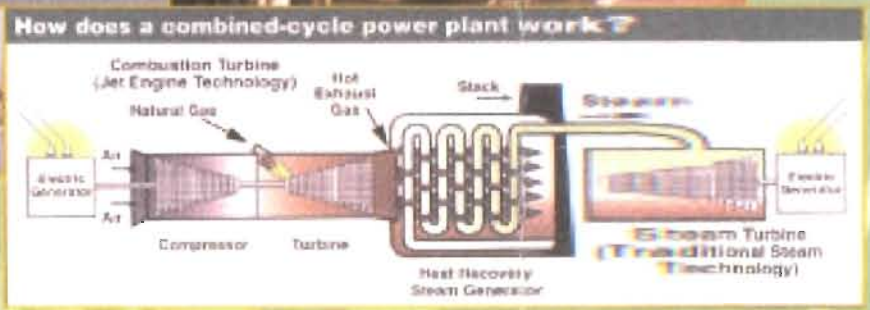
Turkey Point

expansion project



Volume 1 of 3

FPL

SITE CERTIFICATION APPLICATION
TURKEY POINT EXPANSION PROJECT

VOLUME 1 OF 3

Submitted by:

Florida Power & Light Company
700 Universe Boulevard
Juno Beach, Florida 33408

Kennard F. Kosky, P.E.
Professional Registered Engineer No. 14996

Golder Associates Inc.
6241 NW 23rd Street, Suite 500
Gainesville, Florida 32653-1500

November 2003
0337600

FPL

APPLICANT INFORMATION

Please supply the following information:

Applicant's Official Name *Florida Power and Light Company*

Address *700 Universe Boulevard, Juno Beach, FL 33408*

Address of Official Headquarters *700 Universe Boulevard, Juno Beach, FL 33408*

Business Entity (corporation, partnership, co-operative) *Corporation*

Names, owners, etc. *Florida Power and Light Company (an investor-owned electric utility)*

Name and Title of Chief Executive Officer *Armando J. Olivera, President*

Name, Address, and Phone Number of Official Representative responsible

for obtaining certification *Barbara Linkiewicz, Environmental Licensing Manager, New Generation Projects, Environmental Services*

700 Universe Boulevard, Juno Beach, FL 33408 Phone: (561) 691-7518 Fax: (561) 691-7049

Site Location (county) *9 miles east of US Highay 1 on 344th Street, Miami-Dade County, FL 33035*

Nearest Incorporated City *Homestead, FL (about 4.5 miles east of nearest boundary)*

Latitude and Longitude *25°26' 09" 80°19' 52"*

UTM's Northerly *2,813.2 km N*

Easterly *567.2 km E (Zone 17)*

Section, Township, Range *Portions of Sections 27 and 28 of Township 57S, Range 40E*

Location of any directly associated transmission

facilities (counties) *Not Applicable*

Name Plate Generating Capacity *Nominal 1,150 MW*

Capacity of Proposed Additions and Ultimate Site

Capacity (where applicable) *Capacity Addition is 1,150 MW nominal*

Remarks (additional information that will help identify the applicant)

Project Name: Turkey Point Expansion Project (a.k.a. Turkey Point Unit 5)

TURKEY POINT EXPANSION PROJECT

PROJECT AREA

LEGAL DESCRIPTION:

A PORTION OF FRACTIONAL SECTION 27 AND SECTION 28, OF TOWNSHIP 57 SOUTH, RANGE 40 EAST, OF MIAMI-DADE COUNTY, FLORIDA AND MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGIN AT A POINT WHICH HAS CO-ORDINATES OF N-403,236.84, E-873,718.92',
THIS POINT OF BEGINNING TO BE KNOWN AS POINT NO. 1;
THENCE S49°33'29"E FOR 776.97 FEET TO POINT NO. 2, WHICH HAS COORDINATES OF N-402,732.84, E-874,310.24;
THENCE DUE EAST FOR 3,033.86 FEET TO POINT NO. 3, WHICH HAS COORDINATES OF N-402,732.84, E-877.344.10;
THENCE N33°34'54"W FOR 682.27 FEET TO POINT NO. 4, WHICH HAS COORDINATES OF N-403,301.24, E-876,966.72;
THENCE N58°03'49"E FOR 138.21 FEET TO POINT NO. 5, WHICH HAS COORDINATES OF N-403,374.35, E-877,084.01;
THENCE S33°28'28"E FOR 589.23 FEET TO POINT NO. 6, WHICH HAS COORDINATES OF N-402,882.85, E-877,409.01;
THENCE N56°32'02"E FOR 232.10 FEET TO POINT NO. 7, WHICH HAS COORDINATES OF N-403,010.84, E-877,602.63;
THENCE S33°28'19"E FOR 402.86 FEET TO POINT NO. 8, WHICH HAS COORDINATES OF N-402,674.79, E-877,824.82;
THENCE S56°31'43"W FOR 299.39 FEET TO POINT NO. 9, WHICH HAS COORDINATES OF N-402,509.67, E-877,575.08;
THENCE S59°49'08"E FOR 623.69 FEET TO POINT NO. 12, WHICH HAS COORDINATES OF N-402,196.12, E-878,114.22;
THENCE S47°44'52"E FOR 198.98 FEET; TO POINT NO. 13, WHICH HAS COORDINATES OF N-402,062.33, E-878.261.50;
THENCE S50°12'57"W FOR 174.23 FEET TO POINT NO. 14, WHICH HAS COORDINATES OF N-401,950.84, E-878,127.61;
THENCE N50°40'25"W FOR 347.61 FEET TO POINT NO. 15, WHICH HAS COORDINATES OF N-402,171.13, E-877,858.72;
THENCE N68°05'45"W FOR 326.31 FEET TO POINT NO. 16, WHICH HAS COORDINATES OF N-402,292.86, E-877,555.97;
THENCE S82°09'12"W FOR 216.15 FEET TO POINT NO. 17, WHICH HAS COORDINATES OF N-402,263.35, E-877,341.84;
THENCE S53°36'20"W FOR 217.19 FEET TO POINT NO. 18, WHICH HAS COORDINATES OF N-402,134.48, E-877,167.01;
THENCE DUE SOUTH FOR 771.69 FEET TO POINT 19, WHICH HAS COORDINATES OF N-401,362.79, E-877,167.01;
THENCE DUE EAST FOR 86.00 FEET TO POINT NO. 20, WHICH HAS COORDINATES OF N-401,362.79, E-877,253.01;
THENCE DUE SOUTH FOR 165.72 FEET TO POINT NO. 21, WHICH HAS COORDINATES OF N-401,197.07, E-877,253.01;
THENCE DUE WEST FOR 136.38 FEET TO POINT NO. 22, WHICH HAS COORDINATES OF N-401,197.07, E-877,116.63;
THENCE DUE NORTH FOR 476.06 FEET, TO POINT NO. 23, WHICH HAS COORDINATES OF N-401,673.13, E-877,116.63;
THENCE DUE WEST FOR 551.42 FEET TO POINT NO. 10, WHICH HAS COORDINATES OF N-401,673.13, E-876,565.21;
THENCE DUE SOUTH FOR 442.84 FEET TO POINT NO. 11, WHICH HAS COORDINATES OF N-401,230.29, E-876,565.21;
THENCE DUE WEST FOR 223.66 FEET TO POINT NO. 32, WHICH HAS COORDINATES OF N-401,230.29, E-876,341.55;
THENCE DUE NORTH FOR 144.47 FEET TO POINT NO. 31, WHICH HAS COORDINATES OF N-401,374.76, E-876,341.55;
THENCE DUE WEST FOR 459.74 FEET TO POINT NO. 24, WHICH HAS COORDINATES OF N-401,374.77, E-875,881.81;
THENCE S39°35'15"W FOR 440.26 FEET TO POINT NO. 25, WHICH HAS COORDINATES OF N-401,035.48, E-875,601.25;
THENCE N50°24'48"W FOR 1,140.05 FEET TO POINT NO. 26, WHICH HAS COORDINATES OF N-401,761.97, E-874,722.66;
THENCE N39°35'15"E FOR 422.12 FEET TO POINT NO. 27 WHICH HAS COORDINATES OF N-402,087.28, E-874,991.66;
THENCE N50°24'48"W FOR 714.45 FEET TO POINT NO. 28, WHICH HAS COORDINATES OF N-402,542.56, E-874,441.06;
THENCE S42°54'20"W FOR 41.60 FEET TO POINT NO. 29, WHICH HAS COORDINATES OF N-402,512.09, E-874,412.74;
THENCE N49°31'16"W FOR 995.08 FEET TO POINT NO. 30, WHICH HAS COORDINATES OF N-403,158.06, E-873,655.84;
THENCE N38°41'05"E FOR 100.92 FEET TO POINT NO. 1 AND THE POINT OF BEGINNING.

CONTAINS 3,876,398 SQUARE FEET OR 88.990 ACRES OF LAND, MORE OR LESS.

SURVEYOR'S NOTE:

CO-ORDINATES SHOWN WITHIN THIS LEGAL DESCRIPTION BASED ON STATE OF FLORIDA TRANSVERSE MERCATOR GRID SYSTEM, NORTH AMERICAN DATUM OF 1983/90.

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LIST OF ACRONYMS AND ABBREVIATIONS

AADT	Average Annual Daily Traffic
AAQS	Ambient Air Quality Standards
ANSI	American National Standard Institute
BACT	best available control technology
Btu/lb	British thermal units per pound
°C	degrees Celsius
CAA	Clean Air Act
CEM	continuous emission monitoring
CFR	Code of Federal Regulations
cfs	cubic feet per second
Cl	chloride
cm	centimeter
CO	carbon monoxide
CO_2	carbon dioxide
dB	decibel
dBA	A-weighted decibel
DEM	Digital Elevation Model
DLN	dry-low NO_x
EPA	U.S. Environmental Protection Agency
°F	degrees Fahrenheit
F.A.C.	Florida Administrative Code
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
FFWCC	Florida Fish and Wildlife Conservation Commission
FLM	Federal Land Manager
FLUCFCS	Florida Land Use, Cover and Forms Classification System
FNAI	Florida Natural Area Inventory
FPL	Florida Power & Light Company

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LIST OF ACRONYMS AND ABBREVIATIONS - continued

F.S.	Florida Statutes
ft	foot
ft^2	square foot
ft^2/day	square feet per day
ft-bls	feet below land surface
ft-msl	feet above mean sea level
gpd	gallons per day
gpm	gallons per minute
H_2O	water vapor
HRSG	heat recovery steam generator
HSH	highest, second-highest
Hz	hertz
I	Interstate Highway
IRP	integrated resource planning
IWAQM	Interagency Workgroup on Air Quality Models
kg	kilogram
km	kilometer
kWh	kilowatt hour
lb/hr	pounds per hour
lb/yr	pounds per year
LOS	Level of Service
m	meter
mgd	million gallons per day
mg/L	milligrams per liter
mi^2	square mile
MM4	Mesoscale Model - Generation 4
MMBtu/hr	million British thermal units per hour
MMcf/hr	million cubic feet per hour
mph	miles per hour
MW	megawatt

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LIST OF ACRONYMS AND ABBREVIATIONS - continued

NEPA	National Environmental Policy Act
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NOAA	National Oceanic and Atmospheric Administration
NP	National Park
NSPS	New Source Performance Standards
NWS	National Weather Service
O_2	oxygen
O_3	ozone
OFW	Outstanding Florida Waters
ppt	parts per thousand
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter of 10 micrometers or less
ppm	parts per million
ppmvd	parts per million-dry conditions
PSD	prevention of significant deterioration
QA/QC	quality assurance/quality control
RO	reverse osmosis
S	sulfur
SCA	Site Certification Application
SHPO	State Historic Preservation Officer
SIP	site implementation plan
SO_2	sulfur dioxide
SPCC	Spill Prevention Control and Countermeasure
SPL	sound pressure level
SR	State Road
SFWMD	South Florida Water Management District
TDS	total dissolved solids
TPY	tons per year

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LIST OF ACRONYMS AND ABBREVIATIONS - continued

TRB	Transportation Research Board
TTN	Technical Transfer Network
$\mu g/m^3$	micrograms per cubic meter
µg/gdw	micrograms per gram dry weight
µm	micrometer
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound

1.0 NEED FOR POWER AND THE PROPOSED FACILITIES

This chapter of the Site Certification Application (SCA) introduces Florida Power & Light Company (FPL), discusses the additional generating capacity needed to supply electricity to FPL's customers, and briefly describes the self-build option identified by FPL to meet that need.

1.1 INTRODUCTION – THE TURKEY POINT EXPANSION PROJECT

FPL has identified the Turkey Point Expansion Project (the Project) as the best self-build option to meet its customers' increased need for electricity in 2007. The Project involves construction of a new combined cycle generating unit that would provide approximately 1,150 additional megawatts (MW) at its existing Turkey Point power plant site in Miami-Dade County, Florida.

FPL is seeking approval of the Turkey Point Expansion Project under the Florida Electrical Power Plant Siting Act (PPSA), Chapter 403, Part II, Florida Statutes (F.S.). The PPSA provides a centralized review process for new electrical generating facilities in Florida, involving a balancing of "the increasing demand for electrical power plants with the broad interests of the public." The Florida Public Service Commission (FPSC) is the sole forum for the determination of need for a proposed facility. The Florida Department of Environmental Protection (FDEP) acts as the coordinator for the remainder of the site certification process, with input from various state, regional and local agencies, along with interested citizens. Ultimate disposition of the SCA is by the Governor and Cabinet sitting as the Siting Board.

In accordance with the Florida Public Service Commission's "Bid Rule" (Rule 25-22.082, Florida Administrative Code), FPL issued a Request for Proposals (RFP) on August 25, 2003 for the purpose of identifying and negotiating contracts for firm capacity and energy beginning in 2007 from non-FPL supply side resources. This RFP sought alternatives that can be compared to FPL's self-build option – i.e., the Turkey Point Expansion Project constituting FPL's "next planned generating unit". The eligible proposals submitted to FPL in response to the RFP will be evaluated against the Turkey Point Expansion Project.

After a comprehensive evaluation of power purchase alternatives, if FPL determines that the Turkey Point Expansion Project is the best, most cost-effective option to meet the needs of its customers, FPL will submit a Petition to Determine Need for the Project to the FPSC. That Petition, along with supporting documentation, will address the manner in which FPL's Turkey Point Expansion Project will meet the need for electric system reliability and integrity and the need for adequate electricity at reasonable cost, whether the Project is the most cost-effective alternative available, and whether there is conservation available to mitigate the need for the Project. Section 1.5 contains a summary of FPL's capacity needs and it's Request for Proposal process.

This SCA is being filed with the FDEP pursuant to Chapter 62-17, Florida Administrative Code (F.A.C.). The SCA describes the Turkey Point Expansion Project and addresses its environmental and socioeconomic aspects by presenting information on the existing natural and human environment, the new facilities to be constructed and operated, and the impacts of those facilities on those environments.

1.2 THE APPLICANT

FPL, the principal subsidiary of FPL Group, Inc., is the largest electric utility in Florida. FPL serves more than 7 million people (approximately 4 million customer accounts) along the eastern seaboard and the southern and southwestern portions of Florida. FPL serves customers in all or parts of 35 Florida counties (see Figure 1.2-1).

FPL's existing generating resources are located at fourteen power plant sites distributed geographically around the service territory, and also include partial ownership of two units located in Jacksonville and one unit in Georgia. The current generating facilities consist of nuclear steam units, coal units, combined cycle units, fossil steam units, combustion turbines and diesel units. This diverse mix of generating technologies and fuels provides operating reliability, flexibility, and the opportunity to minimize fuel costs.

FPL's bulk transmission system is composed of 1,105 circuit miles of 500 kilovolt (kV) lines and 2,702 circuit miles of 230 kV lines. The underlying transmission network is composed of 1,630 circuit miles of 138 kV lines, 718 circuit miles of 115 kV lines and 178 circuit miles of 69 kV lines. Integration of the generation, transmission and distribution system is achieved through FPL's 515 substations.

FPL has seen significant growth in the number of customers and the demand for electricity over the past ten years. In the coming decade, FPL expects continued growth in the demand for electricity to meet its customers' needs.

1.3 OVERVIEW OF THE PROJECT

FPL must add generating resources in the near future to provide continued reliable and cost-effective service to its customers, and to meet future load growth. FPL has determined that the best self-build option to meet the need projected in the year 2007 involves construction of a new combined cycle generating unit at the Turkey Point Power Plant site.

The Turkey Point Plant has reliably supplied electric power to FPL's residential, commercial and industrial customers since 1967, when Unit 1 began operation. The Turkey Point Plant site occupies approximately 11,000 acres in Miami-Dade County, Florida (see Figure 1.3-1). Generating units at the Turkey Point Plant site presently include Units 1 and 2 (each nominal 400-MW residual oil and/or natural gas-fired steam units) and Units 3 and 4 (each nominal 700 MW nuclear units). The site includes a 5,900-acre cooling canal system that serves Units 1 through 4. The Turkey Point Plant site was designed and developed to accommodate additional generating capacity.

The Project will consist of four new combustion turbines (CTs), four new heat recovery steam generators (HRSGs), and a new steam turbine/electric generator (ST) to create a "four-on-one" combined cycle unit. The CTs are similar to, but larger and more efficient than, traditional jet engines. They produce electrical energy by direct connection to an electric generator. The exhaust heat from the CTs, which would otherwise be wasted energy released to the atmosphere, will be routed through the HRSGs, which act as boilers to produce steam for the new turbine generator, which produces additional electricity. The HRSGs will have duct burners to optimize the new Unit's generating capacity. Natural gas will be the primary fuel for the new Unit, with ultra low sulfur light oil as a backup fuel for the CTs. Cooling water for Turkey Point Unit 5 will come from the Floridan aquifer, and a cooling tower for the new unit will be added as part of the Project. Turkey Point Unit 5, with a generating capacity of approximately 1,150 MW, will be the most efficient electric generator in the FPL system.

The portion of the Turkey Point Plant site that will be occupied by Project facilities comprises approximately 65 acres within the defined 90-acre Project Area. Existing Units 1 through 4 will remain in operation during and after construction of Unit 5.

Natural gas is currently supplied to the Turkey Point Plant Site by a lateral from the Florida Gas Transmission interstate pipeline. The existing gas pipeline will serve Unit 5.

Turkey Point Unit 5 will interconnect with FPL's existing transmission network at the existing on-site substation at the Turkey Point plant site. FPL plans to make limited design revisions to two existing transmission line segments which connect to the onsite substation, involving less than seven miles of existing right-of-way in Miami-Dade County.

Protecting the environment while providing safe, reliable and adequate power to its customers is of great importance to FPL. FPL's Turkey Point Plant will continue to comply with all applicable regulatory standards through construction and operation of Unit 5.

1.4 FPL'S RESOURCE PLANNING PROCESS

FPL uses an integrated resource planning (IRP) process in order to determine when new resources are needed, the magnitude of the resources needed, and the type of resources that should be added. The timing and type of potential new power plants are determined as part of this process. A description of FPL's IRP process is contained in FPL's Ten Year Power Plant Site Plan 2003-2012.

Four basic steps are fundamental to FPL's resource planning process:

- Step 1: Determine the magnitude and timing of FPL's resource needs.
- Step 2: Identify which resource options and resource plans can meet the determined magnitude and timing of these resource needs (i.e., identify competing options and resource plans).
- Step 3: Determine the economics for the total utility system with each of the competing options and resource plans.
- Step 4: Select a resource plan and commit, as needed, to near-term options.

1.5 NEED FOR THE PROJECT

1.5.1 FPL'S CAPACITY NEEDS

FPL's IRP process in 2002 and early 2003 confirmed what its work in previous years had shown: that FPL will have a need for additional resources in 2007. This part of the IRP process is generally called a "reliability assessment," and it is designed to determine both the magnitude and timing of FPL's resource needs. It is a forecast of how many megawatts of load reduction, new capacity, or a combination of both load reduction and new capacity options are needed, and when these megawatts are needed to meet FPL's customers' demand for electricity with the required reserve margin.

In the reliability assessment portion of its recent IRP work, FPL started with an updated load forecast. The primary drivers to develop these forecasts are demographic trends, weather, economic conditions, and prices of electricity. In addition, the resulting forecasts are an integration of economic evaluations, inputs of local economic development boards, weather assessments from NOAA, and inputs from FPL's own customer service planning areas. In the area of demographics, population trends by county, and housing characteristics, such as housing starts, housing size, and vintage of homes, are assessed. FPL also updated several databases, including: delivered fuel price projections, current financial and economic assumptions, and power plant capability and reliability assumptions.

Four assumptions were made by FPL during its recent IRP work that had a direct impact on the reliability assessment. These four assumptions concerned near-term construction capacity additions, near-term firm capacity purchase additions, long-term demand side management (DSM) implementation, and the projected extension or renegotiation of certain existing power purchase contracts.

The first of these assumptions is based on FPL's plans to add near-term capacity through various construction projects. FPL committed in 1998 to repower both existing steam units at its Fort Myers Plant site and two of the three existing steam units at its Sanford Plant site. Both of these repowering projects have been completed, and the capacity additions resulting from the Fort Myers and Sanford repowerings were assumed as installed capacity in the IRP analysis.

Another part of FPL's construction capacity addition assumption was its previously announced decision to add two new CTs during 2003 at the existing Fort Myers Plant site. FPL's resource planning work assumed this capacity as installed capacity.

The final part of FPL's construction capacity addition assumption was the addition of a new combined cycle unit at Manatee and the conversion of two existing CT's at Martin into a new combined cycle unit. Both additions are scheduled for mid-2005. The need for these capacity additions was determined by the Florida Public Service Commission in November 2002 and the Siting Board issued site certifications for them in April 2003.

The second of these assumptions involves short-term, firm capacity purchase additions. FPL decided through its 2000 resource planning work to secure an amount of purchase capacity for the next few years through short-term, firm capacity purchases. These firm capacity purchases are from a combination of utility and independent power producers. These purchase amounts were also assumed as firm capacity in FPL's resource planning work.

The third of these assumptions involved DSM. Since 1994, FPL's resource planning work has used the DSM MW called for in FPL's approved DSM Goals as a "given" in its analyses. This was again the case in FPL's most recent planning work, as its most recently approved new DSM goals through the year 2009 were taken as a "given".

The fourth of these assumptions is a projected extension or renegotiation of certain power purchase contracts that are currently scheduled to end in 2010. No final decision has been reached on this matter, but FPL has initiated discussions with Southern Company regarding a possible extension or renegotiation of these purchases. The inclusion, for planning purposes, of the assumption that these coal-by-wire purchases will continue beyond the current expiration date reflects, in part, an interest in maintaining/enhancing fuel diversity in FPL's system.

These assumptions and much of the updated database information were then used to determine the magnitude and the timing of FPL's resource needs. This determination is accomplished by system reliability analyses, which are typically based on a dual planning criteria of a minimum peak period reserve margin of 20 percent (FPL applies this to both summer and winter peaks) and a maximum loss-of-load probability (LOLP) of 0.1 days/year criteria. Both of these criteria are commonly used throughout the utility industry.

These reliability criteria (20-percent reserve margin, and 0.1 day per year) reflect two types of reliability assessment approaches: deterministic and probabilistic. Reserve margin analysis is a deterministic approach while LOLP analysis is a probabilistic approach. The reserve margin approach is essentially a calculation of excess firm capacity at the annual system peaks. It provides an indication of how well a generating system can meet its native load during peak periods.

However, a deterministic approach such as a reserve margin calculation does not take into account probabilistic-related elements such as: the reliability of individual generating units, the total number of generating units, or the sizes of these generating units. Nor does a deterministic approach fully take into account the value of being part of an interconnected system. Therefore, FPL also utilizes a probabilistic approach (LOLP) to provide additional information on the reliability of its generating system. Simply stated, LOLP is an index of how well a generating system may be able to meet its demand (i.e., a measure of how often load may exceed available resources). In contrast to reserve margin, the calculation of LOLP looks at the daily peak demands for each year, while taking into consideration such probabilistic events as the unavailability of individual generators due to scheduled maintenance or forced outages. LOLP is expressed in units of "number of times per year" that the system demand could not be served. The standard for LOLP commonly accepted in the industry is a maximum of 0.1 day per year. This analysis requires a more complicated calculation methodology than does reserve margin analysis.

In a reliability assessment, either a reserve margin criterion or the LOLP criterion will be violated first. This means that, for a given future year, FPL's system will not have a 20 percent reserve margin or it will have a projected LOLP value greater than 0.1. Whichever criterion is violated first is said to "drive" FPL's future resource needs. For the last few years, summer reserve margin has driven FPL's future needs. This again was the case in FPL's most current reliability assessment work performed as part of its 2002-3 IRP work.

FPL's work showed that with no additional resources beyond its existing generating units and purchases, plus the repowerings, new CTs, new purchases, DSM implementation and new combined cycle units mentioned above, FPL would fall below its summer reserve margin criterion of 20 percent starting with the summer of 2007. FPL projects that approximately 1,066 MW of additional resources will be needed by mid-2007 in order for FPL to continue to meet its summer reserve margin criterion

Consequently, FPL determined that it needs to add new resources for 2007. FPL needs to begin the licensing process in 2003 for a new combined cycle generating unit to insure that it meets those needs.

1.5.2 GEOGRAPHIC CONSIDERATIONS

FPL's recent planning efforts have also identified two issues that are now receiving attention in FPL's ongoing resource planning work. Those two issues are: 1) the significant imbalance in

Southeast Florida between regional load and generating capacity located within this region; and 2) maintaining/enhancing fuel diversity in the FPL system.

As to the first issue, one of the key considerations in the 2007 need requirement is the growing disparity between load and generating resources in Southeast Florida. This disparity has been created by strong regional load growth without new generating capacity additions in this region since 1993. Because of the continuing load growth in this region, the imbalance between generation and load will increase significantly during the next few years unless additional generation is sited in the Southeast Florida region.

Southeast Florida is the regional load center in the State, with load and generation in this area of approximately 12,000 MW at peak and 6,500 MW, respectively. The remaining power requirements in the Southeast region are met by transmission facilities providing capability for power imports originating to the north and west. The current import capability into the Southeast region is finite (in the range of 6,000 to 7,000 MW).

Based on the latest available forecasts, the load growth in the Southeast area will continue to increase the imbalance between generation and load to the point where the power system may not be able to be operated reliably. Avoiding this will require a combination of additional generation in and around the Southeast area and/or substantial transmission upgrades (including the siting of new, "greenfield" high voltage transmission lines) in the next several years. The generation and/or transmission facilities that are chosen will have a cost impact on how existing Southeast Florida generating units are operated.

1.5.3 FPL'S REQUEST FOR PROPOSALS

A new combined cycle unit such as the proposed Turkey Point Unit 5 falls under the FPSC's "Bid Rule" (Rule 25-22.082, F.A.C.). This rule requires electric utilities seeking to build such a unit to first solicit bids from interested parties in order to determine whether the utility's construction of this unit is the most economical alternative available. Consequently, FPL issued a Request for Proposal (RFP) on August 25, 2003. The RFP was announced in an advertisement in the Wall Street Journal and in a press release that was carried in numerous Florida newspapers and trade publications.

After a comprehensive evaluation of all eligible proposals, if FPL determines that the Turkey Point Expansion Project is the best, most cost-effective option to meet the needs of its customers, FPL will submit a Petition to Determine Need for the Project to the FPSC. That Petition, along with supporting documentation, will address the manner in which FPL's Turkey Point Expansion Project will meet the need for electric system reliability and integrity and the need for adequate electricity at reasonable cost, whether the Project is the most cost-effective alternative available, and whether there is conservation available to mitigate the need for the Project.

1.6 BENEFITS OF THE PROJECT

The most significant benefit of the Turkey Point Expansion Project is the continued supply of reliable, cost-effective electrical service to FPL's customers. Location of the Project at the Turkey Point site would provide enhanced system reliability and transmission system support. Project benefits also include increased employment during construction and operation of Unit 5, as well as additional opportunities for incorporating community involvement into Plant development activities.

1.7 SUMMARY OF PUBLIC OUTREACH PROGRAM

Employees of the Turkey Point Plant have been involved with the local community for many years, including providing ongoing communication about the Plant's activities and plans. FPL will continue this dialogue with citizens in Homestead, Florida City and the surrounding areas. One goal will be to build shared understanding between FPL, citizens and other stakeholders about this new Project, as well as to explore other shared, individual and community interests. This process includes various outreach activities focused on a wide variety of individuals and groups that have, or may have, an interest in the project. These activities involve FPL employees, surrounding community residents, customers, interested individuals or groups, and both Biscayne National Park and Everglades National Park.

In addition to generating well-informed decisions about the Project, FPL also hopes to achieve a high degree of alignment between Project features and the interests and priorities of people living in the surrounding communities. FPL plans to maximize the potential for the surrounding community to participate in the Project through outreach efforts already underway that will continue throughout the Project and into the future.

Primary activities for accomplishing these outreach goals include continuing dialogue with citizens through one-on-one discussions, group meetings, and other opportunities as may be of interest to residents. Activities will be focused on listening to people's needs, issues, and concerns. FPL is committed to responding to people's comments and questions in a timely manner. FPL's goal is to be the first and best source of information about the project.

Immediately following the announcement of the Project, FPL began its outreach to residents. Dialogue-based research continues to determine what people in the surrounding communities know about the Project, what they are interested in learning about it, and how to best communicate with them. So far, there has been a very positive response to the Project. Many interviewees recognize the need for power and comment that they believe the Project will have economic, social and environmental benefits. Findings from this research, the ongoing dialogue and outreach FPL has initiated, plus continuing feedback from the community, will be used as a basis for future communication initiatives.

FPL is committed to keeping the community updated on the Project through ongoing conversations, presentations, information on the FPL website, and in various print materials.

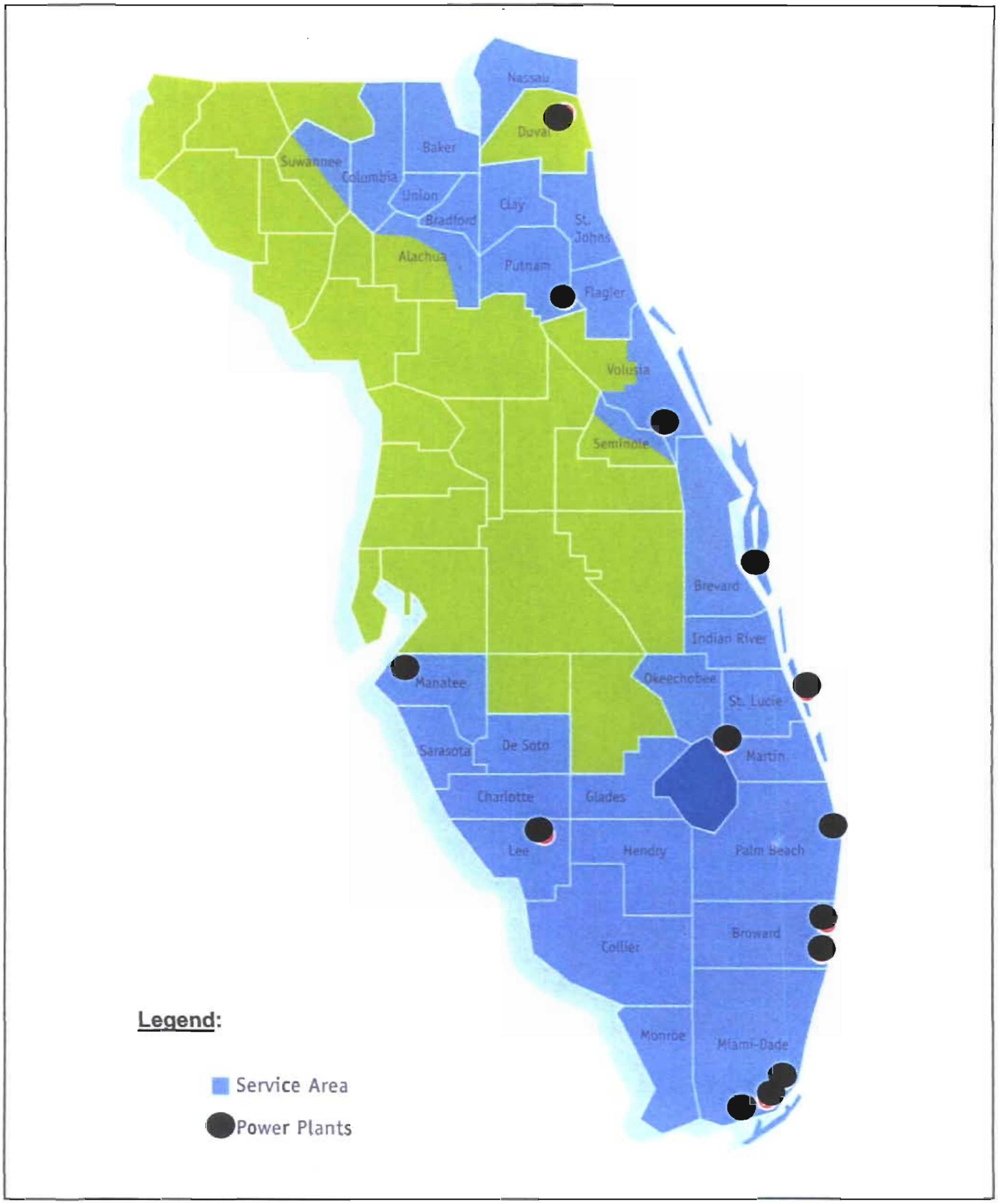


Figure 1.2-1. FPL Service Territory

Source: FPL, 2001; Golder, 2002.

FPL

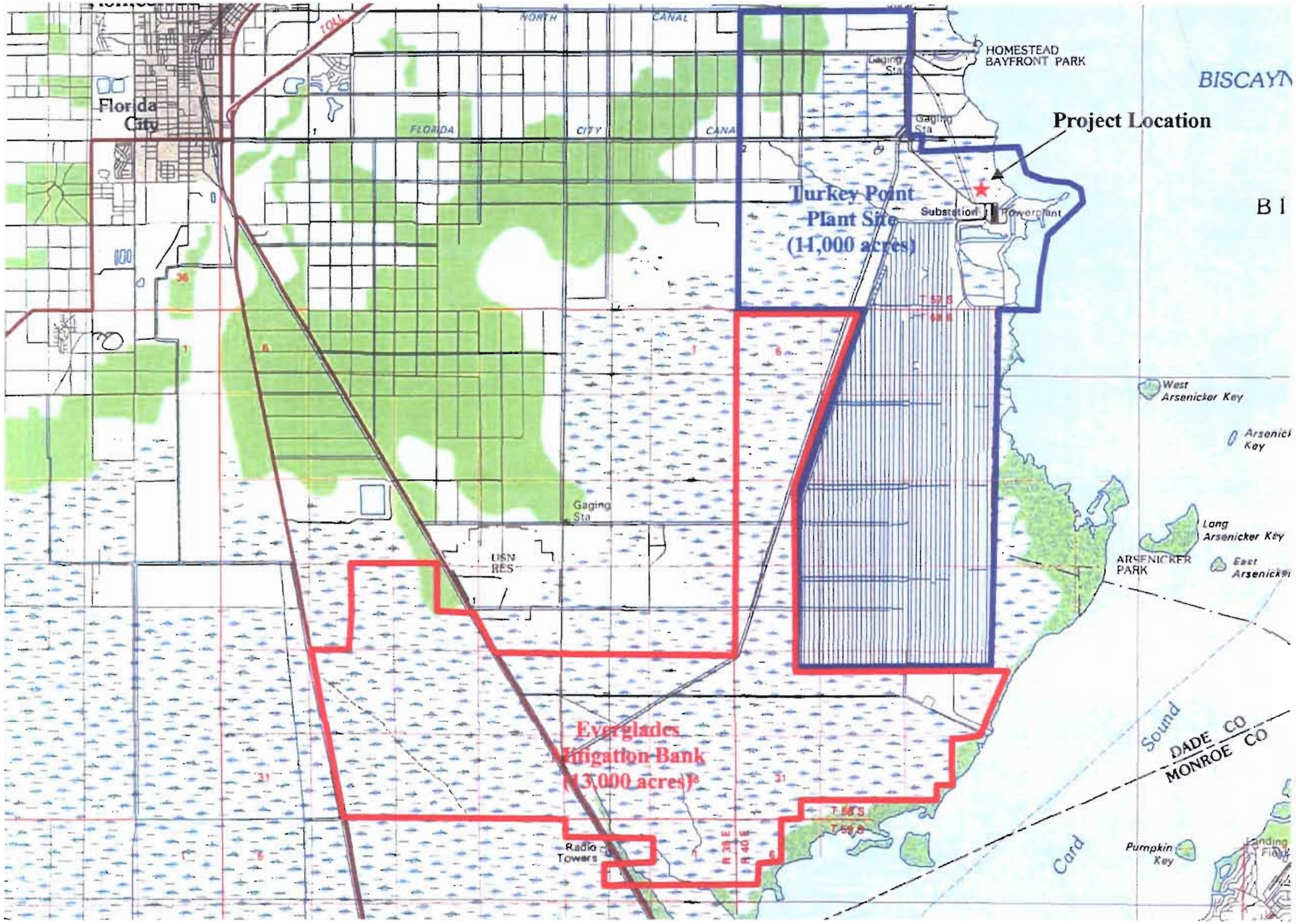


Figure 1.3-1.
FPL Turkey Point Plant Site Location, Project Location, and Everglades Mitigation Bank

Source: National Geographic, 2003; Golder, 2003.

FPL

2.0 SITE VICINITY CHARACTERIZATION

2.1 SITE LOCATION

2.1.1 SITE LOCATION

The site for the Project is the existing 11,000-acre FPL Turkey Point Plant Site, located in unincorporated Miami-Dade County (see Figure 2.1-1). Four steam electric generating units (two fossil and two nuclear) presently operate at the Plant Site, which also includes a 5,900-acre closed loop cooling canal system for the existing units. The existing power generating facilities are primarily located in portions of Sections 27, 28, 33, and 34 of Township 57S, Range 40E. The Plant site lies approximately 8 miles east of Florida City, Florida, and 4.5 miles east of the eastern municipal limits of Homestead. It is approximately 9 miles east of the intersection of U.S. 1 and Palm Drive (SW 344th Street). The site is adjacent to the 13,000-acre Everglades Mitigation Bank (EMB) that is also owned by FPL.

Within the Turkey Point Plant Site is the approximately 90-acre "Project Area", which is the site proposed for certification. The Project Area is north of the existing generating units.

2.1.2 EXISTING SITE USES

An aerial photograph which includes the Project facilities is provided as Figure 2.1-2. The existing power generation and fuel handling facilities occupy a relatively small (about 130 acres) area at the Turkey Point Plant Site. Those facilities include the two existing fossil fuel fired steam electric generating units, two nuclear generating units, fuel oil tanks, water treatment facilities, cooling water intake and outfall structures, service buildings, nuclear administration building, nuclear simulator (training facility), nuclear maintenance and warehousing buildings, wastewater treatment basins, and system substation and are shown on Figure 2.1-2. A small portion of the 5,900-acre cooling canal system is also shown in the aerial photograph.

The two existing 400-MW (nominal) fossil fuel fired steam electric generation units at the site have been in service since 1967 (Unit 1) and 1968 (Unit 2). These units currently burn residual fuel oil and or natural gas with a maximum equivalent sulfur content of 1 percent. The two existing 700-MW (nominal) nuclear units have been in service since 1972 (Unit 3) and 1973 (Unit 4).

2.1.3 ADJACENT PROPERTIES

Land uses surrounding the Turkey Point Plant Site are almost exclusively undeveloped land. The FPL-owned EMB is adjacent to most of the western and southern boundaries of the Turkey Point Plant Site. South Florida Water Management District (SFWMD). Canal L 31E is also situated to the west of the Plant Site. The eastern portions of the Plant Site are adjacent to open waters of the Biscayne National Park. The southernmost eastern portion of the Turkey Point Plant Site is bounded by state owned land located on Card Sound. Undeveloped land owned by Miami-Dade County is situated to the north of the Plant Site and is part of Biscayne National Park.

2.1.4 USES WITHIN PROJECT AREA

The Project will consist of four nominal 170-MW GE "F" Class advanced CTs, four HRSGs, which will utilize the waste heat from the CTs to produce steam, and a new steam electric turbine-generator. This configuration is a referred to as a 4-on-1 combined cycle unit. The Project facilities and their approximate areas are:

Power Block and Collector Yard	24 acres
System Substation Addition	2 acres
Site Runoff Stormwater Pond	3 acres
Roadway Expansion Area, Parking Lot, and Roads	4 acres
Construction Laydown, Parking, Trailers	28 acres
Non-impacted Areas	26 acres
Miscellaneous (Includes Outfall Structure, Tie-ins, Parking, Stormwater)	3 acres
Project Area	90 acres

2.1.5 100-YEAR FLOOD ZONE

The entire Project Area is within the 100-year flood zone [Federal Emergency Management Agency (FEMA), 1994].

2.1.6 PROPERTY DELINEATION

A boundary survey map of the Project Area is presented in Figure 2.1-3, which is the site proposed for certification.

2.2 SOCIO-POLITICAL ENVIRONMENT

2.2.1 GOVERNMENTAL JURISDICTIONS

Miami-Dade County is the local government in whose jurisdiction the proposed Project will be located. The majority of Miami-Dade County's urban development lies along the eastern boundary of the county (Atlantic coast). The community nearest the site is the municipality of Homestead (see Figure 2.2-1). The eastern boundary of the municipality is approximately 4.5 miles west of the Project Area, off of Palm Drive (SW 344th Street).

A number of federal, state, regional, and local designated lands lie within 5-miles of the Project area. Biscayne National Park, the Model Lands Basin, Biscayne Bay Aquatic Preserve, Homestead Bayfront County Park, Mangrove County Preserve, and Homestead Air Reserve Base are located within 5 miles of the Project Area and their general locations are depicted in Figure 2.2-1. Many other federal, state, regional, and local designated lands are not located within 5 miles of the Project Site (see Table 2.2-1). Critical habitat of endangered species is identified in Subsection 2.3.6.

2.2.2 ZONING AND LAND USE PLANS

The Project Area is located in unincorporated Miami-Dade County. The Comprehensive Development Master Plan (CDMP) as amended through April 12, 2001, currently governs land development located in unincorporated portions of Miami-Dade County. Additionally, Ordinance 03-87 was adopted by the BOCC on April 10, 2003, and provides a Summary of Final Actions related to and supplements the CDMP. The CDMP contains a Land Use Element and map entitled Adopted 2005-2015 Comprehensive Development Master Plan that identifies Future Land Use categories for unincorporated and incorporated portions of Miami-Dade County.

The existing Turkey Point electrical power generation facilities and a portion of the Project Area for the proposed expansion project are classified Institutional and Public Facility (IPF) in the adopted future land use plan (Figure 2.2-2). The existing cooling canals are classified as Environmental Protection (EP) with a perimeter designation of IPF. The majority of the Project Area is classified EP. The existing facilities and Project Area are located outside of the 2005 Urban Development Boundary (UDB), the 2015 Urban Expansion Area Boundary, and the Urban Infill Area Boundary.

The IPF future land use classification illustrates the location of major institutional uses and utilities of metropolitan significance. The IPF land use category allows neighborhood or community-serving institutional uses and utilities where compatible in all urban land use categories. The IPF land use category recommends that major utility facilities should be guided away from residential areas. When considering the approval of proposed projects, the County considers the type of function involved, the public need, existing land use patterns, alternative locations for the facility, and a project's consistency with the goals, objectives, and policies of the CDMP.

Uses considered for approval in the EP future land use category are described for several Subareas of Miami-Dade County. The Project Area is located in Subarea F. Necessary electrical generation and transmission facilities are expressly permitted in this Subarea as long as consistency with the goals, objectives, and policies of the Plan and conformity with all prevailing environmental regulations are demonstrated.

The EP future land use category applies to those areas in the County that are environmentally significant, that are susceptible to environmental degradation, and where such degradation may adversely affect the supply of potable water or environmental systems of importance. Uses permitted in the EP category are to be compatible with the area's environment and are not to adversely affect the long-term viability, form, or function of the ecosystems. Compatible use of private ownership land in the EP future land use category will be permitted by Miami-Dade County consistent with the goals, objectives, and policies of the Plan.

Site and project attributes that support the development of the Project at the proposed location include the existing electrical power generation and transmission facilities that are located on and adjacent to the Project Area, and the distance between the Project Area and areas classified for residential use (between 5 and 6 miles). Specific reference to allowance for electrical generation and transmission facilities in Subarea F of the Environmental Protection classification is made in the CDMP. The proposed Project is consistent with the Future Land Use Element of the CDMP because the Project is being designed, and will be constructed and operated in a manner that demonstrates consistency with the goals, objectives, and policies of the CDMP and conformity with all prevailing local environmental regulations. Additional information related to the CDMP is contained in Appendix 10.3.

The proposed power block is zoned IU-3 (see Figure 2.2-3). The construction access road to the proposed power block area and the construction laydown and construction parking areas are zoned

GU. Adjacent zoning is IU-3 to the south of the proposed power block, where Units 1 through 4 are located and GU elsewhere on the Turkey Point Site. Given the fact that the existing zoning of the Turkey Point Plant facilities is IU-3 and the County Zoning Department has concluded that the proposed combined cycle power plant is permitted as a matter of right in the IU-3 zoning district, the Project Area designated for the power block is consistent with the current zoning designation. A copy of the letter from the Assistant Director for Zoning is provided in Appendix 10.2.

The CDMP Future Land Use Element recognizes that there are numerous instances where existing uses and parcels zoned for a particular use are not specifically depicted on the Land Use Plan map. This circumstance exists at Turkey Point. Each of the land use categories utilized on the Land Use Plan map also provides for the inclusion of some other uses under certain conditions. The specific reference to electrical generation and transmission facilities in the Environmental Protection Subarea F category is an example of including other uses in a broad land use category. All existing lawful uses and zoning are deemed to be consistent with the Plan as provided in the section of the Future Land Use Element titled "Concepts and Limitations of the Land Use Plan Map".

2.2.3 DEMOGRAPHY AND ONGOING LAND USE

The Project Area is located near the shore of Biscayne Bay in southeast Miami-Dade County. Based upon Municipality Maps received from the Miami-Dade Planning and Zoning Department, the nearest incorporated city limits are Homestead, which is approximately 4.5-miles west of the Project area. This is the only municipality located within the SCA Guidelines prescribed 5-mile study area .

According to the Florida Statistical Abstract 2002, Homestead is estimated to have 32,300 residents in the year 2001, while the entire county was estimated to have 2,285,869 residents, a 1.44 percent increase from 2000 (see Table 2.2-2). Homestead's population increased 1.23 percent from 2000 to 2001. The medium population projections for all of Miami-Dade County for 2010 and 2020 depict continued growth, with an estimated population of 2,836,672 in 2020.

The Comprehensive Development Master Plan depicts population forecasts for Minor Statistical Areas of the County for 2005 and 2015. Growth in the Minor Statistical Area that contains the Project Area is expected to result in a population increase from 12,070 in 2005 to 22,902 in 2015.

The year 2000 census count for Census Tract 114.01 is 4,330. Census Tract 114.01 surrounds the Project Area and extends 1.5 miles north to North Canal and 8.8 miles west to Krome Avenue. Population within 5 miles of the Project Area is negligible; only a few homes exist in the study area.

Existing land use patterns in the vicinity of the Project Area are depicted in Figure 2.2-4. Land use adjacent to the Project Area is comprised of undeveloped land and power plant generation and transmission infrastructure. The cooling canal system for the existing generation facilities is located to the south and southwest of the existing units. Recreational facilities (see Subsection 2.2.7.2) and a daycare center for FPL Turkey Point Plant employees are located within 1 to 2 miles of the Project Area. Nearby recreational facilities include Biscayne National Park, Homestead Bayfront County Park, and Mangrove County Preserve and are located from less than 1 mile from the Project Area boundary to over 5 miles from the Project Area along the western shore of Biscayne Bay.

The predominant land use from the Project Area out to 5 miles is undeveloped land. The exceptions to this land use pattern include the parks identified above, Homestead Air Reserve Base located over 4 miles north-northwest of the Project area, numerous tree nurseries and agricultural land located between the undeveloped land and the study area boundary, and Homestead-Miami Motor Speedway located 4 to 5 miles west-northwest of the Project area.

Future land use patterns in the study area mirror the existing uses significantly. As depicted in the Adopted 2005 and 2015 Land Use Plan, Environmental Protection and Environmentally Protected Parks are the predominant future land use pattern along the coast and to the south and west. Open land is located between the presently undeveloped land and existing tree nurseries and agricultural land. The Agriculture future land use classification overlays existing agricultural uses and the Infrastructure and Public Facility future land use classification overlays the Air Reserve Base and FPL's facilities.

The only commercial future land use classification is located where Homestead-Miami Motor Speedway is located. There are no residential future land use classifications in the 5-mile study area.

2.2.4 EASEMENTS, TITLE, AGENCY WORKS

No easements, title, or agency works approvals are required for the onsite facilities.

2.2.5 REGIONAL SCENIC, CULTURAL, AND NATURAL LANDMARKS

Biscayne National Park is located just east and north of the Project Area. Biscayne National Park is also designated by the National Park Service as a Maritime Park. The national park is generally being managed for its ecological and scenic value to the area.

Biscayne National Park was first established in 1968 as a National Monument and was last expanded in 1980 to approximately 173,000 acres of water, coastal lands, and 42 keys. The park fulfills a multi-purpose mission by managing natural and historic resources, advocating responsible stewardship, and enabling visitors to experience scenic vistas and compatible recreation activities. Boating is the most prevalent activity in the park and both recreational and commercial fishing are allowed. Other activities include snorkeling, diving, camping, picnicking, and hiking.

A General Management Plan is being prepared for the park to provide guidance, vision, and direction to the Park for the next 15 years. A fisheries management plan and comprehensive interpretive plan are also being prepared in conjunction with the General Management Plan. The Park is designated as an Outstanding Regional Resource Water by the South Florida Regional Planning Council (SFRPC).

Model Lands Basin is a Save our Rivers (SOR) acquisition by SFWMD located west of the Project Area. With the exception of a small segment of Canal L 31E, the existing Model Lands Basin properties are located 3 miles or farther from the Project Area. Projected land acquisitions by SFWMD, through the CARL program or from federal sources, are anticipated to occur west of Canal L 31E.

Model Lands Basin is comprised largely of fresh and salt water wetlands that form a contiguous habitat corridor with Everglades National Park, the Southern Glades SOR project located further to the southwest, Biscayne National Park, and other designated lands in Monroe County. In addition to habitat value, the Model Lands Basin acquisition has a significant role in the treatment of stormwater prior to release to tidal systems to the east and south. The property is not yet open to public use.

Biscayne Bay Aquatic Preserve is located throughout portions of Biscayne Bay that lie outside of the National Park boundaries. Only a small portion of the 5-mile study area contains a portion of the aquatic preserve. Aquatic preserves were established by the State Legislature for state-owned submerged lands that have exceptional biological, scenic, and scientific value. Biscayne Bay

Aquatic Preserve is comprised of 75,000 acres. Uses in the aquatic preserve include various types of boating and skiing, hang gliding, swimming, windsurfing, snorkeling, diving, and fishing. The bay is also important as a transportation resource (the Port of Miami and Chalk Airline is located in the aquatic preserve) and as a hub of educational and research activities, which include University of Miami, Florida International University, Barry University, N.O.A.A., Southeast Fisheries Laboratory, and Miami Seaquarium. The aquatic preserve is designated as an Outstanding Florida Water and an Outstanding Regional Resource Water.

Homestead Bayfront Park and Hoover Marina is a recreation activity-based park located 1.5 miles north of the Project Area. Facilities include a marina, atoll pool and beach, picnic pavilions, grills, playground, and fishing area. Mangrove County Preserve is a County-owned linear strip of mangrove forest located 2.5 miles north of the Project Area. The park does not contain any improvements for general public active recreation and has been established to preserve the natural scenic properties and ecological value of the area.

Homestead Air Reserve Base is located 4 miles northwest of the Project Area. The 482nd Fighter Wing maintains and operates the facility which has 34 aircraft and an average of 135 operations per day. Approximately 97 percent of the operations are military flights, the remaining three percent are general aviation operations.

A number of designated lands are located south and west of the Project Area, but outside of the 5-mile study area. These areas include Crocodile Lake National Wildlife Refuge, John Pennekamp Coral Reef State Park, and Key Largo State Botanical Site. The Biscayne Bay Coastal Wetland Project, part of the Comprehensive Everglades Restoration Plan CERP), is located north and west of the Turkey Point Site. The purpose of the Project is to rehydrate wetlands and reduce point source discharge to Biscayne Bay. It involves pump stations, swales, stormwater treatment, flowways, levees, culverts, and backfilling canals. The Project is in the pre-construction engineering and design phase.

2.2.6 ARCHAEOLOGICAL AND HISTORIC SITES

Results of a search of the Florida Master Site File conducted for the Project in June 2003 list no previously recorded archeological sites, no standing structures, and one prior field survey for the Project Area and vicinity. Historic and archaeological site file searches were also conducted at the

National Park Service Southeast Archaeological Center and at Biscayne National Park for an EIS associated with the relicensing of the nuclear units in 2002. An archeological resource survey for the EMB, southwest of the existing Turkey Point Plant Project Area, found no historic or prehistoric cultural materials within the 13,000-acre mitigation bank site. During this 1996 investigation, areas most likely to contain historic or prehistoric cultural resources were identified through evaluations of several maps, photographs, and other information sources. No cultural resources were found in surveys of more than 100 target sites and 61 test excavations (Phase 1 Archaeological Resource Survey of the Florida Power & Light Company's South Dade Mitigation Bank, Dade County, Florida, by S. P. Lewis and J. Davis, 1996). In a letter dated September 11, 1996, the archaeologist for the Miami-Dade County Office of Community and Economic Development, Historic Preservation Division, concurred with the findings of the survey report. There are no prehistoric or historic sites located along the Turkey Point Site's boundary with Biscayne National Park.

2.2.7 SOCIOECONOMICS AND PUBLIC SERVICES

2.2.7.1 Labor Force

The total labor force in Miami-Dade County for 2001 was 1,080,432 with employment of 1,005,810. Unemployment in 2001 was 74,622 or 6.9 percent. For the State of Florida and the United States, unemployment was 4.8 for both state- and US-wide statistical areas for the same period.

Average monthly private-sector employment by major industry group in Miami-Dade County in 2001 is depicted below:

Major Industry Group	Employment
Agriculture	13,138
Mining	474
Construction	36,034
Manufacturing	63,357
Transportation, Communications, and Public Utilities	92,605
Wholesale Trade	75,159
Retail Trade	180,401
Finance, Insurance, and Real Estate	65,386
Services	320,970
Other	816

The service and retail industries provided the most employment in Miami-Dade County with about 38 and 21 percent, respectively of the total employment. The construction industry provides about 36,000 jobs. 2001 employment increased over 2000 employment for five of the nine specific major industry groups.

Employment projections for construction trades and extraction for Florida has been estimated for the year 2009. Statewide, construction employment is estimated to increase from 230,661 in 2001 to 259,798 (State of Florida Agency for Workforce Innovation, Bureau of Labor Market Information, n.d.).

General Income

Miami-Dade County had a per capita personal income of $25,320 for 2000 compared to the State of Florida and United States per capita personal income of $27,764 and $29,469, respectively (Florida Statistical Abstract, 2002). This income level ranked 21st out of the 67 counties in Florida. Approximately 99.4 percent of earned income is derived from non-farm origins.

Thirty-seven billion (B) dollars of non-farm earned income is derived from private sector businesses origins with about $7.1 B of non-farm income coming from public sector income sources. The construction industry was the source of $1.7 B in earned income in Miami-Dade County (U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic System, May 2002).

Median household income in Miami-Dade County was $30,669 in 1998. This income level ranked the County 36th out of 67 Florida Counties in median household income and represents a household income level that is 12 percent lower than the statewide median (U.S. Department of Commerce, Bureau of the Census, 2002). Average wage and salary earnings in Miami-Dade County in 2000 was $34,898, 14 percent lower that the statewide average.

Housing

The total number of housing units in Miami-Dade County, Homestead, and Florida City in 2000 is depicted below by occupancy type:

Type of Housing	Miami-Dade County	Homestead	Florida City
Renter-Occupied	327,441	6,408	1,327
Owner-Occupied	449,333	3,657	862
Other	75,504	1,034	298
Total	852,278	11,099	2,487

County-wide, an annual average of approximately 500 single-unit housing permits were issued over a 7-year period ending in 2002.

The average cost to purchase a house in Miami-Dade County in 2000 was $132,582 (Bureau of Economic and Business Research, 2002).

Transient accommodations in Miami-Dade County are significant. A total of 6,694 lodgings exist, representing 230,792 lodging units. The total number of apartment building, rooming house, rental condominium, and transient apartment building units in the County totaled 182,781 in 2002 (Department of Business and Professional Regulation, Division of Hotels and Restaurants, 2002).

2.2.7.2 Area Public Service And Utilities

Education

Public education in Florida is operated on a county-wide basis. Each County's respective school district establishes educational policies and staffing requirements. According to the Florida Department of Education Bureau of Education Information and Accountability Services, Miami-Dade County had a total enrollment of 374,806 for the 2001-2002 school year. Miami-Dade County schools employed approximately 36,906 full-time staff employees in the fall of 2002.

A total of 412 elementary and secondary schools exist in the County. The closest public school to the Project Area is Keys Gate Charter School, located approximately 6.2 miles west of the Project Area. There are no existing public schools or planned public school sites within 5 miles of the Project Area.

Transportation

The Florida Turnpike, Interstate 95, and U.S. Highway 1 are considered the major transportation corridors for north-south traffic movement in Miami-Dade County. U.S. Route 41 is a major east-west highway that transverses the middle of the county.

Road access to the existing Turkey Point Plant Site is via Palm Drive (SW 344th Street). SW 344th Street maintains a functional classification of a County collector roadway for both the 1995 and 2015 roadway systems. The existing roadway and planned 2015 roadway is four lanes from U.S. 1 east to Speedway Boulevard (Tallahassee Road), and two lanes from the intersection eastward to the Plant Site. The planned 2015 Level of Service (LOS) for the roadway is C or better from U.S. 1 east.

Both SW 344th Street and U.S. 1 are four-lane roads in the vicinity of the intersection.

A traffic count conducted on April 19, 2001 was received from the Miami-Dade Traffic Engineering Department. The traffic count was performed at SW 344th Street west of SW 137th Avenue (Speedway Boulevard). Results of the count showed an Average Weekday Daily Traffic count of 1,485 vehicles per day, representing a peak hour LOS B. 2002 traffic counts on U.S. 1 (SR 5) show a traffic volume of 27,500 Annual Average Daily Traffic (AADT) 100 ft north of the intersection of SR 5 with SW 328th Street (Lucy St./Canal Drive) and 23,500 AADT 2,500 ft south of the intersection of SR 5 with SW 344th Street.

The minimum acceptable peak period operating LOS for all State and County roads in Miami-Dade County outside the UDB is LOS D on State minor arterials and LOS C on all other State roads and on all County roads. The intersection of U.S. 1 and Palm Drive (SW 344th Street) is four lanes and operates at a LOS B. Palm Drive is four-lane about half way to the plant entrance road. The remainder of Palm Drive is two-lane to the Turkey Point Plant entrance.

There are no rail systems in place within 5 miles of the proposed site.

The Homestead Air Reserve Base and its associated runways lie within the 5-mile study area. The airport has both military and civilian operations.

Medical Facilities

Miami-Dade County has over 40 hospitals which contain over 12,300 licensed beds. Emergency medical transport is provided within Miami-Dade County by emergency medical technicians (EMT) stationed at most of the county's fire stations. Licensed medical practitioners in Miami-Dade County include 6,427 physicians, 2,129 dentists and dental hygienists, 4,798 health practitioners, 17,073 nurses, and 460 opticians and pharmacists (Florida Department of Business and Professional Regulation, 2002).

Homestead Hospital in Homestead is the primary health care provider in the southeast portion of Miami-Dade County and is located 9.6 miles northwest of the Project Area. Homestead Hospital is a 120-bed facility and provides emergency facilities and services as well as numerous surgical and non-surgical programs. The Emergency Medical Service (EMS) Division of Miami-Dade County Fire and Rescue Department provides emergency medical transport services throughout the County, including the Turkey Point Vicinity. The EMS Division has 57 Advanced Life Support units, 760 state-certified paramedics, and 640 state-certified emergency medical technicians.

Firefighting Facilities

The Miami-Dade County Fire and Rescue Department provides fire and rescue service to the proposed site, as well as response to hazardous material incidences. During 2002, the Miami-Dade Fire and Rescue Department responded to a total of 191,368 calls, an average of 524.3 calls per day. Eighty percent of the total service calls are for medical rescue. The closest fire stations to the Project Area are Stations 6 and 16, located 8.2 miles and 9.6 miles northwest and west-northwest of the Project Area, respectively. Station 6 has a tanker and rescue truck. Station 16 has an engine, 50-ft tank truck, and rescue truck. Both facilities are manned 24 hours a day.

Police Protection

The Miami-Dade County Police Department provides law enforcement in the vicinity of the Turkey Point Plant Site and patrols the area surrounding the existing Turkey Point Plant area.

FPL has contracted a private security company to control access to the existing Turkey Point Plant Site.

Recreation Facilities

Miami-Dade County and the surrounding region offer many recreational activities. The Miami-Dade Parks and Recreation Department manages over 12,000 acres and 500 parks, recreation facilities, and greenway areas. According to the Miami-Dade Park and Recreation Department there are two County-owned parks within the 5-mile radius from the proposed Project Area. The Homestead Bayfront Park and Hoover Marina, located north of the Project Area and Mangrove Preserve, located approximately 3 miles north of the Project Area. A description of the facilities at Homestead Bayfront Park is provided in Subsection 2.2.5. The County is also seeking land for future park sites, but none of the target areas for future recreational facilities are located within 5 miles of the Project Area.

State and national recreation facilities are also described in Subsection 2.2.5. Biscayne Bay and the associated waters to the east of the Project Area contain the majority of the activity related to local recreation facilities and use.

Electricity and Gas

Electricity is provided to Miami-Dade County businesses and residents by FPL and Homestead Electric and natural gas service is provided primarily by TECO Peoples Gas. A natural gas line to the existing Turkey Point fossil units is owned and operated by Florida Gas Transmission.

FPL's generation facilities in Miami-Dade County include the Cutler Plant and Turkey Point Plant. The demand for electrical power in Miami-Dade County exceeds the supply that is available from these facilities.

Water Supply Facilities

Two major aquifers exist in Miami-Dade County: 1) a surficial non-artesian aquifer known as the Biscayne aquifer and 2) the Floridan (artesian) aquifer. Both aquifers provide water via wells to meet potable and non-potable water needs in Miami-Dade County. Water from the Floridan aquifer is used for irrigation and stock watering, and with advanced treatment, for potable water. The majority of the potable water in Miami-Dade County is obtained from the Biscayne aquifer. Residents in Miami-Dade County obtain potable water from a variety of water systems, including governmental, private systems, or individual wells. The government and private supply systems are regulated by the FDEP, SFWMD, and DERM. Florida City, Homestead, North Miami, North Miami Beach and the Miami-Dade Water, and Sewer Department provide potable water.

Approximately 330 million gallons per day (mgd) of raw water is withdrawn from about 88 wells in the Biscayne aquifer to provide potable water to Miami-Dade County businesses and residents. Three water treatment plants supply the needs of users north of SW 248th Street through a common distribution system. Five smaller water treatment plants serve the unincorporated County south of SW 248th Street, which includes the Project Area. This system is known as the South Dade Water Supply System. The Miami-Dade Water and Sewer Department plans on increasing the capacity of the northern treatment system by 13 mgd and the south system by 18 mgd.

The existing Turkey Point Power Plant receives potable water from the Newton treatment plant, which is part of the Miami-Dade's South Dade Water Supply System. The water received from Miami-Dade is used primarily for process water (demineralized water makeup), potable water, and fire protection. The Newton plant as reported in 1998 had a daily demand of water of 117,000 gallons per minute (gpm) and a peak demand of 130,000 gpm.

The existing Turkey Point generation facilities use an onsite cooling canal system to cool heated water and to recirculate water for reuse. The cooling canal system includes approximately 150 miles of canals that occupy an area approximately 2 miles wide by 5 miles long. The existing units use the cooling canals system to release heated condenser water at one end and withdraw cooled water at the other end for re-use. Rainfall, plant stormwater runoff, treated plant process wastewater, and groundwater inflows compensate for evaporative cooling losses.

Sewage Treatment Facilities

Miami-Dade County businesses and residents are served by one of the following types of wastewater facilities: septic tanks, package plants, or regional facilities. Septic tanks provide service to individual residences or small developments that produce flows of less than 2,000 gpd. Package plants are generally small and pre-constructed, serving isolated developments. Use of package plants will be allowed outside the primary and secondary Urban Service District provided the criteria of the Future Land Use Element has been met.

Regional facilities are large systems that serve areas of densely populated development. There are three regional facilities that serve the majority of businesses and residents in Miami-Dade County, North, Central, and South Dade Wastewater Treatment Plants.

Most of the sanitary wastes at the Turkey Point Plant are treated in an onsite treatment plant. The effluent, after treatment, and disinfection is discharged through a 50-ft-deep injection well. Smaller volumes of sanitary waste are routed to a septic tank system.

Solid Waste Disposal

Miami-Dade County Department of Solid Waste Management is responsible for solid waste collection, transport, and disposal in unincorporated portions of the County and five municipalities. The Department has several facilities located in north, central, and south parts of the County for disposal, including two landfills and a resource recovery facility. The South Dade Landfill is located about 10 miles northwest of the Turkey Point Plant at 24000 SW 97th Avenue. The facility is permitted to dispose of garbage, trash, yard trash, tires, treated sludge from sewage treatment plants, construction and demolition debris, and septic tank pump out. The landfill is operated under permit from the Florida Department of Environmental Protection (FDEP) and the SFWMD.

There is no solid waste disposal at the existing Turkey Point Plant. An approved solid waste contractor collects and transports the solid waste generated at the existing Plant for disposal at County facilities.

2.3 BIO-PHYSICAL ENVIRONMENT

2.3.1 GEOHYDROLOGY

2.3.1.1 Geologic Description of the Site Vicinity

The generalized hydrostratigraphy for Miami-Dade County, including the FPL Turkey Point Plant Site, is shown in Table 2.3-1. The Turkey Point Plant Site lies within the Floridan Plateau, a partly submerged peninsula of the continental shelf. The peninsula is underlain by approximately 4,000 to 15,000 ft of sedimentary rocks consisting of limestone and associated formations that range in age from Paleozoic to Recent. Little information is known about the basement complex of Paleozoic igneous and metamorphic rocks due to their great depths.

Generally in Miami-Dade County, the surficial aquifer (Biscayne aquifer) consists of a wedge-shaped system of porous clastic and carbonate sedimentary materials, primarily limestone and sand deposits of the Miocene to late Quaternary age. The Biscayne aquifer is thickest along the eastern coast and varies in thickness from 80 to 200 ft thick. The surficial aquifer is typically composed of Pamlico Sand, Miami Limestone (Oolite), the Fort Thompson and Anastasia Formations (lateral equivalents), Caloosahatchee Marl., and the Tamiami formation. The lower confining layers, below the surficial aquifer, range in thickness from 350- to 700-ft and are composed of the Hawthorn Group. Beneath the Hawthorn Group, the Floridan Aquifer System ranges from 2,800- to 3,400-ft thick and consists of Suwannee Limestone, Avon Park Limestone, and the Oldsmar Formations.

2.3.1.2 Site Lithologic Description

The subsurface conditions at the site were evaluated based on eight borings conducted at the locations presented in Figure 2.3-1 for the proposed Project Site (Peico, 2003). This geotechnical investigation was limited to conducting borings at accessible areas of the site with no specific foundation recommendations. In summary, three borings designated as 1 through 3 were drilled near the access road leading to the plant and transmission line access road, and four borings designated as 4 through 8 were drilled in the area of just north of the existing Turkey Point Power Plant, along the southern perimeter of the Project Area. Borings 1 through 4 and 8 were drilled to a depth of 30 ft and borings 5 through 7 to depths of 68.7 to 70 ft. The description of the site lithology is summarized below.

Based on soil samples and rock cores from the eight soil borings conducted by Peico, the Project Area appears to be underlain by about 2 to 4 ft of very loose to very dense fine to medium sand with limestone fragments (Miami Oolite) with Standard Penetration Test (SPT) N-values ranging from 4 to 61 blows per foot (bpf). This surficial stratum was encountered at all of the boring locations with the exception of Boring 8. Beneath the surficial stratum, very loose silt with gravel (2) and organics (4, 5, 6, 8) was encountered at all boring locations at a depth ranging from the ground surface (8) to a depth of 10 ft. SPT N-values for the silt ranged from 1 to 20 bpf. Underlying the silt stratum, tan limestone of the Anastasia Formation containing sand and silt was generally encountered from 5 to 68 ft, the maximum depth explored. A stratum of very dense sand with limestone grading into cemented sand was encountered at 5 from 38 to 48 ft. The limestone encountered had SPT N-values ranging from 5 to refusal. During the drilling of borings 2, 4, 5, and 8, Peico experienced a loss of drilling mud at depths of approximately 14, 22, 24, and 16 ft, respectively. Rock cores were obtained in the limestone formation in boring 6 and the percent of core recovery, rock quality designation (RQD), and drilling time were recorded. The percent recovery in the limestone ranged from 0 to 100 percent with the higher percent recovery and RQD at depths below 28 ft. Unconfined compression tests conducted on limestone samples ranged from 500 to 770 psi at depths of 15 and 35 ft and 1,010 and 2,840 psi at depths of 54 and 69 ft, respectively. Reference to each individual boring log should be made for specific details of the subsurface conditions encountered at each boring location.

Groundwater levels were typically observed at the time of drilling to range from about 1 to 8 ft-bgs.

Extensive borings have been taken within the Project Area confirming the lithologic description.

2.3.1.3 Bearing Strength

Data generated from 8 borings conducted at the perimeter of the Project Area show that it is overlain by a sand stratum, ranging from loose to very dense, extending from the ground surface to 6 ft. Beneath the sand stratum is very loose silt with varying degrees of organics and an average thickness of about 4.5 ft that is underlain by limestone extending to the maximum depth explored.

2.3.2 SUBSURFACE HYDROLOGY

There are three major components to the subsurface hydrology in this area of southern Florida: an unconfined surficial aquifer called the Biscayne aquifer, a confined deep aquifer called the Floridan aquifer, and a nearly impermeable layer of soils between the two comprised of sediments of the Hawthorn Group.

2.3.2.1 Subsurface Hydrologic Data for the Site Aquifers

2.3.2.2 Subsurface Hydrologic Data for the Site

The Biscayne Aquifer

The Biscayne aquifer is a surficial aquifer that underlies all of Miami-Dade County and parts of Broward and Monroe Counties as shown in Figure 2.3-2. The area underlain by the aquifer is approximately 3,000 mi^2.

The major portion of the aquifer is composed of rocks ranging in age from Pliocene through Pleistocene in the following sequence from top to bottom: Pamlico sand, Miami oolite, Anastasia formation, Key Largo limestone, Fort Thompson formation, and Caloosahatchee marl. The aquifer is underlain by a relatively impermeable greenish marl of the Tamiami formation. Characteristics of each formation are included in Table 2.3-1. The lower boundary of the aquifer is formed by the contact between the marl and the limestone of the Tamiami, Fort Thompson, Anastasia formations, or the Key Largo limestone.

The wedge-shaped aquifer is thickest along the coast in the Miami area and northward in the vicinity of Fort Lauderdale, where it extends 200 ft in places. It decreases in thickness gradually southward from Miami, and rapidly westward into the Everglades. The contour map included as Figure 2.3-3 was developed in 1958 and shows the base of the Biscayne aquifer lying at 60 ft-bsl in the vicinity of the Turkey Point Plant Site. The Florida Geological Survey (FGS) estimates that the average water-saturated thickness of the aquifer is approximately 72 ft.

The water table normally lies within the Miami oolite, the Pamlico sand, or the organic soils of Recent age. It commonly slopes eastward toward the coast. The water table fluctuates with variations in recharge (from rainfall, drainage wells, septic tanks, irrigation, etc.), natural discharge (seepage into streams or canal or into the sea), evapotranspiration, and pumping rates. Rainfall is thought to be the major factor affecting water table levels. The Florida Geological Society reported in 1958 that approximately two-thirds of the annual rainfall falling on the region reaches the water table in southern Miami-Dade County. Along the coast, the water table also fluctuates in response to ocean tides. These variations produce irregularities in the shape and slope of the water table from place to place across the aquifer. In general, high groundwater levels occur during the fall months, while low levels occur during the spring and early summer. Historical maximum and minimum recorded water table elevations are +5.5 ft-msl and +0.5 ft-msl, respectively, in the Florida City area (Parker *et. al.*, 1955).

The Biscayne aquifer is the only source of fresh groundwater in Miami-Dade County. Groundwater is stored in joints, pore spaces, and solution cavities in the aquifer rock. Most of the groundwater in the Biscayne aquifer is stored in cavities formed by the dissolving action of percolating groundwater. The Biscayne aquifer material has a permeability equivalent to that of coarse, well-sorted gravel, because the interconnected solution cavities greatly facilitate groundwater movement. In 1951 the FGS reported the average transmissibility of the aquifer to be approximately 5 mgd per foot.

According to the U.S. Geological Survey (USGS), the Biscayne aquifer is one of the most productive aquifers in the United States. In 1958, the FGS estimated that there were approximately 9 trillion gallons of fresh water stored in the aquifer. The Pamlico sand formation generally contains small-diameter wells for small domestic supplies. Large supplies of water are obtained from the Miami oolite, Key Largo limestone, Anastasia, and Fort Thompson formations. The Fort Thompson formation is by far the most permeable unit within the aquifer. The FGS reports that wells lying within this formation can be pumped at high rates for extended intervals with small drawdowns. Wells that tap the thick limestone in the deeper part of the aquifer commonly yield more than 1,500 gpm with only 3 to 6 ft of drawdown (Sherwood *et. al.*, 1973). Water quality, rather than quantity, is the limiting factor in the use of water from the Biscayne aquifer.

Water quality in the Biscayne aquifer varies with locality. Most differences in quality are due to the nature of the aquifer and local land use. In general, water is of excellent quality, except for hardness. The water is generally of a hard calcium bicarbonate type, neutral to slightly alkaline. Table 2.3-2 shows water quality data reported by the USGS in 1978 for municipal well fields that withdraw water from the Biscayne aquifer and finished water quality data reported in 1999 by the Miami-Dade County Water & Sewer Department for its Newton water treatment plant.

Salt-water intrusion affects the entire coastal zone of the Biscayne aquifer. Saltwater extends inland from the coast and tidal streams, and man-made canals that serve as avenues to intrusion. Groundwater pumping can reduce freshwater flow toward coastal discharge areas and cause saltwater to be drawn toward the freshwater zones of the aquifer. Saltwater intrusion extends approximately 4-miles landward from the coast along most of the Miami-Dade County coastline. Coastal structures along canals in the eastern part of the county are used to maintain higher water levels upstream, preventing saltwater intrusion into the Biscayne aquifer. Higher surface-water levels induce higher groundwater levels, preventing saltwater movement inland through the aquifer.

The cooling canal system at the Turkey Point Plant includes an interceptor ditch located on the western portion of the canal system. The interceptor ditch serves as a barrier during the dry season to limit the westward movement of cooling canal water and saline ground water. FPL monitors water levels in the cooling canals, interceptor ditch, and four groundwater monitoring wells located west of the interceptor ditch. The interceptor ditch is monitored once per week during the dry season and twice monthly during the wet season. When monitoring indicates that the natural seaward gradient does not exist, water in the interceptor ditch is pumped back into the cooling canal system, blocking westward movement of cooling canal water. Approximately 200 million gallons are pumped annually.

The Floridan Aquifer

Underlying the surficial Biscayne aquifer is the Floridan aquifer. The Floridan aquifer is a massive and deep system that extends underneath all of Florida and southern Georgia. In south Florida the aquifer system is comprised of a series of confined aquifer zones separated by aquicludes. This series of inter-bedded limestone and dolomite is approximately 3,000 ft thick in Miami-Dade County (see Figure 2.3-4).

The principal artesian zone of the aquifer is overlain by a confining bed of relatively impermeable and indurated claystone/siltstone approximately 100 ft thick at the base of the St. Mark's formation. Most of the groundwater flow in the principal artesian zone occurs between 1,100 and 1,400 ft-bgs in the vicinity of the Turkey Point Plant Site. This zone is known as the Upper Floridan aquifer. A confining layer of several hundred feet separates this zone from the Lower Floridan aquifer, as shown in Figure 2.3-5.

The Biscayne aquifer is separated from the Floridan aquifer by approximately 700 ft of low-permeability confining sands and clays of the Hawthorn Group. This is called the Intermediate Confining Unit. Another approximately 1,000 ft thick confining unit underlies the Floridan aquifer and separates it from a zone of boulders as shown in Figure 2.3-4. Data on hydraulic conductivity, porosity depths, and unit thickness for each hydrologic unit are presented in Table 2.3.-3.

The principal artesian water-bearing zone of the Floridan aquifer is 800 to 900 ft. thick in the area of the Turkey Point Plant Site and ranges in depth from approximately 1,000 to 1,900 ft-bgs. A study conducted in 1975 by Dames & Moore for FPL found the transmissivity of the aquifer to be 500,000 gpd per ft in the area of the Turkey Point Plant Site.

Modeling of the aquifer performed in 1999 by the SFWMD ("Lower East Coast Floridan aquifer Model") found that the bulk of recharge water within the Floridan aquifer system emanates from below. The model estimated that upward flow rates to the Upper Floridan aquifer are extremely low (0.02 inch/yr). Flow direction in the Upper Floridan was found to be predominantly eastward.

The model incorporated data from a number of wells within the area. One of these wells was Observation Well A located on the Turkey Point Plant Site. The bottom elevation of the surficial aquifer was reported at -97 for this well. The flow zone extended from -1,097 to -1,250. These values were based on data reported by Dames & Moore in 1975.

The Floridan aquifer is used for fresh water supplies throughout much of central and north Florida. However, in southern Florida it is generally too brackish for such use without extensive treatment. Table 2.3-4 shows water quality data collected for the Upper Floridan aquifer for a variety of parameters. Data in Table 2.3-4 includes data from the Grossman well, an artesian well in the upper Floridan aquifer.

The Grossman well was a flowing artesian well that tapped the upper part of the Floridan aquifer at Chekika Hammock State Park in southwest Miami-Dade County. The park is operated by the FDEP. The well flowed continuously from the time it was drilled in 1944 until it was finally plugged in 1985. In 1982, the USGS reported that the well had been contaminating the overlying Biscayne aquifer with saline water since its construction. The USGS estimated that the contaminating plume extended approximately 7-miles downstream and south of the well and ranged in width from 1 to 2 miles. The entire area of contamination was estimated at 12 mi^2. The plume's primary chemical constituents were reported to be chloride, sodium, and sulfate ions. The well is approximately 22 miles from the Turkey Point Plant Site as shown in Figure 2.3-6. The well was finally plugged on March 7, 1985.

2.3.2.3 <u>Karst Hydrogeology</u>

There is no documentation of karst development at the site. In addition, no mention is made in the geologic literature of karst development in this region of south Florida (e.g., Sinclair and Stewart 1985; Lane, 1986).

2.3.3 SITE WATER BUDGET AND AREA USERS

2.3.3.1 <u>Site Water Budget</u>

Climate and Meteorology

The Turkey Point Plant Site is located in the southeastern most portion of peninsular Florida, which has a climate characterized as subtropical marine. Air dry bulb temperatures in the vicinity of the Plant (measured at Miami International Airport) range from a normal monthly average of about

67.1 degrees Fahrenheit (°F) in January, to a normal monthly average of about 82.8°F in August, with an annual average of about 75.2°F. The highest and lowest temperatures recorded were 98°F and 30°F, respectively. Monthly and annual average dry bulb temperatures are presented in Table 2.3-5.

Normal mean total annual rainfall measured at Miami International Airport (1961-1990) is 57.55 inches, with mean monthly totals ranging from 1.86 in December to 9.13 inches in July. Generally, the period of the year with the heaviest rainfall in southeast Florida is from May to October. Annual and monthly average rainfall (1961-1990) are presented in Table 2.3-6. Parker *et al.* (1955) report that the average rainfall at Miami over a 51-year period (1901-1952) was 57.3 inches; the minimum annual rainfall was 28.66 inches in 1944, and the maximum annual rainfall was 85.36 inches in 1908.

Parker *et. al.* (1955) report that in the coastal ridge south of Miami, annual average rainfall was 60 inches, of which 38 inches was recharge to the aquifer and 22 inches was lost to evapotranspiration. There is very little direct runoff of precipitation; however, discharge of the aquifer into drainage canals and directly into Biscayne Bay is estimated to be about 15 to 25 inches per year.

2.3.3.2 **Area Users**

In 1945, pumpage from the Biscayne aquifer was estimated at 58.4 mgd (Parker *et. al.*); in 2003, Miami-Dade County Water and Sewer Department reports they withdraw approximately 330 mgd from the aquifer to meet the potable needs of the community, and an additional 320 mgd are used for agricultural purposes. SFWMD regulates surface and groundwater usage in the vicinity of the Turkey Point Plant Site. Figure 2.3-7 shows the locations of permitted users within 10 miles of the Project Area. There are no permitted users of the Floridan aquifer within 5 miles of the Project. The permitted users in the Biscayne aquifer are related to agricultural irrigation.

During the wet season a seaward gradient exists and groundwater flow is southeasterly towards Biscayne Bay. This gradient tends to disappear during the dry season, where the groundwater levels are depressed below the sea level, resulting in a reverse flow direction. The groundwater at the site is classified as a Class G-III that has no reasonable potential as a future source of drinking water due to the high dissolved solids.

2.3.3.3 Turkey Plant Site

Figure 2.3-8 presents the water balance for the existing Turkey Point Plant. Makeup water for the canal system comes from precipitation, groundwater seepage, stormwater runoff, and process water. Water from the Miami-Dade potable water supply system is used for process water (demineralized water makeup for the steam cycle of Units 1 through 4), potable water, and fire protection.

2.3.4 SURFICIAL HYDROLOGY

2.3.4.1 Hydrological Characterization

Site

The Turkey Point Plant Site is located on the western shore of Biscayne Bay, about 25 miles south of Miami, Florida. Natural drainage of the area is to the east and south toward Biscayne Bay. Since the shallow tidal creeks and swales are submerged, stream flow is very sluggish. This, together with the permeable limestone bedrock of the area, results in about two thirds of the rainfall percolating directly to the groundwater aquifer. In the absence of well-defined stream channels, heavy precipitation runs off in a slow sheet-like flow toward the bay. Some surface flow is directed away from the site by drainage and flood control canals like the Model Land Company Canal.

The proposed Project Area consists of 90 acres located on undeveloped and developed land north of the existing units. Since the natural ground surface at the site is less than 1 ft above mean sea level and the normal tide range of the Bay is about 2 ft, the undeveloped portion of the site is inundated during high tide and most of the area remains under 1 to 3 inches of water at high tide. Therefore, tidal flooding is a much more significant surface hydrological feature of the area than is rainfall runoff.

Biscayne Bay is to the east of the Project Area, the cooling canal system is to the south, mangrove wetlands are to the north and immediate west, and Levee L 31E and its associated canal are to the west.

Biscayne Bay

Biscayne Bay is a shallow tropical saline lagoon located on the southeast coast of Florida. The eastern boundary of the Bay is composed of barrier islands which eventually become part of the Florida Keys. The western shore is the Florida mainland. The Bay is connected to the Atlantic Ocean by several channels and cuts, some natural and some man-made. Major tributaries are (north to south) Arch Creek, Biscayne Canal, Little River, Miami River, Coral Gables Waterway, Snapper Creek Canal, Black Creek, Goulds Canal, North Canal, Florida City Canal, and Model Land Canal. The Bay was formed as rising sea level filled a limestone depression. It is not a drowned river valley like most estuaries. Unlike other estuaries, the Bay does not receive a sediment load from major river systems. Biscayne Bay can be divided into three areas: North Bay, Central Bay, and South Bay. Turkey Point Plant is located on South Bay, which is generally undeveloped and fringed by mangrove wetlands. Benthic habitats are dense seagrass beds, large hard ground areas, and algal communities. The main canals draining into this portion of the bay are Black Creek, Princeton Canal, Military Canal, Mowery Canal, and Model land Canal. Ocean exchange is restricted to the tidal creeks between the islands of the northern portion of the Florida Keys.

South Bay (also identified as Lower Biscayne Bay) is about 100 mi^2 (64,000 acres) in area. The average depth is on the order of 5 ft at Mean Low Water (MLW), with a maximum depth of 13 ft. The volume at MLW is on the order of 15 billion cubic feet. Mean tide is 1.65 ft on the mainland shore and 1.55 ft on Elliot Key (eastern side). Salinities vary widely, ranging from a low of 24 parts per thousand (ppt) to a high of 44 ppt, depending on the amount of rainfall and surface drainage reaching the coastal zone. The vertical salinity gradient in the Bay is relatively low, and the water can be considered vertically homogeneous. Natural water temperatures range from 59°F to 92°F at the surface, with little or no stratification.

Studies of the Bay show the principal circulation forces to be tidal, although winds which persist for longer than complete tidal cycles of 12 to 13 hours cause relatively large water movements and represent the principal driving force for the circulation of water from outside the Bay system itself.

Measurements of cyclic tidal flow past discrete points such as Cutter Bank (east of the cooling canal system) average about 50,000 acre-feet per day, or a continuous flow of 60,000 acre-feet per half tidal cycle. Tidal exchange between Biscayne Bay and the ocean is estimated to be less than 10,000 acre-feet per day [5,000 cubic feet per second (cfs)] (FPL, 1972).

SFWMD reports the results of a network of water quality monitoring stations in Biscayne Bay (see Figure 2.3-9). Data from several of these stations in the Turkey Point Plant Site vicinity have been analyzed; the results are shown in Table 2.3-7. In particular, an analysis was performed on recent salinity levels, which are plotted in Figure 2.3-10. Biscayne Bay does not appear on the most recent

Florida 305b list of impaired waters, and is described as having "fairly good water quality" (FDEP, 2002).

Cooling Canal System

The existing four units utilize a 5,900-acre closed-cycle cooling canal system for condenser cooling (see Figure 2.3-10), which is the most significant surface water feature south of the proposed plant expansion. The cooling canal system receives tidal inflow and outflow from Biscayne Bay due to the exceptional porosity of the underlying rock. The cooling canal system is a closed system that carries warm water south of the existing plant and returns cooled water. The canal system does not directly discharge fresh or marine surface waters; however, because the canals are not lined groundwater does interact with water in the canal system. Makeup water for the canal system comes from process water, rainfall, stormwater runoff, and groundwater infiltration to replace evaporative and seepage losses. Consequently, the water in the canals is hypersaline due to the effects of evaporation and with salinity concentrations approximately twice that of Biscayne Bay. Water quality sampling and analysis were performed by the FPL laboratory on cooling canal water; the results are summarized in Table 2.3-8. Cooling canal salinities are compared to Biscayne Bay salinities in Figure 2.3-10.

Tidal Mangrove Areas and L 31E Canal

The surface water features to the north and west of the proposed plant expansion primarily consists of undeveloped wetlands. Levee L 31E, which lies west of the cooling canals and runs in a north-south direction, is part of the flood control system of the area. Its associated canal, designated L 31E Canal, is the nearest offsite surface water feature to the west (see Figure 2.3-12).

USGS maintains two flow stations on the L 31E Canal in the site vicinity; S-20 south-southwest of the proposed project site, and S-20F northwest of the proposed project site. Flows at both locations are through the levee and to the east. Flows at S-20 have been measured since 1968, discharge through the C-107 Canal, and are shown on Figure 2.3-13; the associated flow frequency distribution is shown on Figure 2.3-14, which shows that for about 75 percent of the time, the flow is zero at this location. Flows at S-20F have been measured since 1985, discharge through the North Canal, and are shown on Figure 2.3-15; the associated flow frequency distribution is shown on Figure 2.3-16, which shows that for about 16 percent of the time, the flow is zero at this location.

Table 2.3-8 summarizes the water quality in the L 31E Canal.

2.3.4.2 Measurement Programs

Most of the water quality data for the Turkey Point Expansion Project have been obtained from the literature. Where it was necessary to supplement the historical database, additional data were obtained by the FPL Laboratory, which took samples and performed or subcontracted chemical analysis. The purpose of the water quality baseline studies was to provide information on the existing surface water hydrology and water quality conditions. This information provided the background for the water quality analyses presented in Chapter 3, and the impact assessments presented in Chapter 5.

Two surface waters were tested by FPL as part of this assessment: the Turkey Point cooling canal system and the L 31E canal. Samples were collected from both sources in May 2003 and subjected to laboratory analysis for a variety of inorganic and organic parameters. The water quality data for each source, as well as the literature values, are presented in Appendix 10.5.3.

2.3.5 VEGETATION/LAND USE

Characteristic vegetative communities/land uses within the Project were classified utilizing the FLUCFCS during field reconnaissance conducted on April 24, July 10 and 11, and October 22, 2003. Vegetative communities in, and adjacent to, the Project Area are discussed in detail in Subsection 2.3.6.1.

Existing vegetation/land use within the approximately 90-acre Project Area includes mangrove tidal marsh (FLUCFCS 612), electrical utility facilities and open land associated with the existing Turkey Point facility (FLUCFCS 831/190), access roads (FLUCFCS 814), recreational areas (FLUCFCS 180), Brazilian pepper (FLUCFCS 422), and a transmission line (FLUCFCS 832) (see Figure 2.3-17). The majority of the Project Area (approximately 60 acres) supports mangrove marsh, tidally inundated with waters from Biscayne Bay, a shallow, subtropical bay supporting seagrasses, sponges, coral reefs, and a variety of marine life. Existing plant facilities are located along the southern and eastern perimeter of the mangroves, including parking areas and access roads. A transmission line corridor and associated access road is located along the western boundary of the Project Area.

2.3.6 ECOLOGY

2.3.6.1 Species-Environmental Relationships

The following subsections include descriptions of important flora and fauna at the Project Area and surrounding areas within the Turkey Point Plant Site. This discussion includes information related to the abundance of important species found and the value of the habitats present, based upon field reconnaissance conducted in April, July, and October 2003 and a review of previous investigations.

Terrestrial Ecology Systems- Flora

The following descriptions of the flora and fauna at or near the site follow the FLUCFCS-Level III codes.

Mangrove Tidal Marsh (FLUCFCS 612)

Mangrove tidal marsh is generally described as a coastal community composed of red mangrove (*Rhizophora mangle*) and/or black mangrove (*Avicennia germinans*), which are present in pure or predominant stands. Typically, the major associates include white mangrove (*Laguncularia racemosa*), buttonwood (*Conocarpus erectus*), cabbage palm (*Sabal palmetto*), and sea grape (*Coccoloba uvifera*).

Approximately 60 acres of the Project Area are classified as dwarf red mangrove marsh, established within the shallow, tidally flushed area adjacent to Biscayne Bay and Card Sound. Two small tidal creeks flow into the mangrove area within the Project Area and form a relatively small (approximately 1.8 acres) area of open water is located near the Project Area access road. Analyses of historical aerial photographs illustrate that the open water area was not present prior to development of the existing Turkey Point Plant Site, which indicates that the area was created as a result of historical dredge and fill activities. The presence of spoil piles colonized with Australian pine on the northern edge of the lagoon, as well as elevated spoil areas on the southern edge of the lagoon, provide evidence that the area was created following the initial plant construction.

The dwarf mangrove tidal marsh community comprises mangroves less than 24 inches in height, stunted in response to decreased nutrient availability and increased salinity. The majority of the Project Area is within an area that experiences flushing of tidal waters that overflow the tidal creek channel. This tidal marsh area exhibits more saline conditions with decreased nitrogen and phosphorus available for plant uptake compared to those areas adjacent to tidal creeks. Where the cuts through the dwarf mangrove marsh, the adjacent mangroves are up to 20 ft in height due to the exposure to nutrient-rich tidal creek water with lower salinities. These areas adjacent to the tidal creek experience lower salinities compared to the tidal flat area, where evapotranspiration and reduced flushing increases the salinity in comparison to the tidal creek.

Within the red mangrove community at the Turkey Point Plant Site, buttonwood is a common subdominant canopy component, along with occasional white mangrove. Only a few individual black mangroves were observed within the Project Area. Approximately 90 percent of the red mangroves in the Project Area are characteristic of the dwarf mangrove community, while approximately 10 percent are large individuals located adjacent to the sinuous tidal creek. Additional vegetative species observed within the mangrove community include occasional Brazilian pepper (*Schinus terebinthfolius*), Australian pine (*Casuarina equisetifolia*), tree seaside oxeye (*Borrichia arborescens*), grey nicker (*Caesalpinia bonduc*), groundsel tree (*Baccharis halimifolia*), and cordgrass (*Spartina* sp.).

Electrical Utilities (FLUCFCS 831)

The remainder of the Project Area contains existing Turkey Point Plant facilities, including paved parking and storage areas, an access road, and small areas of manicured grasses adjacent to the road. The access road is located immediately south of the mangrove marsh community.

Transmission Line Corridor (FLUCFCS 832)

An existing 330-ft-wide transmission line corridor is located along the western boundary of the Project Area, traveling roughly south to north over the mangrove marsh. An access road lies adjacent to the transmission line corridor, and individual pole pad structures are located on areas of fill extending into the mangroves to the east of the access road. These small areas of fill are mostly barren, with the perimeter colonized by mangroves, buttonbush, occasional Brazilian pepper, and tree seaside oxeye.

Vegetative Communities Adjacent to the Project Area

Outside of the Project Area, within the 11,000-acre Turkey Point Plant Site, the dominant features are Biscayne Bay, Card Sound, and the 5,900-acre cooling water canal system. The FPL-owned approximately 13,000-acre EMB is located adjacent to the southwest.

Biscayne Bay is shallow, with an average depth at low tide of 5 ft and maximum depth of approximately 13 ft. Salinity varies from 24 to 44 ppt, depending on rainfall and surface drainage (FPL, 2000). Card Sound, which is located immediately south of Biscayne Bay, is approximately 24 mi^2 in size and has a mean depth of approximately 10 ft. Biscayne Bay and Card Sound support seagrass beds, dominated by turtle-grass (*Thalassia testudinum*), subdominant species shoal grass (*Halodule wrightii*), and manatee-grass (*Syringodium filiforme*), which extend thousands of feet offshore.

The cooling canal system services the existing generating units (Units 1, 2, 3, and 4), and comprises approximately 150 miles of channels covering 5,900 acres. The cooling system includes a network of 32 channels that carry warm water south from the plant and dissipate heat prior to recirculating back to the plant north through 8 channels that flow towards the plant intake canal. The approximately 200-ft wide channels contain 1 to 3 ft of hypersaline water and are separated by approximately 90-ft wide berms. Vegetation in the cooling canal system includes submerged, rooted marine plants, primarily widgeongrass (*Ruppia maritime*), as well as terrestrial woody vegetation along the berms.

The EMB is situated to the southwest of the Turkey Point Plant Site, adjacent to the Everglades National Park on the west and Biscayne Bay and Card Sound to the east. The EMB contains freshwater and estuarine wetlands, including sawgrass marsh, wet prairie, herbaceous flats, dwarf mangrove, scrub mangrove, coastal band mangroves, coastal ridge mangroves, and disturbed areas that support the exotic species Australian pine and Brazilian pepper. The EMB is permitted through the FDEP and U.S. Army Corps of Engineers (USACE) in order to maintain functioning wetland habitat that may be purchased as mitigation credits to offset wetland impacts within the EMB's service area.

Terrestrial Ecology Systems–Fauna

The Project Area provides suitable feeding habitat for a variety of wildlife, primarily wading birds and aquatic species associated with mangrove tidal marsh, although the proximity of the existing Turkey Point facilities reduces wildlife utilization of the area. The wildlife habitat in the region surrounding the Turkey Point Plant Site supports a variety of species characteristic of the Biscayne Bay Aquatic Preserve and National Park. Extensive mangrove areas extend to the north and south of the Turkey Point Plant Site, which provide important nursery areas for juvenile fishes as well as provides breeding habitat for the endangered American crocodile, as well as foraging area for several species of wading birds.

Electrical Power Facilities/Open Land (FLUCFCS 831/190)

The existing plant facilities and surrounding open areas are poor habitat for wildlife, due to the lack of cover, forage species of vegetation, and disturbance. No species of birds, mammals, or reptiles were observed in those areas classified as electrical power facilities, with the exception of common urban avian species such as mourning dove (*Zenaida macroura*), European starling (*Sturnus vulgaris*), mockingbird (*Mimus polyglottis*), and rock dove (*Columba livia*).

Mangrove Tidal Marsh (FLUCFCS 612)

The dwarf red mangrove habitat within the Project Area provides suitable habitat for wading birds, as well as habitat for fish, reptiles, and invertebrates. During field reconnaissance conducted in April, July, and October 2003, great egret (*Ardea albus*), ibis (*Eudocimus albus*), tricolor heron (Egretta tricolor), and black-crowned night heron (Nycticorax nycticorax) were observed foraging within the mangrove area. In addition to wading birds, individuals of common avian species were observed, including red winged blackbird (*Agelius phoenicius*), mockingbird, and mourning dove.

Aquatic Ecology Systems–Fauna

The Project Area includes approximately 60 acres of mangrove tidal marsh, which are inundated with approximately 1 to 6 inches of hypersaline water over the majority of the area. Salinity within the tidal marsh area is increased due to a combination of evapotranspiration and reduced flushing. Two tidal channels flow into the mangrove area and connect to an approximately 1.8-acre area of open water near the southern edge of the mangroves adjacent to the existing access road and parking area for Turkey Point Units 1 and 2. The water depth within the tidal channels has not been determined; however, depths within the open water area were measured in July 2003 and ranged from 2 to 5 ft. Aquatic biological sampling was not conducted within this mangrove area; however, several species of fish were observed within the open water area, including marsh killifish (*Fundulus confluentus*), spotfin mojarra (*Eucinostomus argenteus*), mangrove snapper (*Lutjanus griseus*), mullet (*Mugil* sp.), snook (*Centropomus undecimalis*), bonefish (*Albula vulpes*), and a small tarpon (*Megalops atlanticus*).

Aquatic ecological studies were initially conducted in Biscayne Bay and Card Sound adjacent to the Turkey Point Plant Site as part of the 1972 Turkey Point Units 3 & 4 Final Environmental Impact Statement. Fish and invertebrate sampling conducted in the red mangrove community along the shoreline of Biscayne Bay resulted in over 50 species of fish, dominated by gray snapper (*Lutjanus griseus*), mullet (*Mugil* sp.), and yellowfin mojarra (*Gerres cinereus*). Five species of invertebrates were collected, with 90 percent represented by the blue crab (*Callinectes sapidus*).

Threatened and Endangered Species—Flora and Fauna

Plant and animal species designated by the U.S. Fish and Wildlife Service (USFWS), the Florida Fish and Wildlife Conservation (FFWCC), and the Florida Department of Agriculture and Consumer Services (FDACS) as endangered, threatened, species of special concern, commercially exploited, or under review, were included in this category.

There are a number of federally and state listed plants and animals that are associated or potentially associated with the Turkey Point Power Plant Site. A number of wetland-dependent animal species (e.g., wading birds) have the potential to use the mangrove marsh in the Project Area for foraging, including little blue heron, tricolor heron, snowy egret, and wood stork. These species are common to the area and use other similar habitats that are found throughout the surrounding region.

Threatened and Endangered Species--Methodology

Prior to the field reconnaissance conducted in April, July, and October 2003, literature and agency surveys were undertaken to determine the species that could potentially be present in the habitats found on the Project Area. Primary sources of information are the Florida Natural Areas Inventory (FNAI) database; Florida Committee on Rare and Endangered Plants and Animals (FCREPA) reports; Preservation of Native Flora of Florida Law, Rule Chapter 5B-40, F.A.C., the Regulated Plant Index (5B-40.0055); and Notes on Florida's Endangered and Threatened Plants, FDACS, Division of Plant Industry, Bureau of Entomology, Nematology and Plant Pathology - Botany Section, Contribution No. 38, Addition 2, Gainesville. In addition, previous reports of surveys conducted in and near the Project Area were reviewed.

<u>Plant and Animal Surveys</u>

Because of the rareness and seasonality of threatened and endangered species, either multiseason surveys or an evaluation of threatened and endangered species habitat conditions are necessary to determine their presence or absence on the Project Area. For this study, field surveys conducted in April and July 2003 were combined with the evaluation of habitat conditions to determine the presence or absence of threatened and endangered species. Based on the literature review, federally and state listed species whose ranges include the Project Area were identified.

Flora--Threatened, endangered, and/or plant species of special concern that occur within Miami-Dade County are listed in Table 2.3-9. The FNAI database review did not result in any occurrences of listed plant species in the vicinity of the Project Area. During the listed species survey, no threatened or endangered plants were observed, although the potential exists for the occurrence of several epiphytic species known to occur in association with tidal mangrove marsh, such as the Giant wild-pine (*Tillandsia utriculata*), banded wild-pine (*Tillandsia flexuosa*), and powdery strap airplant (*Catopsis berteroniana*).

Fauna--Threatened, endangered, and/or animal species of special concern that occur within Miami-Dade County are listed in Table 2.3-9. During the field reconnaissance conducted in April, July, and October 2003, three species listed by the FFWCC as species of special concern were observed in the Project Area, the white ibis (*Eudocimus albus*), tricolor heron (*Egretta tricolor*), snowy egret (*Egretta thula*), and roseate spoonbill (*Ajaja ajaja*). All four of these species are listed as species of special concern in the State of Florida, but none are listed federally by the USFWS. Non-listed avian species observed in the Project Area include red winged blackbird (*Agelaius phoeniceus*), mourning dove (*Zenaida macroura*), rock dove (*Columba livia*), European starling (*Sturnus vulgaris*), mockingbird (*Mimus polyglottis*), double-crested cormorant (*Phalacrocorax auritius*), common nighthawk (*Chordeiles minor*), cattle egret (*Bubulcus ibis*), green heron (*Butorides striatus*), black vulture (*Coragyps atratus*), and great egret (*Ardea albus*).

Listed species known to occur in the nearby Biscayne National Park that could potentially utilize the Project Area include the peregrine falcon (*Falco peregrinus*), wood stork (*Mycteria americana*), American crocodile (*Crocodylus acutus*), mangrove rivulus (*Rivulus marmoratus*), roseate spoonbill (*Ajaja ajaja*), limpkin (*Aramus guarauna*), little blue heron (*Egretta caerulea*), snowy egret (*Egretta thula*), American oystercatcher (*Haematopus palliates*), least tern (*Sterna antillarum*), brown pelican (*Pelicanus occidentalis*), and bald eagle (*Haliaeetus leucocephalus*). The FFWCC's bald eagle nest locator database (http://wld.fwc.state.fl.us/eagle/eaglenests/Default.asp#criterialocator) was queried and resulted in no known bald eagle nests in the vicinity of the Project Area. According to the FFWCC's database, no bald eagle nests are located within 25 miles of the Project Area.

Additional evening and daytime crocodile surveys were conducted within the proposed expansion area and vicinity in November 2003. During the nighttime survey, no individuals were observed, although the windy weather conditions were not ideal to evening crocodile observation. Signs of crocodile tracks were observed in the Project Area during the daytime survey, which included claw marks and draglines onto the Australian pine spoil piles along the northern boundary of the open water area. No nests were observed within this area and no individuals were observed during this or previous surveys. Near the Girl Scout Camp, the northwest portion of Area G, an inactive historical nest was observed in an area not designated for Project use.

The FNAI database review resulted in no documented occurrences of listed species within the Project Area; however, FNAI did identify a breeding bird colony located approximately 1 mile to the southwest of the Project Area containing mangrove cuckoo (*Coccyzus minor*), clapper rail (*Rallus longirostris*), and the Florida prairie warbler (*Dendroica discolor paludicola*). While not threatened or endangered, the mangrove cuckoo and Florida prairie warbler are classified as state rank S3, defined as "either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors". Two subspecies of clapper rail known to occur in Miami-Dade County, the mangrove clapper rail (*R. longirostris insularum*) and Florida clapper rail (*R. longirostris scottii*), are also classified as S3 species, although it is not reported which variety of clapper rail was observed at the breeding bird colony.

In addition, the FNAI database query identified an occurrence of the threatened indigo snake (*Drymarchon couperi*) approximately 1.5 miles to the northwest of the Project Area.

The proposed Project will not impact the breeding bird colony located approximately 1 mile to the southwest nor will the Project impact the area approximately 1.5 miles to the northwest where the indigo snake was historically observed. The Project is not expected to result in adverse effects to any listed species.

Although not identified in the FNAI database review, the Turkey Point Plant Site is known to harbor a variety of listed species within the existing 5,900-acre cooling canal system, including the endangered American crocodile as well as listed species of wading birds.

Panther Protection Areas

Effective August 2003, the USACE has implemented an Interim Florida Panther Key to aid in consultations with the USFWS regarding potential adverse impacts to the Florida Panther from proposed projects. A map of the Panther Protection Area and the Florida Panther Effect Determination Key is presented in Figure 2.3-18.

As shown in Figure 2.3-18, consultation area does not include the existing Turkey Point Plant, the cooling canal system, or the Project Area. According to the Florida Panther Effect Determination Key, the Project would not be expected to have any effect on the Florida panther. Further, the Project Area is greater than 2 miles from the closest telemetry point and does not contain land cover suitable for dispersal (i.e., forested, forested mixed with row crops/groves, or rural with forested cover).

2.3.6.2 Pre-Existing Stresses

Terrestrial Systems

The greatest pre-existing stress to terrestrial systems of the Project Area and surrounding area is the result of past development activity. The natural topography, soils, and hydrology of a portion of the Project Area have been altered as a result of the construction of the existing power plant facilities. The existing Turkey Point facility was constructed upon mangrove-covered tidal marsh. Natural surface water drainage features have been modified through filling, road building, and the cooling canal system.

Aquatic Systems

The cooling canal system contains hypersaline water (approximately 40 to 50 ppt), shallow depths (approximately 3 ft), and temperatures between 95 to 100°F. The biotic community is restricted to those species that can survive under the limiting conditions of salinity, temperature, and depth. The predominant aquatic vegetation is widgeongrass (*Ruppia maritime*) and the dominant fishes are livebearing forage fishes, such as the killifish (*Fundulus* sp.). Predatory fish, including jacks, snapper, and barracuda have been observed within the cooling canal system, although the environmental conditions are not conducive to successful reproduction for these fish. Primary predators within the cooling canal system include wading birds and the American crocodile.

2.3.6.3 Measurement Programs

Terrestrial Ecology

Terrestrial ecological resources within the Project Area were evaluated through field reconnaissance, agency review, previous studies, and literature searches. Vegetative communities, wildlife utilization, and potential for threatened and endangered wildlife occurrence were addressed during the field reconnaissance conducted in April, July, and October 2003.

Aquatic Ecology

Aquatic species were observed during the field reconnaissance conducted in April, July, and October 2003. Additional sources of information used to identify those species that may potentially utilize the mangrove habitat within the Project Area include the EIS for Turkey Point Units 3 & 4 (1972), the NOAA/University of Miami's "Biodiversity Study of Southern Biscayne Bay and Card Sound" (2000), Supplement 5 of the "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," Regarding Turkey Point Nuclear Plant Units 3 & 4 (NUREG-1437, 2002), and FPL's Environmental Report for the Operating License Renewal Stage, Turkey Point Units 3 & 4 (2000).

Threatened and Endangered Species

Prior to the field surveys, literature and agency surveys were undertaken to determine the species that could potentially be present in the habitats found on the Project Area. Primary sources of information are the FNAI database, FCREPA reports, Preservation of Native Flora of Florida Law, Rule Chapter 5B-40, F.A.C., Regulated Plant Index (5B-40.0055), and Notes on Florida's Endangered and Threatened Plants, FDACS. The Environmental Report filed in association with the License Renewal Application for Turkey Point Units 3 and 4 was also reviewed (FPL, 2000).

Wetland Methodology

The determination of wetland boundaries associated with power generation facilities is under the jurisdiction of the USACE, FDEP, and DERM. To be jurisdictional, a wetland must ascribe to three characteristics defined by rule: presence of hydrophytic vegetation, having a certain defined hydrology, and the presence of hydric soils.

Within the Project Area, the mangrove marsh area is considered a jurisdictional wetland. Of the total Project Area (90 acres), approximately 60 acres are classified as wetlands. Disturbance of these areas will require compensatory mitigation to offset the loss of wetland functions.

2.3.7 METEOROLOGICAL AND AMBIENT AIR QUALITY

2.3.7.1 Meteorology

Meteorological data collected at existing monitoring stations were used to describe the local and regional climatology in the vicinity of the Turkey Point Plant Site. The closest existing meteorological station to the Turkey Point Plant with complete data is the National Weather Service (NWS) station located at the Miami International Airport, situated approximately 46 kilometers (km) (29 miles) north of the Plant. The NWS has recorded weather observations for more than 50 years at this site. These data are the most complete for, and representative of, the region surrounding the Project. FDEP has approved the use of these meteorological data in previous air permit applications for this area and recommended that these data be used for this Project.

The climate in the Project Area is subtropical with a marine influence from the Atlantic Ocean. The monthly and annual average temperatures for this area are presented in Table 2.3-5. The annual average temperature is approximately 75°F with monthly annual average temperatures varying from a maximum of 83°F to a minimum of 68°F. Record extreme temperatures range from a low of 30°F to a record high of 98°F. During the summertime, temperatures rarely exceed 98°F due to the high relative humidifies with subsequent cloud cover formation and the abundant convective-type (e.g., thunderstorms) precipitation.

The monthly and annual average precipitation data are presented in Table 2.3-6. The average annual precipitation measured at Miami International Airport is approximately 58 inches, but this has varied from as little as 39 inches to more than 83 inches in the past 30 years. The majority of rain is in the form of short-lived convection showers (e.g., thunderstorms). Large amounts of rain are also produced during the late summer or fall when tropical storms or hurricanes may pass near the region. These events may result in heavy downpours that reach torrential proportions; 24-hour amounts of about 12 inches have been associated with hurricanes.

Monthly and annual average relative humidities, which indicate the amount of moisture in the air at a given temperature, are presented in Table 2.3-6 for the morning hours of 1:00 a.m. and 7:00 a.m. and early afternoon and evening hours of 1:00 p.m. and 7:00 p.m. The highest humidities are coincident with the coolest ambient temperatures, which generally occur at 7:00 a.m. or near dawn. The lowest humidities coincide with the highest ambient temperatures.

The Project Area lies entirely within the trade wind belt (i.e., below 30°N latitude), resulting in predominant winds from the east. Annual and seasonal windroses for the 5-year period from 1987 through 1991 are given in Figures 2.3-19 and 2.3-20a through 2.3-20d. A summary of the seasonal and annual average wind direction and wind speed, including calm conditions, is presented in Table 2.3-10.

Except during the passage of tropical storms or hurricanes, wind speeds greater than 25 miles per hour (mph) are not common.

Atmospheric stability is a measure of the atmosphere's capability to disperse pollutants and potentially reduce ground-level concentrations. During the daytime with strong solar heating, the atmosphere can disperse pollutants very quickly for a relatively short period of time. This condition is considered as very unstable and generally occurs infrequently during the year. During the nighttime under clear skies and light wind speeds, the atmosphere is considered stable with minimal potential to disperse pollutants. During the day or night when wind speeds are moderate to high, pollutants are dispersed at moderate rates (i.e., dispersion rates that are lesser than those during unstable conditions but greater than those during stable conditions). This condition is considered neutral and occurs frequently throughout the year. The seasonal and annual average occurrences of atmospheric stability classes for this area for 1987 to 1991 are shown in Table 2.3-11.

During the summer months, unstable conditions occur nearly 28 percent of the time due to strong solar heating, whereas unstable conditions occurs only 10 percent of the time in the winter months. Neutral stability occurs most frequently during the winter months due to the higher wind speeds that occur in this season. The occurrence of stable conditions is nearly uniform throughout the year.

The mixing height is a parameter used to define the vertical height to which pollutants can disperse and, therefore, is used in estimating the volume of air in which pollutants are emitted and can be dispersed. In general, a higher mixing height produces a greater potential for pollutants to be dispersed and for ground-level concentrations to be reduced.

The seasonal and annual average morning and afternoon mixing heights for the Turkey Point Plant area for 1987 to 1991 determined using the Holzworth method are listed in Table 2.3-12. The highest afternoon mixing heights occur in the spring and the lowest morning mixing heights occur in winter.

Thunderstorms are the most frequent of severe storms, occurring an average of 74 days per year as reported by the NWS at Miami International Airport. These storms occur throughout the year, but about 82 percent occur from May through October.

Hurricanes and tornadoes are other types of severe weather that can occur at the Project Area, but the probability of a hurricane or tornado passing over the Turkey Point Plant is low.

In the 80-km (50-mile) coastal strip from Homestead to Long Key, there is about a 16-percent chance that a tropical storm will pass over the area during any given year (Gale Research Co., 1980). For storms of hurricane strength (i.e., wind speeds exceeding 73 mph), the chance decreases to about 12 percent with a 5-percent chance that the winds will be greater than 124 mph (i.e., wind speeds of a great hurricane).

Statistics compiled by the severe local storms branch of the national severe storms forecast center (Pautz, 1969) show that 25 tornadoes were spotted within the 1-degree latitude by 1-degree longitude square centered near the Turkey Point Plant Site from 1955 to 1967. This averages about two tornadoes per year. The tornado recurrence interval for any specific point location within the 1 degree square was estimated by the methodology of Thom (1963). The recurrence interval, r, is equal to 1/p where p is the probability of a tornado striking within the 1 square area and is estimated as follows:

$$p = (2.8209 \times t)/a$$

where: t = mean annual frequency of tornadoes occurring, and

a = area of the 1°square (square miles).

In this analysis, t was assumed to be 1.1 based on data collected from 1953 to 1962 and was estimated to be 4,300 square mile (mi^2). Therefore, the mean recurrence interval for a tornado striking a point within this square is more than 1,300 years. The month during which tornadoes occur most frequently is June.

2.3.7.2 Ambient Air Quality

Ambient Standards

The National and Florida Ambient Air Quality Standards (AAQS) are presented in Table 2.3-13. Primary National AAQS were promulgated to protect the public health, and secondary National AAQS were promulgated to protect the public welfare from any known or anticipated adverse effects associated with the presence of pollutants in the ambient air. Areas of the country in violation of AAQS are designated as nonattainment areas, and new sources to be located in or near these areas may be subject to more stringent air permitting requirements. Pollutants for which AAQS have been established are referred to as criteria pollutants. These pollutants include particulate matter with an aerodynamic particle size of 10 micrometers (μm) or less (PM_{10}), sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and lead (Pb).

Miami-Dade County has adopted AAQS for SO_2. These SO_2 standards are 25, 110, and 350 micrograms per cubic meter (μg/m^3) for the annual, 24-hr, and 3-hr averaging times (Chapter 24, Section 24-17, Miami-Dade County Code).

On July 18, 1997, the U.S. Environmental Protection Agency (EPA) promulgated revisions to the National AAQS for O_3 and particulate matter (PM) (62 Federal Register No. 138). The O_3 standard was revised to be 0.08 parts per million (ppm) for an 8-hour average concentration; this standard is achieved when the 3-year average concentration of the 99th percentile values is 0.08 ppm or less. The revised PM AAQS included two new $PM_{2.5}$ standards ($PM_{2.5}$ represents PM with an aerodynamic diameter of 2.5 μm or less), a short-term 24-hour average standard and an annual average standard as well as a revised PM_{10} standard. The $PM_{2.5}$ standards were introduced with a 24-hour standard of 65 μg/m^3 (3-year average concentration of the 98th percentile values) and an annual standard of 15 μg/m^3 (3-year average concentration at community monitors). The revised PM_{10} standard changes the form of compliance from an expected exceedance not to be exceeded more than once per year averaged over 3 years to a 3-year average concentration of the 99th percentile values. In June 2003, EPA proposed rules for implementing the 8-hour O_3 National AAQS. A final rule is expected to be issued by the end of 2003, with areas to be classified as attainment or non-attainment by

April 15, 2004. It is expected that EPA will issue proposed rules to implement the PM_{10} and $PM_{2.5}$ National AAQS by the end of 2003.

Miami-Dade County is classified as an attainment area for all criteria pollutants (Rule 62-204.340, F.A.C.).

In promulgating the 1977 Clean Air Act (CAA) Amendments, Congress specified that certain increases above an air quality *baseline concentration* level of SO_2 and PM concentrations would constitute *significant deterioration* for sources located in attainment areas. The magnitude of the allowable increases, or prevention of significant deterioration (PSD) increments, depend on the classification of the area in which a new source (or modification) will be located or have an impact. Three PSD increment classifications were designated based on criteria established in the 1977 CAA Amendments. Initially, Congress promulgated areas as either Class I (national parks, national wilderness areas, and memorial parks larger than 5,000 acres, and national parks larger than 6,000 acres) or as Class II (all areas not designated as Class I). No Class III areas, which would allow greater deterioration than Class II areas, were designated. EPA then promulgated the requirements for classifications and area designations. On October 17, 1988, EPA promulgated regulations to prevent significant deterioration due to NO_x emissions and established PSD increments for NO_2 concentrations.

The EPA class designations and allowable PSD increments are presented in Table 2.3-12. FDEP has adopted the EPA allowable increments for PM_{10}, SO_2, and NO_2 (Rule 62-272.500, F.A.C.).

Miami-Dade County is classified as a Class II area (Rule 62-204.340, F.A.C.) since it is an attainment area for all pollutants. The nearest Class I area to the Project Area is the Everglades National Park located about 21 km (13 miles) to the southeast.

Ambient Air Quality Data

The Turkey Point Plant is located in a rural area of Miami-Dade County. Air monitoring data are collected in the County for SO_2, PM_{10}, O_3, and NO_2. These data are representative of air quality in Miami-Dade County and the Project Area.

A summary of the maximum pollutant concentrations measured in Miami-Dade County from 2000 through 2002 is presented in Table 2.3-14. These data indicate that the maximum air quality concentrations measured in Miami-Dade County are below applicable standards for all pollutants.

Given the lack of industrial development in the vicinity of the plant, existing concentrations of other criteria pollutants, i.e., CO and Pb, which are usually associated with an urban environment, are expected to be well below the AAQS.

Existing Air Pollutant Sources

The Turkey Point Plant is located in an area with a minimal number of air pollution sources. The existing Turkey Point Plant includes two nominal 440-MW oil-fired and natural gas-fired units (Units 001 and 002), each permitted at a maximum heat input rate of 4,180 million British thermal units per hour (MMBtu/hr). Unit 001 began commercial operation in April 1967. Unit 002 began commercial operation in 1968. The applicable emission limits for the existing units are specified in the state's emission limiting standards for PM, SO_2, and NO_x, as specified in FDEP Chapter 62-296, F.A.C. These regulations stipulate that fossil fuel-fired steam generators located at the Turkey Point Plant Site must meet:

PM – 0.1 lb/MMBtu [Rule 62-296.405(1)(b), F.A.C.]

SO_2 – 1.1 lb/MMBtu [Rule 62-213.440, F.A.C.]

NO_x – 0.4 lb/MMBtu [Rule 62-296.570(4)(b)2] (Natural gas firing)

0.53 lb/MMBtu [Rule 62-296.570(4)(b)2] (Fuel oil firing)

For PM emissions, an allowance of no greater than 0.3 lb/MMBtu for up to 3 hours in a 24-hour period is allowed for soot blowing and load changing (Rule 62-296.570, F.A.C).

Miami-Dade County has adopted emission limits for opacity, PM, and SO_2. The opacity limit is 20 percent (Section 24-14, Miami-Dade County Code) and similar to that adopted by FDEP and applicable to existing fossil fuel fired steam generators with a heat input of 250 MMBtu/hr and greater (Rule 62-296.405(1) F.A.C.). The PM emission limits are based on a process weight table that limits the PM emissions based on the process weight. Process weight is the total amount of all materials introduced into a process unit [Section 24-16 (1)]. It does not include uncombined water, liquid and gaseous fuels, combustion, and other air introduced into the process. These PM limits would not apply to the existing Turkey Point Units 1 and 2. The SO_2 emission standards set limitations for stationary combustion sources. For existing sources greater than 250 MMBtu/hr heat input and firing liquid fuel the limitation is 1.1 lb/MMBtu [Section 24-17 (2)(a)(ii)], the same as that established by FDEP in the Title V Operating Permit and applicable to Units 1 and 2.

The emission units are regulated under Acid Rain-Phase II, Fossil Fuel Steam Generators with More Than 250 MMBtu/hr Heat Input (Rule 62-296.405, F.A.C.), and RACT Requirements for Major VOC and NO_x Emitting Facilities (Rule 62-296.570, F.A.C.).

2.3.7.3 Measurement Programs

All information (i.e., meteorology and air quality data) was compiled from monitoring stations maintained and operated by FDEP, Miami-Dade County, or cooperating governmental agencies (i.e., NWS). No significant changes in these programs are anticipated after the construction and operation of the Project.

Meteorological data were obtained from the NWS surface and upper-air station at the Miami International Airport. These data were obtained for a 5-year period from 1987 through 1991 from which the joint frequency of wind direction, wind speed, atmospheric stability, and a 5-year average of mixing heights were developed. The wind sensors at the Miami International Airport have been located 22 ft above grade. Regular surface observations are taken just before each hour, 7 days per week. Upper-air soundings are conducted twice per day at 0700 and 1900 eastern standard time.

2.3.8 NOISE

2.3.8.1 Background

Sound propagation involves three principal components: a noise source, a person or a group of people, and the transmission path. While two of these components, the noise source and the transmission path, are easily quantified (i.e., direct measurements or though predictive calculations), the effects of noise on humans is the most difficult to determine due to the varying responses of humans to the same or similar noise patterns. The perception of sound (noise) by humans is very subjective, and just as for odors and taste, it is very difficult to predict a response from any particular individual to another.

The magnitude of noise levels or loudness is referred to as sound pressure level (SPL) with units in decibels (dB). Decibels are calculated as a logarithmic function of SPL in air to a reference effective pressure, which is considered the hearing threshold, or:

$$SPL = 20 \log_{10} (P_e/P_o)$$

where:

P_e = measured effective pressure of sound wave in micropascals (μPa), and

P_o = reference effective pressure of 20 Pa.

To account for the effect of how the human ear perceives sound pressure, at moderate to low levels, SPLs are adjusted for frequency (or pitch). One of the most commonly used frequency filters is the A-weighting (dBA), which adjusts measurements for the approximated response of the human ear to low-frequency SPLs [i.e., below 1,000 hertz (Hz)] and high-frequency SPLs (i.e., above 1,000 Hz). There are no State of Florida noise regulations that are applicable for the construction and operation to the proposed Project. There is only a "nuisance" noise ordinance for Miami-Dade County.

2.3.8.2 Noise Measurement Procedures

A comprehensive ambient noise-monitoring program was performed to assess the existing ambient noise levels in the Project Area and the FPL Turkey Point Plant Site. The field effort to collect the baseline noise level data was conducted on April 24, 2003 during the daytime and nighttime. The equipment used to monitor the baseline noise levels operated in the slow response mode to obtain accurate, integrated, A-weighted sound pressure levels. A windscreen was used because all measurements were taken outdoors. The microphone was positioned so that a random incidence response, as specified by the American National Standard Institute (ANSI), was achieved. The sound level meter and octave band analyzer were calibrated immediately prior to and just after the sampling period to provide a quality control check of the sound level meter's operation during monitoring.

Integrated SPL data consisting of the following noise parameters were collected at each location:

L_{eq} The sound pressure level averaged over the measurement period; this parameter is the continuous steady sound pressure level that would have the same total acoustic energy as the real fluctuating noise over the same time period.

L_{90} The sound level exceeded 90 percent of the time during the monitoring period.

The SPL data were analyzed and reported in both dB and dBA. The higher the decibel value, the louder the sound.

The SPLs and octave band data were collected at the seven monitoring locations, for a minimum of 15 continuous minutes during each monitoring event, using measurement techniques set forth by ANSI S12.9-1993/Part 3, 1993).

The noise monitoring equipment used during the study included:

1. Continuous Noise Monitoring Equipment
    a. Larson Davis Model 824 Precision Integrating Sound Level Meter with Real Time Frequency Analyzer
    b. Larson Davis Model PRM902 Microphone Preamplifier
    c. Larson Davis Model 2560 Prepolarized 1/2" Condenser Microphone
    d. Windscreen, tripod, and various cables
2. Sound Level Meter Calibration Unit
    a. Larson Davis Model CAL200 Sound Level Calibrator, 94/114 dB at 1,000 Hz.

Monitoring was conducted using the sound level meter mounted on a tripod at a height of 1.2 m (4 ft) above grade. Local meteorological conditions (wind speed, wind direction, temperature, and relative humidity) were measured during the monitoring periods. The operator recorded detailed field notes during monitoring and included major noise sources in the area. The Larson Davis sound level meter complies with Type I--Precision requirements set forth for sound level meters and for one-third octave filters.

The SPLs and octave band data were collected at seven different locations (see Figure 2.3-21). Five of the seven monitoring locations (Sites 1, 2, 3, 4, and 5) were selected to delineate the noise levels at or near the proposed Project's power block boundary. Additionally, Sites 6 and 7 were selected to delineate the existing noise levels produced by the Turkey Point Plant and other noise sources at the pre-school to the west of the facility, and at the Homestead Bay front entrance, respectively. Noise monitoring was performed at the seven sites during the daytime and nighttime.

The L_{eq} (equivalent sound pressure level averaged for the sampling period), as well as the L_{90}, SPLs during each monitoring event at each location were recorded and are presented in Table 2.3-15. The calibration certificates are provided in Appendix A. The SPL averages were calculated using the following formula:

$$\text{Average SPL} = 10 \text{ Log} \frac{\sum_{i-1}^{N} 10^{(SPLi/10)}}{N}$$

where: N = number of observations.

SPL_i = individual sound pressure level in data set.

2.3.8.3 Existing Ambient Sound Pressure Level Conditions

The daytime and nighttime ambient noise levels, measured as an L_{eq}, for each of the monitoring sites are illustrated in Table 2.3-15. During the monitoring program, the maximum L_{eq} noise levels for daytime and nighttime were 61.2 and 61.5 dBA, at Sites 4 and 3, respectively, which are near the existing Plant generating units. The minimum L_{eq} noise levels for daytime and nighttime were 49.3 and 40.7 dBA, at Sites 6 and 7, respectively. Sites 6 and 7 are located about 1.6 miles northwest and 2 miles north, respectively, from the existing Turkey Point Plant.

Table 2.2-1. Areas Not Located Within 5 Miles of the Project Area

National	State	Regional/Local/Other
Forests	Parks	Special Management Areas Established by Law
Seashores	Forests	Indian Reservations
Wildlife Refuges	Game Management Areas	Major Private Land-Holding for which the Primary Purpose is Environmental Protection
Wilderness Areas	Areas of Critical State Concern	
Memorials	Conservation and Recreation Lands	
Monuments	Archeological Landmarks or Landmark Zone	
Marine Sanctuary	Scenic and Wild Rivers	
Estuarine Sanctuaries		
Roadless Area Review and Evaluation (RARE) Areas		
Wild and Scenic Rivers		

Source: Golder, 2003.

Table 2.2-2. Population Census Counts, Population Estimates, and Projections

Political Jurisdiction	2000 Census	2001 Population Estimate	2002 Population Estimate	Medium Population Projection 2010	Medium Population Projection 2020
Miami-Dade	2,253,362	2,285,869	2,332,599	2,548,177	2,836,672
Homestead	31,909	32,300	33,727	NA	NA
Florida City	7,843	7,986	7,880	NA	NA
Census Tract 114.01	4,330	NA	NA	NA	NA

Note: NA = Information Not Available.

Source: University of Florida, Bureau of Economic and Business Research, 2002.

U.S. Census Bureau, 2003.

http://factfinder.census.gov/servlet/CTGeoSearchByListServlet?ds_name=DEC_2000_SF1_U&_lang=en&_ts=83173322218

http://www.state.fl.us/edr/population/web10.xls

Table 2.3-1. Stratigraphic Column of Rock Units in the Vicinity of the Turkey Point Plant Site (Page 1 of 2)

Age	Formation	Lithologic Description	Thickness (ft)	Water-bearing Unit
Holocene	Soils	Peat and muck.	0-12	
	Lake Flirt Marl	White to gray calcareous mud, rich with shells of Helisoma sp., a fresh-water gastropod. In some places cemented to form dense limestone. Relatively impermeable.	0-6	
Pleistocene (formations are contemporaneous in part)	Pamlico Sand	Quartz sand, white to black or red, depending upon nature of staining materials, very fine-to coarse-grained, average medium-grained. Mantles large areas underlain by Miami oolite and Anastasia Formation.	0-40	Biscayne aquifer
	Oolite facies of the Miami Limestone	Limestone, oolitic, soft, white to yellowish containing thin layers of calcite, massive to crossbedded and stratified; generally perforated with vertical solution holes. Fair to good aquifer.	0-40	Biscayne aquifer
	Anastasia Formation	Coquina, sand, calcareous sandstone, sandy limestone, and shell marl. Probably composed of deposits equivalent in age to marine members of Fort Thompson Formation. Fair to good aquifer.	0-120	Biscayne aquifer
	Key Largo Limestone	Coralline reef rock, ranging from hard and dense to soft and cavernous. Probably interfingers with the marine members of the Fort Thompson Formation. Crops out along southeastern coastline of Florida from Soldier Key in Biscayne Bay to Bahia Honda. Excellent aquifer.	0-60	Biscayne aquifer
	Fort Thompson Formation	Alternating marine, brackish-water and fresh-water marls, limestones, and sandstone. A major component of the highly permeable Biscayne aquifer of coastal Dade and Broward Counties, which yields copious supplies of groundwater.	0-150	Biscayne aquifer
Pliocene	Caloosahatchee Marl	Sandy marl, clay, silt, sand, and shell beds. Yields groundwater less abundantly than most other parts of the Biscayne aquifer.	0-25	Biscayne aquifer

Table 2.3-1. Stratigraphic Column of Rock Units in the Vicinity of the Turkey Point Plant Site (Page 2 of 2)

Age	Formation	Lithologic Description	Thickness (ft)	Water-bearing Unit
Miocene	Tamiami Formation	Cream, white and greenish-gray clayey marl, silty and shelly sands, and shelly marl, locally hardened to limestone. Upper part, where permeability is high, forms the lower part of the Biscayne aquifer. Lower and major part of formation is low permeability and forms the upper beds of the aquiclude that confines water in the Floridan aquifer below.	0-500	Biscayne aquifer and confining horizon
horizon	Hawthorn Formation	Sandy, phosphatic marl, interbedded with clay, shell, marl, silt, and sand. Greenish color predominates. Water is generally scarce, of poor quality, and in the permeable beds is confined under low-pressure head. Comprises the major part of aquiclude confining the Floridan aquifer.	50-500	Confining
	Tampa Limestone	White to tan, soft to hard, often partially recrystallized limestone. Yields artesian water but not as abundantly as lower parts of the Floridan aquifer.	150-250	Floridan aquifer
Oligocene	Suwannee Limestone	Creamy soft to hard limestone, lithologically similar to underlying Ocala Limestone.	0-450	Floridan aquifer
Eocene	Ocala Group Avon Park Limestone Lake City Limestone Oldsmar Limestone	Crystalline carbonate rocks; limestone and dolomite, generally yields highly mineralized water.	1,500-3,000	Floridan aquifer
Paleocene	Absent	--	--	Not a source of water
Cretaceous	Lawson Limestone Pine Key Formation Austin Age Limestone	Crystalline carbonate rocks; limestone and dolomite, not used as source of water.	>10,000	Not a source of water
Precambrian and Palezoic	--	Crystallized igneous and metamorphic rocks.	--	Not a source of water

Sources: Schroeder *et al.*, 1958; Carter, 1984; Sherwood *et al.*, 1973; Vecchiolo and Foose, 1984; Florida Bureau of Geology, 1986; and Anderson *et al.*, 1986.

Table 2.3-2. Water Quality Data for Biscayne Aquifer

Constituent (Concentrations in milligrams per liter, except as indicated)	Analyses of Untreated Water from Selected Municipal Well Fields and from Everglades Sites, 1973-75.*							
	Boca Raton well field	Fort Lauderdale Fiveash well field	Miami Preston well field	Miami Orr well field	Keys Aqueduct well field, south Dade County	Northwest Dade test well	Southwest Dade test well	Newton Water Treatment Plant Finished Water (1999)**
Silica (SiO_2)	7.5	9.7	7	4.3	3.2	7.1	5.3	4
Calcium (Ca)	80	100	90	92	100	98	81	87
Magnesium (Mg)	2.1	2.8	5.4	3.2	3.8	7	4.1	4.1
Sodium (Na)	18	19	38	16	13	17	14	26
Potassium (K)	1.4	1.5	3	1.7	5.7	0.7	0.3	5.4
Strontium (Sr)	0.75	0.78	0.87	0.74	1.1	0.89	0.61	
Bicarbonate (HCO_3)	212	299	272	259	236	321	263	
Sulfate (SO_4)	26	26	28	28	62	1.3	0.9	32
Chloride (Cl)	34	33	57	25	23	29	25	43
Fluoride (F)	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.13
Nitrate (NO_3-N)	0.01	0.01	0.01	0.25	0	0	0	2
Nitrite (NO_2-N)	0	0	0	0	0	0	0	0
Nitrogen, organic (N)	-	-	1.1	-	-	0.55	0.89	
Nitrogen (Ammonia total NH_4-N)	0.31	0.63	1.1	0.01	0.01	1.2	0.46	0.05
Iron (Fe)	0.08	1.8	0.9	0.03	0.29	2.9	-	0
Phosphorus, total (P)	-	-	-	-	-	0.02	0	
Dissolved solids (residue at 180°C)	320	388	394	322	356	353	285	346
Total hardness (as $CaCO_3$)	210	260	250	240	270	280	220	238
Noncarbonate hardness (as $CaCO_3$)	36	15	27	28	76	13	9	38
Alkalinity (as $CaCO_3$)	174	245	223	212	194	263	215	200
pH (units)	7	7.4	7.6	7.5	7.5	7 3	7.8	7.3
Specific conductance (umhos/cm at 25°C)	500	619	663	540	569	561	465	657
Color (Pt-Co units)	7.5	45	55	5	5	-	-	1
Temperature (°C)	28	-	28	28	-	24.3	24	25.3
Turbidity (JTU)	-	-	1	-	-	9	16	0.13
Carbon, organic, total (C)	-	-	-	-	-	15	9	1.2
Orthophosphate total (PO_4-P)	-	-	-	-	-	0.06	0	0.2

* From USGS Report 78-107, "Biscayne Aquifer," 1978.
** Data believed representative of Biscayne aquifer quality.

Table 2.3-3. Data for Hydrologic Units Underlying Miami-Dade County, Florida

Hydrologic Unit or Subunit	Hydraulic Conductivity (ft/day)		Porosity	Approximate Depth (ft below land surface)	Unit Thickness (ft)
	Horizontal	Vertical			
Biscayne Aquifer	1,524	15	0.31	0 - 230	230
Intermediate Confining Unit	90	0.1-2.38	0.1-0.31	230 - 840	610
Upper Floridan Aquifer	42	0.42-2.38	0.1-0.32	840 - 2,060	1,220
Middle Confining Unit	4.7	0.04-1.50	0.1-0.43	2,060 - 2,550	490
Lower Floridan Aquifer	0.01	0.1	0.1-0.4	2,550 - 2,750	200*
Boulder Zone	6,540	65	0.2	2,750 - 3,250+	500

*The Lower Floridan Aquifer extends below the Boulder Zone; this value for thickness represents only the portion above the Boulder Zone.

Table 2.3-4. Water Quality of Upper Floridan Aquifer

Parameter	Units	Maximum Concentration	Mean Concentration
Alkalinity (Bicarbonate)	mg/L	268	196
Aluminum	mg/L	<0.5	<0.02
Arsenic	mg/L	<0.8	<0.2
Cadmium	mg/L	<0.003	<0.002
Calcium	mg/L	196	149
Chloride	mg/L	3850	2909
Chromium	mg/L	<0.02	<0.0147
Copper	mg/L	<0.03	<0.02
Fluoride	mg/L	3.6	1.6
Iron Total	mg/L	0.67	0.28
Lead	mg/L	<0.1	<0.07
Magnesium	mg/L	252	177
Manganese	mg/L	<0.1	<0.07
Mercury	mg/L	<0.0013	<0.0003
Molybdenum	mg/L	<0.1	<0.1
Nickel	mg/L	0.06	<0.031
Nitrate as N	mg/L	0.03	<0.01
pH	SU	7.9	7.7
Potassium	mg/L	120	77
Selenium	mg/L	<0.5	<0.2
Silica	mg/L	18	12
Silver	mg/L	<0.01	<0.005
Sulfate	mg/L	770	661
Total Dissolved Solids (TDS)	mg/L	7016	5451
Total Hardness	mg/L as $CaCO_3$	1750	1136
Total- Phosphate	mg/L	0.14	0.11
TSS	mg/L	<10	<1
Turbidity	NTU	5.2	1.1
Zinc	mg/L	<0.02	<0.010

Table 2.3-5. Monthly and Annual Average Temperatures Measured at Miami International Airport

	Daily Temperatures (°F)[a]			Extremes (°F)[b]	
Month	Average	Maximum	Minimum	Maximum	Minimum
January	67.1	75.5	58.7	88	30
February	68.1	76.6	59.5	89	32
March	71.4	79.5	63.3	92	32
April	74.8	28.6	67.1	96	46
May	78.2	85.4	70.9	96	53
June	81.2	88.0	74.3	98	60
July	82.5	89.3	75.6	98	69
August	82.8	89.7	75.9	98	68
September	81.7	88.2	75.2	97	68
October	78.1	84.7	71.4	95	51
November	72.9	80.2	65.7	89	39
December	68.8	76.8	60.8	82	30
Annual	75.2	83.1	68.2	98	30

[a] 30-year period of record, climatological normal, 1961 to 1990.
[b] 54-year period of record, 1947 to 2000.

Source: National Oceanic and Atmospheric Administration (NOAA), 2000.

Table 2.3-6. Monthly and Annual Average Precipitation and Relative Humidity Measured at Miami International Airport

Month	Precipitation (inches)			Humidity (%) hour (LT) [a]			
	Average[a]	Maximum[b]	Minimum[b]	1 a.m.	7 a.m.	1 p.m.	7 p.m.
January	1.97	6.66	< 0.04	81	84	59	69
February	1.92	8.07	0.01	79	83	57	66
March	2.28	10.57	0.02	77	82	56	65
April	3.57	17.29	< 0.05	76	86	53	63
May	6.16	18.54	0.44	79	81	59	69
June	8.61	22.36	1.81	83	84	65	74
July	6.65	13.51	1.77	82	84	63	72
August	7.40	16.88	1.65	83	86	65	74
September	8.31	24.4	2.63	85	88	66	76
October	6.68	21.64	1.25	82	86	63	73
November	2.75	13.84	< 0.09	81	85	61	71
December	1.80	6.39	0.12	79	83	60	70
Annual	58.1			81	84	61	70

[a] 30-year period of record, climatological normal, 1961 to 1990.
[b] 54-year period of record, 1947 to 2000.

Note: LT = local time.

Source: NOAA, 2000.

Table 2.3-7. Biscayne Bay Water Quality

Constituent	Overall Max	Overall Avg	Overall Min
Specific Conductivity - µS/cm	68200	51648.29	32
Lab Conductivity - µS/cm	55000	49867.083	38100
Total Coliform - CFU/100ml	7500	14.86	1
Fecal Coliform - CFU/100ml	4600	11.896	1
Total Zinc - µg/L	395	20.718	0.1
Salinity - PPT	354	34.638	0.1
Total Iron - µg/L	61	9.763	0.1
Temperature - °C	34.5	25.565	5.63
Total Lead - µg/L	30	1.042	0.04
Color - PCU	24	5.676	1
Turbidity - NTU	15	1.233	0.1
Chlorophyll A - mg/cubic meter	10.86	0.576	0.03
Total Copper - µg/L	9.4	0.758	0.034
pH	8.8	8.021	6.93
D.O. - mg/L	8.5	5.986	1.9
NH4 - mg/L	0.9	0.065	0.0079
Total Cadmium - µg/L	0.9	0.083	0.01
NO_x - mg/L	0.54	0.033	0.01
Total Phosphate - mg/L	0.168	0.006	0.0001

Source: SFWMD, 2003; Tetra Tech FW, 2003.

Table 2.3-8. Water Quality Data for L 31E and Cooling Canal System

All tested as total unfiltered.
ND indicates non-detected.

No.	Parameter	Unit	L-31E Max	L-31E Avg	Cooling Canal System Max	Cooling Canal System Avg
1	pH	SU			8.21	8.02
2	TSS	mg/L	ND	ND	19	16
3	COD	mg/L	ND	ND	2100	1650
4	BOD (5-day)	mg/L	ND	ND	ND	ND
5	Soluble BOD	mg/L	ND	ND	ND	ND
6	Total Residual Chlorine	mg/L	ND	ND	0.8	0.8
7	Total Dissolved Solids (TDS)	mg/L	390	370	56000	54500
8	Ammonia as N	mg/L			0.16	0.16
9	Kjeldahl Nitrogen	mg/L			1.9	1.8
10	Nitrite as N	mg/L	ND	ND	ND	ND
11	Nitrate as N	mg/L	1.1	1.05	ND	ND
12	Total Phosphorus	mg/L			0.11	0.0965
13	Dissolved Oxygen	mg/L			12.02	8.7
14	Total Hardness	mg/L as CaCO3	240	215	10000	10000
15	Total Alkalinity	mg/L as CaCO3	200	200	170	165
16	Nitrogen (total)	mg/L			1.9	1.8
17	Fluoride	mg/L	ND	ND	ND	ND
18	Chloride	mg/L	60	58.5	33000	30000
19	Iron Total	mg/L	ND	ND	ND	ND
20	Magnesium	mg/L	5.5	5.35	2200	2050
21	Calcium	mg/L	72	70	760	720
22	Manganese	mg/L	ND	ND	0.0089	0.00855
23	Sulfate	mg/L	26	26	4200	3950
24	Temperature	°C			31.5	30.05
25	Antimony	mg/L	ND	ND	ND	ND
26	Arsenic	mg/L	ND	ND	0.042	0.0295
27	Beryllium	mg/L	ND	ND	ND	ND
28	Cadmium	mg/L	ND	ND	ND	ND
29	Chromium	mg/L	ND	ND	ND	ND
30	Copper	mg/L	ND	ND	0.021	0.0175
31	Lead	mg/L	ND	ND	0.0001	0.0001
32	Soluble Lead	mg/L	ND	ND	0.00021	0.000152
33	Mercury	mg/L	ND	ND	ND	ND
34	Molybdenum	mg/L	ND	ND	0.018	0.018
35	Nickel	mg/L	ND	ND	0.05	0.0395
36	Selenium	mg/L	0.0062	0.00435	0.67	0.3475
37	Silver	mg/L	ND	ND	ND	ND
38	Thallium	mg/L	ND	ND	0.0018	0.00107
39	Zinc	mg/L	ND	ND	0.019	0.019
40	Cyanide	mg/L			ND	ND
41	Phenols	mg/L			ND	ND
42	Oil & Grease	mg/L	ND	ND	ND	ND
43	Silica	mg/L			0.61	0.52
44	Ortho-Phosphate	mg/L	ND	ND	ND	ND
45	Alkalinity(Bicarbonate)	mg/L	200	200	170	165
46	Total- Phosphate	mg/L				
47	Turbidity	NTU			2	1.915
48	Sulfides	mg/L			ND	ND
49	Aluminum	mg/L	ND	ND	0.017	0.014
50	Barium	mg/L	0.014	0.0135	0.08	0.073
51	Iron(Dissolved)	mg/L	ND	ND	ND	ND
52	Potassium	mg/L	6.3	6.3	690	680
53	Vanadium	mg/L	ND	ND	0.0056	0.004

Source: FPL, 2003.

FPL

Table 2.3-9. Threatened, Endangered, and Species of Special Concern Known to Occur in Miami-Dade County, Florida (Source: Florida Natural Areas Inventory, 1997)

Scientific Name	Common Name	Federal Status	State Status
FISH			
Rivulus marmoratus	mangrove rivulus	N	LS
AMPHIBIANS and REPTILES			
Rana capito	gopher frog	N	LS
Alligator mississippiensis	American alligator	T(S/A)	LS
Caretta caretta	loggerhead	LT	LT
Chelonia mydas	green turtle	LE	LE
Crocodylus acutus	American crocodile	LE	LE
Dermochelys coriacea	leatherback	LE	LE
Eretmochelys imbricata	hawksbill	LE	LE
Gopherus polyphemus	gopher tortoise	N	LS
Pituophis melanoleucus mugitus	Florida pine snake	N	LS
Tantilla oolitica	rim rock crowned snake	N	LT
BIRDS			
Ajaia ajaja	roseate spoonbill	N	LS
Ammodramus maritimus mirabilis	Cape Sable seaside sparrow	LE	LE
Aramus guarauna	limpkin	N	LS
Charadrius melodus	piping plover	LT	LT
Columba leucocephala	white-crowned pigeon	N	LT
Egretta caerulea	little blue heron	N	LS
Egretta rufescens	reddish egret	N	LS
Egretta thula	snowy egret	N	LS
Egretta tricolor	tricolored heron	N	LS

Table 2.3-9. Threatened, Endangered, and Species of Special Concern Known to Occur in Miami-Dade County, Florida (Source: Florida Natural Areas Inventory, 1997)

Scientific Name	Common Name	Federal Status	State Status
Eudocimus albus	white ibis	N	LS
Falco peregrinus	peregrine falcon	LE	LE
Falco sparverius paulus	southeastern American kestrel	N	LT
Grus canadensis pratensis	Florida sandhill crane	N	LT
Haematopus palliatus	American oystercatcher	N	LS
Haliaeetus leucocephalus	bald eagle	LT	LT
Mycteria americana	wood stork	LE	LE
Pelecanus occidentalis	brown pelican	N	LS
Rostrhamus sociabilis plumbeus	snail kite	LE	LE
Rynchops niger	black skimmer	N	LS
Speotyto cunicularia floridana	Florida burrowing owl	N	LS
Sterna antillarum	least tern	N	LT
MAMMALS			
Eumops glaucinus floridanus	Florida mastiff bat	N	LE
Felis concolor coryi	Florida panther	LE	LE
Podomys floridanus	Florida mouse	N	LS
Trichechus manatus	manatee	LE	LE
Ursus americanus floridanus	Florida black bear	C	LT
PLANTS			
Acacia choriophylla	tamarindillo	N	LE
Acrostichum aureum	golden leather fern	N	LE

Table 2.3-9. Threatened, Endangered, and Species of Special Concern Known to Occur in Miami-Dade County, Florida (Source: Florida Natural Areas Inventory, 1997)

Scientific Name	Common Name	Federal Status	State Status
Actinostachys pennula	ray fern	N	LE
Adiantum melanoleucum	fragrant maidenhair fern	N	LE
Adiantum tenerum	brittle maidenhair fern	N	LE
Alvaradoa amorphoides	Everglades leaf lace	N	LE
Amorpha herbacea var *crenulata*	crenulate lead-plant	LE	LE
Anemia wrightii	Wright's anemia	N	LE
Argusia gnaphalodes	sea lavender	N	LE
Argythamnia blodgettii	Blodgett's wild-mercury	N	LE
Asplenium auritum	auricled spleenwort	N	LE
Asplenium serratum	bird's nest spleenwort	N	LE
Asplenium trichomanes-dentatum	slender spleenwort	N	LE
Basiphyllaea corallicola	rockland orchid	N	LE
Bourreria cassinifolia	little strongbark	N	LE
Brassia caudata	spider orchid	N	LE
Brickellia eupatorioides var *floridana*	Florida thoroughwort brickell-bush	N	LE
Byrsonima lucida	locustberry	N	LE
Calyptranthes zuzygium	myrtle-of-the-river	N	LE
Campyloneurum angustifolium	narrow-leaved strap fern	N	LE
Catopsis berteroniana	powdery catopsis	N	LE
Catopsis floribunda	many-flowered catopsis	N	LE
Chamaecrista lineata var *keyensis*	big pine partridge pea	N	LE
Chamaesyce deltoidea	hairy deltoid spurge	LE	LE

Table 2.3-9. Threatened, Endangered, and Species of Special Concern Known to Occur in Miami-Dade County, Florida (Source: Florida Natural Areas Inventory, 1997)

Scientific Name	**Common Name**	**Federal Status**	**State Status**
ssp *adhaerens*			
Chamaesyce deltoidea ssp *deltoidea*	deltoid spurge	LE	LE
Chamaesyce garberi	Garber's spurge	LT	LE
Chamaesyce porteriana var *porteriana*	Porter's broad-leaved spurge	N	LE
Cheilanthes microphylla	southern lip fern	N	LE
Cheiroglossa palmata	hand fern	N	LE
Coccothrinax argentata	silver palm	N	LE
Colubrina cubensis var *floridana*	Cuban snake-bark	N	LE
Conradina grandiflora	large-flowered rosemary	N	LE
Crossopetalum ilicifolium	Christmas berry	N	LE
Crossopetalum rhacoma	rhacoma	N	LE
Ctenitis sloanei	Florida tree fern	N	LE
Cyrtopodium punctatum	cow-horned orchid	N	LE
Digitaria pauciflora	few-flowered crabgrass	N	LE
Eltroplectris calcarata	spurred neottia	N	LE
Encyclia boothiana var *erythronioides*	dollar orchid	N	LE
Encyclia cochleata var *triandra*	clamshell orchid	N	LE
Epidendrum nocturnum	night-scented orchid	N	LE
Eugenia confusa	tropical ironwood	N	LE
Eugenia rhombea	red stopper	N	LE
Euphorbia pinetorum	rockland painted-leaf	N	LE

Table 2.3-9. Threatened, Endangered, and Species of Special Concern Known to Occur in Miami-Dade County, Florida (Source: Florida Natural Areas Inventory, 1997)

Scientific Name	**Common Name**	**Federal Status**	**State Status**
Galactia smallii	Small's milk pea	LE	LE
Galeandra beyrichii	galeandra	N	LE
Glandularia maritima	coastal vervain	N	LE
Gossypium hirsutum	wild cotton	N	LE
Govenia utriculata	sheathing govenia	N	LE
Guaiacum sanctum	lignum-vitae	N	LE
Guzmania monostachia	Fuch's bromeliad	N	LE
Harrisia simpsonii	Simpson's prickly apple	N	LE
Hippomane mancinella	manchineel	N	LE
Hypelate trifoliata	white ironwood	N	LE
Ilex krugiana	Krug's holly	N	LE
Ionopsis utricularioides	delicate ionopsis	N	LE
Ipomoea microdactyla	wild potato morning glory	N	LE
Ipomoea tenuissima	rocklands morning glory	N	LE
Jacquemontia curtissii	pineland jacquemontia	N	LE
Jacquemontia reclinata	beach jacquemontia	LE	LE
Jacquinia keyensis	joewood	N	LT
Lantana depressa var *depressa*	Florida lantana	N	LE
Lantana depressa var *floridana*	Atlantic Coast Florida lantana	N	LE
Lechea divaricata	pine pinweed	N	LE
Licaria triandra	Gulf licaria	N	LE
Linum arenicola	sand flax	N	LE
Linum carteri var carteri	Carter's small-flowered flax	N	LE

Table 2.3-9. Threatened, Endangered, and Species of Special Concern Known to Occur in Miami-Dade County, Florida (Source: Florida Natural Areas Inventory, 1997)

Scientific Name	Common Name	Federal Status	State Status
Linum carteri var smallii	Carter's large-flowered flax	N	LE
Lomariopsis kunzeana	holly vine fern	N	LE
Matelea floridana	Florida spiny-pod	N	LE
Microgramma heterophylla	climbing vine fern	N	LE
Myrcianthes fragrans var *simpsonii*	twinberry	N	LT
Okenia hypogaea	burrowing four-o'clock	N	LE
Oncidium floridanum	Florida oncidium	N	LE
Peperomia humilis	terrestrial peperomia	N	LE
Peperomia obtusifolia	blunt-leaved peperomia	N	LE
Phoradendron rubrum	mahogony mistletoe	N	LE
Polygala smallii	tiny polygala	LE	LE
Polyrrhiza lindenii	ghost orchid	N	LE
Ponthieva brittoniae	Bahama shadow-witch	N	LE
Prescotia oligantha	small-flowered prescotia	N	LE
Pseudophoenix sargentii	Florida cherry-palm	N	LE
Pteris bahamensis	Bahama brake	N	LE
Pteroglossaspis ecristata	wild coco	N	LT
Rhipsalis baccifera	mistletoe cactus	N	LE
Roystonea elata	Florida royal palm	N	LE
Sachsia polycephala	Bahama sachsia	N	LE
Selaginella eatonii	Eaton's spikemoss	N	LE
Sphenomeris clavata	wedgelet fern	N	LE
Spiranthes costaricensis	Reichenbach's orchid	N	LE

Table 2.3-9. Threatened, Endangered, and Species of Special Concern Known to Occur in Miami-Dade County, Florida (Source: Florida Natural Areas Inventory, 1997)

Scientific Name	Common Name	Federal Status	State Status
Spiranthes elata	tall neottia	N	LE
Spiranthes polyantha	green ladies'-tresses	N	LE
Spiranthes torta	southern ladies'-tresses	N	LE
Swietenia mahagoni	West Indies mahogany	N	LE
Tectaria coriandrifolia	Hattie Bauer halberd fern	N	LE
Tectaria fimbriata		N	LE
Tephrosia angustissima var *angustissima*	devil's shoestring	N	LE
Tephrosia angustissima var *corallicola*	rockland hoary-pea	N	LE
Thelypteris reptans	creeping fern	N	LE
Thelypteris sclerophylla	hard-leaved shield fern	N	LE
Thrinax morrisii	brittle thatch palm	N	LE
Thrinax radiata	Florida thatch palm	N	LE
Tillandsia flexuosa	banded wild-pine	N	LE
Tragia saxicola	pineland noseburn	N	LE
Trichomanes krausii	Kraus' bristle fern	N	LE
Trichomanes punctatum	Florida bristle fern	N	LE
Tripsacum floridanum	Florida gama grass	N	LE
Vanilla barbellata	worm-vine orchid	N	LE
Vanilla mexicana	scentless vanilla	N	LE
Vanilla phaeantha	brown-flowered vanilla	N	LE
Warea carteri	Carter's warea	LE	LE
Zanthoxylum coriaceum	Biscayne prickly ash	N	LE
Zephyranthes simpsonii	rain lily	N	LT

Table 2.3-9. Threatened, Endangered, and Species of Special Concern Known to Occur in Miami-Dade County, Florida (Source: Florida Natural Areas Inventory, 1997)

Note:

C = Candidate species for which federal listing agencies have sufficient information on biological vulnerability and threats to support proposing to list the species as Endangered or Threatened.

LE = Listed as Endangered.

LS = Listed as Species of Special Concern.

LT = Listed as Threatened.

N = Not Listed.

T(S/A) = Listed due to Similarity of Appearance.

Source: Florida Natural Areas Inventory, 1997.

Table 2.3-10. Seasonal and Annual Average Wind Direction and Wind Speed Measured at Miami International Airport[a]

Season	Average Wind Speed (mph)	Calm (Percent)	Prevailing Wind	
			Direction	Average Wind Speed (mph)
Winter	8.7	0.77	Northeast	7.8
Spring	9.6	0.5	Southeast	7.7
Summer	7.8	1.4	Southeast	6.9
Fall	8.1	0.6	Northeast	7.3
Annual	8.6	0.8	East	7.7

[a] 5-year period of record, 1987 to 1991. The data for this period were also used in the air quality impact analyses for the project.

Source: NOAA, 1995.

Table 2.3-11. Seasonal and Annual Average Atmospheric Stability Classes Determined at Miami International Airport [a]

	Occurrence (Percent) of Stability Class					
Season	Very Unstable	Moderately Unstable	Slightly Unstable	Neutral	Slightly Stable	Moderately Stable
Winter	0.0	1.7	8.4	50.8	21.3	17.0
Spring	0.4	3.8	14.1	49.3	18.8	13.0
Summer	1.1	7.2	19.8	33.7	19.1	17.7
Fall	0.3	4.0	13.4	42.3	20.2	19.2
Annual	0.4	4.2	14.0	44.0	19.8	16.7

[a] 5-year period of record, 1987 to 1991. The data for this period were also used in the air quality impact analyses for the project.

Source: NOAA, 1991.

Table 2.3-12. Seasonal and Annual Average Morning and Afternoon Mixing Heights Determined at Miami International Airport [a]

Season	Mixing Height (m)	
	Morning	Afternoon
Winter	700	1,259
Spring	868	1,429
Summer	840	1,372
Fall	868	1,307
Annual	819	1,342

[a] 5-year period of record, 1987 to 1991. The data for this period were also used in the air quality impact analyses for the Project. Mixing heights based on surface temperatures and upper-air data from the NWS stations at Miami International Airport and Ruskin, respectively.

Source: NOAA, 1991.

Table 2.3-13. National and State AAQS, Allowable PSD Increments, and Significant Impact Levels

Pollutant	Averaging Time	National AAQS (μg/m³) Primary Standard	National AAQS (μg/m³) Secondary Standard	Florida AAQS [a] (μg/m³)	PSD Increments (μg/m³) [a] Class I	PSD Increments (μg/m³) [a] Class II	Significant Impact Levels[b] (μg/m³)
Particulate Matter [c] (PM_{10})	Annual Arithmetic Mean	50	50	50	4	17	1
	24-Hour Maximum	150	150	150	8	30	5
Sulfur Dioxide	Annual Arithmetic Mean	80	NA	60	2	20	1
	24-Hour Maximum	365	NA	260	5	91	5
	3-Hour Maximum	NA	1,300	1,300	25	512	25
Carbon Monoxide	8-Hour Maximum	10,000	10,000	10,000	NA	NA	500
	1-Hour Maximum	40,000	40,000	40,000	NA	NA	2,000
Nitrogen Dioxide	Annual Arithmetic Mean	100	100	100	2.5	25	1
Ozone [c]	1-Hour Maximum [d]	235	235	235	NA	NA	NA
Lead	Calendar Quarter Arithmetic Mean	1.5	1.5	15	NA	NA	NA

Note: Particulate matter (PM_{10}) = particulate matter with aerodynamic diameter less than or equal to 10 micrometers.
NA = Not applicable, i.e., no standard exists.

[a] Short-term maximum concentrations are not to be exceeded more than once per year, except for PM_{10} and O_3 AAQS which are based on expected exceedances.

[b] Maximum concentrations are not to be exceeded.

[c] On July 18, 1997, EPA promulgated revised AAQS for particulate matter and ozone. For particulate matter, $PM_{2.5}$ standards were introduced with a 24-hour average standard of 65 μg/m³ (based on the 3-year averages of the 98th percentile values) and an annual standard of 15 μg/m³ (3-year averages at community monitors). The form of the 24-hour PM_{10} standard was changed; compliance is based on 3-year average of 99th percentile concentrations that is 150μg/m³ or less. The O_3 standard was modified to be 0.08 ppm for the 8-hour average; achieved when the 3-year average of 99th percentile values is 0.08 ppm or less. Florida DEP has not yet adopted the revised standards.

[d] 0.12 ppm; achieved when the expected number of days per year with concentrations above the standard is fewer than 1.

Sources: Federal Register, Vol. 43, No. 118, June 19, 1978.
40 Code of Federal Regulations (CFR) 50; 40 CFR 52.21.
Florida Chapter 62.204, F.A.C.

Table 2.3-14. Summary of Maximum Measured SO_2, PM_{10}, O_3, and NO_2 Concentrations Observed from Representative Monitoring Stations in Miami-Dade County, 2000 through 2002

AIRS/ Saroad Site No.	Operator	Location	Measurement Period Year	Measurement Period Months	Concentration 1-Hour Highest	1-Hour 2nd Highest	3-Hour Highest	3-Hour 2nd Highest	8-Hour 3-year Average 4th Highest	24-Hour Highest	24-Hour 2nd Highest	Annual Average
Sulfur dioxide		**Florida AAQS**			**NA**	**NA**	**NA**	**0.5 ppm**	**NA**	**NA**	**0.1 ppm**	**0.02 ppm**
12-025-019	Dade County	FHP Route E US 27	2000	Jan-Dec	NA	NA	0.01	0.006	NA	0.004	0.003	0.002
			2001	Jan-Dec	NA	NA	0.01	0.007	NA	0.004	0.004	0.0015
			2002	Jan-Dec	NA	NA	0.005	0.005	NA	0.004	0.004	0.0022
PM_{10} [a]		**Florida AAQS**			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**150 μg/m³**	**50 μg/m³**
12-025-0020	Dade County	7100 NW 36th Street	2000	Jan-Dec	NA	NA	NA	NA	NA	48	39	24
			2001	Jan-Dec	NA	NA	NA	NA	NA	56	47	25
			2002	Jan-Dec	NA	NA	NA	NA	NA	51	43	22
12-025-6001	Dade County	Fire Station 325	2000	Jan-Dec	NA	NA	NA	NA	NA	46	43	21
			2001	Jan-Dec	NA	NA	NA	NA	NA	56	55	22
			2002	Jan-Dec	NA	NA	NA	NA	NA	38	31	19
Ozone [a]		**Florida AAQS**			**NA**	**0.12 ppm**	**NA**	**NA**	**0.08 ppm**	**NA**	**NA**	**NA**
12-025-0021	Dade County	Thompson Park	2000	Jan-Dec	0.085	0.085	NA	NA	0.071	NA	NA	NA
			2001	Jan-Dec	0.107	0.092	NA	NA	0.068	NA	NA	NA
			2002	Jan-Dec	0.095	0.094	NA	NA	0.066	NA	NA	NA
12-025-0027	Dade County	Rosentiel School	2000	Jan-Dec	0.091	0.088	NA	NA	0.076	NA	NA	NA
			2001	Jan-Dec	0.119	0.103	NA	NA	0.066	NA	NA	NA
			2002	Jan-Dec	0.084	0.083	NA	NA	0.069	NA	NA	NA
12-025-0029	Dade County	Perdue Medical	2000	Jan-Dec	0.100	0.094	NA	NA	0.075	NA	NA	NA
			2001	Jan-Dec	0.119	0.101	NA	NA	0.068	NA	NA	NA
			2002	Jan-Dec	0.091	0.086	NA	NA	0.069	NA	NA	NA
Nitrogen dioxide		**Florida AAQS**			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**0.053 ppm**
12-025-0027	Dade County	Rosentiel School	2000	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	0.007
			2001	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	0.0061
			2002	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	0.0064
12-025-4002	Dade County	Metro Annex	2000	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	0.016
			2001	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	0.0158
			2002	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	0.0142

Note: NA = not applicable.
AAQS = ambient air quality standard.

[a] On July 18, 1997, EPA promulgated revised AAQS for particulate matter and ozone. For particulate matter, $PM_{2.5}$ standards were introduced with a 24-hour average standard of 65 $\mu g/m^3$ (based on the 3-year averages of the 98th percentile values) and an annual standard of 15 $\mu g/m^3$ (3-year averages at community monitors).
The form of the 24-hour PM_{10} standard was changed; compliance is based on 3-year average of 99th percentile concentrations that is 150 $\mu g/m^3$ or less. The O_3 standard was modified to be 0.08 ppm for the 8-hour average; achieved when the 3-year average of 99th percentile values is 0.08 ppm or less.

Source: EPA Aerametric Information Retrieval System, Air Quality Subsystem, Quick Look Report, Florida 2003

Table 2.3-15. Baseline Ambient Sound Pressure Level Data for FPL Turkey Point Power Plant

Baseline Site	Location	Date	Time	Wind Speed	Wind Direction	Sound Levels (dBA) L90	Sound Levels (dBA) Leq	Comments/Notes
1	200 meters east of Project power	24-Apr-03	Day	5-7	East	48.2	50.0	Plant not noticeable; security drive-by
	block by Red Barn	24-Apr-03	Night	5-7	NE	51.6	53.4	Wind;some insects
2	70 meters southeast	24-Apr-03	Day	8-10	East	56.1	57.3	Loudspeaker announcements
	of Project power block	24-Apr-03	Night	Gusty	NE	57.7	58.6	Wind
3	35 meters south of Project power	24-Apr-03	Day	8-10	East	58.3	59.2	Turbine whine; steam noise/venting;prop jet
	block steam tubine	24-Apr-03	Night	Gusty	NE	60.5	61.5	Turbine whine; steam hiss, intermittent
4	165 meters southwest of Project	24-Apr-03	Day	5-7	East	60.1	61.2	Palm rustling in wind
	power block	24-Apr-03	Night	8-10	NA	59.3	60.2	Low humming noise; not turbine
5	230 meters west of Project power	24-Apr-03	Day	3-5	East	54.1	55.2	Turbine noticeable
	block on T-line	24-Apr-03	Night	5-7	NA	55.0	56.6	Turbine noticeable
6	Pre-School on Palm Drive	24-Apr-03	Day	3-5	East	44.2	49.3	Birds; cars on Palm Dr.;gun range
		24-Apr-03	Night	1-3	NE	41.5	44.0	Crickets;distant plant noise
7	Homestead Bayfront Park Entrance[a]	24-Apr-03	Day	5-7	East	49.6	52.3	Plant not audible
		24-Apr-03	Night	1-3	NE	39.5	40.7	Cars and security passed by

[a] The entrance to the Biscayne national Park is at the same location. Neither the county park nor the National Park have camping facilities in this area. There is a marina at the Homestead Bayfront County Park where overnight stay in boats can be obtained.

Source: Golder, 2003

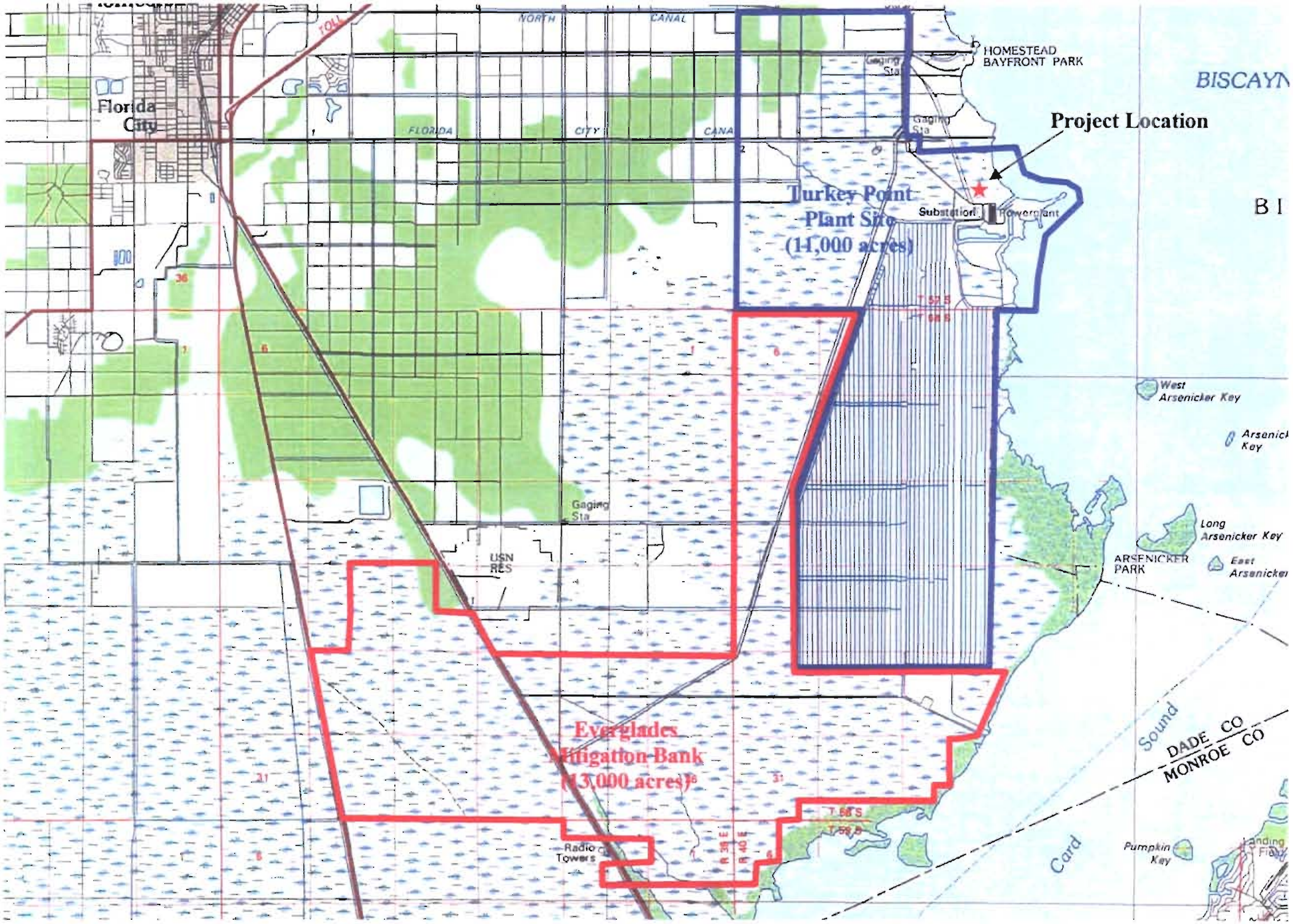
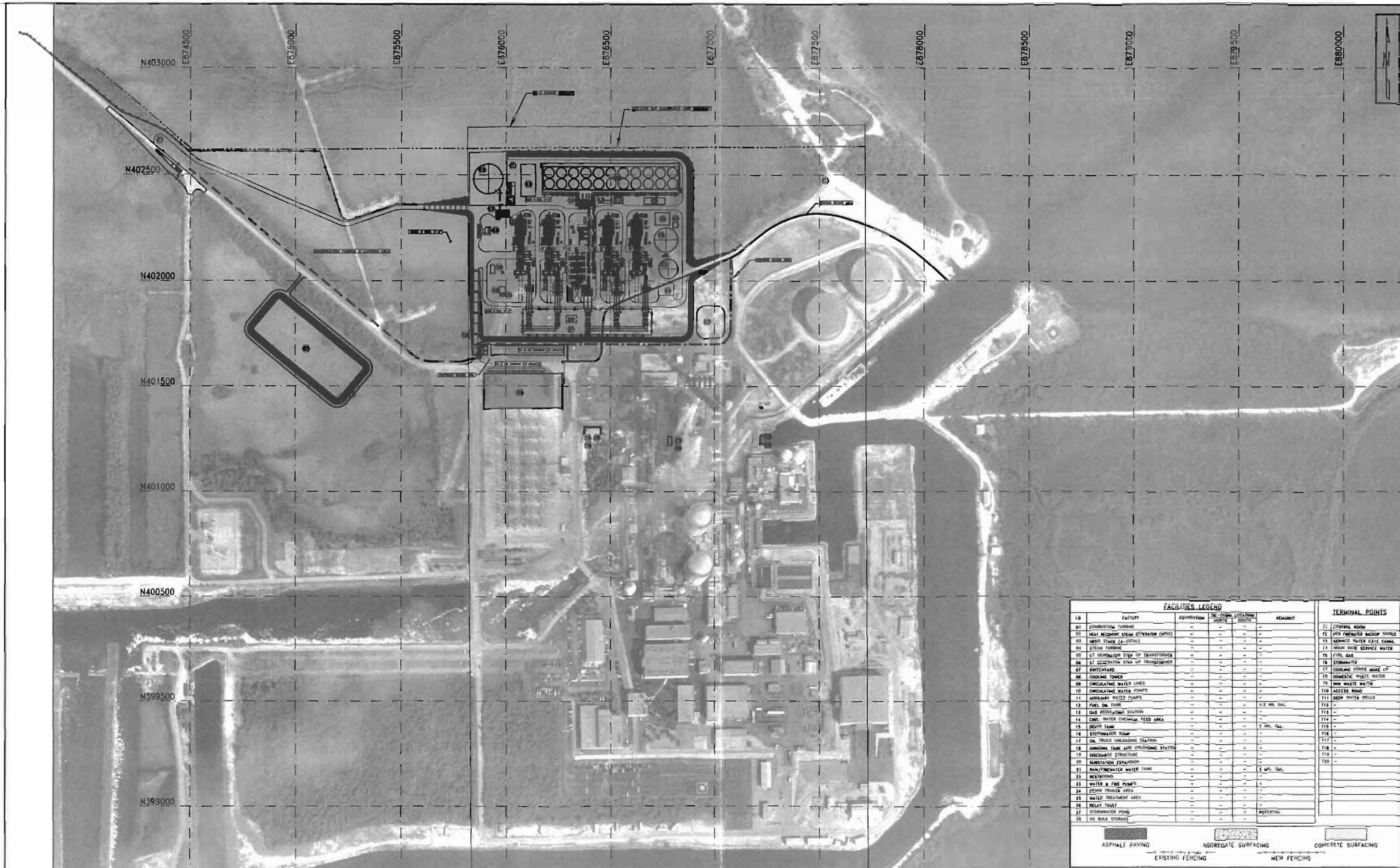


Figure 2.1-1.
FPL Turkey Point Plant Site Location, Project Location, and Everglades Mitigation Bank

Source: National Geographic, 2003; Golder, 2003.

FPL



FACILITIES LEGEND

I.D.	FACILITY	FOUNDATION	TIE-DOWN LOCATION NORTH	TIE-DOWN LOCATION SOUTH	REMARKS
01	COMBUSTION TURBINE	-	-	-	-
02	HEAT RECOVERY STEAM GENERATOR (HRSG)	-	-	-	-
03	HRSG STACK (4-TOTAL)	-	-	-	-
04	STEAM TURBINE	-	-	-	-
05	CT GENERATOR STEP UP TRANSFORMER	-	-	-	-
06	ST GENERATOR STEP UP TRANSFORMER	-	-	-	-
07	SWITCHYARD	-	-	-	-
08	COOLING TOWER	-	-	-	-
09	CIRCULATING WATER LINES	-	-	-	-
10	CIRCULATING WATER PUMPS	-	-	-	-
11	AUXILIARY WATER PUMPS	-	-	-	-
12	FUEL OIL TANK	-	-	-	4.3 MIL. GAL.
13	GAS REGULATING STATION	-	-	-	-
14	CIRC. WATER CHEMICAL FEED AREA	-	-	-	-
15	DEMIN TANK	-	-	-	2 MIL. GAL.
16	STORMWATER SUMP	-	-	-	-
17	OIL TRUCK UNLOADING STATION	-	-	-	-
18	AMMONIA TANK AND UNLOADING STATION	-	-	-	-
19	DISCHARGE STRUCTURE	-	-	-	-
20	SUBSTATION EXPANSION	-	-	-	-
21	RAW/FIREWATER WATER TANK	-	-	-	3 MIL. GAL.
22	RESTROOMS	-	-	-	-
23	WATER & FIRE PUMPS	-	-	-	-
24	DEMIN TRAILER AREA	-	-	-	-
25	WATER TREATMENT AREA	-	-	-	-
26	RELAY VAULT	-	-	-	-
27	STORMWATER POND	-	-	-	POTENTIAL
28	H2 BULK STORAGE	-	-	-	

TERMINAL POINTS

T1	CONTROL ROOM
T2	NEW FIREWATER BACKUP SOURCE
T3	SERVICE WATER C51E CANAL
T4	MIAMI DADE SERVICE WATER
T5	FUEL GAS
T6	STORMWATER
T7	COOLING TOWER MAKE UP
T8	DOMESTIC WASTE WATER
T9	RAW WASTE WATER
T10	ACCESS ROAD
T11	DEEP WATER WELLS
T12	-
T13	-
T14	-
T15	-
T16	-
T17	-
T18	-
T19	-
T20	-

ASPHALT PAVING AGGREGATE SURFACING CONCRETE SURFACING
EXISTING FENCING NEW FENCING

REV	DATE	REVISION DESCRIPTION	BY	CH	COR	APR	ORG
0	10/31/03	ISSUED FOR SCA USE	GMG			TOJ	PGBU

FPL

SYSTEM: N/A	DISCIPLINE: CS	PLANT/UNIT: TURKEY POINT	BAR CODE
SCALE: 1"=200'	CAD FILE NAME: A-DER.dwg	TITLE: FIGURE 2.1-2 EXPANSION PROJECT AERIAL DERIVED DEVELOPMENT PLAN	
DRAWING SIZE: D(24"X36")	FPL ARCHIVE NAME		
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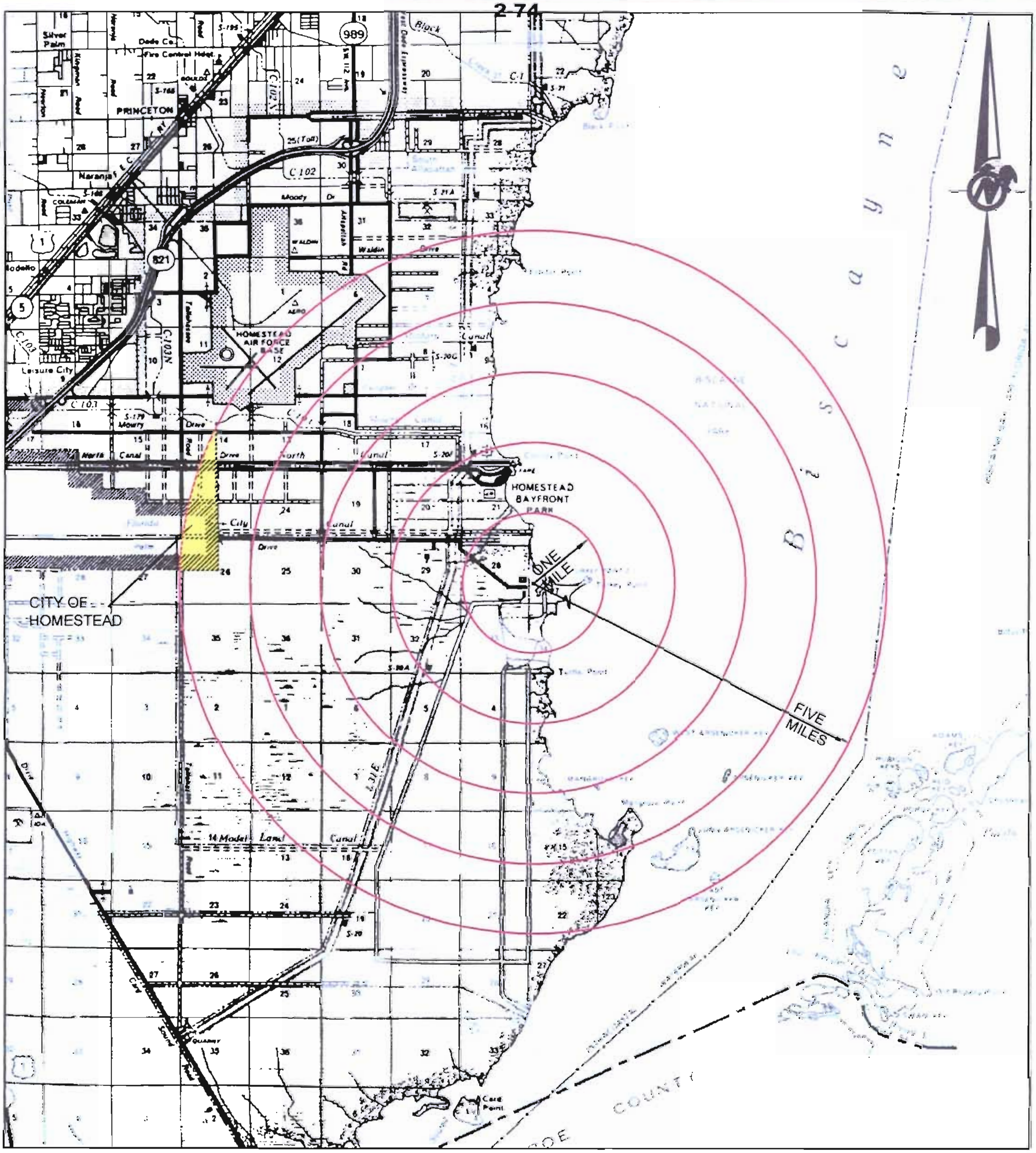

SOURCE

FLORIDA DEPARTMENT OF TRANSPORTATION

SCALE 2 0 2 MILES

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	DESIGN RAZ		
	CADD TDA		
FILE No. 0337600/4/4.2.1/Figures/Figure 2.2-1.dwg	CHECK XXX		
PROJECT No. 033-9700 REV. 0	REVIEW XXX	FP&L TURKEY POINT	FIGURE 2.2-1

LEGEND

ADOPTED 2005 AND 2015
LAND USE PLAN *
FOR MIAMI-DADE COUNTY, FLORIDA

RESIDENTIAL COMMUNITIES

ESTATE DENSITY	1 TO 2.5	DWELLING UNITS PER GROSS ACRE
LOW DENSITY	2.5 TO 6	DWELLING UNITS PER GROSS ACRE
LOW-MEDIUM DENSITY	5 TO 13	DWELLING UNITS PER GROSS ACRE
MEDIUM DENSITY	13 TO 25	DWELLING UNITS PER GROSS ACRE
MEDIUM-HIGH DENSITY	25 TO 60	DWELLING UNITS PER GROSS ACRE
HIGH DENSITY	60 TO 125	DWELLING UNITS PER GROSS ACRE

(D I-1) One Density Increase With Urban Design
(D I-2) Two Density Increase With Urban Design

- INDUSTRIAL AND OFFICE
- RESTRICTED INDUSTRIAL AND OFFICE
- BUSINESS AND OFFICE
- OFFICE / RESIDENTIAL
- INSTITUTIONAL AND PUBLIC FACILITY
- PARKS AND RECREATION
- AGRICULTURE
- OPEN LAND
- ENVIRONMENTAL PROTECTION
- ENVIRONMENTALLY PROTECTED PARKS
- TRANSPORTATION
- TERMINALS
- EXPRESSWAYS
- MAJOR ROADWAYS (3 OR MORE LANES)
- MINOR ROADWAYS (2 LANES)
- EXISTING / FUTURE RAPID TRANSIT
- URBAN CENTERS
  - REGIONAL
  - METROPOLITAN
  - COMMUNITY
- URBAN DEVELOPMENT SUBJECT TO FARMLAND CONSERVATION STUDY OPPORTUNITY
- 2005 URBAN DEVELOPMENT BOUNDARY
- 2015 EXPANSION AREA BOUNDARY
- WATER
- CANAL
- LEVEE / CANAL

N

0 2640 5280'
SCALE: 1" = 5280' (1 Mile)

SOURCE:
Miami-Dade Dept. of Planning and Zoning, 1998; Golder, 2003.
0337600/4/4.2/4.2.1/FIGURES/Figure 2.2-2.dwg

PROJECT
FLORIDA POWER & LIGHT

TITLE
FIGURE 2.2-2
TURKEY POINT
FUTURE LAND USE MAP

FPL

PROJECT No.	033-7600		FILE No.	0337600A006
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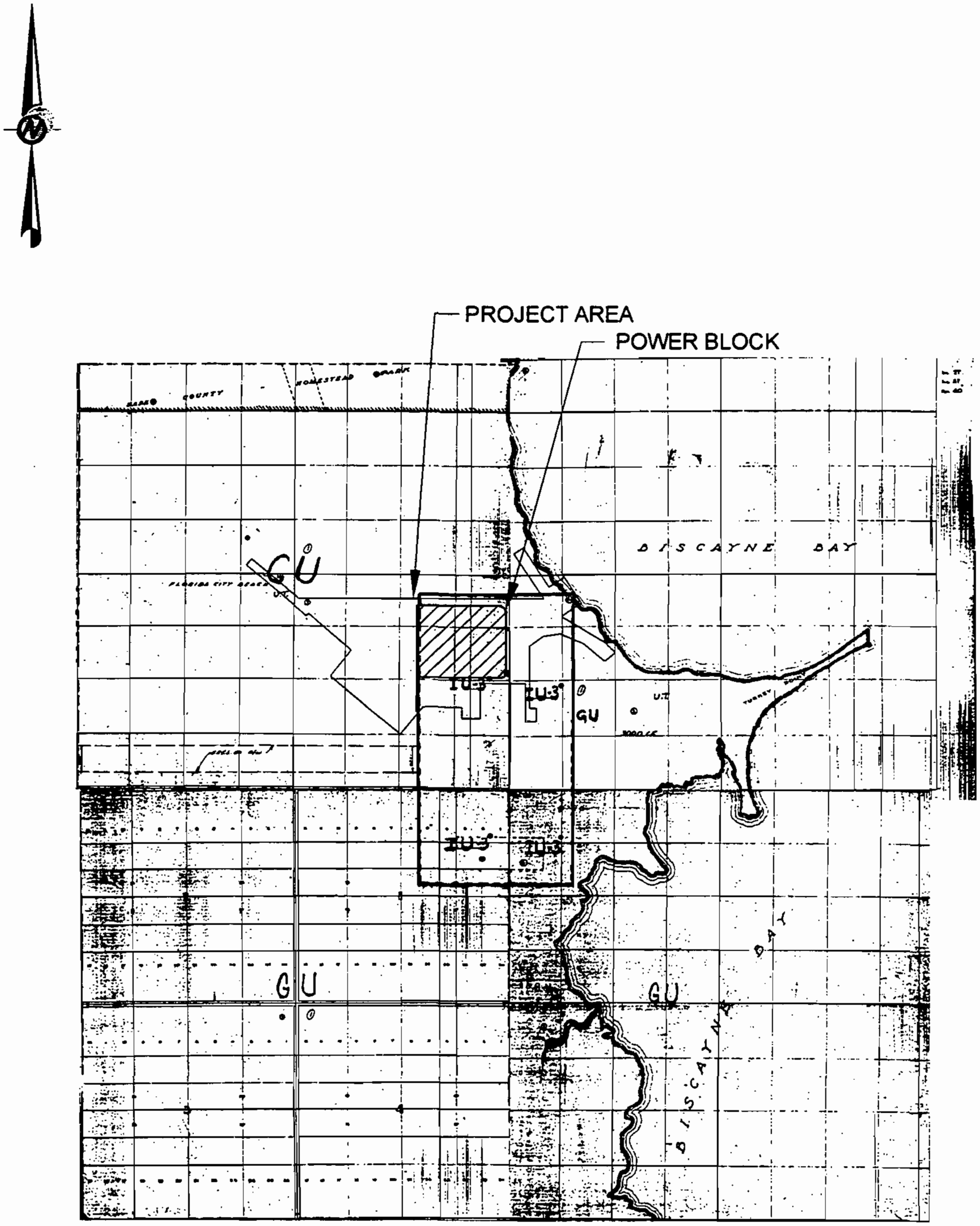
CHECK	RAZ			
REVIEW				



SOURCE:
Dade Co. Engineering Dept. Zoning Maps V-173, V-174, V-246 & V-247; Golder, 2003.

0337600\4\4.2\4.2.1\Figures\Figure 2.2-3.dwg

PROJECT

FLORIDA POWER & LIGHT

TITLE

Figure 2.2-3

TURKEY POINT

ZONING MAP

FPL

PROJECT No.		033-7600	FILE No.	0337600A007		
DESIGN		06/16/03	SCALE	NTS	REV.	0
CADD	TDA	10/03/03				
CHECK	RAZ	10/06/03	-			
REVIEW						

FLORIDA LAND USE COVER AND FORMS CLASSIFICATION SYSTEM - LEVEL II

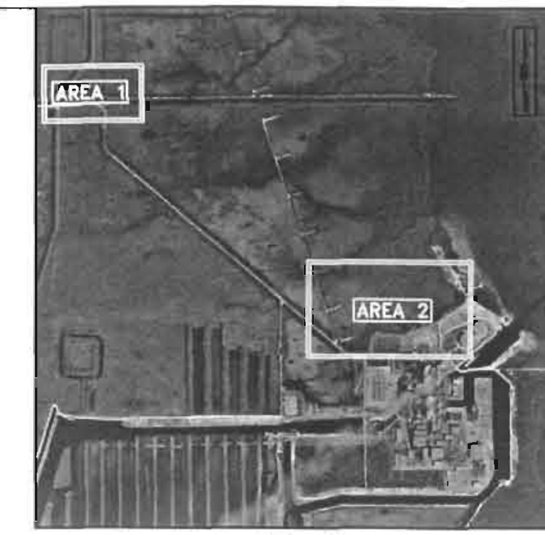
160 - EXTRACTIVE
170 - INSTITUTIONAL
180 - RECREATIONAL
190 - UNDEVELOPED LAND
210 - CROP LAND AND PASTURE LAND
240 - NURSERIES AND VINEYARDS
830 - UTILITIES

SOURCE

AIR PHOTO USA

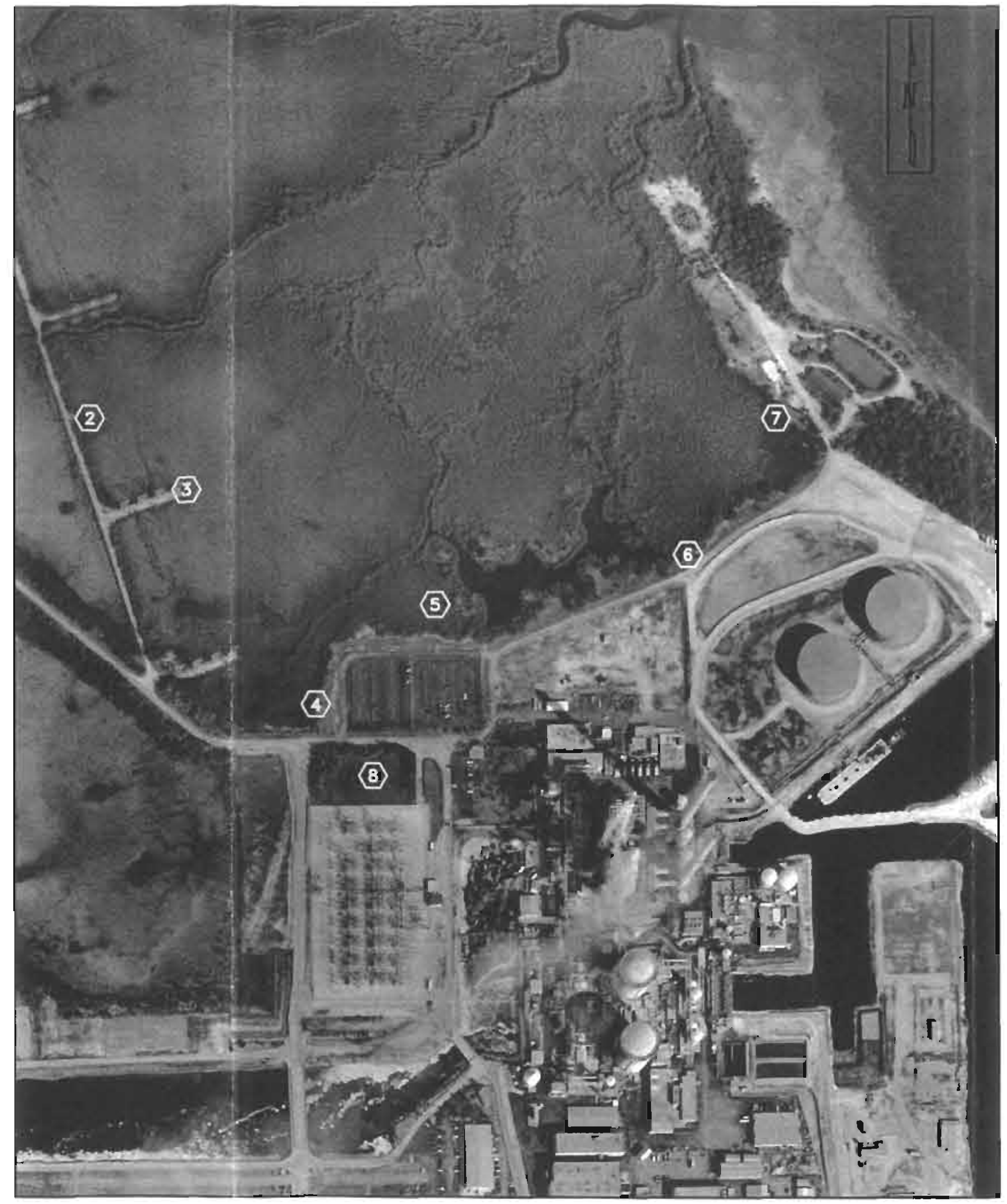
SCALE 2 0 2 MILES

FPL	SCALE: AS SHOWN	TITLE: AERIAL PHOTO DEPICTING PROJECT AREA AND VICINITY LAND USE	
	DATE: 10/15/03		
	DESIGN: RAZ		
	CADD: TDA		
FILE No. 0337600/4/4.2.1/Figures/Figure 2.2-4.dwg	CHECK: XXX		
PROJECT No. 033-9700 REV. 0	REVIEW: XXX	FP&L TURKEY POINT	FIGURE 2.2-4



KEY PLAN

AREA 1



AREA 2

(1) SOIL BORING LOCATIONS

REV	DATE	REVISION DESCRIPTION	BY	CH	COR	APR	ORG
A	04/17/03	OPEN ISSUE (DRAFT)	GMG			TDJ	PGBU

FPL

SYSTEM N/A	DISCIPLINE CS	PLANT/UNIT TURKEY POINT	BAR CODE
SCALE NTS	CAD FILE NAME Soil Borings.dwg	TITLE FIGURE 2.3-1 EXPANSION PROJECT SOIL BORINGS	
DRAWING SIZE D(24"X36")	FPL ARCHIVE NAME N/A		
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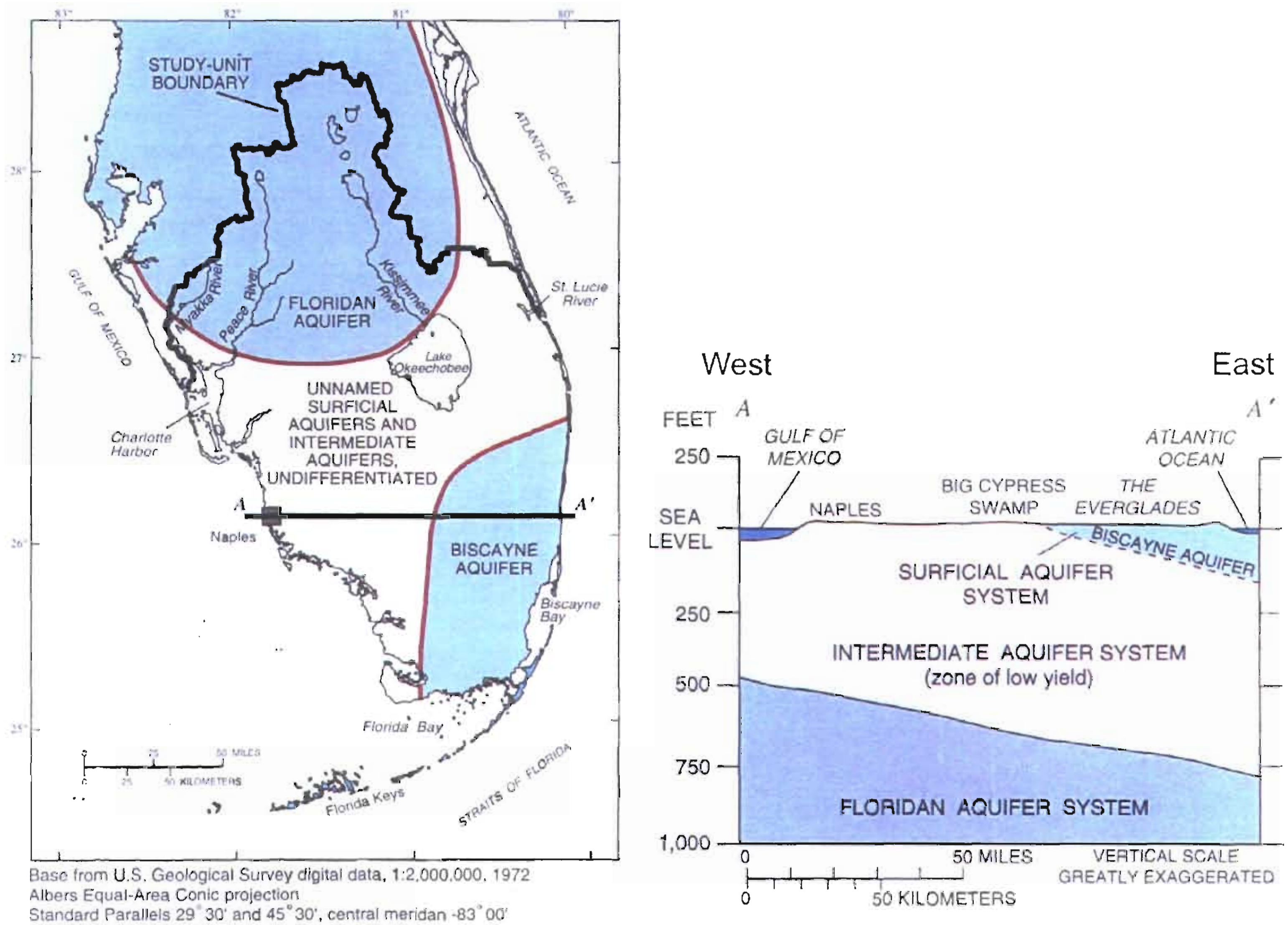
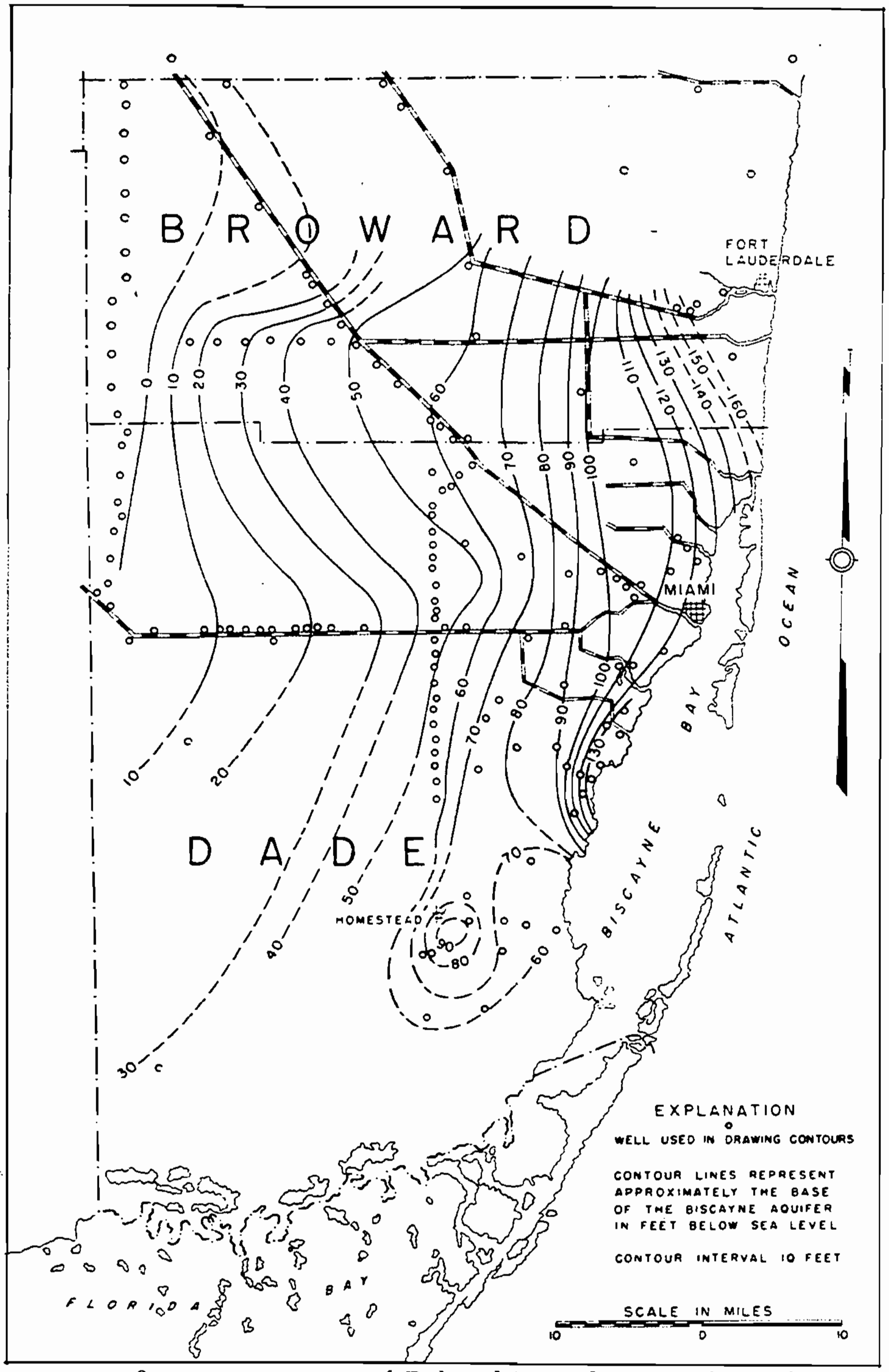


Figure 2.3-2.
Aquifer Systems in Central and Southern Peninsula Florida

Source: EPA, 2003.



Structure contour map of Dade and Broward counties showing base of Biscayne aquifer.

Figure 2.3-3
Structure Countour Map of Baiscayne Aquifer in Dade and Broward Counties

Source: FGS, 1958.

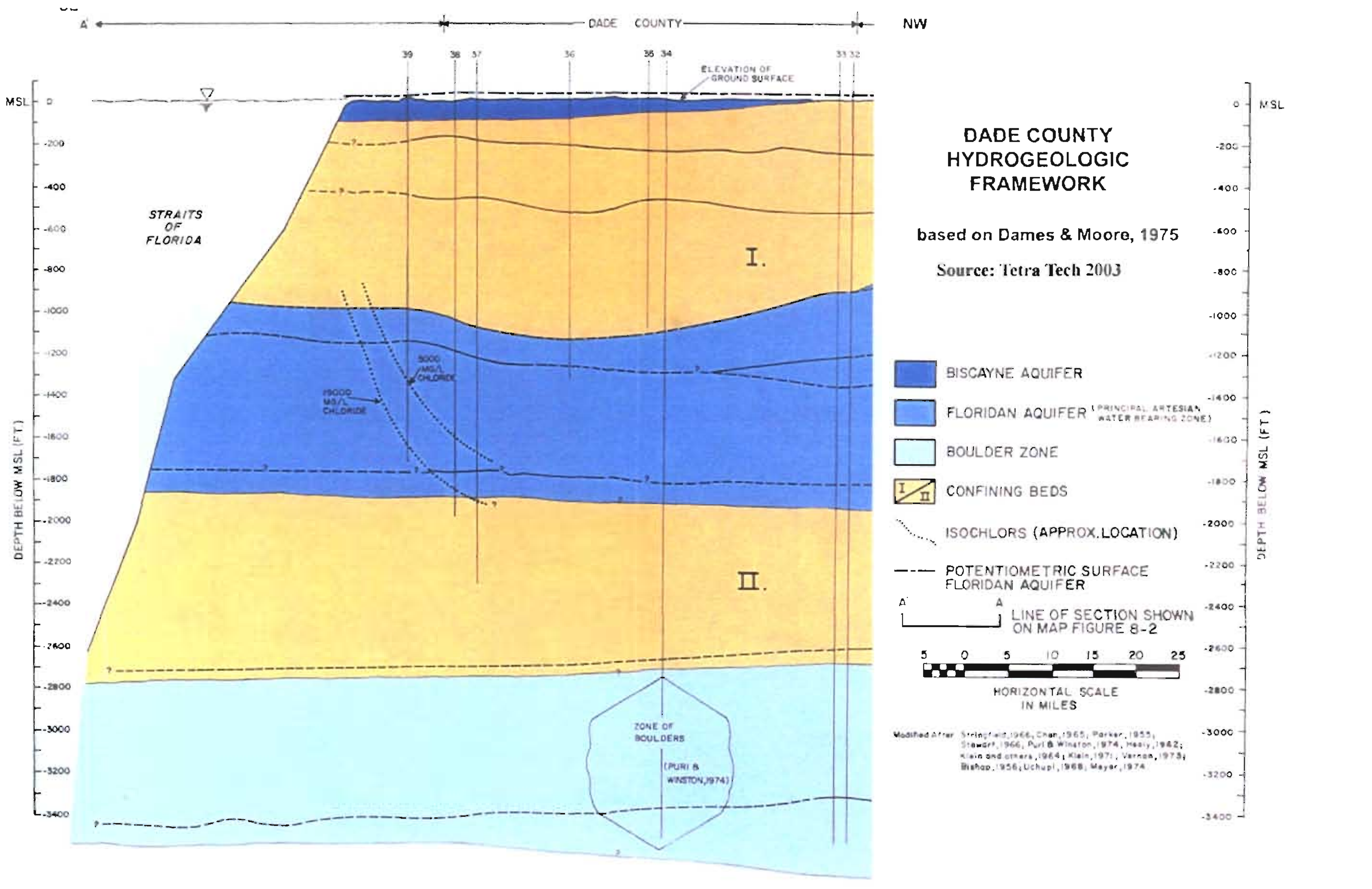


Figure 2.3-4.
Miami-Dade County Hydrogeologic Framework

Source: Tetra Tech, 2003.

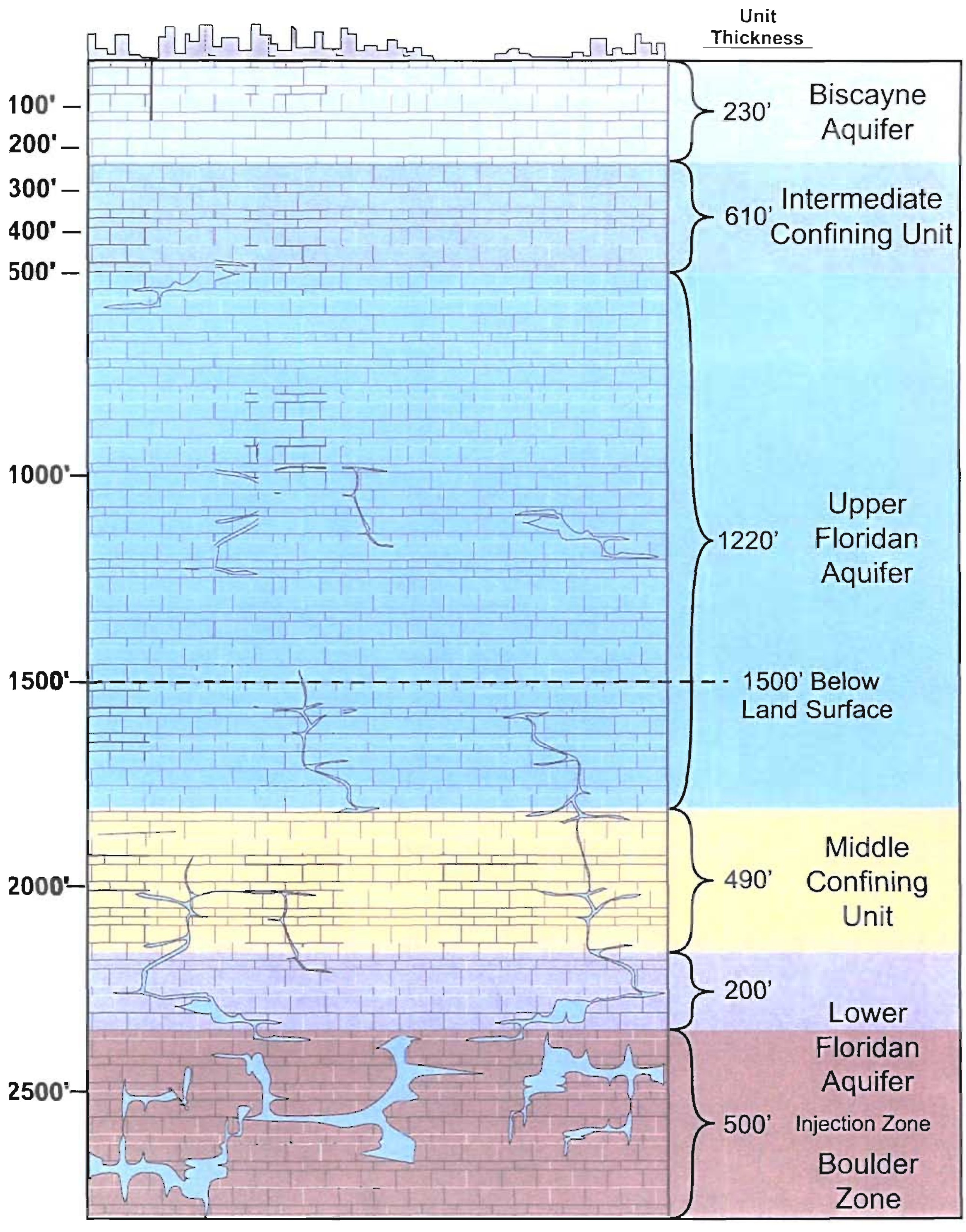


Figure 2.3-5.
Representative Hydrogeologic Cross Sections
Miami-Dade County, FL

Source: Tetra Tech, 2003.

FPL

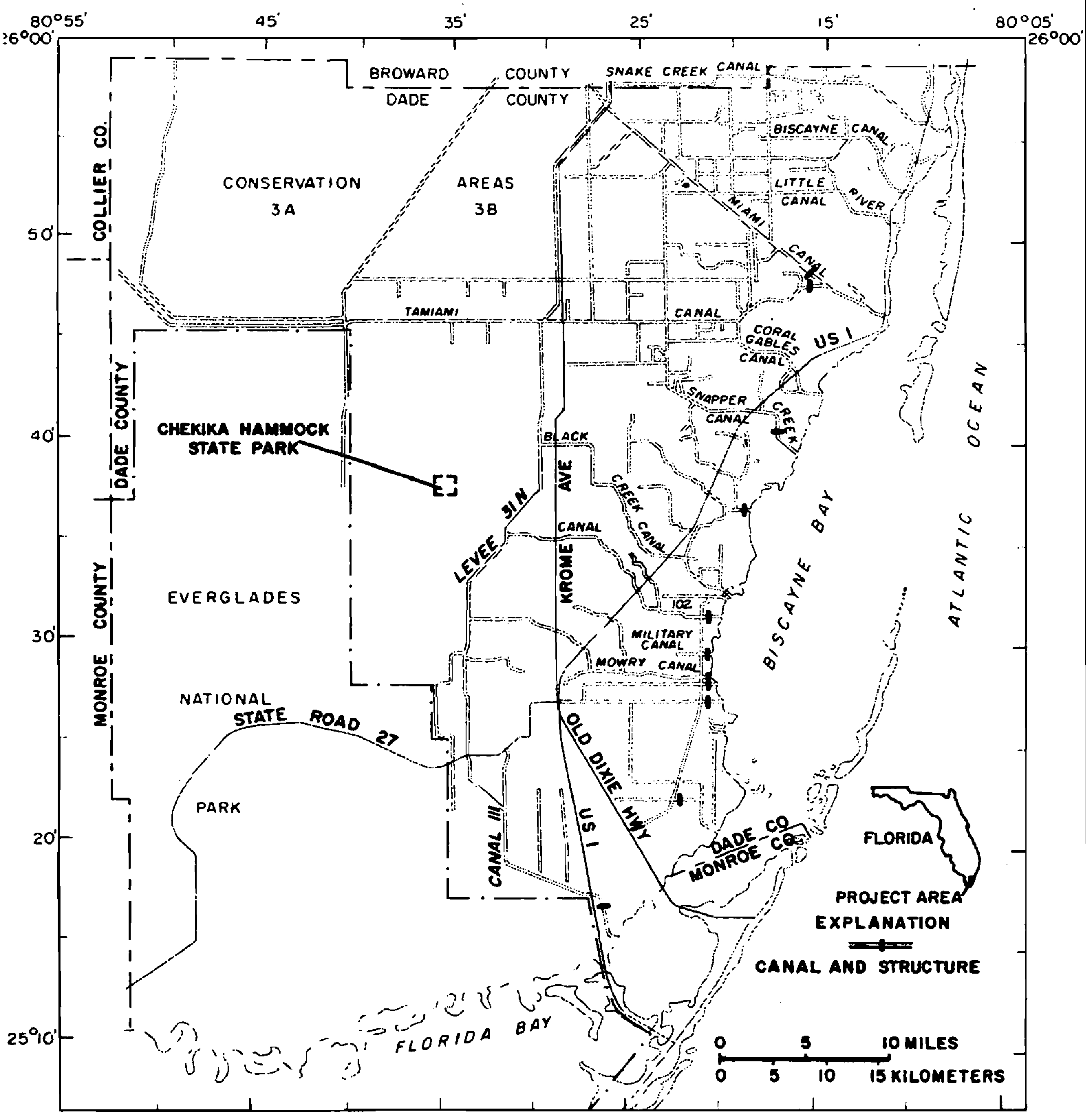


Figure 2.3-6.
Location of Chekika State Park

Source: USGS,

FPL

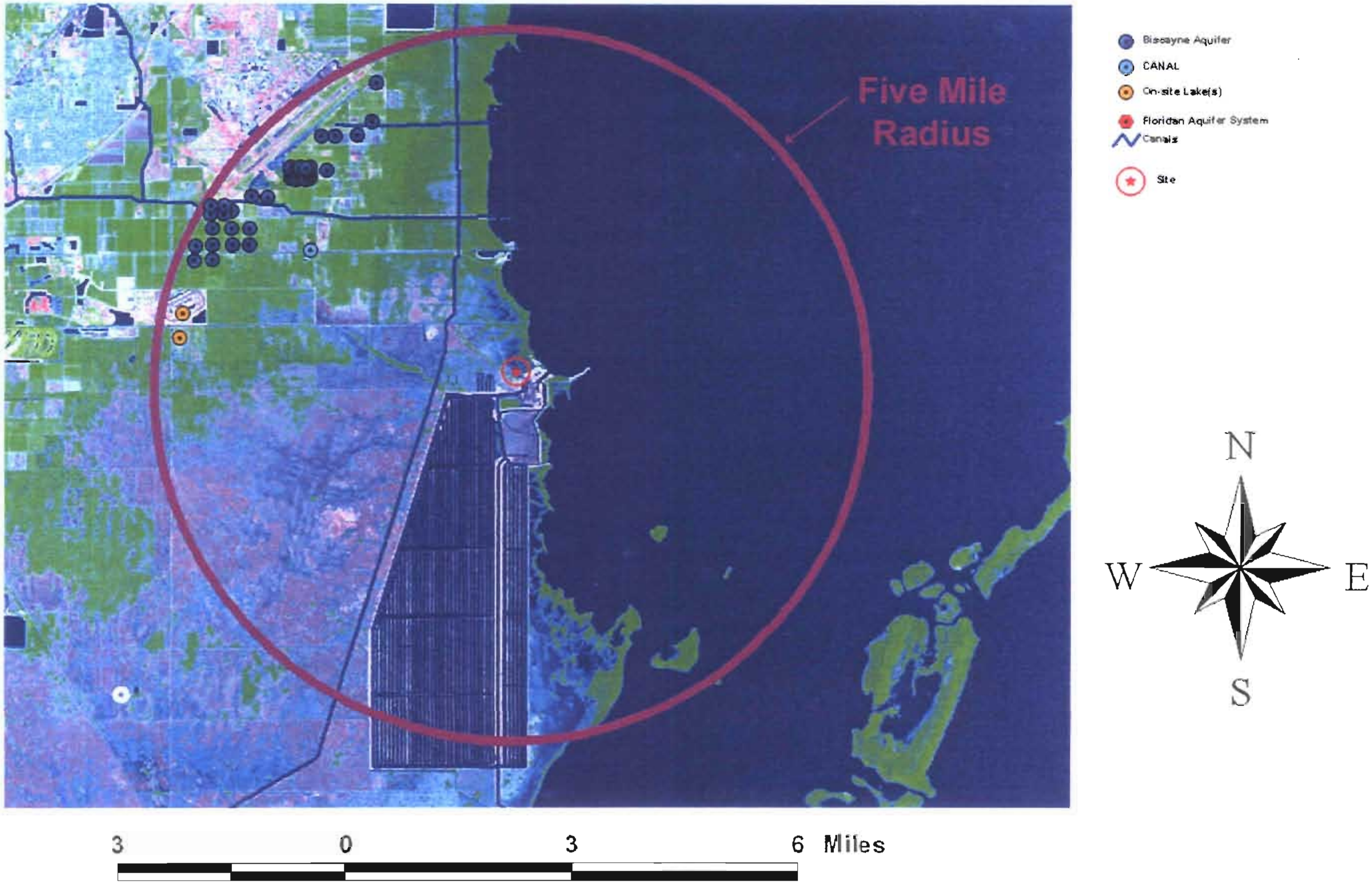


Figure 2.3-7.
Water Use Permits Within 5 Miles of the Site

Source: SFWMD, 2003; Tetra Tech FW, 2003.

FPL

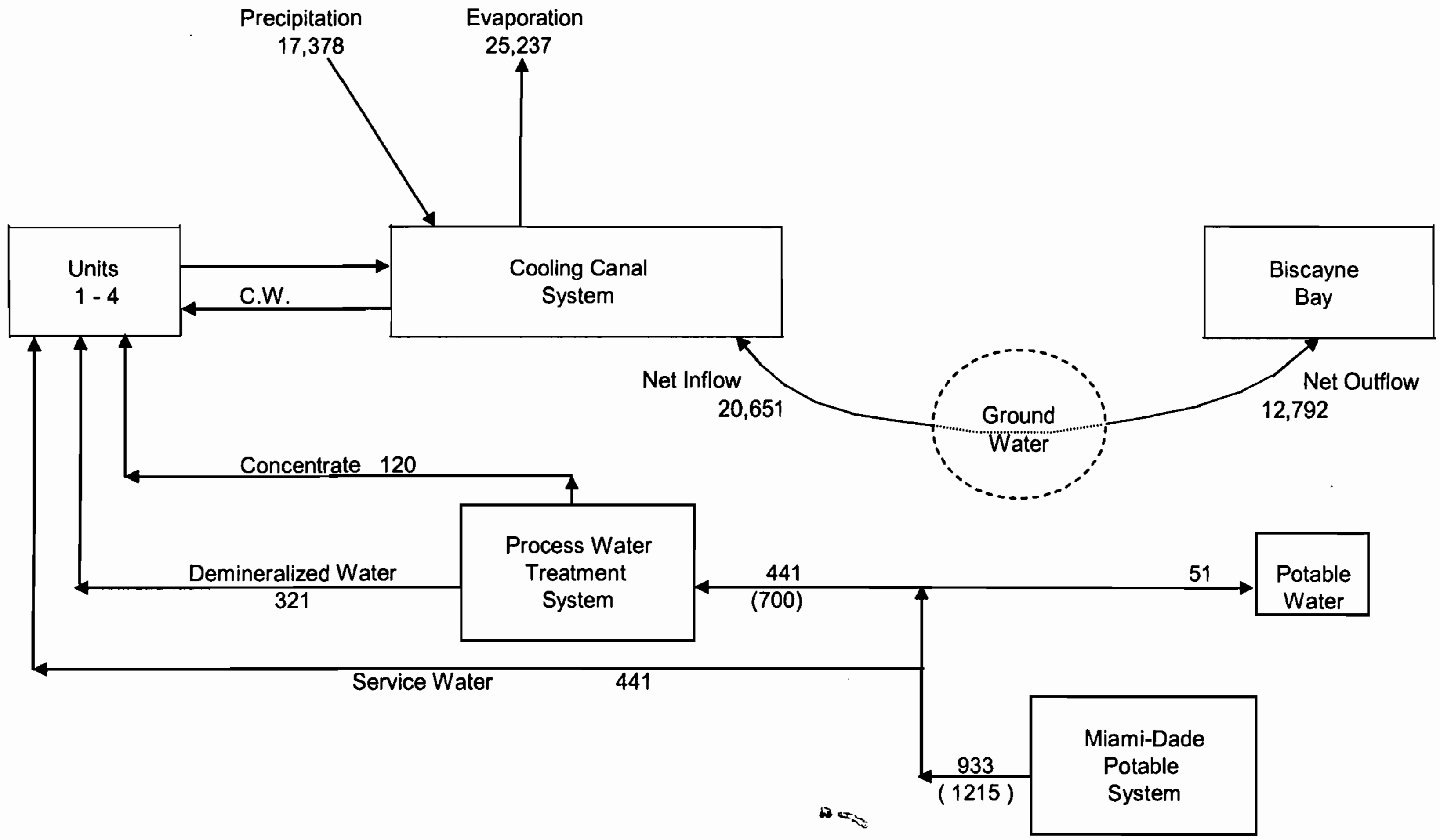


Figure 2.3-8.
Existing Turkey Point Plant Water Balance
[Average Flows in gpm (Peak Flow)]

Source: FPL, 2003.

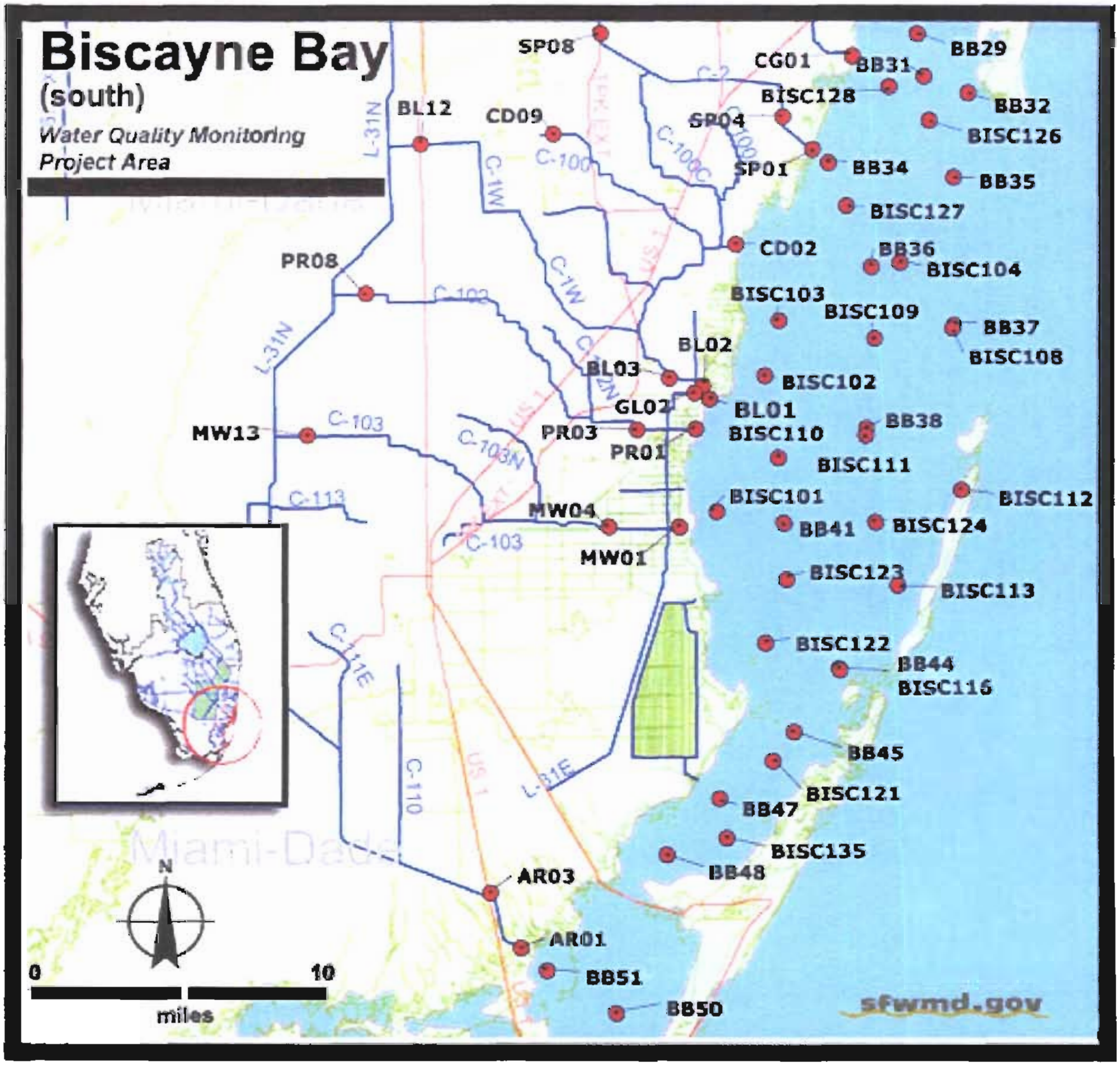
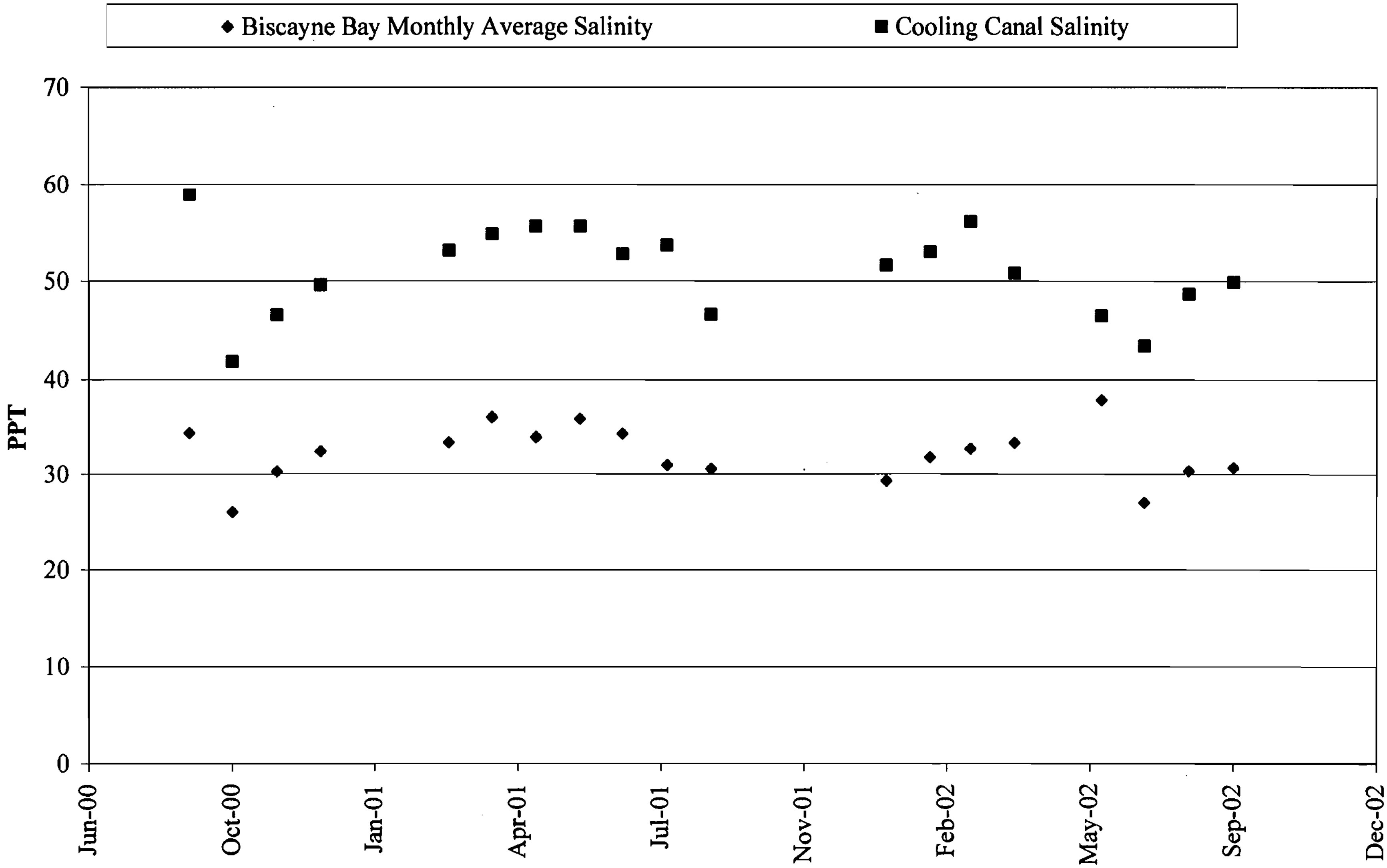


Figure 2.3-9.
Biscayne Bay Water Quality Monitoring Stations

Source: SFWMD, 2003.

Figure 2.3-10. Salinity in Biscayne Bay and Turkey Point Plant Cooling Canal System (6/2000 to 12/2002)



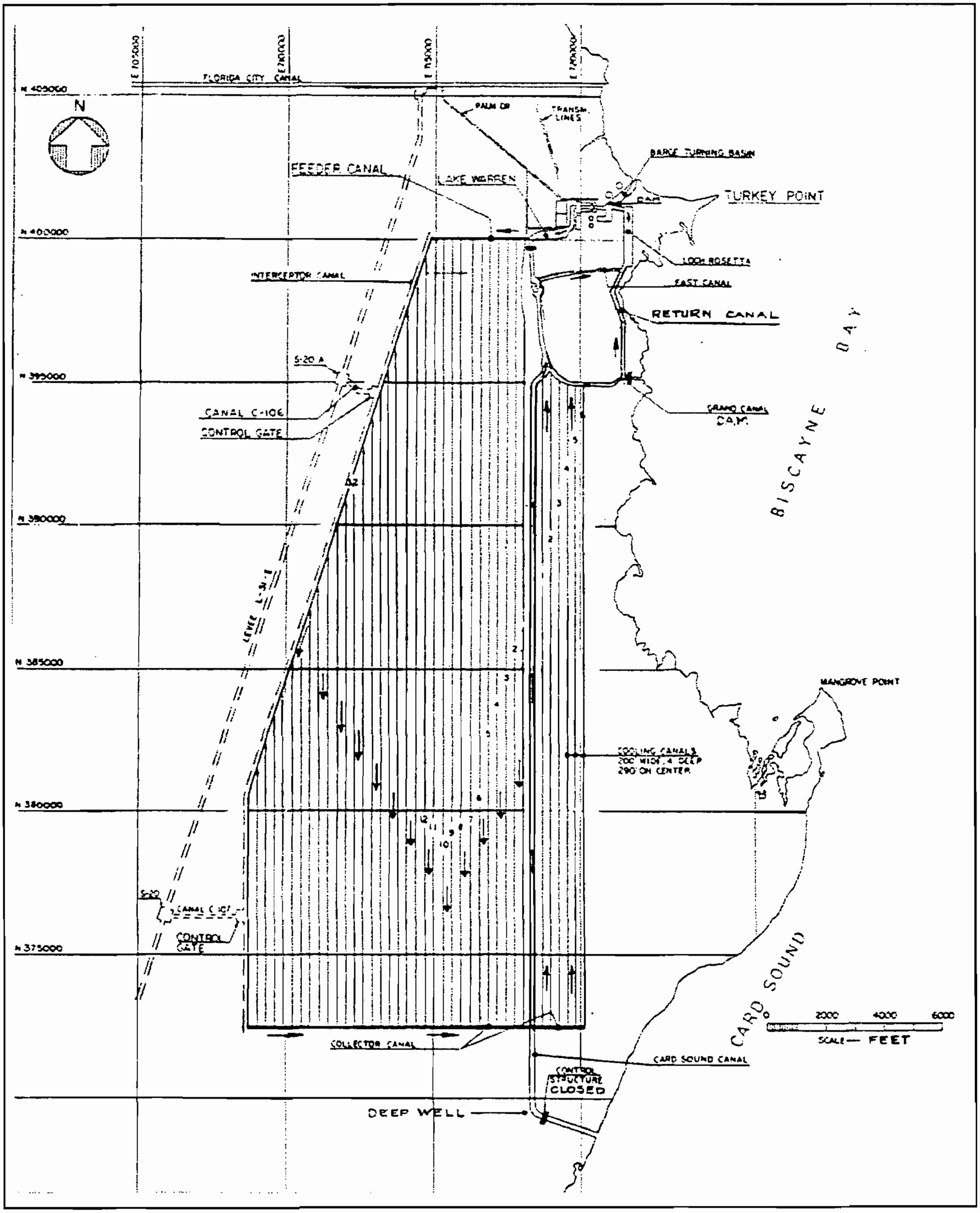


Figure 2.3-11.
Turkey Point Cooling Canal System – Final Design

Source: FPL, 1972.

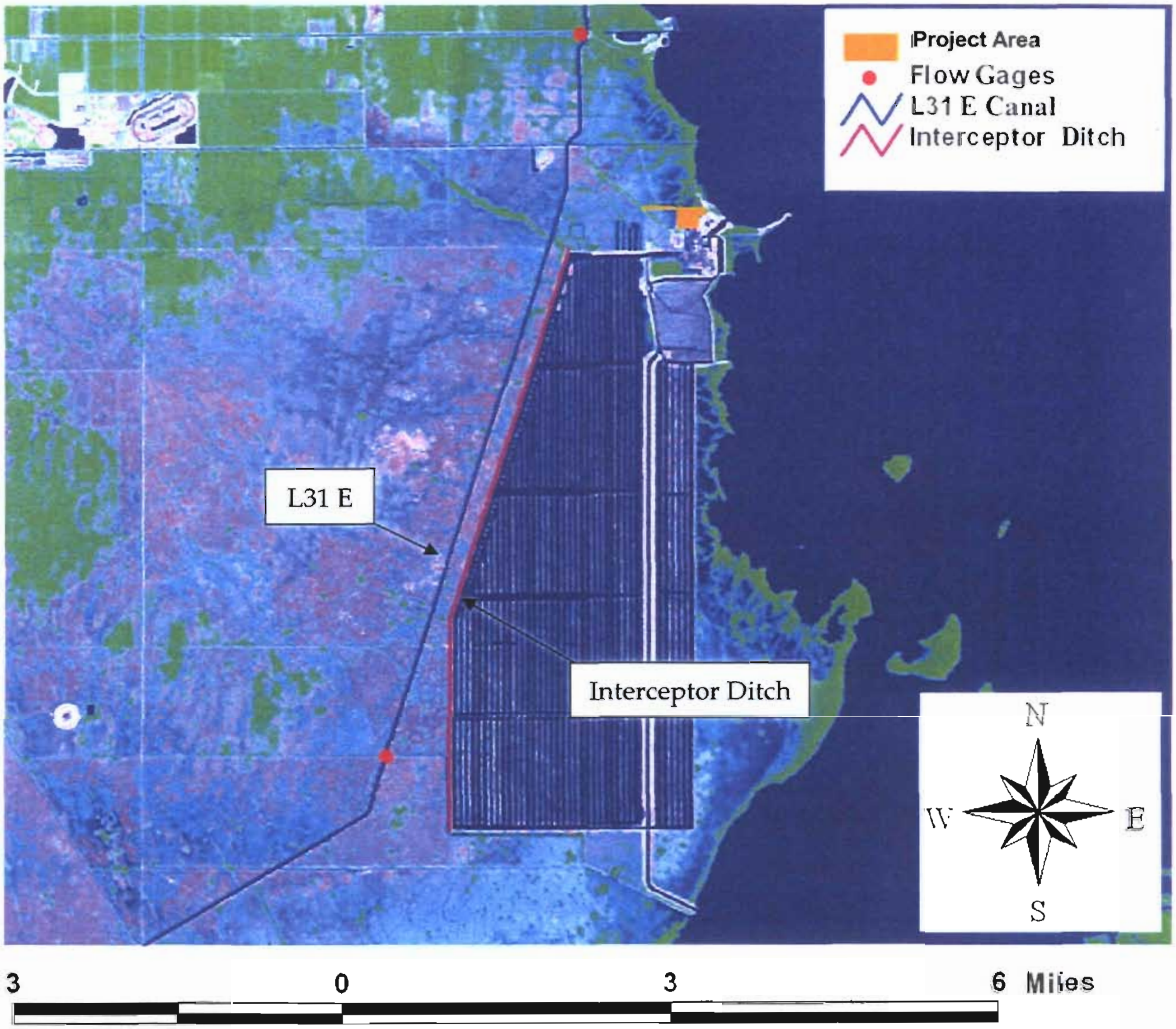


Figure 2.3-12.
Location of Project Area and Surface Water Features

Source: Golder, 2003.

FPL

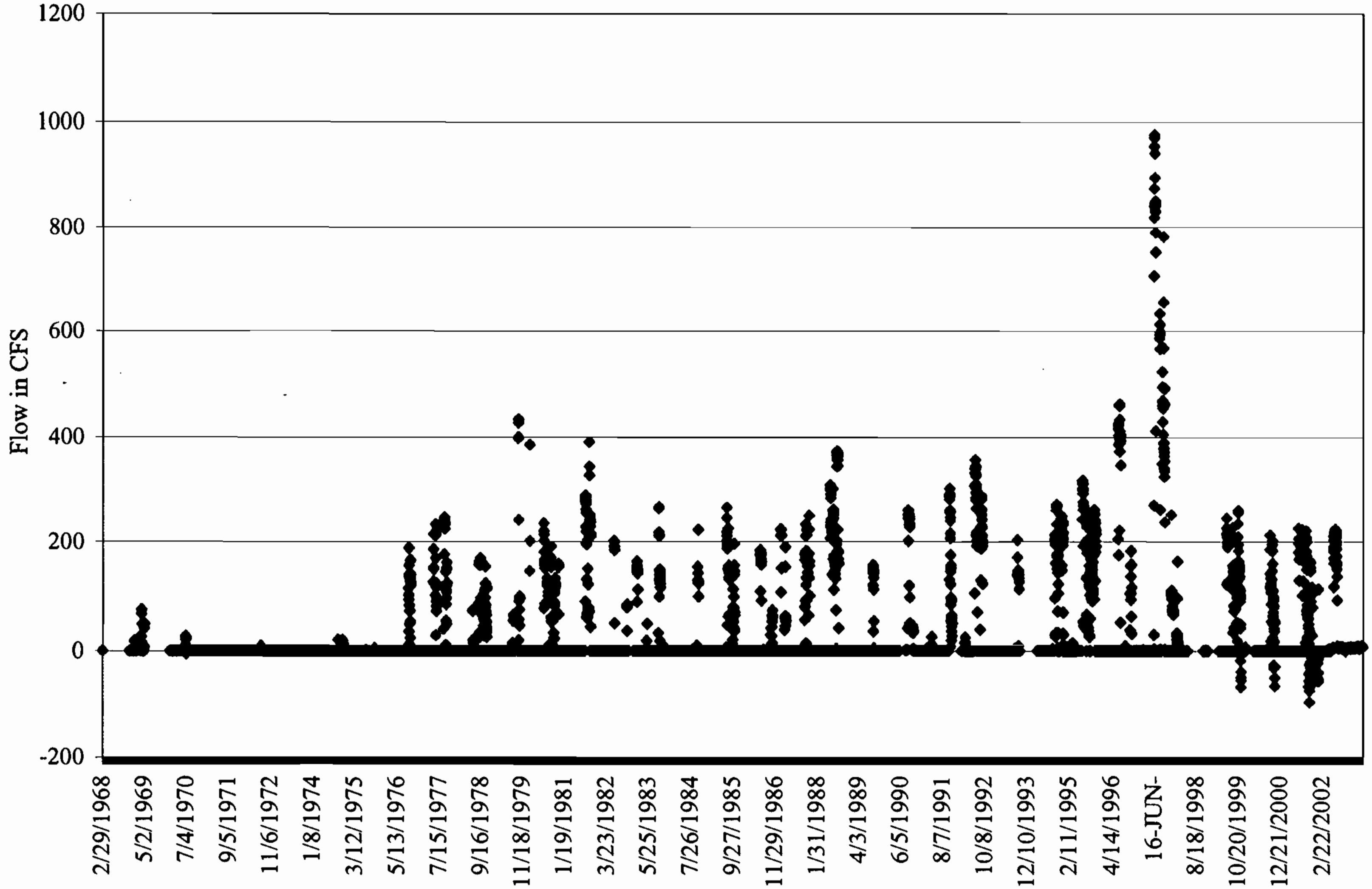


Figure 2.3-13.
Flow (CFS) at S-20 (1968-2002)

Source: USGS, 2003.

FPL

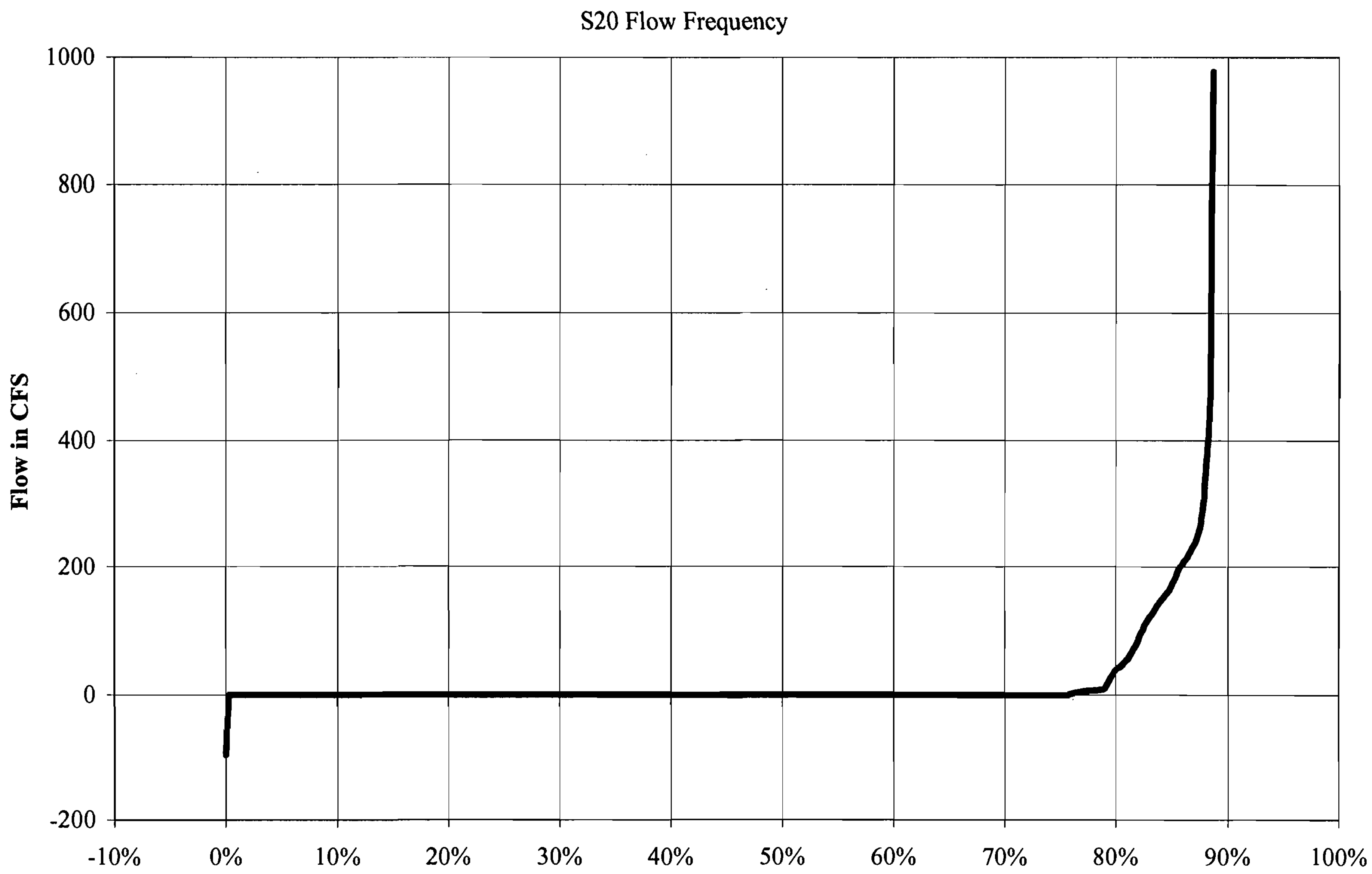


Figure 2.3-14.
Flow Frequency at S-20

Source: USGS, 2003.

FPL

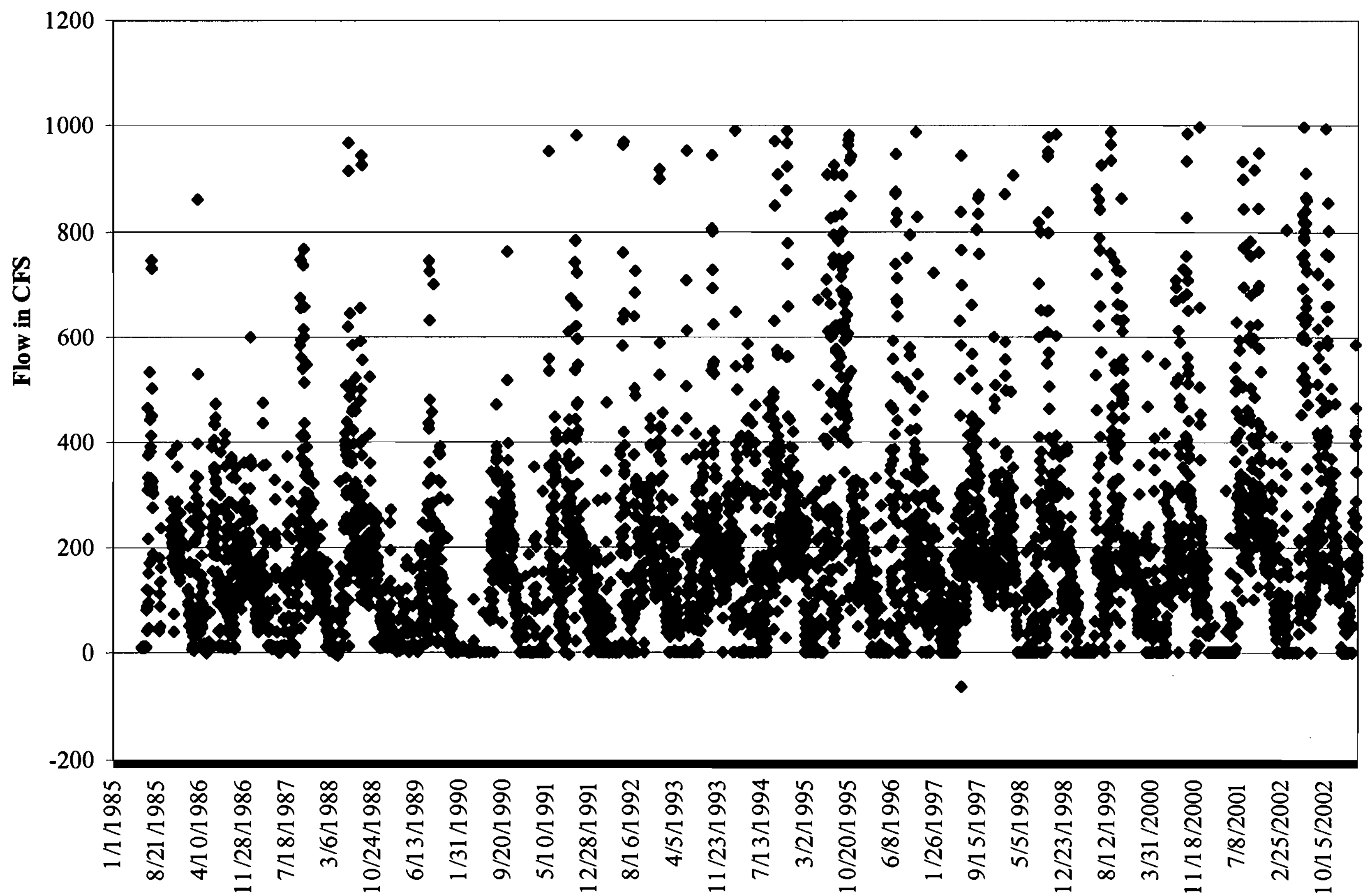


Figure 2.3-15.
Flow at S-20F (1985-2002)

Source: USGS, 2003.

FPL

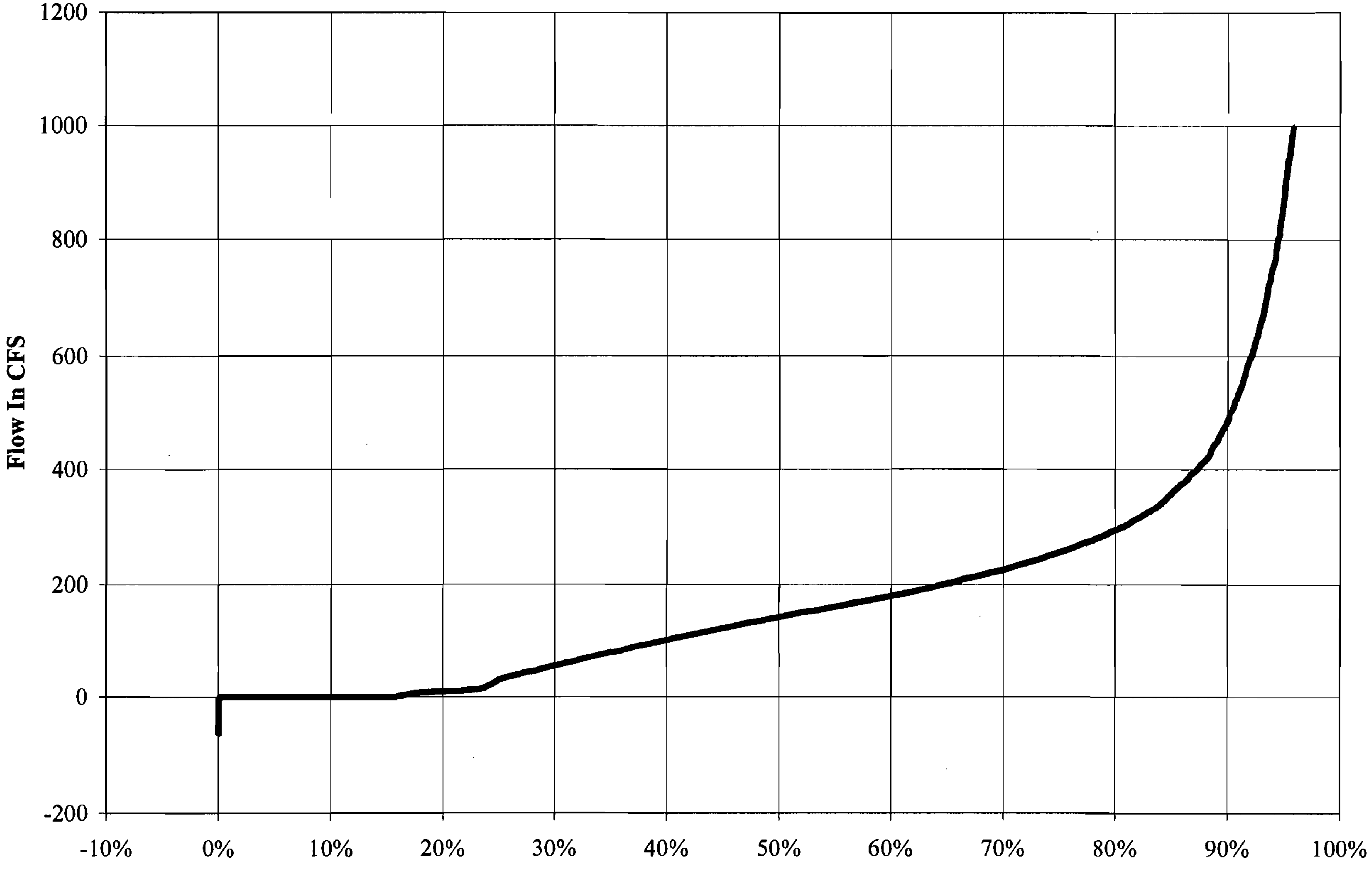


Figure 2.3-16.
Flow Frequency at S-20F

Source: USGS, 2003.

FPL

REFERENCES

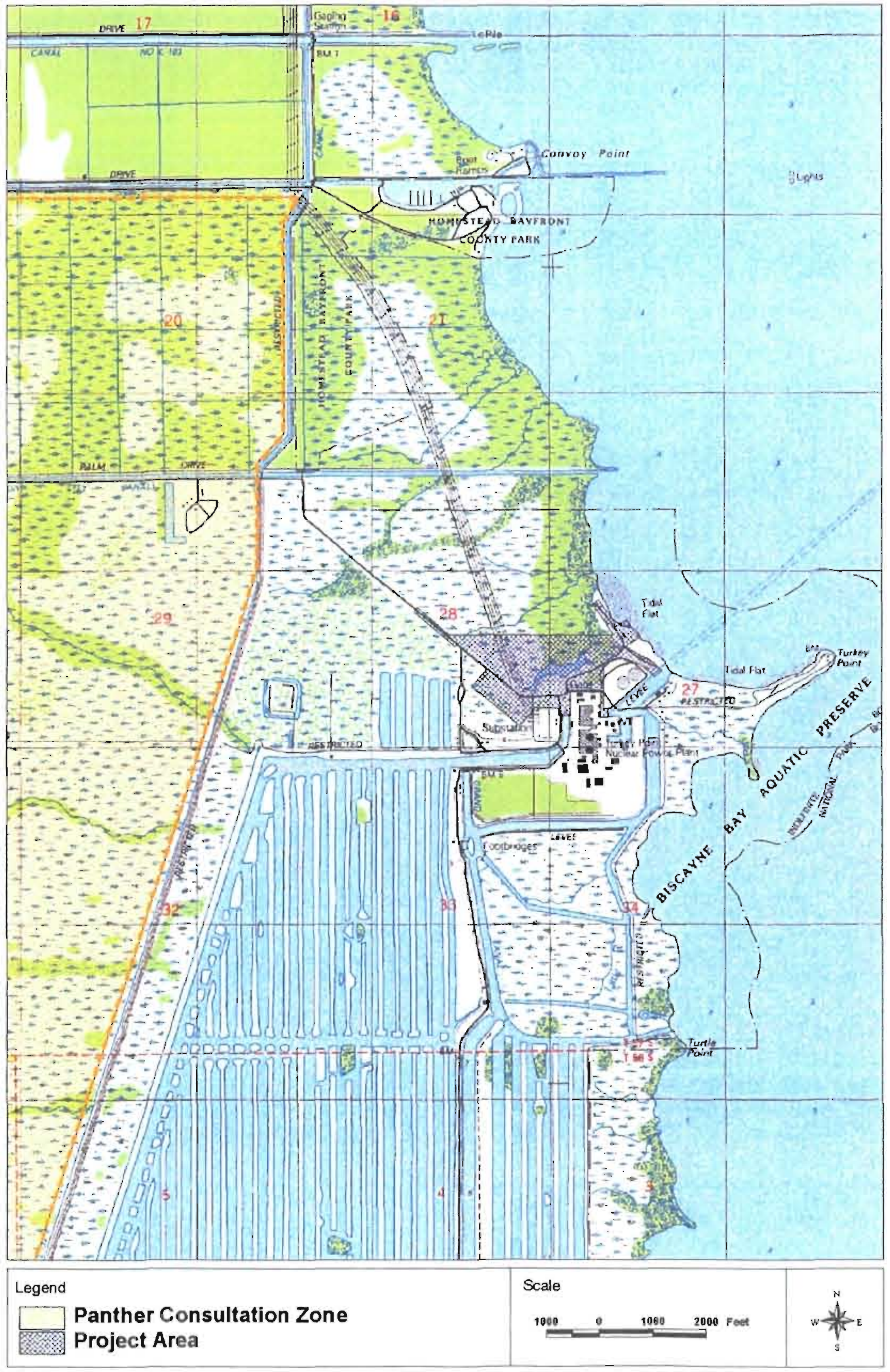
1.) Florida Power and Light, 2003.

LEGEND

— — — PROPERTY BOUNDARY

180 – Recreational
190 – Open Land
422 – Brazilian Pepper
612 – Mangroves
814 – Roads
831 – Electric Power Facilities
832 – Transmission Line

FPL	SCALE N/A	TITLE	
	DATE 10/24/03	FLORIDA LAND USE, COVER AND FORMS CLASSIFICATION SYSTEM (FDOT, 1999) MAP OF TURKEY POINT PROJECT AREA.	
	DESIGN		
	CADD JEJ		
FILE No. Figure 2.3-16.dwg	CHECK		
PROJECT No. 033-7600 REV. 0	REVIEW	0337600/4/4.2/4.2.1/Figures/Figure 2.3-17.dwg	FIGURE 2.3-17



Florida Panther Effect Determination Key

A. Project is within the consultation area[1]..................................B

Project is not within the consultation area..................... ... *No effect*

B. Project is within 2 miles of a telemetry point[1]........................ ...D

Project is not within 2 miles of a telemetry point.......................C

C. Surrounding land cover within 1 mile **is suitable**[2] for panther dispersal.............D

Surrounding land cover within 1 mile **is not suitable**[3] for panther dispersal........*No effect*

D. Project is for a single-family residence on a lot > 1 acre.............*May affect not likely to adversely affect*

Project is not for a single-family residence on a lot > 1 acre......... E

E. Project is for a single-family[4] residence on a lot < 1 acre..............*May affect*

Project is not for a single-family[4] residence on a lot < 1 acre.................F

F. Project is for a new subdivision or is other than a single-family residence and is constructed on 1-40 acres...G

Project is for a new subdivision or is other than a single-family residence and is constructed on < 1 or > 40 acres...*May affect*

G. Project will preserve a portion of the site of sufficient size and configuration to maintain panther crossing the property.........*May affect not likely to adversely affect*

Project will not preserve a portion of the site of sufficient size and configuration to maintain panther crossing the property. ....*May affect*

1 - See map shows the boundary of the consultation area and the telemetry points.

2 - Land cover suitable for dispersal contains one or more of the following: forested; forested and row crop mixture; forested and grove mixture; generally rural in nature (residential with > 1 acre lots with forested cover, with or without small farms, tree nurseries, pasture)

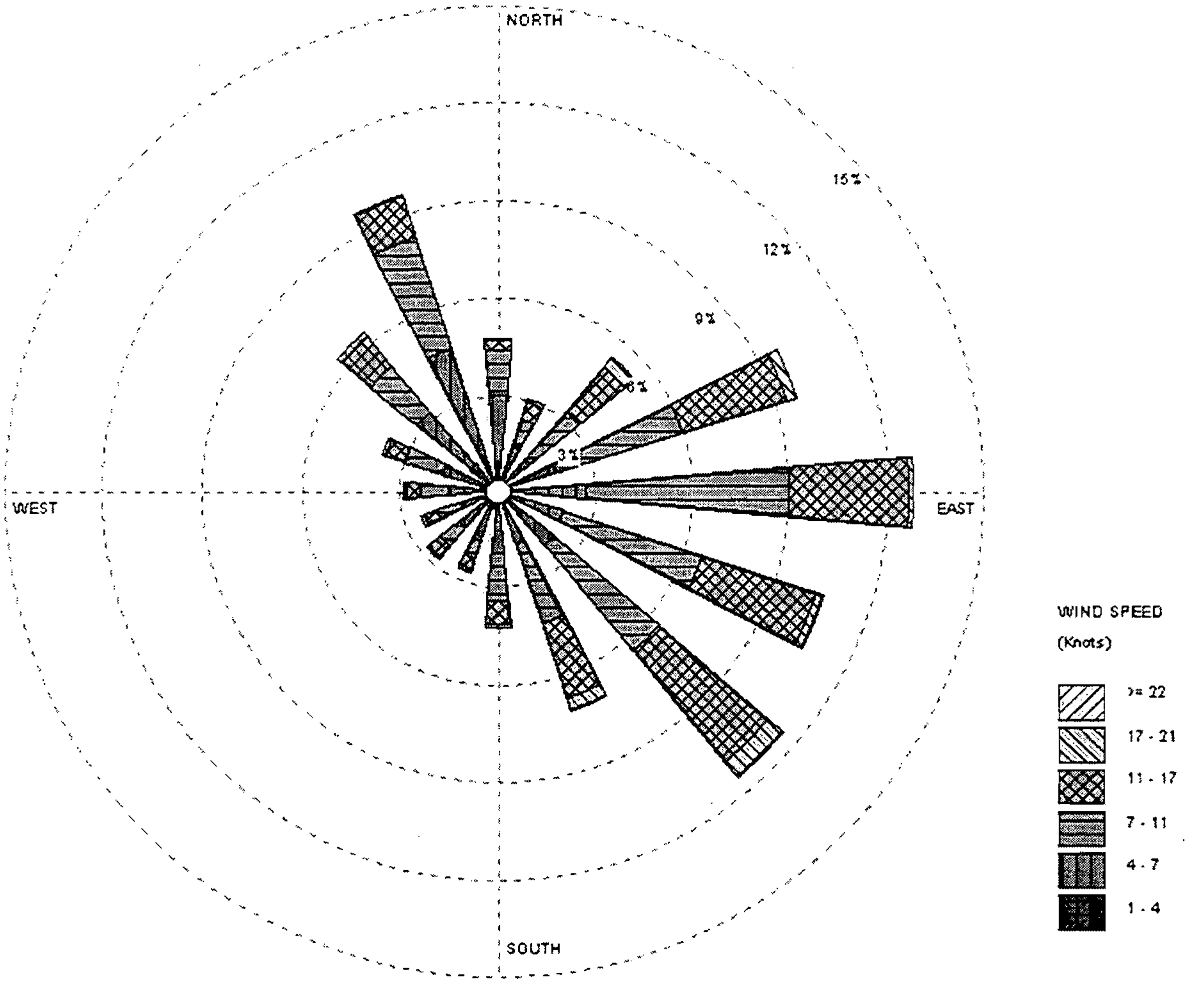
3 - Land cover not suitable for dispersal is generally urban, i.e., > 50% developed with: (1) residential subdivisions with lot sizes < 1 acre; (2) industrial sites; (3) commercial sites.

4 - If project site was in a >50% built-out subdivision, then it would be considered "not suitable for dispersal" under couplet C above. Couplet E is for existing platted subdivisions that are < 50% build out.

Figure 2.3-18
Florida Panther Consultation Area Near Project Area

Source: Golder, 2003.

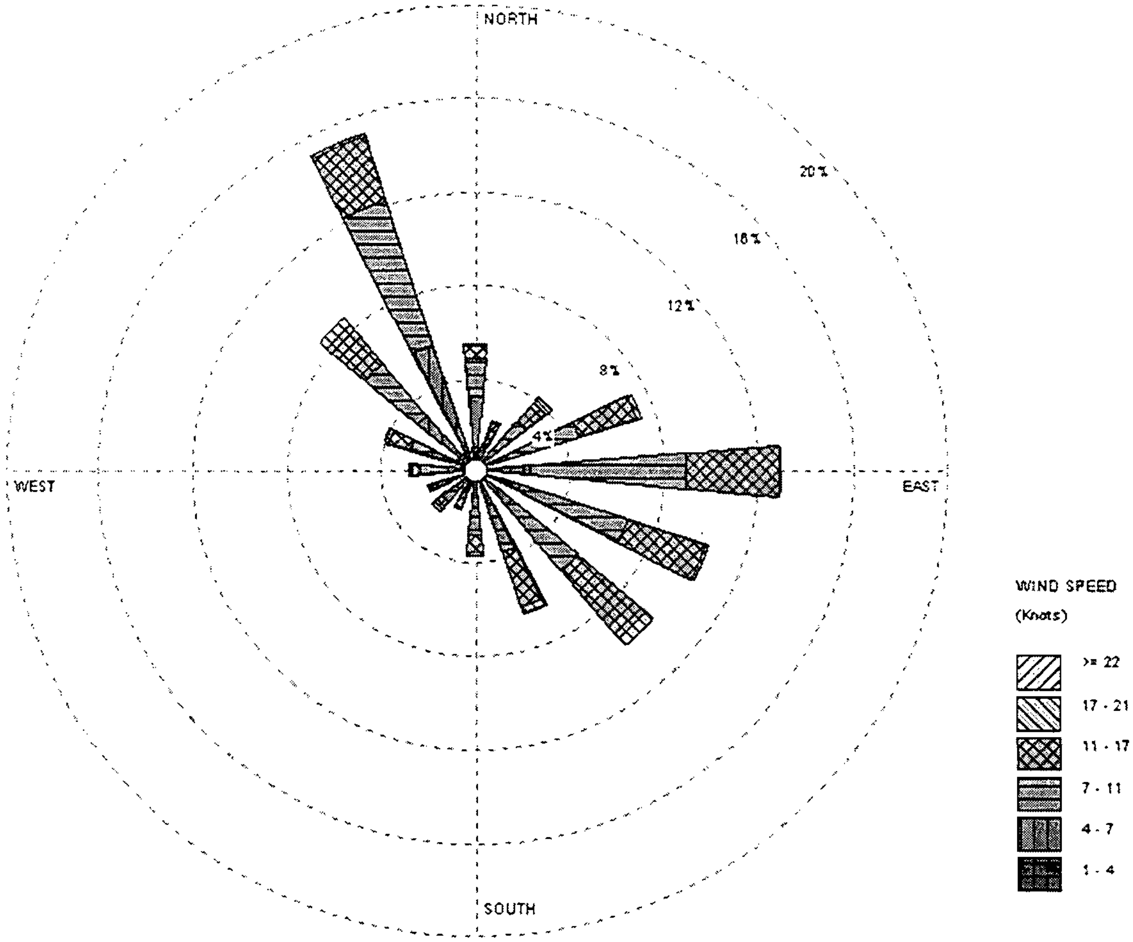
FPL



Average Wind Speed 8.55 knots
Calm winds 0.81%

Figure 2.3-19.
Annual Wind Rose for Miami International Airport, Florida 1987-1991

Source: National Climatic Data Center, 1987-1991; Golder, 2003.

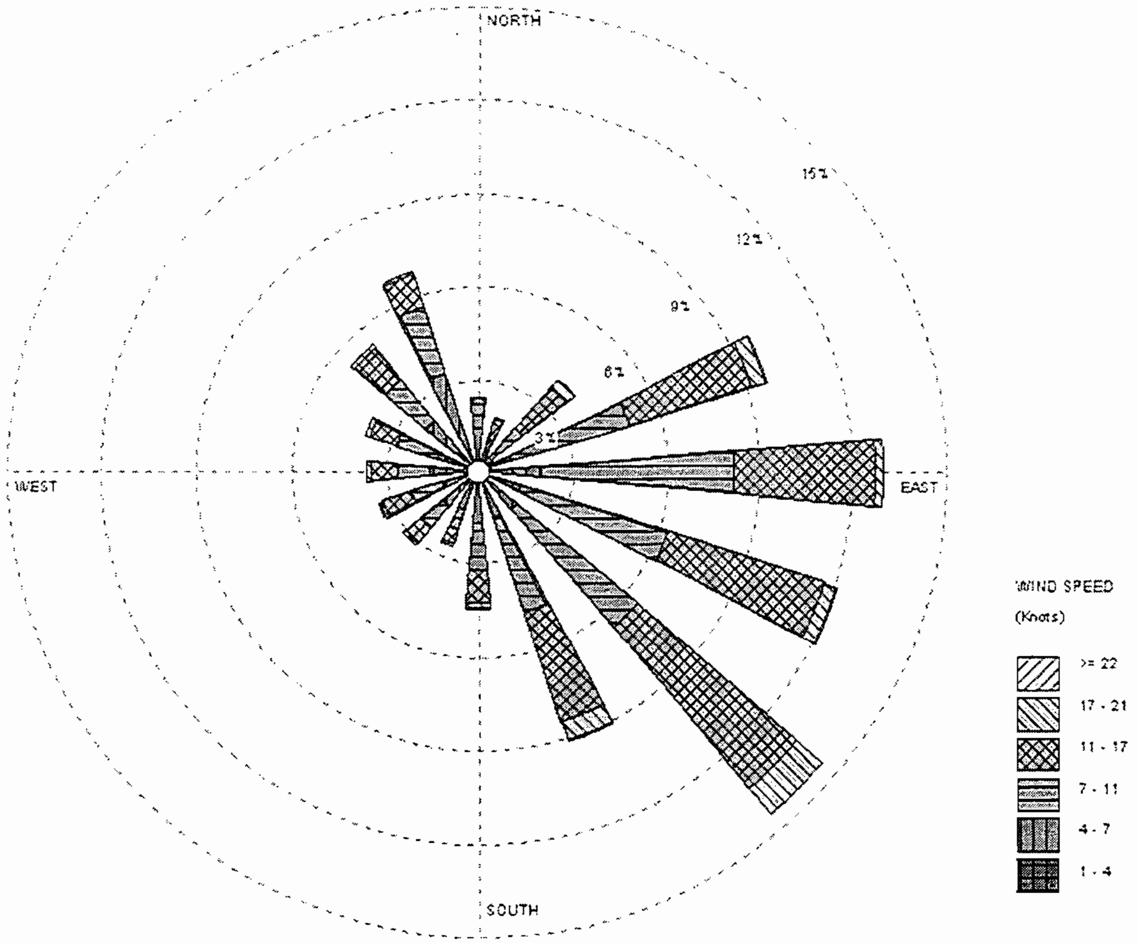


Average Wind Speed 8.71 knots
Calm winds 0.77%

Figure 2.3-20a.
Winter Wind Rose for Miami International Airport, Florida 1987-1991
December-February 1987-1991

Source: National Climatic Data Center, 1987-1991; Golder, 2003.

FPL

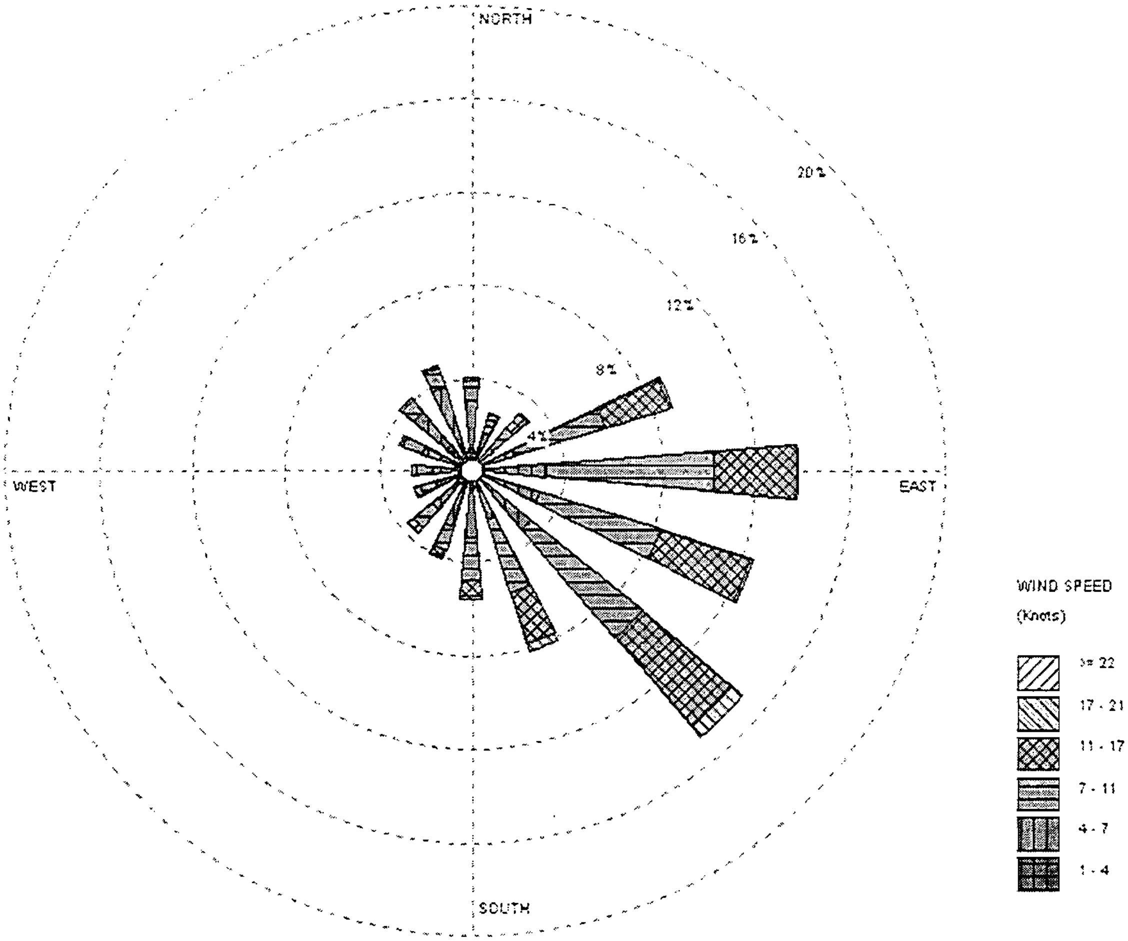


Average Wind Speed 9.56 knots
Calm winds 0.48%

Figure 2.3-20b.
Spring Wind Rose for Miami International Airport, Florida 1987-1991
March-May 1987-1991

Source: National Climatic Data Center, 1987-1991; Golder, 2003.

FPL

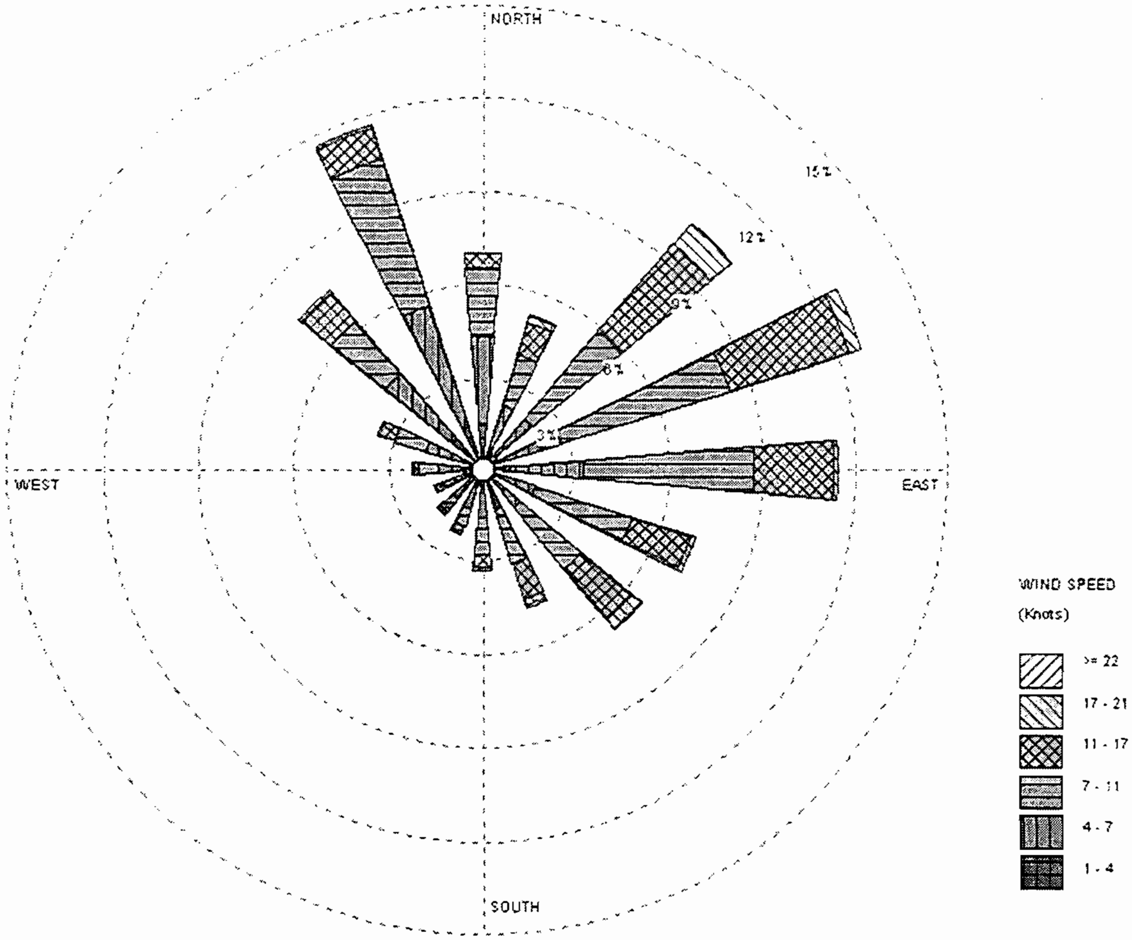


Average Wind Speed 7.82 knots
Calm winds 1.37%

Figure 2.3-20c.
Summer Wind Rose for Miami International Airport, Florida 1987-1991
June-August 1987-1991

Source: National Climatic Data Center, 1987-1991; Golder, 2003.

FPL

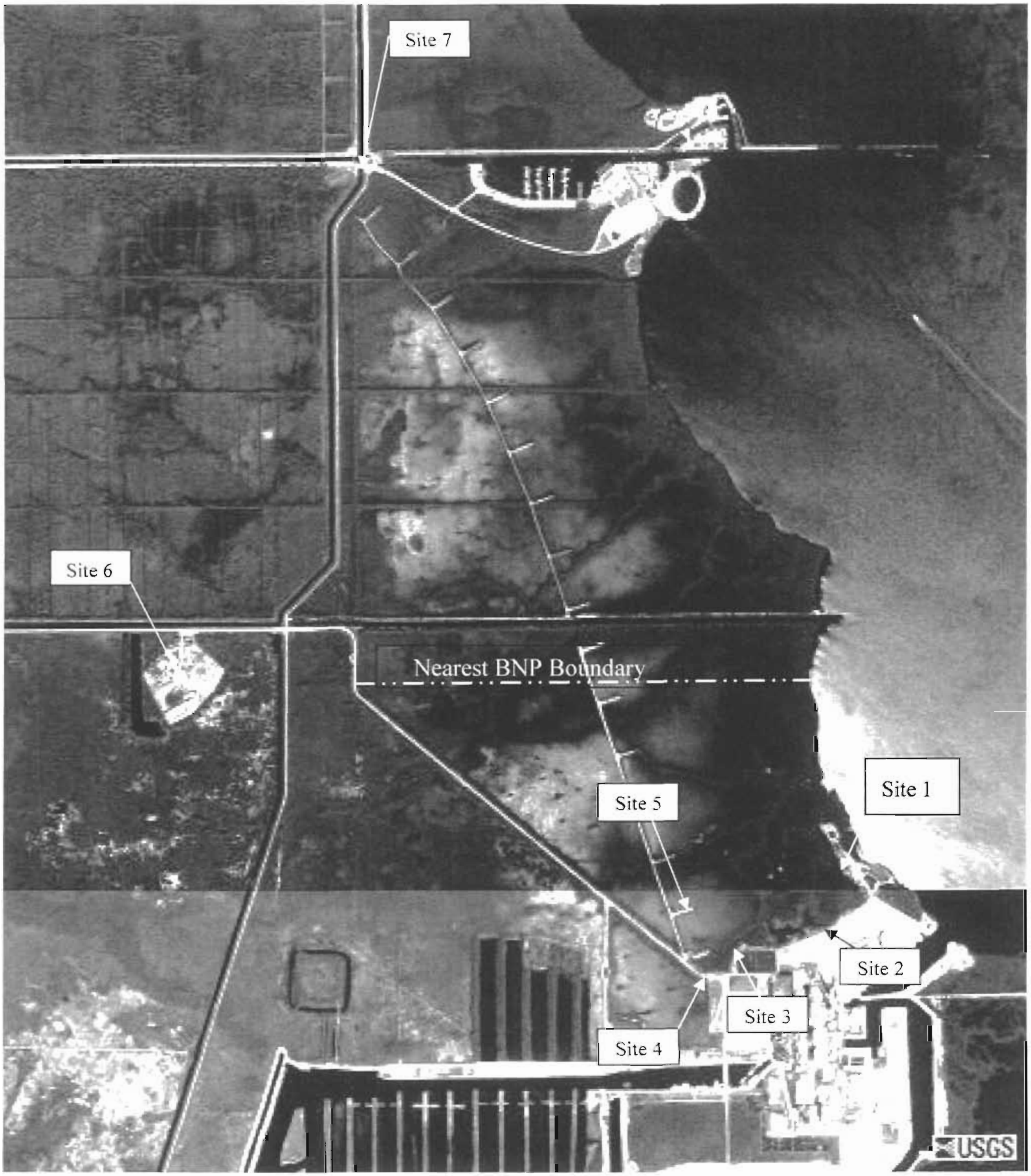


Average Wind Speed 8.11 knots
Calm winds 0.60%

Figure 2.3-20d.
Fall Wind Rose for Miami International Airport, Florida 1987-1991
September-November 1987-1991

Source: National Climatic Data Center, 1987-1991; Golder, 2003.

FPL



BNP = Biscayne National Park

Figure 2.3-21.
Noise Monitoring Locations Within and Around the FPL Turkey Point Plant Site

Source: Golder, 2003.

FPL

3.0 THE PLANT AND DIRECTLY ASSOCIATED FACILITIES

3.1 BACKGROUND

This chapter provides a description of the Turkey Point Expansion Project, including the overall site layout, key components of the facility and their operation, and proposed controls for air emissions and water discharges. Fuel specifications are provided for pipeline natural gas and ultra low-sulfur light oil. Estimates of the expected character, quality, and quantity of discharges and emissions from the Project are provided.

The Turkey Point Plant is an existing generating facility originally constructed in the mid 1960s, with the commercial in-service for Units 1 and 2 in 1967 and 1968, respectively. Units 3 and 4 were constructed in the early 1970s with commercial in-service in 1972 and 1973, respectively. The plant consists of the following units:

- Unit 1 – 400 MW (nominal capacity)
  - Steam electric generating unit firing residual oil and natural gas
- Unit 2 – 400 MW (nominal capacity)
  - Steam electric generating unit firing residual oil and natural gas
- Unit 3 - 700 MW (nominal capacity)
  - Nuclear electric generating unit
- Unit 4 - 700 MW (nominal capacity)
  - Nuclear electric generating unit
- Units FIC 1 through FIC5 – 2.5 MW (nominal capacity)
  - Black start diesel generating units associated with steam electric Units 1 and 2
- Units NIC1 through NIC4 – 2.5 MW (nominal capacity)
  - Emergency diesel generators associated with nuclear Units 3 and 4

Location of the new combined cycle unit (to be called Unit 5) at the existing Turkey Point Plant Site, and selection of the combined cycle technology, will maximize the beneficial use of the site while minimizing environmental, land use, and cost impacts otherwise associated with development of a nominal 1,150-MW power plant. The Project will utilize a number of existing facilities, while increasing the generating capacity of the site without increasing the overall size of the site.

The Project will consist of four nominal 170-MW GE "F" Class advanced combustion turbines (CTs), with dry-low NO_x combustors and four heat recovery steam generators (HRSGs), which will utilize the waste heat from the CT to produce steam to be utilized in a new steam turbine generator. The configuration is referred to as 4 on 1 combined cycle unit. The Project will have a total nominal generating capacity of 1,150 MW (net) firing gas at an annual average ambient condition of 75 °F and 60-percent relative humidity. Duct burners are also proposed for each HRSG and are fired during peak demand periods to achieve the total nominal generating capacity. Duct firing will be limited to an equivalent of 2,880 hours per CT per year at the maximum firing rate.

Each CT unit will utilize inlet air evaporative cooling. Evaporative cooling systems achieve adiabatic cooling using water either in the form of fine droplets (fog) or water evaporated from a woven material. The evaporated water extracts the latent heat of vaporization from the gas stream when the water droplet is converted to gas. Heat is removed at a rate of 1,075 British thermal units per pound (Btu/lb) of water. The result is a cooler, more moisture-laden air stream. This allows additional power to be produced more efficiently. For the GE Frame 7FA CT, an 8°F average decrease in temperature would result in a 3.0 percent increase in power and an associated 1.2 percent decrease in heat rate. Thus, while power increases, the production of power is more efficient with concomitant lower emissions per MW-hr generated.

Each CT will also be capable of operation in "peak" and power augmentation modes. In peak mode, the firing temperature of the turbine is increased resulting in increased power. In power augmentation mode, steam is injected into the CT resulting in increased power.

The CTs will use natural gas as the primary fuel with distillate "light oil" used as a backup fuel. The HRSG duct burners will fire natural gas only. Gas will be transported to the Project through an existing pipeline connected to a new onsite gas yard (e.g., meters, regulators, and compression), and ultra low-sulfur light oil will be trucked to the site. When firing natural gas, NO_x emissions will be controlled using dry low-NO_x combustion technology and selective catalytic reduction (SCR). Demineralized water is utilized during firing of ultra low-sulfur light oil to reduce the combustion temperature and the generation of NO_x emissions from the combustion turbine. Water injection and SCR will be used to reduce NO_x emissions when firing ultra low-sulfur light oil. These design alternatives maximize control of air emissions while balancing economic, environmental, and energy impacts [see Section 3.4 for a description of the control technology and a summary of best available control technology (BACT)].

Primary water uses for the Project will be for condenser cooling, combustion turbine inlet air evaporative cooling, NO_x injection water, power augmentation, steam cycle makeup, and service water.

Condenser cooling for the steam cycle portion of the Project will be accomplished using a mechanical draft cooling tower with makeup from wells in the Floridan aquifer. Service and process water for the Project will come from the existing Miami-Dade potable supply system. The Project is being designed to accommodate reuse water as an alternative pending its availability, quality, and quantity.

Other onsite facilities to be constructed as part of the Project will include interconnections with existing infrastructure including system substation, roadway expansion, outfall structures, and parking.

The Project has been designed to minimize direct discharge to surface waters. Non-contact stormwater runoff in the power block area will be routed to the cooling canal system. Non-contact stormwater outside the power block will be collected and routed to a stormwater pond, which will be designed to meet federal, state, regional, and local requirements (see Section 3.8). All wastewaters will be treated as appropriate and recycled to the existing cooling canal system.

The Project will be connected to the existing transmission network through an onsite system substation on the Turkey Point Plant Site. No new transmission lines are required to connect the Project to the existing transmission network.

For informational purposes, FPL is providing the following information about two line segments which connect to the onsite substation. While the maximum current rating for the following two segments of existing transmission lines will not be increased, after the Project is in operation there will be an increase in ampacity on these line segments due to the increased generation at the Turkey Point Plant Site:

- Turkey Point-Galloway Tap 230 kV line: 3.6 miles
- Turkey Point-Killian 230 kV line: 2.9 miles

Although the existing transmission conductor specifications will not be changed to accommodate the new ampacity, the ampacity increases that will occur on these two line segments will necessitate limited design revisions. Specifically, the additional conductor sag during periods of maximum conductor heating will require replacement of the existing transmission structures for these two line segments with taller structures to maintain the minimum ground clearances required by the National Electrical Safety Code (NESC).

Any required individual permits required for these structure replacements will be obtained prior to commencement of this work.

3.2 SITE LAYOUT

The Project will be located north of the existing steam Units 1 and 2 on the existing 11,000-acre Turkey Point Plant Site. Figure 3.2-1 presents the boundary of the Project Area, which comprises approximately 90 acres. Figures 3.2-2 and 3.2-3 present an overall plot plan (i.e., arrangement) and Project Areas, respectively. A profile of the facilities is shown in Figure 3.2-4. The new CTs and associated HRSGs will be north of existing fossil fuel fired steam generating units (Units 1 and 2). Within the Project Area, approximately 24 acres will be utilized for Unit 5 (Project Area A) and 28 acres for construction (laydown, parking, and construction trailers—Project Areas D, F, and G). The area designated for the power block (Project Area A) contains the four CT/HRSG trains, steam turbine/electric generator, cooling tower, ultra low-sulfur light oil tank, and other associated facilities. About 21 acres will be used for roadway expansion, system substation, stormwater pond, parking lot, and roads (Project Areas B, C, E, I, J, and K). About 17 acres of the Project Area will be unaffected by the Project (Project Area H).

Point source water releases are shown on Figure 3.2-2. Non-contact stormwater in the power block area (Project Area A) will be released to the cooling canal system. Contact stormwater in the power block is treated and recycled to the cooling canal system. Site non-contact stormwater not associated with power block is treated and released as shown in Figure 3.8-1.

3.3 FUEL

The primary fuel used by the CTs and the HRSG duct firing will be natural gas, delivered to the plant by the existing pipeline. Typical properties of pipeline-grade natural gas are shown in Table 3.3-1. The heat content is typically 20,835 Btu/lb [lower heating value (LHV)] with a sulfur content of 2 grains per 100 standard cubic feet (gr/100 scf) of gas.

Ultra low-sulfur light oil may be used for an equivalent of 500 hours/year per CT at baseload conditions. Typical properties of ultra low-sulfur light oil are shown in Table 3.3-2. The heat content is typically 18,367 Btu/lb (LHV) with a maximum sulfur content of 0.0015 percent by weight.

No onsite storage will be provided for natural gas. Ultra low sulfur light oil will be stored in a new 4.3 million gallon tank.

The generating capacity of a combined cycle plant is affected by ambient temperature, with increased temperature resulting in less efficient electric production. Greater overall fuel consumption will occur at lower ambient temperatures. For the purpose of calculating maximum hourly fuel use quantities, the following operating conditions for the CTs were used:

1. 35°F dry-bulb turbine inlet temperature,
2. 60-percent relative humidity,
3. 45 feet above mean sea level (ft-msl)] elevation, and
4. 20,835-Btu/lb heating value (LHV) of natural gas and 18,367-Btu/lb heating value (LHV) for ultra low-sulfur light oil.

At these conditions, the maximum heat input is 1,674 million (MM) Btu/hr (LHV) for each CT when firing natural gas (100-percent capacity, 35°F). The corresponding maximum fuel usage is about 80,300 pounds per hour (lb/hr) or about 1,857 million cubic feet per hour (MMcf/hr) of natural gas for each CT. Annual fuel usage at 59°F turbine inlet temperature would be 2,691 billion pounds per year (lb/yr) or 5.9 x 10^{10} cubic feet per year (yr^3) of natural gas for the Project. The duct burners associated with each HRSG will have a maximum firing rate of 550 MMBtu/hr high heating value (HHV) or 495.5 MMBtu/hr (LHV). The maximum annual fuel usage for the duct burners is based on 2,880 hours/year at this heat input. The maximum potential annual fuel usage for the duct burners is calculated to be 274 million lb/year or 6 billion scf/year. Ultra low-sulfur light oil will be limited to 500 hours per year per CT at full load. This is equivalent to a maximum fuel use of about 13,900 gallons/hour/CT at 59°F turbine inlet and an annual usage of 27.9 million gallons for the four CTs. The existing plant is connected to an existing FGT natural gas lateral serving the site. Ultra low-sulfur light oil will be delivered to the site by truck.

3.4 AIR EMISSIONS CONTROLS

3.4.1 AIR EMISSIONS TYPES AND SOURCES

Air pollutants will be emitted from the CT/HRSGs when firing natural gas and ultra low-sulfur light oil. Air emissions result from either the combustion process or impurities in the fuel. Tables 3.4-1 and 3.4-2 present the maximum estimated emission rates of regulated pollutants for each CT/HRSG stack when firing natural gas and ultra low-sulfur light oil, respectively. The maximum estimated emission rates were determined using the manufacturer's information for the equipment proposed for the Project. The design parameters were provided for operating loads of 100-percent (baseload), 75-percent, and 50-percent capacity and for ambient temperatures of 35°F, 59°F, 75°F, and 95°F. Annual emissions were based on emissions expected for baseload and ambient temperatures of 59°F. The maximum emissions are based on 8,260 hours firing natural gas and 500 hours per year firing oil. Natural gas firing includes 2,880 hours with maximum duct firing of 550 MMBtu/hr and 400 hours peak firing with duct firing. The potential emissions are based on the 59°F turbine inlet temperature at 100-percent load condition since it represents a conservative average when the annual average temperatures are slightly higher than 70°F. Appendix 10.1.5, the PSD Application, presents the basis for the emission rates and maximum annual emissions of regulated and non-regulated pollutants.

During combustion, two primary types of NO_x are formed: fuel NO_x and thermal NO_x. Fuel NO_x emissions are formed through the oxidation of a portion of the nitrogen contained in the fuel. Thermal NO_x emissions are generated through the oxidation of a portion of the nitrogen contained in the combustion air. NO_x formation can be limited by lowering combustion temperatures (through water or steam injection) and/or staging combustion (a reducing atmosphere followed by an oxidizing atmosphere, known as dry NO_x control).

Carbon monoxide is formed by incomplete combustion of fuel. High combustion temperatures, adequate excess air, and good fuel/air mixing during combustion will minimize CO formation. Carbon monoxide formation is limited by ensuring complete efficient combustion of the fuel in the turbines. Recent improvements in CT combustor technology allow for both reduced NO_x emissions and low CO emissions.

Emissions of NO_x for Turkey Point Expansion Project are proposed at concentrations of 2.5 parts per million-dry conditions (ppmvd), corrected to 15-percent oxygen (O_2) when firing natural gas and 10 ppmvd corrected to 15-percent O_2 when firing ultra low-sulfur light oil.

The level of NO_x control established emission rates for CO, since dry low-NO_x combustors will be used. Maximum CO emission rates for the Project when firing natural gas would be 9 ppmvd at baseload operation and 17 ppmvd when duct firing. When firing ultra low-sulfur light oil, the CO emissions would be 20 ppmvd at baseload operation.

Maximum SO_2 emission rates are controlled and minimized by the very low sulfur content in the fuel.

Table 3.4-3 presents the potential PM/PM_{10} emissions from the mechanical draft cooling tower.

Table 3.4-4 presents the annual potential emissions for the Project compared to the PSD significant emission rates, which are thresholds for PSD review. If a project located at an existing major source results in an increase in emissions of a pollutant greater than the listed PSD significant emission rate, then, PSD review is required. PSD review requires a determination of BACT.

3.4.2 AIR EMISSION CONTROLS

The use of clean fuel, i.e., natural gas, and combustion controls will minimize air emissions and ensure compliance with applicable emission-limiting standards. Using clean fuels will minimize emissions of SO_2, PM/PM_{10}, and other fuel-bound contaminants. Combustion controls will minimize the formation of NO_x and the formation of CO and VOCs by combustor design. Further NO_x reduction will be achieved by SCR. The combination of these techniques are proposed for this Project and have been determined to represent BACT on previous projects based on an evaluation of economic, energy, and environmental impacts. The following subsection presents a summary of the Air Pollution Control Technology and BACT analysis, which is presented in the PSD permit application in Appendix 10.1.5.

3.4.3 CONTROL TECHNOLOGY DESCRIPTION AND BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

BACT review is required under FDEP rules and EPA regulations pertaining to PSD. Federal regulations are codified in 40 Code of Federal Regulations (CFR) Part 51.166, and FDEP has adopted PSD rules in FAC 62-212.400. The BACT review is part of the evaluation of control technology under the Florida PSD rules. BACT is applicable to all pollutants for which PSD review is required and is pollutant-specific. It is an emission limitation that is based on the maximum degree of reduction for each regulated pollutant, which is determined to be appropriate after taking into account energy, environmental, economic impacts, and other costs. BACT cannot be any less stringent than the federal New Source Performance Standards (NSPS) applicable to the source under evaluation.

The FDEP and EPA have established a policy for BACT review in which the most stringent control alternatives are evaluated first. The alternatives are either rejected based on technological, environmental, energy, or economic reasons or are proposed as BACT. This procedure is referred as the "top-down" approach. For the Project, BACT is applicable for emissions of particulate matter and PM_{10}, sulfur dioxide, nitrogen oxides, carbon monoxide, volatile organic compounds and sulfuric acid mist.

The applicable NSPS for the Project are those promulgated by EPA for stationary gas turbines. These NSPS (40 CFR Part 60, Subpart GG) establish emission-limiting standards for NO_x and SO_2. The applicable NSPS are:

- NO_x 75 ppmvd corrected to 15-percent oxygen and heat rate plus adjustment to fuel-bound nitrogen
- SO_2 no more than 0.8-percent sulfur in the fuel

Appendix 10.1.5 of the Site Certification Application for the Project contains a complete PSD application. The PSD application includes the BACT evaluation for the Project and addresses those pollutants for which BACT is applicable. A discussion of the environmental, economic, and energy aspects of alternative control techniques and methods are included. The remainder of this section briefly describes those control technologies that are proposed for the Project.

3.4.3.1 Nitrogen Oxides

Dry low-NO_x combustor technology has been offered and installed by CT manufacturers to reduce NO_x emissions by inhibiting thermal NO_x formation through premixing fuel and air prior to combustion and providing pre-mix combustion to reduce flame temperatures. GE has guaranteed NO_x emissions of 9 ppmvd (corrected to 15-percent O_2) for new CTs firing natural gas and 42 ppmvd (corrected to 15-percent O_2) for ultra low-sulfur light oil firing.

The NO_x emissions will be controlled using state-of-the-art dry low-NO_x combustors in the CTs when firing natural gas and water injection when firing ultra low-sulfur light oil. NO_x emissions will be further controlled by SCR systems when firing either natural gas or ultra low-sulfur light oil. The dry low-NO_x combustors have premixed fuel zones plus a standard diffusion flame pilot burner for startup. Low-NO_x levels are achieved by introducing fuel primarily to the pre-mix zones and reducing the amount of fuel being combusted from the pilot nozzle. To further reduce emissions of NO_x, SCR systems will be installed within the HRSGs. SCR is a post-combustion process where NO_x in the gas stream is reacted with ammonia in the presence of a catalyst to form nitrogen and water. The reaction occurs typically between 316 and 399 degrees Celsius (°C) (600 and 750°F), where such temperatures occur within the HRSG. Ammonia will be stored in one 20,000-gallon tank. The SCR system is designed for approximately 73-percent reduction of flue gas NO_x emissions to 2.5 parts per million volume dry (ppmvd), corrected to 15-percent O_2 when firing natural gas and approximately 76-percent reduction to 10 ppmvd when firing fuel oil.

The recent permitting trend for combined cycle units is the use of dry low-NO_x combustors and SCR. Based on the ability to control NO_x to low emission levels, an emission level of 2.5 ppmvd corrected to 15-percent oxygen is proposed for the Project when firing natural gas and is equal to or lower than BACT determinations made in EPA Region IV.

3.4.3.2 Carbon Monoxide

The proposed BACT emission rates for CO are 9 ppmvd when firing natural gas and 20 ppmvd when firing ultra low-sulfur light oil. The maximum emission rate proposed as BACT is 17 ppmvd when duct firing. The CTs would utilize advanced combustion technology, and the proposed emission rates are consistent with those established as BACT.

3.4.3.3 Sulfur Oxides (SO_2 and H_2SO_4 Mist)

Post-combustion controls for SO_2 emissions comprise various wet and dry flue gas desulfurization (FGD) processes. However, FGD alternatives are not feasible for use on CT facilities due to high-pressure drops across the control device. The only feasible control for combined cycle facilities are clean fuels, i.e., natural gas and ultra low-sulfur light oil. The ultra low-sulfur light oil proposed for the Project will be limited to 0.0015 percent. Additionally, sulfuric acid mist production will be limited by the use of low sulfur fuels.

3.4.3.4 Particulate Matter and Other Regulated Pollutants

Post-combustion alternatives such as baghouses, scrubbers, and electrostatic precipitators are not feasible due to the high pressure drops associated with the units and the small amount of PM reduction, which would occur since the CT PM emissions are minimal (i.e., these emissions are already lower than most baghouses emit). Clean-burning fuels that have low PM and trace contaminant contents are being proposed as BACT for the Project.

PM emissions will be emitted from the mechanical draft cooling tower in the form of drift. Cooling tower drift will be controlled through the use of mist eliminators that will be designed to limit drift to 0.001 percent of the circulating water rate of the cooling tower. Table 3.4-3 presents information on the cooling tower and potential PM and PM_{10} from drift.

3.4.4 DESIGN DATA FOR CONTROL EQUIPMENT

Design data for the air pollution control equipment is presented in Section 4.0 of Appendix 10.1.5 (PSD Application).

Emissions of other pollutants for the Project are expected to be minimal and require no additional control technology. Therefore, analysis of alternative emission controls for these other pollutants is not necessary.

3.4.5 DESIGN PHILOSOPHY

The Project minimizes air pollutant emissions by using the most efficient and pollutant-preventing generating technology. This concept has been incorporated with the selection of a combined cycle process utilizing advanced CTs. Combined cycle plants can be expected to achieve fuel conversion rates on the order of 7,000 Btu/kilowatt hours (kWh), as opposed to values in the 9,000 to 10,000 Btu/kWh range for more conventional generating plants. This is an improvement of about 30 percent. Thus, by maximizing the megawatt output per unit of fuel consumed, the air pollutant emissions per megawatt output are minimized. Pollution prevention is incorporated in the design by the use of clean fuels and combustion technology. Natural gas and very low sulfur content ultra low-sulfur light oil will be used. Moreover, advanced dry low-NO_x combustion technology will be used to minimize NO_x emissions while ensuring that CO and VOC emissions are within accepted limits. SCR will be installed to further reduce NO_x emissions. Taken together, the design of the Project will incorporate features that will make the Project the most efficient and one of the lowest polluting power plants in the State of Florida.

3.5 PLANT WATER USE

The source of cooling water for the Project will be the upper Floridan aquifer. This water will be obtained from 4 new wells, each rated at 5,000 gpm, which will be constructed in the Project Area (see Figure 3.2-2). This water will be treated and used as makeup to a closed cycle recirculating cooling system for heat dissipation. FPL is also providing for the potential use of reclaim water from the Miami-Dade Water & Sewer Department's (WASD) South District Wastewater Treatment Plant, water which is presently disposed by deep well injection. The ultimate use of reclaim water will be based on availability, quantity, and quality considerations.

General plant service water, fire protection water, and process water will be obtained from the Miami-Dade potable water supply system. Process water uses will include demineralized water use in the combustion turbine inlet air inlet evaporative cooling system, NO_x injection system (for ultra low-sulfur light oil firing), power augmentation, HRSG steam cycle makeup, and general service water use for washdowns. The increase in potable water use resulting from the Project is well within WASD's permitted quantity.

The Project water balance is presented schematically in Figure 3.5-1. The water quality of the proposed cooling tower makeup water source is presented in Table 3.5-1, which has been derived from information described in Section 2.3.4. Similarly, expected water quality of the reclaim water is presented in Table 3.5-2. The following sections (3.5.1 through 3.5.4) provide more detailed descriptions of proposed plant water uses.

3.5.1 CIRCULATING WATER HEAT REJECTION SYSTEM

A rectangular wet mechanical draft cooling tower located within the power block will be used to reject the Project heat load of 2.3 billion Btu/hr to the atmosphere. Makeup water from the upper Floridan aquifer will be pre-treated to remove scale-causing chemicals (e.g., calcium, magnesium, and sulfate). Cooling tower blowdown will be released to the existing cooling canal system at a location near the discharge for Units 1 and 2 (see Figure 3.2-2). Table 3.5-3 presents design information on the cooling tower. As shown in Figure 3.5-1, cooling tower circulating water will be used for steam condensate cycle makeup water.

Figure 3.5-2 presents a special case water-use diagram developed to represent the maximum expected 90-day water demand of the heat dissipation system for cooling tower makeup. This special case water usage will be used to simulate a 90-day maximum withdrawal without recharge and meets the SFWMD requirements for groundwater modeling.

3.5.2 DOMESTIC/SANITARY WASTEWATER

A new restroom will be installed to handle additional domestic/sanitary wastewater. A lift station will send this wastewater to the existing plant sanitary wastewater treatment plant. The increase in flow rate will not cause the system capacity to be exceeded.

3.5.3 POTABLE WATER SYSTEMS

Potable water uses for the Project will not cause the facility to exceed the existing capacity from Miami-Dade potable water supply system. Potable water use will be limited by using water conserving features such as bottled water for drinking purposes. Permanent safety shower/eyewash stations will be installed at the site.

3.5.4 PROCESS WATER SYSTEMS

The Project will utilize trailer mounted reverse osmosis/mixed bed (RO/MB) demineralizer systems for process water treatment using water from a 3 million gallon raw water tank. The demineralized water will be pumped to a 2 million gallon storage tank for process water use. RO reject will be released to the cooling canal system while regeneration of the mixed bed systems will be offsite.

3.5.4.1 Demineralized Water

The second largest water use for the Project will be the production of demineralized water (i.e., conductivity < 0.1 µS/cm). Demineralized water is required for:

- Makeup to replace blowdown from the HRSG (necessary to maintain a low dissolved solids content in the HRSG);
- Makeup to replace miscellaneous steam losses in the steam cycle;
- Emergency makeup water;
- CT power augmentation;
- Injection into the CTs for NO_x control when firing ultra low-sulfur light oil; and
- CT air inlet evaporative cooling system feed.

Raw water from the Miami-Dade potable water supply system will be used as process water treatment system influent and service water.

3.5.4.2 General Service Water

General service water uses, including seal water, cleaning and flushing water, and fire protection water, will be provided by the service water system.

3.5.5 WATER SUPPLY ALTERNATIVE

An evaluation of possible alternative water supply strategies for Turkey Point Unit 5 is provided in Appendix 10.10.

3.6 CHEMICAL AND BIOCIDE WASTE

The new wastewaters generated by Unit 5 will include HRSG blowdown, Process Water Treatment System wastewater (RO reject water), ground-water pretreatment wastewaters (softener backwash water), cooling tower blowdown, and equipment area storm and wash waters. HRSG blowdown will be quenched with cooling tower blowdown and recycled to the cooling canal system. Equipment area storm and wash waters will be passed through an oil/water separator and then recycled to the cooling canal system. Cooling tower blowdown and the water treatment wastewaters will be recycled directly to the cooling canal system.

The principal uses of chemicals and biocides will be for steam cycle water quality control, chemical cleaning of the HRSG and pre-HRSG piping systems, and conditioning of water in the cooling tower.

3.6.1 COOLING SYSTEM WATER CHEMICAL TREATMENT

Intermittent shock chlorination or other oxidizing or non-oxidizing biocides will be used to prevent biofouling of the heat rejection system. A chlorine solution will be fed into the cooling tower.

A scale inhibitor will be fed to the circulating water system to control the formation of calcium carbonate scales. These scales can adhere to heat transfer surfaces and impair cooling condenser performance. Sulfuric acid will be added to the circulating water system to reduce alkalinity in the circulating water makeup, thus reducing the likelihood of scale formation. In addition, a polymer may be added to the circulating water system to help hold suspended solids in suspension.

Cooling tower makeup water (groundwater from the upper Floridan aquifer) will be pretreated by chemical softening prior to addition to the cooling tower basin.

3.6.2 STEAM CYCLE WATER TREATMENT

The steam-condensate-feedwater cycle will be chemically treated to prevent corrosion or scaling of the condensate piping and the HRSG preboiler piping and drums. The steam cycle water will be treated with an oxygen scavenger, such as hydrazine, for dissolved oxygen control and with ammonia or an amine for pH control. Sodium phosphate will be fed to the HRSGs for control of pH and hardness. Residual phosphate in the HRSG will react with hardness to form a nonadherent precipitate that can be removed through boiler blowdown.

3.6.3 SANITARY WASTEWATER TREATMENT

No additional sanitary treatment system will be required. The new restroom will be connected to the existing sanitary wastewater treatment plant.

3.6.4 MAKEUP WATER DEMINERALIZATION

As discussed in Section 3.5.4, the makeup water to the steam cycle will be demineralized using trailer-mounted RO/MB type demineralizer trains. The resulting RO reject will be recycled to the cooling canal system. Regeneration of the mixed bed ion exchange units will be performed offsite.

3.6.5 CHEMICAL CLEANING

The HRSG and preboiler piping will be chemically cleaned initially during commissioning and also periodically during the life of the plant. The chemicals used will not be permanently stored onsite but will be delivered to the site by a licensed contractor at the time of the scheduled periodic cleanings. The chemical cleaning solutions to be used for acid and alkaline cleaning of the HRSG will be dependent on the HRSG manufacturer selected. The actual cleaning solutions used must be consistent with the HRSG manufacturer's recommendations. Chemicals typically used in HRSG and feedwater pipe cleaning include the following:

1. Inhibited citric acid,
2. Aqueous Ammonia,
3. Organic Chelates, such as EDTA,
4. Disodium phosphate,
5. Trisodium phosphate,
6. Nonfoaming wetting agents, and
7. Foam inhibitors.

Wastewaters will consist of the cleaning solutions and material removed during the cleaning process. The chemical cleaning contractor will dispose of the chemical cleaning wastes offsite or other FDEP-approved method.

Since chemical cleaning is an infrequent maintenance operation, it does not contribute to the liquid wastes produced by the normal operation of the plant.

3.6.6 MISCELLANEOUS CHEMICAL DRAINS

Chemical wastewater can result from draining a chemical storage tank or from cleaning and maintenance operations such as washdown of chemical storage areas. Chemical wastes will be contained and disposed of offsite. Flows from the miscellaneous chemical drains will be intermittent and will not normally contribute to the wastewater flows. Periodic off-line washes of the combustion turbines using water or a detergent-water solution will also produce chemical wastes. These wastes are collected in a local sump and pumped out by a licensed Contractor for offsite disposal.

3.7 SOLID AND HAZARDOUS WASTE

3.7.1 SOLID WASTE

Only small quantities of solid wastes will be generated by the Project since there will be no ash or FGD waste generated. Solid wastes will be limited to municipal solid waste and infrequent replacement of inlet air filters. An approved solid waste disposal contractor will dispose of all solid wastes.

3.7.2 HAZARDOUS WASTE

Potential hazardous waste associated with the Project may include periodic chemical cleaning of the boilers [less than 100 kilograms (kg)/month], spent solvents, boiler chemical cleaning wastes, and other chemicals. These wastes, if hazardous, will be collected onsite and disposed of by a licensed hazardous waste contractor. Hazardous waste will be managed according to applicable rules and regulations.

3.8 SITE DRAINAGE

3.8.1 DESIGN CRITERIA AND APPLICABLE REGULATIONS

The surface water management system for the Project will be designed to meet the requirements of all applicable local, regional, state, and federal requirements, which include the requests of SFWMD, DERM, FDEP, and EPA. The design rainfall event, based on a 25-year 72-hour storm, is approximately 12.6 inches. The basic design requirement is that the peak post-construction runoff flow rate resulting from the design storm should not exceed the pre-development peak flow rate.

The Project drainage system of catch basins, pipes, channels, swales, and culverts will convey runoff to a new stormwater pond. A conceptual stormwater management plan and pre-existing vs. post-construction flow rate calculations for the Project are presented in Appendix 10.8.

3.8.2 CONSTRUCTION SITE DRAINAGE

Construction drainage features are shown on Figure 3.8-1. Prior to beginning any earth disturbing activities, a silt fence will be installed along the perimeter of areas to be used for construction laydown, parking, and trailers (Areas D, F, and G on Figure 3.2-3) and where runoff to offsite areas is expected. This silt fence will filter sediments from construction runoff. Along the perimeter of areas that will be filled and are presently tidal (Areas A, D, and E on Figure 3.2-3), silt fence may not be appropriate. Therefore, an impermeable barrier (e.g., Fabriform, soil, cement bags, and sheet piling) or silt fence will be placed along the perimeter of those areas to prevent tidal circulation and to keep sediment within the Project Area. Concurrent with that installation, the new stormwater pond will be installed along the south side of the existing plant access road (Area C on Figure 3.2-3), and two culverts will connect the otherwise isolated area adjacent to the new stormwater pond with tidal exchange to the north. One of these culverts will be placed to connect an existing culvert under the plant access road at the southeast corner of Area C with non-impacted Area H (on Figure 3.2-3). The second tidal culvert will be placed under the northwest corner of Area H and will also connect Area C with Area H. Stormwater from portions of the Project Area will be released to the north via the new culverts after traversing the new 3.3-acre stormwater pond, which will be installed prior to any filling of wetlands. Filling will be performed within the confines of the impermeable barrier, which will then be left in place to protect the toe of the slope from tidal erosion when filling is complete.

During construction, the extent of earth disturbances will be minimized as much as is practical. Areas outside of cut and fill operations will be protected against unnecessary equipment traffic. Aggregate-surfaced areas will be provided for roads, while limerock surfacing will be provided for laydown and parking areas.

Temporary erosion and sedimentation control measures will be designed to prevent sediment from being displaced and carried offsite by construction runoff. Silt fences as well as inlet and outlet protection will be used at catch basins and culverts to assist in sediment control. As necessary, sediment collected during construction will be removed. All temporary sediment and erosion control measures will be removed at the end of construction.

3.8.3 OPERATIONAL SITE DRAINAGE

At the completion of construction, Area G (see Figure 3.2-3) will be revised in accordance with mitigation requirements as approved by the USACE, FDEP, and DERM. Area F (see Figure 3.2-3) will be returned to the existing units. Area D (see Figure 3.2-3) will be retained as an operational laydown area. Area E will be seeded and its runoff, along with that from Area D, will be routed to the stormwater pond which will be retained (see Figure 3.8-2). Except for potentially oil-contaminated areas (containment areas for transformers, oil tanks, and other oil-containing or handling equipment), runoff from Area A (the Power Block) will be collected and recycled to the cooling canal system. Runoff from the potentially oil-contaminated areas will be routed through an oil/water separator and then recycled to the cooling canal system.

Generally, drainage will be directed away from structures and routed to the stormwater collection system. The CT/HRSG area will be graded with moderate slopes for effective drainage. Site runoff will be conveyed to the stormwater pond through a drainage system of pipes, channels, swales, and culverts.

3.9 MATERIALS HANDLING

3.9.1 CONSTRUCTION MATERIALS AND EQUIPMENT

Construction materials and equipment will be delivered to the Project Area by existing roads and possibly by barge for large components. The existing access road and the proposed new access roads will be used during construction and operation of the Project.

Materials will be unloaded and moved around the site using portable cranes and trucks. Some of the heaviest items such as the new CTs, new steam turbines, electric generators, HRSGs, and transformers may require barge delivery as discussed in Section 3.9.4. Pollution control measures for the laydown areas will include runoff collection as is described in Section 3.8. Main roads in the laydown areas will be surfaced with aggregate/limerock and treated with dust palliative to reduce dust. Water sprays will also be used on unpaved roadways, as required, to control dust due to traffic.

3.9.2 FILL MATERIAL

Material unsuitable for the power block and associated structures will be removed from the Project Area. This material, primarily organic soils and muck, will be transported to the EMB for use in improving the wetland systems as approved by FDEP and USACE permit requirements. Fill material will include materials such as limerock stockpiled along the existing cooling canal berms at the Turkey Point Plant Site. The existing stockpiles are a result of the construction and maintenance of the existing cooling canal system. All material will be transported to the Project Area by truck via existing roads.

3.9.3 ROADS

Construction trucks will travel to the Turkey Point Plant Site via SW 137th Avenue, and the existing access road. This route was used during construction of the existing units, and continues to be in use for operational and maintenance purposes. From the existing access road, construction trucks will be directed to the Project construction laydown areas.

3.9.4 BARGE

The Turkey Point Plant Site has barge access near the Project location. Barge deliveries of construction materials and equipment for the Project may be delivered to the barge area and transported by truck to the Project Area.

Table 3.3-1. Typical Natural Gas Composition

Composition	Mole %
Nitrogen (N_2)	0.27 - 0.45
Helium (He)	0.01
Carbon Dioxide (CO_2)	0.44 - 0.88
Methane (CH_4)	96 - 97.0
Ethane (C_2H_6)	1.8 - 2.6
Propane (C_3H_8)	0.16 - 0.29
Butane (C_4H_{10})	0.011 - 0.017
Pentanes (C_5H_{12})	0.007 - 0.03
Hexanes (C_6H_{14})	0.03
Heptanes (C_7H_{16})	0.01
Octanes (C_8H_{18})	0.0
Argon, Oxygen (Ar, O_2)	0.0
Sulfur (S)	2 grains per 100 scf
Water Vapor (H_2O)	0.6 lb/MMscf

Low Heating Value (LHV) - 20,835 Btu/lb; 950 Btu/scf

High Heating Value (HHV) - 23,127 Btu/lb; 1,055 Btu/scf

Note: scf = standard cubic feet

MM = million

Table 3.3-2. Expected Ultra Low-sulfur Light Oil Composition

Elements	Maximum
Carbon Residue	0.35 % on 10% Bottoms
Water and Sediment	0.05 %
Ash	0.01 %
Vanadium	0.5 ppm
Sodium and potassium	0.5 ppm
Lead	1 ppm
Calcium	2 ppm
Sulfur	0.0015 wt. %

Low Heating Value (LHV) - 18,367 Btu/lb; 129,900 Btu/gallon

High Heating Value (HHV) - 19,469 Btu/lb; 137,694 Btu/gallon

Note: ppm = parts per million

Table 3.4-1. Stack, Operating, and Emission Data for the Combustion Turbines/HRSGs and Duct Burners for Combined Cycle Operation-Natural Gas Combustion

		Operating and Emission Data [a] for Ambient Temperarure									
		Combustion Turbine/ HRSG					Combustion Turbine/ HRSG/ Duct Burner				
					w/Paug					w/Paug	
Parameter		35 °F	59 °F	75 °F	80 °F [b]	95 °F	35 °F	59 °F	75 °F	80 °F [b]	95 °F
CT/HRSG Stack Data (ft)											
Height		131	131	131	131	131	131	131	131	131	131
Diameter		19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
100 Percent Load											
Temperature (°F)		203	202	204	204	201	189	188	189	188	190
Velocity (ft/sec)		61.6	59.0	57.3	57.9	54.5	61.0	58.4	56.7	54.1	54.3
Maximum Hourly Emissions per Unit											
SO_2	lb/hr	10.2	9.8	9.4	9.5	8.9	13.3	12.8	12.4	12.5	11.9
PM/PM_{10}	lb/hr	11.1	11.0	10.9	10.9	10.8	14.4	14.3	14.3	14.3	14.2
NO_x	lb/hr	17.0	16.3	15.6	15.9	14.7	24.2	23.6	23.1	22.1	22.3
CO	lb/hr	30.3	28.8	27.7	46.2	26.2	52.3	50.8	49.7	68.2	48.2
VOC (as methane)	lb/hr	2.4	2.3	2.2	2.2	2.1	4.6	4.5	4.4	4.4	4.3
Sulfuric Acid Mist	lb/hr	1.02	0.98	0.94	0.95	0.89	1.33	1.28	1.24	1.25	1.19
75 Percent Load											
Temperature (°F)		187	188	189	NA	190	NA	NA	NA	NA	NA
Velocity (ft/sec)		48.4	47.1	45.9	NA	44.3	NA	NA	NA	NA	NA
Maximum Hourly Emissions per Unit											
SO_2	lb/hr	8.3	7.9	7.7	NA	7.3	NA	NA	NA	NA	NA
PM/PM_{10}	lb/hr	10.7	10.6	10.5	NA	10.5	NA	NA	NA	NA	NA
NO_x	lb/hr	13.6	13.1	12.6	NA	12.0	NA	NA	NA	NA	NA
CO	lb/hr	24.4	23.5	22.7	NA	21.7	NA	NA	NA	NA	NA
VOC (as methane)	lb/hr	2.2	2.1	2.0	NA	1.9	NA	NA	NA	NA	NA
Sulfuric Acid Mist	lb/hr	0.83	0.79	0.77	NA	0.73	NA	NA	NA	NA	NA
50 Percent Load											
Temperature (°F)		175	178	175	NA	182	NA	NA	NA	NA	NA
Velocity (ft/sec)		39.1	38.4	37.4	NA	36.9	NA	NA	NA	NA	NA
Maximum Hourly Emissions per Unit											
SO_2	lb/hr	6.6	6.4	6.2	NA	5.9	NA	NA	NA	NA	NA
PM/PM_{10}	lb/hr	10.3	10.3	10.2	NA	10.2	NA	NA	NA	NA	NA
NO_x	lb/hr	10.8	10.4	10.1	NA	9.6	NA	NA	NA	NA	NA
CO	lb/hr	20.1	19.5	19.0	NA	18.3	NA	NA	NA	NA	NA
VOC (as methane)	lb/hr	1.8	1.7	1.7	NA	1.6	NA	NA	NA	NA	NA
Sulfuric Acid Mist	lb/hr	0.66	0.64	0.62	NA	0.59	NA	NA	NA	NA	NA

[a] Refer to Appendix A for detailed information on basis of pollutant emission rates and operating data. Duct firing is assumed for 100% operating load. No duct firing is assumed for loads less than 100%.

[b] Steam augmentation and inlet cooling

Source: Golder, 2003.

Table 3.4-2. Stack, Operating, and Emission Data for Each Combustion Turbine/HRSG for Combined Cycle Operation- Distillate Fuel Oil Combustion

		Operating and Emission Data [a] for Ambient Temperarure			
		Combustion Turbine/ HRSG			
Parameter		35 °F	59 °F	75 °F	95 °F
CT/HRSG Stack Data (ft)					
Height		131	131	131	131
Diameter		19.0	19.0	19.0	19.0
100-Percent Load					
Temperature (°F)		297	295	294	294
Velocity (ft/sec)		73.6	70.2	67.7	64.5
Maximum Hourly Emissions per Unit					
SO_2	lb/hr	3.1	3.0	2.8	2.7
PM/PM_{10}	lb/hr	17.6	17.6	17.6	17.5
NO_x	lb/hr	79.5	76.0	73.1	68.6
CO	lb/hr	68.1	64.7	62.1	58.9
VOC (as methane)	lb/hr	7.6	7.3	7.0	6.7
Lead	lb/hr	0.03	0.03	0.02	0.02
Sulfuric Acid Mist	lb/hr	0.62	0.59	0.57	0.53
75-Percent Load					
Temperature (°F)		271	274	276	278
Velocity (ft/sec)		55.6	54.3	53.3	51.4
Maximum Hourly Emissions per Unit					
SO_2	lb/hr	2.5	2.4	2.3	2.2
PM/PM_{10}	lb/hr	17.5	17.5	17.5	17.4
NO_x	lb/hr	62.5	60.1	58.2	55.0
CO	lb/hr	53.5	51.7	50.5	48.3
VOC (as methane)	lb/hr	6.0	5.8	5.7	5.5
Lead	lb/hr	0.02	0.02	0.02	0.02
Sulfuric Acid Mist	lb/hr	0.49	0.47	0.46	0.43
50-Percent Load					
Temperature (°F)		256	259	264	268
Velocity (ft/sec)		44.6	44.0	43.5	42.6
Maximum Hourly Emissions per Unit					
SO_2	lb/hr	1.9	1.9	1.8	1.7
PM/PM_{10}	lb/hr	17.4	17.4	17.4	17.4
NO_x	lb/hr	49.0	47.4	45.9	43.6
CO	lb/hr	44.3	43.2	42.3	41.0
VOC (as methane)	lb/hr	4.9	4.8	4.7	4.6
Lead	lb/hr	0.02	0.02	0.02	0.01
Sulfuric Acid Mist	lb/hr	0.39	0.38	0.37	0.35

[a] Refer to Appendix 10.1.5 for detailed information on basis of pollutant emission rates and operating data.

Source: Golder, 2003.

Table 3.4-3. Physical, Performance, and Emissions Data for the Mechanical Draft Cooling Tower

Parameter	Turkey Point 4 x 1
Physical Data	
Number of Cells	22
Deck Dimensions, ft	
Length	661.1
Width	114
Height	51
Stack Dimensions	
Height, ft	65
Stack Top Effective Inner Diameter, per cell, ft	38
Effective Diameter, all cells, ft	178.2
Performance Data	
Discharge Velocity, ft/min	1,323
Circulating Water Flow Rate (CWFR), gal/min	306,000
Design hot water temperature, °F	105.2
Design cold water temperature, °F	86.9
Heat Rejected, million Btu/hr	2,600
Design Air Flow Rate per cell, acfm	1,500,000
Liquid/ Gas (Air Flow) (L/G) Ratio	1.045
Hours of operation	8,760
Emission Data	
Drift Rate[a] (DR), percent	0.0010
Total Dissolved Solids (TDS) Concentration [b], maximum ppm	30,000
Solution Drift [c] (SD), lb/hr	513
PM Drift [d], lb/hr	45.90
tons/year	201.2
PM_{10} Drift[e]	
PM_{10} Emissions, lb/hr	2.35
tons/year	10.3

[a] Drift rate is the percent of circulating water.

[b] A TDS of 30,000 results in maximum PM emissions.

[c] Includes water and based on circulating water flow rate and drift rate (CWFR x DR x 8.34 lb/gal x 60 min/hr).

[d] PM calculated based on total dissolved solids and solution drift (TDS x SD).

[e] PM_{10} based on a TDS of 4,000 ppm, see Cooling Tower PM Emissions Study, see Appendix A.

Source: Marley, 2003. FPL, 2003, Golder, 2003.

FPL

Table 3.4-4. Summary of Maximum Potential Annual Emissions for the FPL Turkey Point Unit 5 Combined Cycle Project

Pollutant	Annual Emissions (tons/year): 4 CTs/HRSGs with Duct Burners	Annual Emissions (tons/year): Cooling Tower	Annual Emissions (tons/year): TOTAL	PSD Significant Emission Rate (tons/year)	PSD Review Required?
SO_2	191	NA	191	40	Yes
PM	218	201.2	419	25	Yes
PM_{10}	218	10.3	229	15	Yes
NO_x	387	NA	387	40	Yes
CO	681	NA	681	100	Yes
VOC (as methane)	57.1	NA	57	40	Yes
Sulfuric Acid Mist	19.1	NA	19.1	7	Yes
Lead	0.025	NA	0.025	0.6	No

Table 3.5-1. Design Upper Floridan Water Quality

	Minimum	Average	Maximum
Alkalinity as CaCO3 (mg/l)	160	176.7	200
Alkalinity (Bicarbonate) (mg/L)	196	232.0	268
Aluminum (mg/L) - Non Detects @ 50% and Detects	ND	ND	ND
Ammonia as N (mg/L)	0.004	0.2	1.5
Antimony (ug/L) - Non Detects @ 50% and Detects	ND	ND	ND
Arsenic (ug/L) - Non Detects @ 50% and Detects	ND	ND	ND
Barium (ug/L) - Non Detects @ 50% and Detects	5	65.7	320
Beryllium (ug/L) - Non Detects @ 50% and Detects	0.05	8.6	110
Bicarbonate Ion (mg/L)	260	266.0	270
BOD (5-day) (mg/L)	2.5	7.6	11
Cadmium (ug/L) - Non Detects @ 50% and Detects	ND	ND	ND
Calcium (mg/L)	62	105.2	210
Chloride (mg/L)	54	773.0	6800
Chlorine, Total (mg/L) - Non Detects @ 50% and Detects	ND	ND	ND
Chromium (ug/L) - Non Detects @ 50% and Detects	2.5	10.7	100
COD (mg/L)	60	106.3	190
Color (Color Units) - Non Detects @ 50% and Detects	2.5	42.5	400
Conductivity (umho/cm)	2.92	3102.1	6590
Copper (ug/L) - Non Detects @ 50% and Detects	5.6	19.1	130
Cyanide (mg/L) - Non Detects @ 50% and Detects	ND	ND	ND
Dissolved Oxygen (mg/L)	0.10	2.72	7.50
Fluoride (mg/L) - Non Detects @ 50% and Detects	0.45	1.2	3.6
Hardness (mg/l as CaCO3)	170	716.6	1750
Hardness - Non Carbonate (mg/l as CaCO3)	380	402.0	430
Iron Total (ug/L) - Non Detects @ 50% and Detects	25	220.0	670
Lead (ug/L) - Non Detects @ 50% and Detects	ND	ND	ND
Magnesium (mg/L)	5.1	144.1	252
Manganese (mg/L) - Non Detects @ 50% and Detects	0.01	0.09	0.4
Mercury (ug/L) - Non Detects @ 50% and Detects	ND	ND	ND
Molybdenum (ug/L) - Non Detects @ 50% and Detects	ND	ND	ND
Nickel (ug/L) - Non Detects @ 50% and Detects	1	22.7	110
Nitrate as N (mg/L) - Non Detects @ 50% and Detects	0.001	0.021	0.385
Nitrate + Nitrite as N (mg/L) - Non Detects @ 50% and Detects	0.025	0.6	1.2
Nitrite as N (mg/L) - Non Detects @ 50% and Detects	ND	ND	ND
Nitrogen as N (total) (mg/L) - Non Detects @ 50% and Detects	0.25	8.0	12.56
Oil & Grease (mg/L) - Non Detects @ 50% and Detects	ND	ND	ND
pH (SU)	5.6	7.9	8.94
Phenols (mg/L) - Non Detects @ 50% and Detects	ND	ND	ND
Phosphate, Total as P (mg/l) - Non Detects @ 50% and Detects	0.005	0.05	1.16
Potassium (mg/L)	38	56.1	120
Selenium (ug/L) - Non Detects @ 50% and Detects	0.25	21.8	250
Silica (mg/L)	0.52	5.3	8.4
Silver (ug/L) - Non Detects @ 50% and Detects	ND	ND	ND
Sodium (mg/L)	440	1610.0	3300
Sulfate (mg/L)	17	304.0	770
TDS (mg/l)	310	1911.0	9900
Temperature (F)	68	75.7	86.9
Thallium (ug/L) - Non Detects @ 50% and Detects	ND	ND	ND
TKN as N (mg/L) - Non Detects @ 50% and Detects	ND	ND	ND
TOC (mg/L)	0.126	1.8	12.66
TSS (mg/L) - Non Detects @ 50% and Detects	0.24	3.1	10
Turbidity (NTU)	1.1	3.2	5.2
Zinc (ug/L) - Non Detects @ 50% and Detects	2.5	27.4	160

Table 3.5-2. South District Wastewater Plant Design Reclaim Water Quality

Parameter	Units	Maximum	Average	Minimum
Aluminum	mg/L as Al	0.924	0.17	0.05
Antimony	ug/L as Sb	25	5.16	0.45
Arsenic	ug/L as As	24	3.59	0.593
Barium	mg/L as Ba	0.57	0.075	0.013
Beryllium	ug/L as Be	28.56	2.43	0.1
Cadmium	ug/L as Cd	50	4.10	0.05
Chromium	ug/L as Cr	25	7.08	0.5
Copper	ug/L as Cu	25	9.66	2.4
Iron	mg/L as Fe	1.23	0.23	0.025
Lead	ug/L as Pb	34.4	6.13	0.5
Manganese	mg/L as Mn	0.116	0.03	0.0025
Mercury	ug/L as Hg	2.1	0.36	0.05
Nickel	ug/L as Ni	26.8	8.95	0
Selenium	ug/L as Se	11	3.00	0.004
Silver	ug/L as Ag	25	5.28	0.5
Sodium	mg/L as Na	130	61.35	46.5
Thallium	ug/L as Tl	39.5	4.20	0.0065
Zinc	ug/L as Zn	198	39.42	0.008
Chlorides	mg/L as Cl+	369	77.08	50
Cyanides	ug/L as CN-	17	6.13	0
Fluoride	mg/L as F	31	2.90	0.37
Nitrates	mg/L as N	4.89	0.97	0.002
Nitrites	mg/L as N	1.23	0.59	0.01
Sulfates	mg/L as SO42-	601	34.81	14
Ammonia	mg/L as NH3	26.23	14.15	0.12
Color	PCU	50	30.91	10
Conductivity	umhos/cm	1695	709.57	550
Fecal Coliform	# col/100 mL	11100000	1835982	0
Nitrogen	mg/L	33.42	17.83	0.39
Dissolved Oxygen	mg/L as O2	4	3.64	3.2
Oil & Grease	mg/L	5	1.85	0.5
pH	Std. Units	7.79	6.78	6.3
Phosphate, Total	mg/L as PO43+	11.3	1.32	0
Temperature	C	30.2	27.65	22.9
Temperature	F	88	81.07	73
TDS	mg/L	960	377.03	252
TOC	mg/L	36	11.90	3.5
TSS	mg/L	42.4	9.50	1.6

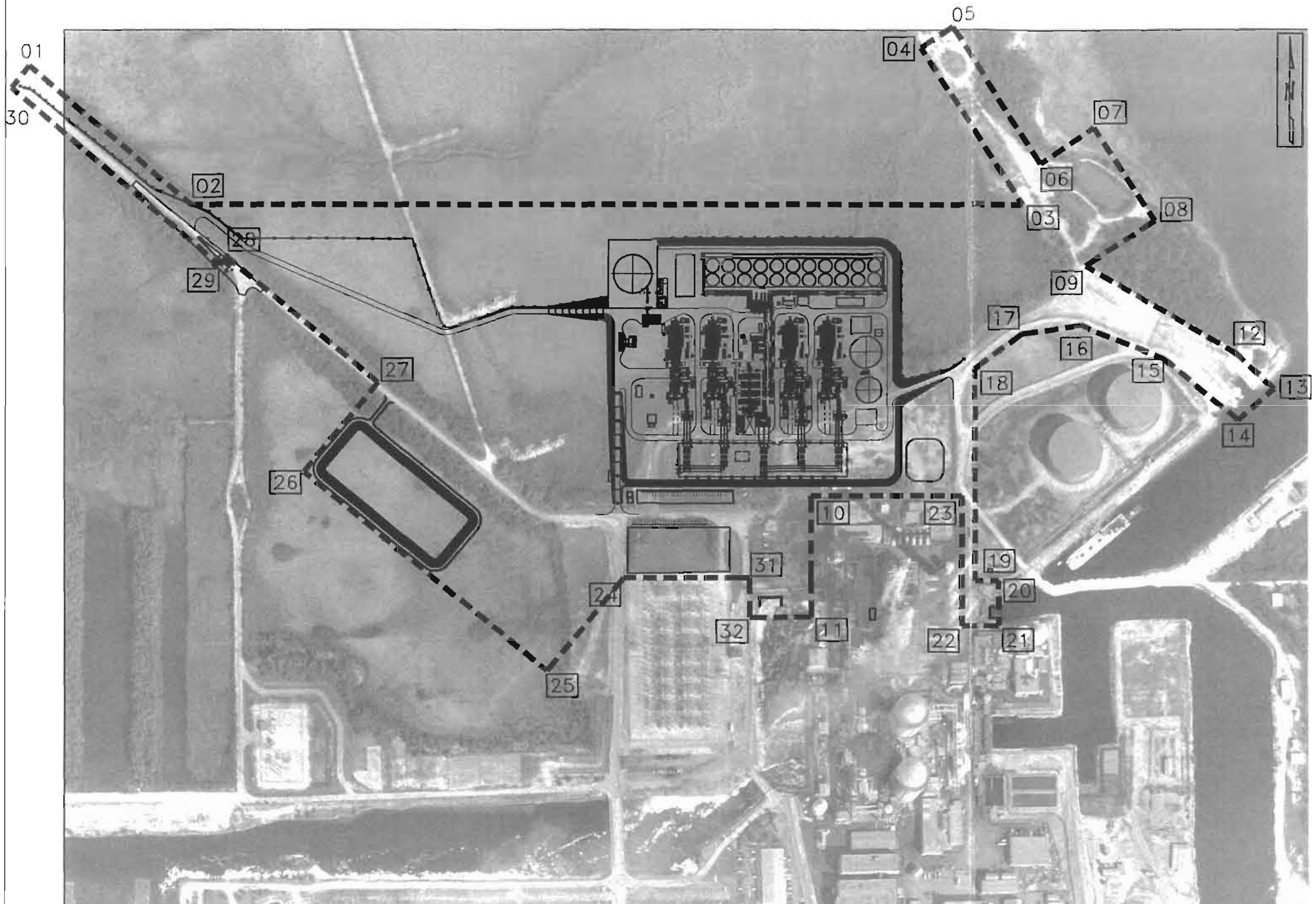
Table 3.5-2. South District Wastewater Plant Design Reclaim Water Quality

Parameter	Units	Maximum	Average	Minimum
4,4'-DDT	ug/L	0	0.00	0
4,4'-DDE	ug/L	0	0.00	0
4,4'-DDD	ug/L	0	0.00	0
Atrazine	ug/L	8.55	1.79	0.1
Dalapon	ug/L	0.65	0.48	0.0005
Dieldrin	ug/L	ND	ND	ND
Alpha-Endosulfan	ug/L	ND	ND	ND
Beta-Endosulfan	ug/L	ND	ND	ND
Endosulfan Sulfate	ug/L	ND	ND	ND
Endrin Aldehyde	ug/L	ND	ND	ND
Endothall	ug/L	ND	ND	ND
Endrin	ug/L	ND	ND	ND
Ethylene dibromide	ug/L	ND	ND	ND
Glyphosate	ug/L	ND	ND	ND
Heptachlor	ug/L	ND	ND	ND
Heptachlor epoxide	ug/L	ND	ND	ND
Hexachlorobenzene	ug/L	ND	ND	ND
Hexachlorocyclopentadiene	ug/L	ND	ND	ND
Lindane	ug/L	ND	ND	ND
Methoxychlor	ug/L	ND	ND	ND
Oxamyl (vydate)	ug/L	ND	ND	ND
Pentachlorophenol	ug/L	ND	ND	ND
Picloram	ug/L	ND	ND	ND
Polychlorinated biphenyls	ug/L	ND	ND	ND
Simazine	ug/L	ND	ND	ND
Toxaphene	ug/L	25	1.69	0
Bis (2-Ethylhexyl)Phthalate	ug/L	50	8.46	0.50
1,1-Dichlorethylene	ug/L	ND	ND	ND
1,1,1-Trichloroethane	ug/L	7	0.98	0
1,1-Dichloroethane	ug/L	5	1.18	0.185
1,1,2-Trichloroethane	ug/L	ND	ND	ND
1,2-Dichloroethane	ug/L	ND	ND	ND
1,2-Dichloropropane	ug/L	ND	ND	ND
1,2,4-Trichlorobenzene	ug/L	ND	ND	ND
1,4-dichlorobenzene	ug/L	5	2.50	0.25
Benzene	ug/L	ND	ND	ND
Butyl Benzyl Phthalate	ug/L	50	6.17	0.43
Carbon Tetrachloride	ug/L	2.5	0.68	0.10
Chloroform	ug/L	2.8	1.52	0
cis-1,2-Dichloroethylene	ug/L	ND	ND	ND

Table 3.5-2. South District Wastewater Plant Design Reclaim Water Quality

Parameter	Units	Maximum	Average	Minimum
trans-1,2-Dichloroethylene	ug/L	2.5	0.75	0.10
Dichloromethane	ug/L	ND	ND	ND
Diethyl Phthalate	ug/L	50	6.29	0.375
Di-n-butyl Phthalate	ug/L	50	6.16	0.50
Ethylbenzene	ug/L	3.55	0.85	0.10
Monochlorobenzene	ug/L	ND	ND	ND
o-Dichlorobenzene	ug/L	ND	ND	ND
para-Dichlorobenzene	ug/L	1.77	0.45	0.10
PCB-1242	ug/L	25	4.52	0.015
Styrene	ug/L	ND	ND	ND
Tetrachloroethylene	ug/L	4.6	1.31	0.17
Toluene	ug/L	ND	ND	ND
Trichloroethylene	ug/L	3.9	0.90	0.10
Trihalomethanes	ug/L	50	4.80	0.10
Vinyl Chloride	ug/L	ND	ND	ND
Xylenes (total)	ug/L	ND	ND	ND
Ethylene dibromide	ug/L	ND	ND	ND

Note: ND = not detected in any sample.



PROJECT AREA BOUNDARY STATE PLANE COORDINATES

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02	N402732.84	E874310.24
03	N402732.84	E877344.10
04	N403301.24	E876966.72
05	N403374.35	E877084.01
06	N402882.85	E877409.01
07	N403010.84	E877602.63
08	N402674.79	E877824.82
09	N402509.67	E877575.08
10	N401673.13	E876565.21
11	N401230.29	E876565.21
12	N402196.12	E878114.22
13	N402062.33	E878261.50
14	N401950.84	E878127.61
15	N402171.13	E877858.72
16	N402292.86	E877555.97
17	N402263.35	E877341.84
18	N402134.48	E877167.01
19	N401362.79	E877167.01
20	N401362.79	E877253.01
21	N401197.07	E877253.01
22	N401197.07	E877116.63
23	N401673.13	E877116.63
24	N401374.77	E875881.81
25	N401035.48	E875601.25
26	N401761.97	E874722.66
27	N402087.28	E874991.66
28	N402542.56	E874441.06
29	N402512.09	E874412.74
30	N403158.06	E873655.84
31	N401374.76	E876341.55
32	N401230.29	E876341.55

BEARINGS AND COORDINATES SHOWN HEREIN REFER TO THE STATE OF FLORIDA TRANSVERSE MERCATOR GRID SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983.

COORDINATE LOCATIONS WERE DERRIVED FROM A DIGITAL ORTHO PHOTOGRAPH THAT HAS BEEN RECTIFIED AND SPATIALLY LOCATED TO STATE PLANE COORDINATES PER NAD, 83. THE DIGITAL ORTHO WAS PURCHASED FROM THE MIAMI DADE COUNTY PUBLIC ACCESS DEPT., GIS DIVISION.

REV	DATE	REVISION DESCRIPTION	BY	CH	COR	APR	ORG
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FPL

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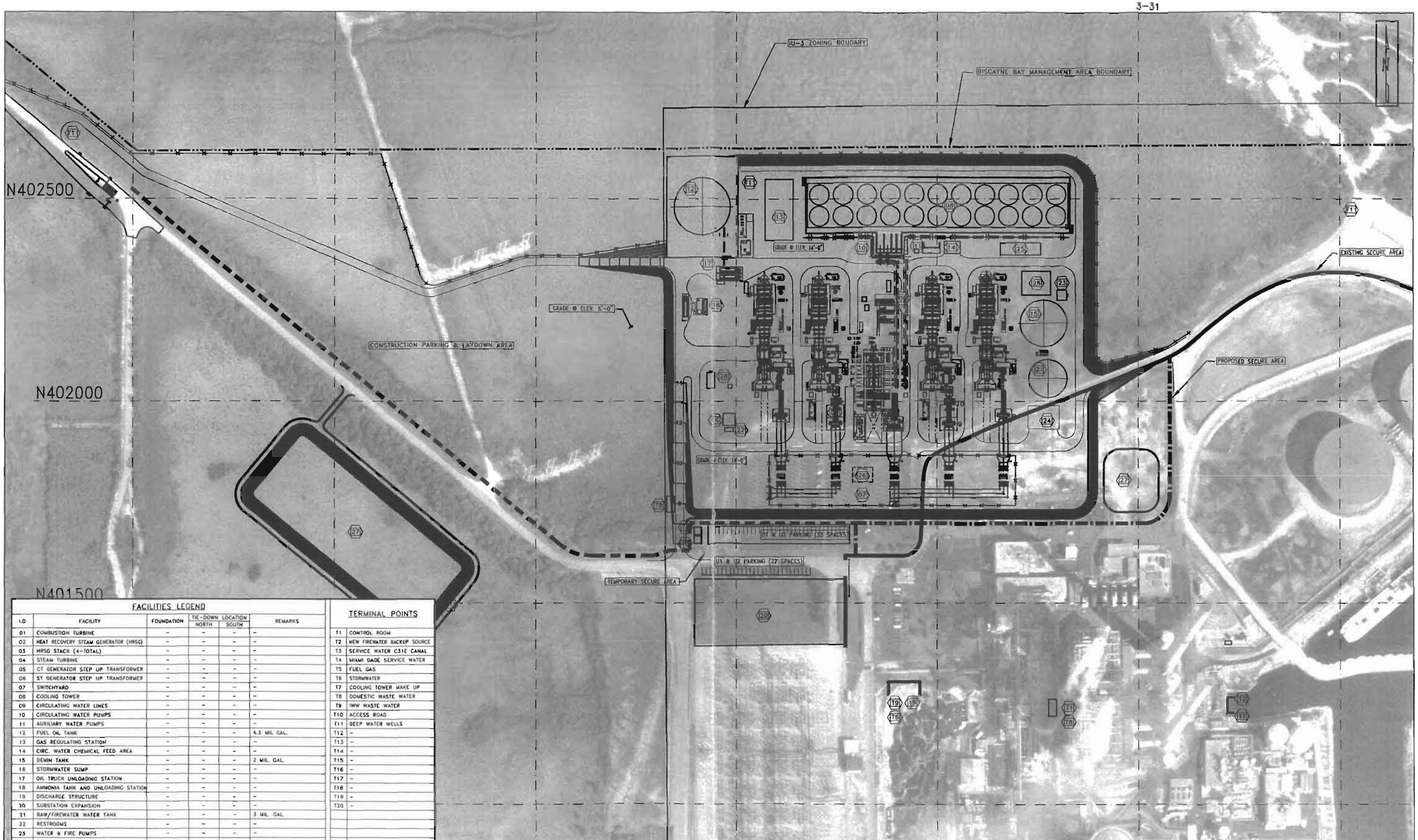

FACILITIES LEGEND

I.D	FACILITY	FOUNDATION	TIE-DOWN LOCATION NORTH	TIE-DOWN LOCATION SOUTH	REMARKS
01	COMBUSTION TURBINE	–	–	–	–
02	HEAT RECOVERY STEAM GENERATOR (HRSG)	–	–	–	–
03	HRSG STACK (4-TOTAL)	–	–	–	–
04	STEAM TURBINE	–	–	–	–
05	CT GENERATOR STEP UP TRANSFORMER	–	–	–	–
06	ST GENERATOR STEP UP TRANSFORMER	–	–	–	–
07	SWITCHYARD	–	–	–	–
08	COOLING TOWER	–	–	–	–
09	CIRCULATING WATER LINES	–	–	–	–
10	CIRCULATING WATER PUMPS	–	–	–	–
11	AUXILIARY WATER PUMPS	–	–	–	–
12	FUEL OIL TANK	–	–	–	4.5 MIL. GAL.
13	GAS REGULATING STATION	–	–	–	–
14	CIRC. WATER CHEMICAL FEED AREA	–	–	–	–
15	DEMIN TANK	–	–	–	2 MIL. GAL.
16	STORMWATER SUMP	–	–	–	–
17	OIL TRUCK UNLOADING STATION	–	–	–	–
18	AMMONIA TANK AND UNLOADING STATION	–	–	–	–
19	DISCHARGE STRUCTURE	–	–	–	–
20	SUBSTATION EXPANSION	–	–	–	–
21	RAW/FIREWATER WATER TANK	–	–	–	3 MIL. GAL.
22	RESTROOMS	–	–	–	–
23	WATER & FIRE PUMPS	–	–	–	–
24	DEMIN TRAILER AREA	–	–	–	–
25	WATER TREATMENT AREA	–	–	–	–
26	RELAY VAULT	–	–	–	–
27	STORMWATER POND	–	–	–	POTENTIAL
28	H2 BULK STORAGE	–	–	–	

TERMINAL POINTS

T1	CONTROL ROOM
T2	NEW FIREWATER BACKUP SOURCE
T3	SERVICE WATER C31E CANAL
T4	MIAMI DADE SERVICE WATER
T5	FUEL GAS
T6	STORMWATER
T7	COOLING TOWER MAKE UP
T8	DOMESTIC WASTE WATER
T9	IWW WASTE WATER
T10	ACCESS ROAD
T11	DEEP WATER WELLS
T12	–
T13	–
T14	–
T15	–
T16	–
T17	–
T18	–
T19	–
T20	–

ASPHALT PAVING — AGGREGATE SURFACING — CONCRETE SURFACING

EXISTING FENCING — NEW FENCING

REV	DATE	REVISION DESCRIPTION	BY	CH	COR	APR	ORG
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FPL

SYSTEM	DISCIPLINE	PLANT/UNIT
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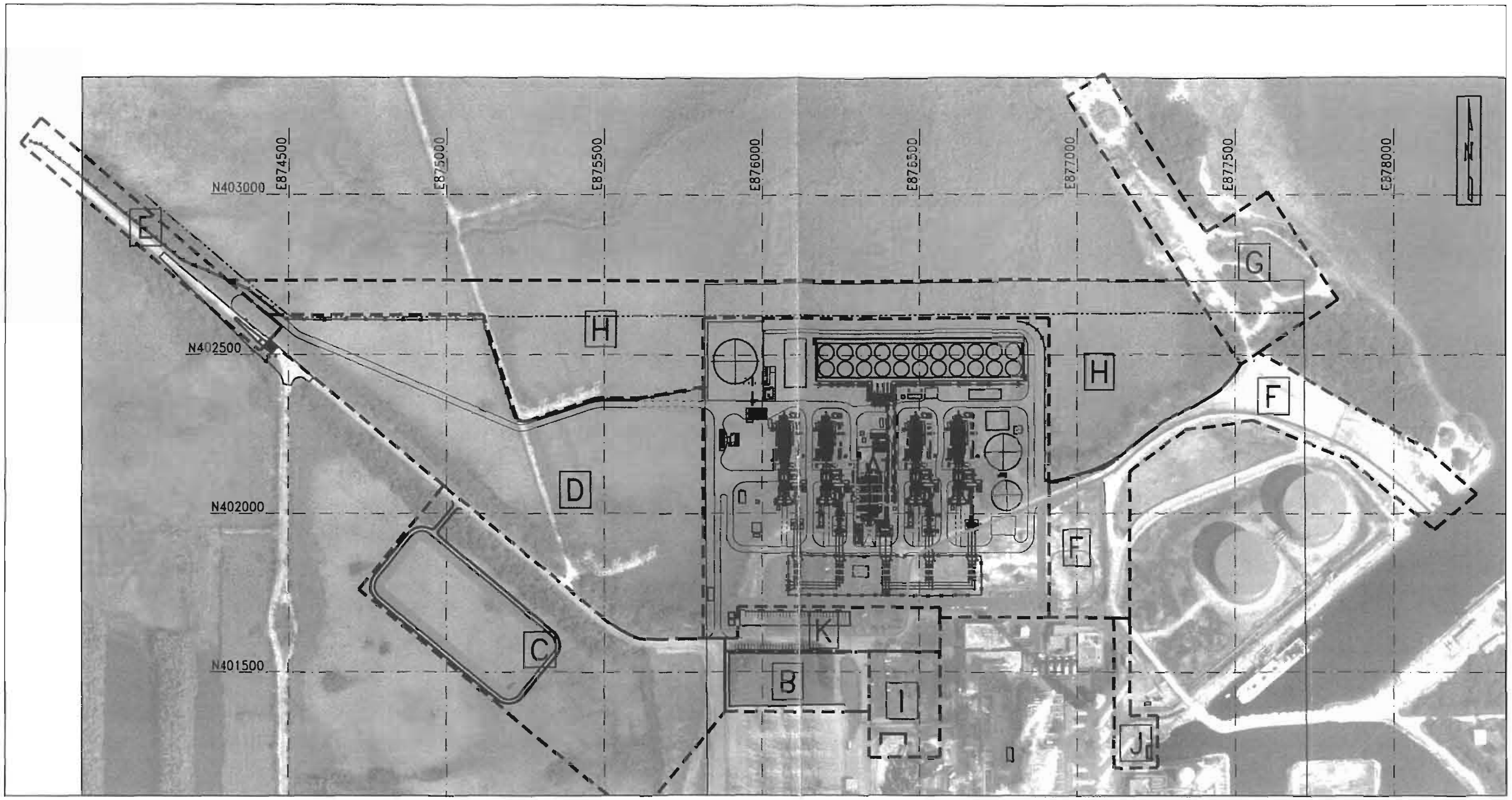

PROJECT AREAS

A- POWER BLOCK AND COLLECTOR YARD	23.53 AC.
B- SYS. SUBSTATION ADDITION	2 AC.
C- SITE RUNOFF STORMWATER POND	12 AC.
D- CONST. LAYDOWN, PARKING & TRAILERS	15.62 AC.
E- ROADWAY EXPANSION AREA	2.32 AC.
F- CONST. LAYDOWN, PARKING & TRAILERS	6.66 AC.
G- CONST. LAYDOWN, PARKING & TRAILERS	5.30 AC.
H- NON IMPACTED AREA	16.84 AC.
I- OUTFALL STRUCTURE, PARKING	1.7 AC.
J- TIE-INS TO EXIST. PLANT	.9 AC.
K- PARKING LOT & ROADS	2.12 AC.
TOTAL PROJECT AREA --------	88.99 AC.

REV	DATE	REVISION DESCRIPTION	BY	CH	COR	APR	ORG
0	11/05/03	Revised Figure Box/Update Filename Code	JEA			TDJ	PGBU

FPL

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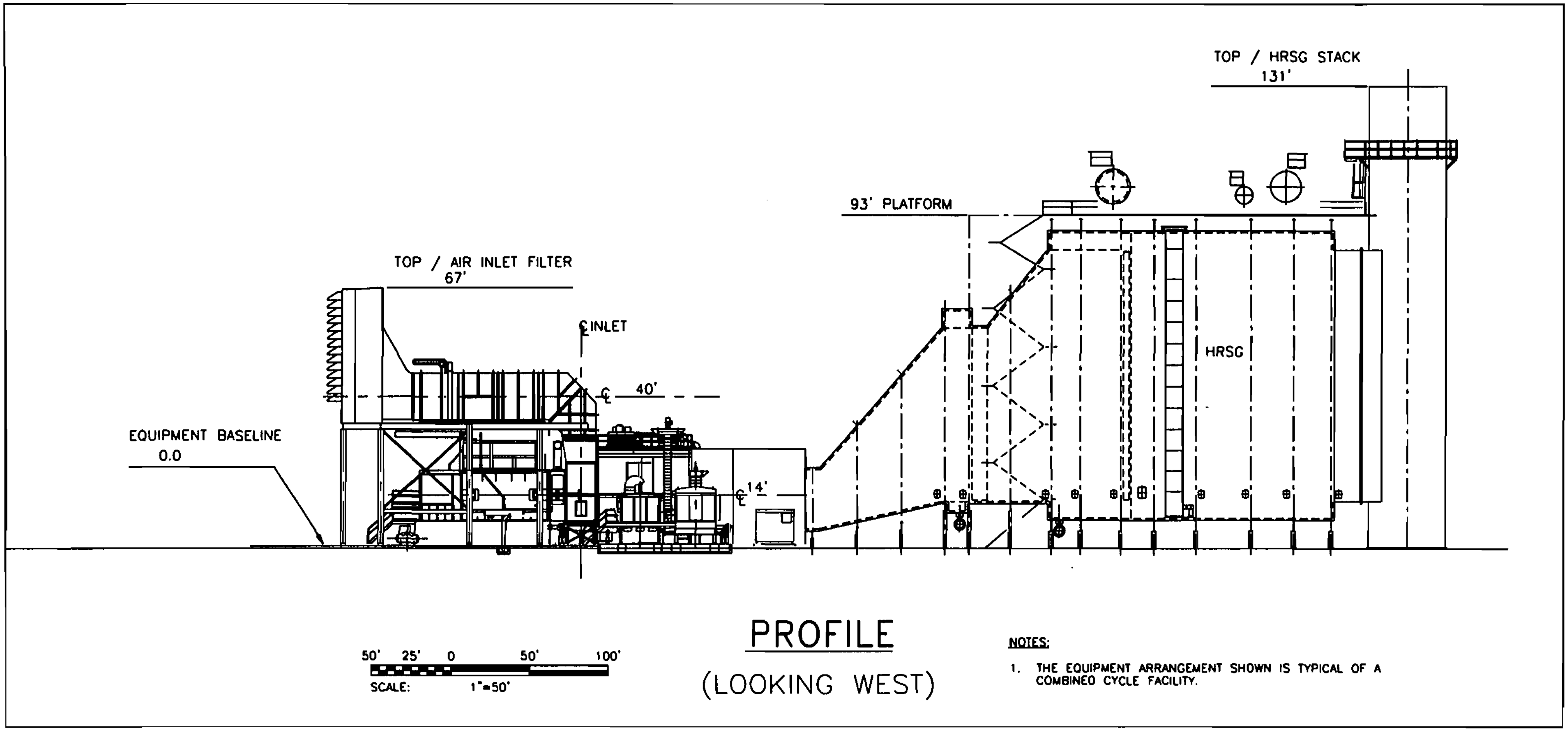
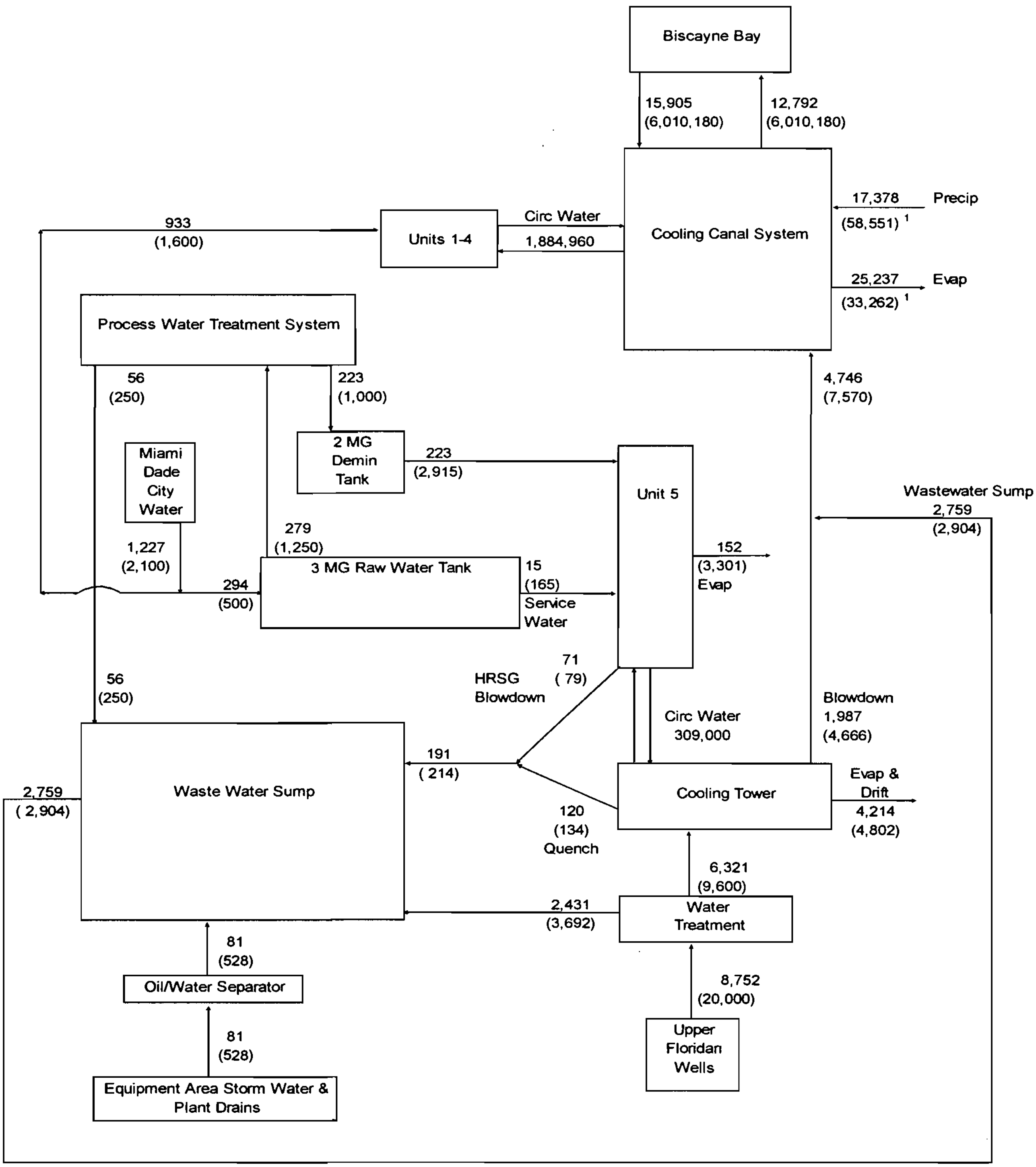


Figure 3.2-4. Profile of Combustion Turbine and Heat Recovery Steam Generator

Source: Black & Veatch, 2001; FPL, 2003; and Golder, 2003



[1] = **Monthly peak values**

Figure 3.5-1
Average Water Use Diagram
[Average flows in gpm; Peak flows in parentheses ( )]

Source: Golder, 2003.

FPL

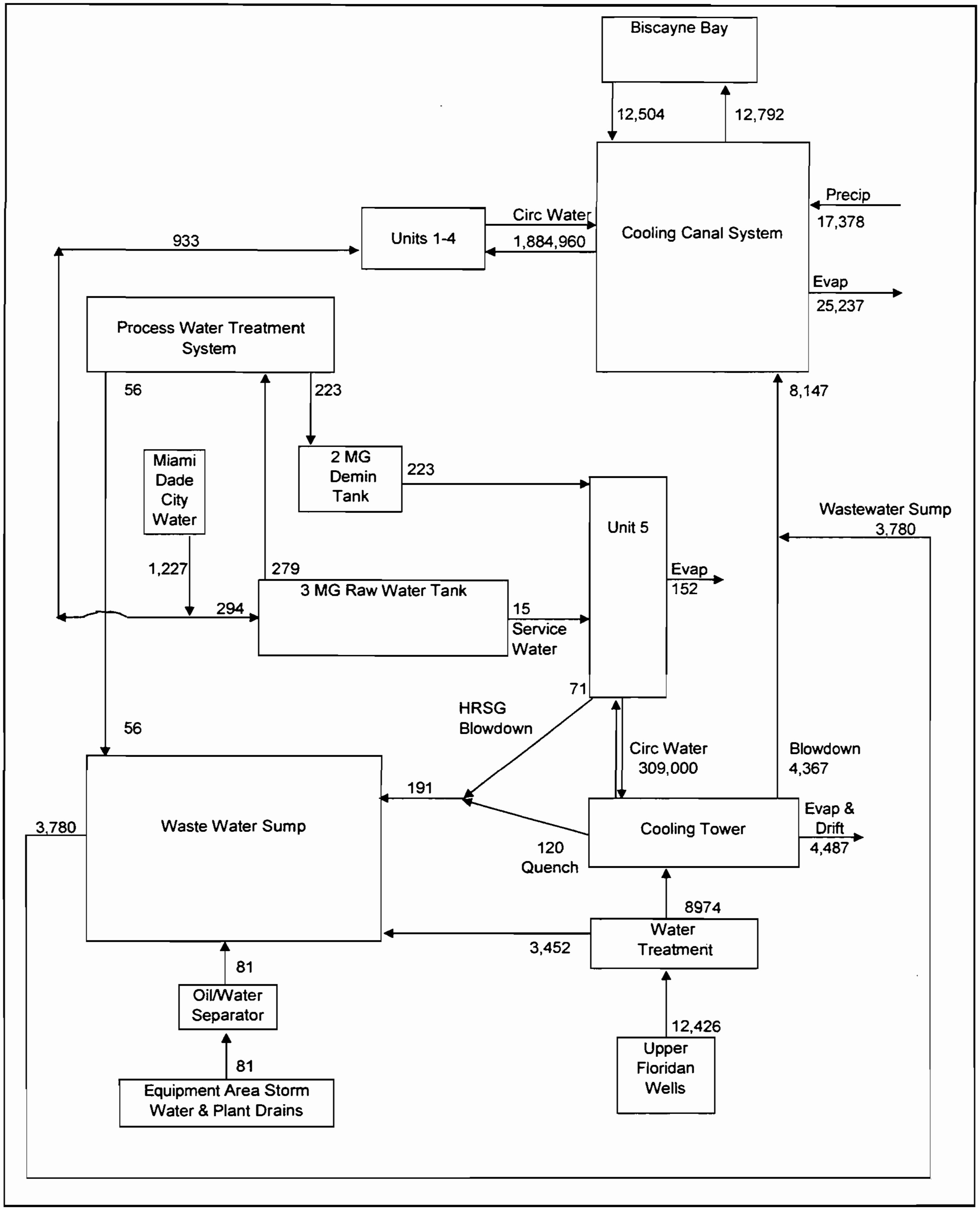


Figure 3.5-2
Special Water Use Diagram
[flows in gpm]

Source: Golder, 2003.

FPL

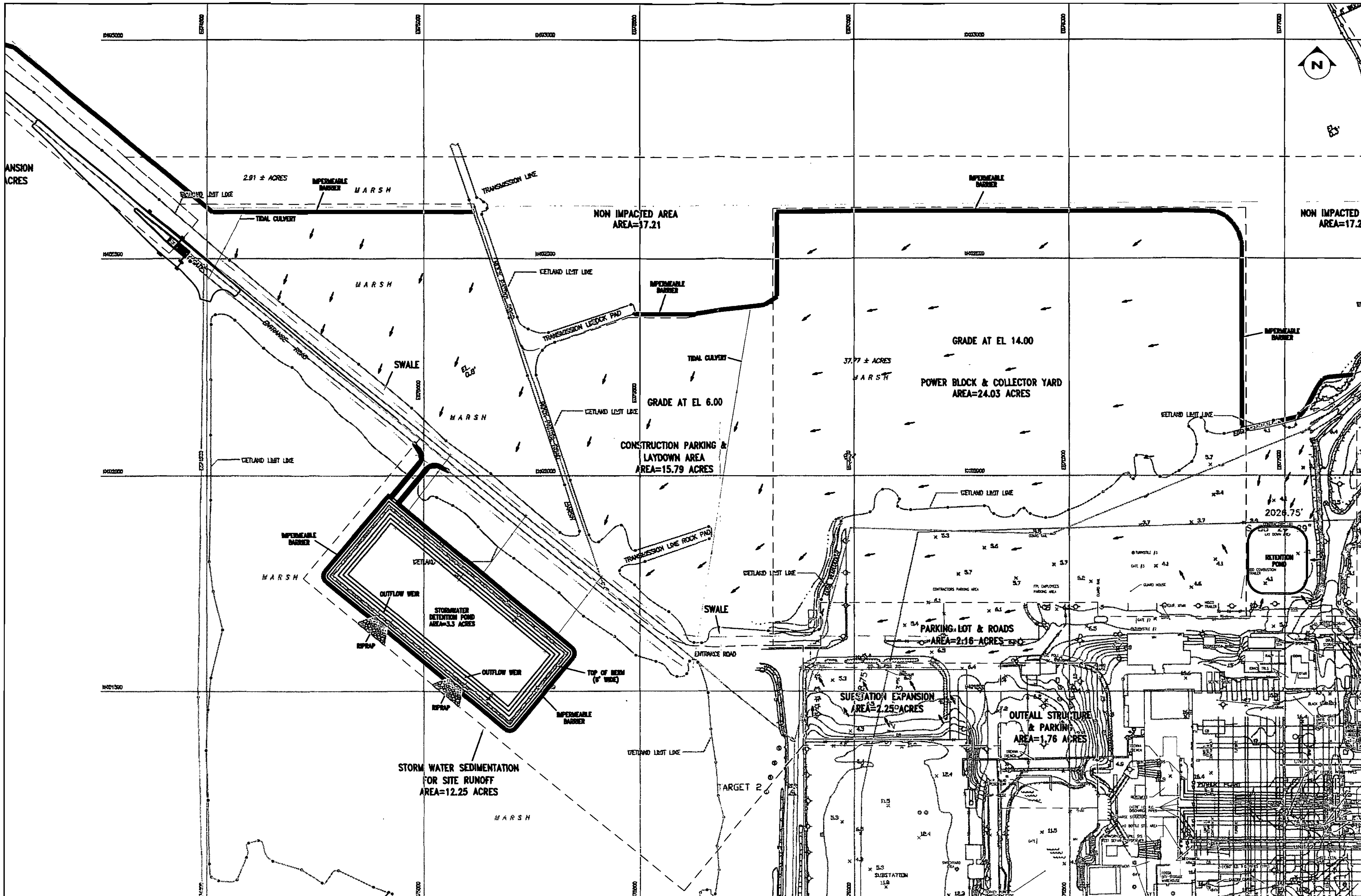


FIGURE 3.8-1 *(Sheet 1 of 2)*
TURKEY POINT EXPANSION PROJECT - CONSTRUCTION STORMWATER DRAINAGE

Source: Tetra Tech FL, 2003.

0337600/4/4.2/4.2.1/Figures/Figure 3.8-1.dwg

FPL

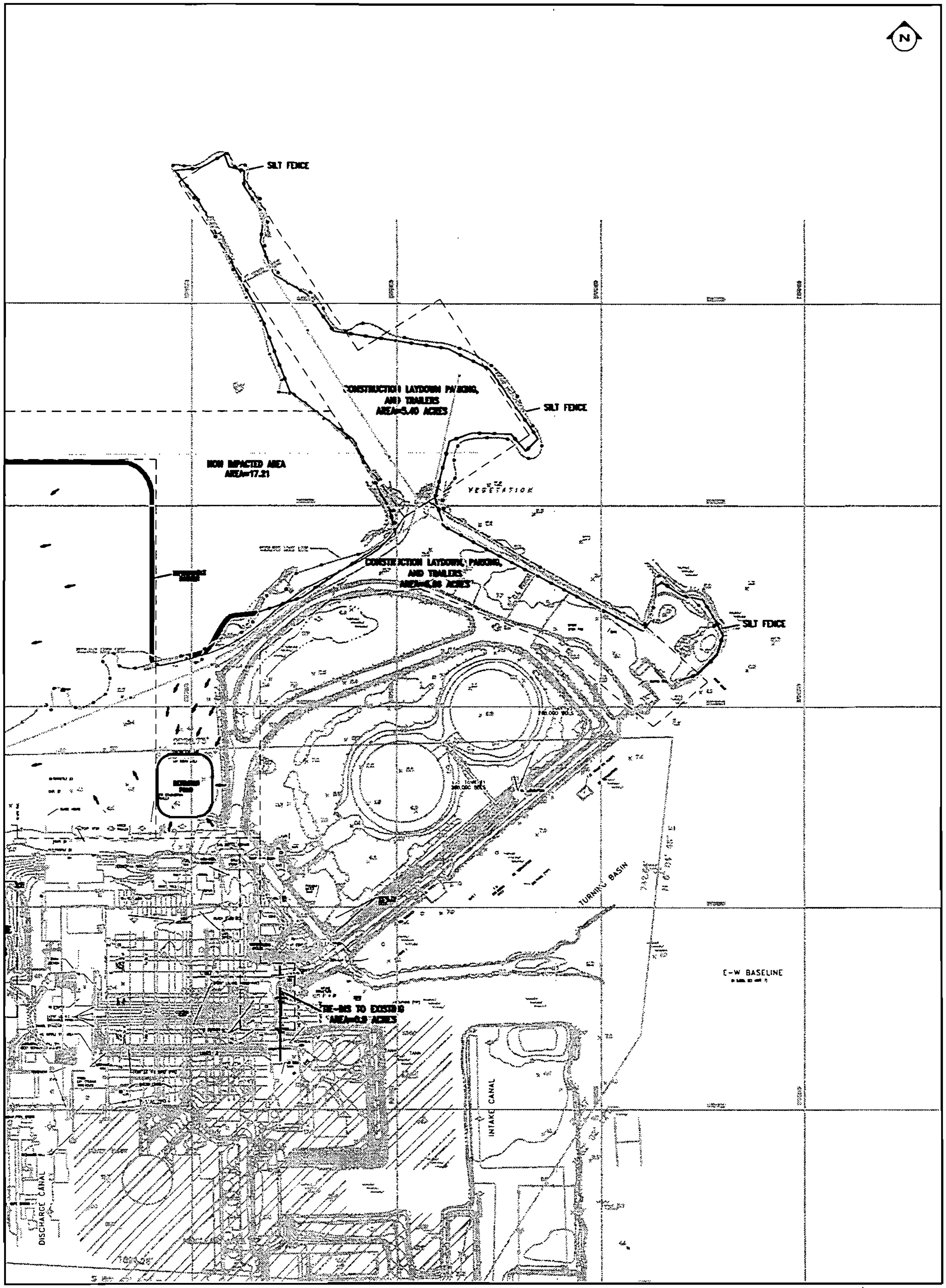


FIGURE 3.8-1 *(Sheet 2 of 2)*
TURKEY POINT EXPANSION PROJECT - CONSTRUCTION STORMWATER DRAINAGE

Source: Tetra Tech FL, 2003.

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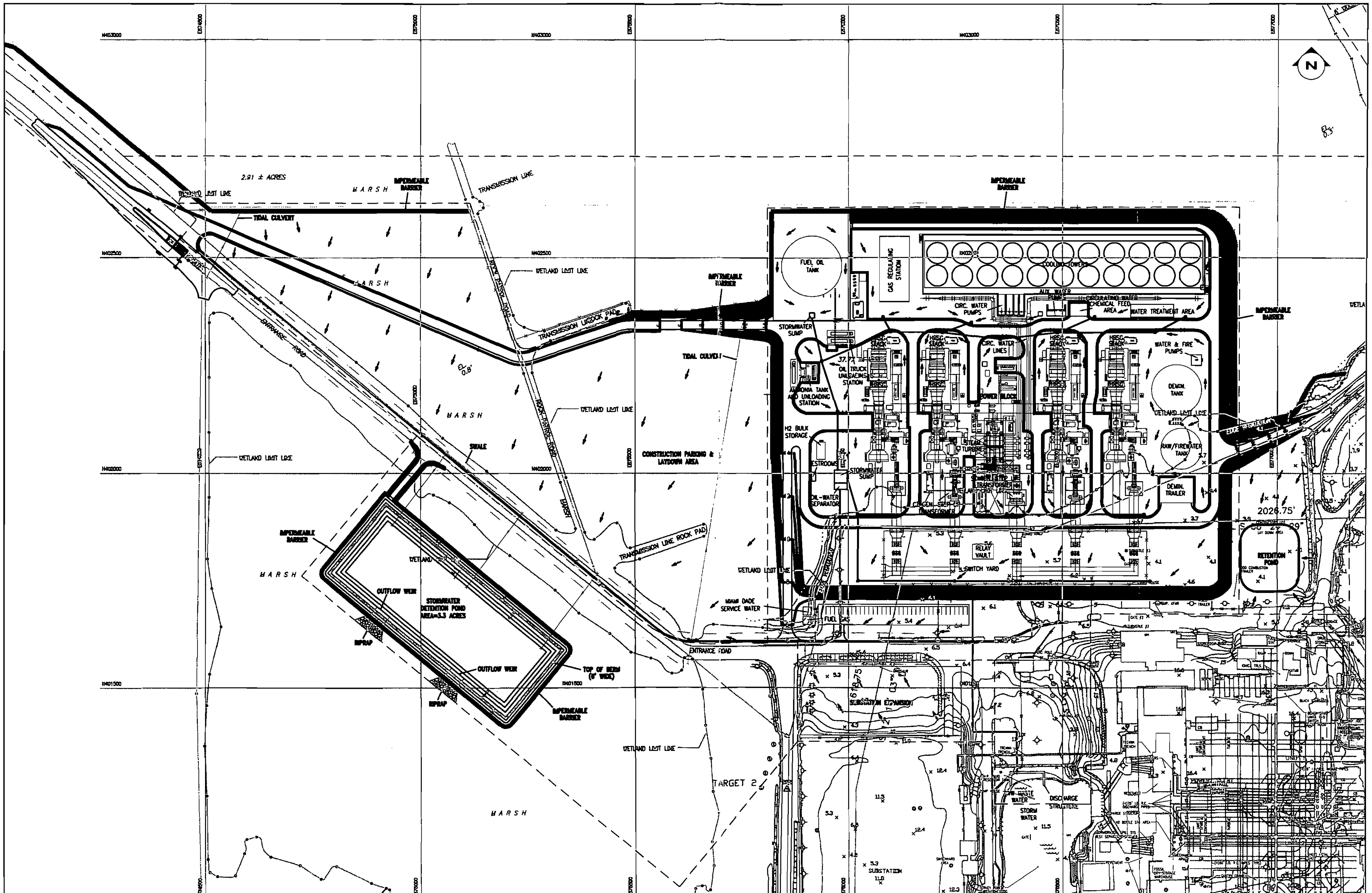

FIGURE 3.8-2 *(Sheet 1 of 2)*
TURKEY POINT EXPANSION PROJECT - POST-CONSTRUCTION STORMWATER DRAINAGE

Source: Tetra Tech FL, 2003.

0337600/4/4.2/4.2.1/Figures/Figure 3.8-2.dwg

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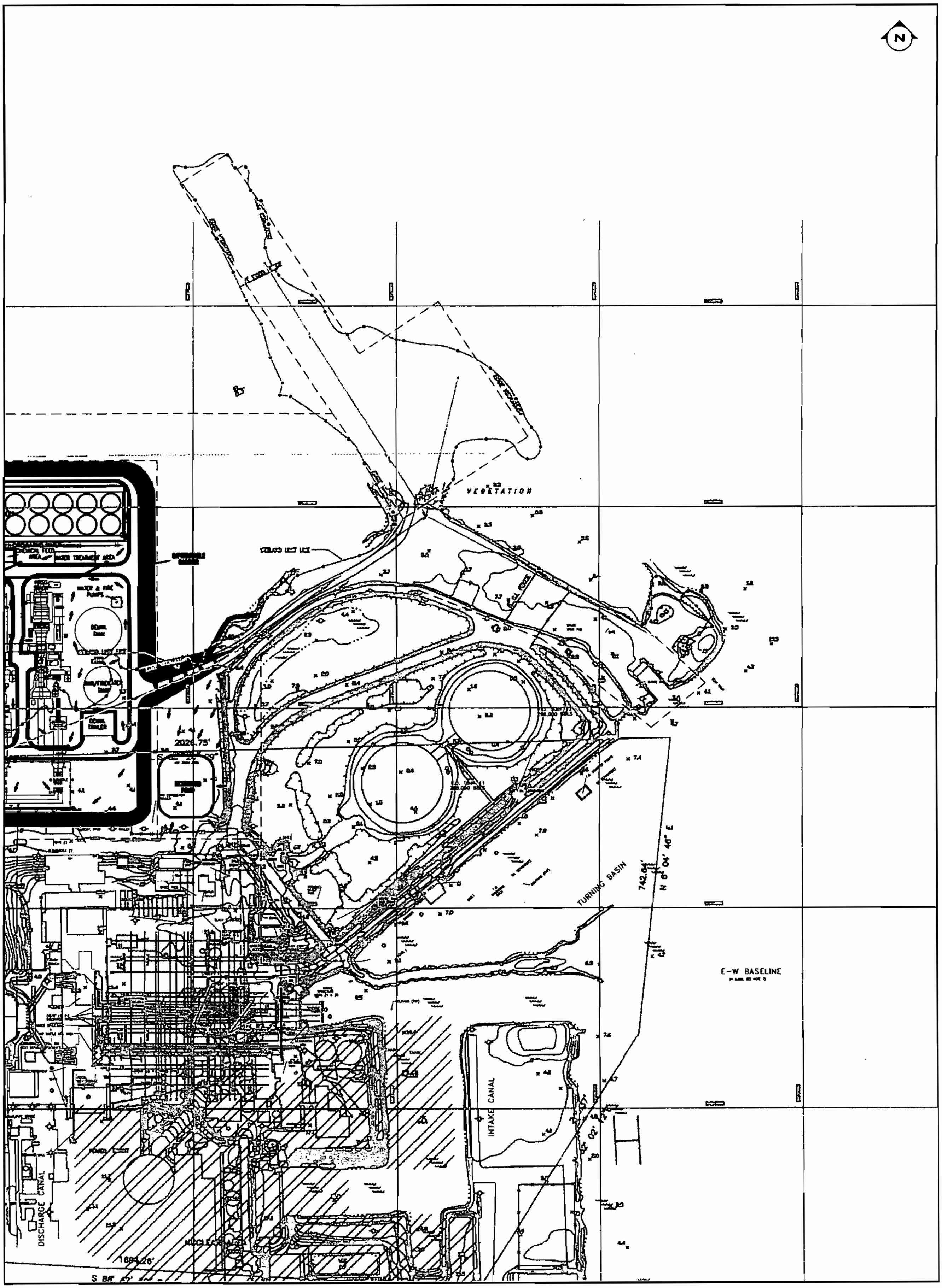

FIGURE 3.8-2 *(Sheet 2 of 2)*
TURKEY POINT EXPANSION PROJECT - POST-CONSTRUCTION STORMWATER DRAINAGE

Source: Tetra Tech FL, 2003.

0337600/4/4.2/4.2.1/Figures/Figure 3.8-2.dwg

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4.0 ENVIRONMENTAL EFFECTS OF SITE PREPARATION AND PLANT AND ASSOCIATED FACILITIES CONSTRUCTION

4.1 LAND IMPACTS

4.1.1 GENERAL CONSTRUCTION IMPACTS

The portions of the Turkey Point Plant site that will be affected by the construction of the Project are shown in Figure 4.1-1. As described in Section 3.2, a total of about 64 acres within the 90-acre Project Area will be utilized during construction. The power block area will be located north of the existing steam electric Units 1 and 2, and occupy about 24 acres (Project Area A). Activities directly associated with construction will occupy about 28 acres (Project Areas D, F, and G). These areas will be cleared of any vegetation and filled for the Project as necessary. Construction laydown and parking areas, which may be heavily traveled, will be stabilized with shell or rock. Other, more lightly traveled areas will be seeded with grass to prevent erosion. Site runoff areas and the stormwater pond will occupy about 7 acres.

The areas occupied by the power block (Project Area A) provide space for the four CTs and associated HRSGs, steam turbine generator, cooling tower, ultra low-sulfur light oil tank, collector yard, gas regulating station (i.e., meters, compressors, and moisture separation regulation), and raw/demineralized water tanks (see Figure 4.1-2). Other facilities include the parking lot and roads (Project Area F); stormwater pond (Project Area C); outfall structure; and parking (Project Area I); and connectors to the exist plant (Project Area J). These areas will require clearing and filling with limestone. The expansion of the system substation (Project Area B) will be about 2 acres and require minimal clearing and filling with limestone.

No explosives for blasting will be used during construction of the Project.

There will be a new onsite permanent road that will serve to provide access for the construction of the Project. Access to the existing plant and proposed expansion from public roads is through SW 344th Street from its intersection with U.S. Highway 1 in Florida City. Fugitive dust generation from traffic and/or excavations will be minimized through paving, the use of water sprinkling, or other dust suppressant technique.

The existing grade for most of the Project Area is at or slightly above mean sea level. The power block (Project Area A) will be filled to approximately 14 ft-msl and graded. Construction laydown and parking areas not previously filled will be filled with limestone or limerock to an elevation of 6 ft-msl (Project Area D).

Site preparation at the power block area will commence with the grubbing and clearing of all vegetation and removal of unsuitable soils (e.g., muck) in all structural areas. Pockets of material unsuitable for buildings or heavy equipment foundation may be found at the site during site clearing operations. Removal of any unsuitable material and the unavoidable removal of some adjacent material may be required. Unsuitable material (i.e., muck) will be stockpiled onsite for future use in the Everglades Mitigation Bank (EMB) to enhance the wetlands in accordance with FDEP and USACE permits. The stockpiled material will be put in an existing excavated area adjacent to the cooling canal system. The removed material will be replaced, as necessary, by structural fill. Structural fill from an onsite construction and maintenance source will be applied and compacted in lifts. An initial thin lift of fill, preferably limestone, will be used to provide a stable course for subsequent lifts. The fill will be placed and compacted in such manner to provide support for the plant foundations, piping, electrical duct banks, trenches, and manholes.

Foundations required to support heavy loads (i.e., such as building columns, CTs, and generators) will be supported by pilings.

Temporary dewatering effluent for initial site preparation will be routed to the existing cooling canal system or contained onsite. Dewatering, when required, will be accomplished by localized pumping of water in the de-mucked area. The dewatering system will be designed to control turbidity. Lowering the water table in the de-mucked area allows backfilling with structural fill (i.e., limerock or limestone). After initial filling of sites for deep foundations, additional dewatering may be required. The dewatering system will be designed to control turbidity with water contained onsite or routed to the existing cooling canal system.

The duration of each dewatering task will generally be limited to 6 months. Based on the location of dewatering areas within the Project Area, no offsite impacts to groundwater are anticipated (see Section 4.3). There will be no impacts to the underlying deeper aquifers because excavation and dewatering activities will be limited to the surficial aquifer system. Once the detailed design is completed, a dewatering plan, if required, will be submitted prior to commencing dewatering activities.

Water associated with hydrostatic testing will be obtained from the plant service water system and will be contained onsite or released to the cooling canal system. This water contains no chemicals and is only used for hydrostatic testing of piping and tank systems after they are installed.

Plant service water system will provide water for chemical cleaning of the HRSG and steam piping, as well as for steam blow processes. Chemical cleaning involves cleaning the HRSG to clean the piping systems (see Section 3.6.5). The steam blow process involves cleaning steam piping systems to remove accumulated weld spatter, slag, filings, and other debris. If this material is not removed prior to steam turbine operation, the steam turbine will be damaged by the metal particles, which would strike the blades and steam path at very high velocities. Blowing through the piping system with steam removes this material, along with rust, grease, and other fabrication and construction residues prior to commencement of combined cycle operation. The steam blow process requires treated water and may require additional portable reverse osmosis unit for a short time period. RO reject will be routed as described in Subsection 3.5.

Solid waste materials will be disposed of in accordance with applicable rules and regulations. Construction and demolition wastes, such as scrap wood and metal, will be transferred to a specified storage area on the site where they will be separated and stockpiled for salvage and recycling. General waste materials (i.e., typical of municipal solid wastes) will be collected in appropriate waste collection containers for disposal at an approved offsite location.

During construction, the construction labor force will use portable chemical toilets and/or permitted holding tanks. A licensed contractor will pump all sanitary sewage from the portable toilets and holding tanks as needed and transport the waste to an approved disposal facility.

Potable water for consumption during construction will be obtained from the existing potable water system for the Turkey Point Plant Site through temporary piping connections or from bottled water. Potable water for emergency eyewash and shower stations will be obtained from the existing potable water system through permanently installed piping systems.

Used oil from construction vehicles and equipment will be collected in appropriate containers and transported offsite for recycling or disposal at an approved facility. The approved disposal facility will be an existing facility that has been previously permitted for commercial recycling or disposal of used oils.

Individual contractors will be responsible for handling any hazardous materials required to perform their tasks and any resulting hazardous wastes. This responsibility includes the proper recordkeeping, transportation, storage, handling, and offsite disposal of such wastes.

It is anticipated that onsite construction activities for the Project will begin by May 2005 and be completed by June 2007. Demobilization, site restoration, and clean-up will extend to November 2007. The peak employment, which is expected to occur in Summer 2006, will be about 650 construction workers and management. Construction employment will average about 430 workers from about October 2005 through September 2006.

4.1.2 ROADS

Construction traffic will use SW 344th Street to access the main plant entrance, which is an asphalt-paved road. A separate onsite asphalt driveway will be constructed to connect the Project Area to the Turkey Point Plant Site access road. Construction traffic will be directed to either the parking or laydown areas.

4.1.3 FLOOD ZONES

Based on the flood zones delineated by the Federal Emergency Management Agency (FEMA), the entire Project Area is within the 100-year flood zone. All permanent structures will be protected from the 100-year flood by being raised above the design flood level (elevation 14 msl) or by being protected from flooding up to the design flood level. The Project will not adversely impact adjacent surface water flood elevations or flows and will not cause any adverse flooding or related impacts to offsite property.

4.1.4 TOPOGRAPHY AND SOILS

Current topographic features at the Project Area reflect both existing undisturbed conditions as well as past and present power-plant-related activities. The existing grade varies up to about 7 ft-msl. During site preparation, any soft or yielding areas noted will be excavated to remove unsuitable material unsuitable and replaced with structural fill.

No adverse impact is anticipated to soil stability or bearing strength because concrete piles will support the power block foundation; therefore, overall settling of the land area will be negligible. Slight settling may take place in areas of construction, but this will be moderate and localized in extent.

The areas affected by construction do not include any areas designated as Prime and Unique Farmland.

Most of the areas designated for construction facilities will generally require filling. Those areas requiring fill will average about 10 ft of fill. The fill will consist of limestone or limerock. Construction-related changes in site topography will not have any adverse effect on aesthetics or view shed. Since the elevations after construction will be no more than existing structures onsite, no significant topographical changes will be observable from offsite locations.

Construction activities will alter runoff in several parts of the Project Area; however, no adverse effects are anticipated from this alteration. Surface water runoff from the power block, construction parking, and laydown areas will be directed during construction to stormwater ponds or the cooling canal system.

Groundwater levels will not be significantly affected by modifications to soil percolation from construction activities in the Project Area due to the proximity of surface water and the interconnection between these surface water bodies and the surficial aquifer. Slight changes in percolation rates will have negligible impacts on water levels, because the surface infiltration affects only localized areas within the Project Area.

4.2 IMPACT ON SURFACE WATER BODIES AND USES

4.2.1 IMPACT ASSESSMENT

The surface waters surrounding the Project Area, which potentially could be affected by site preparation and construction activities, include the mangrove marsh wetlands within and outside of the Project Area, and that portion of Biscayne Bay adjacent to the Project Area. In addition to the tidal mangrove marsh and Biscayne Bay, other surface water features in proximity to the Project Area include the 5,900-acre cooling canal system and tidal mangrove marsh associated with the 13,000-acre EMB. With the exception of the construction of the power block and access road within the tidal mangrove marsh and some interconnection structures with the existing cooling canal system, no other construction activities will take place in the above-referenced water bodies. Appropriate measures will be implemented ot mitigate impacts to adjacent surface waters and Biscayne Bay. Figure 4.1-1 presents the land areas that will be impacted by construction. The focus of this impact evaluation is on potential discharges from these land areas to those surface water systems.

4.2.1.1 Surficial Hydrology—Physical and Chemical Impacts

Construction of the Project will impact about 37 acres of mangrove tidal marsh, which includes approximately 1 acre of open water area near the southern edge of the mangroves adjacent to the existing access road and parking area for Units 1 and 2. These areas will be filled for the construction of the power plant.

The potential impacts during construction will be minimized by initially isolating the surrounding surface water bodies (primarily tidal mangroves) from those areas within the Project Area that are required to be dredged and filled. This will be done by first enclosing the Project Area requiring site preparation with sedimentation barriers (e.g., screens). A non-porous barrier (e.g., Fabriform, soil/cement bags, or sheet pile) will then be constructed outlining those areas where Project structures or construction areas are required (see Section 3.8.2). Concurrent with that installation, the new stormwater pond will be installed along the south side of the existing plant access road (Project Area C), and a culvert(s) will connect the otherwise isolated area adjacent to the new stormwater pond with tidal exchange to the north. Stormwater from the present portions of the Project Area will be released to the north via the new culvert(s) after traversing the new stormwater pond, which will be installed prior to any filling of wetlands. Filling will be performed starting at the southwest corner of Project Area A and working north and west toward the transmission line road, and at the northwest corner of Project Area D and working east and south toward the transmission line road. The non-porous barriers will be left in place when filling is complete. Once those areas within the Project Area are filled, offsite impacts will be controlled and minimized through proper design and placement of runoff control features in accordance with federal, state, regional, and local regulations described in Section 3.8.

Erosion will be controlled by compaction of soils, construction of ditches and embankments, maintenance of relatively flat grades, and other appropriate erosion control techniques.

Sedimentation will be controlled during construction by use of sediment control basins and traps, filter berms, straw bales, and other applicable devices as appropriate.

Runoff from the construction laydown areas and parking will drain to stormwater ponds or the existing cooling canal system.

Based on the limited discharge quantity and treated nature of runoff to surface water bodies associated with construction activities, adverse impacts to surface waters are anticipated to be negligible.

Dewatering will be limited to initial site preparation and construction of deep foundations and structures. The water quality of the dewatering effluent will essentially be identical to the groundwater and will be routed to the existing cooling canal system or retained onsite and allowed to percolate and/or evaporate..

Impacts from the use of chemicals for cleanup of spillage of chemicals or oil and grease will be mitigated thorough proper handling and disposal practices. Construction contractors will be required to implement environmental control practices (e.g., designating specific areas for fueling and maintenance) to minimize any spills. These areas will be located so that any spills, if they do occur, will not be adjacent to any surface waters. If any spills occur, immediate cleanup will be performed with ultimate disposal in an approved facility. When appropriate, such materials will be handled as described in FPL's existing Spill Prevention Control and Countermeasure (SPCC) plan and the Turkey Point Plant hazardous waste management plan. In addition, construction-specific procedures will be developed and implemented by individual contractors.

4.2.1.2 Aquatic Systems

The Project design will require filling of approximately 37 acres of mangrove marsh for locating the combustion turbines, cooling tower, access road, and associated facilities. The mangrove habitat on the Project Area is considered jurisdictional wetlands by the USACE, FDEP, and DERM; therefore, any dredge and fill activities within the mangrove marsh will require compensatory mitigation to offset the loss of wetland functions, as described in Section 4.4.1.2. The Project will comply with the requirements of the USACE and FDEP, as well as Miami-Dade County Code Section 24-58.

Subsection 4.4.1.2 also describes the mitigation proposed for the Project. In addition, Appendix 10.1.4 presents the detailed description of the mitigation proposed for the Project.

As described in Section 4.2.1.1, the potential for impacts to aquatic systems outside of the Project Area will be minimized through the use of appropriate construction techniques to control erosion, sedimentation, and surface runoff.

4.2.2 MEASURING AND MONITORING PROGRAMS

Release of treated stormwater associated with construction activities will be monitored as required under the applicable regulations.

4.3 GROUNDWATER IMPACTS

4.3.1 PHYSICAL AND CHEMICAL IMPACTS

Activities associated with site preparation and construction are not expected to produce any significant changes to groundwater quality, quantity, or levels in the vicinity of the Project Area. Dewatering, if required during construction, will be confined to a localized area surrounding the dewatering site. Consequently, the zone of influence for the dewatering activities will be confined to the Turkey Point Plant Site. In addition, the surficial aquifer in the area is tidally influenced and unsuitable for potable uses. As a result, no impacts to groundwater resources or offsite wells will occur from dewatering activities.

Construction workforce will require an average of approximately 5,000 gpd of potable water, which will come from either the existing potable supply system or bottled water.

As discussed in Section 4.2.1.1, construction contractors will be required to implement practices to minimize spills. Maintenance and refueling will be performed only in designated areas. Any spills will be immediately cleaned up and wastes disposed of properly.

Hydrostatic testing water will be obtained from the plant service water system and contain no chemical additives. This water will be contained onsite or released to the cooling canal system. There will be no significant impacts to groundwater as this water contains no chemicals and is of a better quality (e.g., TDS) than the underlying groundwater that is affected by tidal movement.

4.3.2 MEASURING AND MONITORING PROGRAM

During construction dewatering any applicable measuring and monitoring programs will be conducted.

4.4 ECOLOGICAL IMPACTS

4.4.1 IMPACT ASSESSMENT

4.4.1.1 Terrestrial Systems

The Project Area comprises approximately 90 acres of which about 69 acres will be used during construction. The terrestrial systems comprise about 30 acres that have been previously cleared, filled, and developed in connection with the existing Turkey Point Plant. These areas currently are paved or filled with limerock and used as parking areas, storage, laydown, and access roads. The construction activities in these areas will not cause adverse ecological impacts.

These 30 acres of altered terrestrial systems (see Section 2.3.6, Pre-Existing Stress, Terrestrial Systems) do not contain unique wildlife species and are not considered important wildlife habitats because of their disturbed nature. No adverse impacts to wildlife resources in the areas will occur as a result of construction in these areas.

No adverse impacts to federally or state listed terrestrial plants and animals are expected, due to the existing developed nature of the terrestrial habitat within the Project Area. The paved and/or limerock-covered parking and storage areas do not provide suitable habitat for listed plants or animals.

Fugitive dust generated by construction activities will be minimized through best management practices (see Section 4.5.2). Any localized fugitive dust will not adversely affect the terrestrial systems surrounding the Project Area.

Noise (including human disturbance from construction activities) will not affect wildlife in the vicinity of the Project Area. Presently, the Project Area experiences noise associated with operation of the existing plant facilities, and wildlife that occurs in the vicinity of the Project Area, such as wading birds, is acclimated to such activities. No noise-sensitive wildlife is known to occur in the Project Area or in the vicinity of the Project Area since wildlife in the area have been acclimated to noise associated with the existing Turkey Point Plant.

4.4.1.2 Aquatic Systems/Wetlands

The proposed Project will involve the filling of approximately 37 acres of tidal mangrove marsh. It is anticipated that mobile species of fish and wildlife will disperse either into the extensive mangroves located immediately north of the Project Area or towards Biscayne Bay. The Project design reflects an effort to reduce and/or eliminate wetland impacts through avoidance and minimization where feasible. To this end, the Project has been designed with a minimal footprint, and facilities collocated with the existing Turkey Point facilities to reduce the acreage required for construction where possible. The area for the power block and construction areas (Project Areas A and D) have been located as close as possible to the existing facilities to allow integration. This includes road access, transmission access, and tie-ins to the existing facility. About 30 acres of the 90-acre Project, which have been previously impacted, will be used for the Project (portions of Project Areas A and E and Project Areas B, F, G, I, J and K). The stormwater pond (Project Area C) has been located to minimize impacts to more productive wetland areas. About 17 acres of the Project Area (Project Area H) will be left undisturbed.

FPL proposes that the loss of wetland habitat will be mitigated through a combination of onsite wetland enhancement and use of the FDEP- and USACE-approved EMB, located to the southwest of the Project Area and west-southwest of the cooling canal system. Rather than an acre-for-acre mitigation or the use of mitigation ratios, the calculation of mitigation requirements involves the use of a wetland functional assessment value multiplied by the acreage of impact to determine the required number of mitigation credits. Wetland functional assessments typically involve ranking the subject wetland relative to several variables, such as vegetation, wildlife utilization, hydrology, and surrounding landscape conditions. The goal of the functional assessment is to determine the ecological value of the wetland prior to disturbance, to ensure that mitigation is designed to replace the wetland's ecological functions rather than merely the acreage of fill. Using this rationale, a 2-acre wetland dominated by exotic vegetation with altered hydrology and little wildlife utilization would have a lower functional value and thus require fewer mitigation credits as compared to a 2-acre wetland supporting a diverse assemblage of native flora and fauna and unaltered hydrologic regime.

The functional assessment, acreage of impact, resulting mitigation credits required to offset the loss of wetlands within the Project Area, and a description of FPL's proposed wetland mitigation plan are described below.

The EMB functional assessment protocol, Wetland Assessment Technique for Environmental Review (W.A.T.E.R.), is similar to the Wetland Rapid Assessment Procedure (WRAP) utilized by the USACE for functional assessment, but is designed to be directly applicable to the conditions present in southeast Florida. The FDEP's Florida Uniform Mitigation Assessment Method (FUMAM), effective February 2004, is designed to be used throughout the state, and therefore is not considered as sensitive to the regional environmental conditions present in southeastern Florida when compared to W.A.T.E.R. Furthermore, in order to assess impact sites for the purpose of determining mitigation credits, the applicant must use the functional assessment methodology approved for the particular mitigation bank, as described in Chapter 62-345.100 (6), F.A.C.:

> *Pursuant to paragraph 373.414(18)(b), F.S., an entity that has received a mitigation bank permit issued by the Department of Environmental Protection or a water management district under Sections 373.4135 and 373.4136, F.S., prior to the adoption of this rule (Uniform Mitigation Assessment Method, Chapter 62-345, F.A.C.) must have impact sites assessed for the purpose of deducting bank credits using the credit assessment method, including any functional assessment methodology, that was in place when the bank was permitted. A permitted mitigation bank has the option to modify the mitigation bank permit to have its credits re-assessed under the method in this chapter, and thereafter have its credits deducted using the method adopted in this chapter.*

The W.A.T.E.R. functional evaluation matrix includes four main categories: fish and wildlife; vegetation; landscape/hydrology; and salinity. These main categories are further subdivided to represent most of the important ecological components and factors of the Everglades and coastal ecosystems of southeast Florida. In addition, a site suitability evaluation is incorporated, which is designed to provide a quantifiable means of determining mitigation credits that should be assigned for societal value parameters. The resulting Site Suitability Multiplier is to be multiplied by the number of functional mitigation credits to determine the total number of credits required.

A functional assessment of each wetland parcel in the Project Area was conducted utilizing the W.A.T.E.R. protocol. The existing, pre-development condition was evaluated with regard to each assessment category: fish and wildlife functions, vegetative functions, hydrologic functions, and salinity parameters. Scoring for the suite of variables contained within each assessment category is detailed in Appendix 10.1.4. The following sections summarize the resulting pre-development functional values, acreage of impact, and mitigation credits required for wetlands within each Project Area (see Figure 4.1-1).

Area A (Power Block and Collector Yard)

Project Area A will impact approximately 17.37 acres of dwarf red mangrove marsh, created lagoon, and tidal creek within area A will be impacted. The W.A.T.E.R. score (refer to Appendix 10.1.4) for this parcel of mangrove wetlands was estimated at 0.90. Based on the functional assessment value, acreage of impact, and Site Suitability Multiplier (1.07), development of this area should require 16.72 credits of mitigation.

Area D (Construction Laydown, Parking and Trailers)

The approximately 15.79-acre construction laydown area is located immediately to the west of the power block area and is bisected by the existing transmission line patrol road. Area D contains two wetland parcels, comprising 15.20 acres. Construction of the patrol road has hydrologically isolated the parcel west of the road, therefore separate functional assessment scores were calculated for the mangrove wetlands east and west of the patrol road. The area east of the patrol road is dwarf red mangrove marsh contiguous with Project Area A, with a resulting W.A.T.E.R. score of 0.89. The area west of the patrol road (7.76 acres) is isolated from Project Area A and does not experience adequate flushing due to the elevated patrol road. As a result of the decreased flushing, mangroves west of the patrol road are less dense, groundcover is sparser, and the area provides lower quality habitat for fish and wildlife. The resulting W.A.T.E.R. score for the area west of the patrol road is 0.71 (refer to Appendix 10.1.4).

Based upon the functional assessment, acreage of impact, and Site Suitability Multiplier (1.07), the construction laydown, parking, and trailers area should require a total of 12.99 credits of mitigation (7.09 credits for Area D-east, 5.90 credits for Area D-west).

Area C (Site Runoff Stormwater Ponds)

The 3.6-acre area proposed for site runoff and stormwater ponds is located to the southwest of Project Areas A and D and the primary plant access road. This parcel is hydrologically isolated, with the exception of a single culvert located on the eastern edge of the parcel that connects a small tidal creek originating from within Project Area A. The influence of the tidal creek is evident within the eastern portion of Project Area C, while the western half of Project Area C appears to be influenced by increased input of freshwater from the surrounding roads. The groundcover vegetation within Project Area C displays marked zones correlating to salinity, with freshwater species appearing on the western portion and saline species present within the eastern portion. To accurately quantify functional values for Project Area C, the eastern and western portions were scored individually. The resulting W.A.T.E.R. score for the eastern portion of Project Area C is 0.78, whereas the score for the western portion is 0.71 (refer to Appendix 10.1.4). The stormwater pond will occupy 1.63 acres of the eastern, saline portion of Area C and 1.97 acres within the western, brackish portion of Area C. Based upon the functional assessment, acreage of impact, and Site Suitability Multiplier (1.06), a total of 2.83 credits should be required as mitigation.

Area E (Roadway Expansion Area)

The expansion of the access road will impact 0.77 acres of mangrove wetlands located adjacent to the existing plant access road. The area of impact is the western edge of the mangrove parcel adjacent to the plant entrance road, located north of Area D and west of the transmission line patrol road. The W.A.T.E.R. score for this area is 0.80 (see Attachment 4A). Based upon the functional assessment, acreage of impact, and Site Suitability Multiplier (1.07), a total of 0.66 credits should be required for mitigation.

Secondary Impacts

In order to compensate for impacts to wetland areas adjacent to the expansion area, additional mitigation will be required for changes to wetland function surrounding the immediate wetland fill impacts. Calculation of secondary impact acreage may be assessed at a minimum of 25 ft surrounding all fill activities. Calculating the minimum 25 ft of surrounding secondary impact will require an additional 1.07 acres of impact adjacent to Area A, 0.19 acres adjacent to eastern Area D, 0.40 acre adjacent to western Area D, 0.45 acre adjacent to Area C-east, 0.52 acre adjacent to C-west, and 0.57 acre adjacent to Area E. For each of these wetland parcels, mitigation credits required to offset secondary impacts were calculated as 60 percent of the credits that would be required to offset direct impacts. Based upon the 25-ft secondary impact zone acreages, each wetland parcel's corresponding W.A.T.E.R. score, and the Site Suitability Multiplier, 1.65 credits of mitigation should be required. In addition to the 25-ft zone adjacent to all areas of wetland fill, additional secondary impacts were identified and quantified. As a result of the construction activity and the filling of wetlands within Area A, undisturbed areas of wetlands within Area H to the east of Area A and adjacent to the upland Red Barn area will suffer hydrologic secondary impacts. It can be expected that there will be a functional loss of 0.48 credits for this 7.5 acres of dwarf mangrove marsh as a result of construction activities. Therefore, the total amount of mitigation required for secondary impacts is 2.13.

As calculated there should be a total of 35.33 mitigation credits required to offset wetland impacts associated with the construction of the expansion project, 33.20 credits for direct unavoidable wetland impacts and 2.13 credits for secondary impacts.

Direct Impacts

Area	Direct Impact Acreage	W.A.T.E.R. Score: Pre-development	W.A.T.E.R. Score: Post-development	Site Suitability Multiplier	Direct Impact Mitigation Credits Required
A	17.37	0.90	0	1.07	16.72
C-east	1.63	0.78	0	1.06	1.35
C-west	1.97	0.71	0	1.06	1.48
D-east	7.44	0.89	0	1.07	7.09
D-west	7.76	0.71	0	1.07	5.90
E	0.77	0.80	0	1.07	0.66
TOTAL	36.94				33.20

Secondary Impacts

Area	Secondary Impact Acreage	W.A.T.E.R. Score: Pre-development	W.A.T.E.R. Score: Post-development	Site Suitability Multiplier	Secondary Impact Mitigation Credits Required*
A	1.07	0.90	0	1.07	0.62
C-east	0.45	0.78	0	1.06	0.22
C-west	0.52	0.71	0	1.06	0.23
D-east	0.19	0.89	0	1.07	0.11
D-west	0.40	0.71	0	1.07	0.18
E	0.57	0.80	0	1.07	0.29
H-east	7.5	0.89	0.83	1.07	0.48 (calculated using 0.06 loss of functional value/acre)
TOTAL	10.7				2.13

- Unless otherwise noted, credits for mitigation of secondary impacts calculated as 60 percent of functional loss of direct impact

4.4.1.3 Mitigation Plan

To offset the unavoidable loss of wetland functions, FPL proposes to utilize a combination of onsite mitigation in the form of hydrological improvements and habitat restoration in addition to offsite mitigation through the purchase of credits from the EMB. The goal of onsite wetland enhancement is to restore a more natural hydrologic regime through the addition of several culverts that will improve connectivity between each wetland parcel and Biscayne Bay. The installation of culverts will enhance tidal flushing and circulation functions that have been impacted as a result of the initial plant construction. In addition, an area of upland spoil pile ribs associated with the pilot program cooling canals west of Area C are proposed to be cleared of exotic species, graded to saturated soil elevation, and planted with native wetland species. A description of the onsite wetland enhancement conceptual design, post-enhancement functional values, and total mitigation credits gained through onsite enhancement and restoration is presented below.

To restore hydrologic connectivity with Biscayne Bay between Areas A, C, and D, a series of 11 vertebrae culverts may be installed through the access roadways currently impeding water circulation (Appendix 10.1.4). The patrol road associated with the transmission line corridor separates the eastern and western halves of Area D. The raised patrol road has no culverts within Area D, and only three culverts north of Area D, one culvert located at the tidal creek location, a second culvert located further north along the patrol road, and a third culvert associated with the recent improvements to the SW 344th Street canal along the northern edge of FPL's property boundary. The remainder of the roadway is an impediment to free tidal exchange and flow. Tidal water flows into Area D through the tidal creek culvert, but the single culvert is not able to facilitate the outflow of saline water during low tide. The net effect is that the chloride levels increase and lower the functional attributes of this wetland. This condition is further exacerbated during the dry winter season when summer rains are less likely to flush the salinity of this marsh back through the tidal creek. A similar condition exists within Area C, where the entire 28.24-acre parcel is receiving water through a single culvert on the eastern edge of the parcel.

- *Area D-mid and D-north Enhancement* – Hydrologic enhancement will be achieved through the installation of a series of eleven 24-inch vertebrae culverts through the transmission line patrol road north of the impact zone. An elliptic culvert will need to be installed to replace the existing inadequate round culvert within the tidal creek connection. Additional new culverts will be installed along the patrol road north of the tidal creek to increase the free exchange of tidal waters, which will provide an improvement to an area of approximately 86 acres (Area D-mid: 44.34 acres, Area D-north: 41.85 acres). The W.A.T.E.R. functional scores for these areas are 0.76 and 0.79, respectively, for Areas D-mid and D-north (Attachment 4A). It can reasonably be expected that after the installation of eleven 24-inch vertebrae culverts, the functional value of Area D will improve to 0.86 for both Area D-mid and D-north, respectively. Therefore, the functional lift associated with enhancing this wetland area should be 7.87 credits

- *Area H Enhancement* – As a result of the construction activity and the filling of wetlands within Area A, undisturbed areas of wetlands within Area H to the east of Area A and adjacent to the upland Red Barn area will suffer hydrologically as a result of secondary impacts. It can be expected that there will be a functional loss of 0.48 credits for this 7.5 acres of dwarf mangrove marsh as a direct result of construction activities. To improve the hydrologic connectivity with Biscayne Bay, this area may be enhanced through the installation of a culvert through the Red Barn area just south of the Red Barn structure. Installing a culvert from Biscayne Bay connecting to the mangrove marsh will alleviate this functional loss and elevate the function of this area overall. Successfully establishing the new point of flushing and contact with Biscayne Bay should regain 0.56 credits.
- *Area C Enhancement* – The mangrove wetland area proposed for the location of the project's stormwater ponds is currently connected to Area A and Biscayne Bay through a single tidal creek that flows through a small culvert underneath the primary plant access road to the northeast corner of the parcel. This connection will be preserved through extension of the existing culvert under the construction laydown Area D to maintain the tidal creek influence within Area C. A second culvert would be installed in the northwest corner of the parcel near the intersection of the plant's entrance road and the contractor's Unit 3&4 road. This culvert would provide a connection between Area C and the undisturbed wetlands within Area H, west of the transmission line patrol road and north of the construction laydown Area D. The location of the newly proposed culvert could further enhance the mitigation aspects of undisturbed areas located to the west of the transmission line patrol road if stormwater pretreatment and adequate water storage allow the discharge of stormwater through the wetland system. Cleansed freshwater inputs will enhance the mangrove wetlands and mimic historic conditions. A total of 3.08 credits of mitigation should be regained through the hydrologic improvements of Area C.

- *Restoration of Australian Pine Test Cooling Canals* – To the west of Area C are located a series of five upland spoil deposit ribs and canals constructed in the late 1960s-early 1970s as a pilot program testing the efficiency of cooling canals. The upland ribs are dominated by the exotic species Australian pine (*Casuarina equisetifolia*), which provide a seed source for the infestation of other natural areas. FPL proposes to remove the exotic Australian pine and spoil berm from the easternmost two ribs to an elevation 4 inches above the seasonal high water elevation. This elevation will remain saturated during the high waterfall months (the rainy season) and allow native wetland species to be planted, such as buttonwood (*Conocarpus erectus*) and white mangrove (*Laguncularia racemosa*). Following removal of exotics, topographical grading, and planting, the area will be monitored for a period of 5 years to ensure survival of native wetland species and the successful removal of exotic species. The acreage of the two upland spoil pile ribs totals 6.5 acres, with a current W.A.T.E.R. functional assessment score of 0. It can be reasonably expected that the area's function may attain a functional score of 0.84 after 5 years of maintenance and growth. Therefore this restoration activity may contribute an additional 5.73 credits of mitigation to offset impacts associated with the expansion project.
- *Optional Mitigation* – Another mitigation option under consideration involves continuing the vertebrae culvert installation along the transmission line patrol road further north to the Malrey Canal, where the transmission line turns west and intersects with the L 31E levee. This property is owned by the Biscayne National Park. This option would require coordination and cooperation with the Park Service. Under this option, 24-inch culverts would be placed at a spacing of approximately 200 ft to provide connection between the dwarf red mangrove wetlands located east of the levee of the L 31E canal and the open waters of Biscayne Bay. This hydrological enhancement would allow for potential additional benefit with regards to the overall Comprehensive Everglades Restoration Plan (C.E.R.P.), including re-establishment of historical freshwater sheetflow to estuarine areas. This mitigation option would be a positive step toward goals of C.E.R.P. and could generate an additional 9.06 credits of enhancement mitigation.

The cumulative lift generated from the hydrologic improvements to undisturbed wetlands onsite and the restoration of the Australian Pines in the test canals is 17.24 credits. This amount of onsite mitigation equals 48.8 percent of the total mitigation requirements remaining on site and within the same drainage basin. The remaining mitigation credits (18.09) will be acquired from the FPL EMB, Phases 1 and 2, which is also within the same drainage basin as the Project Area.

Onsite Mitigation Summary

Area	Undisturbed Acreage	Pre-mitigation W.A.T.E.R. Score	Post-mitigation W.A.T.E.R. Score	Site Suitability Multiplier	Lift per Acre	Credits Generated through Onsite Mitigation
C-east	9.84	0.78	0.85	1.06	0.07	0.73
C-west	14.8	0.71	0.86	1.06	0.15	2.35
D-mid	44.34	0.76	0.86	1.07	0.10	4.74
D-north	41.85	0.79	0.86	1.07	0.07	3.13
H-east	7.5	0.83	0.90	1.07	0.07	0.56
Australian Pine Ribs	6.5	0	0.84	1.05	0.84	5.73
TOTAL						17.24

Erosion, sedimentation, and runoff control measures will mitigate the potential for water quality degradation; therefore, associated impacts to adjacent aquatic biological communities are not expected to be significant. During the construction of the Project, no discharges will occur to the adjacent tidal mangrove areas and, subsequently, to Biscayne Bay.

4.4.1.4 Endangered and Threatened Species

The Project site is located immediately north of the USFWS-designated critical habitat area for the American crocodile. According to the USFWS (Federal Register, Vol. 42, No. 184, September 1977), the following area (exclusive of those existing man-made structures or settlements which are not necessary to the normal needs or survival of the species) is critical habitat for the American crocodile:

> "All land and water within the following boundary in Florida beginning at the easternmost tip of Turkey Point, Dade County, on the coast of Biscayne Bay; then

southeastward along a straight line to Christmas Point at the southernmost tip of Elliott Key; then southwest along a line following the shores of the Atlantic Ocean side of Old Rhodes Key, Palo Alto Key, Anglefish Key, Key Largo, Plantation Key, Windley Key, Upper Matecumbe Key, Lower Matecumbe Key, and Long Key, to the westernmost tip of Long Key; then northwestward along a straight line to the westernmost tip of Middle Cape; then northward along the shore of the Gulf of Mexico to the north side of the mouth of Little Sable Creek; then eastward along a straight line to the northernmost point of Nine-Mile Pond; then northeastward along a straight line to the point of beginning".

Although not contained within the USFWS-designated critical habitat for the American crocodile, small portions of Project Area A could potentially be utilized by the American crocodile. FPL's successful crocodile management program conducted within the Turkey Point Plant Site has increased the population of resident crocodiles and continues to provide habitat utilized by the crocodile. The loss of any potential habitat associated with the expansion Project will not jeopardize the continuing existence of the American crocodile nor will it impact designated critical habitats.

4.4.2 MEASURING AND MONITORING PROGRAMS

4.4.2.1 Terrestrial Systems

No monitoring programs will be undertaken because no important terrestrial systems will be affected by construction activities proposed for the Project.

4.4.2.2 Aquatic Systems/Wetlands

Wetland impacts will be mitigated through a combination of on-site wetland creation and purchase of mitigation credits from the nearby EMB. In order for the created wetland to be considered successful, semi-annual monitoring will be performed to document the vegetative and hydrologic conditions within the created wetland and ensure that success criteria are being fulfilled. Typically, these success criteria include no more than 10-percent coverage of exotic species, greater than 80 percent coverage of desirable wetland species, and low mortality of planted wetland trees. Monitoring will be performed for a period of 3 to 5 years, or until success criteria have been fulfilled for a period of 1 year without requiring any replanting or exotic species removal.

In the case of the EMB, the bank assumes the ultimate responsibility for the successful management of wetland functional values, as required by the USACE and FDEP. The acquisition of each mitigation credit is used to fund required vegetative monitoring, exotic species removal, planting of desirable species, hydrologic improvements, and/or other activities to ensure that the mitigation bank is maintained as a functioning wetland ecosystem.

4.5 AIR IMPACTS

4.5.1 AIR EMISSIONS

Construction activities will result in the generation of fugitive PM emissions and vehicle exhaust emissions. Fugitive PM emissions will result primarily from land clearing and grubbing, ground excavation, grading, cut and fill operations, and vehicular travel over paved and unpaved roads. Vehicular traffic will include heavy-equipment traffic and traffic due to construction workers entering and leaving the Turkey Point Plant Site. Construction personnel and equipment will enter the site primarily over surfaced roadways. Exposed land areas may also generate fugitive dust due to wind erosion. There will be no open burning associated with land clearing activities.

Emissions of fugitive PM from these activities are extremely difficult to quantify because of their variable nature. They can only be estimated since emissions are dependent upon a number of factors, including specific activities conducted, level of activity, meteorological conditions, and control measures utilized.

Both EPA and FDEP have promulgated AAQS for PM_{10}.

During the construction period, the PM_{10} emissions are estimated to average about 8.3 TPY, 63.8 lb/day (5 days/week), or 6.4 lb/hr (10 hr/day).

An emission rate of 8.3 TPY of PM_{10} is less than the PSD significant emission rate of 15 TPY. As a result, the estimated fugitive emissions are not expected to significantly affect air quality outside the Turkey Point Plant Site boundary.

Emissions will also result from onsite construction equipment including cranes, trucks, compressors, etc., operating with diesel and gasoline engines. This equipment will produce emissions of CO, NO_x, VOC, PM, and SO_2. Exhaust emissions were based on EPA emission factors (AP-42) for diesel engines. Based on the EPA emission factors and the estimated maximum number of vehicles, the CO, NO_x, VOC, PM, and SO_2 emissions are estimated to be 4.3, 19.8, 1.6, 1.4, and 1.3 TPY, respectively, over the 2-year construction period. These levels of emissions will not cause significant impacts to air quality in the vicinity of the Turkey Point Plant Site.

4.5.2 CONTROL MEASURES

A number of control measures will be implemented during the construction period in order to minimize air emissions and potential impacts. Clearing within the Project Area will be kept to a minimum, thereby reducing air emissions due to wind erosion of exposed surfaces. After grading, the untravelled or lightly traveled areas will be either paved or vegetated to minimize fugitive PM and wind erosion. Heavily traveled unpaved construction laydown areas and unpaved roads will be stabilized with shell or rock. Watering on an as-needed basis will control fugitive dust from highly traveled areas. The plant entrance road is currently paved, which minimizes dust emissions from vehicles entering the Turkey Point Plant Site.

4.6 IMPACT ON HUMAN POPULATIONS

Construction projects can affect human populations by altering demographic patterns; by placing demands on infrastructure elements such as housing, transportation, and educational facilities; by contributing noise to the environment; and by creating inconveniences due to the movement of workers, materials, and machinery. Due to the likely patterns of local employment and daily commuting, the Turkey Point Expansion Project's demographic impact is expected to be small. Section 7.0 of this Application includes a detailed analysis of the income, employment, tax revenue, and service needs associated with the construction workforce. This section is, therefore, limited to a discussion of workforce requirements and the relatively minor impacts of Project-related traffic, housing, education, and noise.

4.6.1 CONSTRUCTION WORKFORCE

The construction workforce for the Project is expected to average approximately 290 workers. Construction is anticipated to commence in the spring of 2005 and conclude in the fall of 2007. Peak construction is estimated at approximately 650 workers in mid-2006 and will result in workforce skills as follows:

	Percent		Percent
Laborers	12	Pipefitters	19
Carpenters	6	Insulators	2
Operators	5	Electricians	22
Ironworkers	4	Painters	1
Millwrights	10	Supervision	13
Boilermakers	6		

The majority of construction workers are expected to commute to the site from within a commuting distance of up to 100 miles, primarily from locations within Broward and Miami-Dade Counties. Contractors will be responsible for hiring the construction workforce. A more detailed discussion of the workforce, payrolls, and economic impacts of the workforce is found in Section 7.0.

4.6.2 TRANSPORTATION

Traffic during construction will affect area roadways on a temporary basis for the duration of the construction period. Peak use of U.S. 1, SW 137th Avenue, and SW 344th Street will occur in directions opposite typical peak flow as Project traffic will flow south and east in the a.m. peak hour, while peak commuting volumes travel west and north. The opposite will occur in the p.m. peak hour, when construction traffic will flow in a predominant west and north flow, while most commuters will be travelling south and east.

A traffic impact analysis was conducted to determine impacts during the construction period timeframe when the peak construction workforce will be present onsite (2006). The 2002 annual average daily traffic (AADT) counts and 1991 County 24-hour traffic counts represent background conditions and were compounded annually by 3 percent to obtain background traffic during the year in which peak construction will occur.

Construction will take place primarily over a 2-year period and will require the use of several area roadways. During construction, there will be a maximum of approximately 650 construction workers onsite. The workers will be concentrated onsite between the hours of 7:00 a.m. and 4:00 p.m. Delivery trucks will also be expected to arrive at the site daily during this timeframe to bring in materials and equipment. Most of the deliveries, however, are expected to arrive after the work shift begins or later during the day and will not have a significant impact in the a.m. or p.m. peak hours. Worst-case traffic impacts have been calculated for the evening peak hour when the peak construction workforce is present in 2006.

The p.m. peak-hour traffic departing from the site is expected to include a worst-case condition of 100 percent of the peak construction workers and one eighth of the delivery trips (delivery arrivals are expected throughout the day). Assuming this temporal/distribution and a trip generation rate of 0.51 per construction employee, the total trip generation from the Project construction during p.m. peak hour results in 421 exiting vehicles; 331 from the construction employees and 90 for delivery and miscellaneous activities. Only miscellaneous inbound trips to the site would be expected in the p.m. peak hour and these have been estimated to be 10 trips.

Roadways that will be impacted the most by Project traffic include U.S. 1, SW 137th Avenue, and SW 344th Street. Estimated traffic assignment from the Turkey Point Project Site to these roadways was based upon the location of logical trip ends for the traffic generated by the Project. It is expected that 100 percent of the Project trips will depart the Turkey Point Project Site and travel to the west on SW 344th Street, with 50 percent then turning north on SW 137th Avenue. The remaining 50 percent would continue to travel west on west on SW 344th Street and then north on U.S. 1 to access local communities and accommodations or the Florida Turnpike.

Information was obtained from the Florida Department of Transportation (FDOT) and Miami-Dade County Traffic Engineering Department regarding the existing road lanes, the Level of Service (LOS) standard that applies to the road segment, and existing peak hour traffic volumes on these roads. The baseline conditions, described in Section 2.2.5, and the projected peak hour background traffic plus construction traffic was used to generate the maximum peak hour traffic volumes and are summarized in Table 4.6-1. The LOS for the total traffic volume has been determined using the HCM (2000) -Model software. As indicated in Table 4.6-1, all road segments that will be impacted by construction traffic will continue to operate at an acceptable LOS.

Several intersections in the Project vicinity that will be affected by construction traffic were also evaluated to determine if the anticipated construction traffic would have an adverse impact on intersection LOS. The intersections of U.S. 1 and SW 344th Street and SW344th Street and SW 137th Avenue are also anticipated to operate at an acceptable LOS.

4.6.3 HOUSING

An average of 290 employees will be required during the project construction, and employment will peak at 650 employees. Many of these employees will be employed for only a portion of the construction period due to the changing skill requirements of the construction project. There is a significant labor pool of construction workers in Miami-Dade County, estimated at 36,000 in 2001. As a result, it is expected that few construction workers will be relocating to the area for the construction term. Most workers that do relocate will use the abundant lodging accommodations (approximately 230,000 motel and hotel units) in Miami-Dade County.

4.6.4 EDUCATION

Because of the short duration of employment, few workers will relocate with their families. As a result, there will be little immigration of school-aged children resulting from Project construction. No significant adverse effects on local elementary school, middle school, or high school enrollment are anticipated.

4.6.5 CONSTRUCTION NOISE IMPACTS

The impacts of noise on human populations are dependent upon the proximity of institutional and residential land uses to construction activities and the type and extent of noise sources. The nearest locations that could potentially be impacted by noise (i.e., critical receptor) from the proposed facility construction area are located approximately 7,000 ft northwest and 9,000 ft north of the power block. These locations are a daycare located on SW 344th Street and the Homestead Bayfront County Park/Biscayne National Park Visitors Center, respectively.

Construction of the Project will require installation of foundations and erection of major components of the combined cycle unit such as the CTs, HRSG, steam turbines, and cooling system. The use of construction equipment, such as dump trucks, pile drivers, cranes, bulldozers, graders, front-end loaders, and air compressors will be required. These sources have maximum noise levels ranging from about 70 to 90 dBA (measured at a distance of 50 ft).

The evaluation of noise impacts from construction activities was performed using previous results from noise propagation computer programs to estimate noise levels (CADNA A). Noise source levels are entered as octave band sound power levels. The user can specify coordinates, either rectangular or polar. To determine noise impacts from the Project's construction activities, the receptor grid used for the modeling was 10 x 10 meters out to a distance of 4 kilometers. All noise sources are assumed to be point sources; line sources can be simulated by several point sources. Sound propagation is calculated by accounting for hemispherical spreading and three other user-identified attenuation options: atmospheric attenuation, path-specific attenuation, and barrier attenuation. Atmospheric attenuation is calculated using the data specified by the American National Standard Institute Method for the Calculation of the Absorption of Sound by the Atmosphere (ANSI, 1999). Path specific attenuation can be specified to account for the effects of vegetation, foliage, and wind shadow. Direction source characteristics and reflection can be simulated using path-specific attenuation. Giving the coordinates and height of the barrier can specify attenuation due to barriers. Barrier attenuation is calculated by assuming an infinitely long barrier perpendicular to the source-receptor path. Total and A-weighted SPLs (filtered to approximate human hearing) are calculated. Background noise levels can be incorporated into the program and are used to calculate overall SPLs.

The model was performed to predict the maximum noise levels produced by a combination of likely noise sources with and without background noise levels. A conservative estimate of the number and types of construction equipment was assumed to calculate construction noise levels.

Table 4.6-2 lists the major types of equipment expected to be used during the construction of the Project and their associated noise characteristics. For the purpose of the construction noise impact analyses, all of the equipment was conservatively assumed to be operating simultaneously at peak power. These heavy construction activities are expected to occur during the daytime hours. Most of the heavy construction activities will occur during the first 6 to 8 months of construction. Mechanical and electrical installation activities may occur at night; however, these activities have minimal noise levels and are much less than the existing plant.

The noise levels resulting from these combinations of equipment were input as multiple sources to the model. Octave bands were estimated from *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliance* (EPA, 1971). It is unlikely that all the equipment would be operating simultaneously and continuously, and, therefore, this impact assessment is conservative. Background SPL values were incorporated into the model to calculate impacts at the locations identified in Section 2.3.8. Only the atmospheric attenuation option was enabled during the noise modeling runs.

The construction noise impacts at two off-plant property-monitoring locations and at the Biscayne National Park Boundary are presented in Table 4.6-3. The L_{90} and L_{eq} are from background noise monitoring and the background with construction impacts are presented in the table. As shown in

Table 4.6-3, the estimated L_{eg} noise levels during the construction of the Project are estimated to be less than 58 dBA. The predicted noise levels are not expected to adversely impact the sensitive receptors identified in the vicinity of the Project Area. The noise estimates are conservative and include only atmospheric attenuation. The actual or measured noise levels due to construction are expected to be lower than predicted.

During the initial startup of the Project, steam blows are conducted to clean piping. Steam blows result in elevated noise levels for short durations. Notification will be made to those locations that may be able to notice elevated noise levels.

4.7 IMPACTS ON LANDMARKS AND SENSITIVE AREAS

Construction-related impacts to landmarks and sensitive areas will be minor and will not result in any changes to accessibility or use. The closest landmarks and sensitive areas within a 5-mile radius of the Project (refer to Section 2.2.5) include the Biscayne National Park, Biscayne Bay Aquatic Preserve, Homestead Bayfront Park, and Hoover Marina and Mangrove Preserve. These areas will not experience any significant changes in air quality, noise level, water quality, or visual characteristics perceptible to their users.

Occasional construction noise may be heard near the Project Area during the construction term. The noise is anticipated to be infrequent and of short duration. Visual impacts will be minor since most of the construction activity and new structures will be near the existing facilities and the closest public viewpoint is either offshore or more than a mile away at Homestead Bayfront Park and Hoover Marina. Views of the construction activity from the nearby public recreational areas will contain the existing generation and transmission infrastructure and associated facilities in the view in the background or immediately adjacent to the Project Area.

No use-related impacts are anticipated at public recreational facilities since these areas are a considerable distance from the Project Area.

4.8 IMPACT ON ARCHAEOLOGICAL AND HISTORIC SITES

Results of a search of the Florida Master Site File conducted for the Project in June 2003 lists no previously recorded archeological sites, no standing structures, and one field survey for the Project Area and vicinity. In the past, an archeological resource survey for the EMB, southwest of the existing Turkey Point Plant Project Area, found no historic or prehistoric cultural materials within the 13,500-acre mitigation bank site.

Construction impacts on historic properties listed, or eligible for listing in the *National Register of Historic Places*, or otherwise of historical or archaeological value is anticipated to be unlikely.

A letter to the Florida Department of State, Division of Historical Resources, requesting confirmation of potential Project impacts has been requested and will be provided.

4.9 SPECIAL FEATURES

There will be no unusual products, raw materials, solid waste disposal, incinerator effluents, or residues produced during construction of the Project that will have influence on the environment or ecological systems of the Project Area, Turkey Point Plant Site, or adjacent areas.

The Project will utilize existing transmission facilities connected to the Turkey Point Plant Site with minimal transmission upgrades to existing facilities. Offsite transmission upgrades will be within the existing transmission facilities. Existing facilities at the Turkey Point Plant Site, including Units 1 through 4, transmission systems, and fuel delivery and storage facilities, will be unaffected by construction activities.

4.10 BENEFITS OF CONSTRUCTION

The construction phase of the Project will contribute both short- and long-term economic benefits to the surrounding region. Construction benefits will include construction employment that will average several hundred over the 2-year construction period. Construction wages will increase the demand for goods and services in the region. Direct purchases of construction materials will have both direct and indirect economic benefits. This includes materials and services required as a direct result of construction activities. This includes construction materials (e.g., concrete and steel for foundations), rental equipment (e.g., construction cranes, pumps), food services, and transportation services.

4.11 VARIANCES

No variances from applicable standards due to the construction of the Project are being sought as part of this SCA.

Table 4.6-1. Level of Service for Roadway Links Associated with Peak Construction Traffic Associated with Turkey Point Expansion Project (2006)

Roadways	Link	2006 Baseline P.M. Peak-Hour Traffic[2]	2006 Baseline P.M. Peak-Hour LOS[1]	2006 Baseline P.M. Peak-Hour and Peak Construction Traffic[3]	2004 Baseline P.M. Peak-Hour and Peak Construction Traffic LOS[1]
SR 5	SR 5 to SW 137th Avenue	307	A/A	578	B/B
SW 344th Street	SW 344th Street to Plant Entrance	307	A/A	729	C/C
SW 137th Avenue	SW 137th Avenue. to Plant Entrance	1,242	C-SB/A-NB	1,453	C-SB/B-NB

1 Level of Service:

- LOS A Completely free-flow conditions. The operation of vehicles is virtually unaffected by the presence of other vehicles and operations are constrained only by the geometric feature of the highway and by driver preferences.
- LOS B Free flow, although the presence of other vehicles becomes noticeable. Average travel speeds are the same as LOS A, but drivers have slightly less freedom to maneuver. Minor disruptions are easily absorbed, although local deterioration will be more obvious.
- LOS C Influence of traffic density on operations becomes marked. The ability to maneuver within the traffic stream is clearly affected by other vehicles. Minor disruptions can cause serious local deterioration on service.
- LOS D Ability to maneuver is severely restricted due to traffic congestion. Travel speed is reduced by the increasing volume. Only minor disruptions can be absorbed.
- LOS E Operations at or near capacity, an unstable level. Disruptions cannot be dissipated readily.
- LOS F Forced or breakdown flow. Vehicles arrive at a rate greater than the rate at which they are discharged. The demand exceeds the computed capacity of the planned facility.

2 Background traffic based on 2002 FDOT traffic or 2001 Miami-Dade Traffic Engineering Department counts, compounded annually by 3%.

3 Background traffic plus peak construction traffic.

Note: NB = northbound SB = southbound EB = eastbound

WB = westbound PM = afternoon peak hour AM = morning peak hour

Source: LOS values based on Highway Capacity Manual (HCM), 2000.

Table 4.6-2. Summary of Construction Noise Sources Associated with Heavy Construction Activities

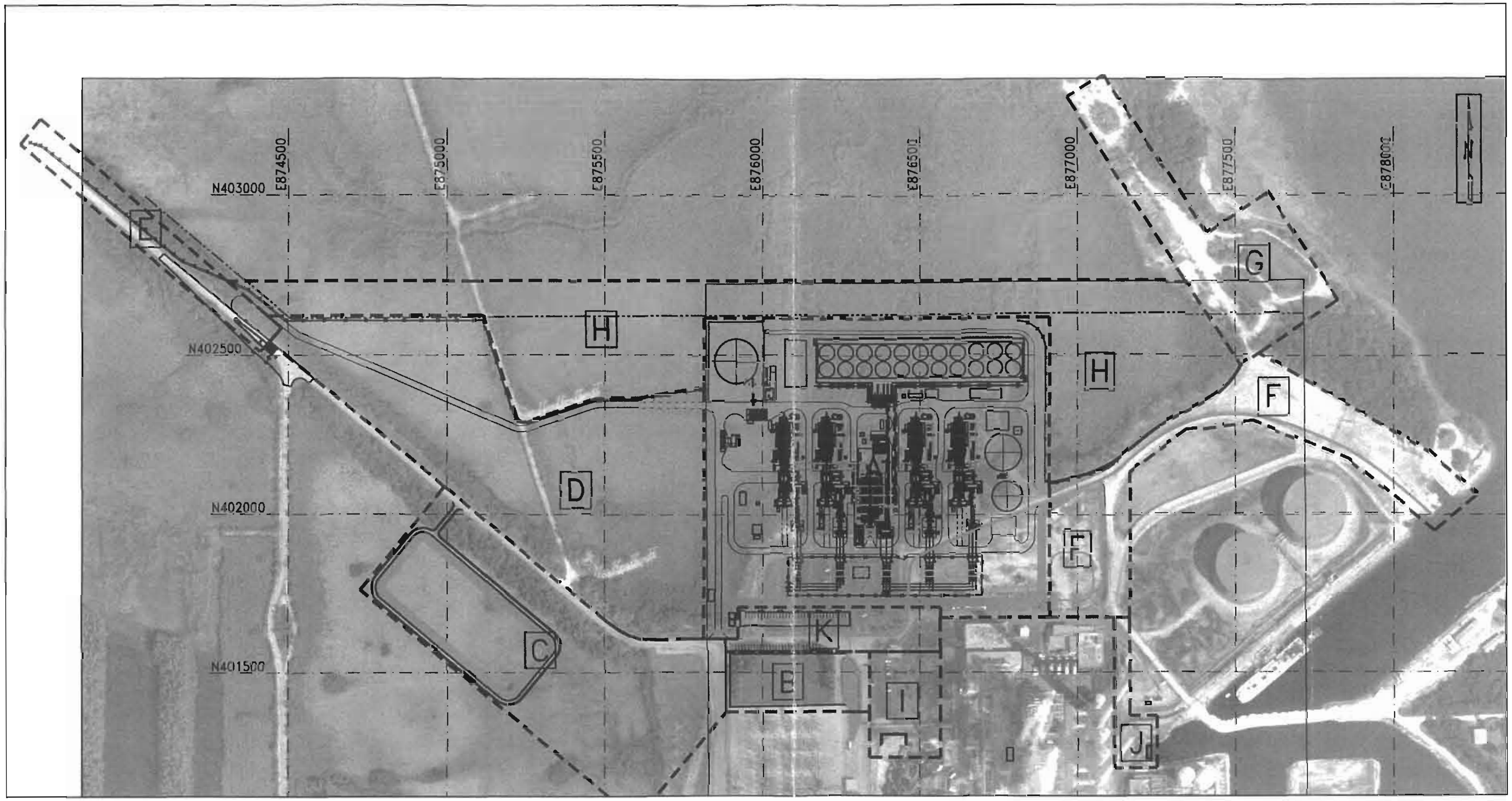
Source	Modeled Source Height[a] (m)	Sound Power Level (dB) for Octave Band Center Frequency (Hz)									Overall Sound Power Level	
		31.5	63	125	250	500	1K	2K	4K	8K	(dB)	(dBA)
Front End Loader 1	1.8	0.0	111.6	118.6	116.6	114.6	109.6	104.6	98.6	92.6	122.4	115.5
Truck 1	1.8	0.0	0.0	118.6	116.1	113.1	109.6	106.1	102.1	0.0	121.7	115.3
Truck 2	1.8	0.0	0.0	118.6	116.1	113.1	109.6	106.1	102.1	0.0	121.7	115.3
Front end Loader 2	1.8	0.0	111.6	118.6	116.6	114.6	109.6	104.6	98.6	92.6	122.4	115.5
Bulldozer 1	1.8	0.0	106.6	103.6	101.6	102.6	99.6	96.6	94.6	96.6	105.3	110.9
Bulldozer 2	1.8	0.0	106.6	103.6	101.6	102.6	99.6	96.6	94.6	96.6	105.3	110.9
Crane 1	1.8	0.0	111.6	118.6	116.6	114.6	109.6	104.6	98.6	92.6	122.4	115.5
Crane 2	1.8	0.0	111.6	118.6	116.6	114.6	109.6	104.6	98.6	92.6	122.4	115.5
Welder 1	1.8	0.0	102.6	110.6	105.6	98.6	98.6	93.6	88.6	84.6	103.6	112.7
Welder 2	1.8	0.0	102.6	110.6	105.6	98.6	98.6	93.6	88.6	84.6	103.6	112.7
Welder 3	1.8	0.0	102.6	110.6	105.6	98.6	98.6	93.6	88.6	84.6	103.6	112.7
Welder 4	1.8	0.0	102.6	110.6	105.6	98.6	98.6	93.6	88.6	84.6	103.6	112.7
Pile Drivers (2)	4	130.6	131.6	126.6	115.6	118.6	121.6	123.6	116.6	109.6	135.5	127.5

[a] Source height used for modeling analysis only and does not necessarily represent the physical height of the source.
Source: Golder, 2003.

Table 4.6-3. Baseline and Impacts of Construction Turkey Point Project

Baseline Site	Location	Time	Baseline Sound Levels (dBA)		Sound Levels with New Unit (dBA)		Increase (dBA)	
			L90	Leq	L90	Leq	L90	Leq
6	Daycare on SW 344th Street	Day	44.2	49.3	46.5	50.1	2.3	0.8
		Night	41.5	44.0	45.1	46.4	3.6	2.4
7	Homestead Bayfront County Park and Hoover Marina	Day	49.6	52.3	50.3	52.7	0.7	0.4
	Biscayne National Park Visitor Center	Night	39.5	40.7	43.9	44.4	4.4	3.7

Source: Golder, 2003.



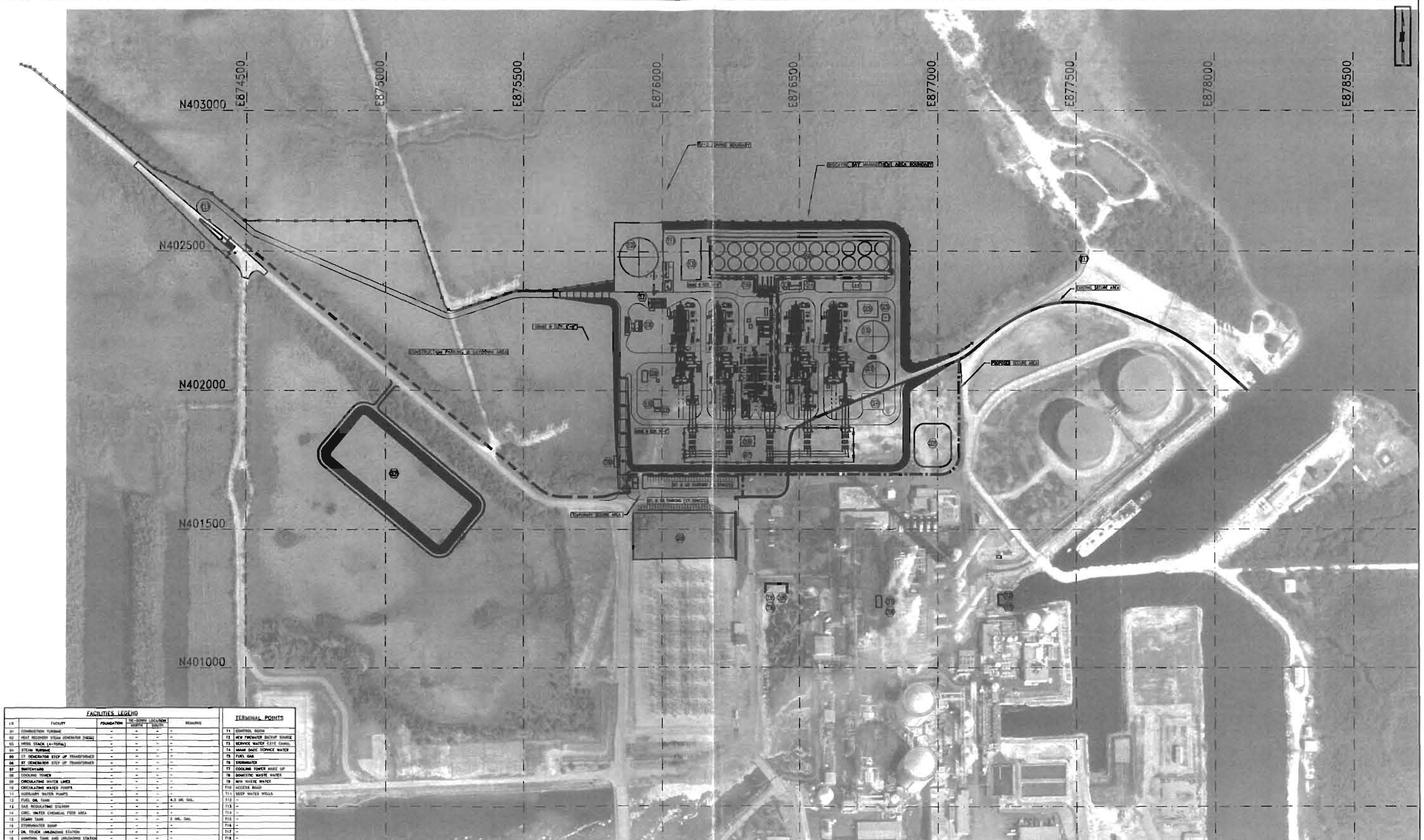
PROJECT AREAS

A- POWER BLOCK AND COLLECTOR YARD	23.53 AC.
B- SYS. SUBSTATION ADDITION	2 AC.
C- SITE RUNOFF STORMWATER POND	12 AC.
D- CONST. LAYDOWN, PARKING & TRAILERS	15.62 AC.
E- ROADWAY EXPANSION AREA	2.32 AC.
F- CONST. LAYDOWN, PARKING & TRAILERS	6.66 AC.
G- CONST. LAYDOWN, PARKING & TRAILERS	5.30 AC.
H- NON IMPACTED AREA	16.84 AC.
I- OUTFALL STRUCTURE, PARKING & STORMWATER POND	1.7 AC.
J- TIE-INS TO EXIST. PLANT	.9 AC.
K- PARKING LOT & ROADS	2.12 AC.
TOTAL PROJECT AREA	88.99 AC.

REV	DATE	REVISION DESCRIPTION	BY	CH	CDR	APR	ORG
0	11/05/03	Revised Figure Box/Update Filename Code	JEJ			TDJ	PSBU

FPL

SYSTEM N/A	DISCIPLINE CS	PLANT/UNIT	TURKEY POINT
SCALE N/A	SIO FILE NAME Figure 4.4-1.dwg	TITLE	FIGURE 4.1-1 EXPANSION PROJECT PROJECT AREAS
DWG SIZE D(24"X36")	FPL ARCHIVE NAME N/A		
DRAWING NUMBER	6337600/4/4.2/4.2.1/Figures/Figure 4.1-1.dwg	SHEET 1 OF 1	REV 0



FACILITIES LEGEND

I.D.	FACILITY	FOUNDATION	TIE-DOWN LOCATION NORTH	TIE-DOWN LOCATION SOUTH	REMARKS
01	COMBUSTION TURBINE	-	-	-	-
02	HEAT RECOVERY STEAM GENERATOR (HRSG)	-	-	-	-
03	HRSG STACK (4-TOTAL)	-	-	-	-
04	STEAM TURBINE	-	-	-	-
05	CT GENERATOR STEP UP TRANSFORMER	-	-	-	-
06	ST GENERATOR STEP UP TRANSFORMER	-	-	-	-
07	SWITCHYARD	-	-	-	-
08	COOLING TOWER	-	-	-	-
09	CIRCULATING WATER LINES	-	-	-	-
10	CIRCULATING WATER PUMPS	-	-	-	-
11	AUXILIARY WATER PUMPS	-	-	-	-
12	FUEL OIL TANK	-	-	-	4.3 MIL. GAL.
13	GAS REGULATING STATION	-	-	-	-
14	CIRC. WATER CHEMICAL FEED AREA	-	-	-	-
15	DEMIN TANK	-	-	-	2 MIL. GAL.
16	STORMWATER SUMP	-	-	-	-
17	OIL TRUCK UNLOADING STATION	-	-	-	-
18	AMMONIA TANK AND UNLOADING STATION	-	-	-	-
19	[illegible]				
20	SUBSTATION EXPANSION	-	-	-	-
21	RAW/FIREWATER WATER TANK	-	-	-	3 MIL. GAL.
22	RESTROOMS	-	-	-	-
23	WATER & FIRE PUMPS	-	-	-	-
24	DEMIN TRAILER AREA	-	-	-	-
25	WATER TREATMENT AREA	-	-	-	-
26	RELAY VAULT	-	-	-	-
27	STORMWATER POND	-	-	-	POTENTIAL
28	H2 BULK STORAGE	-	-	-	

TERMINAL POINTS

T1	CONTROL ROOM
T2	NEW FIREWATER BACKUP SOURCE
T3	SERVICE WATER [illegible] CANAL
T4	MIAMI DADE SERVICE WATER
T5	FUEL GAS
T6	STORMWATER
T7	COOLING TOWER MAKE UP
T8	DOMESTIC WASTE WATER
T9	NEW WASTE WATER
T10	ACCESS ROAD
T11	DEEP WATER WELLS
T12	-
T13	-
T14	-
T15	-
T16	-
T17	-
T18	-
T19	-
T20	-

ASPHALT PAVING — AGGREGATE SURFACING — CONCRETE SURFACING

EXISTING FENCING — NEW FENCING

REV	DATE	REVISION DESCRIPTION	BY	CH	COR	APR	ORG
0	11/05/03	REVISED FIGURE BOX & FILE NAME CODE	JEJ			TDJ	PGBU

FPL

SYSTEM: N/A — DISCIPLINE: CS — PLANT/UNIT: TURKEY POINT

SCALE: 1"=150' — CAD FILE NAME: Figure 4.1-2.dwg

DRAWING SIZE: D(24"X36") — FPL ARCHIVE NAME: N/A

TITLE: FIGURE 4.1-2 EXPANSION PROJECT DEVELOPMENT PLAN

DRAWING NUMBER: 0337600/4/4.2/4.2.1/Figures/Figure 4.1-2.dwg — SHEET 1 OF 1 — REV 0

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5.0 EFFECTS OF PLANT OPERATION - INTRODUCTION

As discussed in this chapter, operation of the Turkey Point Expansion Project, along with the existing power generating facilities at the Turkey Point Plant, will comply with applicable regulatory standards. Utilization of the existing FPL Turkey Point Plant site for this Project will result in lower overall environmental impacts than if the project were undertaken on a greenfield site.

5.1 EFFECTS OF THE OPERATION OF THE HEAT DISSIPATION SYSTEM

Heat is a necessary byproduct of the fossil-fuel fired generation of electricity. While a significant portion of the thermal energy produced from the fuel is converted to electrical energy by the turbine generators, a portion is absorbed by cooling water flowing through the condenser tubes. The heat from the existing Units 1 through 4 is dissipated in the existing closed cycle recirculating cooling canal system, primarily to the atmosphere. That system also has a permitted discharge to the Class G-III groundwater within the FPL property. From that groundwater there is some exchange with Biscayne Bay; however, the existing system is already permitted. The cooling canal system does not have a direct discharge to surface waters, and does not have a Cooling Water Intake System (CWIS) as defined in EPA regulations. The operating temperatures and exchanges with groundwater in that system have been discussed in Subsection 2.3.4 and Appendix 10.7.

Unit 5 will have a closed cycle recirculating heat dissipation system, utilizing a rectangular wet mechanical draft cooling tower. The cooling tower will receive makeup water from the Upper Floridan aquifer, and blowdown will be released to the existing cooling canal system. There will be neither be a withdrawal from, nor discharge to, surface waters of the state. The release of cooling tower blowdown to the cooling canal system will not have any significant effect on the thermal composition of the cooling canal system.

5.1.1 TEMPERATURE EFFECT ON RECEIVING BODY OF WATER

Operation of the Unit 5 heat dissipation system and release of cooling tower blowdown will have no adverse thermal effect on any receiving body of water. Figure 5.1-1 compares the estimated cooling water temperatures of the existing cooling canal system with the proposed Unit 5 cooling tower (see Appendix 10.7 for derivation). During the summer months the cooling tower operating temperatures are lower than those of the existing cooling canal system. Therefore, the cooling tower blowdown will have no adverse impact on the temperature of the cooling canal system or other waters it may affect.

5.1.2 EFFECTS ON AQUATIC LIFE

No adverse effects to aquatic life are expected from the operation of the Turkey Point Expansion Project. There will be no changes to water temperature resulting from the heat dissipation system for Unit 5.

5.1.3 BIOLOGICAL EFFECTS OF MODIFIED CIRCULATION

No detrimental effects on aquatic life in the waters of the state are expected to result from the Project. There will be no entrainment/impingement impacts to surface water associated with the Project.

5.1.4 EFFECTS OF OFFSTREAM COOLING

5.1.4.1 Cooling Canal System

The operation of the cooling canal system will not change as a result of the Turkey Point Expansion Project. As a result, the Project will not increase the temperature in the cooling canal system, which under certain meteorological conditions could have the potential to produce fog (i.e., cold winter mornings).

5.1.4.2 Cooling Tower

The potential impacts of the mechanical draft cooling tower were addressed by performing plume dispersion analyses that predicted impacts with respect to:

- Plume Length,
- Plume Height,
- Plume Shadowing,
- Plume Fogging,
- Plume Icing, and
- Salt [from total dissolved solids (TDS)] Deposition.

Assessments of maximum seasonal and annual cooling tower impacts of potential plume-induced visibility effects, fogging and icing, and deposition of drift were predicted with the cooling tower impact model (SACTI), which was developed through the Electric Power Research Institute (EPRI, 1984). Standard hourly meteorological data of surface weather observations and coincident twice-daily mixing height data are used in the analysis and processed with cooling tower data (e.g., tower size, height, latitude/longitude) by a preprocessor program. The output meteorological record is utilized by the SACTI model to predict the increase in annual frequencies of meteorological events due to a particular cooling tower's design and configuration. Icing and fogging frequencies at a particular location are based on the prediction of the cooling tower's visible plume length under various ambient meteorological conditions. The impacts of the visible plumes are evaluated in the model through use of physical plume dispersion in conjunction with an algorithm to take into account the thermodynamic interactions of the plume as well as any potential wake effects. The SACTI model can also determine the potential drift and deposition frequencies by wind direction and distance category from a cooling tower.

The general parameters used in the modeling are presented in Table 3.4-3. A distribution of the predicted drift droplet sizes for the cooling tower design is presented in Table 5.1-1. The drift emissions from the cooling tower were based on the maximum concentration of TDS in the circulating water. The concentrations were based on three cycles of concentration with representative inlet water quality from the Floridan aquifer. The maximum TDS was 9,900 ppm in the Floridan aquifer and the TDS in the cooling tower would be 30,000 ppm based on three cycles of concentration.

Hourly surface meteorological data from Miami International Airport and twice-daily mixing height data from the West Palm Beach International Airport for the years 1987 through 1991 were used. This 5-year record coincides with the meteorological data used for other air impact analyses. Long-term monthly clearness indices and daily solar insolation values were also used.

Annual and seasonal impacts were predicted. The seasonal results are for winter (December, January, and February), spring (March, April, and May), summer (June, July, and August), and fall (September, October, and November).

The SACTI model calculations utilized a polar coordinate receptor grid system centered on the tower. Receptors were placed surrounding the source at 22.5-degree intervals and at varying distance intervals. For the drift deposition and plume length computations, 100-m intervals out to 10,000 m were used; for plume fogging and icing computations, 100-m intervals out to 1,600 m were used; for plume height, 10-m intervals up to 1,000 m were used; and for plume shadowing, 200-m intervals out to 8,000 m were used.

To estimate potential impacts conservatively, it was assumed that the tower operated year-round without plume abatement. This would produce conservative estimates of plume length, fogging, icing, plume shadowing, and salt deposition.

Cooling Tower Visibility

The visible plume from a cooling tower is a result of the mixing of the saturated exhausts from the cooling tower with the ambient air, and the resultant mixture is beyond its ability to accommodate the entrained moisture as a gas. At this point, the moisture in the mixture condenses and forms a visible water vapor plume. The ability for air to accommodate water as a gas depends on the temperature. For example, at an ambient temperature of 90°F, the air is capable of accommodating almost six times more water vapor (as mass) than at 40°F. With wet cooling towers, plumes are typically more visible and at greater plume lengths during the winter months than during the summer.

The frequencies of visible plume length, height, and shadowing, and hours of fogging resulting from the mechanical draft cooling towers without plume abatement are summarized in Table 5.1-2 for each season and annually. The table presents results for various increasing distances from the towers. The results indicate that the predicted frequency of an elevated visible plume is about the same during the winter as in the summer.

A maximum plume length of 200 m or less is predicted to occur about 1.3 percent of the time during the winter and about 0.3 percent during the summer, with an annual frequency of about 2 percent. Plume lengths of 300 m and less are predicted to occur less than 2 percent of the time on an annual basis.

The frequency for the heights of visible plumes is shown in Table 5.1-2. About 11.4 percent of the time, plume heights during the winter are 30 m and less. Plume heights of 30 m and less occur about 19.3 percent of the time in the summer. Plume heights of 30 m and less were predicted to occur about 14 percent of the time on an annual basis. Plume heights of greater than 50 m (150 ft) were predicted to occur only about 1.9 percent of the time on an annual basis.

Plume shadowing was estimated to decrease significantly with increasing distance from the cooling tower. Beyond 600 m (1,970 ft) from the tower, the annual average number of hours of plume shadowing in any direction is estimated to be less than 32 hours per year. This distance is within the boundary of the Turkey Point Plant site. Plume shadowing is the best indicator of a highly visible plume since it the indicator of a distinct shadow. As shown in the Table 5.1-2, this effect occurs primarily close to the cooling tower.

The nearest road to the Project Site is Palm Drive (SW 344th Street), which runs in an east-west direction approximately 1 mile (1.6 km) to the northwest of the cooling tower center. Ground level fogging on Palm Drive is not predicted to occur during plume fogging conditions. The total hours per year of induced fogging surrounding the cooling tower is estimated to be about 35.5 hours (200 m from the cooling tower), all on plant property.

Rime icing is not predicted to occur from cooling tower drift.

Cooling Tower Deposition

The maximum and minimum average salt deposition predicted from the cooling tower is presented seasonally and annually in Table 5.1-2. The maximum average seasonal deposition from the cooling tower is 997 kg/km^2/month during the spring at a distance of 200 m (0.2 km) from the tower toward the north/northwest. At a distance of 500 m (0.5 km), the maximum average seasonal deposition is 155 kg/km^2/month during the winter toward the south/southeast. The maximum annual average deposition is 634 kg/km^2/month, 200 m (0.2 km) from the cooling tower in a north/northwest direction. At 500 m (0.5 km), the maximum annual average deposition is 110 kg/km^2/month.

According to data collected as part of the Florida Acid Deposition Study (FADS), which measured wet and dry deposition over many locations in Florida, background salt deposition in south Florida ranges from approximately 400 to 600 kg/km^2/month. Data from Crystal River and FADS for coastal areas suggest a background level of total deposition ranges from about 250 to 560 kg/km^2/month. Studies of coastal vegetation in other parts of the country have shown that natural deposition levels of 168,000 to 450,000 kg/km^2/yr (14,000 to 37,500 kg/km^2/month) may be experienced in the highly exposed beach-dune areas (Van der Valk, 1974; Fletcher, 1975; Profitt, 1977). In the less exposed areas supporting maritime forest and coastal hammock vegetation, levels of 15,000 to 40,000 kg/km^2/yr (1,250 to 3,330 kg/km^2/month) have been measured (Art, 1971; Van der Valk, 1974; Fletcher, 1975; Profitt, 1977). The BTI data (1954) indicate that the natural loads for these dune and forest communities may actually be as high as $1x10^6$ and $0.5x10^6$ kg/m^2/yr (83,000 to

42,000 kg/m^2/month), respectively. The BTI data also indicate that normal leaf chloride concentration in exposed leaves of the salt tolerant marsh-elder (*Iva imbricata*) may reach 75,000 micrograms per gram dry weight (µg/gdw), while threshold toxicity levels approach 200,000 µg/gdw. Normal values in live oak (*Quercus virginiana*) and yaupon holly (*Ilex vomitoria*) reach 16,000 and 50,000, with toxic levels at about 150,000 µg/gdw.

Potential impacts to vegetation may result through deposition of salt from cooling tower drift. Vegetation may be affected by absorbing salts that accumulate in the soil as well as foliar deposition. Accumulation in soil will occur if the annual deposition rate of salt exceeds the rate at which salt is leached from the soil by rainfall. It is difficult to predict which plant species would be most affected by soil salinity, as tolerance to salt spray does not necessarily parallel known plant tolerances to soil salinity, but is governed by the rate of foliar absorption (Grattan *et al.*, 1981). However, the Turkey Point Site is surrounded by salt tolerant dwarf red mangroves (*Rhizophora mangle*), which have developed physiological characteristics to allow the plants to survive in highly saline soils and areas of salt spray.

The two major deleterious effects of salinity on plants are reduced water uptake attributed to high salt content in soil, and a toxic effect of sodium and chloride ions, which can inhibit enzyme activity, interfere with protein synthesis, and alter respiration rates (McKee, 1996). Mangroves exhibit strategies for tolerance of salinity stress, including exclusion of salts by the plant roots, excretion of salts from salt glands in the leaves, dilution of salts by increased water content in leaf tissues, elimination of salt-saturated organs, compartmentalization of salts in the vacuole which removes toxic ions from metabolically active portions of the cell, and synthesis of organic solutes to balance inorganic ions in the vacuoles (McKee, 1996). Due to mangroves' ability to tolerate elevated salinity, they are often found near monocultures in areas that are uninhabitable by freshwater and/or terrestrial vegetation.

Taking together the existing salt-tolerant vegetative community surrounding the proposed cooling tower, the infrequency of the potential maximum deposition, and the close proximity to the cooling tower that will be affected by deposition, the impacts of salt drift to vegetation at the Turkey Point Site are not considered significant.

5.1.5 MEASUREMENT PROGRAM

FPL has maintained water level and water quality sampling programs in the Turkey Point Plant cooling canal system, in accordance with the Plant's industrial wastewater facility permits. The currently required monitoring will continue. The cooling canal system includes an interceptor ditch located on the western portion of the canal system. The interceptor ditch is used as a barrier during the dry season to limit the westward movement of cooling canal water. FPL monitors water levels in the cooling canals, interceptor ditch and four groundwater monitoring wells located west of the interceptor ditch. Groundwater monitoring frequency is quarterly. Monitoring of the interceptor ditch is once a week during the dry season and twice monthly during the wet season. When groundwater monitoring indicates that the natural seaward gradient does not exist, water in the interceptor ditch is pumped back into the cooling canal system, blocking westward movement of cooling canal water. During pumping, monitoring is conducted twice a week. About 200 million gallons are pumped annually from the interceptor ditch into the cooling canal system.

Since no significant impacts to surface water quality are expected from the Project, no additional monitoring is proposed. Because there are no significant adverse ecological impacts due to the proposed Project's heat dissipation system, no biological monitoring is proposed.

5.2 EFFECTS OF CHEMICAL AND BIOCIDE DISCHARGES

Unit 5 wastewaters will be recycled to the existing cooling canal system. The existing cooling canal system is a recognized wastewater treatment facility (see the FDEP Industrial Waste Facility Permit in Appendix 10.4.2). Unit 5 is therefore a zero discharge facility according to the National Pollutant Discharge Elimination System (NPDES) program. As such, the recycled wastewaters from Unit 5 are not subject to effluent limits. The recycling of Unit 5 wastewaters will not cause the discharge of cooling canal water to the groundwater to exceed Class G-III standards (Rule 62-520.430, F.A.C.). Miami-Dade County Water Quality Standards are codified in Chapter 24, Section 24-11(4) of the County Code. Because the groundwater in the vicinity of the cooling canals is non-potable and exceeds 500 ppm chlorides, the Miami-Dade criteria for tidal salt water have been used for comparison purposes.

5.2.1 INDUSTRIAL WASTEWATER DISCHARGES

The five industrial wastewaters generated by Unit 5 are:

1. Cooling tower blowdown,
2. HRSG blowdown,
3. Process water treatment system wastewater and inlet evaporative cooler blowdown,
4. Upper Floridan water pretreatment wastewater, and
5. Equipment area stormwater and plant drains.

These five wastewater streams will be combined and released to the existing cooling canal system. A simple mass balance calculation has been done to calculate the overall concentration in that combined wastewater. The mass balance was conservatively based on maximum measured concentrations in the water sources, and does not include insoluble precipitates that will settle out in the cooling canal system. These precipitates could not be released to the groundwater. The results of the calculation are presented in Table 5.2-1, along with the relevant Miami-Dade water quality criteria for tidal salt water. There are only two constituents for which the concentration in the combined wastewater stream recycled to cooling canals are higher than Miami-Dade water quality criteria -- ammonia and chromium. Because all other constituents in the combined Unit 5 wastewater are at concentrations lower than the water quality standards, they can not increase the concentration in the cooling canal system to levels that would cause the cooling canal system discharge to groundwater to exceed any water quality standards in that groundwater.

Because the amount of combined wastewater being recycled to the cooling canals is significantly smaller than the volume of the cooling canal system, it will take time for that release to cause any increase in concentration within the cooling canal system. Based on the most recent measured value of ammonia in the cooling canal system [0.16 milligrams per liter (mg/L)] and the average value of ammonia reported in Biscayne Bay (0.065 mg/L), the buildup of ammonia in the cooling canal system has been predicted over time and is presented in Figure 5.2-1. The net result is that, after 200 years, the increase in ammonia in the cooling canal system is predicted to be 0.000123 mg/L, or about 0.008 percent; an amount that is not measurable. Similarly, the increase in concentration of chromium in the cooling canal system due to Unit 5 would not be measurable.

Based on the above analysis, the release of Unit 5 wastewaters to the cooling canal system will not cause any constituent's concentration level in the cooling canal system's discharge to groundwater to exceed Miami-Dade Tidal Salt Water Criteria. Therefore, there will be no adverse effects from Unit 5 chemical wastewaters.

Unit 5 will utilize shock chlorination or other oxidizing or non-oxidizing biocide to control biofouling of the heat rejection system. The biocide used by Unit 5 will be present in the cooling tower blowdown, and thus in the combined Unit 5 wastewater recycled to the cooling canal system. By the same analysis as was done for chemical wastewaters above, concentrations of biocide in the cooling canal system resulting from Unit 5 will not be measurable. Therefore, there will be no adverse effects from Unit 5 chemical wastewaters.

5.2.2 COOLING TOWER BLOWDOWN

Because cooling tower blowdown is mixed with other industrial wastewater discharges prior to recycle to the existing cooling canal system, the effects of chemicals and biocides in the cooling tower blowdown are included in Subsection 5.2.1 above, and will cause no adverse impacts to the environment.

5.2.3 MEASUREMENT PROGRAMS

5.2.3.1 Surface Water

FPL's existing monitoring programs are adequate to ascertain compliance of surface water discharges with State of Florida surface water criteria. No additional monitoring is proposed.

5.2.3.2 Groundwater

As discussed in Subsection 5.1.5, a ditch running the western length of the cooling canal system intercepts potential groundwater discharges. FPL's existing monitoring programs are adequate to ascertain compliance of groundwater discharges with State of Florida surface water criteria. No additional monitoring is recommended.

5.3 IMPACTS ON WATER SUPPLIES

5.3.1 SURFACE WATER

No industrial discharges to surface waters will result from the operation of the Project.

Surface water runoff from the Project is routed to stormwater ponds and the cooling canal system, which are designed to comply with the performance requirements of the local, regional, state, and federal requirements (DERM, SFWMD, FDEP and EPA). Therefore, the applicable water quality standards will be met.

5.3.2 GROUNDWATER

The baseline characterization of the site found in Section 2.3 includes a complete description of both the local and regional geology and hydrology.

Locally, groundwater is present beneath the site in the surficial or Biscayne aquifer and in deeper aquifer zones that are part of the Floridan Aquifer System (FAS).

The Biscayne aquifer is unconfined and occurs from just a few feet below land surface to a depth of nearly 200 ft-bls at the site. In the vicinity of the Turkey Point Plant Site, saline water is found within this aquifer from depths of approximately 40 ft downward. FPL does not withdraw water for plant use from this aquifer. There are limited impacts to this aquifer from the plant such as seepage from the cooling pond, surface water infiltration resulting from rainfall runoff, and the plant interceptor ditch system. The latter is designed to restrict the inland movement of seepage from the plant's cooling water ponds within the Biscayne aquifer. The Project will have little or no effect on these impacts to the Biscayne aquifer as the sources and quantities of waters will not change significantly.

Beneath the Biscayne aquifer, a major confining unit is present. This confining unit, known as the intermediate aquifer or the intermediate confining unit, is approximately 800 ft thick vertically beneath the Turkey Point Plant Site. The intermediate confining unit isolates groundwater in the FAS from groundwater in the shallow Biscayne aquifer system. In the vicinity, the FAS is found at depths beginning about 1,000 ft-bls. The intermediate confining unit is composed almost entirely of silty sand and clayey sands with relatively low vertical permeability and specific yield. The presence of this semi-confining unit significantly reduces the potential that any activities occurring on or near the surface could have any impact to groundwater in the FAS. Alternatively, groundwater in the FAS is not in direct contact with groundwater in the Biscayne aquifer or surface water in the vicinity of the Turkey Point Plant Site. Potential for impact could only occur through a breach in the intermediate confining unit (e.g., from an improperly constructed or abandoned well). This is a relatively uncommon occurrence in this geographic region because few wells fully penetrate the intermediate confining unit in this area due to the depth, poor water quality, and the expense of constructing such wells.

The FAS is present beneath the site beginning at a depth of approximately 1,000 ft-bls. This aquifer contains brackish water with a TDS concentration that increases with depth from a concentration of nearly 2,000 ppm in the upper portion to much higher concentrations in the deeper zones. The potentiometric head in this aquifer near the Turkey Point Plant Site ranges from 35 to over 40 ft above land surface (i.e., more than 1,000 ft above the top of the aquifer). This potentiometric head is in part maintained by the confining units separating water in the FAS from water in the overlying Biscayne aquifer. Groundwater flow in the FAS is generally southeast. From recharge areas located in Central Florida, groundwater moves southeast toward the lower potentiometric levels located southeast of the Turkey Point Plant.

The quality of water found in the FAS in this geographic region does not meet potable water standards and the cost associated with treating water to meet potable or agricultural requirements were relatively high. This has resulted in only limited use of water from the FAS in this geographic area. Population increases in the region have resulted in demands for potable water that cannot be met entirely by water in the Biscayne aquifer. In addition, improvements in water treatment technology have rendered treatment of brackish water in the upper portion of the FAS more economically feasible. Currently, there are two golf courses which rely upon water from the FAS for irrigation.

To supply cooling water for the Project, four wells designed to withdraw water from the upper portion of the Floridan aquifer will be installed. Three wells will be used to supply water during operation with one well serving as backup. The three wells will be capable of withdrawing 12,426 gpm or 17.9 mgd from the upper portion of the FAS. The four wells will be located within the Project Area and their locations were identified in Figure 3.2-2. A groundwater flow model was constructed to evaluate the potential impact of the proposed wells to existing and proposed users of groundwater from the FAS located in the vicinity of the Turkey Point Plant Site. The USGS Modular Finite Difference Groundwater Flow Model (MODFLOW) was used for this evaluation. A complete description of this model including input parameter selection and model output is provided in Appendix 10.9.1. The results of this modeling study indicate that proposed withdrawals will contribute to the development of a cone of depression in the potentiometric surface of the FAS in this geographic region. An existing cone of depression is present, which was generated by withdrawals from the existing permitted groundwater users. Currently, the only permitted users located in this area are the Ocean Reef and Card Sound Golf Clubs, each of which is located approximately 9 miles southeast of the FPL facility. Current operation of these wells for golf course irrigation has resulted in a cone of depression that extends outward radially from these wells including toward the Turkey Point Plant Site. The cone of depression generated by the Project's wells will extend outward from the Project Area and, over time will merge with the existing cone of depression from the golf course wells. In addition, the Florida Keys Aqueduct Authority is currently permitting FAS wells and Miami-Dade Water and Sewer District is proposing future FAS wells.

The Florida Keys Aqueduct Authority has proposed a well that will be located approximately 10 miles west of the Project Area, and the Miami-Dade Water and Sewer District has proposed a well that will be located about 8 miles north of the proposed Project Area. Over time, the cone of depression generated by these combined FAS water users will result in a single merged cone of depression. The combined cone of depression will have a slight impact to the potentiometric surface of the FAS, which extends a number of miles outward from the location of the wells. The area of the 1-ft drawdown contour will extend more than a few miles beyond the location of the wells. In areas near the wells (within a few miles), the maximum drawdowns will range from several feet to tens of feet adjacent to the wells. It is unlikely that these drawdowns will result in a potentiometric surface within the FAS that is below land surface over an area that extends outward very far from the wells. Figure 5.3-1 depicts the extent of the 1-ft drawdown resulting from the proposed FPL wells operating in conjunction with other existing or proposed FAS wells after 90 days of pumping withdrawals under the conditions as predicted by the model.

The potentiometric surface of the FAS will remain well above the top of the aquifer because the top of this aquifer is found more than 1,000 ft-bls. The proposed groundwater withdrawals will not create a subsidence or sinkhole risk in the surrounding region because the FAS will not be partially dewatered by the proposed groundwater withdrawals. Also, impacts to other uses from the proposed Project wells are expected to be minimal because the cumulative drawdown is not significantly increased from that currently occurring in the FAS.

5.3.3 DRINKING WATER

The use of water from the Miami-Dade potable water supply system for process purposes (demineralized water and service water), is not expected to impact the availability of potable water in Miami-Dade County.

5.3.4 RUNOFF AND LEACHATE

Operation of the Turkey Point Expansion Project will not generate leachate. The Project has been designed to minimize direct discharge to surface waters. All contact waters are routed through an oil/water separator and then routed to the cooling canal system. Non-contact stormwater runoff is collected and routed to stormwater ponds. The stormwater system will be designed to meet applicable standards. Therefore, no significant impacts to water supplies are expected due to runoff or leachate.

5.4 IMPACTS FROM DISPOSAL OF BYPRODUCTS AND SOLID AND HAZARDOUS WASTES

5.4.1 SOLID WASTE

As explained in Subsection 3.7.2, all solid wastes generated during plant operations will be disposed of in offsite licensed landfills or by other approved methods. The operation of the Project will generate minor amounts of solid wastes (e.g., used turbine inlet filters), and the number of plant employees will increase only slightly. Therefore, there will be no adverse impacts resulting from solid waste generated by the project.

5.4.2 HAZARDOUS WASTE

The types of hazardous wastes currently generated at the Turkey Point Plant are not anticipated to change as a result of operation of the Project. FPL instituted an aggressive pollution prevention and waste minimization program at the Turkey Point Plant during the 1990s to reduce the amount of hazardous waste quantities.

FPL has a contract with Chemical Waste Management to transport and dispose of hazardous waste from the Turkey Point Plant at licensed facilities in a manner that complies with environmental regulations. Therefore, no impacts are anticipated from hazardous wastes generated at the Turkey Point Plant resulting from the operation of the Project.

5.5 SANITARY AND OTHER WASTE DISCHARGES

Minimal additional sanitary facilities are proposed as part of this expansion. A restroom will be connected to the existing permitted sanitary system.

5.6 AIR QUALITY IMPACTS

This section presents a summary of the air quality requirements, air modeling methodology, and results of air quality impact analyses. Detailed information is contained in Appendix 10.1.5, Air Construction and PSD Application.

5.6.1 IMPACT ASSESSMENT

5.6.1.1 Regulatory Applicability

Under federal and State of Florida PSD review requirements, all major new or modified sources of air pollutants regulated under the Clean Air Act (CAA) must be reviewed and a pre-construction permit issued. EPA has approved Florida's State Implementation Plan (SIP), which contains PSD regulations; therefore, PSD approval authority has been granted to FDEP. The EPA has promulgated PSD regulations under 40 CFR Part 51.166. Florida's PSD rules are codified in Florida Rule 62-212.400, F.A.C.

A "major facility" is defined as any one of 28 named source categories that have the potential to emit 100 TPY or more or any other stationary facility that has the potential to emit 250 TPY or more of any pollutant regulated under the CAA. A "major modification" is defined under PSD regulations as a change at an existing major facility that increases emissions by greater than specified significant amounts. "Potential to emit" means the capability, at maximum design capacity, to emit a pollutant after the application of control equipment. Once a new emission unit is determined to be a "major modification" for any regulated pollutant, all pollutants emitted in amounts greater than the PSD significant emission rates are subject to PSD review.

The existing Turkey Point Plant is classified as a major source because it is one of the named source categories and has the potential to emit more than 100 TPY of at least one regulated pollutant. The Project is a proposed major modification to an existing major source since the net increase in emissions is greater than the PSD significant emission rate for several regulated pollutants.

Annual emissions for the Project are presented in Table 3.4-4 and are compared to the PSD significant emission net increase thresholds. Based on the proposed emissions for the Project, PSD review is required for each of the following regulated pollutants:

- Particulate matter (PM) as total suspended particulate matter (TSP),
- Particulate matter with aerodynamic diameter of 10 microns or less (PM_{10}),

- Sulfur dioxide (SO_2),
- Nitrogen dioxide (NO_2),
- Carbon monoxide (CO),
- Volatile organic compounds (VOCs), and
- Sulfuric acid mist.

Miami-Dade County has been designated as an attainment area for all criteria pollutants [i.e., ozone (O_3), PM_{10}, SO_2, CO, and NO_2]. Thus, the air quality in Miami-Dade County meets all standards established by the federal and state governments to protect public health and welfare with an adequate margin of safety. All of Miami-Dade County, with the exception of the Everglades NP, is classified as a PSD Class II area for PM_{10}, SO_2, and NO_2.

PSD review is used to determine whether significant air quality deterioration will result from new or modified facilities. The following analyses related to PSD are required for each pollutant emitted in significant amounts:

- Control technology review,
- Source impact analysis,
- Air quality analysis (monitoring),
- Source information, and
- Additional impact analyses.

The control technology review requirements of the federal and state PSD regulations require that all applicable federal and state emission-limiting standards be met, and that Best Available Control Technology (BACT) be applied to control emissions from the source. The BACT requirements are intended to ensure that the control systems incorporated in the design of a proposed facility reflect the latest in control technologies used in a particular industry and take into consideration existing and future air quality in the vicinity of the proposed facility. BACT must, as a minimum, demonstrate compliance with NSPS for a source (if applicable). An evaluation of the air pollution control techniques and systems, including a cost-benefit analysis of alternative control technologies capable of achieving a higher degree of emission reduction than the proposed control technology, is required. The cost-benefit analysis requires documentation of the materials, energy, and economic penalties associated with the proposed and alternative control systems, as well as the environmental benefits derived from these systems. A decision on BACT is to be based on balancing environmental benefits with energy, economic, and other impacts.

A source impact analysis must be performed for criteria pollutants to address compliance with AAQS and PSD Class II and I increments. These analyses may be limited to the new source if the net increases in impacts as a result of the new source are below significant impact levels. The significant impact levels are threshold levels that are used to determine the level of air impact analyses needed for the project. If the new source's impacts are predicted to be less than significant, then the source's impacts are assumed not to have a significant adverse affect on air quality and additional modeling with other sources is not required. However, if the source's impacts are predicted to be greater than the significant impact levels, additional modeling with other sources is required to demonstrate compliance ambient.

An air quality monitoring analysis must be performed that contains an analysis of continuous ambient air quality data in the area affected by the proposed major stationary facility. Existing data from the vicinity of the proposed source may be used if the data meet certain quality assurance requirements; otherwise, additional data may need to be gathered. The regulations also include an exemption that excludes or limits the pollutants for which an air quality analysis must be conducted if the air quality impacts for the proposed source are predicted to be less than the *de minimis* levels.

Source information must be provided to adequately describe the proposed project. The general type of information required for this Project is presented in Section 3.4.

Additional analyses of the proposed source's impacts on soils, vegetation, and visibility, especially as they affect air quality related values (AQRVs) in PSD Class I areas, must be performed. Air quality impacts as a result of general commercial, residential, industrial, and other growth associated with the source also must be addressed.

The following sections describe the methods and assumptions that must be used to determine the air quality impacts due to the Project.

5.6.1.2 Analysis Approach and Assumptions

General Modeling Approach

The air quality modeling approach for the Project must follow EPA and FDEP modeling guidelines for determining compliance with AAQS and PSD increments. In general, when model predictions are used to determine compliance with AAQS and PSD increments, current policies stipulate that the highest annual average and highest, second-highest (HSH) short-term (i.e., 24 hours or less) concentrations are to be compared to the applicable standard when a 5-year period of meteorological data is used. The HSH concentration is calculated for a receptor field by:

1. Eliminating the highest concentration predicted at each receptor,
2. Identifying the second-highest concentration at each receptor, and
3. Selecting the highest concentration among these second-highest concentrations.

This approach is consistent with the air quality standards, which permit a short-term average concentration to be exceeded once per year at each receptor.

To predict the maximum annual and short-term concentrations for the proposed Project, the modeling approach involves screening and refined phases. Concentrations are predicted for the screening phase using a coarse receptor grid and a 5-year meteorological data record. If the highest concentration is predicted at a receptor that lies in an area where the receptor spacing is more than 100 m, then a refined analysis is performed in that area using a receptor grid of greater resolution. Modeling refinements are performed using a receptor spacing of 100 m or less with a receptor grid centered on the screening receptor at which the maximum concentration must be predicted. The air dispersion model is then executed with the refined grid for the entire year of meteorology during which the screening concentration occurred.

This approach ensures that valid highest concentrations were obtained. Descriptions of the emission inventory and receptor grids requirements for the screening and refined phases of the analysis are presented in the following sections.

Air Quality Models

The selection of an air quality model to calculate air quality impacts for this Project must be based on the models' ability to simulate impacts in areas surrounding the Turkey Point Plant Site as well as at the PSD Class I area of the Everglades NP, located about 21 km from the Site. Two air quality dispersion models have been used in these analyses to address air quality impacts for the Project. These models are:

- Industrial Source Complex Short Term (ISCST3) dispersion model, and
- California Puff model (CALPUFF).

The ISCST3 was used to evaluate the maximum pollutant impacts due to the Project in nearby areas surrounding the Project Site. The ISCST3 model is applicable for estimating the air quality impacts in areas that are within 50 km from a source. This model is maintained by the EPA on its Internet website, Support Center for Regulatory Air Models (SCRAM), within the Technical Transfer Network (TTN).

The ISCST3 model is designed to calculate hourly concentrations based on hourly meteorological data (i.e., wind direction, wind speed, atmospheric stability, ambient temperature, and mixing heights). The ISCST3 model is applicable to sources located in either flat or rolling terrain where terrain heights do not exceed stack heights. These areas are referred to as simple terrain. The model can also be applied in areas where the terrain exceeds the stack heights. These areas are referred to as complex terrain.

The Turkey Point Plant Site is only several feet above mean sea level. Around the immediate vicinity of the site, the terrain is flat with elevations that range less 10 ft above the Site elevation. Due to the minimal amount of terrain elevation differences in the Project's vicinity, receptor elevations do not need to be included in the analysis. As a result, the simple terrain option would be used for the air modeling analysis, which assumes that all receptors are at the same elevation as the stack base elevations for the Project's stacks.

At distances beyond 50 km from a source, the CALPUFF model is recommended for use by the EPA and the Federal Land Manager (FLM). The CALPUFF model is a long-range transport model applicable for estimating the air quality impacts in areas that are more than 50 km from a source. The CALPUFF model is maintained by the EPA on the SCRAM internet website. The methods and assumptions used in the CALPUFF model are based on the latest recommendations for modeling analysis as presented in the following reports:

- Interagency Workgroup on Air Quality Models (IWAQM), *Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts*; and
- *Federal Land Manager's Air Quality Relative Values Workgroup (FLAG) Phase I Report.*

In addition, updates to the modeling methods and assumptions must be followed based on discussions with the FLM.

The CALPUFF model was used to perform a significant impact analysis for the Project at the PSD Class I area of Everglades NP and to assess the Project's potential impact on regional haze and total nitrogen and sulfur deposition levels.

For modeling analyses that will undergo regulatory review, such as PSD permit applications, the following model features are recommended by EPA for rural mode and are referred to as the regulatory default options in the ISCST3 model and, where applicable, the CALPUFF model:

1. Final plume rise at all receptor locations,
2. Stack-tip downwash,
3. Buoyancy-induced dispersion,
4. Default wind speed profile coefficients for rural mode,
5. Default vertical potential temperature gradients, and
6. Calm wind processing.

The EPA regulatory default options would be used to address maximum impacts.

Meteorological Data

Meteorological data used in the ISCST3 model to determine air quality impacts consisted of a concurrent 5-year period of hourly surface weather observations from Miami International Airport and twice-daily upper air soundings from the NWS office located at the Palm Beach International Airport. The 5-year period of meteorological data from 1987 through 1991 was used. The NWS office at the Miami International Airport is located approximately 50 km north of the Site and is the closest primary weather station to the study area considered to have meteorological data representative of the project site. These meteorological data have been approved by the FDEP and used for numerous air modeling studies submitted as part of air construction permits approved for sources located in Miami-Dade County.

CALMET, the meteorological preprocessor to CALPUFF, was used to develop a 3-dimensional wind field necessary to perform the air modeling analysis to evaluate pollutant impacts at the PSD Class I area. The modeling domain covers an area over south Florida that consisted of a rectangular 3-dimensional grid that extended from approximately 79.0 to 83.5 degrees longitude and from 23.75 to 28.0 degrees latitude. The modeling domain includes the following meteorological and land use parameters:

- Surface weather data,
- Upper air data,
- A 1-degree land use data,
- A 1-degree Digital Elevation Model (DEM) terrain data,
- Mesoscale Model - Generation 4 and Generation 5 (MM4 and MM5) data (for initializing the wind field), and
- Hourly precipitation data.

These data were processed for the calendar years 1990, 1992 and 1996. The CALMET wind field and the CALPUFF model options must be consistent with the suggestions of the FLMs contained in the IWAQM and FLAG documents. Meteorological data used with the CALPUFF model consist of a CALMET-developed wind field covering south Florida.

Emission Inventory

Emission rates for regulated pollutants and stack and operating parameters for the Project must be used. The emission and stack operating parameters used in the air modeling analysis must cover the operating range that includes the three operating loads (50, 75, and 100 percent) and turbine inlet temperatures (35°F, 59°F, and 95°F) for the four CTs firing natural gas and ultra low-sulfur light oil. Peak firing would also have to be addressed.

The stack, operating, and emission data used in the air dispersion modeling are those presented in Section 3.4.

Receptor Locations

To determine the maximum impact for all pollutants and averaging times in the Project's vicinity, concentrations are predicted at receptors located in a detailed polar receptor grid centered on the modeling origin. This grid consists of 180 radials, spaced at 2-degree intervals along each radial. Receptors were located at the following distances from the origin:

- Every 100 m out to 3 km;
- Every 250 m from 3 to 7 km;
- Every 500 m from 7 to 10 km; and
- Every 5,000 m from 10 to 30 km.

Cartesian receptors must be placed every 50 m along the plant boundary.

For each pollutant and averaging time, modeling refinements must be performed, as needed, by employing a Cartesian receptor grid with a maximum spacing of 100 m centered on the receptor and for the year during which the maximum impact from the Project was predicted.

For the PSD Class I analysis, the maximum concentrations must be predicted at receptors along the boundary of the Everglades NP Class I Area. These receptors have been provided by the FDEP for use on previous applications.

5.6.1.3 Model Results

A summary of the predicted maximum SO_2, PM_{10}, NO_2, and CO concentrations for Unit 5 compared to the EPA significant impact levels is presented in Table 5.6-1. The modeling results indicated that maximum predicted concentrations due to Unit 5 were below the significant impact levels for all pollutants. As a result, additional modeling analyses are not required to address compliance with AAQS and PSD increments.

The maximum SO_2, PM_{10}, and NO_2 concentrations predicted for Unit 5 at the Everglades NP PSD Class I area are compared with the EPA's proposed PSD Class I significance levels in Table 5.6-2. All maximum predicted impacts were below the significant impact levels except for the 24- and 3-hour averaging times for SO_2 and the 24-hour averaging time for PM_{10}. The maximum 24-hour and 3-hour SO_2 impacts were 0.39 and 1.67 $\mu g/m^3$, respectively. These concentrations are above the proposed Class I significant impact levels of 0.2 and 1.0 $\mu g/m^3$, for the 24- and 3-hour averaging times, respectively. The maximum 24-hour PM impact was 0.51 $\mu g/m^3$, which is above the Class I significant impact level of 0.3 $\mu g/m^3$. Therefore, a PSD Class I increment analysis for Unit 5 and other PSD increment sources was performed for SO_2 and PM_{10}. The results of this analysis determined that the maximum predicted high second-high (HSH) 24-hour and HSH 3-hour SO_2 increment consumption concentrations were 4.1 and 17.5 $\mu g/m^3$, respectively. These concentrations are below the allowable PSD Class I increments of 5 and 25 $\mu g/m^3$, respectively. The results of the analysis for PM_{10} determined that the maximum predicted HSH 24-hour PM_{10} increment consumption concentrations was 2.1 $\mu g/m^3$, which is less than the PSD Class I Increment of 5 $\mu g/m^3$.

5.6.1.4 Additional Impact Analysis

Impacts Due To Direct Growth

The Project is needed to meet the growth in load demand expected from customers in 2007. FPL is obligated to provide reliable and adequate electric service to meet its customer's demand. Additional growth as a direct result of the additional electric power provided by the Project is not expected.

Construction of the Project will occur over a 24-month period requiring an average of approximately 500 workers during that time. It is anticipated that many of these construction personnel will be drawn from surrounding metropolitan areas and will commute to the job site.

The Project will employ a total of about 12 operational workers at project build-out. The operational workforce will also include annual contracted maintenance workers to be hired for periodic routine services. It is expected that most of these workers will be contracted from outside the region. The workforce needed to operate the Project represents a small fraction of the population already present in the immediate area. Therefore, while there would be a very slight increase in vehicular traffic in the area, the effect on air quality levels would be minimal.

There are also expected to be no air quality impacts due to associated industrial/commercial growth given the Project's location on the existing Turkey Point Plant Site. The existing commercial infrastructure should be more than adequate to provide any support services that the Project might require.

Impacts on Soils, Vegetation, Wildlife, and Visibility

The potential effects of the Project on soils, vegetation, wildlife, and visibility in the local vicinity of the Turkey Point Plant Site and in the PSD Class I area of the Everglades NP were analyzed and are also not expected to be significant. Certain air pollutants in acute concentrations or chronic exposures can impact soils, vegetation, and wildlife. Based on available literature, soils impacts can result from

SO_2 and NO_2 deposition creating an acidic reaction or lowering of soil pH. Vegetation is sometimes affected by acute exposures to high concentrations of pollutants often resulting in foliar damage. Lower dose exposure over longer periods of time or chronic exposure can often affect physiological processes within plants causing internal and external damage. Based on an evaluation of the literature for effects from SO_2, acid rain (sulfuric acid mist), NO_2, CO, and combinations of these pollutants, emissions from the Project are not expected to result in impacts that cause harm to soils and vegetation. Maximum concentrations of SO_2, PM_{10}, NO_2, and CO in the vicinity of the Turkey Point Plant Site are lower than the EPA Class II significant impact levels for all pollutants. Since the Project's impacts are less than the significant impact levels and AAQS that are designed to protect the public welfare, including effects on soils and vegetation, no detrimental effects on soils or vegetation should occur in this area.

Maximum concentrations of SO_2, PM_{10}, and NO_2 at the PSD Class I area of the Everglades NP are not expected to cause detrimental effects on soils or vegetation.

The major air quality risk to wildlife in the United States is from continuous exposure to pollutants above the National AAQS. This occurs in non-attainment areas, of which there are none in Florida. Risks to wildlife also may occur for wildlife living in the vicinity of an emission source that experiences frequent upsets or episodic conditions resulting from malfunctioning equipment, unique meteorological conditions, or startup operations. Under these conditions, chronic effects (e.g., particulate contamination) and acute effects (e.g., injury to health) have been observed. For impacts on wildlife, the lowest threshold values of SO_2, NO_2, and particulates that are reported to cause physiological changes are up to orders of magnitude higher in concentration, than maximum concentrations predicted from operation of the Project. As a result, no adverse effects on wildlife due to SO_2, NO_2, and particulate impacts from the Project are expected.

No adverse visibility impairment is expected from the Project in the immediate vicinity of the Turkey Point Plant Site or within the PSD Class I area at the Everglades NP due to the type and quantities of emissions from the Project sources. Opacity levels from the combustion exhausts from the Project will be low and are typically at or approaching zero. Emissions of PM_{10} and SO_2 will also be low due to the primary use of low-sulfur content natural gas, the cleanest fuel commercially available. While the Project will emit NO_x and VOC, the potential to impair visibility at the local level, or to cause regional haze at the PSD Class I area, have been determined to be lower than the FLM criteria. As a result, the Project will not adversely affect visual qualities in the area.

Impacts Due to Deposition

The use of the cleanest fuels and latest pollution prevention and control technology in Unit 5 results in low levels of air emissions. An evaluation of atmospheric deposition of these low air emissions levels has determined that potential impacts will be minimal in the Everglades NP and the Biscayne NP as a result of the operation of Unit 5. The paragraphs that follow summarize the analyses performed.

Atmospheric deposition for sulfur and nitrogen was determined for the Everglades NP as part of evaluating the AQRVs in this PSD Class I area. Atmospheric deposition was determined using CALPUFF and 3 years of meteorological data (1990, 1992, and 1996). The dominant soils of the Everglades NP include organic histosols with extremely high buffering capacities and sandy entisols overlying limestone, which provide a buffer to acidic inputs. These soils are resistant to acidic atmospheric inputs. The averaging buffering capacity of histosols is 765,000 equivalents/hectare (eq/ha) [Florida Acid Deposition Study (FADS), 1986]. As acid inputs (e.g., HNO_3^{-1} and $H_2SO_4^{-2}$), the maximum predicted deposition rates of 0.015 kg/ha/yr for nitrogen and 0.023 kg/ha/yr for sulfur, are 1.1 and 1.4 eq/ha/yr, respectively. These deposition rates are extremely small compared to the buffering capacity of the soils in the Everglades NP. These deposition rates are also small compared to the observed sulfur and nitrogen deposition data obtained from the FADS. Measurements taken near the northern boundary of the Everglade NP (near U.S. Highway 41 and the boundary of Miami-Dade and Monroe Counties) found wet and dry deposition rates of 243 eq/ha/yr for nitrogen and 306 eq/ha/yr for sulfur over a 3-year period (FADS, 1986). In addition, the groundwater table is highly buffered due to the interaction with subsurface limestone formations, which results in high alkalinity (as $CaCO_3$). The relatively low sensitivity of the soils to acid inputs coupled with the extremely low ground-level concentrations of contaminants projected for the Everglades NP from the Project emissions precludes any significant impact on soils. Similarly, the total annual sulfur and nitrogen deposition rates at the Everglades NP as a result of the Project are not expected to alter soil and/or groundwater pH that may result in adverse effects on vegetation. As presented in Subsection 7.3.3, the phytotoxic effects on the Everglades NP from proposed Project's emissions are predicted to be minimal.

Atmospheric deposition was also evaluated for the Biscayne NP and focused on nitrogen deposition. Deposition of sulfur as well as acidic inputs would not be meaningful given the high buffering capacity of high salinity water in Biscayne Bay as well as the natural sulfate content of sea water. Nitrogen deposition resulting from the operation of the Project was determined in the Biscayne NP using the same techniques and meteorological data as those used to determine maximum deposition in the Everglades NP. The maximum predicted nitrogen deposition was 0.011 kg/ha/yr over a receptor domain covering that portion of Biscayne NP within Biscayne Bay. The area of Biscayne NP beyond the barrier islands was excluded since this area reflects the high energy, well mixed, open ocean system of the Park. The FADS station located in the Everglades NP reflects some local anthropogenic influence due to the predominate easterly winds in the South Florida area and air emission sources in the region (vehicles and industrial facilities). The FADS operated a deposition monitoring station in Big Pine Key reflecting minimal local influence. The deposition values at Big Pine Key were about 60 percent of those observed at the Everglades NP monitoring site. Given the FADS data for the region, nitrogen deposition in the Biscayne NP would likely range from 3.4 to 2 kg/ha/yr. The predicted deposition for the Project (i.e., 0.011 kg/ha/yr) is over two orders of magnitude less than that previously observed. The relatively low amount of nitrogen deposition predicted for the Project suggests that impacts in the Biscayne NP due to atmospheric deposition are predicted to be minimal.

5.6.2 MONITORING PROGRAMS

5.6.2.1 Ambient Air Quality Monitoring

Pre- and post-construction ambient air quality monitoring is not required for this Project since the air quality impacts are less than the *de minimis* monitoring thresholds. Air quality concentrations at and in the region of the Turkey Point Plant comply and are anticipated to continue to comply with all applicable ambient standards.

5.6.2.2 Air Emissions Monitoring

The Project will be subject to the applicable NSPS for the CTs (40 CFR Part 60, Subpart GG) and the duct burners (40 CFR Part 60, Subpart Db) and acid rain program (40 CFR 75). Continuous monitoring will be required for the Project pursuant to applicable NSPS. Monitoring of fuel sulfur and nitrogen content will also be performed pursuant to the NSPS in Subpart GG, 60.334(b). Initial performance testing of the CTs for SO_2 and NO_x emissions will be conducted as required by Subpart GG, 60.335.

Continuous emission monitoring (CEM) for SO_2 and NO_x is required for gas- and oil-fired affected units in accordance with the provisions of 40 CFR 75. SO_2 emissions may be determined using procedures established in Appendix D, 40 CFR Part 75. CO_2 emissions must also be determined either through CEM (e.g., as a diluent for NO_x monitoring) or calculation. Alternate procedures, test methods, and quality assurance/quality control (QA/QC) procedures for CEM are specified (Part 75 Appendices A through I). The CEM requirements, including QA/QC procedures are, in general, more stringent than those specified in the NSPS for Subpart GG. New units are required to meet the requirements not later than 90 days after the unit commences commercial operation. The Project will be required to either install CEMs for NO_x or to meet the Part 75 requirements.

Initial and periodic compliance testing of pollutants emitted by the Project will be conducted pursuant to the FDEP requirements as specified in the FDEP Air Construction PSD Permit in accordance with Section 62-297.401, F.A.C.

5.7 NOISE IMPACTS

Sound propagation involves three principal components: a noise source, a person or a group of people, and the transmission path. While two of these components, the noise source and the transmission path, are easily quantified (i.e., direct measurements or through predictive calculations), the effects of noise to humans is the most difficult to determine due to the varying responses of humans to the same or similar noise patterns. The perception of sound (noise) by humans is very subjective, and just like odors and taste, is very difficult to predict a response from one individual to another.

The noise predictions for the Turkey Point Expansion Project were developed using the CADNA A computer model. The noise impacts of the Project were evaluated using the sound power levels (L_w) (see Appendix 10.5.2) for the various equipment associated with Unit 5. The location of each noise source was based on its location in the computerized plot plan (see Figure 3.2-2). The computerized drawing was imported into the CADNA A model for the noise analysis.

CADNA A is an environmental noise propagation computer program that was developed to assist with noise propagation calculations for major noise sources and projects. Noise sources are entered as octave band sound power levels, L_w. Locations of the noise sources, buildings, and receptors are input directly on the base map and can be edited throughout the modeling process. All noise sources are assumed to be a point, line, area or vertical area source, and can be specified by the user. Sound propagation is calculated by accounting for hemispherical spreading and three other user-identified attenuation options: atmospheric attenuation, path-specific attenuation, and barrier attenuation. Atmospheric attenuation is calculated using the data specified by the Calculation of the Absorption of Sound by the Atmosphere (ANSI, 1999). Path-specific attenuation can be specified to account for the effects of vegetation, foliage, and wind shadow. Directional source characteristics and reflection can be simulated using path-specific attenuation. Barrier attenuation is calculated by assuming an infinitely long barrier perpendicular to the source-receptor path. Total and A-weighted SPLs are calculated. Sources modeled included the CT air inlets, CT exhaust ducts, the HRSGs, and stack and power transformers, as well as the cooling tower.

Table 5.7-1 presents the noise impacts of the Project. The predicted levels from Unit 5 combined with baseline noise levels at the closest sensitive receptors, the school located on SW 344th Street and Homestead Bayfront County Park and Hoover Marina, are calculated to be less than 53 dBA during the daytime and 48 dBA during the nighttime. Noise levels of this magnitude would be lower than quantitative noise standards established in noise ordinances of other municipalities for residential and institutional land use (i.e., Broward County, Manatee County, etc.).

Figure 5.7-1 shows the maximum predicted noise level for Unit 5 at Site 7 compared with the L_{eq} baseline sound level observed during the nighttime at Site 7. This figure also shows a comparison of various noise sources and their respective sound levels.

Intermittent noise sources during routine startup, testing and maintenance, and emergency conditions will include steam venting. Such activities would not normally occur simultaneously and would last for a short duration. The noise impacts of these conditions would not be expected to cause a nuisance.

5.8 CHANGES TO NON-AQUATIC SPECIES POPULATION

5.8.1 IMPACTS

5.8.1.1 Flora

Potential impacts to non-aquatic species will be due to plant construction rather than plant operation and, therefore, are discussed in Section 4.2. Subsection 5.1.4.2 presents the potential impacts of salt deposition from the mechanical draft cooling tower.

5.8.1.2 Fauna

The existing cooling canal system is used for foraging by birds, mammals, reptiles, and amphibians. No adverse impacts will occur to fauna utilizing the cooling pond as a result of the proposed Project.

As mentioned in Subsection 2.3.6 and Section 4.4, the Project Area is nearby the existing power plant that consists of two fossil steam units and two nuclear units. Thus, the wildlife species present in the area are generally those that tolerate human proximity. No populations of recreational or commercially important species will be significantly affected by operation of the proposed Project.

5.8.2 MONITORING

Because no significant impacts to non-aquatic species populations are anticipated, no monitoring program is proposed.

5.9 OTHER PLANT OPERATION EFFECTS

5.9.1 OPERATIONS TRAFFIC

Operational impacts to area roadways will be very small since increased employment is very small, with no more than 12 full-time employees working in four shifts of three employees each. In addition to employee traffic, fuel oil and ammonia deliveries and maintenance activities will also generate additional trips. Most of the fuel used to operate the plant will be delivered by natural gas pipeline. When ultra low-sulfur light oil is used and the maximum amount to be delivered represents no more than six deliveries per hour. Ammonia is required for the SCR system, and a maximum of 60 trucks per year, or a little over one truck per week are needed for ammonia delivery if the units run at 100-percent capacity function all year long. Plant maintenance activities are infrequent and of short duration and were not included in the operation traffic impact assessment.

As a result of the estimates described above, a worst-case estimate of traffic indicates that up to 10 trips per peak hour could be expected (three operations employees and six fuel oil truck deliveries and one ammonia truck delivery). These impacts were evaluated for a year 2007 buildout that represents the first year of commercial operation.

The year 2007 non-project background volumes were determined to be the 2002 non-project background volumes increased by means of a growth rate. A generalized growth rate of 3 percent per year was applied to the 2002 non-project volumes to derive future volumes.

Trips associated with the operating conditions at the expansion project assumed trip distribution similar to constructions. It is expected that 100 percent of the Project trips will depart the Project site and travel to the west on SW 344th Street, with 50 percent then turning north on SW 137th Avenue. The remaining 50 percent would continue to travel west on SW 344th Street and then north on U.S. 1 to access local communities and accommodations or the Florida Turnpike. In-bound trips would follow the same route.

The year 2006 non-project background volumes and operations traffic volumes were combined to provide a projection of year 2006 total traffic. The total traffic volume in the vicinity of the Project was analyzed to determine the anticipated operating conditions. The roadway segments are anticipated to operate acceptably at project buildout (LOS C or better). Since there is no degradation of LOS, no improvements are required to accommodate the traffic impacts from operation traffic of the Project.

5.10 ARCHAEOLOGICAL SITES

No sites of historic or archaeological significance are likely to be impacted due to operation of the Project. The Project Site will have received clearance from the Florida Department of State, Division of Historical Resources prior to construction (see Appendix 10.5.1). No sites listed, or eligible for listing, in the *National Register of Historic Places* are located in close proximity to the site. No direct or indirect impacts are anticipated from any operation aspect of the Project.

5.11 RESOURCES COMMITTED

The major irreversible and irretrievable commitments of national, state, and local resources due to the Project are the use of land and wetlands, the consumptive use of water, natural gas, ultra low-sulfur light oil, ammonia, and PSD increment.

Of the total Turkey Point Plant Site (11,000 acres), the Project will affect about 64 acres. In contrast to a new generating facility constructed on a greenfield site, the Project will be significantly more effective in the use of land per megawatt generated.

The consumption of water by the proposed Project will be for condenser cooling, power augmentation, pollution control equipment (NO_x control when firing ultra low-sulfur light oil), other process water requirements, and potable water.

The units will consume PSD increment for several pollutants (NO_x, PM_{10}, and SO_2). However, the magnitude of increment consumption is very low compared to the PSD Class I and Class II increments.

Natural gas and distillate oil will be consumed during the operation of the Project. The amounts are described in Chapter 3.0, Section 3.3. This is an irreversible and irretrievable commitment of a national energy resource for the production of electricity for the people of Florida.

Less than one-half million gallons of ammonia annually will be required for the operation of the Project's SCR systems. While ammonia will be consumed, emissions of nitrogen oxides will be substantially reduced (about 70 percent) as a result.

Given the low environmental impacts of the project and the use of an existing plant site for the Project, the Turkey Point Expansion Project will effectively utilize state and local resources.

5.12 VARIANCES

No variances are being requested as part of this application

Table 5.1-1. Estimated Drift Emission Spectrum for the Turkey Point Expansion Project Cooling Tower

Particle Size Range (micrometers)	Total in Size Range (percent)
0 - 50	50.00
51 - 100	25.00
101 - 150	12.00
151 - 250	9.10
251 - 400	3.15
401 - 500	0.48
>500	0.27

Source: Golder, 2003.

Table 5.1-2 Predicted Plume Characteristics and Drift Deposition from Optional Mechanical Draft Cooling Tower

	Distance from Tower (meters)	Winter		Spring		Summer		Fall		Annual	
		For Sector	For All Sectors	For Sector	For All Sectors	For Sector	For All Sectors	For Sector	For All Sectors	For Sector	For All Sectors
		Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum
Plume Length	100	16.4	90.1	12.6	95.9	18.6	98.9	15.1	96.1	16.8	95.3
(Units = Percent)	200	1.3	3.2	0.4	1.8	0.3	1.2	0.6	1.8	0.6	2
	300	1.3	3.2	0.4	1.8	0.3	1.2	0.6	1.8	0.6	2
		Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum
Plume Height	10	16.4	90.1	17.3	95.9	18.6	98.9	15.1	96.1	16.8	95.3
(Units = Percent)	30	2.6	11.4	1.4	8.9	2.2	19.3	2.8	16.7	2.1	14
	50	1.1	2.8	0.4	1.7	0.3	1.2	0.3	1.7	0.5	1.9
		Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average
Plume Shadowing	200	528.2	179.5	610.3	155.5	515.5	140	439.8	142.6	1712	617.6
(Units = Hours)	400	87.7	17.4	74	17.2	165.7	22.4	82.6	18.5	263	75.5
	600	24.9	4.2	30.6	5.9	112	13.8	35.5	8	145	32
		Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum
Plume Fogging	100	0.7	1.8	0.4	0.9	1.5	3.5	0.9	3.5	2	9.6
(Units = Hours)	200	5.3	13.5	6	13.6	3	4.8	1.3	3.7	6.8	35.5
	300	3.2	9.9	6	10.5	3	4	1	1	6	25.4
		Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum
Rime Icing	100	0	0	0	0	0	0	0	0	0	0
(Units = Hours)	200	0	0	0	0	0	0	0	0	0	0
	300	0	0	0	0	0	0	0	0	0	0
		Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
Deposition	100	342	8	419	13	273	15	208	10	281	13
(Units = $kg/km^2/month$)	200	670	12	997	22	650	24	371	14	634	19
	300	504	12	733	16	473	24	288	14	463	18
	500	155	12	84	12	122	19	154	20	110	26

Table 5.2-1. Water Quality Comparison (all values in mg/L unless otherwise stated)

	Discharge to Cooling Canals	Miami-Dade Water Quality Standard
Alkalinity as CaCO3	79.71	
Alkalinity (Bicarbonate) (mg/L)	84.72	
Aluminum	0.00	
Ammonia as N	2.77	0.5
Antimony	0	
Arsenic	0	
Barium	0.59011	
Beryllium	0.20285	
Bicarbonate Ion	518.08	
BOD (5-day)	20.28	
Cadmium	0.00	
Calcium	32.42	
Chloride	12,543.00	
Chlorine, Total	0	
Chromium	0.18441	0.05
COD	350.38	
Color (Color Units)	0	
Copper	0.23973	0.4
Cyanide	0.00	
Fluoride (mg/L)	6.65	10
Hardness (as CaCO3)	875.55	
Hardness - Non Carbonate (as CaCO3)	795.84	
Iron Total	0.12	0.3
Lead	0.00	
Magnesium	190.62	
Manganese	0.07376	
Mercury	0	
Molybdenum	0	
Nickel	0.20285	
Nitrate as N	0.86	
Nitrate + Nitrite as N	2.36	
Nitrite as N	0.00	
Nitrogen as N (total)	23.31	
Oil & Grease	0.00	
pH (SU)	0.00	
Phenols	0.00	
Phosphate, Total as P	2.15	
Potassium	221.70	
Selenium	0.29505	
Silica	15.79	
Silver	0.00	
Sodium	6,087.43	
Sulfate	1,422.37	
TDS	17,686.99	
Thallium	0.00	
TKN as N	0.00	
TOC	23.44	
TSS	18.44	
Zinc (ug/L)	0.29505	1

Source: FPL, 2003.

Table 5.6-1. Summary of Maximum Pollutant Concentrations for Turkey Point Unit 5 Compared to the EPA Class II Significant Impact Levels, and Florida and Miami-Dade AAQS

Pollutant	Averaging Time	Maximum Predicted Impact of Unit 5 (μg/m^3)	EPA Class II Significant Impact Levels (μg/m^3)	Additional Modeling Necessary?	Florida AAQS (μg/m^3)	Miami-Dade AAQS (μg/m^3)
SO_2	Annual	0.14	1	No	60	25
	24-Hour	2.23	5	No	260	110
	3-Hour	7.73	25	No	1,300	350
PM_{10}	Annual	0.21	1	No	50	NA
	24-Hour	3.7	5	No	150	NA
NO_2	Annual	0.26	1	No	100	NA
CO	8-Hour	29.6	500	No	10,000	NA
	1-Hour	72.6	2,000	No	40,000	NA

Note: AAQS = Ambient Air Quality Standards.

Source: Golder, 2003.

Table 5.6-2. Summary of Maximum Pollutant Concentrations Predicted for Turkey Point Unit 5 Compared to the EPA Class I Significant Impact Levels and PSD Class I Increments

Pollutant	Averaging Time	Maximum Impact of Unit 5 ($\mu g/m^3$)	EPA Class I Significant Impact Levels ($\mu g/m^3$)	Additional Modeling Necessary?	Maximum Impact All Sources ($\mu g/m^3$)	Allowable PSD Class I Increments ($\mu g/m^3$)
SO_2	Annual	0.04	0.1	No	NA	2
	24-Hour	0.39	0.2	Yes	4.10	5
	3-Hour	1.67	1.0	Yes	17.50	25
PM_{10}	Annual	0.42	0.2	No	NA	4
	24-Hour	0.51	0.3	Yes	2.10	8
NO_2	Annual	0.07	0.1	No	NA	2.5

[a] Highest concentration predicted with CALPUFF model and CALMET South Florida Domain.

Source: Golder, 2003.

Table 5.7-1. Baseline and Impacts for the Operation of Turkey Point Unit 5

Baseline Site	Location	Time	Baseline Sound Levels (dBA)		Sound Levels with New Unit (dBA)		Increase (dBA)	
			L90	Leq	L90	Leq	L90	Leq
6	FPL Daycare on SW 344th Street	Day	44.2	49.3	48.3	51.0	4.1	1.7
		Night	41.5	44.0	47.4	48.2	5.9	4.2
7	Homestead Bayfront County Park/ Hoover Marina/ Biscayne National Park	Day	49.6	52.3	50.3	52.7	0.7	0.4
		Night	39.5	40.7	43.9	44.4	4.4	3.7

Source: Golder, 2003.

Figure 5.1-1 Cooling Canal System vs. Cooling Tower Cold Water Temperatures

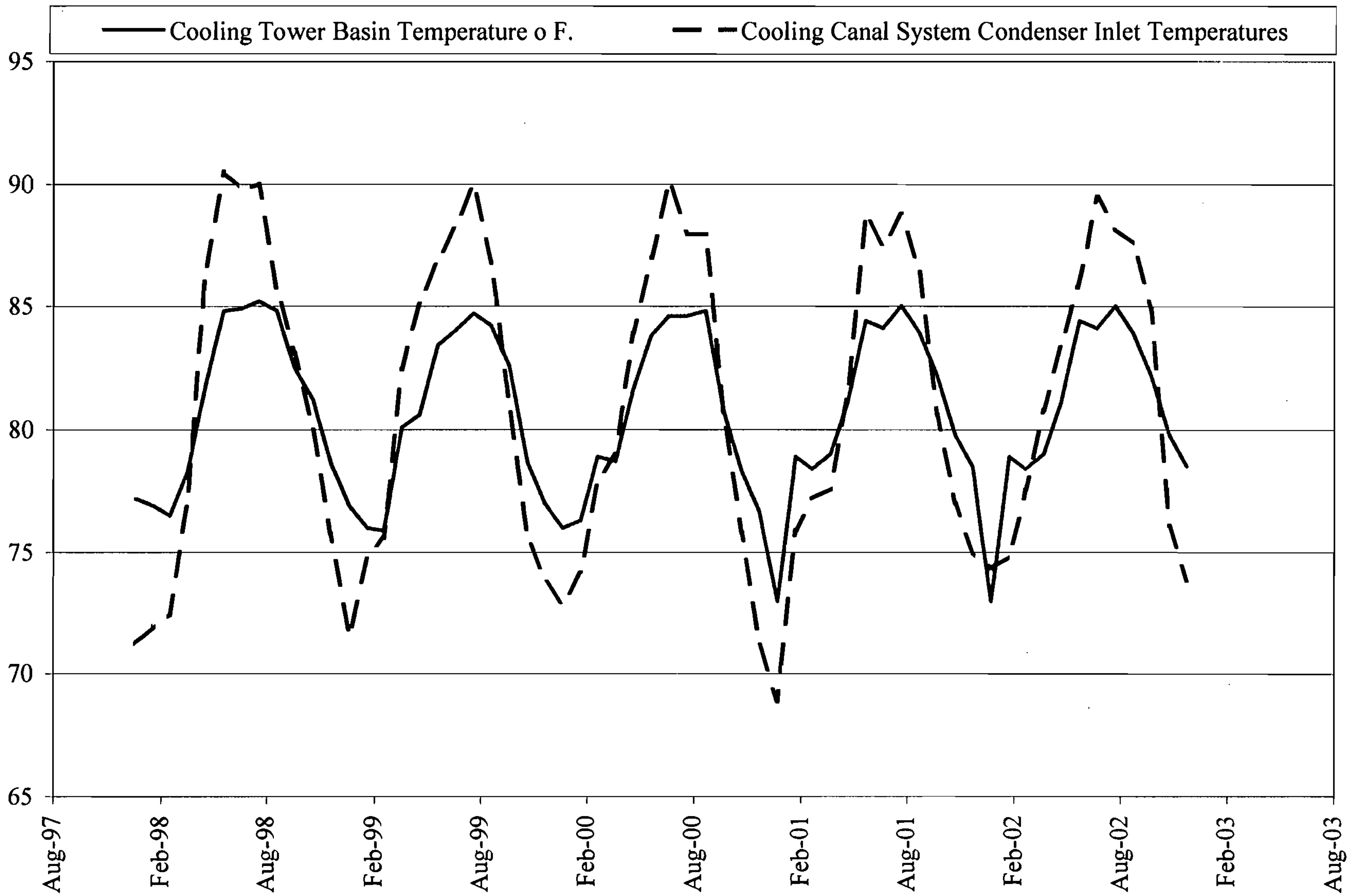
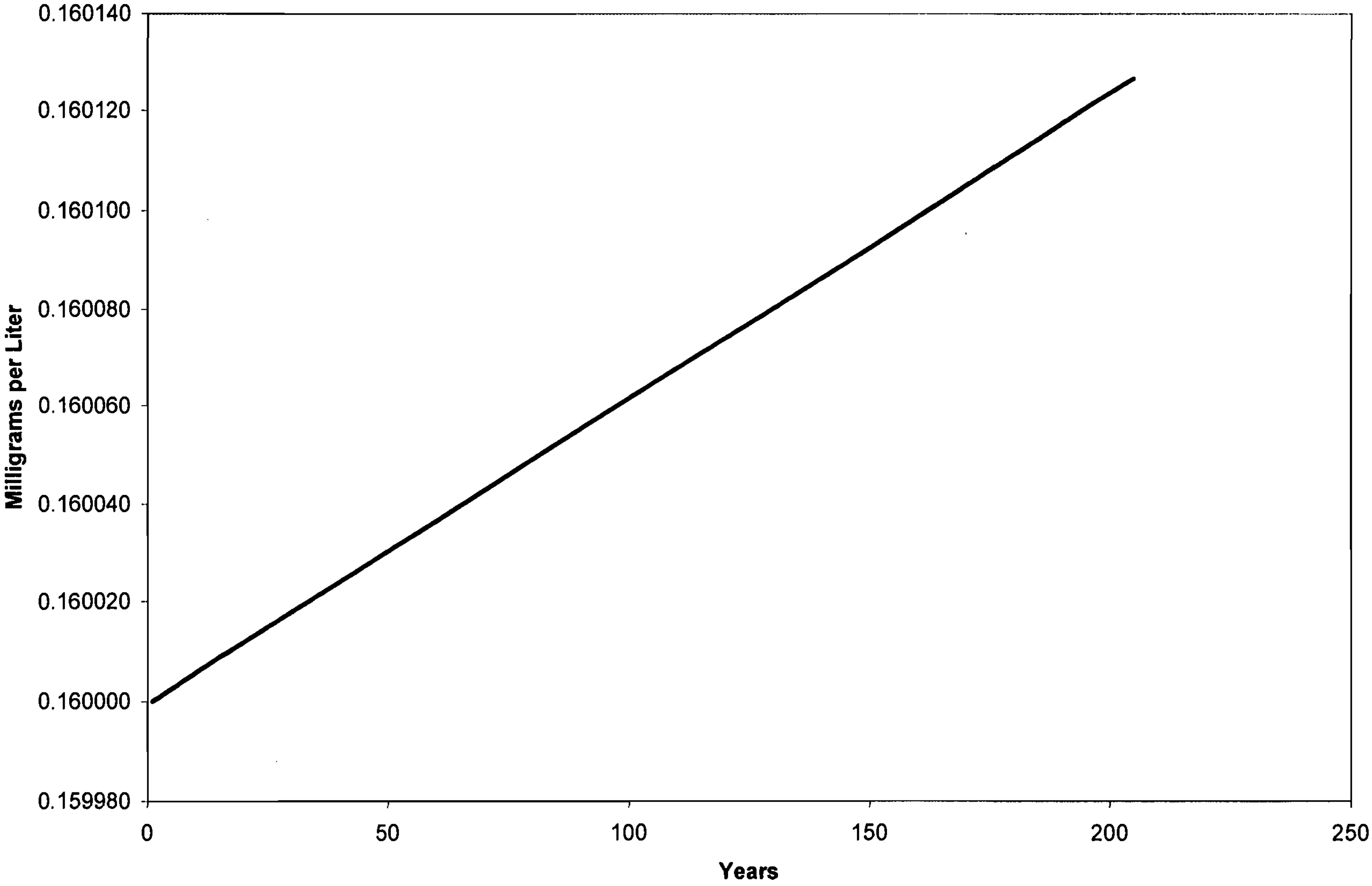
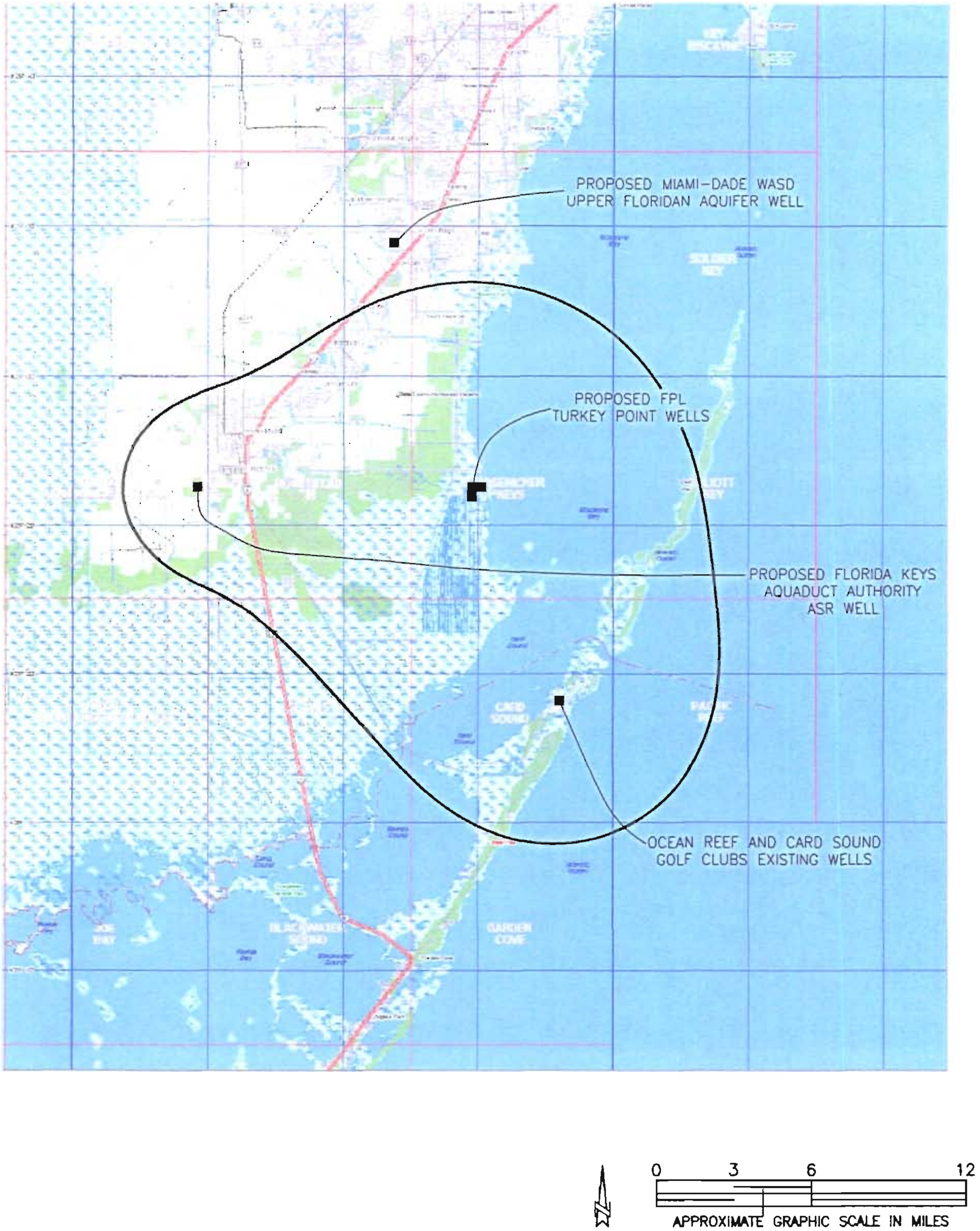


Figure 5.2-1. Ammonia Concentration in Cooling Canal System Over Time





LEGEND

ONE FOOT DRAWDOWN CONTOUR

NOTE

THE PROPOSED FPL WELLS AND OTHER USERS ARE ALL ACTIVE IN THIS SIMULATION AND PUMPING AT THEIR MAXIMUM PERMITTED DAILY RATES.

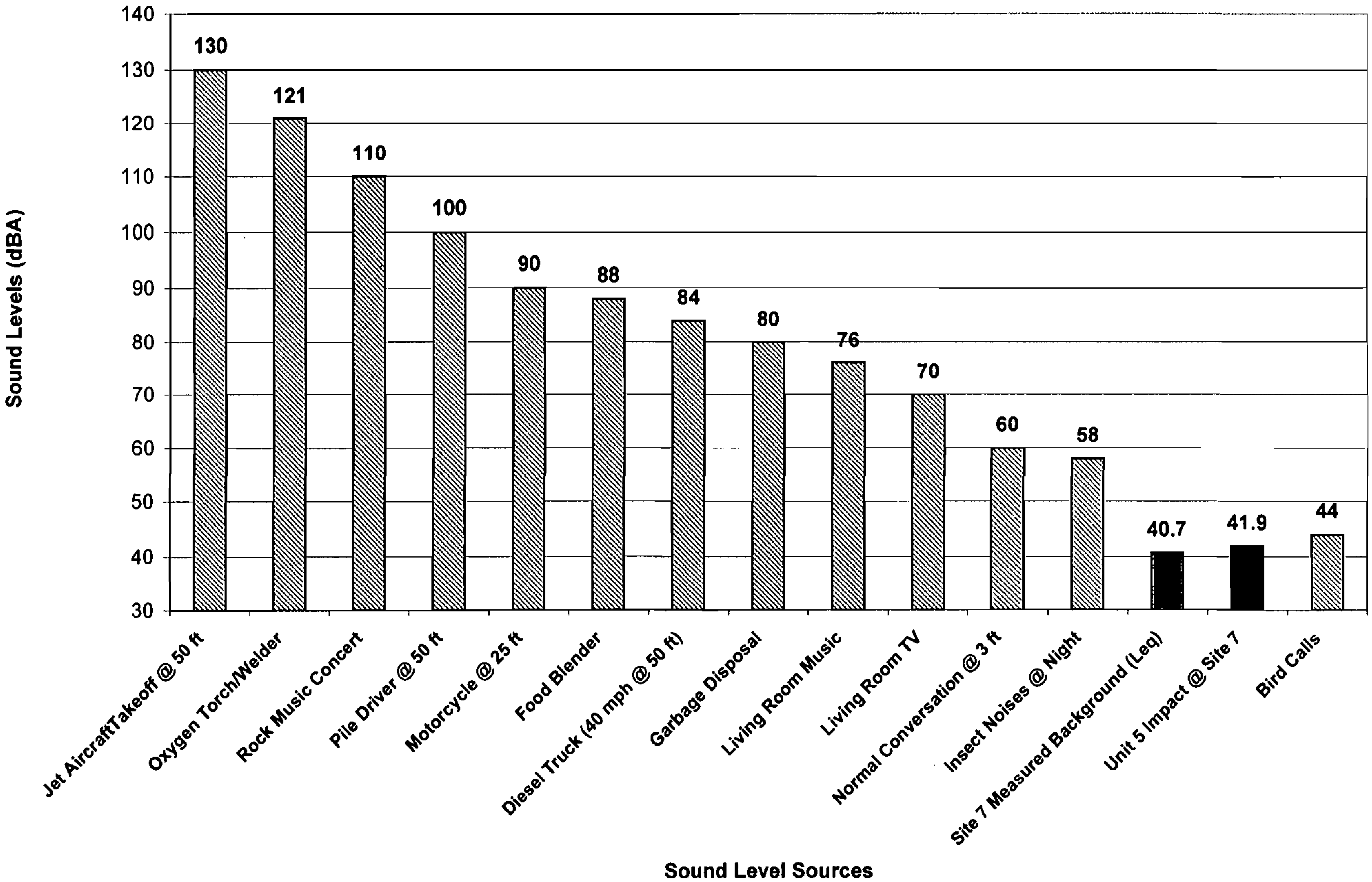
Figure 5.3-1
Total Drawdown of Floridan Aquifer for Existing and Proposed Users

SOURCE: DELORME, 3D TOPOQUADS, 1999

0337600/4/4.2/4.2.1/Figures/Figure 5.3-1.DWG

FPL

Figure 5.7-1
Sound Level Comparisons
Turkey Point Unit 5-Noise Impact



6.0 TRANSMISSION LINES

The Turkey Point Expansion Project will not require certification of any associated linear facilities, such as electrical transmission lines or rail lines. Therefore, Chapter 6 is not necessary for this application.

7.0 ECONOMIC AND SOCIAL EFFECTS OF PLANT CONSTRUCTION AND OPERATION

7.1 SOCIO-ECONOMIC BENEFITS

The purpose of this chapter is to:

- Identify the economic and social effects of construction and operation of the Project.
- Quantify the Project benefits and costs to the groups affected in the area surrounding the site as well as other people and businesses in Miami-Dade County and the State of Florida.

Socio-economic effects can be classified as either direct or indirect effects. Direct effects are those that are the direct result of the construction or operation of the Project. Indirect costs and benefits affect people and business interests in the vicinity of the Project who, because of their proximity to the site, may experience changes in their local environment, such as increased spending by the Project construction and operation personnel. Many of these effects are difficult to measure, and qualitative assumptions must be made to assess the relative values of expected costs and benefits.

This chapter is divided into two parts. Section 7.1 deals with socio-economic benefits and consists of an analysis of the plant construction and operational expenditures. Section 7.2 addresses temporary and long-term indirect costs involving the construction and operational personnel's use of private and public services in the vicinity of the site. All cost and benefit values are based on present (2003) dollar values.

7.1.1 DIRECT SOCIO-ECONOMIC BENEFITS

The Project is expected to benefit the economies of Miami-Dade County and surrounding communities. Direct benefits from the Project include employment opportunities created by the construction and operation of the Project. Construction of the Project is anticipated to begin in 2005 and conclude in 2007. The peak construction workforce is estimated to be about 650 people with an average construction workforce estimated at 290 employees over a 2-year period. Construction employment during the period October 2005 through September 2006 will average about 430 workers and management staff. Employment opportunities will result from construction job opportunities as well as jobs indirectly generated through the purchase of goods and services in the area. With the addition of approximately 12 full-time equivalent jobs for the operation of the Project, the labor demands associated with the operation of the Project will not create labor shortages. Due to the proximity of the Turkey Point Plant Site to large labor markets in the South

Florida metropolitan areas, much of the labor demand for both construction and operation can be met by workers in these areas. Population and housing impacts from construction and operation will be minimal because little migration into the area is anticipated.

Sales tax benefits of about $0.6 million will be paid to the State of Florida as a result of the construction of the Project with the local portion estimated at $50,000.

The construction cost for the Project will be about $530 million. The major cost associated with construction will be the major equipment (about $255 million), labor and associated labor-related costs (about $115 million), and materials (about $100 million). The remaining cost (about $60 million) is associated with engineering, licensing, contingencies, and other miscellaneous costs.

Direct economic benefits of construction of the Project will also result from the purchase of materials and equipment. About $15 to 20 million will be for materials and equipment purchased or leased within the state.

Among the primary direct benefits of the Project will be the increase in skilled job opportunities within the region associated with both plant construction and operation. Construction employment is expected to peak at approximately 650 workers. The total construction payroll, including labor-related costs (i.e., safety gear, small tools), for this facility is estimated at $115 million, which will be paid over the 2-year construction period. About $57.5 million will be wages to construction workers. The approximate type of workers over the construction period is presented below:

Estimated Construction Workforce

Cost Component	Percent
Laborers	12
Carpenters	6
Operators	5
Ironworkers	4
Millwrights	10
Boilermakers	6
Pipefitters	20
Insulators	2
Electricians	22
Painters	1
Supervision	13
Total	100.0

Ongoing operation of the Project will employ approximately 12 people. Assuming average wages of $50,000 annually per person, the additional annual operational payroll will be approximately $600,000. Other fixed operational costs, excluding fuel costs, would be about $2,000,000, which would generally be expended in the region.

7.1.2 INDIRECT ECONOMIC BENEFITS

The purchase of goods and services to support the construction of the Project is anticipated to occur over a 2-year period beginning in 2005 and ending in 2007. It is expected that the majority of the $57.5 million in direct construction wages paid for by the Project will be spent within Miami-Dade County and the surrounding region. These wages will create additional demands for goods and services. As this money is spent, it will create a multiplier effect within the area, thereby generating additional jobs and earnings. These earnings are indirect or secondary benefits of the Project, which will be enjoyed by other companies whose payroll will increase from the construction of the Project. Materials such as concrete, stone, drainage piping, and other building materials are necessary during Project construction and are normally manufactured or produced in the region. Rental of construction equipment would also be obtained locally.

The direct wages from ongoing plant operations will also generate indirect economic benefits. The direct wages will be spent mostly within the region and will increase the demand for goods and services. Using a typical economic multiplier for this effect, wages paid direct to plant personnel will indirectly generate at least $500,000 annually in additional earnings (wages and benefits) in the region.

7.1.3 OTHER ECONOMIC BENEFITS

The major new costs of operating Unit 5 are associated with fuel, water treatment chemicals, and ammonia. These costs not only include the cost of the commodity but the cost of transportation to the site. For example, natural gas will be transported to the site by a regional pipeline. In addition, the ultra low-sulfur light oil and ammonia will be transported by truck to the site. Some of the payments for both the commodity and transportation will benefit the region through additional employment, taxes, and materials.

7.1.4 RECREATIONAL AND ENVIRONMENTAL VALUES

Construction and operation of the Project will not impact the recreational value and visual qualities of the facilities in the vicinity of the Turkey Point Plant Site. Several recreational facilities are located within 5 miles of the Project Area. Disturbance during construction of the planned facilities will not be significant since the recreational facilities are located outside of the area affected by facility construction and operation. Aesthetic and visual impact to nearby recreational facilities is expected to be minimal.

7.1.5 ONSITE ENHANCEMENTS

FPL desires to minimize the Project's impacts on the environment and the community. Accordingly, the Project design incorporates features that reduce the visual and other impacts to the local community. These major features include the low profile design of the Project and its setback from Biscayne Bay, noise attenuation, and air pollution control equipment. In addition, there are minimal transportation impacts to the local roadways during operation.

The use of these features and methods, combined with the location for the Project and associated facilities on the Turkey Point Plant Site, will assure minimal impacts to the community. For example, the location of the Project is well buffered from the borders of the site. The approximate distances from the Project power block area to areas accessible to the public are: over 5 miles from the nearest residential community, 0.5 mile from the closest public point in Biscayne National Park, and 13 miles from the closest point in the Everglades National Park. Both the location on the Turkey Point Plant Site and the design features for the Project will minimize the impacts to aesthetics, ambient noise levels, and transportation.

7.1.6 OTHER ENVIRONMENTAL BENEFITS

The Project maximizes beneficial use of an existing power plant site. This minimizes the potential environmental impacts associated with the generation of electrical power through the use of existing facilities (i.e., developed site, access roads, natural gas pipeline, substation and transmission lines, and barge facilities).

7.1.7 ELECTRICAL RELIABILITY

The Project will add about 1,100 MW of new, natural gas-fired generation in Miami-Dade County that will be capable of serving approximately 230,000 customers. About 40 percent of the electric demands in Miami-Dade County and 45 percent of the electric demands in Broward County are imported from FPL plants and other resources outside the region. Recently, construction has been completed on new power plants in Lee and Volusia Counties in southwest and northern Florida, respectively. In addition, construction has commenced on two power plants in Martin and Manatee Counties. While the system is designed to deliver electricity to customers through FPL's large electric grid, it is important to ensure the system is reasonably balanced. Additional generation in South Florida, and especially in Miami-Dade County, would begin to restore the balance between generation and transmission and improve overall system reliability. It also provides additional generation in the South Florida region where significant growth in electric demand has occurred and is expected to continue to occur.

7.1.8 SUMMARY OF BENEFITS

Impacts to the economy associated with construction and operation of the Project are expected to be positive. Labor demands associated with the construction and operation of the Project are not expected to create any labor shortages. Expenditures for field materials and spending by newly hired workers will boost incomes in Miami-Dade and surrounding counties. Population and housing impacts associated with the Project will be slight due to minimal in-migration into the area.

Construction activities will increase tax revenues to the county and state governments due to sales and income taxes from the purchase of equipment and material to support construction activities. Once operational, county and state governments are expected to continue to receive more dollars in revenues than expenditures on public services due to the minimum requirements for public service facilities needed to support the additional units.

Although the local communities may experience some temporary impacts during the peak construction periods, overall, socioeconomic impacts associated with the construction and operation of the Project and the Turkey Point Power Plant will be favorable.

7.2 SOCIO-ECONOMIC COSTS

7.2.1 TEMPORARY EXTERNAL COSTS

Over 100,000 construction workers reside within the region, comprising Miami-Dade, Broward, and Palm Beach Counties. Since ample labor supply exists within commuting distance, and since a labor surplus exists within the region, it is anticipated that many workers can be hired from within the region, with minimal relocation required. Consequently, construction should have no adverse effect on permanent housing and school enrollment.

As is typical with longer construction projects, some workers commuting from longer distances may choose to live in transient accommodations (motels, hotels), returning to their permanent homes and families on weekends. Transient accommodations are plentiful in the area.

Since workers will mostly be commuting and not relocating permanently into the region, it is not anticipated that construction will create any new or unusual impacts or demands on public facilities or services.

Temporary external costs include the generation of construction traffic and noise from delivery trucks each day. Construction will last approximately 2 years with a peak period of about 12 months from October 2005 through September 2006. The projected construction traffic is not predicted to have a significant impact to the level-of-service on SW 344th Street (Palm Drive).

7.2.2 LONG-TERM EXTERNAL COSTS

The Project's external cost impacts will be minimal and localized. The Project is located in the central portion of the Turkey Point Plant Site and over a 0.5 mile from any fixed public or private facilities used for recreational purposes. With the incorporation of environmental mitigation measures, the operation of the Project will not cause any impairment to recreational values, result in any deterioration of aesthetic and scenic values, or restrict access to areas of scenic values. The Project also will not displace persons from the land, cause loss of income, or result in any significant costs to local government.

Since the operational workforce is expected to be approximately 12 employees, and most are assumed to be residing within commuting distance to the plant, the Project's impacts to local services (e.g., schools, police) are expected to be minimal.

8.0 SITE AND DESIGN ALTERNATIVES

This optional Chapter of the SCA will not be submitted as part of this application because it is not anticipated that an Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA) would be required for the Turkey Point Expansion Project.

9.0 COORDINATION

State, regional, and local governmental agencies were contacted by FPL representatives to inform these agencies about the Proposed Turkey Point Expansion Project and to solicit input regarding the project. The Agency staff contacted is listed below:

- Army Corps of Engineers
  - John F. Studt
  - Kenneth B. Huntington
  - Penny L. Cutt

- Biscayne National Park
  - Linda Canzanelli

- Everglades National Park
  - John Benjamin

- Florida Department of Community Affairs
  - Paul Darst

- Florida Department of Environmental Protection (Tallahassee)
  - Hamilton S. Oven
  - Steven L. Palmer
  - Scott Goorland
  - Al Linero
  - David Struhs
  - Alan Bedwell
  - Cameron Cooper

- Florida Department of Environmental Protection (SE District, West Palm Beach)
  - Timothy Gray
  - John Moulton
  - Timothy Rach
  - Kris McFadden
  - Indar Jagnarine
  - Tim Rach
  - Kris McFadden
  - Indar Jamarine
  - Timothy Gray

- Florida Department of Transportation
  - Sandra Whitmire

- Florida Fish and Wildlife Conservation Commission
  - Gary Cochran
  - Richard Brust
  - David Arnold

- Miami Dade County
  - Douglas Yoder
  - Partrick Wong
  - Rick Garcia
  - Jose Lopez
  - Carlos Espinosa
  - Lee Hefty
  - Trina Vielhauer
  - Alberto J. Torres
  - Dianne O'Quinn Williams

- National Park Service
  - John Notar
  - Don Shepard
  - Dee Morse

- South Florida Water Management District
  - Thomas D. Colios
  - John Morgan
  - Liz Abbott
  - Mark E. Elsner
  - Susan Coughanour
  - Ken Ammon
  - Cecile Ross
  - Steve Bell
  - Jorge A. Jaramillo
  - Jorge Marban
  - Tom Olliff

- Miami- Dade Water and Sewer (WASAD)
  - Bill Brandt
  - John Chorlog
  - Bertha Goldenberg

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