1,450	-	-	-	1,450
-1	1,475	-	-	-	1,475
Unit 6 Construction Begins					
1	1,500	-	-	-	1,500
2	1,525	-	-	-	1,525
3	1,550	-	-	-	1,550
4	1,600	-	-	-	1,600
5	1,625	-	-	-	1,625
6	1,650	-	-	-	1,650
7	1,675	-	-	-	1,675
8	1,700	-	-	-	1,700
9	1,725	-	-	-	1,725
10	1,750	-	-	-	1,750
11	1,775	-	-	-	1,775
12	1,800	-	-	-	1,800
Unit 7 Construction Begins					
13	1,825	-	-	-	1,825
14	1,850	-	-	-	1,850
15	1,900	-	-	-	1,900
16	1,950	-	-	-	1,950
17	2,000	-	-	-	2,000
18	2,100	-	-	-	2,100
19	2,250	-	-	-	2,250
20	2,350	-	-	-	2,350
21	2,450	-	-	-	2,450
22	2,600	-	-	-	2,600
23	2,750	-	-	-	2,750
24	2,900	-	-	-	2,900
25	3,050	-	-	-	3,050
26	3,200	-	-	-	3,200
27	3,350	-	-	-	3,350
28	3,500	-	-	-	3,500
29	3,650	-	-	-	3,650
30	3,850	-	-	-	3,850

Table G-1. (contd)

Month	Number of Employees				
	Construction	Operations			Total
		Unit 6	Unit 7	Total	
31	3,950	-	-	-	3,950
32	3,950	-	-	-	3,950
33	3,950	-	-	-	3,950
34	3,950	-	-	-	3,950
35	3,950	-	-	-	3,950
36	3,950	-	-	-	3,950
37	3,950	-	-	-	3,950
38	3,950	-	-	-	3,950
39	3,950	-	-	-	3,950
40	3,950	-	-	-	3,950
41	3,950	16	-	16	3,966
42	3,950	33	-	33	3,983
43	3,925	49	-	49	3,974
44	3,900	66	-	66	3,966
45	3,870	82	-	82	3,952
46	3,850	99	-	99	3,949
47	3,825	115	-	115	3,940
48	3,800	132	-	132	3,932
49	3,775	148	-	148	3,923
50	3,750	164	-	164	3,914
51	3,725	181	-	181	3,906
52	3,700	197	-	197	3,897
53	3,675	214	16	230	3,905
54	3,650	230	33	263	3,913
55	3,625	247	49	296	3,921
56	3,600	263	66	329	3,929
57	3,575	280	82	362	3,937
58	3,550	296	99	395	3,945
59	3,525	313	115	428	3,953
60	3,500	329	132	461	3,961
61	3,450	345	148	493	3,943
62	3,400	362	164	526	3,926
63	3,300	378	181	559	3,859
64	3,200	395	197	592	3,792
65	3,100	403	214	617	3,717
66	3,000	403	230	633	3,633
67	2,900	403	247	650	3,550
68	2,800	403	263	666	3,466
69	2,700	403	280	683	3,383
70	2,600	403	296	699	3,299
71	2,500	403	313	716	3,216
72	2,400	403	329	732	3,132
73	2,300	403	345	748	3,048
74	2,200	403	362	765	2,965
75	2,100	403	378	781	2,881

Table G-1. (contd)

Month	Number of Employees				
	Construction	Operations			Total
		Unit 6	Unit 7	Total	
76	1,900	403	395	798	2,698
77	1,700	403	403	806	2,506
78	1,500	403	403	806	2,306
79	1,300	403	403	806	2,106
80	1,100	403	403	806	1,906
81	800	403	403	806	1,606
82	550	403	403	806	1,356
83	450	403	403	806	1,256
84	375	403	403	806	1,181

Source: (FPL 2014-TN4058)

G.2 Supporting Radiological Dose Assessment

The U.S. Nuclear Regulatory Commission (NRC) staff performed an independent dose assessment of the radiological impacts resulting from normal operation of the proposed nuclear Units 6 and 7 at the Florida Power and Light Company (FPL) Turkey Point site. The results of that assessment are presented in this section in comparison to the results of the FPL Environmental Report (ER) Section 5.9 (FPL 2014-TN4058). This section is divided into five sections: (1) dose estimates from the deep-well injection exposure scenario, (2) dose estimates to the public from gaseous effluents, (3) cumulative dose estimates, (4) dose estimates to construction workers from Units 3, 4, and 6 during construction of Unit 7, and (5) dose estimates to biota other than humans.

G.2.1 Dose Estimates from the Deep-Well Injection Exposure Scenario

Hydrologic alterations affecting the Boulder Zone of the Lower Floridan aquifer would result from the deep-well injection of blowdown water and other liquid waste streams from the proposed Turkey Point Units 6 and 7. The injected water would include effluent from the sanitary waste-treatment plant, wastewater-retention basin, and liquid radioactive-waste-treatment system. The Boulder Zone is isolated from the Upper Floridan aquifer which can be used as an underground source of drinking water (USDW). However, although a normal operation exposure pathway is not expected, because of the unique nature of the radioactive effluent discharge and in response to NRC requests for additional information (NRC 2013-TN3937), FPL evaluated three potential dose scenarios in Final Safety Analysis Report (FSAR) Section 11.2.3.5 (FPL 2014-TN4069) and ER Section 5.4.1.1 (FPL 2014-TN4058) based on potential groundwater flow pathways of the injected radioactive liquid effluent that could result in inadvertent radioactive exposure to the general public. Therefore, FPL included an analysis of the potential liquid effluent pathways for radiological impacts from this waste disposal method (FPL 2014-TN4058), which was reviewed by the NRC staff for this environmental impact statement. The NRC's safety evaluation of FPL's deep-well injection of radioactive liquid effluent is ongoing and will be addressed in the NRC's final safety evaluation report. Any changes to the combined construction permit and operating license (COL) application that are deemed necessary as a result of the NRC's safety review will be incorporated into the applicant's Final Safety Analysis Report.

This discussion is concerned with the dose estimates of the scenarios, not with the hydrology model of the injectate transport. The hydrology model is discussed in Section G.3.

The results of the evaluation are summarized in the following sections.

G.2.1.1 Scope

As discussed in Sections 5.9.2.1 and 5.9.3.3, three exposure scenarios were postulated. However, does analysis was not performed for one scenario, the Ocean Reef Club scenario (located approximately 7.7 mi south-southeast of the deep-well injection analysis centerpoint), because the injectate plume never reached that far. Therefore, the only scenarios for which dose analysis was performed were the so-called "child" and "driller" scenarios located at a private parcel of land (located approximately 2.2 mi north-northwest of the deep-well injection analysis centerpoint).

G.2.1.2 Resources Used

The NRC staff calculated the postulated liquid pathway doses from the so-called child and driller conceptual scenario using a personal computer (PC) version of the LADTAP II code—NRCDose, Version 2.3.10 (CNS 2006-TN102)—obtained through the Oak Ridge Radiation Safety Information Computational Center (RSICC).

G.2.1.3 Input Parameters

Table G-2 provides a listing of the major parameters used in calculating dose to certain members of the public from liquid effluent releases into the Boulder Zone for retained scenarios during normal operation. Appendix G, Section G.3.3, discusses the hydrology groundwater confirmatory calculations of the potential for upward migration of injectate from the Boulder Zone of the lower Floridan aquifer, which forms the technical basis for the radiological source term input parameters.

G.2.1.4 Comparison of Results

The results documented by FPL in its ER (FPL 2014-TN4058) and the FSAR (FPL 2014-TN4069) for doses from accessing groundwater with infiltration from the Boulder Zone are compared in Table G-3 with the results calculated by the NRC staff. The largest dose to a member of the public calculated for this scenario was from an inadvertent intrusion by a subsistence driller. The doses calculated by the NRC staff are uniformly two-thirds of the doses calculated by FPL.

Table G-2. Parameters Used in Calculating Dose for Retained Scenarios

Parameter	NRC Values		Comments
Intrusion well source term (Ci/yr)	H-3 Sr-90 Cs-134 Cs-137	2.76×10^{1} 4.99×10^{-7} 6.86×10^{-6} 6.78×10^{-4}	Scenario-specific values based on FSAR Section 11.2.3.5 (FPL 2014-TN4069) and ER Section 5.4.1.1 (FPL 2014-TN4058).

Table G-2. (contd)

Parameter	NRC Values	Comments
Discharge flow rate (ft^3/s)	1.0	Scenario-specific values based on FSAR Section 11.2.3.5 (FPL 2014-TN4069) and ER Section 5.4.1.1 (FPL 2014-TN4058).
Source term multiplier	1	Source term already accounts for two units discharging into the deep-well injection
Site type	Fresh water	Discharge is to surface freshwater sources
Reconcentration model	Fully Mixed	Scenario-specific
Total 50-mi population	1	Scenario-specific to one individual.
Dilution factors for aquatic food and boating, shoreline and swimming, and drinking water	1	LADTAP II code default values (NRC 1977; Strenge et al. 1986)
Transit time (hr)	0 (all uses)	Scenario-specific values
Consumption and usage factors for adults, teens, children, and infants	Shoreline usage (hr/yr) 12 (adult) 67 (teen) 14 (child) 0 (infant) Water usage (L/yr) 730 (adult) 510 (teen) 510 (child) 330 (infant) Fish consumption (kg/yr) 21 (adult) 16 (teen) 6.9 (child) 0 (infant)	LADTAP II code default values (NRC 1977; Strenge et al. 1986).
Irrigation rate (L/m^2/month)	38.7	Scenario-specific values based on FSAR Section 11.2.3.5 (FPL 2014-TN4069) and ER Section 5.4.1.1 (FPL 2014-TN4058).
Fraction of animal feed and water not contaminated	1.0	Scenario-specific values based on FSAR Section 11.2.3.5 (FPL 2014-TN4069) and ER Section 5.4.1.1 (FPL 2014-TN4058).
Total production within 50 miles (kg/yr)	1000.0	Scenario-specific values based on FSAR Section 11.2.3.5 (FPL 2014-TN4069) and ER Section 5.4.1.1 (FPL 2014-TN4058).
Irrigated growing period (days)	60	Scenario-specific values based on FSAR Section 11.2.3.5 (FPL 2014-TN4069) and ER Section 5.4.1.1 (FPL 2014-TN4058).
Crop yield (kg/yr)	2.0	Scenario-specific values based on FSAR Section 11.2.3.5 (FPL 2014-TN4069) and ER Section 5.4.1.1 (FPL 2014-TN4058).

(a) Only radionuclides included in Regulatory Guide 1.109 are considered (NRC 1977).

Table G-3. Comparison of Doses to the Public from Intrusion Well Above Boulder Zone

Type of Dose	FPL ER or FSAR[a]	NRC Staff Calculation	Percent Difference
Total body (mrem/yr)	5.6 (adult)	3.63 (adult)	35
Other organ (mrem/yr)	7.8 (liver)	5.15 (liver)	34

(a) ER Table 5.4-3 (FPL 2014-TN4058) and FSAR Table 11.2-209 (FPL 2014-TN4069).

G.2.2 Dose Estimates to the Public from Gaseous Effluents

The NRC staff used the dose-assessment approach specified in Regulatory Guide 1.109 (NRC 1977-TN90) and the GASPAR II computer code (Strenge et al. 1987-TN83) to estimate doses to the maximally exposed individual (MEI) from the gaseous effluent pathway and to the population within the 50 mi radius of the Turkey Point site from the gaseous effluent pathway as recommended by NUREG-1555 (NRC 2007-TN614) for proposed Units 6 and 7.

G.2.2.1 Scope

The NRC staff and FPL independently calculated the maximum gamma air dose, beta air dose, total body dose, maximum organ dose, thyroid dose, and skin dose to receptors located at the maximum exposure point for each pathway discussed in Section 5.9. The maximum atmospheric dispersion factor and the maximum ground deposition occur in the north direction. In ER Section 5.4, the MEI is assumed to be located at 2.69 mi N (FPL 2014-TN4058). Dose to the MEI was calculated for the following exposure pathways: plume immersion, direct shine from deposited radionuclides, inhalation, ingestion of local farm or garden vegetables, and ingestion of locally produced beef and goat milk.

The NRC staff reviewed the input parameters and values used by FPL for appropriateness, including references made to Advanced Passive 1000 (AP1000) pressurized water reactor Design Control Document (DCD) Revision 19 (Westinghouse 2011-TN261). When site-specific input parameters were not available, default values from Regulatory Guide 1.109 (NRC 1977-TN90) were used. The NRC staff verified that FPL used reasonable exposure pathways, DCD input parameters (including source term), and recommended RG 1.109 input parameter values, and used those pathways and parameters in its independent calculation using GASPARII as summarized below.

Joint frequency-distribution data of wind speed and wind direction by atmospheric-stability class for the Turkey Point site (FPL 2014-TN4058) were used as input to the XOQDOQ code (Sagendorf et al. 1982-TN280) to calculate long-term average atmospheric dispersion factor (χ/Q) and atmospheric deposition factor (D/Q) values for routine releases. Based on 2 years of meteorological data, the NRC staff's independent results are similar to those reported by FPL in ER Tables 2.7-16 through and 2.7-18 (FPL 2014-TN4058). The NRC staff calculated population doses for all types of releases (i.e., noble gases, iodines, particulates, tritium, and carbon-14) for the applicable exposure pathways (i.e., plume immersion, direct shine from deposited radionuclides, ingestion of meat, vegetables, and goat milk) using the GASPAR II code.

G.2.2.2 Resources Used

The NRC staff calculated doses to the public from gaseous effluents using a PC version of the XOQDOQ and GASPAR II codes—NRCDose Version 2.3.10 (CNS 2006-TN102)—obtained through the Oak Ridge RSICC.

G.2.2.3 Input Parameters

Table G-4, Table G-5, and Table G-6 list the major parameters used in calculating dose to the public from gaseous effluent releases during normal operation. For population dose assessment, FPL used the population projection for the year 2090. These population projections are presented in ER Table 2.5-1 (FPL 2014-TN4058). The guidance in Section 5-4.1 of the Environmental Standard Review Plan (ESRP; NRC 2000-TN614) advises the NRC staff to assume 5 years from the time of licensing action. Staff doses were calculated using both the FPL assumption and with population estimated for the year 2023 (5 years from anticipated licensing). Population estimates are provided by decade and thus 2030 population estimates are used to conservatively estimate the population in 2023. This is a valid and bounding assumption because population estimates in ER Table 2.5-1 (FPL 2014-TN4058) increase consistently from current projections through 2030 projections.

Table G-4. Gaseous Effluent Source Term

Parameter	Staff Value		Comments
New unit gaseous effluent source term (Ci/yr)	Ar-41	3.4×10^{1}	Values from Westinghouse AP1000 DCD Table 11.3-3 , Rev 19 (Westinghouse 2011-TN261).
	Kr-85m	3.6×10^{1}	
	Kr-85	4.1×10^{3}	
	Kr-87	1.5×10^{1}	
	Kr-88	4.6×10^{1}	
	Xe-131m	1.8×10^{3}	
	Xe-133m	8.7×10^{1}	
	Xe-133	4.6×10^{3}	
	Xe-135m	7.0×10^{0}	
	Xe-135	3.3×10^{2}	
	Xe-138	6.0×10^{0}	
	I-131	1.2×10^{-1}	
	I-133	4.0×10^{-1}	
	H-3	3.5×10^{2}	
	C-14	7.3×10^{0}	
	Cr-51	6.1×10^{-4}	
	Mn-54	4.3×10^{-4}	
	Co-57	8.2×10^{-6}	
	Co-58	2.3×10^{-2}	
	Co-60	8.7×10^{-3}	
	Fe-59	7.9×10^{-5}	
	Sr-89	3.0×10^{-3}	
	Sr-90	1.2×10^{-3}	
	Zr-95	1.0×10^{-3}	
	Nb-95	2.54×10^{-3}	
	Ru-103	8.0×10^{-5}	
	Ru-106	7.8×10^{-5}	
	Sb-125	6.1×10^{-5}	
	Cs-134	2.3×10^{-3}	
	Cs-136	8.5×10^{-5}	
	Cs-137	3.6×10^{-3}	
	Ba-140	4.2×10^{-4}	
	Ce-141	4.2×10^{-4}	

1 **Table G-5. NRC Staff GASPAR Parameters and Selected Inputs**

GASPAR Code Entry, Site Specifics	Input Value	Reference
Source Term: annual average gaseous release	Table G-3	Westinghouse AP1000 DCD Table 11.3-3, Rev 19 (Westinghouse 2011-TN261)
Source multiplication factor	1.0	
Distance from site to NE corner of the United States	1,800 mi	Estimate
50 mi milk production[a]	4.36×10^4 L/yr	Milk cows in the four counties within 50 mi represent approximately 0.046 percent of the State total (USDA 2004-TN1390). The annual production of milk in the State (USDA 2008-TN1393) was multiplied by 0.046 percent to estimate the production within 50 mi as 4.36×10^4 L/yr.
50 mi meat production[a]	6.53×10^4 kg/yr	Beef cows and broilers in the four counties within 50 mi represent approximately 0.21 percent and 0.0017 percent, respectively, of the State totals (USDA 2004-TN1390). The annual productions of red meat (USDA 2007-TN1391) and broiler (USDA 2008-TN1393) in the State were multiplied by these percentages and summed to estimate the total meat production within 50 mi as 6.53×10^4 kg/yr.
50 mi vegetable production[a]	6.04×10^7 kg/yr	The harvested land area in the four counties within 50 mi represents approximately 2.6 percent of the State total (USDA 2004-TN1390). The annual production of vegetables in the State (USDA 2008-TN1392) was multiplied by 2.6 percent to estimate the production within 50 mi as 6.04×10^7 kg/yr.
Fraction of leafy vegetables grown	1	This is the most conservative value.
Fraction of year milk cows on pasture	1	This is the most conservative value.
Fraction of maximum individual's vegetable intake from own garden	0.76	This is the default value in GASPAR II.
Fraction of milk-cow feed from pasture	1	This is the most conservative value.
Average absolute humidity for growing season	8 g/m^3	This is the default value in GASPAR II.
Fraction of year goats on the pasture	1	This is the most conservative value.
Fraction of goat feed from pasture	1	This is the most conservative value.
Fraction of year beef cattle at pasture	1	This is the most conservative value.
Fraction of beef cattle feed from pasture	1	This is the most conservative value.

(a) These values differ from the FPL ER input selections put into GASPAR II. This is discussed in detail in Section G.2.2.3.

Table G-6. Gaseous Effluent Exposure Pathway Receptor Locations

Nearest Receptor[a]	Direction	Distance (mi)
Site boundary	SSE	0.35
Residence	N	2.7
Vegetable garden	NW	4.8
Meat	N	2.7
Biota	SSE	0.25

(a) There are no milk animals within 5 mi of Turkey Point Units 6 and 7.

The NRC review guidance from ESRP Section 5.4.1 (NRC 2000-TN614) states, “projected populations should be calculated 5 years from the time of licensing action under consideration.” This review guidance also states that present-day annual milk, meat, and vegetable consumption should be used. In its ER (FPL 2014-TN4058), FPL provided estimates for dose at the projected end of plant life, 2090. FPL’s ER also projects food productions to increase linearly with population growth. The NRC staff was able to replicate FPL’s GASPAR II dose results using the assumptions stated in the ER.

The NRC staff calculated population dose estimates for the year 2023. This reflects 5 years from the estimated 2018 licensing date of Turkey Point Units 6 and 7. FPL provided population estimates by decade in ER Table 2.5-1 (FPL 2014-TN4058); thus, the NRC used the year 2030 to conservatively estimate the 50 mi population in 2023. This is a valid and bounding assumption because population estimates in ER Table 2.5-1 (FPL 2014-TN4058) increase consistently from current projections through 2030 projections. Current food production estimates were used to be consistent with guidance in the ESRP (NRC 2000-TN614). Population dose projections by FPL and the NRC staff differ due to differences in population assumptions.

G.2.2.4 Comparison of Doses to the Public from Gaseous Effluent Releases

Table G-7, Table G-8, and Table G-9 present dose estimates to the MEI for each gaseous pathway as calculated by FPL and the NRC staff. Table G-7 shows that the maximum doses from each unit occur at the Turkey Point site boundary and that most of the dose is derived from the external pathways. The maximum total body dose per unit is 3.9 mrem/yr to the adult and the teen, while the maximum organ doses per unit are 14 mrem/yr to the skin and 7.5 mrem/yr to the thyroid of the child based on conservative assumptions. In ER Table 5.4-5 (FPL 2014-TN4058), FPL provided comparable doses from the operation of Units 3 and 4 showing that the doses are less than 0.01 mrem/yr, based on the bounding values in 5 years of annual effluent reports, and thus are considered negligible. The doses provided by FPL in its ER and those calculated by the NRC staff were identical.

1 **Table G-7. Gaseous Pathway Doses for Maximally Exposed Individuals for One Unit**

Pathway	Dose (mrem/year) per Unit							
	Total Body	GI-Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Site Boundary								
External								
Plume	2.6	2.6	2.6	2.6	2.6	2.6	2.7	13
Ground	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.2
Total	3.6	3.6	3.6	3.6	3.6	3.6	3.8	14
Inhalation								
Adult	0.28	0.28	0.046	0.29	0.29	2.7	0.37	0
Teen	0.28	0.29	0.055	0.29	0.30	3.3	0.42	0
Child	0.25	0.25	0.067	0.26	0.27	3.9	0.36	0
Infant	0.15	0.14	0.034	0.16	0.16	3.5	0.22	0
Total								
Adult	3.9	3.9	3.6	3.9	3.9	6.3	4.1	14
Teen	3.9	3.9	3.7	3.9	3.9	6.9	4.2	14
Child	3.9	3.8	3.7	3.9	3.9	7.5	4.1	14
Infant	3.7	3.7	3.6	3.8	3.8	7.1	4.0	14
Residence								
External								
Plume	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0074	0.046
Ground	0.0066	0.0066	0.0066	0.0066	0.0066	0.0066	0.0066	0.0077
Total	0.013	0.013	0.013	0.013	0.013	0.013	0.014	0.053
Inhalation								
Adult	0.0012	0.0012	0.00016	0.0012	0.0012	0.0096	0.0015	0
Teen	0.0012	0.0012	0.00019	0.0012	0.0012	0.012	0.0016	0
Child	0.0010	0.0010	0.00023	0.0011	0.0011	0.014	0.0014	0
Infant	0.00059	0.00058	0.00012	0.00063	0.00063	0.012	0.00087	0
Vegetable								
Adult	0.0064	0.0065	0.033	0.0064	0.0061	0.086	0.0055	0
Teen	0.0092	0.0093	0.050	0.0096	0.0091	0.11	0.0083	0
Child	0.020	0.019	0.11	0.021	0.020	0.21	0.018	0
Meat								
Adult	0.0026	0.0036	0.011	0.0027	0.0026	0.0094	0.0025	0
Teen	0.0021	0.0027	0.0095	0.0022	0.0021	0.0070	0.0020	0
Child	0.0038	0.0040	0.018	0.0039	0.0038	0.011	0.0037	0
Total MEI Dose[(a)]								
Adult	0.023	0.025	0.058	0.023	0.023	0.12	0.023	0.053
Teen	0.026	0.026	0.073	0.026	0.026	0.14	0.026	0.053
Child	0.038	0.037	0.15	0.039	0.038	0.24	0.037	0.053
Infant	0.014	0.014	0.013	0.014	0.014	0.025	0.015	0.053

FPL Source: ER Table 5.4-7 (FPL 2014-TN4058)
(a) Total MEI dose per unit is the sum of the residence, vegetable, and meat pathways.

1 **Table G-8. FPL and NRC Staff Results Annual Individual Doses to the Maximally**
2 **Exposed Individual from Gaseous Effluents for One Unit**

Pathway	Location	Age Group	FPL and NRC Staff Total Body Dose (mrem/yr)	FPL and NRC Staff Max Organ Dose (mrem/yr)	FPL and NRC Staff Skin Dose (mrem/yr)	FPL and NRC Staff Thyroid Dose (mrem/yr)
Plume	Residence	All	0.00671	0.00738 (lung)	0.0455	0.00671
Ground	Residence	All	0.00655	0.00655 (lung)	0.00770	0.00655
Inhalation	Residence	Adult	0.00115	0.00145 (lung)	0.00112	0.00956
		Teen	0.00116	0.00163 (lung)	0.00113	0.0119
		Child	0.00103	0.00142 (lung)	0.000994	0.0137
		Infant	0.0592	0.000865 (lung)	0.000572	0.0122
Vegetable	Vegetable garden	Adult	0.00638	0.0329 (bone)	0.00541	0.0855
		Teen	0.00916	0.0499 (bone)	0.00811	0.108
		Child	0.0197	0.114 (bone)	0.0182	0.206
Meat	Residence	Adult	0.00264	0.0114 (bone)	0.00247	0.00938
		Teen	0.00211	0.00954 (bone)	0.00201	0.00702
		Child	0.00377	0.0179 (bone)	0.00367	0.0112
Total MEI Dose[(a)]		Adult	0.0234	0.0577 (bone)	0.0622	0.118
		Teen	0.0257	0.0729 (bone)	0.0645	0.140
		Child	0.0378	0.145 (bone)	0.0761	0.244
		Infant	0.0139	0.0134 (bone)	0.0538	0.0255

FPL Source: ER Table 5.4-7 (FPL 2014-TN4058)
(a) Total MEI dose is a sum of the residence, vegetable, and meat pathways.
There are no milk cows/goats within 5 mi of the Turkey Point site.
Assumes the MEI's food comes from nearest meat and vegetable sources to the Turkey Point site.

3 **Table G-9. Dose to the Nearest Resident (2.69 mi N) Assuming the Resident Began**
4 **Producing and Consuming Milk, Meat, and Vegetables[(a)] for One Unit**

Pathway	Age Group	FPL and NRC Staff Total Body Dose (mrem/yr)	FPL and NRC Staff Max Organ Dose[(b)] (mrem/yr)	FPL and NRC Staff Skin Dose (mrem/yr)	FPL and NRC Staff Thyroid Dose (mrem/yr)
Plume	All	0.0067	0.0074 (lung)	0.046	0.0067
Ground	All	0.006	0.006 (lung)	0.0077	0.0066
Inhalation	Adult	0.0012	0.00145 (lung)	0.0	0.0096
	Teen	0.0012	0.0016 (lung)	0.0	0.012
	Child	0.0010	0.0014 (lung)	0.04	0.014
	Infant	0.00059	0.00087 (lung)	0.0	0.012
Vegetable	Adult	0.0064	0.033 (bone)	0.0	0.086
	Teen	0.0092	0.050 (bone)	0.0	0.11
	Child	0.00	0.114 (bone)	0.0	0.21

Table G-9. (contd)

Pathway	Age Group	FPL and NRC Staff Total Body Dose (mrem/yr)	FPL and NRC Staff Max Organ Dose[b] (mrem/yr)	FPL and NRC Staff Skin Dose (mrem/yr)	FPL and NRC Staff Thyroid Dose (mrem/yr)
Meat	Adult	0.0026	0.011 (bone)	0.0	0.0094
	Teen	0.0021	0.0095 (bone)	0.0	0.0070
	Child	0.0038	0.018 (bone)	0.0	0.011
Milk	Adult	0.00438	0.0144 (bone)	0.00306	0.198
(cow)[c]	Teen	0.00680	0.0262 (bone)	0.00527	0.313
	Child	0.0140	0.0634 (bone)	0.0122	0.623
	Infant	0.0274	0.120 (bone)	0.0247	1.51
Milk	Adult	0.00705	0.0176 (bone)	0.00377	0.237
(goat) [c]	Teen	0.00966	0.0314 (bone)	0.00619	0.376
	Child	0.0171	0.0751 (bone)	0.0136	0.746
	Infant	0.0313	0.137 (bone)	0.0269	1.81

FPL Source: ER Table 5.4-7 (FPL 2014-TN4058)
(a) Hypothetical dose estimates to worst-case scenario if current parameters were to change.
(b) Maximum organ dose excludes skin and thyroid because they are subsequently listed.
(c) Doses for milk animal pathways are from FPL's GASPAR II output file (FPL 2010-TN4151).

G.2.2.5 Comparison of Liquid and Gaseous Doses with 10 CFR Part 50, Appendix I

Table G-10 presents noble gas, radioiodine, and particulate matter dose estimates at the Turkey Point site boundary, as calculated by both FPL and the NRC staff, which are compared with dose design objectives from 10 CFR Part 50 (TN249), Appendix I. All gaseous doses were less than the 10 CFR Part 50 Appendix I design objectives.

Table G-10. Comparisons of the Dose Estimates from Liquid and Gaseous Effluents to 10 CFR Part 50, Appendix I Design Objective at the Turkey Point Site Boundary

Radionuclide Releases/Dose (from site boundary)	FPL and NRC Staff Calculations[a]	Appendix I Design Objectives
Gaseous Effluents		
Beta air dose	18 mrad	20 mrad
Gamma air dose	4.2 mrad	10 mrad
External whole body dose	3.6 mrem	5 mrem
Skin dose	14 mrem	15 mrem
Liquid Effluents		
Total body dose from all pathways	0 rem[a]	3 mrem
Critical organ dose from all pathways	0 rem[a]	10 mrem

(a) This is the dose for a single unit (i.e., either Unit 6 or Unit 7) from FPL 2014-TN4058.
(b) There are no exposure pathways for liquid effluents to reach a population under normal operating conditions as discussed above in Section G.2.1. Under the calculated theoretical release scenario, Appendix I criteria were met and is considered bounding.

G.2.2.6 Comparison of Population Dose from Liquid and Gaseous Exposures

Table G-11 presents person-rem dose estimates to individuals living within the 50 mi radius of the Turkey Point site, as calculated by FPL and the NRC staff. FPL and the NRC staff also calculated the population doses from gaseous effluents to individuals living within the 50 mi radius of the site. For these doses, the population data were projected to the year 2023. The population doses for the various pathways are presented in Table G-12.

Table G-11. Calculated Doses to the Population Within 50 mi of the Turkey Point Site from Gaseous and Liquid Pathways (Two AP1000 Units)

	Whole Body Dose (person-rem/yr)	
Pathway	FPL Estimate[a]	NRC Staff Estimate
Gaseous		
Plume	6.4	4.76
Ground	2.4	1.49
Inhalation	1.49	1.16
Vegetable	28.6	28.4
Cow Milk	10.0	10.0
Meat	21.6	21.6
Liquid Effluents	0	0

(a) FPL 2014-TN4058

Population doses resulting from natural background radiation to individuals living within the 50 mi radius of Turkey Point site are presented in Table G-12. Table G-12 shows that the calculated person-rem/yr exposure from Turkey Point Units 6 and 7 would be much less than the estimated person-rem/yr exposure from natural radiation.

Table G-12. Natural Background – Estimated Whole Body Dose to the Population Within 50 mi of the Turkey Point Site

Source	Annual Individual Dose (mrem/yr)	Annual population Dose (person-rem/yr)
FPL Estimates	300[a]	2.5×10^{6}[a,c]
NRC Staff Estimates	311[b]	1.3×10^{6}[d]

(a) Taken from FPL ER Table 5.4-10 (FPL 2014-TN4058) based on NCRP 1987-TN2258.
(b) NCRP 2009-TN420.
(c) 2090 population estimate from FPL ER Table 2.5-1 (FPL 2014-TN4058).
(d) Annual Population Dose based on projected residential population of 4,012,989 in the year 2023 (Population estimate for 2030 conservatively applied to 2023 from FPL ER Table 2.5-1) (FPL 2014-TN4058).

G.2.3 Cumulative Dose Estimates

Table G-13 presents the comparison of doses for Turkey Point Units 6 and 7 with the dose standards of 40 CFR Part 190 (TN739). The table shows the NRC staff's assessment of total doses to the MEI from FPL liquid and gaseous effluents. The assessment shows that the 40 CFR Part 190 (TN739) standards would be met.

Table G-13. Cumulative Site Dose to MEI from FPL Units 6 and 7 Combined with Units 3 and 4

Type of Dose (mrem/yr)	FPL Units 3 and 4[(a)]	FPL Units 6 and 7 Liquid Dose (child)[(b)]	FPL Unit 6 and 7 Gaseous Dose (child)[(c)]	Combined Maximum Individual Dose	40 CFR 190 Dose Standards
Whole Body	0.0029	0	7.8	7.8	25
Thyroid	0.0059	0	15.0	15.0	75
Other Organ (Bone)	0.0059	0	8.4	8.4	25

(a) Bounding values from 5 years of effluent reports; theoretical values (thyroid, bone, and skin dose assumed to be the same).
(b) Under normal operating conditions expected to be zero.
(c) Values from table representing dose from both AP1000 units.

G.2.4 Dose Estimates During Construction

The NRC staff used the dose-assessment approach specified in Regulatory Guide 1.109 (NRC 1977-TN90) and the GASPAR II computer code (Strenge et al. 1987-TN83) to estimate doses to construction workers. Construction workers would be exposed to several potential sources of radiation. Workers would receive dose during the construction of Units 6 and 7 from the operation of Units 3 and 4. Unit 6 is planned to be operational 1 year prior to Unit 7. During that year, Unit 7 construction workers would be exposed to radiation from Units 3, 4, and 6.

Gaseous effluent and direct radiation were considered as possible routes of exposure. Liquid effluents were not considered a likely route of exposure because drinking water to Units 6 and 7 workers is to be supplied from the Miami-Dade Water and Sewer Department and liquid effluents from Units 3 and 4 are expected to be managed to ensure dose is negligible.

G.2.4.1 Scope

The NRC staff and FPL independently calculated the dose to construction workers working on Units 6 and 7 from Units 3 and 4, and dose to Unit 7 workers while Units 3, 4, and 6 are in operation. The NRC staff and FPL independently calculated the maximum gamma air dose, beta air dose, total body dose, maximum organ dose, and thyroid dose and skin dose to receptors located at the construction site. Dose to construction workers was calculated for the following exposure pathways: plume immersion, direct shine from deposited radionuclides, and inhalation.

The NRC staff reviewed the assumed exposure pathways and input parameters and values used by FPL in ER Section 4.5 (FPL 2014-TN4058) for appropriateness, including references made to AP1000 DCD Revision 19 (Westinghouse 2011-TN261). Default parameters from Regulatory Guide 1.109 (NRC 1977-TN90) were used when site-specific input values were not available. As a result of this independent review, the NRC staff verified that the assumed exposure pathways by FPL were reasonable and that the Turkey Point Units 3 and 4 source term input parameters and RG1.109 values used by FPL were appropriate. NRC staff used these exposure pathways and input parameters in its independent calculation using GASPARII as summarized below.

Joint frequency-distribution data of wind speed and wind direction by atmospheric-stability class for the Turkey Point site (FPL 2014-TN4058) were used as input to the XOQDOQ code (Sagendorf et al. 1982-TN280) to calculate long-term average χ/Q and D/Q values for routine releases. Based on 2 years of meteorological data, the NRC staff's independent results are similar to those reported by FPL in ER Tables 2.7-16 through 2.7-18 (FPL 2014-TN4058).

G.2.4.2 Resources Used

The NRC calculated doses to the public from gaseous effluents using a PC version of the XOQDOQ and GASPAR II codes—NRC Dose Version 2.3.10 (CNS 2006-TN102)—obtained through the Oak Ridge RSICC.

G.2.4.3 Input Parameters

Table G-4 and Table G-5 list the major parameters used in calculating dose to the construction workers from gaseous effluent releases during normal operations at the site. Units 3 and 4 radiological releases are summarized in the annual reports entitled *Turkey Point, Units 3 and 4, Annual Radioactive Effluent Release Report* and *Turkey Point, Units 3 and 4, Annual Radiological Environmental Operating Report*. The limits for all radiological releases are specified in the Turkey Point Offsite Dose Calculation Manual (ODCM), and these limits are designed to meet Federal standards and requirements. The radiological environmental monitoring program (REMP) includes monitoring of the aquatic environment (fish, invertebrates, and shoreline sediment), atmospheric environment (airborne radioiodine, gross beta, and gamma), and terrestrial environment (vegetation) and direct radiation. The NRC staff reviewed these annual reports for calendar years 2002 through 2013 (the references for these reports can be found in Section 2.11). The maximum annual release was assumed to be 35 Ci (FPL 2014-TN4058). Unit 6 effluent releases were estimated for an AP1000 unit in DCD Table 11.3-3 (Westinghouse 2011-TN261). As discussed in DCD Section 12.4.2.1 (Westinghouse 2011-TN261), direct radiation exposure from Unit 6 is expected to be shielded such that the direct dose rate would be negligible.

The calculated annual dose rate, 0.009 mrem/yr, from a fully loaded independent spent-fuel storage installation is negligible. To be conservative, the dose rate for the Unit 7 construction area from Units 3 and 4 is assumed to be 1 mrem. Construction workers were assumed to be at the construction site for 40 hours per week and 52 weeks per year. This constitutes an exposure time of 2,080 hours per year. Adjusted for 2,080-hour occupancy time per year, the direct radiation dose from Units 3 and 4 is not significant at 0.47 mrem/yr.

For dose calculation purposes, the average location of the Unit 7 worker was assumed to be at the center of Unit 7 reactor. Table 3.10-2 from the ER (FPL 2014-TN4058) estimates the maximum workforce for Unit 7 during any month to be 3,950 people. This size workforce is expected to last less than a year. To be conservative, the maximum size was assumed to last the entire year for calculating the maximum annual workforce dose. Total effective dose equivalent (TEDE) was calculated by multiplying the thyroid dose by 0.03 and adding it to the total body dose.

G.2.4.4 Comparison of Doses to Construction Workers

Table G-14 and Table G-15 present dose estimates to the construction workers for each gaseous pathway as calculated by FPL and the NRC staff. Prior to Unit 6 operation, only gaseous effluents and direct radiation from Units 3 and 4 would be expected. Table G-16 presents dose estimates to construction workers from direct exposure and effluent releases. The doses provided by FPL in its ER and those calculated by NRC are nearly identical.

Table G-14. Comparison of FPL and NRC Staff Estimated Dose Rates in Construction Area from Unit 6 Gaseous Effluents

	Construction Area Dose Rates (mrem/yr)					
	Total Body		Thyroid		Skin	
Pathway	FPL	Staff	FPL	Staff	FPL	Staff
Plume	12	12.0	12	12.0	60	60.3
Ground	8.7	8.74	8.7	8.74	10	10.3
Inhalation	1.3	1.32	13	12.5	1.3	1.28
Total	22	22.06	33	33.24	72	71.88

Table G-15. Comparison of FPL and NRC Staff Estimated Gaseous Effluent Doses to Unit 7 Construction Workers

	Annual Dose (mrem)							
	Total Body Dose		Thyroid Dose		Skin Dose		TEDE[c]	
Source	FPL	Staff	FPL	Staff	FPL	Staff	FPL	Staff
Units 3 and 4[a]	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022
Unit 6[b]	5.2	5.24	7.9	7.89	17	17.07	5.5	5.47
Total	5.2	5.24	7.9	7.89	17	17.07	5.5	5.48

(a) Based on annual effluent reports from 2002 through 2013 (the references for these reports can be found in Section 2.11) and adjusted for 2,080 hr/yr occupancy.
(b) Adjusted from Table G-14 values to account for 2,080 hr/yr occupancy.
(c) Calculated by multiplying the thyroid dose by 0.03 and adding it to the total body dose.

Table G-16. Estimated Total Dose to Unit 7 Construction Workers

	Annual Worker Dose (mrem)							
	Total Body Dose		Thyroid Dose		Skin Dose		TEDE	
Pathway	FPL	Staff	FPL	Staff	FPL	Staff	FPL	Staff
Direct Radiation[a]	0.47	0.47	0.47	0.47	0	0	0.47	0.47
Gaseous Effluents[b]	5.2	5.24	7.9	7.89	17	17.07	5.5	5.5
Total	5.7	5.71	8.4	8.36	17	17.07	6	5.95
	Annual Workforce Dose (person-rem)							
Total[c]	16	15.99	23	23.42	48	47.79	17	16.65

(a) Staff calculated values from Section G.2.4.
(b) Total gaseous effluent calculated in Table G-15
(c) Calculated by multiplying the total annual worker dose by the maximum expected number of workers (i.e., 2,800 people).

G.2.4.5 Comparison of Construction Workers Dose Estimates to 10 CFR 20

Table G-17 presents estimated construction worker dose as calculated by both FPL and the NRC staff along with the dose criteria for members of the public as stipulated in 10 CFR 20.1301 (TN283).

Table G-17. Comparison of Construction Worker Doses with 10 CFR 20.1301 Criteria for Members of the Public

Criteria	Worker	Limit
Annual Dose (TEDE mrem)	6	100
Unrestricted area dose rate (mrem/h)	0.0029	2

G.2.5 Dose Assessments to Biota Other Than Humans

To estimate doses to the biota from the liquid and gaseous effluent pathways, the NRC staff used the LADTAP II code (Strenge et al. 1986-TN82), the GASPAR II code (Strenge et al. 1987-TN83), and input parameters supplied by FPL in its ER (FPL 2014-TN4058).

G.2.5.1 Scope

The dose assessments discussed herein are for the operation of Turkey Point Units 6 and 7 and from the combined operation of Turkey Point Units 3, 4, 6, and 7 (i.e., cumulative site dose). Due to the deep-well injection of Units 6 and 7 radioactive liquid effluent, only gaseous effluent is considered from these units. When considering the cumulative site dose, the gaseous and liquid effluents from Units 3 and 4 are also considered.

Liquid effluent doses to both terrestrial and aquatic biota were calculated using the LADTAP II code. Aquatic biota include fish, algae, and invertebrate species. Terrestrial biota include muskrats, raccoons, herons, and ducks. The LADTAP II code calculates an internal dose component and an external dose component and sums them for a total body dose. Terrestrial biota could also be exposed via the gaseous effluent pathway. These values would be based on the MEI calculations using the GASPAR II code.

G.2.5.2 Resources Used

To calculate the doses to biota, the NRC staff used PC versions of the LADTAP II and GASPAR II computer codes—NRCDose, Version 2.3.10 (CNS 2006-TN102). These codes were obtained through the Oak Ridge RSICC.

G.2.5.3 Input Parameters

Gaseous effluents would contribute to the total body dose of the terrestrial surrogate species (i.e., muskrat, raccoon, heron, and duck). The exposure pathways include inhalation of airborne radionuclides, external exposure because of immersion in gaseous effluent plumes, and surface exposure from deposition of iodine and particulates from gaseous effluents. The dose calculated to the MEI from gaseous effluent releases in Section 5.9.3 would also be applicable to terrestrial surrogate species with two modifications. One modification defined in ER Section 5.4.4 (FPL 2014-TN4058) was increasing the ground-deposition factors by a factor of two because terrestrial animals would be closer to the ground than a member of the public. The second modification was to use the biota location delineated in ER Table 5.4-6 (FPL 2014-TN4058). The gaseous effluent releases used in estimating dose are discussed in ER Section 3.5.2 (FPL 2014-TN4058).

In addition to the modifications applied by FPL for modeling biota, the NRC staff elected to make adjustments based on the diet of the organism. For example, because the muskrat is an herbivore, the meat ingestion pathway was omitted from the dose calculation for the species. In addition, the NRC staff chose to consider potential dose to the American crocodile, which is found in the canals surrounding the plant and is a Federally threatened species and on the Florida threatened species list. Because of the size of the American crocodile, a surrogate species model cannot be applied. The American crocodile can be up to approximately 2,006 lb (910 kg) and about 15 ft (4.6 m) long (National Geographic 2012-TN2577). Internal dose was adjusted to account for the size differential and a modification factor of 4 was applied to the ground-deposition factor. In captivity, an 11.5 ft (350 cm) crocodile eats 500 g per day (FAO 2012-TN2580). It was not possible to find the food consumption rate for a crocodile in the wild, but it is likely less for a wild crocodile that has to hunt for food. Since the American crocodile can be up to 15 ft long, a consumption rate of 3 times larger was assumed (1.5 kg/d) to be bounding. Therefore, in the calculations, the meat ingestion pathway was modified to assume 1,213 lb/yr (550 kg/yr), and assumed to be terrestrial rather than aquatic or riparian. Total body dose estimates to the surrogate species and the American crocodile from the gaseous pathway for either Unit 6 or 7 are listed in Table G-18.

Table G-18. NRC Staff Estimate of Non-Human Biota Doses for Proposed Turkey Point Units 6 and 7 for One Unit

Surrogate Species of Non-Human Biota	Doses from Gaseous Effluents	
	Internal Dose (mrad/yr)[(a)]	External Dose (mrad/yr)[(a)]
Saltwater Fish	0.0	0.0
Invertebrate	0.0	0.0
Algae	0.0	0.0
Muskrat	13.9	11.8
Raccoon	15.6	11.8
American Crocodile	155.7	19.0
Heron	2.2	11.8
Duck	15.6	11.8

(a) Radiological doses to non-human biota are expressed in units of absorbed dose (rad).

The NRC staff has done an estimate of the cumulative dose to biota from the proposed operation of Turkey Point Units 3, 4, 6, and 7. For the gaseous effluent doses, the gaseous effluent assumptions discussed above were still used. With respect to the American crocodile gaseous effluent dose, it was assumed that the crocodile spends 100 percent of the time on the shoreline. For the liquid effluent doses from Units 3 and 4, it was assumed that the American crocodile spends 50 percent of the time on the shoreline and 50 percent of the time swimming. There is no definitive information available on the makeup of the American crocodile's diet. It is known that they will eat mammals that come to the shoreline (even deer) and that they also eat fish, snails, and crustaceans (Mazzotti 2003-TN1499), but not in what proportions. A study of American alligators (Fogarty and Albury 1967-TN2581) provided more definitive diet information; however, this was for alligators not crocodiles, which have different feeding habits. Based on the above information, the assumption was made, when modeling dose from the Units 3 and 4 liquid effluents, that 12 percent of the crocodile's diet is fish and the remaining 88 percent is invertebrates. These adjustments bound the potential effluent exposure to the American crocodile because they only consider food sources that were in the water (which would thus have a higher concentration of radionuclides) and that the majority of the diet was from invertebrates (whose bottom-feeding habits would further concentrate radionuclides). By using different assumptions for the American crocodile behavior and diet the with respect to the gaseous versus liquid effluents, the resulting cumulative dose estimates provide a conservative upper bound.

G.2.5.4 Comparison of Results

Operation of Turkey Point Units 6 and 7

Total body dose estimates to the surrogate species and the American crocodile from the gaseous pathway for one unit are shown in Table G-18.

Cumulative Dose from Turkey Point Units 3, 4, 6, and 7

The results of the cumulative dose estimates are provided in Table G-19. Based on these dose estimates, the NRC staff concludes that the cumulative radiological impact on biota would not be significant.

Table G-19. NRC Staff Estimate of the Cumulative Biota Doses from the Proposed Operation of Turkey Point Units 3, 4, 6, and 7 Compared to the IAEA/NRCP Guidelines for Biota Protection

	Liquid Effluent Dose (mrad/d)[a]				Gaseous Effluent Dose (mrad/d)[a]					
Biota	Unit 3	Unit 4	Units 6 & 7	Total	Unit 3	Unit 4	Units 6 & 7	Total	Total Dose from Gaseous and Liquid Effluent (mrad/d)[a]	IAEA/NCRP Guidelines for Protection of Biota Populations (mrad/d)[a][b]
Saltwater Fish	0.0337	0.0337	—	0.0674	—	—	—	—	0.0674	1,000
Invertebrate	0.0337	0.0337	—	0.0674	—	—	—	—	0.0674	1,000
Algae	0.00507	0.00507	—	0.0101	—	—	—	—	0.01517	1,000
Muskrat	0.00729	0.00729	—	0.01458	0.0302	0.0239	0.141	0.1951	0.20968	100
Raccoon	0.00323	0.00323	—	0.00646	0.0343	0.0275	0.150	0.2118	0.21826	100
American Crocodile	0.0322	0.0322	—	0.0644	0.365	0.319	0.957	1.641	1.7054	100
Heron	0.00948	0.00948	—	0.01896	0.00412	0.00368	0.0768	0.08460	0.10356	100
Duck	0.00808	0.00808	—	0.01616	0.0343	0.0275	0.150	0.2118	0.22796	100

Source: IAEA 1992-TN712; NCRP 1991-TN729

(a) Radiological doses to non-human biota are expressed in units of absorbed dose (rad).

(b) Guidelines in NCRP and IAEA reports expressed in Gy/d (1 mGy/d equals 100 mrad/d).

G.3 Supporting Hydrologic Documentation

G.3.1 Review of FPL's Aquifer Performance Test of the Biscayne Aquifer on the Turkey Point Peninsula

FPL performed and analyzed a relatively large-scale aquifer performance test (APT) to determine hydraulic properties of the Biscayne aquifer in the vicinity of the proposed radial collector wells (RCWs). The RCWs are proposed as a backup source of cooling water for proposed Units 6 and 7 and would be constructed horizontally between 25 and 40 ft beneath the bed of Biscayne Bay adjacent to the Turkey Point peninsula. Hydraulic property estimates for the Biscayne aquifer were needed to support modeling which was performed to estimate the potential effects of pumping the proposed RCWs on the aquifer and on the hydraulically connected Biscayne Bay. The design, performance, and analyses of the test are described in FPL 2009-TN1263.

FPL completed the pumped well on the Turkey Point peninsula as an open borehole from 22 to 46 ft below ground surface and with cemented casing above that depth. They also completed five observation wells with the top of the open interval at a depth of 22 ft in each well, and the bottom of the open interval at depths varying between 41 and 46 ft. The observation wells were at distances ranging from 80 to 2,700 ft away from the pumped well. However, FPL did not detect a measurable response at the most distant observation well. The APT was performed by pumping at a rate of 7,100 gpm for 7 days. Measured observation-well data were corrected for influence of both ocean tides and earth tides.

G.3.1.1 Hantush-Jacob Solution

Response at the observation wells indicated an aquifer separated from a constant-head water source by a thin (low storage capacity) semi-confining layer that allows some water to leak through the semi-confining layer and recharge the pumped aquifer. This recharge caused water level drawdowns (s) measured by FPL in the observation wells to stabilize within 2 to 10 min from the start of the APT, depending on radial distance (r) from the production well (Figure G-1). The method used to evaluate the test results and determine aquifer parameters is dependent on the response of the water levels in the wells to pumping. FPL (2009-TN1263) appropriately determined that the drawdown response from APT in the observation wells indicates that the Hantush and Jacob (1955-TN4094) "leaky-aquifer" analysis method should be used to estimate the hydraulic properties transmissivity (T) and storativity (S) of the Biscayne aquifer. The leaky-aquifer analysis method relies on matching the observation-well drawdown data to type curves based on the dimensionless leaky-aquifer well function defined by:

$$W(u,r/B) = 4\pi Ts/Q$$

and plotted vs. $4Tt/r^2S$, where t is elapsed pumping time. Different leaky aquifer type-curves were created by plotting the well function using different values of the dimensionless parameter, r/B (where u is fixed). B is defined as the square root of Tb'/K', where b′ and K′ are the thickness and hydraulic conductivity, respectively, of the semi-confining layer separating the aquifer from the overlying water source. Q is defined as the pumping rate. Therefore, the shape of the generated type-curves vary depending on thickness and hydraulic conductivity of the semi-confining layer

The NRC staff found that precise analysis of the data was challenging because the period between the start of the pumping test and the start of the period of steady drawdown is very short, and is possibly affected by early-time variations in pumping rate. This resulted in a situation where data from any of the four observation wells could be equally well matched to any of several of the r/B-type curves from Hantush and Jacob (1955-TN4094). The shape of the drawdown curves is very similar after drawdown in the wells reaches a near steady value. However, when data are available from wells at different distances, an additional constraint

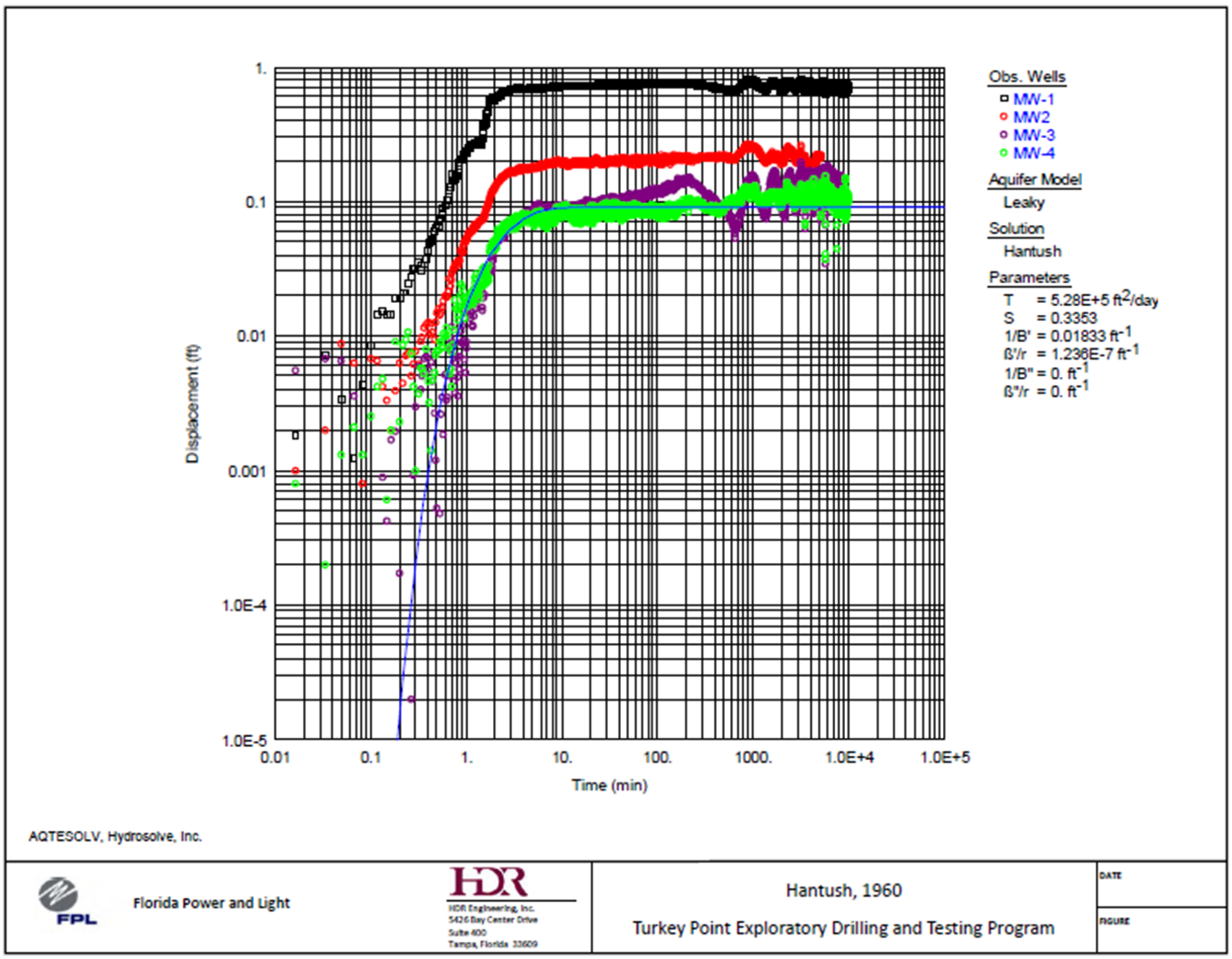


Figure G-1. Composite Graph of Drawdown Data vs. Time for the Turkey Point Aquifer Test. Graph shows match to data for well MW4, but listed values are for data for well MW-1 (FPL 2009-TN1263).

may be added that allows the drawdown data from wells with different r values to match type curves which have proportional r/B values. To illustrate, the observation wells, their distance from the production well, and the steady drawdowns interpreted by the staff for each well are listed in Table G-20. The flat portions of the data curves for wells MW1, MW2, MW3, and MW4 should match different type curves where the ratio of the r/B values are 0.4, 0.52, 0.94, and 1.0, respectively, compared to the *r/B* value calculated for MW4. The staff tested this approach by plotting straight lines representing the drawdowns for each well listed in Table G-20 on log-log paper at the same scale as the leaky-aquifer-type curves provided by Lohman (1972-TN4095). The staff found that using r/B = 1 to match the data for the nearest observation well (MW4) provided matches of data for the other wells to type curves having r/B values that are close to the expected r/B ratios. Using this approach the staff calculated relatively consistent values of K′/b′ with an average value of 0.265 (Table G-20) and estimated a vertical hydraulic conductivity of approximately 0.5 ft/d for the confining layer based on a thickness (b') of 2 ft.

Table G-20. Well Data Used in and Results from the Test Reinterpretation

Well Name	r (ft)	r/r MW4	s (ft)	s_{aq} (ft)	r/B	B (ft)	K′/b′ (day^{-1})
MW1	80	0.039	0.75	0.715	0.04	2,000	0.25
MW2	925	0.45	0.20	0.188	0.52	1,780	0.31
MW3	1,810	0.88	0.10	0.083	0.94	1,930	0.27
MW4	2,065	1.0	0.09	0.079	1.0	2,065	0.23
All Wells					Average	1,940	0.265

The staff's results differ substantially from those presented in FPL 2009-TN1263 Table 5.2, which, based on the listed K′ values, resulted from matching drawdown data from each of the observation wells to the r/B = 1 type curve. These matches resulted in low estimates of T and very high estimates of K′/b′ for the close-in wells. FPL noted this discrepancy in FPL 2009-TN1263, which summarizes:

> Calculated transmissivity (T) values … range from approximately 368,000 $feet^2$/day to 1,000,000 $feet^2$/day … The lowest T value was calculated at MW-1 DZ PI near the pumping well, and the higher T values were calculated at far-field wells MW-3 and MW-4 … The noted increase in hydraulic conductivity with scale is likely a natural consequence of the aquifer heterogeneity…. (FPL 2009-TN1263)

The hypothesized scale effect instead arises because drawdown data from the wells at different distances from the production well should match proportional r/B curve values, as described above.

G.3.1.2 K_0(r/B) Distance-Drawdown Solution

FPL (2009-TN1263) also performed a distance-drawdown an analysis using the Aqtesolv™ software package (HydroSOLVE, Inc. 2007-TN4091) This approach helps to avoid the problem of selecting the appropriate r/B curve, which are discussed in the preceding sub-section. The Aqtesolv™ solution provides an estimate of T of 8E5 ft^2/d and a K′/b′ value of 0.5 day^{-1}. The K′/b′ value is about twice the values determined from the composite plot analysis (discussed in the sub-section above), prompting a separate distance-drawdown analysis for this review. This analysis is based on the theory of de Glee (1930, not referenced), as summarized by Ferris et al. (1962-TN4092), and involves use of a log-log-type curve of the steady-state, leaky-aquifer well function, $K_0(r/B) = 2\pi Ts/Q$, plotted vs. r/B. $K_0(x)$ is the modified Bessel function of second order and zero kind. NRC staff plotted the steady-state drawdowns listed in Table G-20 as x's, and a match was obtained, as shown in Figure G-2. For type curve parameters $K_0(r/B)$ and r/B = 1, the type-curve match provided values of s = 0.25 ft and r = 1,700 ft (Table G-21). These values result in a T of 870,000 ft^2/d and a K′/b′ of 0.3/d. Results for this analysis are closer to those determined from the time-drawdown analysis than the Aqtesolv distance-drawdown solution. To further test that solution, staff interpolated drawdown values from the Aqtesolv™ graph, listed as s_{aq} in Table G-20 and plotted these values as *'s, and shifted to match the type curve (Figure G-2). The same value of r = 1,700 ft at r/B = 1 was obtained, but the value of s determined from the type-curve match was 0.23 ft, resulting in T = 950,000 ft^2/d and K′/b′ = 0.33/d. Thus, uncertainties of a few hundredths of a foot in estimated steady drawdown can result in 10 percent or larger variations in estimated hydraulic properties.

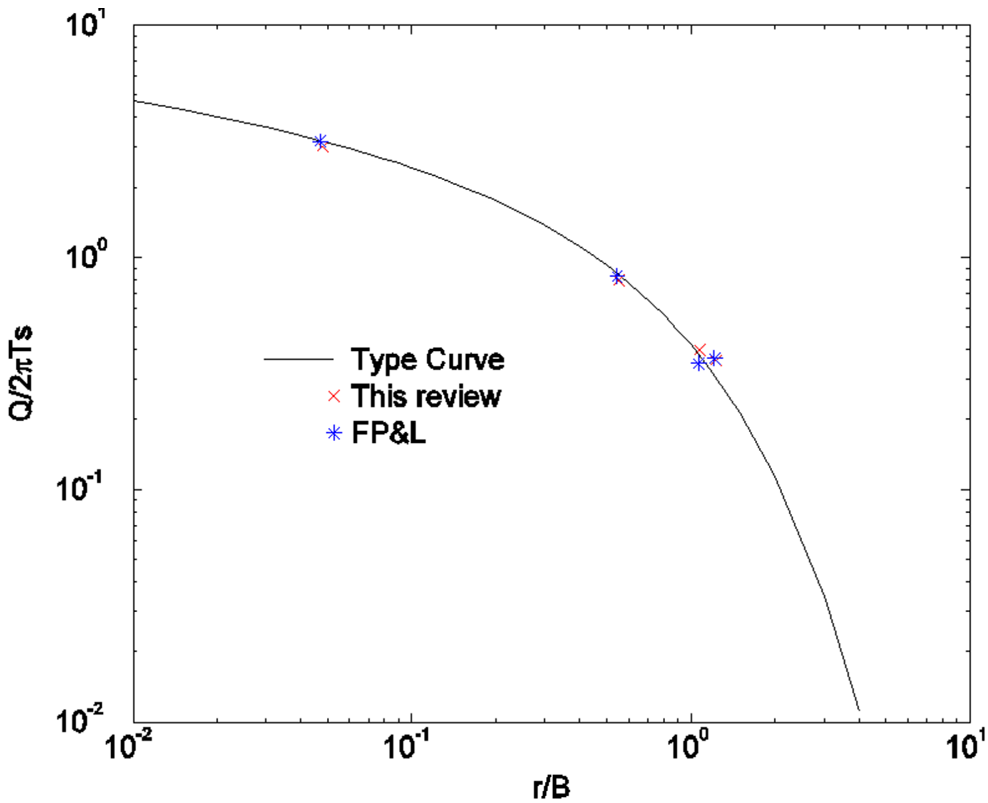


Figure G-2. Match of Drawdowns at Four Different Observation Wells to the Steady-State Distance vs Drawdown Curve

Table G-21. Summary of Distance-Drawdown Solutions, Compared to Average of Hantush-Jacob Solution

Solution	T (ft^2/d)	B (ft)	K′/b′ (day^{-1})
Aqtesolv™	8.0E-05	1,230	0.53
$K_0(r/B)$, s	8.7E-05	1,700	0.30
$K_0(r/B)$, s_{aq}	9.5E-05	1,700	0.33
Hantush-Jacob (ave)	1.0E-06	1,940	0.265

Source: Hantush and Jacob 1955-TN4094

G.3.1.3 Summary

The Biscayne aquifer transmissivity (T) and the vertical hydraulic conductivity (kv) of the confining zone above the Biscayne aquifer are important because they control the rates at which water will flow into the RCWs from the aquifer and the bay and impact the amount that is drawn from each potential source. The NRC staff's analyses resulted in K′/b′ values that vary from 0.23 to 0.53 d^{-1}, and average about 0.3 d^{-1}. If all the vertical resistance to flow is imposed by the muck layer, which averages in thickness (b') of 2 ft, then its vertical hydraulic conductivity is about 0.6 ft/d. This value is close to that determined by FPL (2009-TN1263).

The NRC staff found that values of T between about 800,000 and 1,000,000 ft^2/d are obtained from time-drawdown analysis of the APT using consistent r/B values, or from distance-drawdown analysis. Differences in the calculated T values arise because of uncertainty in steady-state drawdowns of only a few hundredths of a foot. Values from the staff's analysis are comparable with values determined by FPL (2009-TN1263), which states "The mean for the calculated T values using drawdown data is approximately 700,000 $feet^2$/day." Also, "The calculated T value using a distance-drawdown method is 800,000 ft^2/d." Thus, in spite of some inconsistency in analysis methods, results from the analysis prepared by FPL are similar to those determined in the NRC staff review.

G.3.2 Description of Groundwater Modeling Performed to Help Evaluate Effects of Excavation Dewatering and Radial Collector Well Operation on the Biscayne Aquifer

This appendix describes two separate modeling efforts performed to estimate the effects of radial collector well (RCW) pumping on the Biscayne aquifer, Biscayne Bay, and other portions of the hydrologic environment including nearby drainage canals and the cooling canals of the industrial wastewater facility (IWF). Both models were also used to simulate the effects of dewatering the Unit 6 and 7 plant excavations.

FPL conducted modeling (FPL 2014-TN4069) using a local-scale groundwater model of the Biscayne aquifer including the portion of the aquifer underlying Biscayne Bay near the Turkey Point site. The NRC commissioned the U.S. Geological Survey (USGS), to conduct additional modeling to help identify the potential effects of RCW pumping (NRC 2014-TN3078). Each of these hydrologic models provides an estimation of the effects of building and operating the proposed plants, however these estimations are imperfect due to a number of uncertainties. Uncertainty in groundwater models has been described as arising from 1) uncertainty in model parameters, and 2) uncertainty in the definition of the conceptual model framework including the spatial and temporal variation in hydrologic variables (Neuman and Wierenga 2003-TN4090). Therefore, examining the results of both modeling efforts provides a better understanding of the possible range of effects of building and operating Units 6 and 7.

The model used by the USGS model is a submodel of an existing regional-scale (Miami-Dade County) coupled surface-water/groundwater model originally created to evaluate then-recent hypersalinity events in Biscayne Bay, at the county scale, during 1996−2004 (NRC 2014-TN3078). The USGS model domain encompassed Biscayne Bay and included freshwater flows into Biscayne Bay through the offsite drainage canal system, exchange of groundwater between

Biscayne aquifer and surface waterbodies including the Biscayne Bay, drainage canals, and the cooling canals of the IWF. It also included precipitation input to the bay, precipitation recharge to the Biscayne aquifer, evapotranspiration (ET) effects on bay salinity, and the effects of ET on recharge to the Biscayne aquifer. The USGS modified their existing model to include the cooling canals of the IWF, the proposed excavation dewatering wells, and four proposed RCW locations.

Both of the modeling efforts are approximations of the real physical system, and each has shortcomings that result in uncertainty in the modeling results. The FPL model assumes constant density fluid and does not represent the differences in density between fresh and saline water that can result in “density-driven” groundwater flow. The FPL model was strictly a groundwater model with surface-water features represented as boundary conditions. The FPL model area is much smaller than the USGS model and does not include as many offsite canals. However, the USGS model has much lower spatial resolution with 500 × 500 m cell size compared to FPL’s model which is variable and is refined to a 5 ft spacing in the area around the radial collector wells (FPL 2014-TN4069). Therefore, the USGS model’s representation of smaller-scale features is not as accurate as FPL’s model.

G.3.2.1 Summary of FPL Modeling

FPL performed groundwater modeling in support of its application for building and operating Units 6 and 7 at the Turkey Point site. The model was created using Visual MODFLOW, a commercial implementation of the USGS-developed MODFLOW 2000, and was a steady-state three-dimensional model that assumes constant density of the fluid being modeled. Measured heads applied in the model for non-seawater waterbodies (e.g., freshwater canals and hypersaline cooling canals) were corrected to equivalent seawater heads based on the fluid density ratio. The model and results are described in detail in Appendix CC of the FSAR (FPL 2014-TN4069). Therefore, only a brief summary and assessment are provided here.

The objectives of the model were to evaluate groundwater impacts of activities related to the building and operation of two new nuclear units by simulating groundwater flow in the Biscayne aquifer. The primary issues evaluated with the model were the following:

- expected rates of groundwater infiltration into excavations for the new reactor buildings
- origin of water pumped from the RCW, and
- sea water approach velocities to the bay floor during RCW pumping.

FPL calibrated the model by matching the groundwater level response to aquifer pumping tests performed at two wells (PW-7L and PW-7U) near the proposed plant locations and a well (PW-1) near the proposed RCW on the Turkey Point peninsula. An additional aquifer test near the proposed plant locations (PW-6U) was simulated by the model as a "validation run."

FPL used the calibration process to estimate a variety of parameters which were included in their model. These included the horizontal hydraulic conductivity (Kh) and anisotropy (Kv/Kh; ratio of vertical (Kv) to horizontal (Kh) hydraulic conductivity) values for each of the 10 hydrogeologic units included in the model and the conductance values applied to head-dependent boundary conditions (cooling canals, regional canals, Biscayne Bay and model sides). The calibration parameters were varied manually until a model result was obtained that showed satisfactory agreement between simulated and observed pumping test drawdowns at monitored observation wells, as well as a reasonable match to understood directions and amounts of regional groundwater flow.

Model Results – Radial Collector Wells

Determining the environmental impacts of operating the proposed RCWs is the ultimate focus of the FPL groundwater model. The base case model results indicated that approximately 98 percent of water extracted from the RCWs originates in Biscayne Bay with most of the remainder coming from the cooling canals (industrial wastewater facility). Only 0.3 percent of the water produced was predicted by the base case model to come from the freshwater portion of the Biscayne aquifer. This is the water entering the model domain from head-dependent boundaries along the northwest corner of the model. With an assumed RCW continuous withdrawal of 120 Mgd, the predicted volume of water removed from the inland Biscayne aquifer was 0.36 Mgd or 250 gpm according to the base case FPL model. The worst-case sensitivity analysis conducted by FPL regarding extraction of water from the Biscayne aquifer was based on assuming values of vertical conductivity that were 50 percent of the values applied in the base case for all the model layers. This “worst-case” analysis predicted that 1.5 percent or 1,250 gpm would be continuously extracted from the Biscayne aquifer.

The model results indicated that the velocity of water moving downward from Biscayne Bay into the seabed is very low at less than 0.001 cm/s for all sensitivity cases.

The base case model predicted that 1.9 percent of the water extracted by the RCW would come from the industrial wastewater facility. A "worst" case of 3.3 percent of the extracted water coming from the industrial wastewater facility was predicted by cutting the vertical conductivity of all layers in half.

Assessment – Radial Collector Wells

The FPL model provides a reasonable, although uncertain, prediction of the impact of the RCWs on the Biscayne Bay and freshwater resources within the Biscayne aquifer. Parameter uncertainty in the FPL model prediction for the RCW water source is caused by several factors including the following:

- limited area of the pumping test observations used for calibration compared to the extent of the model
- large number of model parameters compared to the limited amount of calibration data
- limited data on the site-specific hydraulic properties of hydrogeologic units except at the pump test locations used in calibration
- lack of data on the hydraulic conductivity of the sediment at the bottom of Biscayne Bay.

Incomplete knowledge of the hydrogeologic system being modeled, the impacts of assuming constant density fluid, the assumption of a steady-state flow system, and problems related to discretization of the model into a cellular grid also cause conceptual model and structural uncertainty in the FPL model results.

One of the most significant uncertainties in the model is the hydraulic conductivity assigned to the sediment at the bottom of Biscayne Bay. The bay bottom was characterized as either "offshore sediment" or exposed "Miami limestone." Water entering the RCW from the bay must pass through one of these materials to enter the higher conductivity "upper high flow zone (UHFZ)" where the RCW are placed.

The NRC staff identified the following issues of potential concern with the FPL model setup:

- Specified heads for the "general head boundary conditions" at the northwest and southwest corners of the model were inconsistent. For the calibration simulations, the western boundary ends at the northwest corner with a specified head of 0.85 ft, while the northern boundary ends at that corner with a value of 0.65 ft. The western boundary ends at the southwest corner with a specified head of -0.2 ft, while the southern boundary ends at that corner with a value of -0.95 ft.
- The non-uniform lateral model discretization (row and column widths) exhibits moderately larger changes than the commonly accepted practice for finite-difference models. The accepted standard practice is for an increase in width between adjacent rows (or columns) to be 50 percent (width ratio of 1.5) or less, whereas the FPL model has increases of 100 percent.
- While the layer elevations mostly vary in a smooth fashion, there are places where adjacent cells of the same layer are offset vertically with no overlap, which differs from the accepted standard practice of 50 percent overlap. The lack of overlap is a result of the magnitude in elevation change over distance combined with the thinness of the layer.

However, the NRC staff expects that the impact of these issues is relatively minor in comparison to the uncertainty in the model parameter calibration.

FPL's base case model predicted that 1.9 percent of the water extracted by the RCW would come from the industrial wastewater facility. This prediction is also regarded as uncertain because of the parameter calibration uncertainty mentioned above and because of the potential effects of variable density fluid on the migration of the hypersaline plume. If the RCWs are operated continuously, then it is likely that the hypersaline water flow induced by the RCW from the industrial wastewater facility would be captured by the RCW. However, intermittent operation could result in an increase of hypersaline flow into the aquifer beneath the bay that could migrate into the bay when the RCW is not operating. The steady-state nature of the FPL model and the assumption of constant density fluids make the model inadequate for modeling this potential scenario.

The NRC staff performed limited runs of the FPL model to verify performance and check some additional sensitivity cases of interest. The main item of interest was the volume of water captured from the inland portion of the Biscayne aquifer along the northwestern corner of the model. A sensitivity case of 10X the base case offshore bay sediment hydraulic conductivity combined with 10X the base case Miami limestone sediment hydraulic conductivity and 10X lower general head boundary conductance was performed. The results showed that approximately 15 percent more water would be captured through the general head boundary along the northwestern corner of the model under these conditions.

Model Results – Inflow to the Power Block Excavations

The FPL model predicted that pumping rates of 140 and 136 gpm would be necessary for dewatering the excavations at Units 6 and 7, respectively. This is based on installation of essentially impermeable grout curtains at the sides of the excavations and grouting of the rock at the base of the excavation.

Assessment– Inflow to the Power Block Excavations

The model results for the dewatering calculations are also affected by model uncertainties discussed above. However, the NRC staff expects the impact of model uncertainty on these calculations to be less significant because of the smaller scale of the focus area. The permeability of the grouted base rock and side walls for the excavation are the primary parameters controlling inflow, and are easier to estimate than the large-scale hydrogeologic parameters that control the source of water captured by the RCW. Engineering controls are also feasible for mitigation of any adverse conditions that are encountered during the excavation activities.

Conclusions

The environmental impact of operating the proposed RCW system is the most important issue addressed by the groundwater model. The FPL model results indicate that continuous operation of the RCW results in extraction of a relatively small volume of water from the inland portion of the Biscayne aquifer and that the velocity of water moving downward from Biscayne Bay into the seabed is very low at less than 0.001 cm/s. The NRC staff's largest concern with the model is caused by uncertainty in the model parameters, especially in light of the limited area of calibration data and the large number of parameters that must be estimated. This may have a significant impact on the predicted volumes of water that would be extracted from the inland potion of Biscayne aquifer along the northwest corner of the model area and the amount captured from the industrial wastewater system. The NRC staff regards model estimates of inflow to the proposed excavations as more accurate than estimates of RCW captured water sources because of the knowledge of hydraulic parameters in that immediate area of the planned excavations.

G.3.2.2 Summary of USGS Modeling

The NRC commissioned the USGS to perform a numerical modeling study of the effects of the operation of a proposed RCW system at the Turkey Point site on surface and groundwater salinity. The resulting report (NRC 2014-TN3078) represents part of the review team's technical basis in its impact determination in this environmental impact statement (EIS).

Purpose of the Study

FPL proposes installing the RCWs at the Turkey Point site for use as a backup source of cooling water for proposed Units 6 and 7 in case of the loss of the normal water supply (reclaimed water from Miami-Dade County waste water treatment system). Neither the reclaimed water nor the water from the RCW system provides a safety-related function. The design of the RCW system and the flow from it are described in Chapter 3 of this EIS. Because of the potential during operation of the RCWs to alter the salinity of two sensitive and significant local water resources—the Biscayne Bay and the Biscayne aquifer—the review team commissioned the USGS independent modeling study. Salinity in Biscayne Bay is a concern because of the ongoing actions under the Comprehensive Everglades Restoration Plan (CERP) to restore freshwater flows to Biscayne Bay National Park (USACE/SFWMD 2011-TN1038). The Biscayne aquifer has been designated a sole-source aquifer by the U.S. Environmental Protection Agency and is critical to the region's freshwater supply.

Unique from other numerical modeling studies included in the review team's assessment, the USGS model explicitly considered density effects on the flow within and between the groundwater and the surface-water systems. The spatial and temporal patterns of salinity are primarily controlled by the flow of water. Therefore, an understanding of various processes resulting in flow is required for the review team to understand the plausible impacts of the RCW operation.

The commissioned study discussed herein relied on a numerical model developed and applied previously to this domain by USGS (NRC 2014-TN3078). This numerical model was used to simulate specific conditions that are understood to exist at the Turkey Point site and under boundary conditions consistent with the operation of the RCW system. The site conceptual model and the numerical model are discussed below.

Conceptual Model

The conceptual model of the region is consistent with a coastal freshwater-saltwater interface. Freshwater results from precipitation that infiltrates into the groundwater system and flows down gradient toward the ocean. As it approaches the seawater, the less dense freshwater tends to flow over the more dense seawater forming a saltwater wedge. The location of this saltwater wedge can move in response to increases and decreases in groundwater recharge from precipitation and also in response to groundwater pumping. Excess precipitation that does not enter the groundwater system through recharge can enter the ocean via sheet flow and channel flow. Several canals discharge freshwater during the wet season (summer to fall). However, along a portion of the area to the south of Turkey Point, the cooling canals prevent sheet flow from discharging to Card Sound and Biscayne Bay directly east of the cooling canals. The warm, hypersaline water in the unlined cooling canals also creates a plume of dense hypersaline groundwater under the cooling canals. Therefore, the site conceptual model reflects these conditions unique to the Turkey Point site. Further discussion of the hydrologic environment including the cooling canals can be found in Section 2.3 of this EIS.

The analysis considered the surface water (notably Biscayne Bay) to be vertically mixed (NRC 2014-TN3078). The review team considered this assumption and determined that because of the shallow depths of Biscayne Bay, particularly near Turkey Point, this assumption was not unreasonable for the examination of potential RCW impacts on salinity in Biscayne Bay. While localized areas of salinity stratification may develop, wind mixing is expected to keep Biscayne Bay well mixed. The analysis used two-dimensional circulation, which is driven in response to wind forcing and tidal elevation boundary conditions (NRC 2014-TN3078). The analysis also assumed that the tidal boundary had a typical seawater salinity of 35 practical salinity units (psu).

Given that one of the motivations for this study was to consider density-driven flow within the groundwater system, the conceptual model explicitly allows for multiple layers and for both vertical variations in hydrogeologic flow-related parameters and for salinity variations. The boundary conditions for the groundwater portion of the model are the freshwater piezometric heads at the boundary of the domain and the areal recharge rates over the extent of the land surface of the domain, which vary seasonally.

The conceptual model explicitly considers the surface-water/groundwater interface with exchange allowed in both directions depending on pressure gradients from upgradient freshwater inflows to groundwater, water-surface elevation differences along canals, well pumping, seepage of cooling canal waters to groundwater, and tidal head variation (NRC 2014-TN3078). For instance, marine waters of Biscayne Bay water can percolate into the bed, enter the groundwater system, and enter the RCWs, and freshwater can enter the Bay through groundwater discharge.

Evaporation of seawater results in increases of salinity. Poorly mixed shallow marine areas without sufficient freshwater inflow are likely to become hypersaline as a result of evaporation. The study included the effect of evaporation on salinity (NRC 2014-TN3078).

As described in Section 2.3 of this EIS, the groundwater underneath Biscayne Bay has salinity levels similar to the marine surface waters. Below the freshwater layer landward of Biscayne Bay, there is a wedge of saline water that intrudes inland. The freshwater underlying the land has a somewhat higher piezometric head than the groundwater underlying Biscayne Bay; hence, there is a flux of freshwater eastward toward Biscayne Bay. Seasonal rainfall patterns also influence the flux of freshwater with increased runoff and surface-water discharge to Biscayne Bay and increased infiltration into the surface layers of the groundwater. Additional components of the surface-water/groundwater system that exist at present include water-supply pumping around population centers, drainage ditches that intercept shallow groundwater, and the cooling canals at Turkey Point. Inland water-supply pumping withdraws freshwater from the groundwater, thereby reducing the piezometric head that drives the salinity wedge seaward. Drainage ditches intercept shallow groundwater and transport it for discharge to Biscayne Bay. These processes are included in the conceptual model.

Numerical Model

The USGS model is based on a previously developed regional-scale model (Lohmann et al. 2012-TN1429) that integrated surface-water and groundwater processes to study flows into and out of Biscayne Bay (Figure G-3). The original model's intent was to examine regional-scale processes that influence Biscayne Bay salinity.

Both model studies (Lohmann et al. 2012-TN1429; NRC 2014-TN3078) covered the period January 1996 through December 2004, a duration of 9 years. This simulation period was chosen because the Lohmann et al. model was calibrated for this period. The canal inflows, precipitation, and meteorology applied in the NRC-commissioned study are the same as those used by Lohmann et al. (2012-TN1429). For the regional-scale analysis, the model used a 500 m by 500 m grid spacing to define the physical features of the model domain. The model uses 20 vertical layers that represent the whole aquifer, with one of those layers representing

Biscayne Bay. The surface layer is 4 m thick, the second layer is 1.5 m thick, and the remaining layers are 2.75 m thick. The NRC commissioned study (NRC 2014-TN3078) updated the previously developed model to include (1) the cooling canals and (2) the representation of two temporary dewatering wells during the construction period at the proposed site for the Unit 6 and 7 reactors for the scenarios. Pumping from the dewatering wells was only included in the base case. The cooling canals were represented in the model by 70 cells for which the water-surface elevations were specified and the salinity was set to a constant 65 psu. The two dewatering wells were represented in the model in one cell and were set to pump for a 6-month period (June 2001 through December 2001). The inclusion of these two updates into the Lohmann et al. (2012-TN1429) model constituted the base case of the analysis.

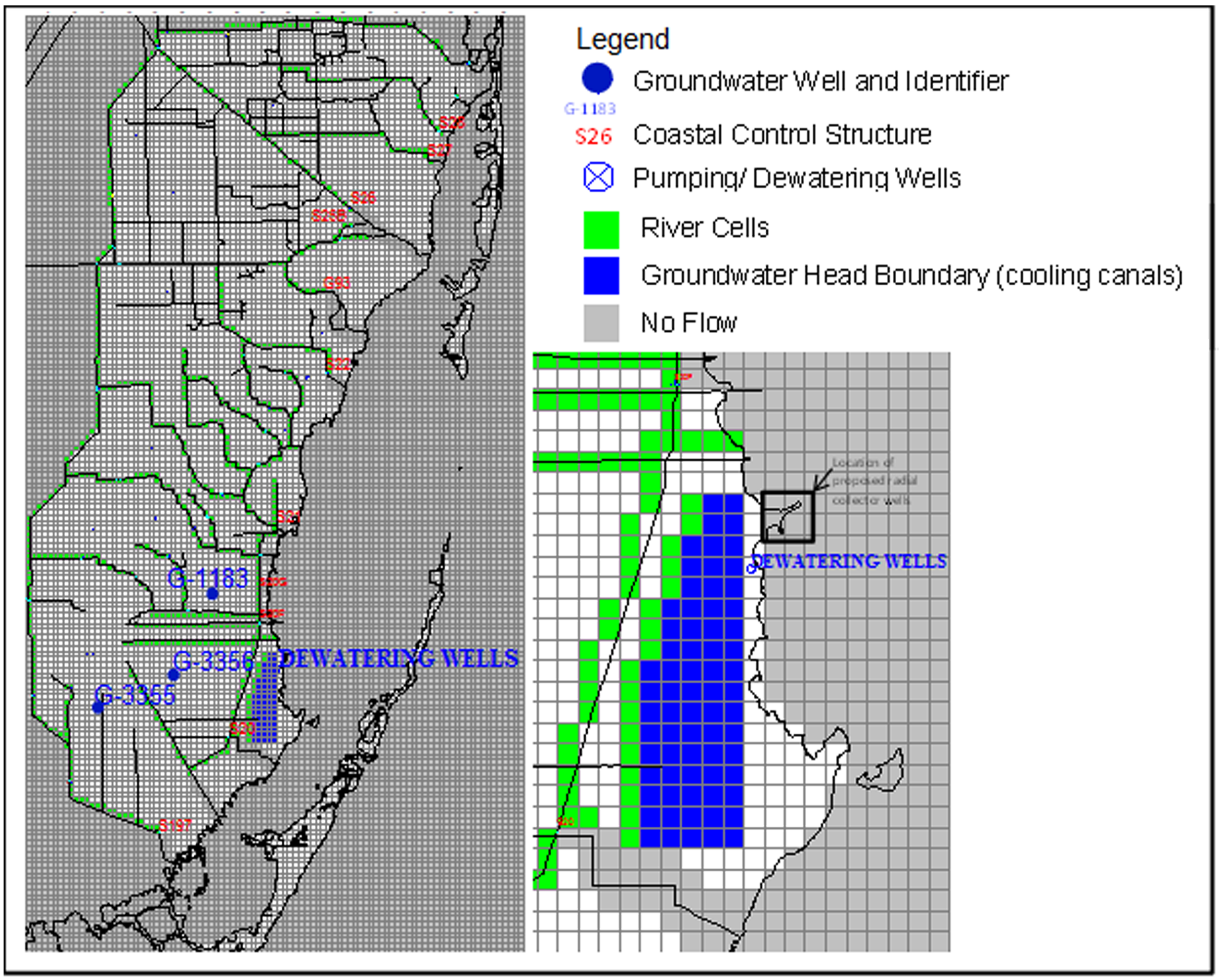


Figure G-3. USGS Model Domain and Grid Used for Salinity Analysis of RCW Pumping at Turkey Point. An inset of the grid in the vicinity of Turkey Point is included. (Taken from NRC 2014-TN3078, Figure 2)

For the evaluation of RCW pumping, the entire RCW system was represented in the model by four grid cells. When active, the total RCW pumping rate was set to 470,965 cubic meters per day (m^3/d) (86,400 gpm). Model inputs that were varied in the commissioned study were (1) the RCW withdrawal layer (layer 3 or layer 5) in the scenarios, (2) the distribution of RCW well intakes in model, (3) the RCW pumping period, and (4) vertical hydraulic conductivities and leakage of the subsurface layers (NRC 2014-TN3078). The commissioned report did not present results for all combinations of the varied inputs because the modeling results of some scenarios were not significantly different from the ones that were included in the report. The analyses ultimately included were for RCW groundwater extraction from layer 3 and for the well intakes distributed along the RCW intake pipes (NRC 2014-TN3078).

In regard to the RCW pumping periods, the commissioned study examined (1) continuous pumping (the most conservative pumping option), (2) 90-day pumping during the annual dry period, and (3) alternating periods of 30 days pumping and 90 days no pumping (NRC 2014-TN3078). Each of these pumping periods is longer than the 60 days mentioned in Section 5.2.1.2 of this EIS as the limit currently proposed by FDEP as the permit condition for operating the wells. Consequently, each pumping period analyzed by the commissioned study (NRC 2014-TN3078) is more conservative than the FDEP conditions would actually permit. Ultimately, the review team included only the continuous-pumping and 90-day-pumping scenarios, because they were the most conservative of the three pumping scenarios examined by USGS. Continuous pumping does not allow any time for system recovery as would occur with the alternating pumping and no-pumping scenarios.

In regard to vertical conductivities, the NRC (2014-TN3078) study examined (1) the values used in the previous study (Lohmann et al. 2012-TN1429), which were used in the base case, (2) decreased vertical conductivity in the subsurface layers plus decreased leakage between surface-water and groundwater layers, and (3) decreased vertical conductivity in all subsurface layers except layers 3, 4, and 5 (RCW extraction layers). The review team only included the first of these realizations because it was based on the calibrated model of the Biscayne Bay and aquifer system. Also, the review team expects that any reduction of vertical conductivity would decrease the effect of RCW pumping on Biscayne Bay salinity.

The commissioned study specified that initial conditions used to start the scenario analyses be the same as the final state of the base case in order to provide each of the scenarios with a common starting point. The specified initial conditions include heads, water levels, and salinity.

Results

The alterations on the salinity in the groundwater and in Biscayne Bay predicted by the USGS model are discussed in the following sections.

RCW Pumping Effects on Groundwater Salinity

At the end of the base case run, the predicted potentiometric surface showed a slight depression along the coast near Turkey Point that is the result of pumping the RCWs in the area that is included in the model (Figure G-4; NRC 2014-TN3078). Layers 2 and 3 were selected for plotting because they are just below Biscayne Bay and any canals, so that any groundwater effects from RCW pumping on Biscayne Bay will be transmitted through these two layers. For the continuous-RCW-pumping scenario, the USGS model predicted a cone of depression that surrounded the RCWs and extended laterally for several hundred meters (NRC 2014-TN3078). The model predicted that the cone of depression for the continuous-pumping case would be present at the end of the simulation because there was no opportunity for recovery. For the 90-day-pumping case, the model predicted that the cone of depression would not be evident at the end of the simulation because the system would have fully recovered after 275 days of no pumping.

The effect on regional groundwater potentiometric head to the northwest and west of the RCWs and Turkey Point site was predicted to be minimal. Sensitivity tests with vertical conductivity predicted there could be slightly larger changes in potentiometric head, which were attributed to a slightly landward movement of higher density (higher salinity) groundwater (NRC 2014-TN3078). The review team notes that these ranges of potentiometric head were within the range of uncertainty and predictive error of the model.

The salinity results at the end of the simulations for layers 2 and 3 within the groundwater system are shown in Figure G-5 (NRC 2014-TN3078). The blue regions landward of the coast represent freshwater. The green regions are where the marine water was predicted to infiltrate into the first two groundwater layers. The red zones are the hypersaline (high density) plume originating from the cooling canals.

For the area north of the hypersaline plume Figure G-5 the model predicts that in the continuous-pumping case, salinity would decrease landward of Turkey Point in comparison with the base case, while in the 90-day-pumping case, there would be a smaller decrease in salinity. For the continuous-pumping case the model predicts an increase in salinity in layer 3 (Figure G-5) directly under Turkey Point (essentially in a single grid cell), and a decrease in salinity north of the hypersaline plume. For the 90-day-pumping scenario, a decrease in salinity north of the hypersaline plume was also predicted, though the decrease was smaller than for continuous pumping. The smaller change results from the 9 months of recovery per year that is modeled in the 90-day-pumping scenario.

The change in groundwater salinity predicted by the model was assessed by finding the greatest differences for each grid cell between a scenario and the base case (NRC 2014-TN3078). The results at the end of the simulations of the greatest salinity differences for the continuous-pumping and 90-day-pumping scenarios are shown in Figure G-6. Note that the maximum predicted salinity differences for each model grid cell would not necessarily occur in the same layer, but this analysis provided an overall trend of salinity change. The predicted penetration into the groundwater system of the hypersaline plume from the cooling canals produced the ring of high positive change that surrounds the Turkey Point facilities. The model predicted greater freshening of the groundwater under the continuous-pumping scenario than under the 90-day-pumping scenario. The freshening is shown by a negative change in salinity centered northwest of Turkey Point. The predicted change, with the inclusion of RCW pumping, likely results from the withdrawal of a portion of the hypersaline plume from the groundwater system. Because the model conserves mass, withdrawal of groundwater results in water being drawn from other sources to replace it, and the freshening in this region could be due to predicted inflow from either freshwater or marine waters.

Examination of the total volumetric exchange between surface waters and groundwater showed that for the base case the model predicted a tendency toward discharge from the aquifer to Biscayne Bay (Figure G-7), though the base case rates were small (<500 m^3/d). Landward of

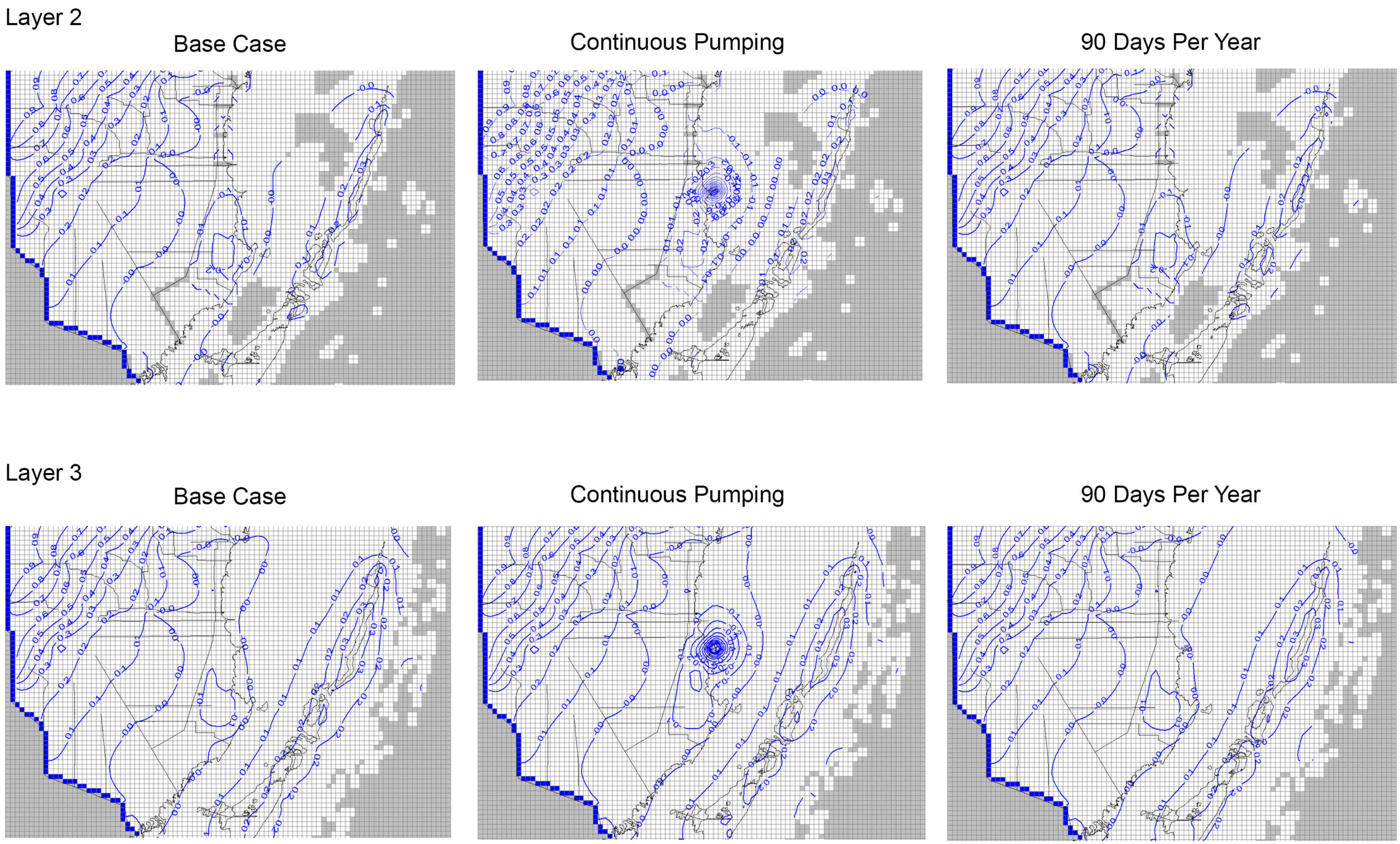


Figure G-4. Potentiometric Surfaces for Base Case and Continuous-Pumping and 90 d/yr Pumping Scenarios at the End of the 9-Year Simulations. Units are meters of elevation (NAVD88). (Taken from NRC 2014-TN3078, Figure 5, Figure 6A, and Figure 7)

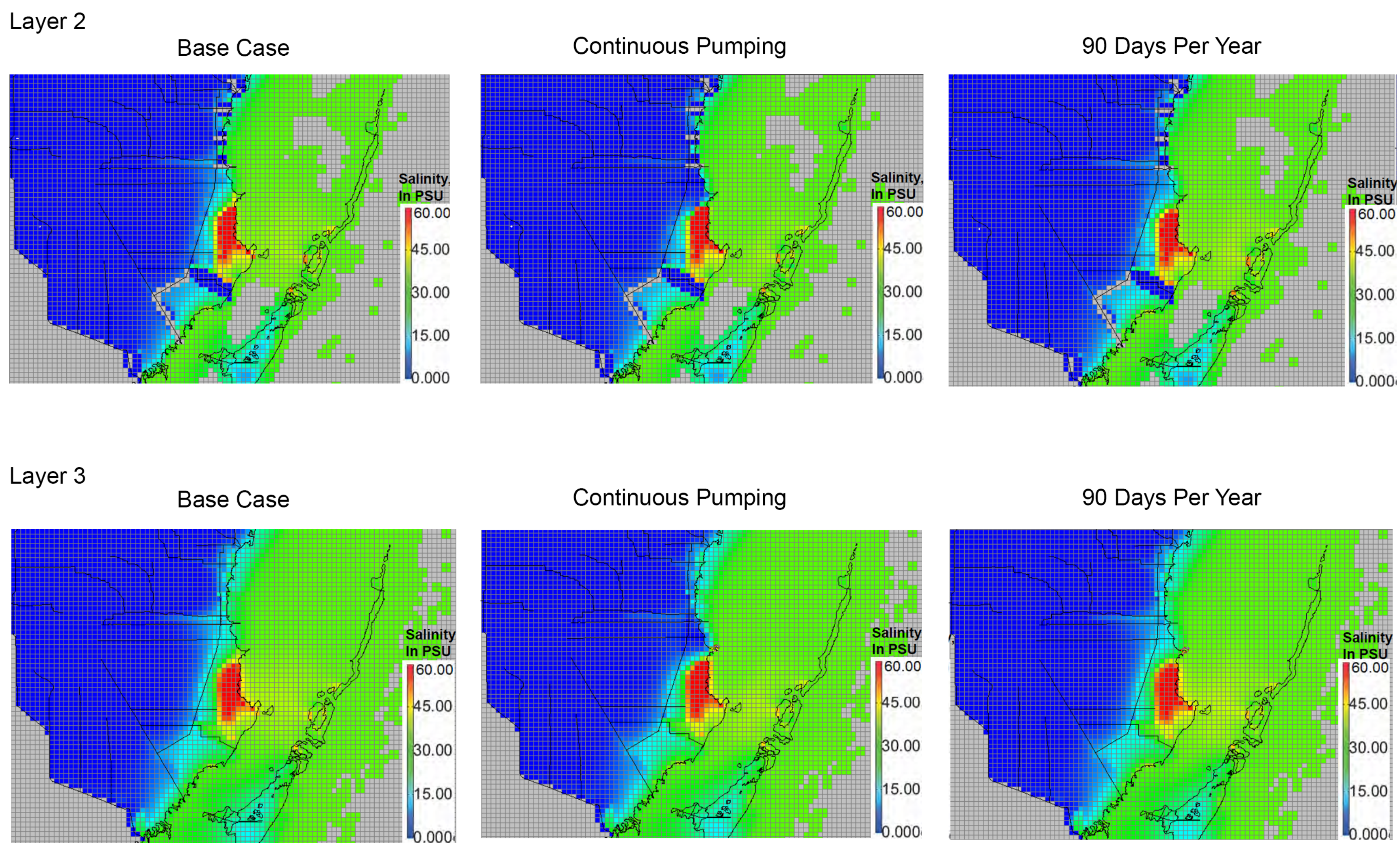


Figure G-5. Salinities for Base Case, Continuous-Pumping, and 90 d/yr Pumping Scenarios at the End of the 9-Year Simulations. Units were practical salinity units. (Taken from [NRC 2014-TN3078](), Figure 17, Figure 18A, and Figure 19)

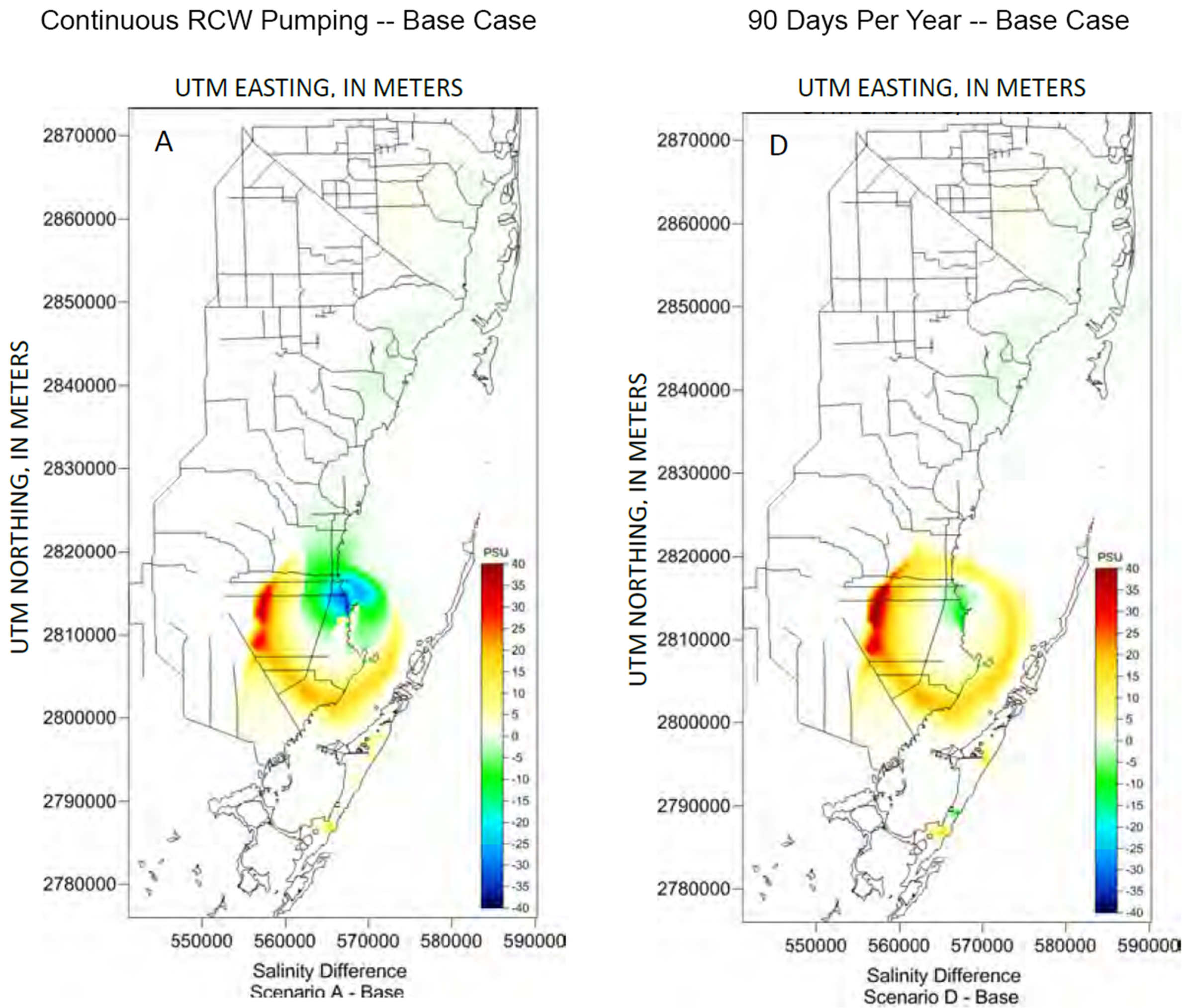


Figure G-6. Differences between Maximum Salinities between the Continuous RCW-Pumping Case and the Base Case and between the 90 d/yr Pumping Case and the Base Case (Taken from NRC 2014-TN3078, Figure 16b)

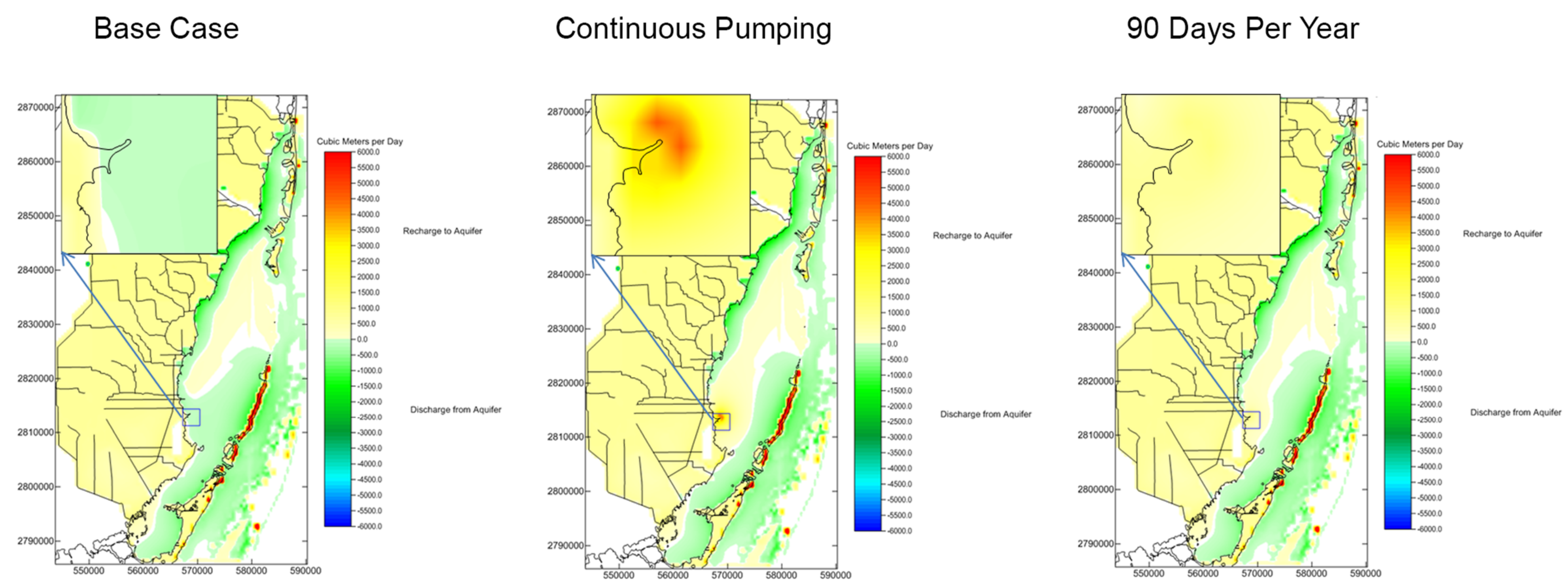


Figure G-7. Total Leakage (m^3/d) at the End of the Simulation for the Base Case, Continuous RCW-Pumping, and 90 d/yr Pumping. (Taken from NRC 2014-TN3078, Figure 26 and Figure 27)

Biscayne Bay, the total volumetric exchange predicted for the base case tended toward recharge, as expected with the occurrence of precipitation and infiltration into the land. For the continuous-pumping case, the model predicted a tendency for high recharge (inflow) from Biscayne Bay into the aquifer, as expected with RCW pumping, with rates locally around 5,000 m^3/d. For the 90-day-pumping scenario, the results tended toward recharge but without the higher localized recharge rate predicted with continuous pumping.

RCW Pumping Effects on Biscayne Bay Salinity

To investigate the salinity response in Biscayne Bay to RCW pumping, the review team examined model output results at locations near Turkey Point (NRC 2014-TN3078) corresponding to the measurement stations reported in this EIS Table 2-9, as well as three additional stations further north and close to Turkey Point (Figure G-8). Only the continuous-pumping scenario was included in the examination of Biscayne Bay salinity because the USGS model predicted the largest effects on groundwater for this scenario and it provided an upper bound of salinity variation of all potential RCW-pumping scenarios.

Time series of salinity results and salinity differences for the seven stations are shown in Figure G-9. Generally, the model predicted that salinity would exhibit seasonal variation due to freshwater inflows from drainage canals into Biscayne Bay, while increases in salinity would result from evaporative losses. For both the base and continuous-pumping cases, the largest seasonal variations were predicted at the northernmost locations (station A and B), with the smallest seasonal variations around Turkey Point (station C). Model results for locations closest to the measurement stations exhibited an intermediate range of seasonal variation. The north-south differences in seasonal salinity variation was likely caused by the northern portion of the region receiving relatively larger inputs of freshwater inflows from canals during the wet season.

The review staff computed the summary statistics (Table G-22) for salinity time series for the stations shown in Figure G-9. As suggested by the variation seen in the time-series plots, the standard deviations were largest for the northernmost stations examined. The minimum and maximum salinities also varied by location, with the largest maximum and smallest minimum predicted for the northernmost stations. For the tidal boundary, the primary source of water for Biscayne Bay, the model had the salinity set to 35 psu (Lohmann et al. 2012-TN1429). In comparison with the measured stations (EIS Table 2-9), the maximum salinities from the NRC commissioned study were smaller than observed at the measured stations (NRC 2014-TN3078). However, the periods from which the data were available were not the same between the measured data (2005 onward) and model results (2004 and earlier), so that direct comparisons are not possible.

The review team finds that the salinity differences between the continuous-pumping and base cases varied between +2 psu to -2 psu, but with most variations between +1 psu and -1 psu (Figure G-9). The model predicted an anomalous increase within the first year (1996) because of the onset of pumping, but this was wiped out by the start of 1997. Variations beyond +2 psu and -2 psu were predicted to be of very short duration.

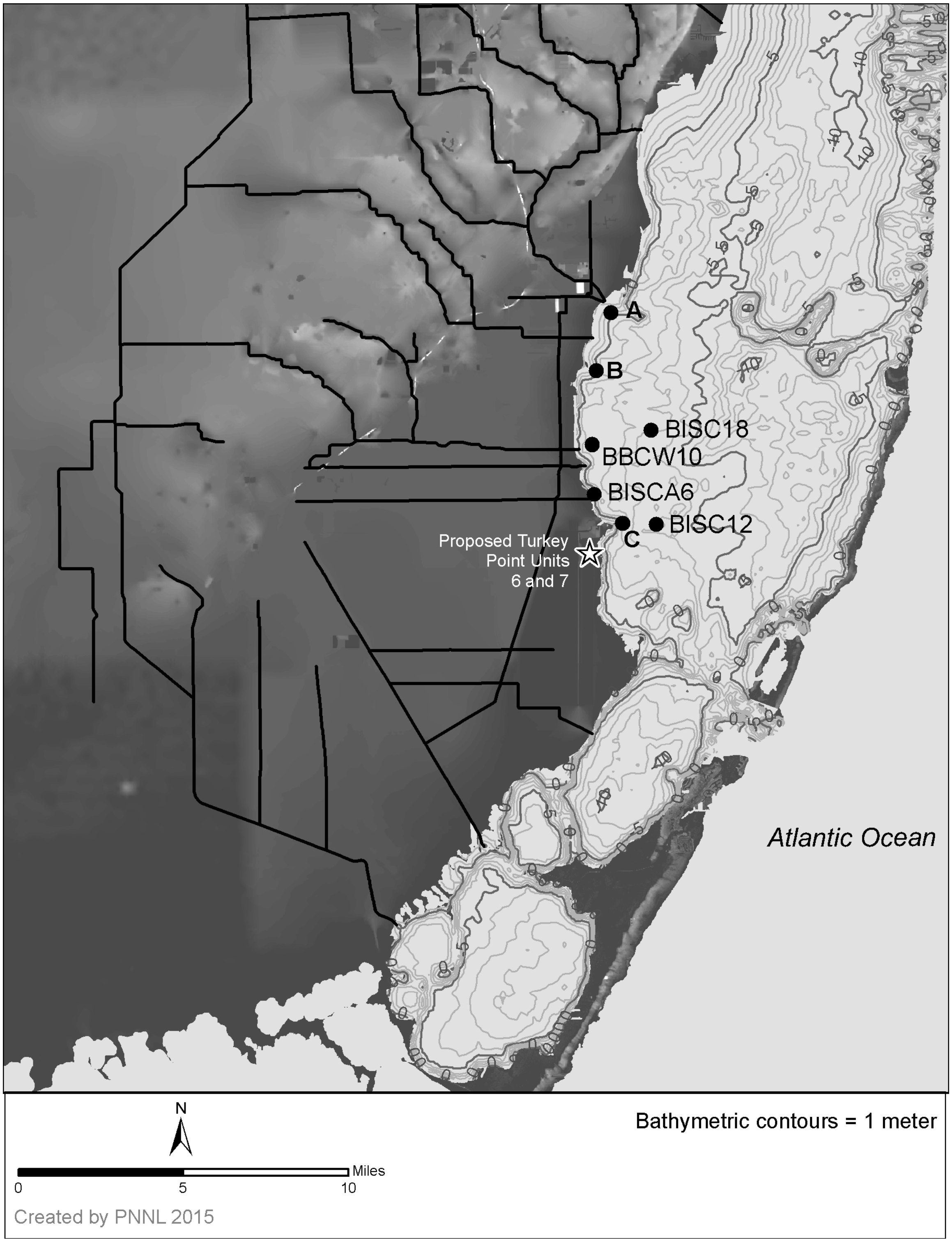
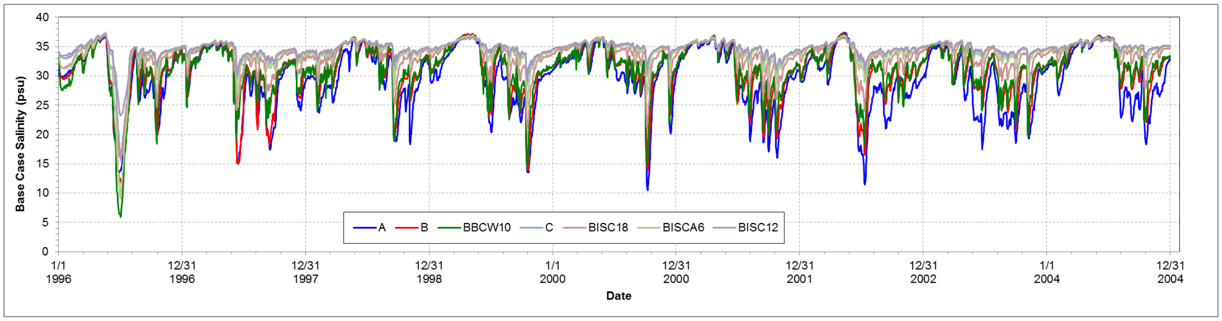
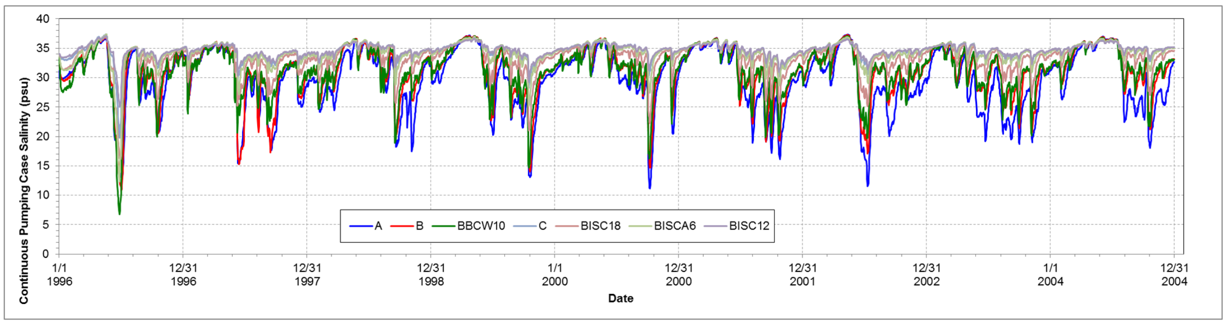


Figure G-8. Locations Where Salinity Time Series from USGS Model Were Examined

Base Case



Continuous Pumping Case



Sailinity Differences

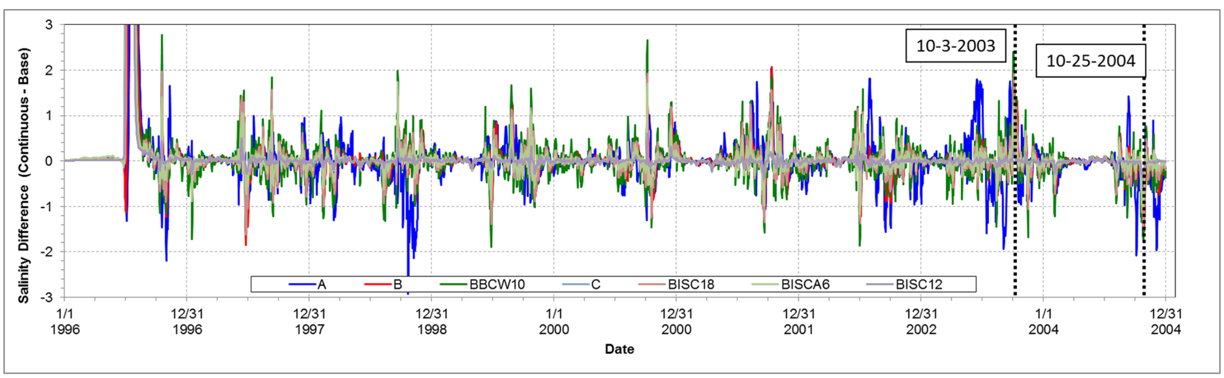


Figure G-9. Salinity and Salinity Differences (psu) from USGS Model at Locations Indicated in Table G-22. The dashed lines indicate the times for which spatial variations were examined (see Figure G-10 and Figure G-11).

Table G-22. Summary of Predicted Salinity for the Period January 1, 1997 through December 31, 2004 near the Turkey Point Site at Stations Shown in Figure G-9

Station	Number of Time Intervals	Mean (psu)	Standard Deviation (psu)	Minimum (psu)	Median (psu)	Maximum (psu)
Base Case						
A	2,922	29.62	5.08	10.48	30.18	37.35
B	2,922	31.24	4.21	13.81	31.84	37.24
BBCW10	2,922	31.66	3.62	14.36	32.02	37.05
BISC18	2,922	33.56	2.34	20.92	33.98	36.91
BISCA6	2,922	34.41	1.48	24.75	34.62	36.97
C	2,922	34.67	1.14	28.26	34.81	36.90
BISC12	2,922	34.76	0.94	29.27	34.86	36.65
Continuous-Pumping Case						
A	2,922	29.58	5.09	11.19	30.13	37.32
B	2,922	31.22	4.20	14.02	31.81	37.24
BBCW10	2,922	31.65	3.60	14.68	31.95	37.06
BISC18	2,922	33.55	2.32	21.03	33.97	36.93
BISCA6	2,922	34.41	1.46	25.20	34.62	36.99
C	2,922	34.67	1.13	28.26	34.81	36.92
BISC12	2,922	34.76	0.94	29.24	34.86	36.70

psu = practical salinity units

Source: NRC 2014-TN3078

To investigate the spatial distribution of salinity and salinity differences, the review team examined salinity at two different characteristic periods. One was selected that had positive salinity differences as shown in Figure G-9, and another was selected that had negative salinity differences as shown in Figure G-9. During both of these periods, the salinities along the nearshore north of Turkey Point were lower than those typically found for marine waters, being on the order of 20 psu compared to 35 psu specified at the model's tidal boundary with the Atlantic Ocean (Figure G-10 and Figure G-11). Examination of the salinity differences from the October 3, 2003 results showed a small increase in salinity in southern Biscayne Bay (Figure G-10), with only a small patch of nearshore water predicted to have a salinity increase on the order of +2 psu. In contrast, the results for the October 25, 2003 period showed a small decrease in salinity (Figure G-11), with a small patch of nearshore water predicted to have a salinity decrease on the order of -1.5 psu.

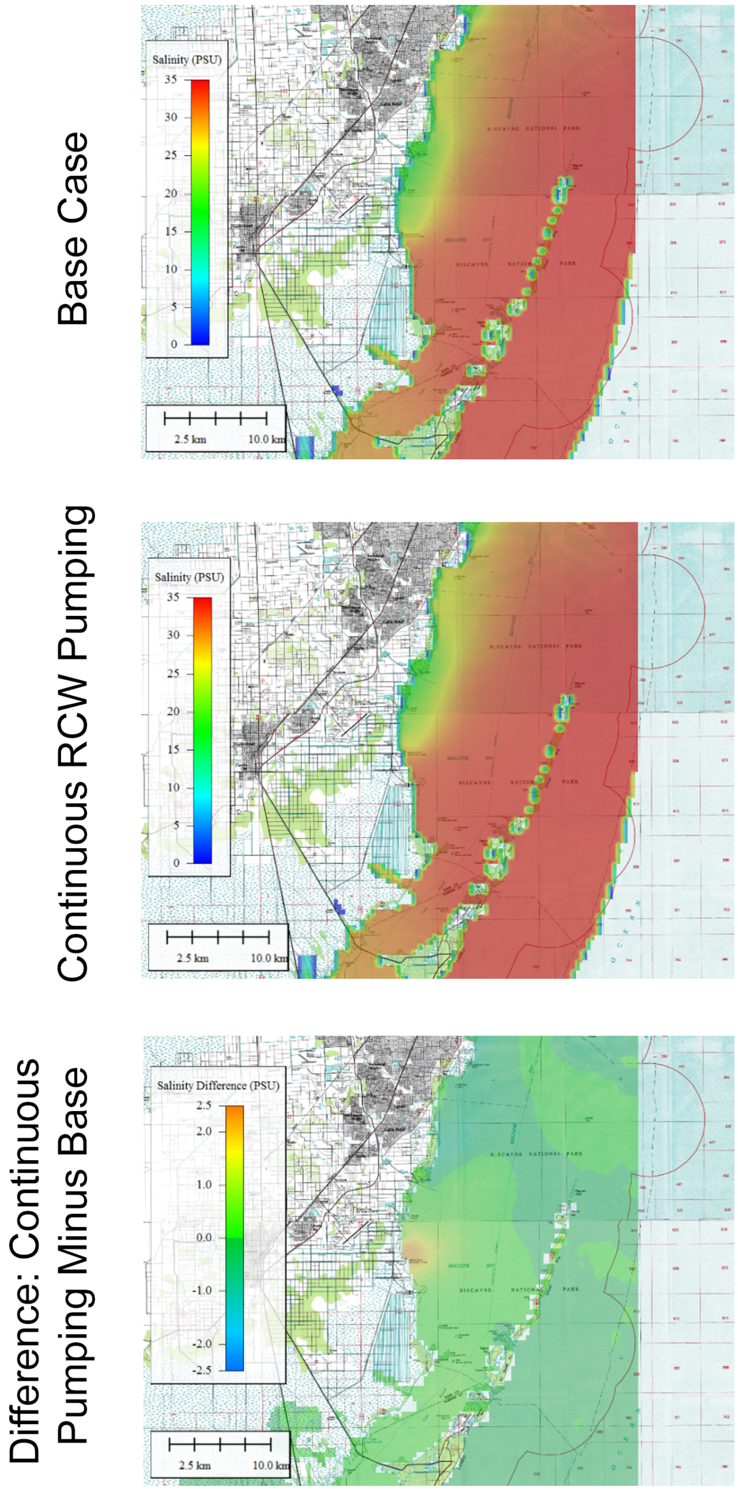


Figure G-10. Surface-Water Salinities at the Time with the Largest Difference North of Turkey Point between the Base Case and Continuous-Pumping Scenario on October 3, 2003. Units are psu (practical salinity units).

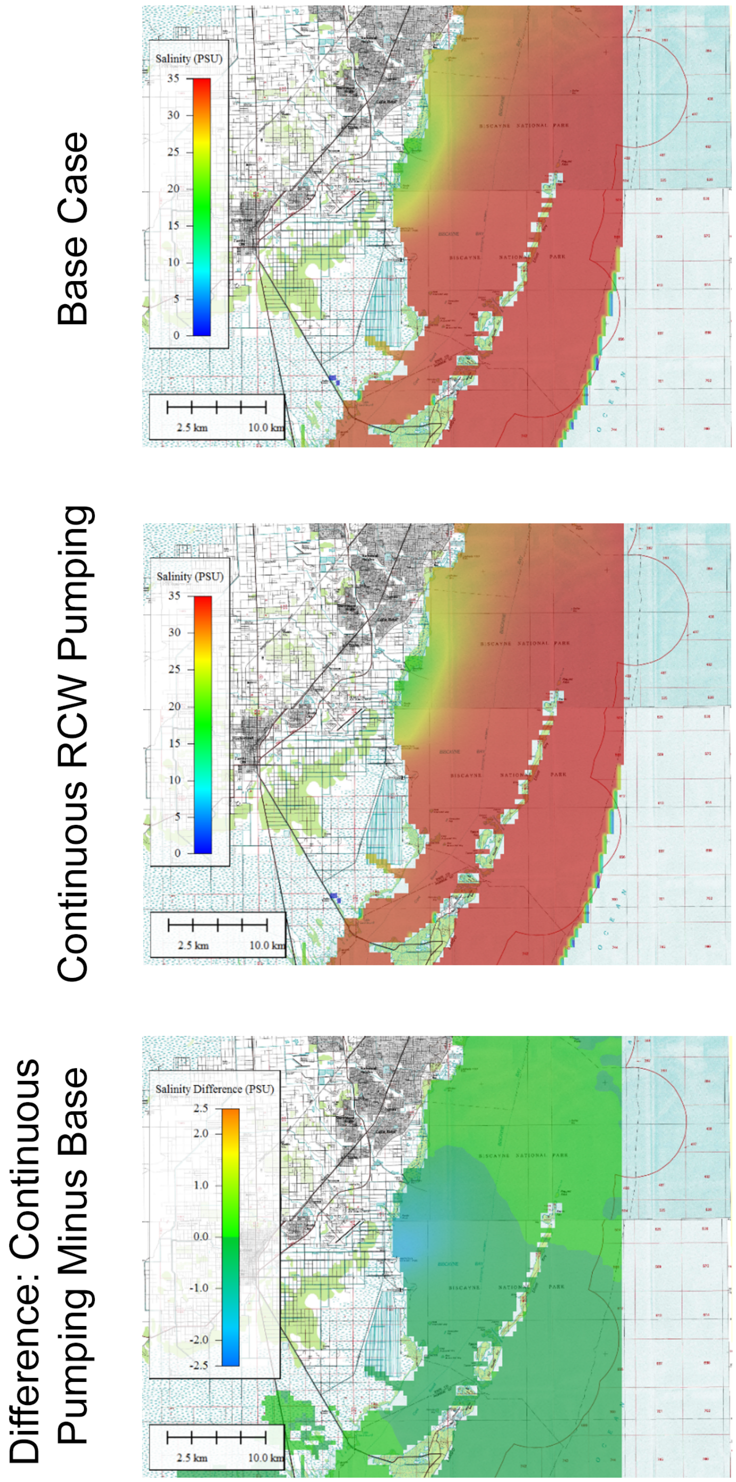


Figure G-11. Surface-Water Salinities at the Time with Largest Decreases North of Turkey Point between the Base Case and Continuous-Pumping Scenario on October 25, 2004. Units are psu (practical salinity units).

G.3.3 Confirmatory Calculations of Potential Upward Migration of Injectate from the Boulder Zone of the Lower Floridan Aquifer

As described in Chapter 5 of the EIS, blowdown and other liquid wastes from the proposed plants would be injected into the Boulder Zone of the Lower Floridan aquifer. Use of reclaimed water as a makeup water source would result in injectate that is buoyant because of its lower density compared to the saline water in the Boulder Zone. FPL conducted performance assessment modeling of potential upward migration of injectate based on the reclaimed water source (FPL 2014-TN4069) in support of the safety and environmental analysis of the proposed plants. The analyses consisted of two main scenarios that were considered feasible:

- Normal Operation Scenario: Upward migration of contaminants through a competent middle confining unit (MCU) under expected hydrogeologic conditions. The normal operation scenario assumes that no system failures occur, e.g., no injection well failure or subsurface loss of confinement beyond the FPL property area.

- Off-Normal Operation and Inadvertent Intrusion Scenario: Bypass of the MCU at a location 2.2 mi from the wastewater injection site through a hypothetical high-conductivity channel or failed well (conduit), where a water-supply well is withdrawing water from the upper Floridan aquifer directly above the MCU conduit. The hypothetical water-supply well provides direct access to the upper Floridan aquifer, bypassing the intermediate confining unit and the Biscayne aquifer.

The FPL analyses were focused on the fate and transport of radionuclides in the injectate, but also demonstrate the potential movement of chemical species in the injectate. The FPL analyses were based on conservative assumptions that would tend to maximize the migration of effluent. The off-normal and inadvertent intrusion scenario "bounded" some other feasible scenarios such as bypass of the MCU at the injection site because it resulted in shorter travel times.

The review team performed a separate confirmatory analysis of these scenarios, which resulted in concentrations of radionuclides at receptor locations similar to those calculated by FPL. The confirmatory analyses were performed through spreadsheet calculations as described below.

G.3.3.1 Normal Operations: Upward Migration through a Competent MCU Layer Scenario

The confirmatory calculation was based on transport equations described by Post et al. (Post et al. 2007-TN4145) and used the parameters shown in Table G-23. The effective vertical hydraulic conductivity of the MCU was based on the harmonic mean of the values determined from testing of core samples from the MCU at the EW-1 exploratory well (FPL 2012-TN1577). The harmonic mean is the most appropriate hydraulic conductivity value for fluid flow perpendicular to a layered system (Freeze and Cherry 1979-TN3275). Lower porosity decreases travel time in the calculations, so a conservatively low porosity value of 0.2 was used. The core analysis results from EW-1 are shown in Table G-24.

1 **Table G-23. Parameters and Results for the Confirmatory Analysis of Upward Migration**
2 **through a Competent MCU Layer**

Parameter	Value	Description
z1[(a)]	-2,900 ft	top of injection zone (referenced to sea level [positive upward])
z2[(b)]	-1,400 ft	bottom of USDW aquifer (referenced to sea level [positive upward])
ρ1[(c)]	62.230 lb_m/ft^3	water density at top of injection zone
ρ2[(d)]	62.792 lb_m/ft^3	water density at bottom of USDW aquifer
h1[(e)]	328.1 ft	piezometer head elevation at top of injection zone
h2[(f)]	188.6 ft	piezometer head elevation at bottom of USDW aquifer
Keff[(g)]	1.82E-07 ft/s	effective hydraulic conductivity
ρa	62.5 lb_m/ft^3	calculated average density over the migration interval
hf1	328.1 ft	fresh water head at top of injection zone
hf2	203.0 ft	fresh water head at bottom of USDW aquifer
Δhf	-125.1 ft	calculated freshwater head difference
Δz	1,500 ft	calculated elevation difference
Δhf/Δz	-0.0834	calculated fresh water gradient
(ρa-ρf)/ρf	0.0045	calculated density gradient
qz	1.24E-3 ft/d	calculated groundwater flux (positive upward)
Θeff[(h)]	0.2	effective porosity along flow path
tt	663 yr	calculated travel time from z1 to z2
Distance in 100 yr	226 ft	calculated vertical migration distance in 100 yr
Linear Velocity	0.00619 ft/d	calculated
C1	1	unit concentration of injectate at top of injection zone
t-half	12.3 yr	tritium half-life
C2	5.92E-17	calculated fraction of unit tritium concentration after 663 yr

Note: flux calculated based on Post et al. (2007-TN4145)
(a) FSAR Fig. 2.4.12-245
(b) FSAR Fig. 2.4.12-246
(c) minimum FSAR value assumed to be freshwater density = 62.2 lb_m/ft^3
(d) 10,000 mg/l TDS @ 20°C
(e) Starr et al. (2001-TN1251), Injection Zone High Value
(f) Starr et al. (2001-TN1251), Upper Monitoring Low Value (wells being purged were not considered)
(g) Approximate maximum MCU Property Estimate
(h) Minimum value from Reese (1994-TN1439)

Source: TN4069 unless otherwise noted

3 Results of the "normal operations" scenario confirmed the FPL result that the injectate would
4 move less than 300 ft upward into the MCU over a 100 yr period. The calculations also resulted
5 in radionuclide concentrations at receptor locations similar to those calculated by FPL (2014-
6 TN4069).
7

Table G-24. Core Analyses From the EW-1 Exploratory Well

Sample Depth (ft bpl)	Vertical Hydraulic Conductivity (cm/sec)	Horizontal Hydraulic Conductivity (cm/sec)	Specific Gravity	Total Porosity (%)
2026.4-2027.0	3.30E-06	3.20E-06	2.71	27.4
2027.0-2027.5	3.70E-04	7.80E-04	2.70	35.0
2029.4-2030.4	1.00E-05	2.80E-05	2.71	33.6
2030.4-2031.3	3.00E-05	1.30E-04	2.71	36.6
2036.2-2036.7	7.60E-05	1.10E-04	2.72	35.5
2036.7-2037.9	NA	NA	NA	NA
2295.2-2296.0	1.90E-04	1.00E-04	2.74	39.5
2296.0-2296.75	8.40E-05	5.90E-04	2.72	37.9
2296.75-2297.5	1.00E-04	1.00E-04	2.72	38.5
2399.9-2400.9	5.40E-04	5.40E-04	2.70	38.7
2576.0-2577.0	1.90E-04	2.50E-04	2.71	41.4
2639.3-2639.7	1.60E-06	8.40E-05	2.69	33.7
2639.7-2640.2	NA	NA	NA	NA
2645.1-2645.5	1.40E-05	6.20E-06	2.70	36.9
2645.5-2646.5	NA	NA	NA	NA
2652.0-2652.8	2.80E-06	4.60E-06	2.71	34.5
2652.8-2653.5	2.30E-06	2.50E-05	2.71	33.2
2675.1-2675.6	2.70E-04	2.90E-04	2.71	39.5
2675.6-2676.1	NA	NA	NA	NA
2676.1-2677.0	1.10E-06	5.30E-04	2.72	43.4
Arith. Mean	**1.18E-04**			
Geom. Mean	**2.86E-05**			
Harmonic Mean	**5.54E-06**			

Source: FPL 2012-TN1577

G.3.3.2 Off-Normal Operation and Inadvertent Intrusion Scenario:

FPL's safety analysis (FPL 2014-TN4069) also considered a case with a hypothetical water-supply well being drilled into the upper Floridan (USDW) aquifer and a simultaneous bypass/failure of the MCU at the same location 2.2 mi from the wastewater injection site. The 2.2 mi distance is based on the nearest privately owned parcel. This scenario makes the off-normal operation assumption that there is a high-permeability connection through the MCU between the injection zone and the upper Floridan aquifer located 2.2 mi from Turkey Point wastewater injection site. This is combined with an inadvertent intrusion scenario that places a water-supply well in the upper Floridan aquifer directly above the conduit through the MCU. The FPL analysis showed that the transit time through the Boulder Zone from the Turkey Point injection wells to the offsite location 2.2 mi away would be 21 years (FPL 2014-TN4069). The staff's confirmatory calculation showed that at the expected injection rate of 12,460 gpm, and a conservatively low porosity of 0.2, the injectate plume would reach the hypothetical offsite location in 23.5 years.

The safety analysis was conservative in that it did not account for transit time through the MCU and it did not account for dilution of contaminants within the Upper Floridan aquifer. It assumed that 100 percent of the water pumped by the water-supply well would be from the Boulder Zone with no dilution in the APPZ or the Upper Floridan aquifer.

The staff performed a calculation of expected flux through the MCU and dilution in the Upper Floridan aquifer using the maximum MCU hydraulic conductivity from the range of values shown in Table G-25 for the area of the enhanced vertical flow pathway. This calculation assumed a pathway size of 0.3 m^2 to match the approximate size of a failed borehole seal. The results of the leakage calculations for this scenario were an upward velocity of 1,245 m/yr and eventual discharge of 54 gpd of injectate into the Upper Floridan aquifer. It was assumed that this volume of injectate would mix over a width of 10 m and 1 percent of the Upper Floridan aquifer depth before being brought to the surface through a water-supply well. This was based on an Upper Floridan aquifer transmissivity equal to the minimum of the range of values, which would minimize the calculated dilution factor. This very conservative mixing scenario results in a dilution factor of 0.93, meaning that 93 percent of the water from the well would be injectate. This calculation represents a conservative case in multiple ways, including the assumption that a water-supply well would be placed such that it would exclusively be pumping water from the assumed mixing zone directly above a high-conductivity conduit from the injection zone. An upward velocity of 262 ft/yr was estimated by Maliva et al. (2007-TN1483) for an enhanced vertical flow feature at an injection site in Palm Beach County compared to the 1,245 ft/yr upward velocity from this analysis.

Table G-25. Parameters and Results for the Confirmatory Analysis of Upward Migration Through a Conduit in the MCU and into the Upper Floridan Aquifer

Parameter	Value	Description
z1[(a)]	-2,900 ft	top of injection zone (referenced to sea level [positive upward])
z2[(b)]	-1,400 ft	bottom of USDW aquifer (referenced to sea level [positive upward])
ρ1[(c)]	62.230 lb_m/ft^3	water density at top of injection zone
ρ2[(d)]	62.792 lb_m/ft^3	water density at bottom of USDW aquifer
h1[(e)]	328.1 ft	piezometer head elevation at top of injection zone
h2[(f)]	188.6 ft	piezometer head elevation at bottom of USDW aquifer
Keff[(g)]	3.28E-04 ft/s	effective hydraulic conductivity
ρa	62.5 lb_m/ft^3	calculated average density over the migration interval
hf1	328.1 ft	fresh water head at top of injection zone
hf2	203.0 ft	fresh water head at bottom of USDW aquifer
Δhf	-125.1 ft	calculated freshwater head difference
Δz	1,500 ft	calculated elevation difference
Δhf/Δz	-0.0834	calculated fresh water gradient
(ρa-ρf)/ρf	0.0045	calculated density gradient
qz	2.24 ft/d	calculated groundwater flux (positive upward)
Θeff[(h)]	0.2	effective porosity along flow path
tt	134.2 d	calculated travel time from z1 to z2
Linear Velocity	11.18 ft/d	calculated

Table G-25. (contd)

Parameter	Value	Description
C1	1	unit concentration of injectate at top of injection zone
t-half	12.3 yr	tritium half-life
C2	0.980	calculated fraction of unit tritium concentration at discharge to USDW aquifer after decay
Discharge Area	0.98 ft^2	assumed failed well (leakage) area through MCU
Discharge Rate	0.67 ft^2/d (54 gal/d)	volumetric discharge rate of injectate through failed well
UFA Mixing Width	32.81 ft	width of UFA over which MCU discharge is mixed
UFA Discharge	4.97 ft^3/d	horizontal volumetric discharge over depth of UFA based on minimum UFA transmissivity and gradient
Mixing Fraction	0.010	assumed fraction of UFA over which MCU discharge is mixed
Dilution Factor	0.931	MCU discharge/(MCU discharge + Mixing Fraction*UFA discharge)

Note: flux calculated based on Post et al. (2007-TN4145)
(a) FSAR Fig. 2.4.12-245
(b) FSAR Fig. 2.4.12-246
(c) minimum FSAR value assumed to be freshwater density = 62.2 lb_m/ft^3
(d) 10,000 mg/l TDS @ 20°C
(e) Starr et al. (2001-TN1251), Injection Zone High Value
(f) Starr et al. (2001-TN1251), Upper Monitoring Low Value (wells being purged were not considered)
(g) Approximate maximum MCU Property Estimate
(h) Minimum value from Reese (1994-TN1439)

Source: TN4069 unless otherwise noted

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Appendix H

Authorizations, Permits, and Certifications

Appendix H

Authorizations, Permits, and Certifications

This appendix contains a list of environmental-related authorizations, permits, and certifications potentially required by Florida Power and Light Company (FPL) from Federal, State, regional, and local agencies related to the combined construction permits and operating licenses (combined licenses or COLs) for proposed Turkey Point Units 6 and 7 in Miami-Dade County, Florida. Table H-1 is based on Table 1.2-1 of the Environmental Report (ER), Revision 6 (FPL 2014-TN4058), submitted on October 29, 2014 by FPL to the U.S. Nuclear Regulatory Commission (NRC).

Table H-1. Federal, State, and Local Environmental Permits and Authorizations

Jurisdictional Agency	Authority, Law, or Regulation	Description of Requirement	License/Permit and/or Applicability[(a)]	Date of Application and/or Date Issued	Activity Covered
Federal					
NRC	10 CFR Part 30	By-product license	(3)	Application submitted 06/30/2009	Possession of by-product material.
NRC	10 CFR Part 40	Source material license	(3)	Application submitted 06/30/2009	Possession of source material.
NRC	10 CFR Part 50	Licensing of nuclear power plant	(3)	Application submitted 06/30/2009	Approval for construction and/or operation of nuclear power plant.
NRC	10 CFR Part 51, 10 CFR Part 52	NRC approval of an environmental report	(2)	Application submitted 06/30/2009	Evaluation of environmental impacts from construction and operation of a nuclear power plant.
NRC	10 CFR Part 52	COL	(3)	Application submitted 06/30/2009	Safety review of the nuclear power plant site.
NRC	10 CFR Part 61	Licensing requirements for land disposal of radioactive wastes	(2)	Application submitted 06/30/2009	Land disposal of radioactive waste that contains by-product source and special nuclear material.
NRC	10 CFR Part 70	Special nuclear material license	(3)	Application submitted 06/30/2009	Possession of special nuclear material.
NRC	10 CFR Part 71	Packaging and transportation of radioactive material	(3)	Application submitted 06/30/2009	Packaging and transportation of licensed radioactive material.

Table H-1. (contd)

Jurisdictional Agency	Authority, Law, or Regulation	Description of Requirement	License/Permit and/or Applicability[a]	Date of Application and/or Date Issued	Activity Covered
Federal					
DOE	Nuclear Waste Policy Act (42 USC 10101 et seq.) and 10 CFR Part 961	Spent fuel contract	No. DE-CR01-09RW9012 (Unit 6) No. DE-CR01-09RW09013 (Unit 7) (3)	11/14/2008 11/14/2008	Disposal of spent nuclear fuel.
USACE	Clean Water Act of 1976 33 USC section 1344	Section 404 Permit	(1)	06/30/2009, modified 05/07/2010	Discharge of dredge and fill materials into waters of the United States.
USACE	Rivers and Harbors Appropriations Act of 1899 (33 USC section 401 et seq.)	Section 10 — Rivers and Harbors Act Permit	(1)	Application submitted 06/30/2009	Excavation or filling within navigable waters of the United States.
USACE	Secretary of the Army	Modified water deliveries to Everglades National Park	DACW-17-3-08-0006 Amendment No.1 Amendment No. 2 Amendment No. 3 Amendment No. 4 (each Amendment extended the license agreement for an additional year, currently expires 6/20/2013)	06/20/2008 06/20/2009 06/20/2010 06/20/2011 06/27/2012 Renewal application submittal date to be determined	Use of Government-owned lands for the purpose of onsite investigations in support of a Phase 1 ESA, Wetland delineation, preparation of legal description and soil borings.
Federal Aviation Agency.	14 CFR Part 77 - Safe, Efficient Use, and Preservation of Navigable Airspace	FAA Obstruction Permit for Unit 6 Containment Building	2012-ASO-7115-OE	08/24/2012	FAA Obstruction Permit for Unit 6 Containment Building.
Federal Aviation Agency	14 CFR Part 77 - Safe, Efficient Use, and Preservation of Navigable Airspace	FAA Obstruction Permit for Unit 7 Containment Building	2012-ASO-7116-OE	08/24/2012	FAA Obstruction Permit for Unit 7 Containment Building.

Table H-1. (contd)

Jurisdictional Agency	Authority, Law, or Regulation	Description of Requirement	License/Permit and/or Applicability[a]	Date of Application and/or Date Issued	Activity Covered
Department of the Interior	RE-DO-53	Temporary Construction Easement	EVER SUP 08-38	07/28/2008	Provide access to delineate wetland boundaries within the proposed utility line ROW relocation in Everglades National Park.
Department of the Interior	RE-DO-53	Temporary Construction Easement	EVER SUP 08-39	07/28/2008	Provide access to conduct visual and pedestrian surveys for Phase I environmental assessment within the proposed utility line ROW relocation in Everglades National Park.
FWS	16 USC 1539(a)(1)(A); 50 CFR Parts 13, 17	Endangered species permit to take American crocodile during monitoring	TE092945-2 (1)	01/29/2010	Provides authorization to take (capture, examine, weigh, sex, collect tissue samples, mark, radiotag, radio-track, relocate, release) endangered American crocodile individuals during population monitoring.

Table H-1. (contd)

Jurisdictional Agency	Authority, Law, or Regulation	Description of Requirement	License/Permit and/or Applicability[a]	Date of Application and/or Date Issued	Activity Covered
FWS	16 USC 703-712	Special purpose salvage permit, migratory birds	MB697722-0 Amendment (1)	04/01/2012	Provides authorization to: salvage dead migratory birds, abandoned nests, and addled eggs after nesting season; dead bald or golden eagles; and possess live migratory birds for transport to permitted rehabilitator.
State of Florida Authorizations					
FDEP, Siting Board	FS 403.501-.518	Power plant site certification[b]	(2)	06/30/2009, Amendment submittals 05/07/2010 11/12/2012 12/21/2012 Errata submitted 03/22/2013 Final of Certification issued May 19, 2014	Construction and operation of a power plant with more than 75 MW of steam generated power and associated facilities.
FDEP, USEPA Region IV review	FAC 62-621	NPDES storm water operations permit for industrial activities	(3)	06/30/2009 Final Conditions of Certification issued May 19, 2014	Operation of an industrial facility.

Table H-1. (contd)

Jurisdictional Agency	Authority, Law, or Regulation	Description of Requirement	License/Permit and/or Applicability[(a)]	Date of Application and/or Date Issued	Activity Covered
FDEP	Chapter 403 FS	Exploratory well construction permit	0293962-001-UC (1)	05/05/2010. Final Conditions of Certification issued May 19, 2014	Allows for the construction of the exploratory well and dual-zone monitor well.
FDEP	Chapter 403 FS	UIC well construction permit	(1)	07/29/2013. Final Conditions of Certification issued May 19, 2014	Allows for the conversion of the exploratory well to an injection well and perform operational testing for up to 2 years.
FDEP	Chapter 403 FS	UIC well construction permit	(1)	Final Conditions of Certification issued May 19, 2014	Allows for the construction and operational testing of additional injection and dual zone monitoring wells.
FDEP	Chapter 403 FS	Class I well operation permit	(3)	Final Conditions of Certification issued May 19, 2014	Allows for the operation of the injection wells. This permit must be renewed every 5 years.
FDEP, USEPA Region IV review	FAC 62-212	Prevention of significant deterioration construction permit	PSD-FL-409 (1)	05/28/2010. final Conditions of Certification issued May 19, 2014	Construction and operation of facilities that generate air emissions.

Table H-1. (contd)

Jurisdictional Agency	Authority, Law, or Regulation	Description of Requirement	License/Permit and/or Applicability[(a)]	Date of Application and/or Date Issued	Activity Covered
FDEP, USEPA Region IV review	403.0885 FS	Modification of Industrial Wastewater Treatment Facility permit	FL0001562 (2)	06/30/2009. Final Conditions of Certification issued May 19, 2014	Construction of Units 6 and 7 within the industrial wastewater facility.
FDEP/USEPA	FAC 62-25, 62-40	NPDES construction storm water permit	(1)	To be submitted 2 days prior to beginning construction Final Conditions of Certification issued May 19, 2014	Construction of any facility that disturbs 1 acre or more.
FDEP	403.087, FS and FAC 62-4, 62-520, 62-522, 62-528, 62-550, 62-600, 62-601	Operation of Class V, Group 3 domestic wastewater injection (gravity flow) well	0127512-006-UO (3)	08/14/2012. Final Conditions of Certification issued May 19, 2014	Operation of IW-1.
FDEP	403, FS and FAC 62-600, 62-601, 62-602, 62-620, 62-640, 62-699	Operation of domestic wastewater treatment facility	FLA013612- 003-DW3P (3)	09/28/2010. Final Conditions of Certification issued May 19, 2014	Operation of Turkey Point Power Plant wastewater treatment facility.
FDEP	FAC 62-213	Title V Operations Permit	0250003-010-AV (3)	01/01/2009. Final Conditions of Certification issued May 19, 2014	Operation of facilities that generate air emissions.

Table H-1. (contd)

Jurisdictional Agency	Authority, Law, or Regulation	Description of Requirement	License/Permit and/or Applicability[(a)]	Date of Application and/or Date Issued	Activity Covered
FDEP	FAC 62-213	Title V Operations Permit	0250003-021-AV (3)	Effective 01/01/2014. Final Conditions of Certification issued May 19, 2014	Operation of facilities that generate air emissions.
FDEP	403 FS	Nuclear Replacement of Emergency Diesel Engines	0250003-020-AC	04/02/2013	Replacement of diesel engines.
FDEP, South Florida Water Management District	FAC 40B-3	Well Construction Permit	13-59-3795 to 13-59-3814 (2)	01/14/2008. Final Conditions of Certification issued May 19, 2014	Construct, repair, modify, or abandon a well.
South Florida Water Management District	FAC 40E-3	Well Abandonment Permit	#SF092308E, #SF092308F, #SF092308G, #SF092308H (2)	05/05/2009 Cancelled	Well abandonment permits.
State of Florida	FAC 40E-3	Well Abandonment Permit	13-59-2241 through 13-59-2259 (2)	02/19/2008	Application to construct, repair, modify, or abandon well.
FWCC	FAC 68A-9.002, 68A-27.005	Removal of nests and ospreys	LSNR-1100026 (1)	02/02/2011	Removal and replacement of inactive nests of ospreys and other migratory birds.
FWCC	FAC 68A-9.002, 68A-9.025, 68A-27	Carcass Salvage Permit	LSSC-11-00021 (1)	02/02/2011	Salvage, mount, and display wildlife carcasses upon encounter for educational and scientific purposes.

Table H-1. (contd)

Jurisdictional Agency	Authority, Law, or Regulation	Description of Requirement	License/Permit and/or Applicability[(a)]	Date of Application and/or Date Issued	Activity Covered
Florida Division of Historical Resources (SHPO)	National Historic Preservation Act (54 USC 300101 et seq.) and 36 CFR 800	Cultural Resources Review and Consultation	(1), (2), and (3)	07/28/2010. Final Conditions of Certification issued May 19, 2014	Identification, description, and evaluations of cultural resources on and in the site vicinity with the potential to be impacted by construction and operations.
Other States Authorizations					
Utah Department of Environmental Quality Division of Radiation Control	R313-26 of the Utah Radiation Control Rules	Revision of existing general site access permit	(3)	Annual authorization	Transport of radioactive materials into the State of Utah.
Tennessee Department of Environment and Conservation Division of Radiological Health	TDEC Rule 1200-2-10.32	Revision of existing Tennessee radioactive waste license-for-delivery	(3)	Annual authorization	Transport of radioactive waste into the State of Tennessee.
Local Authorizations					
Miami-Dade County	Chapter 163 FS; Miami-Dade County Comprehensive Plan and adopted regulations and Miami-Dade County Ordinances, Chapter 33	Land use and zoning approval (unusual use approval)	Miami-Dade County Board of County Commissioners Resolution Z-56-07 (1)	12/24/2007	Unusual use (zoning approval) to permit a nuclear power plant (atomic reactors) and ancillary structures and equipment.

Table H-1. (contd)

Jurisdictional Agency	Authority, Law, or Regulation	Description of Requirement	License/Permit and/or Applicability[(a)]	Date of Application and/or Date Issued	Activity Covered
Miami-Dade County	Chapter 163 FS; Miami-Dade County Comprehensive Plan and adopted regulations and Miami-Dade County Ordinances, Chapter 33	Land use and zoning approval (unusual use approval)	Miami-Dade County Board of County Commissioners Resolution Z-1-13 (1)	01/13/2013	Unusual use (zoning approval) to permit a reclaimed water treatment facility, radial collector wells, and a parking area associated with Turkey Point Units 6 and 7.
Miami-Dade County	Chapter 163 FS; Miami-Dade County Comprehensive Development Master Plan and adopted regulations	Comprehensive Development Master Plan text amendment	(1)	Application submitted 10/31/2008; withdrawn 03/05/2010	Excavation for fill source.
Miami-Dade County	Chapter 163 FS; Miami-Dade County Comprehensive Development Master Plan and adopted regulations	Comprehensive Development Master Plan text amendment	(1)	04/30/2009	Temporary access roads.
Miami-Dade County	Miami-Dade County Ordinances	IW6 permit (industrial well field) for site investigation	Permit Numbers: 13-59-2241 through 13-59-2259 (1)	02/19/2008	Land use — nonresidential, within major well field protection areas not served by sanitary sewers.
Miami-Dade County Health Department	Chapter 373 FS	Water well construction permits	13-59-2241 to 13-59-2259 13-59-3795 to 13-59-3814 (1)	02/19/2008 01/14/2008	Well installation for hydrologic investigation.
Miami-Dade County	Miami-Dade County Code Chapter 24	Domestic wastewater annual operating permit	DWO-000010-20130-2014 (2)	04/15/2013	Stabilization treatment facility.

Table H-1. (contd)

Jurisdictional Agency	Authority, Law, or Regulation	Description of Requirement	License/Permit and/or Applicability[(a)]	Date of Application and/or Date Issued	Activity Covered
Miami-Dade County	Miami-Dade County Code Chapter 24	Operation of pollution control facility permit	IW5-006229-2012-2013 (2)	05/01/2013	Operation of fleet vehicle maintenance facility that generates waste oil, coolant, and used batteries with a solvent wash tank and served by septic tank.
State of Florida	Department of Agriculture	Burn Permit	1373498 (2)	01/24/2011	Onsite combustion of construction debris. Annual permit issued.
Miami-Dade County	Miami-Dade County Ordinances, Section 24-35	IW5 Permit (or waiver)	IW-000016-2012/2013	06/01/2013	Hazardous materials or hazardous waste-large user or generator. Hazardous waste permit issued 10/01/2008.
Miami-Dade County	Miami-Dade County Code Chapter 24	Stratospheric Ozone Protection Annual Operations Permit	APCF-001747-2012-2013 (1)	07/01/2012	Use of refrigerants R-12, R-22, R-502 for Robinair Recovery Units, Models 25200, 25200A, 25200B.
Miami-Dade County	Miami-Dade County Code Chapter 24	Industrial Waste Annual Operations Permit	IW-000003-2013-2014 (2)	06/01/2013	Onsite disposal of Class III industrial solid waste consisting of earth and earth-like products, concrete, rock, bricks, and land clearing debris.

Table H-1. (contd)

Jurisdictional Agency	Authority, Law, or Regulation	Description of Requirement	License/Permit and/or Applicability[(a)]	Date of Application and/or Date Issued	Activity Covered
Miami-Dade County	Miami-Dade County Ordinance 89-104	Marine Facilities Annual Operations Permit	MOP-000072-2013/2013 (2)	10/01/2012	Operation of 1 wet slip, 1 dry slip, 2 commercial vessels.
Miami-Dade County	Miami-Dade County Ordinances, Chapter 8	Turkey Point Units 6 and 7 Site Investigation-Construction trailers	2008-026502	01/29/2008	Construction Trailers.
Miami-Dade County	Miami-Dade County Ordinances, Chapter 8	Turkey Point Units 6 and 7 Exploratory Well-Electrical permits	2011-028574 2011-031469	03/28/2011 04/13/2011	Exploratory well electrical permit.
State of Florida; Miami-Dade County	Miami-Dade County Ordinances, Chapter 8; FAC 64E-6	Turkey Point Units 6 and 7 Exploratory Well-Construction Trailer permits	2011-031471 2011-031529 2011-031532 13-SC-1307746 2011-031470 2011-031530 2011-031531 13-SC-1307751	04/13/2011 04/13/2011 04/13/2011 03/18/2011 04/13/2011 04/13/2011 04/13/2011 03/18/2011	Exploratory well construction trailer permit.
State of Florida	FAC 40D-3	Turkey Point Units 6 and 7 Exploratory Well and Dual Zone Monitoring Well-Pad monitor well permits	13-59-6664-71	04/14/2011	Exploratory well pad monitor well permits.
South Florida Water Management District	FAC 40D-3	Turkey Point Units 6 and 7 Exploratory and Dual Zone Monitoring Well-Pad monitoring well abandonment	13-59-8020 to 8027	07/24/2012	Pad monitor wells abandonment permit.
Miami-Dade County	Miami-Dade County Ordinances, Chapter 33	Unusual Use Resolution	Resolution Z-56-07	12/24/2007	Unusual use resolution.
Miami-Dade County	Not available	Fencing permit around EW-1 and DZMW-1	2012059049	09/06/2012	
South Florida Water Management District	Chapter 373 FS	Water well construction permits	SF092308A-SF092308D SF123008A-SF123008E	9/23/2008 12/23/2008	Pump test for test wells.

Table H-1. (contd)

Jurisdictional Agency	Authority, Law, or Regulation	Description of Requirement	License/Permit and/or Applicability[(a)]	Date of Application and/or Date Issued	Activity Covered

(a) Applicability of the license or permit to the project activity type, i.e., (1) activities not requiring a COL, (2) construction activities requiring a COL, and (3) plant operation activities.

(b) Pursuant to the Florida Electrical Power Plant Siting Act all State, regional and local permits, except for certain local land use and zoning approvals and certain State issued licenses required under Federally delegated or approved permit programs, are covered under a single "Certification". Because the Certification is the sole license of the State and any agency required for construction and operation of the proposed electrical power plant, it is not necessary to apply for permits individually.

CFR = *Code of Federal Regulations*.
DOE = U.S. Department of Energy.
ESA = Endangered Species Act of 1973, as amended.
FAC = Florida Administrative Code.
FS = Florida Statute.
FAA = Federal Aviation Administration.
FDEP = Florida Department of Environmental Protection.
FWCC = Florida Fish and Wildlife Conservation Commission.
FWS = U.S. Fish and Wildlife Service.
IW = Industrial Well or Industrial Waste
MW = Megawatt.
NPDES = National Pollutant Discharge Elimination System.
NRC = U.S. Nuclear Regulatory Commission.
ROW = Right of Way
TDEC = Tennessee Department of Environment and Conservation.
TP = Turkey Point.
UIC = Underground Injection Control.
USACE = U.S. Army Corps of Engineers.
USC = United States Code.
USEPA = U.S. Environmental Protection Agency.

Appendix I

The Effect of Climate Change on the Evaluation of Environmental Impacts

Appendix I

The Effect of Climate Change on the Evaluation of Environmental Impacts

The review team has determined that it is reasonably foreseeable that climate change may substantially alter the affected environment described in Chapter 2 of this environmental impact statement (EIS). Climate change is a global phenomenon that the construction and operation of the proposed two-unit plant will not appreciably alter. However, climate change will provide a new environment that the operation of the proposed units will affect.

The objective of this appendix is to document the review team's consideration of the potential changes in impacts that may occur as a result of the new future environment. This appendix is not intended to be a comprehensive climate change assessment for the affected region. It documents the review team's qualitative determination of the likely changes in the impacts described in Chapter 5, if the environment is altered in a manner consistent with the predictions in current climate change literature.

The review team assessed the potential effects of climate change on its evaluation of the environmental impacts of the proposed action. The results of this assessment are presented below in three sections: (1) description of the assessment process, (2) potential climate change impacts in the region, and (3) assessment summary.

I.1 Description of the Assessment Process

The U.S. Nuclear Regulatory Commission (NRC) staff developed a process to ensure that the potential effects of climate change are adequately considered for all resource areas in a new reactor licensing National Environmental Policy Act (42 USC 4321 et seq.) (TN661) review. First, a master table was created identifying plausible nexuses between nuclear power station resource area issues related to operation and likely climate change impacts as identified in the most recent climate change impacts report issued by the U.S. Global Change Research Program (GCRP 2014-TN3472). The interagency GCRP was established under the Global Change Research Act of 1990 (P.L. 101-606) (15 USC 2921 et seq.) (TN3330) "to understand, assess, predict, and respond to human-induced and natural processes of global change" and is the authoritative U.S. government source on likely climate change impacts in the United States. The master table was used to develop a list of questions for each resource area to assist review teams in addressing whether GCRP-identified climate change impacts were likely to increase, decrease, or leave unchanged the assessed impact of a proposed facility on the environment, or to identify areas where scientific uncertainty precludes a definitive assessment. The comprehensive master table and question list can be found in the NRC's Agencywide Documents and Management System (ADAMS), which is accessible from the NRC website at www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room) under the following accession number ML5026A470 (NRC 2014-TN4149). A table, termed the site-specific resource table, and list of questions specific to the proposed site of Turkey Point Units 6 and 7 were then generated by removing non-relevant GCRP climate impacts and NRC resource area issues, and by using specific Southeast regional predictions identified by the GCRP. For example, the review team determined GCRP-identified direct impacts related to declining ice volume and extent were not relevant to the Turkey Point environment. The review team used the site-specific resource table and question list (NRC 2014-TN4150) in its assessment of the effects of climate change on relevant resource areas given in Section I.3.

A combined construction permit and operating license (COL) is valid for 40 years (10 CFR 52.103) (TN251). In conducting its assessment, the review team noted that if COLs are granted to the proposed facilities, baseline changes are more likely to be noticeable during operation (Chapter 5) than during preconstruction and construction (Chapter 4). The review team's efforts thus focused on assessing the potential effects of climate change on the resource area impact levels assigned in Chapter 5. While general scientific consensus exists that climate change is occurring and will continue to occur for the foreseeable future, significant uncertainty remains about the magnitude of the changes for specific regions and the precise magnitude and form of the impacts on the environment from climate change. The review team acknowledges this situation, explicitly noting in this appendix where uncertainty in future climate predictions and uncertainty in impacts may make it impossible at this time to conclude qualitatively the influence of climate change on a specific resource area or issue. The review team also acknowledges that the Southeast Florida Regional Climate Change Compact, which includes Miami-Dade County, has established a Regional Climate Action Plan that discusses goals to reduce greenhouse gas emissions and adapt to regional and local impacts of a changing climate. Some of the climate change impacts discussed in this appendix could be further reduced with the efforts of this Regional Compact.

I.2 Potential Climate Change Impacts in the Region

Climate change is a subject of national and international interest. The recent compilation of the state of knowledge in this area—GCRP's climate change impacts report (GCRP 2014-TN3472)—has been considered in the preparation of this EIS. Most GCRP projections are expressed as a change expected for the later part of the 21st century (2071–2099) relative to average conditions existing in the later part of the 20th century (1970–1999). Projected changes are also dependent on future emissions of heat-trapping gases. The GCRP's climate change impacts report includes projections for wide-ranging scenarios where such emissions are rapidly reduced and where they continue to increase.

Florida Power and Light Company (FPL) has indicated that, if the COLs are granted, it expects to initiate commercial operations in the third quarter of 2022 and third quarter of 2023 for Units 6 and 7, respectively (FPL 2014-TN4058). The Atomic Energy Act (42 USC 2011 et seq.) (TN663) and NRC regulations (10 CFR 52.103) (TN251) limit commercial power reactor licenses to an initial 40 years but also permit such licenses to be renewed. If granted, under FPL's proposed schedule the COLs would be valid until 2062 and 2063. If applied for and if granted, license renewal could extend operation of the reactors until 2082 and 2083. The review team considers use of GCRP impacts report projections for the 2071–2099 period under a continued increasing emissions scenario to be a conservative proxy for likely future conditions encompassing the licensing action, and for assessing the effects of climate change on the resource area impact levels presented in this EIS. Unless otherwise stated, projected climate changes discussed in this section are taken from the impacts report (GCRP 2014-TN3472) and refer to changes for the 2071–2099 period relative to the 1970–1999 period under an increasing emissions scenario.

Projected changes in the climate for southeastern Florida include an increase in average surface air temperature of 5°F to 6°F. The number of days with maximum temperatures above 95°F is expected to increase, rising by 50 or more days per year for the 2041–2070 period relative to 1971−2000. The hottest and coldest days expected in a 20-year period at the end of this century (2081–2100) are both projected to be 6°F to 7°F warmer than those experienced at the turn of the last century (1986–2005); in other words, both the hottest and the coldest days will be warmer. Southeastern Florida is projected to experience no days with temperatures below 32°F during the 2070–2099 period; currently, the low-temperature extreme for the proposed Turkey Point site is 25°F (Section 2.9.1.2). Projected precipitation changes in southeastern Florida vary seasonally, increasing by 0 percent–10 percent in winter, decreasing by 0 percent–10 percent in spring, decreasing by 20 percent–30 percent in summer, and increasing by 10 percent–20 percent in fall. Extreme heavy precipitation events are expected to increase in both frequency and intensity; an event that now occurs once in 20 years is projected to occur 2 to 3 times as often by the end of the century. Heavy precipitation events are expected to have a 20 percent increase in the amount of precipitation falling. The climate change impacts report indicates that the number of tropical storms occurring around the globe will decrease, but those that occur will be stronger in force, yielding more Category 4 and 5 storms. Rainfall rates associated with tropical storms are expected to be greater, "…with projected increases of about 20 percent averaged near the center of hurricanes" (GCRP 2014-TN3472).

Sea level is projected to rise 1 to 4 ft globally by 2100. As explained in the impacts report, the amount of sea-level rise experienced in any one location "depends on whether and how much the local land is sinking…or rising, and changes in offshore currents." In its report, the GCRP rates the vulnerability of the Turkey Point area to sea-level rise as "high" to "very high," and notes an "imminent threat of increased inland flooding during heavy rain events in low-lying coastal areas such as southeastern Florida, where just inches of sea level rise will impair the capacity of stormwater drainage systems to empty into the ocean." Sea-level rise also is expected to "…accelerate saltwater intrusion into freshwater supplies from rivers, streams, and groundwater sources near the coast" and agricultural areas around Miami-Dade County "…are at risk of increased inundation and future loss of cropland with a projected loss of 37,500 acres in Florida with a 27-inch sea level rise." Water demand in southeastern Florida is projected to increase by more than 50 percent by 2060, relative to 2005, based on combined changes in population, socioeconomic conditions, and climate. The GCRP cites the Southeast Florida Regional Compact as an "excellent example" of regional cooperative efforts among local, state, and federal agencies to develop "a comprehensive action plan" to adapt to impacts from climate change and sea-level rise.

The Southeast region currently contains "…existing power plant capacity to produce 32 percent of the nation's electricity," but also currently consumes 27 percent of the nation's total capacity, more than any other GCRP-defined region. Higher temperatures and increased use of air conditioning are projected to increase regional energy demand, "potentially stress[ing] electricity generating capacity, distribution infrastructure, and energy costs" (GCRP 2014-TN3472).

Other climate change impacts in the Southeast region identified in the GCRP report and relevant to the Turkey Point area include ecosystem exposure to risks from sea-level rise, particularly in tidal marshes, swamps, and wetlands; compromised protection of coastal lands and people against storm surge due to tidal wetland loss; effects on fisheries and fishery habitats due to wetland loss; spread of non-native plants; decreased crop production and livestock yield; increased formation of allergens and air pollutants, including ozone; and increases in harmful algal blooms and other surface-waterborne disease-causing agents. In addition, the GCRP indicates the potential for ocean warming leading to changes in local species composition, growth rates, spawning seasons, and/or migratory patterns; increased wildfire frequency, intensity, and size; effects on vector-borne and zoonotic (animal to human) disease transmission; increased insurance costs or unavailability of insurance coverage due to increased flooding incidents; stresses on society and infrastructure due to movement of people from vulnerable areas; effects of changes in energy costs on lower income households, the elderly, native tribes, and other vulnerable communities; and damage to transportation infrastructure.

I.3 Assessment Summary

This section summarizes the review team's assessment of the effects of climate change on relevant resource areas using the process outlined in Section I.1.

I.3.1 Land Use

I.3.1.1 Land-Use Summary

Climatological changes are not likely to influence, or lead to, any plant operational impacts on local/regional land-use classifications or economic development plans. Climate change could lead to changes in the distribution of land use in Miami-Dade County and sea-level rise could lead to the loss of some inhabitable land in the county. However, once the operational workforce is housed in the initial years of operation, operation of a reactor is not expected to alter land use. Therefore, there is little potential for interaction between land-use changes resulting from climate change and land-use changes caused by later operational years of the reactor.

I.3.1.2 Land-Use Conclusion

Climatological changes are not expected to affect the land-use operational impact level assigned in Chapter 5.

I.3.2 Hydrology

I.3.2.1 Summary

Climatological changes are not expected to affect the anticipated hydrologic alterations resulting from station operation, or influence (or lead to) plant operations impacts on other water uses and users. Sea-level rise will result in greater depth of Biscayne Bay near the Turkey Point site. Because of the current very shallow conditions of Biscayne Bay in this vicinity even a modest increase in sea level may help to improve circulation (reducing the hypersalinity of water entering the radial collector well system). However, circulation is also controlled by flow conditions away from the site. The review team presumed that the cooling canals' water-surface elevation would likely also rise in response to the rise in sea level. This rise would increase the volume of water in the canals, but it is not expected to appreciably change the gradient between Biscayne Bay and the cooling canals. Therefore, no change in the interface between the canals and the Bay is expected.

Sea-level rise will also push the freshwater–seawater interface further inland. This will put further stresses on freshwater resources inland. However, because the proposed Units 6 and 7 would use reclaimed wastewater for most of its water needs, this would not alter the impact of the plant.

As discussed in Section I.2, precipitation amounts in South Florida are projected to shift in different directions in different seasons. Even if total precipitation increases, if the majority of this increase is in response to intense storms it would not result in a proportional increase in recharge to groundwater. The increase in temperature may also increase evapotranspiration, thereby further reducing recharge. The review team determined that overall recharge to the Biscayne Bay aquifer may be reduced as a result of climate change. However, because the proposed plant would use reclaimed wastewater for most of its water needs, this would not alter the plant's impact on the environment.

The review team could not determine whether an increase in temperature or changes in precipitation patterns would result in any change in the supply of wastewater for the plant's cooling system. Given the abundance of wastewater in this region, the review team determined that a sufficient supply of wastewater would remain available.

I.3.2.2 Conclusion

The review team identified no shift in the Chapter 5-assigned impacts on water use and water quality caused by the operation of the proposed plant due to a reasonably foreseeable alteration in the environmental baseline associated with climate change.

I.3.3 Terrestrial & Wetland Ecology

I.3.3.1 Summary

Climatological changes could affect the impact of plant operations from facility and landscape maintenance, noise, and traffic on terrestrial habitats and wildlife. In particular, climate change could increase stress on terrestrial habitats, especially the freshwater and brackish water wetlands comprising the Everglades, the mangrove wetlands adjoining Biscayne Bay, and the tree islands and remnant patches of pine rocklands that dot the surrounding landscape. Climate change could result in longer periods between precipitation events, drier conditions during some seasons, and more frequent wildfires that could facilitate introduction of new diseases and pests. Sea-level rise could stress mangrove forests due to inundation and could stress surviving wetland vegetation by introducing brackish water farther inland, while the expected tendency to armor fastlands could prevent concurrent establishment of more inland mangrove forests and other coastal wetlands. Climate change would place additional stress on the same habitats and wildlife affected by the operational impacts discussed in Section 5.3.1. Particularly noteworthy is that the stresses on wetlands and other terrestrial habitats caused by climate change could result in greater introduction of exotic species such as Melaleuca, Australian pine, and the Burmese python.

The expected climatological changes could exacerbate the effects of plant operations (discussed in Section 5.3.1) on terrestrial habitats, wetlands, and species. In particular, climate change could lead to drier conditions due to longer periods between precipitation events and wildfires. Climate change could reduce the extent of mangrove forests primarily due to coastal inundation and sawgrass in the Everglades primarily due to alteration of hydroperiod, stressing vegetation and wildlife. Increased introduction of exotic species could further reduce the ecological and hydrological function of wetlands and reduce the suitability of various upland and wetland habitats to threatened, endangered, and rare species.

The expected climatological changes could worsen the minor effects of plant and transmission line operations on birds, bats, and other wildlife due to collisions, electrocution, or electromagnetic radiation effects (discussed in Section 5.3.1). Climate change could substantially alter the hydroperiod of habitats traversed by the proposed corridors for the two transmission lines, including the eastern Everglades and remnant pine rockland patches. These changes could stress wildlife dependent on the affected habitats, including birds, bats, and other wildlife. Even though the effects on wildlife from collisions, electrocution, and electromagnetic radiation are typically minor (see Section 5.3.1), the stresses could be exacerbated when combined with the effects of climate change.

Although climate change could potentially interact synergistically with plant operations to raise impact levels on terrestrial wildlife from plant operations and influence the impact of the proposed units on terrestrial resources and wetlands, the ability to coordinate with other agencies should not be noticeably impeded. The importance of close coordination would, however, be greater.

The expected climatological changes could affect the overall impact of plant operations on regional standing stocks of important terrestrial species, including plant impacts on species' tolerance of environmental changes and their natural survival rates. The increased potential for substantial adverse effects on the sensitive wetland and upland habitats surrounding the Turkey Point site and proposed new offsite corridors would concurrently place increased stresses on species using those habitats, including important species. The increased stresses caused by climate change could reduce the tolerance of some important species to collisions, noise, and other plant operational impacts. Furthermore, many of the identified important species are species whose populations have already been severely lowered by recent decades of drainage and development, and thus are less capable of recovery from new stresses.

The stresses placed on terrestrial habitats by climate change could lead to a greater potential for introduction of disease organisms and invasive species. Climate change could stress those habitats by decreasing the hydroperiod and by inducing the introduction of exotic species adapted to warmer climates and seasonally drier habitats. The subject habitats have already been stressed by a history of introduction of numerous invasive species. Additional stresses to native vegetation can be expected to encourage the further establishment of invasive species.

I.3.3.2 Conclusion

Climate change could place multiple new stresses on wetlands and other terrestrial habitats, especially the hydrologically sensitive Everglades and Everglades National Park, the extensive mangrove forests bordering Biscayne Bay, including those within Biscayne National Park, and other unique ecological communities such as pine rocklands. Climate change would place additional stress on the same habitats and wildlife stressed by plant operations and could cause an increase in the impacts on terrestrial resources discussed in Section 5.3.1.

I.3.4 Aquatic Ecology

I.3.4.1 Summary

Climatological changes would have minimal influence on the impact of the operation of proposed Units 6 and 7 on aquatic resources using either reclaimed water or radial collector wells. A change in sea level would not influence the availability of reclaimed water, so an increase of cooling-water withdrawal by the radial wells is not expected. Sea-level rise will increase the depth of Biscayne Bay but it is not expected to affect the operation of the radial wells. Losses to fish stocks from impingement and entrainment would continue to be negligible and are not expected to change. Entrainment, entrapment, and impingement are highly unlikely, and there is no evidence operation would directly affect aquatic resources. There is no evidence that proposed Units 6 and 7 would affect species tolerance or natural survival rates, or contribute to an increase in invasive or introduced species. Given the proposed cooling-system configurations, influence on the water quality of nearby receiving water would be negligible. Changes in baseline conditions due to climate change are not expected to alter this result. Climate change is not expected to noticeably impede the ability of agencies to coordinate on the protection of aquatic species. The importance of close coordination would, however, be greater.

I.3.4.2 Conclusion

The review team identified no shift in the Chapter 5-assigned impacts on aquatic ecology caused by the operation of the proposed plant due to a reasonably foreseeable alteration of baseline conditions associated with climate change.

I.3.5 Socioeconomics

As discussed in Section 5.4 and summarized in Section 10.2.2, within the area of socioeconomics the categories of physical impacts, demographic impacts, economic impacts, and impacts on infrastructure and community services are assessed separately, and individual category impact levels are assigned. These same categories are discussed here.

I.3.5.1 Summary

The review team determined that all of the expected physical impacts during operations (noise, air quality, buildings, roads, waterways, and aesthetics) would be SMALL and would warrant no mitigation. During the life of the proposed license the review team expects physical impacts on the listed categories would not be exacerbated by the effects of climate change and would remain at negligible levels.

The impacts on the demographic makeup of the area surrounding the proposed site would be SMALL and would not warrant mitigation. If the speculated climate change impacts were to occur during the life of the proposed license, the review team believes the demographic impact would be an out-migration of residents to other areas with higher elevations. Consequently, the operations-related impacts on the demographic makeup of the area would be reduced even further.

All economic impacts from operations of the proposed project would be beneficial and SMALL for Miami-Dade County, Homestead, and Florida City. In the event of climate change-induced sea-level rise, which is likely to occur gradually, the NRC requires licensees of nuclear power plants to implement corrective actions to mitigate conditions adverse to safety. The applicant would need to take measures to mitigate the effects of global climate change such that the proposed nuclear power plants would continue to be operated safely in accordance with 10 CFR Part 50 (TN249). Therefore, the review team anticipates the economic impacts of operations of the proposed project would continue unchanged.

There are four major subsections in the review team's assessment of the operations-related impacts on infrastructure and community services from the proposed project: traffic, recreation, housing, and public services.

- **Traffic**. The review team determined that the operations-related impacts of traffic would be moderate. While the long-term effects of global climate change would have a deleterious impact on the current level of infrastructure in the area, the review team believes it is not unreasonable to expect decision makers in the area to incrementally adapt to the climate change effects (e.g., sea-level rise) by incorporating mitigating measures that would prevent the deterioration of infrastructure services (e.g., raising the elevation of roads). Such adaptive measures would impose significant costs on local communities, the funds for which would either have to come from increased revenues (taxes and tolls) or be diverted from other expenses (maintenance, personnel, services). Consequently, the review team expects that if the physical changes predicted by the GCRP report (GCRP 2014-TN3472) were to occur, the traffic-related impacts on the local communities would increase.

- **Recreation**. The primary receptors of recreational impacts due to operations are accessibility and aesthetics. The review team expects that, like traffic, the long-term effects of climate change would significantly change the aesthetic appeal of local recreation areas and the public's access to Biscayne Bay and the Everglades. However, the NRC portion of the total impact would remain unchanged.

- **Housing**. The review team expects that any physical change in the environment from global climate change would occur at a rate slow enough that home owners in low-lying areas could either adapt their homes to the new conditions or to move out of the area. Consequently, the cumulative impact of global climate change on housing in the economic impact area would decline as the local population migrated away from the 50 mi region.

- **Public Services**. The review team expects that any physical change in the environment from global climate change would occur at a rate slow enough that local governments could adapt to whatever negative impacts may arise. Consequently, the review team determined the global climate change impacts on community services would decline as the population migrated away from the 50 mi region.

I.3.5.2 Conclusion

As indicated in Chapter 5, the review team identified no significant shifts in socioeconomic impacts of operational impacts as a result of possible climatological changes in the environmental baseline. Potential impacts on socioeconomics including infrastructure and community services as a result of climate change would continue to be addressed through regional and local governmental strategic adaptive plans.

I.3.6 Environmental Justice

I.3.6.1 Summary

Climate change could present challenges to minority and low-income communities, which the GCRP climate change impacts report refers to as "socially vulnerable populations," within the demographic region of the proposed project. The challenges include coping with climate change effects (e.g., sea-level rise), the capacity to adapt, and the ability to relocate. The review team believes it is not unreasonable to expect decision makers in the area to incrementally adapt to the climate change effects by implementing strategic adaptation plans and mitigating measures that would inform and assist minority and low-income communities. Therefore, the conclusions in Section 5.1.1 regarding environmental justice would remain unchanged.

I.3.6.2 Conclusion

Overall, the operational impact levels assigned to environmental justice in Chapter 5 did not change as a result of possible climatological changes in the environmental baseline. Potential impacts on environmental justice communities as a result of climate change would continue to be addressed through regional and local governmental strategic adaptive plans.

I.3.7 Historic and Cultural Resources

I.3.7.1 Summary

There are no known onsite historic and cultural resources at the Turkey Point site; therefore, there would be no shift in the impacts on historic and cultural resources caused by the operation and maintenance of the proposed plant due to a reasonably foreseeable alteration in the environmental baseline associated with climate change. It is not known whether the change in the environmental baseline would cause a shift in impacts of offsite facilities (e.g., transmission lines).

I.3.7.2 Conclusion

As previously discussed, the climatological changes would not affect the historic and cultural impact level assigned in Chapter 5 because of the lack of resources at the Turkey Point site. It is not known whether the change in the environmental baseline would affect offsite resources.

I.3.8 Meteorology

I.3.8.1 Summary

The expected climatological changes would largely be unlikely to affect cooling-system impacts from the operating plant on local weather. Projected temperature increases due to climate change may lead to an increase in fogging from the cooling tower, but also a decrease in icing. Changes in severe weather intensity or length of dry spells would be unlikely to change the current parameters.

I.3.8.2 Conclusion

Operational impacts from the cooling system on local weather are discussed in Section 5.7.2 and should not change as a result of reasonably foreseeable climate changes.

I.3.9 Air Quality

I.3.9.1 Summary

Climatological changes may affect the sources, types, and estimates of annual air emissions from the operating plant and transmission lines. For example, changes in climate such as sea-level rise and increased extreme weather events may lead to an increase in air emissions from emergency equipment, if additional emergency backup equipment is needed for the proposed plants and if testing of that equipment increases. Because of expected increases in temperature over the period of operation, the health impacts of operational air emissions may increase. In a higher temperature environment, the formation of ozone due to emissions of nitrogen oxides (NO_x) from the diesel generators and other equipment is likely to increase, thereby leading to an increase in health impacts.

I.3.9.2 Conclusion

Operational air-quality impacts are discussed in Section 5.7.1 and should not change as a result of reasonably foreseeable climate changes. It is unclear whether additional emergency equipment would actually be needed in a changing climate, or whether testing of that equipment would increase, causing an increase in air emissions. Any additional equipment would be subject to Clean Air Act (42 USC 7401 et seq.) (TN1141) Title V permitting requirements. Estimates of air emissions are likely to remain the same, with a possible increase in health impacts due to increased ozone formation from emergency equipment NO_x emissions in a higher temperature environment.

I.3.10 Nonradiological Health

I.3.10.1 Summary

It is not known how changes in climate will affect the presence of etiological agents associated with plant operations (receiving waters and cooling-tower operations). However, it is reasonable to expect that currently existing laws and regulations protecting workers and members of the public would continue, or would be adjusted as necessary, to be as protective as they are under current climate conditions.

Climatological changes are not likely to have an effect on noise produced by operating plants; therefore, there would be no change in the health impacts from noise discussed in Section 5.8.2.

It is not likely that climatological changes would affect potential health impacts from electromagnetic fields (EMFs) associated with plant operations because regulations protecting workers and members of the public from EMFs would likely be adjusted to avoid impacts.

It is not likely that climatological changes would affect occupational health risks for operational plants because regulations protecting workers would be adjusted to avoid impacts on workers.

As discussed in Section I.3.5.1, while the long-term effects of global climate change would have a deleterious impact on the current level of infrastructure in the area, the review team believes it is not unreasonable to expect decision makers in the area would incrementally adapt to the climate change effects (e.g., sea-level rise) by incorporating mitigating measures that would prevent the deterioration of infrastructure services (e.g., raising the elevation of roads, adjusting speed limits). The review team expects that if the physical changes predicted by the GCRP were to occur, such adaptive measures would limit potential health impacts from traffic-related accidents.

I.3.10.2 Conclusion

Overall, the expected climatological changes would not change the nonradiological health resource operational impact level assigned in Chapter 5. Potential impacts from noise, etiological agents, exposure to EMFs, and occupational injuries are and would continue to be regulated to be protective of human health. Although there is some uncertainty surrounding predicted climatological changes, it is likely that regulations governing occupational and public health would be adjusted accordingly if needed.

I.3.11 Radiological Impacts

I.3.11.1 Summary

The review team determined that the expected climatological changes would affect the possibility of exposure to radiation from the operating facility as follows:

- Existing low population exposures of humans from proposed Units 6 and 7 would remain low because the level of effluent releases and regulatory requirements should not significantly change over the time of the license.

- Existing low non-human biota exposures from proposed Units 6 and 7 should not change because the level of effluent releases and regulatory requirements should not significantly change over the time of the license.
- The level of effluent releases, regulatory requirements (including those for occupational doses), and existing low exposures should not significantly change over the time of the license.
- The level of the expected normal radioactive gaseous effluent releases would remain the same. Thus, monitoring activity should remain the same with the exception that the monitoring locations could change because of changes in the physical land and population distribution around the site. Normal radioactive liquid effluent releases should remain unchanged due to the use of deep-well injection.

I.3.11.2 Conclusion

The review team identified no shift in the radiological impacts level caused by the operation of the proposed Units 6 and 7 due to reasonably foreseeable environmental alterations associated with climate change, because the level of effluent releases, regulatory requirements, and existing low population exposures should not significantly change over the time of the license.

I.3.12 Nonradioactive Waste

I.3.12.1 Summary

Sea-level rise and changes in land-use decisions may lead to changes in disposal options for nonradioactive waste and mixed wastes. However, solid, liquid, gaseous, hazardous, and mixed wastes generated during operation of the proposed Turkey Point Units 6 and 7 would still have to be handled, transported, stored, and disposed of according to County, State, and Federal regulations.

I.3.12.2 Conclusion

Because nonradioactive and mixed wastes would still be subject to applicable Federal, State, and local requirements, climatological changes are unlikely to influence the SMALL impact determination discussed in Section 5.10.4.

I.3.13 Accidents

I.3.13.1 Summary

Climatological changes are expected to affect the site-specific, 50th percentile atmospheric dilution factor (i.e., χ/Q) used to evaluate dose consequences from postulated design basis accidents (DBAs). The χ/Q around the site is dependent on local meteorological conditions (wind speed, direction and stability class). The expected variations for these parameters as a result of climate change may increase, likely leading to less stability, which would likely increase dispersion and decrease the corresponding radiological effects. However, the predominant wind direction could change such that higher χ/Qs could shift along the site boundary, low-population zone, and beyond to areas with higher population density, which would increase the impact. Therefore, the overall impact is unknown.

Climatological changes might affect the average environmental risks of severe accidents because of changes in either severe accident probabilities or associated consequences. While the potential severity of storms and other natural phenomena might increase, nuclear power plants must be designed to withstand all creditable natural events at the site of concern. Increases in the severity of hurricanes with associated storm surges could increase the chance that a challenged safety system may not function. However, the core damage frequencies (CDFs) for the Advanced Passive 1000 (AP1000) pressurized water reactor design are very low and climate change is unlikely to change the CDFs appreciably. Therefore, even if consequences change as a result of climate change, severe accident risk is likely to remain SMALL because CDFs are so low.

The effects of climatological changes on the severe accident mitigation alternative (SAMA) cost-benefit analysis of the proposed facility are uncertain. While the averted costs have components that are based on local land values and the cost of evacuation and cleanup, these are typically not the major contributors to the total averted costs. Rather, the cost of replacement power has a larger effect and it is uncertain whether climate change would have an effect that would change the SAMA cost-benefit analysis. However, because the smallest difference between a cost-beneficial severe accident mitigation design alternative that was not studied further for the AP1000 design at the Turkey Point site (see Section 5.11.3) and the averted cost is approximately $400,000 (7 percent discount rate), it is difficult to see how climate change would affect the probability-weighted consequences from severe accidents in a manner to cause a finding different from SMALL for SAMAs.

I.3.13.2 Conclusion

The impact level assigned in Chapter 5 should remain SMALL for next-generation nuclear power plants like the AP1000 reactor design. The overall risks for severe accidents are significantly lower than the current generation of nuclear power plants and any climate change effect would have to change the risks by at least two orders of magnitude to result in a change in the impact level assigned in Chapter 5.

I.3.14 Transportation of Radiological Materials

I.3.14.1 Summary

The number and type of radioactive material shipments, regulatory requirements, and existing low maximally exposed individual and population exposures and risks from accidents for these types of shipments should not significantly change over the time of the license as a result of climate change. Radiological doses are strong functions of the radiation dose rate emitted from the shipment, exposure distance, and exposure duration. None of these parameters would be directly or disproportionately influenced by the impacts of climate change. Transportation accidents risks are a function of weather conditions. However, climate change may increase dispersion conditions in some areas as a result of more frequent storms and severe weather, but may also reduce dispersion in areas where climate change may result in more mild average conditions. As a result, the changes in transportation impacts potentially caused by climate change are not expected to be significant, but there are substantial uncertainties about impacts on weather conditions in specific areas and demographic changes that could affect transportation impacts in the region of interest.

I.3.14.2 Conclusion

Impact levels are not expected to change as a result of the effects of climate change, but there are significant uncertainties associated with the impacts of climate change on local weather conditions and demographics.

I.3.15 Benefit-Cost

I.3.15.1 Summary

Climatological changes could affect the estimated operational benefits and costs of the proposed facility. Proposed Turkey Point Units 6 and 7 would continue to provide benefits in the form of electricity generation and economic impacts to the region such as tax impacts and other spending. To the extent that summer peak demand load increases, the benefit of a large baseload power station such as Units 6 and 7 could increase.

Operating costs include maintenance costs, fuel costs, and annualized capital costs. Future climate change impacts would not affect the already incurred capital costs. However, to the extent that climate change events require repair or prolonged shutdown of Units 6 and 7, maintenance costs could increase.

I.3.15.2 Conclusion

Although climate change could increase or decrease the benefits and costs of the project, the review team expects the accrued benefits of construction and operation of Units 6 and 7 would still outweigh the associated costs.

I.4 References

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10 CFR Part 52. 2012. *Code of Federal Regulations*, Title 10, *Energy*, Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants." Washington, D.C. TN251.

15 USC 2921 et seq. Global Change Research Act of 1990. TN3330.

42 USC 2011 et seq. Atomic Energy Act of 1954. TN663.

42 USC 4321 et seq. National Environmental Policy Act (NEPA) of 1969, as amended. TN661.

42 USC 7401 et seq. Clean Air Act. TN1141.

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Appendix J

Greenhouse Gas Footprint Estimates for a Reference 1,000 MW(e) Light-Water Reactor

Appendix J

Greenhouse Gas Footprint Estimates for a Reference 1,000 MW(e) Light-Water Reactor

The review team has estimated the greenhouse gas (GHG) footprint of various activities associated with nuclear power plants. These activities include building, operating, and decommissioning a nuclear power plant. The estimates include direct emissions from the nuclear facility and indirect emissions from workforce transportation and the fuel cycle.

Preconstruction/construction equipment estimates listed in Table J-1 are based on hours of equipment use estimated for a single nuclear power plant at a site requiring a moderate amount of terrain modification (UniStar 2007-TN1564).

Table J-1. GHG Emissions from Equipment Used in Preconstruction/Construction and Decommissioning

Equipment	Preconstruction/ Construction Total[a] (MT CO_2e)	Decommissioning Total[b] (MT CO_2e)
Earthwork and dewatering	12,000	6,000
Batch plant operations	3,400	1,700
Concrete	5,400	2,700
Lifting and rigging	5,600	2,800
Shop fabrication	1,000	500
Warehouse operations	1,400	700
Equipment maintenance	10,000	5,000
Total[c]	39,000	19,000

(a) Based on hours of equipment usage over 7-year period
(b) Based on equipment usage over 10-year period
(c) Results are rounded

Preconstruction/construction equipment carbon monoxide (CO) emission estimates were derived from the hours of equipment use and carbon dioxide (CO_2) emissions were then estimated from the CO emissions using a scaling factor of 172 tons of CO_2 per ton of CO. The scaling factor is based on the ratio of CO_2 to CO emission factors for diesel fuel industrial engines as reported in Table 3.3-1 of AP-42 (EPA 2012-TN2647). A CO_2 to total GHG equivalency factor of 0.991 is used to account for the emissions from other GHGs such as methane (CH_4) and nitrous oxide (N_2O). The equivalency factor is based on non-road/construction equipment (Chapman et al. 2012-TN2644). Equipment emissions estimates for decommissioning are assumed to be one-half of those for preconstruction/construction. Data on equipment emissions for decommissioning are not available; the one-half factor is based on the assumption that decommissioning would involve less earth moving and hauling of material and fewer labor hours than preconstruction/construction.

Table J-2 lists the review team's estimates of the CO_2 equivalent (CO_2e) emissions associated with workforce transportation. Preconstruction/construction workforce estimates for new plant are conservatively based on estimates in various combined license applications (Chapman et al. 2012-TN2644); operational and decommissioning workforce estimates are based on Supplement 1 to NUREG–0586 (NRC 2002-TN665). Table J-2 lists the assumptions used to estimate total miles traveled by each workforce and the factors used to convert total miles to metric tons (MT) CO_2e. The workers are assumed to travel in gasoline-powered passenger vehicles (i.e., cars, trucks, vans, and sport utility vehicles) that get an average of 21.6 mi/gal of gasoline (FHWA 2012-TN2645). Conversion from gallons of gasoline burned to CO_2e is based on U.S. Environmental Protection Agency (EPA) emission factors (EPA 2012-TN2643).

Table J-2. Workforce GHG Footprint Estimates

	Preconstruction/ Construction Workforce	Operational Workforce	Decommissioning Workforce	SAFSTOR Workforce
Commuting trips (round trips per day)	1,000	550	200	40
Commute distance (miles per round trip)	40	40	40	40
Commuting days (days per year)	365	365	250	365
Duration (years)	7	40	10	40
Total distance traveled (mi)[(a)]	102,000,000	321,000,000	20,000,000	23,000,000
Average vehicle fuel efficiency[(b)] (mi/gal)	21.6	21.6	21.6	21.6
Total fuel burned[(a)] (gal)	4,700,000	14,900,000	900,000	1,100,000
CO_2 emitted per gal[(c)] (MT CO_2)	0.00892	0.00892	0.00892	0.00892
Total CO_2 emitted[(a)] (MT CO_2)	42,000	133,000	8,000	10,000
CO_2 equivalent factor[(c)] (MT CO_2/MT CO_2e)	0.977	0.977	0.977	0.977
Total GHG emitted[(a)] (MT CO_2e)	43,000	136,000	8,000	10,000

(a) Results are rounded
(b) FHWA 2012-TN2645
(c) EPA 2012-TN2643

Title 10 of the *Code of Federal Regulations* (CFR) 51.51(a) (TN250) states that every environmental report prepared for the combined license stage of a light-water-cooled nuclear power reactor shall take Table S–3 from 10 CFR 51.51(b) (TN250) as the basis for evaluating the contribution of the environmental effects of the uranium fuel cycle in licensing the nuclear power reactor. 10 CFR 51.51(a) (TN250) further states that Table S–3 shall be included in the environmental report and may be supplemented by a discussion of the environmental significance of the data set forth in the table as weighted in the analysis for the proposed facility.

Table S–3 does not provide an estimate of GHG emissions associated with the uranium fuel cycle; it only addresses pollutants that were of concern when the table was promulgated in the 1980s. However, Table S–3 does state that 323,000 MWh is the assumed annual electric energy use for the reference 1,000 MW(e) nuclear plant and this 323,000 MWh of annual electric energy is assumed to be generated by a 45 MW(e) coal-fired power plant burning 118,000 MT of coal. Table S–3 also assumes approximately 135,000,000 standard cubic feet (scf) of natural gas is required per year to generate process heat for certain portions of the uranium fuel cycle. The review team estimates that burning 118,000 MT of coal and 135,000,000 scf of natural gas per year results in approximately 253,000 MT of CO_2e being emitted into the atmosphere per year due to the uranium fuel cycle (Harvey 2013-TN2646).

The review team estimated GHG emissions related to plant operations from a typical usage of various diesel generators onsite (UniStar 2007-TN1564). CO emission estimates were derived assuming an average of 600 hr of emergency diesel generator operation per year (i.e., four generators, each operating 150 hr/yr) and 200 hr of station blackout diesel generator operation per year (i.e., two generators, each operating 100 hr/yr). A scaling factor of 172 was then applied to convert the CO emissions to CO_2 emissions and a CO_2 to total GHG equivalency factor of 0.991 was used to account for the emissions from other GHGs such as CH_4 and N_2O.

Given the various sources of GHG emissions discussed above, the review team estimates the total life-cycle GHG footprint for a reference 1,000 MW(e) nuclear plant with an 80 percent capacity factor to be about 10,500,000 MT. The components of the footprint are summarized in Table J-3. The uranium fuel cycle component of the footprint dominates all other components. It is directly related to power generated. As a result, it is reasonable to use reactor power to scale the footprint to larger reactors.

Table J-3. Nuclear Plant Lifetime GHG Footprint

Source	Activity Duration (yr)	Total Emissions (MT CO_2e)
Preconstruction/construction equipment	7	39,000
Preconstruction/construction workforce	7	43,000
Plant operations	40	181,000
Operations workforce	40	136,000
Uranium fuel cycle	40	10,100,000
Decommissioning equipment	10	19,000
Decommissioning workforce	10	8,000
SAFSTOR workforce	40	10,000
Total[(a)]		10,500,000

(a) Results are rounded

The Intergovernmental Panel on Climate Change (IPCC) released a special report on renewable energy sources and climate change mitigation in 2012 (IPCC 2012-TN2648). Annex II of this IPCC report includes an assessment of previously published works on life-cycle GHG emissions from various electric generation technologies, including nuclear energy. In this assessment, the IPCC included only material that passes certain screening criteria for quality and relevance. The IPCC screening yielded 125 estimates of nuclear energy life-cycle GHG emissions from 32 separate references. The IPCC-screened estimates of the life-cycle GHG emissions associated with nuclear energy, as shown in Table A.II.4 of the report, ranged more than two orders of magnitude, from 1 to 220 g of CO_2e/kWh, with 25 percentile, 50 percentile, and 75 percentile values of 8 g CO_2e/kWh, 16 g CO_2e/kWh, and 45 g CO_2e/kWh, respectively. The range of the IPCC estimates is due, in part, to assumptions regarding the type of enrichment technology employed, how the electricity used for enrichment is generated, the grade of mined uranium ore, the degree of processing and enrichment required, and the assumed operating lifetime of a nuclear plant.

The review team's life-cycle GHG estimate of approximately 10,500,000 MT CO_2e for the reference 1,000 MW(e) nuclear plant is equal to about 37.5 g CO_2e/kWh, which places the review team estimate between the 50 and 75 percentile values of the IPCC estimates given in Table A.II.4 of the report.

In closing, the review team considers the footprint estimated in Table J-3 to be appropriately conservative. The GHG emissions estimates for the dominant component (uranium fuel cycle) are based on 30-year-old enrichment technology assuming that the energy required for enrichment is provided by coal-fired generation. Different assumptions related to the source of energy used for enrichment or the enrichment technology that would be just as reasonable could lead to a significantly reduced footprint.

Emissions estimates presented in the body of this environmental impact statement have been scaled to values appropriate for the proposed project. The uranium fuel cycle emissions have been scaled by reactor power and plant capacity factor using the scaling factor determined in Chapter 6 and by the number of reactors to be built. Plant operations emissions have been adjusted to represent the number of large GHG emissions sources (e.g., diesel generators and boilers) associated with the project. The workforce emissions estimates have been scaled to account for differences in workforce numbers and commuting distance. Finally, equipment emissions estimates have been scaled by estimated equipment usage. As can be seen in Table J-3, only the scaling of the uranium fuel-cycle emissions estimates makes a significant difference in the total GHG footprint of the project.

References

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NRC FORM 335 (12-2010) NRCMD 3.7 **BIBLIOGRAPHIC DATA SHEET** *(See instructions on the reverse)*	U.S. NUCLEAR REGULATORY COMMISSION	1. REPORT NUMBER (Assigned by NRC, Add Vol., Supp., Rev., and Addendum Numbers, if any.) NUREG-2176, Volume 2 DRAFT
2. TITLE AND SUBTITLE Environmental Impact Statement for Combined Licenses (COLs) for Turkey Point Nuclear Plant Units 6 and 7, Draft Report for Comment		3. DATE REPORT PUBLISHED MONTH: February YEAR: 2015
		4. FIN OR GRANT NUMBER
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		7. PERIOD COVERED (Inclusive Dates)

8. PERFORMING ORGANIZATION - NAME AND ADDRESS (If NRC, provide Division, Office or Region, U. S. Nuclear Regulatory Commission, and mailing address; if contractor, provide name and mailing address.)
Division of New Reactor Licensing
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9. SPONSORING ORGANIZATION - NAME AND ADDRESS (If NRC, type "Same as above", if contractor, provide NRC Division, Office or Region, U. S. Nuclear Regulatory Commission, and mailing address.)
Same as above

10. SUPPLEMENTARY NOTES
Docket Nos. 52-040 and 52-041

11. ABSTRACT (200 words or less)
This environmental impact statement (EIS) has been prepared in response to an application submitted to the U.S. Nuclear Regulatory Commission (NRC) by Florida Power and Light Company (FPL) for two combined construction permits and operating licenses (combined licenses or COLs). The proposed actions related to the FPL application are (1) NRC issuance of COLs for two new power reactor units (Units 6 & 7) at the Turkey Point Nuclear Power Plant site in Miami-Dade County, Florida, and (2) U.S. Army Corps of Engineers (USACE) decision to issue, deny, or issue with modifications a Department of the Army (DA) permit to perform certain dredge and fill activities in waters of the United States and to construct structures in navigable waters of the United States related to the project.

This EIS documents the review team's analysis, which considers and weighs the environmental impacts of constructing and operating two new nuclear units at the Turkey Point site and at alternative sites, including measures potentially available for reducing or avoiding adverse impacts.

After considering the environmental aspects of the proposed action before the NRC, the NRC staff's preliminary recommendation to the Commission is that the COLs be issued as proposed. This recommendation is based on (1) the application, including the Environmental Report (ER), submitted by FPL; (2) consultation with Federal, State, Tribal, and local agencies; (3) the review team's independent review; (4) the consideration of public scoping comments; and (5) the assessments summarized in this EIS, including the potential mitigation measures identified in the ER and this EIS.

12. KEY WORDS/DESCRIPTORS (List words or phrases that will assist researchers in locating the report.)	13 AVAILABILITY STATEMENT
Turkey Point Nuclear Plant Units 6 and 7 Combined License Application	unlimited
Turkey Point Units 6 and 7 COL	14 SECURITY CLASSIFICATION
Turkey Point Units 6 and 7 Environmental Review	(This Page) unclassified
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Environmental Impact Statement for Combined Licenses (COLs) for
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