

3.0 SITE AND VICINITY CHARACTERIZATION

3.1 Site and Associated Facilities Delineation

3.1.1 Site Location

The Turkey Point plant property comprises approximately 11,000 acres in unincorporated southeast Miami-Dade County, Florida, east of Florida City and the City of Homestead and bordered by Biscayne Bay to the east (Figure 3.1.1-1). The existing Turkey Point Plant consists of two nominal 400-MW oil/gas steam electric generating units (Units 1 and 2); two nominal 700-MW nuclear units (Units 3 and 4); and a nominal 1,150-MW natural gas-fired combined-cycle unit (Unit 5). The Turkey Point plant property includes 5,900-acres of cooling canals that serve Units 1 through 4 for cooling and Units 1 through 5 as an industrial wastewater treatment facility. FPL owns the Everglades Mitigation Bank (EMB), which is a 13,000-acre natural wildlife and wetlands area located west and south of the Turkey Point plant property (see Figure 3.1.1-1).

The Site for which certification is being sought is located south of the existing Units 3 and 4 within the cooling canals of the industrial wastewater facility and will comprise approximately 300 acres. The Site is located in portions of Sections 33 and 34, Township 57 South, Range 40 East. The Site includes the Units 6 & 7 plant area (“plant area”) where the new generating facilities will be located, along with laydown areas (Figure 3.1.1-2).

3.1.2 Associated Non-Linear Facilities

The associated non-linear facilities described in this chapter include the nuclear administration building, training building and parking area, FPL reclaimed water treatment facility and delivery pipelines to the Site, radial collector wells and delivery pipelines, and the equipment barge unloading area, ~~and the FPL-owned fill source~~. These associated facilities, ~~with the exception of the FPL-owned fill source~~, lie within the Turkey Point plant property (Figure 3.1.2-1).

3.1.3 Existing Turkey Point Plant Property Use and FPL-Owned Fill Source

The five existing Turkey Point generation units and support facilities occupy approximately 200 acres of the Turkey Point plant property (Figure 3.1.3-1). Support facilities for the existing power generation units include service buildings, a nuclear administration building, training building and parking areas, fuel oil tanks, water treatment facilities, circulating water intake and outfall structures to the cooling canals, wastewater treatment basins, a system substation and industrial wastewater facility.

Turkey Point Units 1 and 2 have been in service since 1967 (Unit 1) and 1968 (Unit 2). Residual fuel oil is delivered for Units 1 and 2 by barge to an existing fuel oil unloading area. Units 3 and 4 have been in service since 1972 (Unit 3) and 1973 (Unit 4). Unit 5 began operation in 2007.

Units 1 and 2 operate under existing state and local environmental permits. Units 3, 4 and 5 operate under certification issued pursuant to the PPSA (PA03-45A2). Figure 3.1.3-2 shows the Sites certified under the PPSA for Unit 5 and Units 3 and 4, and the Site being proposed for certification for Units 6 & 7.

~~The existing use of the area proposed for the approximately 300-acre FPL-owned fill source is agriculture, of which approximately 244 acres are palm tree nurseries (see Figure 3.1.3-3).~~

3.1.3.1 Industrial Wastewater Facility

The existing Turkey Point Plant industrial wastewater facility includes a closed-loop cooling canal system that serves Units 1 through 4 to cool heated circulating water and to recirculate water for reuse. The canals are used by Units 1 through 4 for condenser and auxiliary cooling and by all five existing units for wastewater treatment. Unit 5 has mechanical draft cooling towers for the steam generation cycle using water from the Upper Floridan Aquifer as makeup, and routing cooling tower blowdown to the industrial wastewater facility. FPL conducts routine maintenance of the canal bottoms and removal of aquatic vegetation to minimize flow restriction.

3.1.3.2 Transmission System

Turkey Point Units 1 through 5 share a single substation that connects to the 230-kilovolt (kV) transmission lines leaving the Turkey Point plant property. Transmission lines exit the plant property in two rights-of-way, one traveling to the west and one to the north. The Florida City – Turkey Point transmission line leaves the plant property extending west for approximately five miles, where it connects to FPL's Florida City substation. This right-of-way is 330 feet (ft) wide and traverses undeveloped land for most of the distance. Seven other lines leave the plant property to the north, in a second 330-ft wide right-of-way. This right-of-way extends approximately 19 miles to the Davis substation, located in southwest Miami at SW 136th Street and SW 127th Avenue.

3.1.4 Adjacent Properties

Properties adjacent to the Turkey Point plant property are almost exclusively undeveloped land. The FPL-owned EMB is adjacent to most of the western and southern boundaries of the Turkey Point plant property. The South Florida Water Management District (SFWMD) Canal L-31E is also

situated to the west of the Turkey Point plant property. The eastern portions of the Turkey Point plant property are adjacent to the Biscayne National Park (BNP) and Biscayne Bay Aquatic Preserve. The southeastern portion of the Turkey Point plant property is bounded by state-owned land located on Card Sound. The Homestead Bayfront Park, owned and operated by Miami-Dade County, is situated to the north of the Turkey Point plant property.

3.1.5 Proposed Uses within the Site

The entire Site is within the industrial wastewater facility. Figure 3.1.5-1 provides the plot plan for Units 6 & 7 within the Site, including the infrastructure that will support operations.

The Turkey Point Units 6 & 7 Project will include the two approximately 1,100-MW (net) nuclear units, six mechanical draft cooling towers, a makeup water reservoir, switchyard, and other associated infrastructure. The technology proposed for Turkey Point Units 6 & 7 is the Westinghouse AP1000 pressurized water reactor (PWR). The Westinghouse AP1000 unit consists of the reactor, steam generators, pressurizer, and steam turbine/electric generator. Condenser cooling for the steam turbine will be accomplished using six circulating water cooling towers that will be located south of the Units 6 & 7 power block. The makeup water reservoir is the reinforced concrete structure beneath the circulating water system cooling towers that will contain reserve reclaimed water capacity to be used for the circulating water system. The structures for the Westinghouse AP1000 are the nuclear island (containment building, shield building, and auxiliary building), turbine building, annex building, diesel generator building, and radwaste building. The plant area will also contain the Clear Sky substation (switchyard) that will connect Units 6 & 7 to FPL's transmission system. A portion of the Site west of the plant area will be used for laydown (Figure 3.1.3-1).

3.1.6 100-Year Flood Zone

Figure 3.1.6-1 shows the Federal Emergency Management Agency (FEMA) map for the Site, indicating it is outside the 100-year floodplain. The plant area will be elevated, with the final grade of 19 ft [North American Vertical Datum of 1988 (NAVD 88)] at the perimeter, sloping upward to a finished grade of 25.5 ft at the power block.

3.2 Social and Political Environment

3.2.1 Governmental Jurisdictions

The Site and all Project-associated facilities are located in unincorporated southeastern Miami-Dade County, Florida. The majority of Miami-Dade County's urban development is located north of the

Turkey Point plant property along the eastern portion of the county (Atlantic coast). The City of Homestead is the closest municipality to the plant area and its boundary is approximately 4.5 miles northwest (Figure 3.2.1-1).

The BNP, Biscayne Bay Aquatic Preserve, SFWMD conservation area (Model Lands Basin), Homestead Air Reserve Base, Homestead Bayfront Park, and the FPL EMB are located within five miles of the plant area and associated non-linear facilities (see Figure 3.2.1-1). The Biscayne Bay Aquatic Preserve and the BNP are located within one mile of the Site (Figure 3.2.1-2). The American Crocodile critical habitat is shown on Figures 3.2.1-1 and 3.2.1-2.

~~Figures 3.2.1-3 and 3.2.1-4 present the governmental jurisdictions within one mile and five miles of the FPL owned fill source. The Biscayne Coastal Wetlands and the Model Lands Basin are within one mile of the proposed location for the FPL owned fill source.~~

3.2.2 Zoning and Land Use Plans

3.2.2.1 Comprehensive Plans

The Site is located in unincorporated Miami-Dade County, Florida. Miami-Dade County has adopted a Comprehensive Development Master Plan (CDMP) to meet the requirements of the Local Government Comprehensive Planning and Land Development Regulation Act, Chapter 163, Part II, F.S., and Chapter 9J-5, F.A.C.

The CDMP Map shown in Figure 3.2.2-1 presents the future land use designations in the vicinity of the Turkey Point plant property. ~~including the location of the FPL owned fill source (water management project).~~ The Miami-Dade County CDMP Future Land Use Element designates the proposed location for the Site and all associated non-linear facilities ~~except the water management project~~ as Environmental Protection Subarea F (Coastal Wetland and Hammocks). The CDMP Land Use Element indicates that necessary electrical generation and transmission facilities are permitted in this area. The relevant future land use categories are described in the Future Land Use Element of the CDMP, which is included in Appendix 10.5. ~~The proposed location of the water management project is designated in the CDMP as Agriculture. FPL has filed an application to amend the CDMP to allow for water management projects in specific geographic locations in the Agriculture land use category.~~

Zoning

The Miami-Dade County Land Development Code (Code) has been adopted to implement the policies and objectives of the Miami-Dade CDMP and to regulate land development within the unincorporated portions of Miami-Dade County. The Code incorporates a zoning map that depicts the zoning categories of lands lying within unincorporated Miami-Dade County. Figure 3.2.2-2 (Rev. 1) presents the Miami-Dade County zoning map for the area in the vicinity of the Turkey Point plant property, ~~including the location of the FPL owned fill source (water management project).~~ In December 2007, the Miami-Dade County Board of County Commissioners passed and adopted Resolution #Z-56-07 that grants an Unusual Use approval and variances for a nuclear power plant (atomic reactors) and ancillary structures and equipment. A copy of Resolution #Z-56-07 is provided in Appendix 10.2.1. ~~The proposed location of the water management project is zoned Agricultural (AU).~~ Relevant excerpts of the Miami-Dade County zoning code are provided in Appendix 10.3. ~~FPL will file an application for a zoning approval to allow for the water management project.~~

3.2.3 Demography and Ongoing Land Use

Miami-Dade County was estimated to have 2,253,362 residents in 2000 (U.S. Census, 2000). Population projections for Miami-Dade County depict continued growth, with an estimated population of 3,103,028 in 2030 (EDR, 2007). Census counts and population estimates for Miami-Dade County, the City of Homestead, and Florida City are shown below:

County and Municipality	Census 2000	Estimates 2007	Percentage Change
Miami-Dade	2,253,362	2,373,297	5.3
Homestead	31,909	56,601	77.4
Florida City	7,843	9,601	22.4

Source: U.S. Census, 2008

Existing land use patterns near the Site are depicted in Figure 3.2.3-1, showing land uses according to the Florida Land Use, Cover and Form Classification System (FLUCFCS) (FDOT, 1999). Land uses adjacent to the Site comprise undeveloped land, Units 1, 2, 3, 4, and 5, and transmission infrastructure. Much of the industrial wastewater facility is located to the west and south of the Site, and canals that return cooling water to Units 1 through 4 surround the Site. The BNP, Biscayne Bay

Aquatic Preserve, Biscayne Trail, and the FPL EMB are adjacent to the Turkey Point plant property. The Homestead Air Reserve Base and the Homestead-Miami Speedway are northwest of the Site.

Future land use patterns in the surrounding area, as designated by Miami-Dade County, are similar to the existing land uses. As depicted on the Miami-Dade County CDMP Map, environmental protection areas and institutions/utilities are the predominant future land uses around the Site.

3.2.4 Easements, Title, Agency Works

The Site and associated non-linear facilities are located on FPL property, with the exception of the radial collector well laterals. Portions of the radial collector well laterals may extend beyond FPL property on sovereign submerged lands in Biscayne Bay Aquatic Preserve and will require a public easement which will be addressed through this certification (see Appendix 10.4). The laterals will not extend beneath BNP. Leases, easements or titles for associated linear facilities are addressed in appropriate sections of Chapter 9.0.

3.2.5 Regional Scenic, Cultural and Natural Landmarks

The regional scenic, cultural and natural landmarks described below are located within five miles of the Site and associated non-linear facilities.

BNP is located northeast, east, and southeast of the Turkey Point plant property. The BNP headquarters is located north of the Site. The BNP was first established in 1968 as a National Monument and was expanded in 1980 to approximately 173,000 acres of water, coastal lands, and 42 Keys. The BNP fulfills a multi-purpose mission by managing natural and historic resources and enabling visitors to experience scenic vistas and compatible recreation activities. Boating is the most prevalent activity in the BNP, and recreational and commercial fishing are allowed. Other recreational activities include snorkeling, diving, camping, picnicking, and hiking.

A portion of Biscayne Bay Aquatic Preserve, a state-owned preserve, is adjacent to the eastern boundary of the Site. The Biscayne Bay Aquatic Preserve is a shallow, subtropical lagoon. The northern part of the Biscayne Bay Aquatic Preserve is just south of Cape Florida on the east, and south of Chicken Key on the west. The southern portion of the Biscayne Bay Aquatic Preserve is in Card Sound. These areas of the Biscayne Bay Aquatic Preserve are separated by BNP. The Biscayne Bay Aquatic Preserve is approximately 69,000 acres of submerged State land that has been designated as an Outstanding Florida Water. The FDEP, Office of Coastal and Aquatic Managed Areas, manages the Preserve. The Preserve offers recreational and commercial in-water activities, including

power boating, sail boating, canoeing, sculling, water skiing, jet skiing, parasailing, swimming, windsurfing, snorkeling, diving, and fishing.

Homestead Air Reserve Base supports both civilian and military operations and is located approximately 4.5 miles northwest of the plant area (see Figure 3.2.1-1). The 482nd Fighter Wing maintains and operates the facility and five tenant organizations use services and infrastructure at the base. The Homestead Air Reserve Base's history dates to World War II when it was originally opened as Homestead Army Air Field to serve as a maintenance and fueling stopover for aircraft headed overseas.

Homestead Bayfront Park is a recreational park located north of the Site (see Figure 3.2.1-1) adjacent to the BNP. Miami-Dade County owns and operates the Park. Facilities include the Hoover Marina, an atoll pool and beach, picnic pavilions, grills, a playground, and a fishing area.

~~Figure 3.2.1-3 shows municipal, Miami-Dade County and federally managed parks within five miles of the FPL owned fill source. The closest recreational facilities are the BNP (approximately one mile) and Homestead Bayfront Park (approximately two miles).~~

3.2.6 Archaeological and Historical Sites

There are no known archaeological or historical Sites located within the Turkey Point plant property.

A cultural resource assessment (CRA) survey was conducted of the Site and associated non-linear facilities. This survey complied with Chapter 267, F.S. (Florida Historical Resources Act), Chapter 1A-46 (Archaeological and Historical reporting Standards and Guidelines). It also complied with Section 106 of the National Historic Preservation Act (NHPA) as implemented by 36 CFR 800 (Protection of Historic Properties, effective January 2001). The results of this CRA are presented in Appendix 10.7.2. A review of the Florida Master Site File (FMSF) conducted as part of this survey revealed no previously existing archaeological sites or historic resources within or adjacent to the proposed Site and associated non-linear facilities.

Informants and an analysis of aerial photographs, confirmed that construction of the Turkey Point Plant began in the mid 1960s with the first unit being completed in 1967. An analysis of aerial maps indicated that prior to 1963, the area surrounding the Site and associated facilities was undeveloped. The only visible manmade feature was a canal, located approximately 0.4 mile north of the FPL

reclaimed water treatment facility. No other structures or buildings were visible within a one mile radius of the Project.

Background research revealed that much of the Site and associated non-linear facilities were located in areas subject to tidal and seasonal inundation or within previously developed areas of the plant property. This research also indicated that the Site and associated non-linear facilities have a low potential for archaeological sites.

A pedestrian survey and subsurface testing was conducted of undeveloped areas and areas where background research suggested either a higher elevation or a possible hardwood hammock. Consequently, testing was conducted within the Site, radial collector wells and delivery pipeline, and the FPL reclaimed water treatment facility. This survey confirmed the low archaeological potential of the Site and associated non-linear facilities. No newly or previously recorded archaeological sites or historic resources were identified.

An archaeological resource survey for the EMB conducted in 1996, southwest of the Turkey Point plant property, found no historic or prehistoric cultural materials within the 13,000-acre EMB. During the investigation, areas most likely to contain historic or prehistoric cultural resources were identified through analysis of maps, photographs, and other information sources. No cultural resources were found in the 1996 surveys of more than 100 target sites and 61 test excavations (Lewis and 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 (FPL, 2000).

3.2.7 Socioeconomics and Public Services

3.2.7.1 Social and Economic Characteristics

Labor Force

The total labor force in Miami-Dade County for 2008 was 1,212,446 with employment of 1,142,665. Unemployment in 2008 was 69,781 or 5.8 percent in Miami-Dade County. For the State of Florida, the unemployment rate in 2008 was 6.2 percent and the U.S. unemployment rate was 5.8 percent (BLS, 2008 and 2009).

The U.S. Bureau of Economic Analysis (BEA) reports employment trend data by industry units/sectors as defined by the National American Industrial Classification System (NAICS) this

information is depicted for the State of Florida and Miami-Dade County for the year 2007 in Table 3.2.7-1. Private employment makes up most of the employment in Miami-Dade County with about 92 percent of the total. The services sector provided approximately 672,436 or 46 percent of the jobs in Miami-Dade County. The construction sector provided approximately 90,402 jobs or 6.2 percent of the jobs in the County.

General Income

Miami-Dade County had a per capita personal income of \$36,081 for 2007 compared to the State of Florida and U.S. per capita personal income of \$38,417 and \$38,615, respectively. This income level ranked 17th out of the 67 counties in Florida for 2007 (U.S. Department of Commerce, 2008 and 2009).

The average wage per job in Miami-Dade County in 2007 was \$44,048, approximately 11.5 percent higher than the statewide average of \$39,505 (U.S. Department of Commerce, 2008).

Housing

The total number of housing units in Miami-Dade County by occupancy type according to the U.S. Census Bureau 2006 American Community Survey is as follows:

Housing Occupancy	Estimate
Total Housing Units	953,031
Occupied Housing Unit	828,794
Vacant Housing Units	124,237
Renter Occupied	333,061
Owner Occupied	495,733

The median house value in Miami-Dade County in 2006 was \$308,500 based on the 2006 American Community Survey data (U.S. Census, 2008).

For Miami-Dade County, a total of 6,006 licensed lodgings were reported in July 2008, representing 192,236 lodging units. This includes 143,759 apartment building units, 710 rooming house units, 3,259 rental condominium units, and 2,072 transient apartment building units (UF/BEBR, 2008).

3.2.7.2 Area Public Service and Utilities

Education

According to the Miami-Dade County Public Schools, Statistical Abstract (2007 - 2008), the county had a total student enrollment in kindergarten through twelfth grade of 347,774 during the 2007-2008 school year. This is an approximately 1.6 percent decrease from the 2006-2007 school enrollment. There are 392 schools (212 elementary, 30 K-8, 73 middle schools, 61 senior high schools, 11 combined schools, and five alternative or special schools) within Miami-Dade County (Miami-Dade County Public Schools, 2008). In the City of Homestead and Florida City, there are 17 schools (11 elementary, three middle schools, one K-8, and two high schools). The Site and associated non-linear facilities are located within Regional Center VI of the Miami-Dade County Public School System. This district has construction and expansion projects underway to provide an additional 12,826 student stations to accommodate projected enrollment with a completion date of 2012-2013.

There are no existing public or private schools within five miles of the plant area; the closest public school to the Site is the Keys Gate Charter School, approximately six miles west (Florida Department of Education, 2008). FPL maintains a daycare center located on SW 344th Street/Palm Drive for employees of the Turkey Point Plant. This daycare center is approximately 1.5 miles from the Site.

Transportation

Florida's Turnpike (State Road 821), Interstate 95, and U.S. Highway 1 (South Dixie Highway) are the major transportation corridors for north-south traffic movement in Miami-Dade County. U.S. Route 41 is a major east-west highway that traverses the middle of the County.

The main access road into and out of the Turkey Point Plant is SW 344th Street/Palm Drive (Figure 3.2.8-1). SW 344th Street/Palm Drive is classified as a county collector roadway for both the 1995 and 2015 roadway systems.

According to Miami-Dade County Concurrency Management System, there are three traffic concurrency stations in the vicinity of the Project. The currently available capacities on the three concurrency stations are presented in Table 3.2.8-1 (see also Appendix 10.7.4).

The available capacities shown in Table 3.2.8-1 reflect existing traffic, as well as traffic associated with developments that are approved, but not yet built and/or fully occupied. As indicated, all nearby traffic concurrency stations have sufficient peak hour capacity to accommodate additional traffic

within southern Miami-Dade County. The existing traffic volumes for these stations include current traffic to and from the Turkey Point Plant to areas west and north of the Site.

There are no rail systems within five miles of the Site. The Homestead Air Reserve Base and its associated runways lie approximately 4.5 miles northwest of the Site. The Base supports both military and civilian operations. Miami International Airport (MIA) is located approximately 25 miles north of the Site.

Medical Facilities

FPL maintains a medical clinic at the Turkey Point Plant for on-site personnel. Homestead Hospital is the primary health care provider in the southeast portion of Miami-Dade County and is located approximately 9.6 miles northwest of the plant area. Homestead Hospital is a 120-bed facility with emergency facilities and services as well as numerous surgical and non-surgical programs. The Emergency Medical Services (EMS) Division of Miami-Dade County Fire and Rescue Department provides emergency medical transport services throughout the County, including the Turkey Point Plant. The EMS Division provides medical direction for 50 Advanced Life Support (ALS) transport units, 49 ALS non-transport units, 13 Basic Life Support (BLS) non-transport units, and four ALS air-transport helicopters. The ALS units are staffed by 1,249 paramedics and 656 Emergency Medical Technicians. In 2006, Miami-Dade Fire Rescue (MDFR) responded to more than 220,000 alarms; over 75 percent were EMS-related (Miami-Dade County, 2007a).

Firefighting Facilities

The Turkey Point Plant has an on-site fire brigade that provides response in the event of an emergency. In addition, Miami-Dade County Fire and Rescue is responsible for providing firefighting, rescue, fire prevention, hazardous materials, and technical rescue services to Miami-Dade County, including the Turkey Point Plant. There are three fire stations located within the City of Homestead (Stations 16, 66, and 65). The closest County fire stations to Turkey Point Plant are Stations 65 and 66, each approximately 6.5 miles northwest of the Site. The stations operate 24 hours a day (Miami-Dade County, 2008).

Police Protection

The Miami-Dade County Police Department (MDPD) provides law enforcement in the vicinity of the Turkey Point plant property and patrols the surrounding area. The MDPD is the eighth largest police department in the U.S. with a staff of over 4,700 dedicated sworn and non-sworn personnel. The MDPD provides customary police services to the South Florida area via nine police districts and

supported by 32 bureaus. The MDPD also provides specialized investigative services to the unincorporated municipal service area and municipalities that contract for police services with the County.

FPL maintains a security force, including contracted security personnel, at the Turkey Point Plant.

Recreation Facilities

The Miami-Dade County Park and Recreation Department manages more than 12,000 acres, roughly half of which are environmentally sensitive or threatened natural areas requiring protection and conservation. The Park and Recreation Department maintains more than 250 parks, recreation facilities, and greenway areas, including Homestead Bayfront Park.

The BNP, Biscayne Bay Aquatic Preserve, and the Homestead Bayfront Park offer residents and visitors of Miami-Dade County many recreational activities as described in Subsection 3.2.5.

The Homestead Miami Speedway, a 600-acre race course, is located approximately five miles northwest of the plant area.

Electricity and Gas

FPL and Homestead Electric provide electricity to Miami-Dade County businesses and residents. TECO Energy Peoples Gas is the primary retail/residential/commercial natural gas provider in the area. A natural gas pipeline, owned and operated by Florida Gas Transmission, serves Turkey Point Units 1, 2, and 5.

Water Supply Facilities

Approximately 330 million gallons per day (MGD) of water are withdrawn from the Biscayne Aquifer through wells extending an average of 80 ft below ground surface (bgs) to meet the needs of Miami-Dade County farms, businesses and residents (Miami-Dade County, 2007b). Three regional water treatment plants supply the needs of users north of SW 258th Street through a common distribution system. Five smaller water treatment plants comprising the South Dade Water Supply System serve the unincorporated areas of the County south of SW 248th Street/Coconut Palm Drive, including the Turkey Point Plant. The five plants pump potable water into a common distribution system.

Sewage Treatment Facilities

Regional wastewater facilities, package plants, and septic tanks serve Miami-Dade County businesses and residents. Regional facilities are large systems that serve areas of dense population. There are three regional facilities that serve the majority of businesses and residents in Miami-Dade County: the North, Central, and South Dade Wastewater Treatment Plants. Package plants are small and pre-constructed, serving isolated developments. Septic tanks provide service to individual residences or small developments that produce flows of less than approximately 2,000 gallons per day (gpd).

Most of the sanitary wastes associated with existing Turkey Point Plant are treated in an on-site treatment plant. The effluent, after treatment and disinfection, is discharged through a Class V injection well. Smaller volumes of sanitary wastes are routed to an on-site septic tank system.

Solid Waste Disposal

The Miami-Dade County Department of Solid Waste Management is responsible for solid waste collection, transport, disposal, and recycling of municipal solid waste. The Department primarily serves single-family residential units and a small number of commercial and multi-family accounts in the unincorporated portions of the County. In addition, the Department has entered into long-term interlocal agreements with 18 municipalities to provide solid waste disposal services. The Department is responsible for the Resources Recovery (waste-to-energy) Facility, landfills, transfer stations, neighborhood Trash & Recycling Centers and for meeting the State's countywide environmental compliance objectives (Miami-Dade Department of Solid Waste Management, 2007 Comprehensive Annual Financial Report, March, 2008).

An approved solid waste contractor collects and transports the solid waste generated at the existing Turkey Point Plant for disposal at County facilities.

3.3 Bio-Physical Environment

3.3.1 Geohydrology

3.3.1.1 Geologic Description of the Site Area

The FPL Turkey Point plant property is located in Miami-Dade County, Florida, approximately 25 miles south of Miami, eight miles east of Florida City, and nine miles southeast of Homestead. The plant property is located within the Southern Slope sub-province of the Southern Zone of the Florida Platform (a partly submerged peninsula of the Continental Shelf) within the Atlantic Coastal Plain physiographic province. It is bordered on the east by Biscayne Bay, on the west by EMB and

Model Lands Basin, and on the northeast by BNP. The physiographic features bordering the plant property are the Atlantic Coastal Ridge, the Everglades, and Florida Keys (Figure 3.3.1-1). The geomorphology of Florida has been described in the literature (White, 1970; Randazzo and Jones, 1997) as having three zones: Northern, Central, and Southern. The FPL Turkey Point plant property is in the Southern Zone.

The Florida Platform lies on Paleozoic African cratonic terrain that was left attached to North America after Mesozoic rifting separated the continents during the Mesozoic (Pindell and Barrett, 1990). The suture between these terrains lies in northern Florida and southern Georgia south of the piedmont. The presence of the Paleozoic in southern Florida is inferred because no wells have been drilled that penetrate below the Jurassic-aged sediments. In southern Florida, the basement consists of Jurassic-aged volcanic rocks (Figure 3.3.1-2).

Above the Jurassic volcanic basement, there are 4,000 to over 15,000 ft of sedimentary rocks and sediments (Arthur, 1988; Dallmeyer, 1987) (Figure 3.3.1-3). The rocks and sediments are predominantly carbonates and evaporates in the pre-Oligocene portion of the section. This part of the stratigraphic section contains dolomites, limestones, anhydrites, and some gypsum. Before the Oligocene, the Florida Platform was an isolated carbonate platform fully separated by a deep-water strait from sources of siliciclastic sediments to the north (Missimer, 2002). With the deposition of the Oligocene Suwannee Limestone and later in time, siliciclastic and carbonate sediment were mixed and the number and complexity of lithologies. The post Oligocene geology contains limestones, dolostones, sandstones, clays, unlithified quartz sands, and various mixes of these lithologies (Scott, 1988; Missimer, 2002; Guertin et al, 2000; Cunningham et al., 1998).

The surficial geology of the terrain within the FPL Turkey Point Units 6 & 7 plant area consists mainly of organic muck and the Miami Limestone. The organic muck is the dominant surficial sediment type over most of the Site whereas the Miami Limestone is exposed at the surface in the northwestern portion of the Site. The Miami Limestone is a marine carbonate consisting predominately of oolitic facies of white to gray limestone with fossils including mollusks, bryozoans, and corals. The overlying organic muck near the plant area can be described as either light gray–dark gray to pale brown muck with trace amounts of shell fragments and little to no reaction to hydrochloric acid and/or black to brown muck with organic fibers and strong reaction to hydrochloric acid.

The Units 6 & 7 plant area is at or near sea level with an existing elevation of -2.4 to 0.8 feet (NAVD 88) and is generally flat. Vegetated depressions occur at the Units 6 & 7 plant area. The vegetative depressions are surficial dissolution features within the surface of the Miami Limestone.

The Site lies on the stable Florida carbonate platform and no faults or folds are mapped within more than 25 miles. The plant area is in a tectonically stable region characterized by low rates of seismicity. New data, including geologic mapping and bedding attitudes obtained from lithologic contacts in boreholes, indicate flat, planar bedding in Pleistocene and older units and an absence of geologic structures within the Site. No topographic features within the Site vicinity indicate the presence of surface faulting.

3.3.1.2 Site Lithologic Description

FPL conducted the geotechnical investigations for the proposed Units 6 & 7 plant area, which included drilling 88 borings. The following descriptions are based on the subsurface investigations boring logs. The locations of the borings are provided on Figure 3.3.1-4. In general, the borings ranged from 100 ft below ground surface (bgs) to 290 ft bgs. Two relatively deep borings were drilled to depths of 419 and 615 ft bgs. The investigations obtained soil and rock samples using standard penetration test (SPT) sampling and rock coring (ASTM D1586-99 and ASTM D2113-99). The carbonate rock encountered was classified according to Dunham (1962). Appendix 10.7.7 contains examples (B-601 DH and B-701 DH) of borehole log descriptions. Geologic cross sections derived from the boreholes are provided on Figures 3.3.1-5 and 3.3.1-6. The locations of the cross sections are shown on Figure 3.3.1-4. The description of the soil and lithology are summarized below.

Soil

According to the Natural Resources Conservation Service, the major soil types at the Units 6 & 7 plant area consist of udorthents, Pennsuco marl and Terra Ceia muck (see Figure 3.3.1-7). The minor soil types are Biscayne marl, Lauderhill muck and Perrine marl. Cation-exchange capacity measured in milliequivalents per 100 grams of soil (meq/100g) in the Turkey Point Units 6 & 7 plant area for udorthents is 13.5, Pennsuco marl is 15.3, Terra Ceia muck is 143.6, Biscayne marl ranges from 1.6 to 14, Lauderhill muck ranges from 124 to 199 and Perrine marl ranges from 2.1 to 33 (USDA, 2008). The Natural Resources Conservation Service description of the soil types are as follows:

- **Udorthents:** Udorthents is developed on the marine terraces. The parent materials are altered marine deposits. The typical profile is 0 to 80 inches of gravelly loam. The depth to the water table is more than 80 inches (USDA, 2008).
- **Pennsuco marl:** Pennsuco marl is developed on the mangrove swamps on marine terraces and subject to tidal flooding. The parent materials are marine deposits over limestone. The typical profile is 0 to 51 inches marly silt loam and 51-55 inches weathered bedrock (USDA, 2008). Under natural conditions, Pennsuco marl soil remains saturated and the water table fluctuates with the tides. The soil is moderately saline or saline. Permeability is moderately slow (USDA 1996).
- **Terra Ceia muck:** Terra Ceia muck are developed on the tidal marshes on marine terraces and subject to tidal flooding. The parent material is herbaceous organic material. The typical profile is 0 to 80 inches of muck. The depth to the water table is approximately 0 to 6 inches (USDA, 2008). Under natural conditions, the Terra Ceia soil remains saturated. Fluctuating tides cover the surface twice daily. Permeability is rapid (USDA, 1996).
- **Biscayne marl:** Biscayne marl is nearly level, poorly drained soil on broad, low coastal flats and in the transverse glades. The typical surface layer is about five inches of gray marl that has a texture of silt loam. The underlying layer, to a depth of about 15 inches, is gray and light gray marl that has a texture of silt loam. Hard, porous limestone bedrock is at a depth of about 15 inches. The water table remains within 10 inches of the surface for four to six months during most years, receding to as deep as 20 inches during dry periods. Permeability is moderate (USDA, 1996).
- **Lauderhill muck:** Lauderhill muck is moderately deep, nearly level, very poorly drained soil in narrow drainageways and broad open areas within sawgrass marshes. It is ponded for 9 to 12 months in most years. Typically, the soil is muck to a depth of about 30 inches. The upper 7 inches is black and the lower 23 inches is very dark brown. Hard, porous, oolitic limestone bedrock is at a depth of about 30 inches. When it is not ponded, the water table is within 10 inches of the surface for the rest of the year. Permeability is rapid (USDA, 1996).
- **Perrine marl:** Perrine marl is moderately deep, nearly level, poorly drained soil on broad, low coastal flats and in transverse glades. Typically, the surface layer is about ten inches of grayish brown marl that has a texture of silt loam. The underlying layer, to a depth of about 26 inches, is light brownish gray marl that has a texture of silt loam. Few to many light gray, soft accumulations of calcium carbonate and few grayish brown stains are in pockets or around pores and root channels between depths of 11 and 26 inches. Soft, porous limestone bedrock is at a depth of about 26 inches. Under natural conditions, the soil has water above the surface for one to three months during most years. During most years the water table remains within ten inches of the surface for two to four months and is at a depth of 10 to 30 inches for most of the rest of the year. Permeability is moderately slow (USDA, 1996).

Lithology – The surficial deposits at the Units 6 & 7 plant area consist of an average of approximately three ft of muck with the thickness increasing towards the south and east (see Appendix 10.7.7.). The muck is composed of recent light gray calcareous silts with varying amounts of organic content. The surface elevations for this stratum ranged from 0.2 to -1.8 ft NAVD 88. The average grain sizes are provided in Table 3.3.1-1.

The Miami Limestone is white to pale yellow and light brownish gray, oolitic, porous, fossiliferous, and contains vugs that are oriented in either the horizontal or the near vertical direction. The Miami Limestone generally ranges from soft to medium hard depending upon the degree of carbonate cementation and often exhibits a sandy texture, but typically becomes very hard near its base. The top of the Miami Limestone is generally encountered between three and six ft bgs. Laboratory grain size analyses were performed on SPT samples of the Miami Limestone during the geotechnical investigation of the plant area. The results of the grain size analyses are summarized in Table 3.3.1-1. The grain size analyses reflect the generally granular nature of the poorly (soft) portions of the formation. The Miami Limestone is directly underlain by the Key Largo Limestone. The contact between the Miami Limestone and the Key Largo Limestone is generally an irregular gradational contact primarily inferred based on hardness and oolite content. The thickness of the Miami Limestone varies from approximately 22 to 28 ft across the plant area.

The underlying Key Largo Limestone is a coralline limestone characterized by the presence of vuggy porosity with a high degree of interconnectivity. Vugs within the Key Largo Limestone typically exhibit evidence of precipitation of secondary minerals (i.e. calcite). The top of the Key Largo Limestone is generally encountered between 23 and 33 ft bgs. The Key Largo Limestone varies in thickness from approximately 24 ft to less than 14 ft toward the southeast (see Appendix 10.7.7). The contact between the Key Largo Limestone and the underlying Fort Thompson Formation has been identified as a layer of dark gray, fine-grained fresh water limestone that occurs at the base of the Key Largo Limestone. The fresh water limestone is generally more than two ft thick, and it often possesses a sharp color change from light to dark gray at its base that distinctly marks the transition from the Key Largo Limestone to Fort Thompson Formation.

The Fort Thompson Formation is generally a sandy limestone with zones of uncemented sand interbeds and zones of moldic porosity after gastropod and/or bivalve shell molds and casts. Overall, the Lower Fort Thompson Formation has a vuggy secondary porosity with a lower degree of interconnectivity than those of the Key Largo Limestone. The top of the Fort Thompson Formation is generally encountered between 48 and 52 ft bgs. The Fort Thompson Formation is approximately

65 ft thick across most of the plant area. The structure contour map of the top of the Fort Thompson Formation indicates it is a gently undulating surface that shows no evidence of fault displacement (see Appendix 10.7.7).

The Tamiami Formation directly underlies the Fort Thompson Formation. The contact between the Tamiami Formation and the Fort Thompson Formation is an inferred contact picked as the bottom of the last lens of competent limestone encountered. The selection of this inferred contact in each boring was primarily determined from core recoveries and drill rates. The Tamiami Formation generally consists of light gray to greenish gray, poorly graded silty sand, but locally it can be interlayered with clayey sand, silt, and clean clay. Laboratory grain size analyses were performed on SPT and undisturbed samples of the Tamiami Formation obtained during the geotechnical investigation of the plant area. The results of the grain size analyses are summarized in Table 3.3.1-1. The grain size analyses reflect the sandy nature of the formation. The top of the Tamiami Formation was generally encountered between 113 and 117 ft bgs. The structural contour map is in Appendix 10.7.7.

The Peace River Formation of the Hawthorn Group directly underlies the Tamiami Formation and generally consists of poorly graded silty sand down to approximately 460 ft bgs. The contact between the Peace River Formation and the Tamiami Formation is inferred based on an increase in activity on the gamma ray log. The average grain size is presented in Table 3.3.1-1. The top of the Peace River Formation is encountered between 216 and 224 ft bgs in borings B-601, B-701, B-710, and B-708.

The Arcadia Formation of the Hawthorn Group underlies the Peace River Formation. The Arcadia Formation consists of carbonate rock ranging from packstone to wackestone to mudstone with a few isolated lenses of silty sand. The Arcadia Formation varies in hardness from soft (friable) to hard (well indurated), with colors ranging from pale yellow to greenish gray. It is fossiliferous with shell molds and casts. The unit is capped by a gray, hard, indurated dolostone/grainstone with sugary texture containing a few gastropod shell molds and casts. The top of the Arcadia Formation was encountered at 455 ft bgs and extended to the bottom of Boring B-701 at 615.5 ft bgs.

3.3.1.3 Geologic Maps

FPL performed geologic field reconnaissance for the Turkey Point Units 6 & 7 plant area during February and March 2008. The purpose of this study was to expand the knowledge of local stratigraphy, geologic history, geologic structure, and to investigate potential faults in the plant property and the potential for tectonic and non-tectonic surface deformation. The investigation indicates the absence of geomorphic or other evidence suggesting the presence of active or recent

tectonic deformation within the plant property. Ground and aerial reconnaissance indicated evidence for non-tectonic surface deformation in the plant property as depressions caused by surficial limestone dissolution.

3.3.1.4 Bearing Strength

The plant area has suitable strata to support the foundations of Units 6 & 7. Subsurface conditions in the area of the two proposed reactors are consistent. After removing surficial muck and weaker portions of Miami Limestone, the excavation will be extended to approved subgrade approximately 35 ft bgs. Thus, the units will bear on the stronger portions of the Key Largo Limestone. If necessary, portions of the native subgrade will be overexcavated and replaced with dental concrete to create a level subgrade suitable for support. A uniform layer of concrete fill will be used to raise the excavation elevation to approximately 16 ft (NAVD 88), where the base of the reactor units are to be set.

3.3.2 Subsurface Hydrology

Three major components to the subsurface hydrology in this area of Southeast Florida underlie the Turkey Point plant property: (a) the surficial aquifer called the Biscayne Aquifer; (b) the intermediate confining unit (elsewhere in Florida it is also known as the “intermediate confining aquifer”); and (c) the Floridan Aquifer system consisting of the Upper Floridan Aquifer, the middle confining unit, and the Lower Floridan Aquifer. A generalized regional hydrostratigraphic column is presented on Figure 3.3.2-1. Data on general hydraulic properties from EPA (2003), including hydraulic conductivity, porosity, hydraulic gradient, and horizontal seepage velocity, for each hydrologic unit are presented in Table 3.3.1-2.

3.3.2.1 Subsurface Hydrologic Data for the Site

Surficial Aquifer System

The surficial aquifer system comprises all the rocks and sediments from the land surface downward to the top of the intermediate confining unit (Fish and Stewart, 1991). These lithologic materials consist primarily of limestones and sandstones with sands, shells, and clayey sands with minor clays and silts. The top of the system is land surface, and the base of the system is defined by a significant change in the average hydraulic conductivity (Fish and Stewart, 1991). Sedimentary bedrock and unconsolidated sediments in the surficial aquifer system have a wide range of hydraulic properties and locally may be divided into one or more aquifers that are separated by less-permeable units. A generalized site hydrostratigraphic column is presented in Figure 3.3.2-2. Within the surficial aquifer system, the major water-producing unit is the unconfined Biscayne Aquifer, which underlies the

Turkey Point plant property and all of Miami-Dade County and parts of Broward, Monroe, and Palm Beach Counties (Parker et al., 1955; Fish and Stewart, 1991). The Biscayne Aquifer contains carbonate rocks, sandstones, and sand extending from land near western Miami-Dade County and deepening northward to more than 200 ft bgs in southeastern Palm Beach County. These formations include, from oldest to youngest (bottom to top): the Tamiami Formation, Caloosahatchee Marl, Fort Thompson Formation, Anastasia Formation, Key Largo Limestone, Miami Limestone, and Pamlico Sand (Fish and Stewart, 1991). However, the entire sequence of units is not present in any one place. In the plant area, the lithologies within the Biscayne Aquifer include the Miami and Key Largo Limestones and the Fort Thompson Formation (Figures 3.3.1-5 and 3.3.1-6). The Fort Thompson and the Key Largo Limestone (interpreted as the Upper Fort Thompson elsewhere) are the major water producing formations within the Biscayne Aquifer (Miller, 1990). Site specific boring data indicates that the approximate thickness of the Biscayne Aquifer is 115 ft in the plant area.

The Biscayne Aquifer has been declared a sole-source aquifer by the EPA. A sole-source aquifer is defined as the sole or principal source of drinking water that supplies 50 percent or more of the drinking water for an area, with no reasonably available alternative source should the aquifer become contaminated. The Biscayne aquifer in the area of Units 6 & 7 contains saline to saltwater and is not potable.

Transmissivities for the highly permeable limestones and less permeable sandstones and sands of the Biscayne Aquifer have been estimated to range from less than 1.0×10^6 gpd/ft (gallons per day per ft) to 3.0×10^6 gpd/ft (Dames and Moore, 1975). The permeable limestone content in the aquifer decreases northward and the overall transmissivity of the aquifer decreases with increased sand content. Along the coast, where the Biscayne Aquifer is the thickest, transmissivities are lower due to the amounts of sandy material. In central and south Miami-Dade County, the aquifer is thinner with higher hydraulic conductivity due to the occurrence of vuggy and highly porous limestone (Klein and Hull, 1978). A generalized structure contour map of the base of the Biscayne Aquifer is presented in Appendix 10.7.7. Large capacity municipal wells are commonly completed as open holes and yield from 500 to more than 7000 gallons per minute with only small draw-downs. Specific capacities obtained from pumping tests are on the order of 1000 gallons per minute per ft of draw-down in Miami-Dade County (Klein and Hull, 1978).

In the vicinity of the Turkey Point plant property, the water table occurs mainly within the Recent organic soils or the Miami Limestone and fluctuates in response to variations in tides, recharge,

natural discharge, and pumpage from wells. Natural discharge is by seepage into streams, canals, or the ocean; by evaporation; and by transpiration by plants. Regional groundwater flow in the Biscayne Aquifer is generally toward the east-southeast.

Locally, the direction of flow may be influenced by the industrial wastewater facility and the two water management canals at the south end of the canal system (FPL, 2008). The cooling canals are approximately 5,900 acres with about 4,370 acres of water surface. The cooling canals receive inflow and outflow from the saline aquifer beneath Biscayne Bay due to the porosity of the underlying rock. The industrial wastewater facility is a closed-loop system that carries warm water south from the existing plant and returns cooled water. Due to evaporation, the salinity of the cooling canals is typically 1.5 to 2 times that of Biscayne Bay. The industrial wastewater facility does not directly discharge to fresh or marine surface waters; however, because the canals are not lined, groundwater does interact with water in the industrial wastewater facility (FPL, 2008).

Water level measurements made inside and outside the industrial wastewater facility have previously indicated that the water in the system rises and falls with the water level in Biscayne Bay. This is probably due to the high porosity and permeability of the rock in which the industrial wastewater facility was constructed (FPL, 2008).

Rainfall is the principal recharge mechanism for the Biscayne Aquifer. Recharge by rainfall is greatest during the wet season, from June to November, and recharge by canal seepage is greatest during the dry season, from December to May. The average annual rainfall in Miami-Dade County is approximately 60 inches. Along the Atlantic Coastal Ridge where the water table is deepest, approximately 38 inches are recharge to the aquifer and 22 inches are lost to evapotranspiration (Parker, Ferguson and Love, 1955). Recharge occurs over most of Miami-Dade County during rainstorms. The low coastal groundwater levels and the low, but continuous, seaward gradient indicate a very high transmissivity in the aquifer, a high degree of interconnection between the aquifer and the drainage canals, and the effectiveness of the present drainage canal system in rapidly dispersing floodwaters (Fish and Stewart, 1991).

Groundwater in the vicinity of Turkey Point is not used as a potable water source because of its salinity. The State of Florida has classified these as Class G-III waters to identify groundwater that has no reasonable potential as a future source of drinking water due to high total dissolved solids content (FPL, 2003).

The Biscayne Aquifer extends beneath Biscayne Bay and the Atlantic Ocean, and because of the aquifer's high permeability and in response to the lowering of inland groundwater levels due to pumping for water supply, saltwater has migrated inland along the base of the aquifer and affects the entire coastal zone. Saltwater moves inland and upward in response to low groundwater levels and moves seaward and downward in response to high groundwater levels (Klein and Hull, 1978).

Biscayne Aquifer groundwater use in the immediate vicinity of the plant area has been limited due to the saline to saltwater composition of the groundwater. The freshwater-saltwater interface is approximately seven to eight miles inland of the plant area (see Appendix 10.7.7).

Intermediate Confining Unit

The intermediate confining unit is defined as including "all rocks that lie between and collectively retard the exchange of water between the overlying surficial aquifer system and the underlying Floridan Aquifer System" (Southeastern Geological Society, 1986). The intermediate confining unit in southeastern Florida consists of strata that are assigned to the Hawthorn Group. These strata consist mainly of silty calcareous sands, silts, calcareous wackestones, limestones, sandstones, and sands. The top of the Hawthorn Group occurs at approximately 100 to 200 ft bgs in the vicinity of the Site. The Hawthorn Group sediments are up to approximately 900 ft thick in southern Florida. The unit is not exposed at the land surface. Sand beds and limestone lenses comprise the permeable parts of the system; however, the overall hydraulic conductivity of the group is very low and provides good confinement for the underlying Floridan Aquifer System. (Representative hydrogeologic properties for the intermediate confining unit are provided in Table 3.3.1-2.)

The Floridan Aquifer System

The Floridan Aquifer System as defined by Miller (1986) is a vertically continuous sequence of interbedded carbonate rocks of Tertiary age that are hydraulically connected by varying degrees and with permeabilities several orders of magnitude greater than the hydrogeologic systems above and below. The system underlies all of Florida and formally consists of three main hydrogeologic units in Southern Florida: the Upper Floridan Aquifer, the middle confining unit, and the Lower Floridan Aquifer (Figure 3.3.2-1). In eastern Miami-Dade County area the top of the Floridan Aquifer, System is found at depths of 900 ft bgs or greater, is approximately 3,000 ft thick, and is directly overlain by the intermediate confining unit (Reese and Richardson, 2008). The Floridan Aquifer System forms the deepest part of the active groundwater flow system in southeastern Florida (Southeastern Geological Society, 1986).

Floridan Aquifer System: Upper Floridan Aquifer

The topmost hydrogeologic unit of the Floridan Aquifer System is the Upper Floridan Aquifer. The Upper Floridan Aquifer consists of several thin water bearing zones of high permeability interlayered with thick zones of low permeability. The hydrogeology of the Upper Floridan Aquifer varies throughout Florida. In southeastern Florida, the aquifer has been interpreted to include a thinner Suwannee Limestone and extends down into the Avon Park Formation. The restriction of groundwater movement between flow zones is typically better in southwestern Florida than in southeastern Florida. In southeastern Florida, the Upper Floridan Aquifer ranges from 100 to greater than 400 ft in thickness (Reese and Richardson, 2008). In the immediate Turkey Point Units 6 & 7 plant area, the Upper Floridan Aquifer is approximately 200 ft thick.

Groundwater movement is generally southward from the area of highest head in central Florida, eastward to the Straits of Florida and westward to the Gulf of Mexico (Meyer, 1989). In southeastern Florida, the pre-development and post-development regional groundwater flow directions are either to the east or to southeast (Bush and Johnston, 1988). Porosity and permeability in the aquifer vary widely depending on location and formation. A pumping test was conducted by JLA Geosciences, Inc. (JLA) in 2006 for FPL on saline groundwater supply well PW-1 (completed as an open hole well between depths of 1,003 ft and 1,242 ft in the Upper Floridan Aquifer). This well, one of three wells installed to supply cooling and process makeup water for Turkey Point Units 1, 2, and 5, produced a transmissivity value of approximately 32,620 ft²/d (244,000 gpd/ft). Transmissivity of the Upper Floridan Aquifer is highest in west central Florida (greater than 100,000 ft²/day) with lower transmissivities (less than 10,000 ft²/day) in central Florida (Reese and Richardson, 2008).

Although the Upper Floridan Aquifer is a major source of potable groundwater in much of Florida, water withdrawn from the unit in southeastern Florida, including Miami-Dade County, is brackish and variable in quality (Reese and Richardson, 2008).

Floridan Aquifer System: Middle Confining Unit

The middle confining unit of the Floridan Aquifer System underlies the Upper Floridan Aquifer separating it from the Lower Floridan Aquifer. In many places, the middle confining unit is divided into upper and lower units separated by the Avon Park permeable zone. The middle confining unit contains beds of micritic limestone (wackestone to mudstone), dolomitic limestone, and dolomite (dolostone) that are distinctly less permeable than the strata of the Upper Floridan aquifer and Lower Floridan aquifer. The elevation of the top of the middle confining unit is approximately -1,200 ft

MSL and the thickness is approximately 1,000 ft in the area of the Turkey Point plant area (Reese and Richardson, 2008; Starr et al., 2001).

The transmissivity of the Avon Park permeable zone of the Lower Floridan Aquifer is generally less than 100,000 square ft/day (ft^2/day) in southern Florida while vertical hydraulic conductivities of core samples from the middle confining unit and Lower Floridan Aquifer range from 3.0×10^{-2} (ft/day) to 3.0×10^{-5} ft/day (Reese and Richardson, 2008). Based on core sample analysis, packer tests, and aquifer tests conducted at the Miami-Dade South District Wastewater Treatment Plant site, the hydraulic conductivity of the middle to lower part of the confining unit ranges from 3.0×10^{-3} to 3.0 ft/day (Reese, 1994). Vertical hydraulic conductivity measured in eight core samples from a well drilled in eastern Broward County, reported in Reese (1994), ranged from 1.3×10^{-4} to 0.24 ft/day .

Floridan Aquifer System: Lower Floridan Aquifer

The Lower Floridan aquifer in southern Florida consists of a thick sequence of low permeability rocks separated by relatively thin permeable zones (Miller, 1986). The aquifer underlies the middle confining unit and extends from a depth of approximately 2,400 feet bgs to a depth that is undetermined, but thought to be greater than 4,000 feet bgs in the Miami-Dade County area. The Lower Floridan Aquifer includes the lower part of the Avon Park Formation, the Oldsmar Limestone, and the upper part of the Cedar Keys Formation (Figure 3.3.2-1). The base of the Lower Floridan aquifer (or the base of the Floridan aquifer system) is marked by impermeable, massive anhydrite beds of the Cedar Keys Formation (Miller 1986).

A highly permeable zone in the Lower Floridan aquifer known as the Boulder Zone occurs in southern Florida. The Boulder Zone contains saline water and has been permitted by the Florida Department of Environmental Protection as a zone to discharge treated sewage and other wastes disposed of through injection wells operated in South Florida.

In southern Florida, the Lower Floridan aquifer contains thick confining units above the Boulder Zone. These confining units are similar in lithology to the middle confining unit of the Floridan aquifer system (Reese 1994). The base of the Lower Floridan aquifer is approximately 500 to 600 feet below the base of the Boulder Zone with the lower section consisting of permeable dolomites or dolomitic limestones of the Cedar Keys Formation (Meyer 1989 and Reese 1994).

Based on previous studies in the region, the Boulder Zone underlies a 13-county area in southern Florida and is found at a depth of approximately 2,800 feet in the Turkey Point Units 6 & 7 plant area

(Reese and Richardson, 2008; Starr et al., 2001; Dames and Moore, 1975). Transmissivities ranging from 3.2×10^6 to 24.6×10^6 ft²/d have been reported (Meyer, 1989). A measured hydraulic conductivity value of approximately 4,250 ft/day was obtained from an injection well at the South District Water Treatment Plant operated by the MDWASD. This value is approximately two orders of magnitude larger than measured values in the overlying portion of the Lower Floridan Aquifer and the middle confining unit (Fish and Stewart, 1991).

There is also a pronounced temperature anomaly present in the Boulder Zone with the lowest observed temperatures (approximately 50 °F) occurring along the southeastern coast. Temperatures increase from the Straits of Florida toward the center of the Florida Plateau, suggesting recharge from cold seawater through the lower part of the Floridan Aquifer System. Average dissolved solids and chloride concentrations of Boulder zone groundwater are approximately 37,000 mg/L TDS and 19,769 mg/L, respectively (Meyer, 1989; Reese, 1994).

3.3.2.2 Karst Hydrogeology

The term karst is used to describe areas where the landscape and its subsurface have been modified by the dissolution of soluble rock, such as limestone within an aquifer. While near-surface geologic rock units in the site area are primarily composed of limestone, personal communication with the Florida Geological Survey (Scott, 2008) indicates that dissolution present in the site area is generally considered to be micro-karst with numerous small cavities as observed in the rock core from the site.

The Florida Geological Survey described southeastern Miami-Dade County as being an area in which sinkholes are few, generally shallow and broad, and develop gradually, with solution sinkholes dominating. Solution sinkholes occur where limestone is exposed at the ground surface or is thinly covered. Dissolution is concentrated at the limestone surface and along joints, fractures, or other openings in the rock. Their development is typified by a slow downward movement of the ground surface that results in the formation of a depression that is commonly filled with organic sediments. These sinkholes typically manifest themselves as bowl-shaped depressions at the ground surface. Solution sinkholes are thus fundamentally different from cover-collapse sinkholes and cover-subsidence sinkholes, which occur in the northern and central parts of Florida where dissolution occurs underground (often undetected) and forms caverns that are subject to abrupt collapse. These areas also commonly have only a thin or no confining sediments between the Surficial and Floridan Aquifer Systems. Sinkholes and caverns are rare in Miami-Dade County (Sinclair and Stewart, 1985 and Lane, 1986).

However, according to Renken et al. (2005), sinkholes and caves have been found in Miami-Dade County along the Atlantic coastal ridge, where limestone is present at a relatively high elevation, extending southward from south Miami toward Everglades National Park. Parker et al. (1955) states that the Miami Limestone and Fort Thompson Formation have significant permeability and solution features that have created turbulent flow conditions in some wells. According to Cunningham et al. (2004), topographic relief related to karst dissolution is well documented in the Lake Belt area of north-central Miami-Dade County approximately 90 miles northwest of Units 6 & 7. These studies contain no suggestion of the presence of buried sinkholes, caverns, or other large-scale underground karst features in the vicinity of the site (Maliva, 2009).

A Florida Geological Survey Investigation (Vanlier et al., 1973) concludes that most of Miami-Dade County is underlain by limestone containing solution cavities. It indicates that a few general localities in the Homestead/Turkey Point area may be underlain by open and sand-filled cavities in a zone occurring between depths of about 18 to 31 feet. However, the locations of any such cavities have not been determined. The indicated depth interval correlates roughly with that of the Miami Limestone beneath Units 6 & 7, which will be removed during plant construction.

Small dissolution features in the form of vugs and moldic secondary porosity were observed in limestone drill core obtained at Units 6 & 7, particularly in the Miami Limestone and Key Largo Limestone. During the course of the site subsurface investigation, the following observations were made with respect to the presence of subsurface solution activity:

- No large dissolution features were encountered;
- Rod drops during drilling were negligible;
- No unusual loss of drilling fluid occurred;
- Caliper logs did not reveal the presence of any large voids; and
- Acoustic logs did not indicate the presence of any large voids.

Subsequent site geophysical surveys using microgravity, seismic refraction, and multi-channel analysis of surface waves (MASW) methods were used to further evaluate the potential for carbonate dissolution features. Analysis of the resulting data confirmed the absence of underground caverns or sinkholes resulting from subsurface dissolution and collapse at the Turkey Point Units 6 & 7 plant area.

3.3.3 Site Water Budget and Area Users

3.3.3.1 Site Water Budget

Climate and Meteorology

The Turkey Point Plant is located in the southeastern portion of peninsular Florida, which has a climate characterized as subtropical marine. Air-dry bulb temperatures in the vicinity of the Site (measured at Miami, Florida) range from a normal monthly average of 68.1 degrees Fahrenheit (°F) in January, to a normal monthly average of 83.7°F in July, with an annual average of 76.7°F. The highest and lowest temperatures recorded are 98° and 30°F, respectively. Monthly and annual average temperatures for MIA are presented in Table 3.3.3-1.

Normal mean total annual rainfall measured at MIA (1971–2000) is 58.5 inches, with mean monthly totals ranging from 1.88 inches in January to 8.63 inches in August. Generally, the period of the year with the heaviest rainfall in southeast Florida is from June through October and, on average, 65 percent of annual rainfall occurs in this season. Annual and monthly average rainfall data from MIA are presented in Table 3.3.3-2.

Potential evapotranspiration (PET), or evaporation from wetlands and shallow lakes, is approximately 54 inches per year (Abtew et al., 2003). The minimum monthly PET occurs in December (3.0 inches) and the maximum monthly PET occurs in May (5.5 inches). Consequently, if rainfall is 58.5 inches per year, runoff from wetland areas is only about 4.5 inches/year.

Parker et al. (1955) report that in the coastal ridge south of Miami, where the water table is deeper, annual average rainfall was 60 inches, 38 inches was recharge to the aquifer and only 22 inches was lost to evapotranspiration. In either case, there is very little direct runoff of precipitation. However, regional discharge of the surficial aquifer into drainage canals that flow directly into Biscayne Bay is estimated to be about 15 to 25 inches per year.

3.3.3.2 Area Users

In 1945, pumpage from the Biscayne Aquifer was estimated at 58.4 MGD (Parker et al., 1955); in 2003, the Miami-Dade Water and Sewer Department (MDWASD) reports they withdrew approximately 330 MGD from the aquifer to meet the potable needs of the community, and an additional 320 MGD are used for agricultural purposes. The amount of withdrawal in 2006 by MDWASD was 347 MGD (SFWMD, 2007a). In November, 2007, the SFWMD issued to MDWASD a 20-year consumptive water use permit with an annual allocation of 152,741 million gallons (about 418 MGD) and a maximum monthly allocation of 13,364 million gallons per month

(about 440 MGD) (SFWMD, 2007b). The allocation consists of withdrawals from the Biscayne Aquifer, Floridan Aquifer and reuse offsets for specific periods. In the period from January 1, 2018 through December 31, 2022, the annual allocation is 136,156 million gallons (about 373 MGD) from the Biscayne Aquifer, 10,741 million gallons (about 29 MGD) from the Floridan Aquifer, and 10,614 million gallons (about 29 MGD) in reuse offsets. The use of reclaimed water by Turkey Point Units 6 & 7 was recognized as a potential beneficial reuse project in the SFWMD recommendations to the SFWMD Governing Board, which approved the consumptive use permit (SFWMD, 2007a).

SFWMD regulates surface and groundwater usage in the vicinity of the Turkey Point Plant. Figure 3.3.3-1 shows the permitted users within a 5-mile radius of the Site and Table 3.3.3-3 shows details of their permits. There are no potable water wells currently in use within 1 mile of the Site.

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 Turkey Point Plant is classified by FDEP as Class G-III (see Appendix 10.6) that has no reasonable potential as a future source of drinking water due to the high dissolved solids.

3.3.4 Surficial Hydrology

3.3.4.1 Hydrological Characterization

Site and Associated non-linear Facilities

The Turkey Point plant property 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 towards Biscayne Bay. Since the shallow tidal creeks and swales are submerged at high tide, stream flow is very sluggish. This, together with the permeable limestone bedrock of the area, results in most of the rainfall evaporating or percolating directly to the groundwater aquifer. Except near well-defined stream channels, heavy precipitation runs off in a slow sheet-like flow toward Biscayne Bay. Some surface flow from the west is directed away from the Turkey Point property by off-site drainage and flood control canals.

The Site, which is approximately 300 acres, is located entirely within the perimeter canals of the industrial wastewater facility. The nuclear administration building, training building and parking area are located north of the Site, inside the perimeter canals of the industrial wastewater facility. Consequently, the Site and these other areas currently drain to the industrial wastewater facility. The area to be used for the FPL reclaimed water treatment plant, which is approximately 44 acres, is

located between the L-31E Canal and the existing Turkey Point Plant access road. This area currently drains north and east through mangrove swamps toward the Bay. The upland area to be used for the radial collector wells on the Turkey Point peninsula also currently drains through coastal mangrove swamps toward the Bay.

~~The FPL owned fill source, which is approximately 300 acres, is located about four miles northwest of the Site (see Figure 3.1.2-1). The property is located northwest of the intersection of SW 107th Avenue and SW 312th Street. Land use is agricultural (predominately tree nurseries). The surface elevation in this area is about three ft above sea level. The land is almost flat, with a very small slope (one to two ft per mile) to the east. Consequently, significant direct surface runoff is not expected. Surface drainage in the area is currently through swales and roadside ditches to the Military or Mowry Canals and then toward Biscayne Bay. Rock (Miami Limestone) is generally encountered four to five ft below ground surface. The upper four to five ft of land surface is a mixture of marl, peat and fill. The Fort Thompson Formation and Key Largo Limestone (interbedded) are found between 9 and 74 ft below ground surface.~~

Biscayne Bay is to the east of the Site, the industrial wastewater facility is to the south and west, and Units 1 through 5 are to the north. The main canals returning cooling water to Units 1 through 4 flow around the Site.

Biscayne Bay

Biscayne Bay is a shallow subtropical lagoon located on the southeast coast of Florida. The eastern boundary of Biscayne Bay is composed of barrier islands that eventually become part of the Florida Keys. The western shore is the Florida mainland. Biscayne Bay is connected to the Atlantic Ocean by several channels and cuts, some natural and some man-made, near barrier islands. 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 (Figure 3.3.4-1). 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, Biscayne Bay does not receive a significant sediment load from major river systems. Biscayne Bay can be divided into 3 areas: North Bay, Central Bay, and South Biscayne Bay. South Biscayne Bay includes water bodies known as South Bay, Card Sound, and Barnes Sound. The Site 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, Mowry Canal, and Model Land

Canal. Ocean exchange is restricted to the tidal channels between the islands of the northern portion of the Florida Keys.

South Bay (also identified as Lower Biscayne Bay) is about 100 square miles (64,000 acres) in area. The average depth is less than 6 ft at Mean Low Water (MLW), with a maximum depth of 13 ft. The volume at MLW is on the order of $1.5 \times 1,010$ cubic ft (ft³). Mean tide is 1.65 ft on the mainland shore and 1.55 ft on Elliott Key (eastern side). Near the Site, salinities vary widely. Typically, salinities range from a low of 23 parts per thousand (ppt) to a high of 41 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° to 92°F at the surface, with little or no stratification. A summary of historical water quality, measured at three stations near the Site in Biscayne Bay, is provided in Table 3.3.4-1.

Studies of the Bay show the principal circulation forces to be tidal, although winds that 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 Biscayne Bay system itself (FPL, 1972).

The radial collector wells will be located on the narrow peninsula of land called Turkey Point, east of the existing Turkey Point Plant. Since almost all the water withdrawn by the radial collector wells will be recharged from the Bay, FPL recently collected a water quality sample from the bay near Turkey Point (location: N 25° 26.386 W 80° 18.881) to further characterize this water source. The sampling location is shown in Figure 3.3.4-2. The results are presented in Table 4.5-3, where the plant water systems are discussed. The water quality results for this sample are consistent with the historical data presented in Table 3.3.4-1.

Cooling Canals/Industrial Wastewater Treatment and Disposal Facility

The existing Units 1 through 4 utilize the 5,900-acre closed-loop cooling canals for condenser cooling (see Figure 3.3.4-3). The cooling canals carry warm water south of the existing Plant and return cooled water. The canal system does not directly discharge to fresh or marine surface waters; however, because the canals are not lined, water in the canal system does interact with groundwater. The closed-loop recirculating cooling canal system is an industrial wastewater treatment and disposal facility authorized under FDEP permit No. FL0001562. Makeup water for the industrial wastewater facility comes from cooling tower blowdown, low-volume wastes and other process wastewaters,

rainfall, stormwater runoff associated with industrial and non-industrial activities, and groundwater infiltration to replace evaporative and seepage losses. Consequently, the water in the canals is hypersaline due to the effects of evaporation, with salinity concentrations between 1.5 and 2.0 times the salinity of Biscayne Bay.

Plant circulating water for Units 1 through 4 is pumped from an internal canal called Loch Rosetta, which draws water northward from the seven easternmost canals, which are the cool side of the canal system. The water then passes through the condensers, where it picks up heat, and then is released to the northern end of the 32 westernmost canals. From there, it flows south in the 32 westernmost canals, is collected and flows east across the southern end of the cooling canal system, and then flows north in the seven easternmost canals.

Water quality sampling and analyses have been performed in the cooling canals by FPL. The results are summarized in Table 3.3.4-2.

3.3.4.2 Measurement Programs

The water quality data for this section of the application have been obtained from the literature, from monitoring under the industrial wastewater facility permit, and from additional field sampling and analysis. This information provided the background for the water quality analyses for the impact assessments presented in Subsections 5.2 and 6.1.

3.3.5 Vegetation/Land Use

Characteristic vegetative communities/land uses within the Site and the locations for associated non-linear facilities were classified utilizing the FLUCFCS Level III (FDOT, 1999) during field reconnaissance conducted in November 2007 and June-October 2008. Vegetative communities within and adjacent to the Site and associated facilities are discussed in detail in Subsection 3.3.6.1. Appendix 10.7.1.1 presents photographs representative of vegetation/land use classifications.

3.3.5.1 Site

The approximately 300-acre Site consists of the 218-acre plant area for Units 6 & 7, and adjacent areas designated for laydown. Existing vegetation/land use within the Site includes hypersaline mud flats (FLUCFCS 650), man-made active cooling canals (FLUCFCS 510), man-made remnant canals (FLUCFCS 511), previously filled areas/roadways (FLUCFCS 744), mangrove heads (FLUCFCS 612-A) associated with historical tidal channels, dwarf mangroves (FLUCFCS 612-B), open

water/discharge canal (FLUCFCS 531) associated with the cooling canals on the western portion of the Site, wet spoil berms associated with remnant canals (FLUCFCS 743-Wet), and upland spoil areas (Figure 3.3.5-1). The areas surrounding and adjacent to the Site include oil and gas-fired generation units (Units 1, 2, and 5), nuclear generation units (Units 3 and 4), and supporting facilities (FLUCFCS 831), tidal mangrove swamp (FLUCFCS 612), transmission lines (FLUCFCS 832), cooling canals (FLUCFCS 510), and Biscayne Bay.

Approximately 64 percent of the Site is composed of sparsely-vegetated hypersaline mud flats (187.5 acres), isolated from Biscayne Bay by the surrounding man-made cooling canals (16.7 acres). This area is contained within the industrial wastewater facility that supports the operation of existing Turkey Point Units 1 through 5. Two remnant cooling canals (8.4 acres) bisect the mud flat area, and small channels support scattered areas of mangrove heads (12.2 acres) within the surrounding mud flats. Additional land use/land cover within the Site includes upland (7.8 acres) and wetland (9.1 acres) spoil berms, located adjacent to the remnant and active canals. Portions of the Site for staging and laydown currently consist of previously filled areas/roadways (20 acres), dwarf mangroves (16.9 acres), open water/discharge canal (12 acres), and a man-made remnant canal in the northwest portion of the Site (4.1 acres of the previously-described 16.7 acres of cooling canals). A north-south access road is located adjacent to the western edge of the mud flat area (Figure 3.3.5-1).

3.3.5.2 Associated Non-Linear Facilities

Nuclear Administration Building, Training Building and Parking Area

Land use/land cover in the area north of the Site for the nuclear administration building, training building and parking area includes isolated mangrove swamp (FLUCFCS 612) and an area dominated by mangrove and coastal plain willow (FLUCFCS 612/618) (see Figure 3.3.5-1). These areas comprise approximately 26 acres, including approximately 18.5 acres of isolated mangroves and 7.6 acres of isolated mangrove/willow wetlands located south of the existing Units 3 and 4 parking lots.

FPL Reclaimed Water Treatment Plant and Treated Reclaimed Water Delivery Pipelines

An FPL reclaimed water treatment facility and treated reclaimed water pipelines are to be located between the L-31E Canal and the existing Turkey Point plant access road (see Figure 3.3.5-2). The reclaimed water treatment facility will occupy approximately 44 acres located within an area dominated by dwarf mangroves (FLUCFCS 612-B).

From the FPL reclaimed water treatment facility, the treated reclaimed water delivery pipelines will follow the existing access road to the southeast and then turn south along an existing road. The pipelines would then cross fill areas/roadways (FLUCFCS 744), dwarf mangroves (FLUCFCS 612-B), mixed wetland hardwoods (FLUCFCS 617), and the existing discharge canal (FLUCFCS 510), ending at the southwest portion of the Site (see Figure 3.3.5-2). Vegetative communities/land use within the reclaimed water delivery pipeline corridor between the Miami-Dade County South District Wastewater Treatment Plant and the FPL reclaimed water treatment facility are discussed in Chapter P9.0.

Radial Collector Wells and Delivery Pipelines

Four radial collector well caissons will be located in uplands on the Turkey Point peninsula to the east of the existing Turkey Point Plant. The footprint for each caisson will be approximately 25 to 30 ft in diameter. Vegetative communities present within the Turkey Point peninsula include previously filled areas/roadways (FLUCFCS 744) and adjacent coastal mangrove swamp (FLUCFCS 612); caissons will be located within previously filled areas of the peninsula (Figure 3.3.5-2). Vegetative communities along the delivery pipelines include previously filled areas/roadways (FLUCFCS 744) and adjacent coastal mangrove swamp (FLUCFCS 612).

Equipment Barge Unloading Area

In order to facilitate equipment barge unloading, a portion of the existing barge unloading area (FLUCFCS 512) will be expanded. Upland portions of the equipment barge unloading area consist of land currently classified as electric power facilities (FLUCFCS 831) (see Figure 3.3.5-2).

~~FPL-Owned Fill Source~~

~~The location of the FPL-owned fill source comprises approximately 300 acres of agricultural land southeast of Homestead Air Reserve Base, northwest of the intersection of SW 117th Avenue and SW 312th Street (Figure 3.3.5-3). The majority of the source area (approximately 82 percent) is composed of tree nurseries (FLUCFCS 241), with additional areas of exotic wetland hardwoods (FLUCFCS 619), wetland scrub (FLUCFCS 631), freshwater marshes (FLUCFCS 641), and ditches (FLUCFCS 511).~~

3.3.5.3 Additional Areas Used During Construction

Additional Laydown Areas Adjacent to the Site

Land use/land cover in the area northwest of the Site for additional laydown areas includes previously filled areas/roadways (FLUCFCS 744) and parking lots associated with existing electric power

facilities (FLUCFCS 831), totaling approximately seven acres southwest of the Turkey Point substation. Previously filled areas (FLUCFCS 744) south of the turning basin will be used for laydown area for the construction of the radial collector wells.

Spoils Areas

Spoils generated from demucking the Units 6 & 7 Site will be deposited upon existing upland spoil berms (FLUCFCS 743) located adjacent to the Grand Canal (main return canal) and the southern boundary of the industrial wastewater facility. These areas comprise approximately 200 acres.

3.3.6 Ecology

3.3.6.1 Species-Environmental Relationships

The following subsections include descriptions of flora and fauna at the Site, locations for associated non-linear facilities, and surrounding areas. This discussion includes information related to the abundance of species found and the value of the habitats present, by FLUCFCS Level III codes.

Vegetative Communities of the Site

Active Canals (FLUCFCS 510) – Man-made active cooling water canals surround the Site. The existing Turkey Point Plant uses the cooling canals of the industrial wastewater facility, to cool and recirculate condenser cooling water for existing Units 1, 2, 3, and 4, and to receive blowdown from the Unit 5 cooling tower. Vegetation in the cooling canals include submerged, rooted marine plants, primarily widgeon grass (*Ruppia maritima*) and marine algae, as well as terrestrial woody vegetation along the berms such as Brazilian pepper (*Schinus terebinthifolius*), Australian pine (*Casuarina equisetifolia*), wild sage (*Lantana involucrata*), and buttonwood (*Conocarpus erectus*).

Approximately 17 acres of active cooling canals are located within the Site, surrounding the mud flat area (see Figure 3.3.5-1). Construction at the Site will not encroach upon the existing cooling canals, with the exception of a 4.1-acre dead-end canal near the northwestern edge of the Site, which is to be used for laydown. The depth of this canal precludes the growth of submerged aquatic vegetation. The edges of the canal contain a narrow strip of mangroves, seagrass (*Coccoloba uvifera*), Brazilian pepper, and Australian pine.

Remnant Canals (FLUCFCS 511) – Two man-made remnant cooling canals bisect the plant area (see Figure 3.3.5-1). These canals were utilized as part of the historic intake/discharge cooling water system of the Turkey Point Plant Units 1 and 2 prior to construction of the closed-loop cooling canals.

These canals no longer connect to Biscayne Bay. The remnant canals connect to the larger active cooling canals on the perimeter of the plant area.

The remnant canals were originally dredged, and spoil material deposited along the edge of the canals. The canals are relatively free of emergent aquatic vegetation, although submerged aquatic vegetation is common. Approximately 80 percent of the canals contain submerged aquatic vegetation, principally widgeon grass, with shoal grass (*Halodule wrightii*) and green algae (*Batophora*, *Caulerpa*, and *Acetabularia* spp.) also present. The remnant canals comprise approximately eight acres of the Site.

Open Water/Discharge Canal 1 (FLUCFCS 531) – The western portion of the Site contains approximately 12 acres of open water (see Figure 3.3.5-1) associated with an active cooling canal (Discharge Canal 1). This area experiences highly variable hydrology resulting from operation of the existing Turkey Point Plant. Due to the elevated temperature, high salinity, and altered hydrology, much of the substrate is bare sediment. Approximately 30 percent of the open water/Discharge Canal 1 area supports submerged aquatic vegetation in the form of widgeon grass and shoal grass. Patches of dwarf mangroves and dead buttonwood are located near the shoreline of the open water/Discharge Canal 1 area.

Mangrove Heads (FLUCFCS 612-A) – Mangrove heads occur within the plant area associated with historical tidal creek channels through the surrounding mud flats (see Figure 3.3.5-1). The historical tidal connections to Biscayne Bay were severed during construction of the cooling canals, which has resulted in hypersaline conditions, altered hydrology, and elevated temperatures. Whereas undisturbed tidal creeks of Biscayne Bay typically contain dense mangrove growth along the entire creek channel, the channels within the Site contain sparse pockets of mangroves, likely due to stress caused by the hypersaline conditions and fluctuations in water levels. Additional catastrophic impacts occurred during the extremely low temperatures of 1989 and Hurricane Andrew in 1992, which reduced the extent of mangroves within the Site. The mangrove heads are dominated by red mangrove (*Rhizophora mangle*), with white mangroves (*Laguncularia racemosa*) and black mangroves (*Avicennia germinans*) also present. A total of approximately 12 acres of mangrove heads occur within the Site.

Dwarf Mangrove (FLUCFCS 612-B) – Patches of dwarf mangroves are present in the western portion of the Site in areas for laydown (see Figure 3.3.5-1). These mangroves are located adjacent to the open water/Discharge Canal 1 portion of the cooling canals, and are stunted due to elevated

salinity and temperature, as well as lack of tidal flushing with nutrient-rich waters from Biscayne Bay. The extremely low temperatures of 1989 and the impact of Hurricane Andrew in 1992 further stressed the vegetative community within this area, resulting in high mortalities, particularly of mangroves and buttonwood. Red mangrove is the dominant species within the dwarf mangrove community, with black mangrove, white mangrove, and buttonwood also present. A total of approximately 17 acres of dwarf mangroves occur within the Site.

Mud Flats (FLUCFCS 650) – The majority of the Site is comprised of semi-barren hypersaline mud flats (see Figure 3.3.5-1). As a portion of the industrial wastewater facility for the existing Turkey Point Plant, this area experiences routine alterations in hydroperiod. The area is typically inundated for approximately three to four months each year. Vegetative cover is sparse in the mud flat area due to the high salinity and drastic fluctuations in water levels. Species present in this area include saltwort (*Batis maritima*), sea oxeye daisies (*Borrchia* spp.), woody glasswort (*Salicornia virginica*), and dwarf glasswort (*Salicornia bigelovii*). Approximately 188 acres of the Site are composed of mud flats.

Upland Spoil Areas (FLUCFCS 743) – There are areas of upland spoil along the northern and southern boundaries of the Site, created through deposition of spoil material generated from canal dredging (see Figure 3.3.5-1). Both areas are dominated by exotic species such as Australian pine, Brazilian pepper, and half-flower (*Scaevola sericea*). Other species present include poisonwood (*Metopium toxiferum*), buttonwood, wild sage, ground orchid (*Bletia* sp.), and sea grape. Approximately eight acres of upland spoil area occur within the Site.

Wetland Spoil Areas (FLUCFCS 743-Wet) – Spoil deposits adjacent to the remnant canals (see Figure 3.3.5-1) are relatively low topographically, exhibit hydric conditions, and support hydrophytic vegetation. Common species on these wetland spoil areas include Australian pine, buttonwood, red mangrove, and white mangrove. Approximately nine acres of wetland spoil areas occur within the Site.

Fill Areas/Roadways (FLUCFCS 744) – Limerock aggregate uplands occur in the western portions of the Site previously filled for construction of access roads, parking areas, and the land utilization building/crocodile research facility (see Figure 3.3.5-1). These areas are dominated by mowed and maintained grasses, although Brazilian pepper, buttonwood, half-flower, wild sage, and cabbage palms (*Sabal palmetto*) are also found near the upland-wetland boundary. Approximately 20 acres of the Site are classified as fill areas, roadways or roads.

Vegetative Communities of Nuclear Administration Building, Training Building and Parking Area

The area north of the Site designated for the nuclear administration building, training building and parking area comprises approximately 33 acres, including approximately 18.5 acres of mangroves, 7.6 acres of mangrove/willow wetlands, and seven acres of parking lots and roadways (see Figure 3.3.5-2). Dominant vegetative communities within these areas are described below.

Mangrove Swamp (FLUCFCS 612) – Approximately 18.5 acres of the area designated for the location of the nuclear administration building, training building and parking area north of the Site consist of isolated mangrove swamp areas surrounded by parking lots and roadways (see Figure 3.3.5-1). These isolated wetlands receive runoff from the surrounding parking lots, contain small areas of open water, and connect to each other through culverts. Dominant species present in these areas include red, white, and black mangrove, buttonwood, Brazilian pepper, sea grape, Australian pine, poisonwood, leather fern (*Acrostichum* spp.), cankerberry (*Solanum bahamense*), rubber vine (*Rhabdadenia biflora*), and cocoplum (*Chrysobalanus icaco*).

Mangrove/Willow (FLUCFCS 612/618) – The eastern edge of the mangrove parcel described above is classified as mangrove/willow wetlands (see Figure 3.3.5-1). This approximately 7.6-acre area is dominated by Carolina willow (*Salix caroliniana*), mangroves, cattail (*Typha* spp.), Brazilian pepper, and Peruvian primrose willow (*Ludwigia peruviana*).

Fill Areas/Roadways (FLUCFCS 744) – Approximately seven acres of the area north of the Site designated for additional parking areas are classified as fill areas, roadways or roads. These areas generally consist of limerock aggregate uplands that were previously filled for construction of access roads and parking areas and are generally dominated by mowed and maintained grasses.

Electric Power Facilities (Parking Lots) (FLUCFCS 831) – Portions of the area northwest of the Site for additional staging and laydown include existing parking lots. These areas total approximately 1 acre in size, and are generally devoid of any significant vegetation.

Vegetative Communities of the Reclaimed Water Treatment Facility and Treated Reclaimed Water Pipelines

An FPL reclaimed water treatment facility and treated reclaimed water delivery pipelines will be located between the industrial wastewater facility and the existing Turkey Point Plant access road (see

Figure 3.3.5-2). Vegetative communities within the approximately 44-acre reclaimed water treatment facility area are described below.

Dwarf Mangroves (FLUCFCS 612-B)

The treated reclaimed water treatment facility will be located upon areas dominated by dwarf mangroves and sawgrass (*Cladium jamaicense*) to the southwest of the existing Turkey Point plant access road. The vegetative community is comprised of an understory of sawgrass and a sparse canopy of dwarf red mangrove, with black mangrove, white mangrove, buttonwood, sea grape, Brazilian pepper, wax myrtle, poisonwood, cocoplum, and Australian pine also present.

The treated reclaimed water delivery pipelines will follow existing roads, traversing previously-filled areas/roadways (FLUCFCS 744), dwarf mangroves (FLUCFCS 612-B), mixed wetland hardwoods (FLUCFCS 617) before crossing the existing discharge canal (FLUCFCS 510) and terminating at the northwest portion of the Site.

Vegetative Communities of the Radial Collector Well Area

Four radial collector well caissons are to be located on the Turkey Point peninsula (see Figure 3.3.5-2) in previously-disturbed areas of upland fill material adjacent to coastal mangrove wetlands. Dominant species within these vegetative communities are described below.

Previously Filled Areas/Roadways (FLUCFCS 744) – The areas designated for the radial collector well caissons and laydown are comprised of previously filled areas and roadways generally consisting of limerock aggregate uplands. Vegetative species are sparse within the fill area, primarily consisting of grasses and occasional Brazilian pepper, morning glory (*Ipomoea* sp.), wild sage, seaside mahoe (*Thespesia populnea*), and half-flower.

Vegetative Communities of the Equipment Barge Unloading Area

Modification of the existing equipment barge unloading area is limited to expansion of a previously excavated area adjacent to an existing boat ramp on the north side of the turning basin (see Figure 3.3.5-2). Vegetative communities in this area are described below.

Turning Basin (FLUCFCS 510) – Construction in the turning basin area is limited to expansion of an equipment barge unloading area. The turning basin is adjacent to Biscayne Bay northeast of Units 1 through 4 (see Figure 3.3.5-2). Vegetation along the shoreline of the basin includes sparse buttonwood, red mangrove, half-flower, sea grape, and Brazilian pepper. Sparse growth of

submerged aquatic vegetation, including seagrasses and algal species, was observed within the turning basin. The green algal species *Caulerpa paspaloides* var. *laxa* occurs along the edge of the southern shoreline of the basin, comprising a total area of approximately 24 ft². Another small area of *Caulerpa paspaloides* var. *laxa* and the algae *Acetabularia calyculus*, comprising an area totaling approximately 24 ft², occurs on the northeastern shore of the basin extending into Biscayne Bay. Sparse patches of seagrass occur along the northern shore of the basin, in the vicinity of the existing boat ramp and equipment barge unloading area. Several small areas with 5- to 20-percent coverage of turtlegrass (*Thalassia testudinum*) and shoal grass were observed, comprising a total of approximately 170 ft² (0.004 acre).

Electric Power Facilities (FLUCFCS 831) –Expansion of the equipment barge unloading area will be confined to an area classified as electric power facilities. This area of approximately one acre is currently filled open land adjacent to an oil tank containment area, and is generally devoid of any significant vegetation.

~~Vegetative Communities of the FPL-Owned Fill Source~~

~~The FPL-owned fill source is an approximately 300-acre area located to the southeast of Homestead Air Reserve Base (see Figure 3.3.5-3). Dominant vegetative communities within the fill source are described below.~~

~~**Tree Nurseries (FLUCFCS 241)** –The majority of the FPL-owned fill source (approximately 244 acres) consists of active commercial palm tree nurseries (see Figure 3.3.5-3). Native vegetative communities were historically cleared and the area was graded for production of palms. Elevated rows of trees are separated by irrigation furrows.~~

~~**Ditches (FLUCFCS 511)** –Ditches occur between blocks of palm trees and adjacent to access roads throughout the fill source. These ditches are typically vegetated with a mixture of nuisance/exotic species, such as Brazilian pepper, cattail (*Typha latifolia*), parrot feather (*Myriophyllum aquaticum*), torpedo grass (*Panicum repens*), and wild taro (*Colocasia esculenta*), as well as native species including arrowhead (*Sagittaria lancifolia*), water spangles (*Salvinia minima*), mosquitofern (*Azolla caroliniana*), primrose willow (*Ludwigia* sp.), and beggarticks (*Bidens* sp.). A total of approximately 5.2 acres of ditches occur within the fill source.~~

~~**Exotic Wetland Hardwoods (FLUCFCS 619)** –Areas dominated by Brazilian pepper, classified as exotic wetland hardwoods, comprise approximately 33.7 acres of the fill source. Subdominant~~

~~species include Carolina willow, primrose willow, wild taro, napier grass (*Pennisetum purpureum*), and beggarticks.~~

~~**Wetland Scrub (FLUCFCS 631)** – Approximately 4.4 acres of the fill source are comprised of wetland scrub habitat dominated by a mixture of exotic and nuisance species such as napier grass, cattail, Carolina willow, wild taro, and Brazilian pepper.~~

~~**Freshwater Marshes (FLUCFCS 641)** – Areas classified as freshwater marshes comprise approximately 8.8 acres within the fill source. These wetland systems are dominated by a mixture of shrub and herbaceous species, including Brazilian pepper, cattail, Carolina willow, primrose willow, and napier grass.~~

Vegetative Communities of the Spoils Areas

Upland spoil berms located between the cooling canals would be utilized for spoils placement. These areas comprise approximately 200 acres consisting of three locations in the industrial wastewater facility. Dominant vegetative communities within these areas are described below.

Spoils Areas (FLUCFCS 743) – The 200 acres for spoils placement consist of existing upland spoils berms created through deposition of material generated from historical cooling canal dredging. The three areas include the berms located on the east and west of the Grand Canal, as well as a portion of the berm along the southern boundary of the industrial wastewater facility. These areas are sparsely vegetated with grasses and wild sage, and exotic species such as Australian pine, Brazilian pepper, and half-flower.

Vegetative Communities Adjacent to the Site and Associated Non-Linear Facilities

Vegetative communities/land uses adjacent to the Site and associated non-linear facilities include electrical utilities (FLUCFCS 831), transmission line corridor (FLUCFCS 832), mangrove swamps (FLUCFCS 612), and dwarf mangroves (FLUCFCS 612B), ~~and tree nurseries (FLUCFCS 241).~~

Electrical Utilities (FLUCFCS 831)

The majority of areas adjacent to the Site and associated non-linear facilities are classified as FLUCFCS 831 and include existing Turkey Point Units 1 through 5, along with access roads, switchyards, the cooling canal system/industrial wastewater facility, parking areas, and additional plant infrastructure.

The cooling canals and industrial wastewater facility serves the existing Turkey Point Plant and comprises approximately 5,900 acres. Vegetation in the cooling canals includes submerged, rooted marine plants, primarily widgeon grass, as well as terrestrial woody vegetation along the berms.

Transmission Line Corridor (FLUCFCS 832)

Existing 330-ft wide transmission line corridors extend to the west and north outside of the Site. Access roads are located within each corridor, and individual structure pads are typically located on areas of fill extending into the mangrove or freshwater marsh wetlands adjacent to the access roads. These small areas of fill are mostly barren, with the perimeter colonized by mangroves, buttonwood, occasional Brazilian pepper, and seaside oxeye (*Borrichia arborescens*).

Mangrove Swamps (FLUCFCS 612)

Areas adjacent to the radial collector wells are classified as mangrove swamp, located along the coast of Biscayne Bay. Additional areas of coastal mangrove swamp occur adjacent to the shoreline of Biscayne Bay and associated with tidal creeks north of Unit 5, as well as to the east and south of the industrial wastewater treatment facility. These areas are dominated by red and black mangroves, with subdominant species including white mangrove and buttonwood, as well as occasional Brazilian pepper, Australian pine, and sea grape.

Dwarf Mangroves (FLUCFCS 612-B)

Dwarf mangroves typically occur within the shallow, tidally flushed areas adjacent to Biscayne Bay and Card Sound. Areas of dwarf red mangrove occur adjacent to the reclaimed water treatment facility, as well to the east and south of the industrial wastewater treatment facility and north of Unit 5. The majority of the mangrove community in these areas experiences sheet flow-type flushing of tidal waters, and exhibits increased salinity with decreased nitrogen and phosphorus available for plant uptake. The dwarf mangrove community contains mangroves less than 24 inches in height, stunted in response to decreased nutrient availability and increased salinity (McKee, 1996). Where tidal creeks cut through the dwarf mangrove community, 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 are classified as mangrove swamp, as described previously.

Within the dwarf red mangrove community, buttonwood is a common subdominant canopy component, along with occasional white mangrove and black mangrove. Additional vegetative species include occasional Brazilian pepper, Australian pine, seaside oxeye, grey nicker (*Caesalpinia bonduc*), groundsel tree (*Baccharis halimifolia*), and cordgrass (*Spartina* sp.).

Tree Nurseries (FLUCFCS 241)

~~Vegetative communities surrounding the FPL owned fill source are dominated by additional palm tree nurseries. These areas have been cleared of native vegetative communities, graded, and converted to commercial production of palm trees. Typically, elevated rows of trees are separated by shallow irrigation furrows, and drainage ditches occur between blocks of trees and along the edges of access roadways.~~

Vegetative Communities Adjacent to the Turkey Point Plant Property

Outside of the Turkey Point plant property, dominant features include Biscayne Bay, Card Sound, and the approximately 13,000-acre EMB. Biscayne Bay is shallow, with an average depth at low tide of five ft and maximum depth of approximately 13 ft. Card Sound is located immediately south of Biscayne Bay, is approximately 24 square miles in size, and has a mean depth of approximately ten ft. Biscayne Bay and Card Sound support seagrass beds, dominated by turtlegrass and subdominant species shoal grass and manateegrass (*Syringodium filiforme*), which extend thousands of feet offshore.

The EMB is situated south and west of the Turkey Point plant property adjacent to Biscayne Bay and Card Sound. The EMB contains relatively undisturbed 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 owned by FPL and managed 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 Site and surrounding areas provide habitat for a variety of wildlife, primarily wading birds and aquatic species associated with coastal mangroves. The wildlife habitat in the region surrounding the Turkey Point plant property supports a variety of species characteristic of the Biscayne Bay Aquatic Preserve and BNP. Extensive mangrove areas provide important nursery areas for juvenile fishes as well as habitat for wading birds. The 5,900-acre industrial wastewater facility provides breeding habitat for the American crocodile (*Crocodylus acutus*), as well as foraging area for several species of wading birds. Non-listed wildlife directly observed, observed through tracks, scat, and/or burrows, or likely to occur based upon habitat present includes species common to southeastern Florida; a complete list of wildlife observations is detailed in Table 3.3.6.1-1.

Site – Areas of suitable wildlife habitat associated with the Site include hypersaline mud flats (FLUCFCS 650), cooling canals (FLUCFCS 510), remnant canals (FLUCFCS 511), mangroves (FLUCFCS 612), and the open water/discharge canal (FLUCFCS 531) associated with the cooling canal system on the western portion of the Site. The mud flats, canals, and mangrove areas provide habitat for a variety of avian species, including spotted sandpiper (*Actitis macularia*), red-winged blackbird (*Agelaius phoeniceus*), great blue heron (*Ardea herodias*), great horned owl (*Bubo virginianus*), red-shouldered hawk (*Buteo lineatus*), green heron (*Butorides striatus*), sanderling (*Calidris alba*), western sandpiper (*Calidris maurii*), least sandpiper (*Calidris minutilla*), great egret (*Casmerodius albus*), willet (*Catoptrophorus semipalmatus*), semipalmated plover (*Charadrius semipalmatus*), killdeer (*Charadrius vociferous*), Wilson's plover (*Charadrius wilsonia*), common nighthawk (*Chordeiles minor*), yellow-billed cuckoo (*Coccyzus americanus*), white-crowned pigeon (*Patagioenas leucocephala*), black vulture (*Coragyps atratus*), prairie warbler (*Dendroica discolor*), little blue heron (*Egretta caerulea*), reddish egret (*Egretta rufescens*), snowy egret (*Egretta thula*), tricolored heron (*Egretta tricolor*), white ibis (*Eudocimus albus*), black-necked stilt (*Himantopus mexicanus*), barn swallow (*Hirundo rustica*), short-billed dowitcher (*Limnodromus griseus*), belted kingfisher (*Megasceryle alcyon*), northern mockingbird (*Mimus polyglottis*), wood stork (*Mycteria americana*), long-billed curlew (*Numenius americanus*), whimbrel (*Numenius phaeopus*), white pelican (*Pelecanus erythrorhynchos*), double-crested cormorant (*Phalacrocorax auritus*), roseate spoonbill (*Platalea ajaja*), black-bellied plover (*Pluvialis squatarola*), blue-gray gnatcatcher (*Poliophtila caerulea*), cliff swallow (*Petrochelidon pyrrhonota*), American avocet (*Recurvirostra americana*), bank swallow (*Riparia riparia*), least tern (*Sterna antillarum*), royal tern (*Sterna maxima*), lesser yellowlegs (*Tringa flavipes*), greater yellowlegs (*Tringa melanoleuca*), and solitary sandpiper (*Tringa solitaria*).

Currently developed portions of the Site designated for laydown and parking provide poor habitat for wildlife due to the lack of cover, native vegetative communities, and disturbance. No species of birds, mammals, or reptiles were observed in those areas of the Site classified as electrical power facilities, with the exception of common urban avian species along the edges of parking areas and access roads, such as mourning dove (*Zenaida macroura*), European starling (*Sturnus vulgaris*), mockingbird, and rock dove (*Columba livia*).

Due to the limited amount of upland habitat, mammalian wildlife species are relatively uncommon in the vicinity of the Site, and include common species such as white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), eastern cottontail (*Sylvilagus*

floridanus), marsh rabbit (*Sylvilagus palustris*), black rat (*Rattus rattus*), cotton rat (*Sigmodon hispidus*), cotton mouse (*Peromyscus gossypinus*), and rice rat (*Oryzomys palustris*).

~~**FPL Owned Fill source** – The severely altered landscape of the FPL owned fill source limits the habitat suitability for wildlife; however, a variety of avian species utilize the area, primarily foraging within ditches and wetland areas. Species observed within the fill source include great blue heron, little blue heron, cattle egret (*Bubulcus ibis*), great egret, belted kingfisher, loggerhead shrike (*Lanius ludovicianus*), white ibis, raccoon, and the exotic species brown basilisk (*Basiliscus vittatus*).~~

Aquatic Ecology Systems – Fauna

Site - The Site is dominated by semi-barren hypersaline mud flats, which provide limited habitat for aquatic biota due to fluctuations in water levels and salinity associated with the cooling canal system. As a portion of the industrial wastewater facility for the existing Turkey Point Plant, this area experiences routine and drastic alterations in hydroperiod. The area is typically inundated with <1 ft of water for approximately 3 to 4 months each year. Vegetative cover is sparse in the mud flat area as a result of high salinity and drastic fluctuations in water levels. Due to the limited duration of inundation and lack of substantial vegetative cover on the mud flats, aquatic species are limited to forage fishes such as marsh killifish (*Fundulus confluentus*), sheepshead minnow (*Cyprinodon variegatus*), and sailfin molly (*Poecilia latipinna*). The surrounding cooling canals are isolated, with elevated temperature and salinity conditions that limit the diversity and abundance of fish species. The fish community within the cooling canals is dominated by forage fishes such as sheepshead minnow and marsh killifish, and with limited numbers of mullet (*Mugil* sp.), needlefish (*Strongylura* sp.), and tarpon (*Megalops atlanticus*).

FPL Reclaimed Water Treatment Facility -- The dwarf mangrove and sawgrass wetlands within the area designated for the FPL reclaimed water treatment facility provide suitable habitat for common forage fishes such as mosquitofish (*Gambusia holbrooki*), sailfin molly, sheepshead minnow, and marsh killifish. This area is isolated due to surrounding roadways and the L-31E Canal, and does not connect to Biscayne Bay. Due to the lack of hydrologic connection to the Bay, estuarine species typically occurring within coastal mangrove wetlands such as gray snapper (*Lutjanus griseus*) and mullet (*Mugil* sp.) were not observed within the area designated for the FPL water treatment facility.

~~**FPL Owned Fill Source** – Freshwater ditches/canals associated with the FPL owned fill source provide habitat for common freshwater forage fishes, such as mosquitofish (*Gambusia holbrooki*),~~

~~sailfin molly, and least killifish (*Heterandria formosa*), as well as sunfish (*Lepomis* sp.), gar (*Lepisosteus* sp.), and exotic species commonly inhabiting canals of Miami Dade County, such as blue tilapia (*Oreochromis aurea*), Mayan eichlid (*Cichlasoma urophthalmus*), and oscar (*Astronotus ocellatus*).~~

As part of the 1972 Turkey Point Units 3 and 4 Final Environmental Statement for operations, studies were conducted in Biscayne Bay and Card Sound adjacent to the Turkey Point plant property. 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

Listed plant species are those plants that are listed by the U.S. Fish and Wildlife Service (USFWS) or the Florida Department of Agriculture and Consumer Services (FDACS) as endangered, threatened, of special concern, or commercially exploited. Listed animal species are those animals listed as endangered, threatened, or of special concern, federally by the USFWS, or within the State of Florida by the Florida Fish and Wildlife Conservation Commission (FFWCC).

There are a number of federal and state-listed animals that are associated or potentially associated with the Site and the areas for associated non-linear facilities, and areas surrounding the developed portions of the Turkey Point plant property. 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 field reconnaissance, county-specific lists of threatened and endangered species were obtained from the Florida Natural Areas Inventory (FNAI, 2008) (Table 3.3.6.1-2). In addition, geographic information system (GIS) data were obtained from the FNAI, which maintains a database of known occurrences of listed species throughout the State of Florida. Previous reports of surveys conducted in and near the Project and agency contacts (see Appendix 10.7.1.4) were also reviewed. The FNAI database was queried and documented locations of listed species within the Site and areas for associated facilities were identified. Listed and non-listed wildlife species observed during the 2008 and 2009 field surveys were recorded, and also supplemented with data from the Miami-Dade Department of Environmental Resources Management (DERM) August 2007 field visit.

Plant and Animal Surveys

Because of the rarity and seasonality of threatened and endangered species, either multi-season surveys or an evaluation of threatened and endangered species habitat conditions are necessary to determine their presence or absence. For this study, multi-season threatened and endangered species surveys were combined with the evaluation of habitat conditions to determine the presence or absence of threatened and endangered species. Based on the Miami-Dade County list of threatened and endangered species and the available habitats within the Site and surrounding area, federally and state-listed species that are likely to occur within the area were identified and are discussed below.

Flora – Threatened, endangered, and/or plant species of special concern known to occur in Miami-Dade County are listed in Table 3.3.6-2. The FNAI database review and elements occurrence report (see Appendix 10.4) did not indicate any reported occurrences of listed plant species in the vicinity of the Site and associated non-linear facilities. Several individuals of the state-threatened mullein nightshade (*Solanum donianum*) and pinepink (*Bletia purpurea*) were reported within upland spoils areas along existing roads north of the industrial wastewater facility and adjacent to the transmission line west of the cooling canal system.

Fauna – Threatened, endangered, and/or animal species of special concern known to occur in Miami-Dade County are listed in Table 3.3.6-2. The FNAI database review and elements occurrence report (see Appendix 10.4) did not indicate any reported occurrences of listed animal species in the vicinity of the Site and associated non-linear facilities. Listed species identified within and adjacent to the Site and associated facilities during the field reconnaissance conducted June through November 2008 and 2009 include several species of wading birds, as well as the white-crowned pigeon, least tern, and American crocodile.

Protected wading bird species observed within the Site include the little blue heron, reddish egret, white ibis, snowy egret, roseate spoonbill, and tricolored heron. These six species of wading birds, while not considered threatened or endangered, are classified by the FFWCC as Species of Special Concern. They are not listed by the USFWS.

Three wood storks were observed foraging in the shallow open water/discharge canal portion of the staging area in the western portion of the Site. The wood stork is classified as endangered by both the FFWCC and the USFWS. No wood stork nesting colonies or roosting Sites are located in the vicinity of the Site. According to the FFWCC wading bird surveys of 1999, two active wood stork colonies are present within Miami-Dade County, both located along Tamiami Trail (US 41) between 20 and

30 miles northwest of the Site (colony # 620313 and 620131). Within Monroe County, an active colony is located approximately 40 miles west of the Site (colony # 620304). The USFWS has defined a wood stork colony's core feeding area as a radius of 18.4 miles surrounding the nesting colony. Impacts to wetlands within the core feeding area are to be replaced through in-kind compensation or offset through habitat improvements on-site that would increase the quantity and/or quality of potential foraging habitat.

American alligators are classified by the USFWS as threatened due to similarity in appearance to the American crocodile, and are classified by the FFWCC as a Species of Special Concern. The FNAI database identified a report of an American alligator less than 0.5 mile to the west of the Site.

The white-crowned pigeon, which forages among fruit-bearing trees in hardwood hammocks of south Florida, is classified as threatened by the FFWCC, but is not listed federally. A white-crowned pigeon was observed during the August 2007 DERM Site visit, and was also observed during the June 2008 Site visit in the vicinity of the existing transmission line right-of-way west of the Site. A least tern was observed during the August 2007 field survey and subsequently during the November 2007 and June 2008 Site reconnaissance, near a portion of the industrial wastewater facility. A documented occurrence of the least tern was also contained in the FNAI database, observed south of the Site, within the industrial wastewater facility. Least terns are classified as threatened by the FFWCC, but are not listed by the USFWS.

The majority of the industrial wastewater facility and other canals in the vicinity of the Turkey Point plant property (C-107, the Sea Dade Canal, Model Land Canals North, South, and East, and L-31E) are within the area designated as critical habitat for the American crocodile. Adult crocodiles were first observed at the Turkey Point Plant in 1976 and nesting was first documented upon berms within the industrial wastewater facility in 1978 (Mazzotti and Brandt, 1994). As a result, FPL developed a crocodile management plan which focused on the creation and enhancement of habitat for crocodile nesting as well as monitoring the reproductive success, growth, and survival of hatchlings. FPL's efforts have resulted in a significant increase in the number of crocodile nests and hatchlings in the Turkey Point cooling canals over the past quarter-century, from 1 to 2 nests and 30 hatchlings in the late 1970s to 26 known nests and over 500 hatchlings in 2008. The critical nesting habitat maintained by FPL within the industrial wastewater facility has been responsible for virtually the entire increase in population of the American crocodile reported in south Florida over the past 25 years (Tucker et al., 2004), which contributed to the USFWS downlisting of the crocodile from endangered to threatened status.

Crocodile nest locations documented between 1978 and 2008 are shown in Figures 3.3.6-1 and 3.3.6-2). Crocodiles are not known to nest within the Site or the areas for the associated non-linear facilities. Crocodiles utilize the active cooling canals surrounding the Site. These active canals will not be impacted by the Project. Appendix 10.7.1.3 presents further discussion regarding the American crocodile population of South Florida, history of crocodile occurrence at Turkey Point, details of the ongoing monitoring within the industrial wastewater facility, and avoidance of impacts to crocodiles resulting from the Project.

The Eastern indigo snake (*Drymarchon couperi*), classified as threatened by both the USFWS and FFWCC, is known to exist on the Turkey Point plant property south of the industrial wastewater facility, and outside of the Project Area. According to the FNAI database, an occurrence of the Eastern indigo snake was documented in 1981 within an area south of SW 344th Street/Palm Drive, adjacent to the existing FPL daycare center. An Eastern indigo snake was observed during a survey in 2004 within the EMB, south of the industrial wastewater facility, and are occasionally observed south of the Site.

The endangered Florida manatee (*Trichechus manatus latirostris*) is known to occur in Biscayne Bay, but does not occur at the Site. The Site is contained within the industrial wastewater facility which does not connect to Biscayne Bay. The Turkey Point Plant utilizes the closed-loop canal system for cooling and wastewater treatment, and does not contribute any thermal discharge into Biscayne Bay that would attract manatees during winter months. The FPL reclaimed water treatment facility is isolated from Biscayne Bay by the existing plant access road; no manatees occur in this area

Additional listed species known to occur in BNP that may potentially utilize the mangrove habitats adjacent to the Site include the peregrine falcon (*Falco peregrinus*), mangrove rivulus (*Rivulus marmoratus*), limpkin (*Aramus guarauna*), American oystercatcher (*Haematopus palliatus*), brown pelican (*Pelicanus occidentalis*), and bald eagle (*Haliaeetus leucocephalus*). A bald eagle was observed on the northwestern edge of the cooling canals in April 2009. The bald eagle was delisted by the USFWS on June 28, 2007, and is no longer protected under the Endangered Species Act, but remains protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act (U.S. Department of the Interior, 2007). Although the bald eagle was recently de-listed, the FFWCC draft bald eagle management plan remains in effect and recommends maintaining a 660-ft buffer zone

around active nests. The FFWCC bald eagle nest database¹ was queried and no nests were found in the vicinity of the Site or the areas for non-linear associated facilities.

Furbearer and Game Species

Table 3.3.6-3 presents a list of furbearer and game species reasonably expected to occur in Miami-Dade County.

3.3.6.2 Pre-Existing Stresses

The pre-existing stresses to ecological systems of the Site and surrounding areas are the result of past development, storm events and invasion of exotic vegetation. The natural topography, soils, and hydrology of the Site have been altered as a result of the construction of the existing Turkey Point Plant, the industrial wastewater facility, and ancillary facilities. The existing Turkey Point Units were constructed upon mangrove-covered tidal flats. Natural surface water drainage features have been modified through construction of roads and the industrial wastewater facility. The Site and surrounding areas have been colonized by the exotic species Australian pine and Brazilian pepper.

3.3.6.3 Measurement Programs

Terrestrial Ecology

Terrestrial ecological resources 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 from 2007 to Spring, 2009.

3.3.7 Meteorological and Ambient Air Quality

This section presents information on meteorology and ambient air quality related to the analyses contained in Appendix 10.2.5 Air Construction Permit Application and PSD Report.. Subsection 3.3.7.1 provides information on the FDEP-recommended meteorological data that was used in the air dispersion modeling. Subsection 3.3.7.2 presents the applicable ambient air quality standards.

3.3.7.1 Meteorology

Meteorological data collected at the nearest National Weather Service (NWS) monitoring station were used to describe the regional climatology and the meteorological data were used in the evaluation of air quality impacts associated with the Turkey Point Units 6 & 7 Project. The closest

¹ <http://wld.fwc.state.fl.us/eagle/eaglenests/Default.asp#criteriaLocator>

primary meteorological station to the Project with complete data is the NWS station located at MIA, situated approximately 40 kilometers (km) (25 miles) to the north. The NWS has recorded weather observations for more than 60 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 sources in this area and recommended that these data be used for this Project. The FDEP-recommended meteorological data for use in air quality modeling is data from 2001 through 2005 (Holladay, 2008). The climate is subtropical with a marine influence from the Atlantic Ocean. The monthly and annual average temperatures at MIA are presented in Table 3.3.3-1 [(National Oceanic and Atmospheric Administration (NOAA), 2007)]. The annual average temperature is 76.7°F with daily average temperatures varying from a maximum of 89.7°F in August to a minimum of 58.7°F in January. Record extreme temperatures range from a low of 30°F to a record high of 98°F. During the summertime, temperatures rarely exceed high 90s°F due to the high relative humidities with subsequent cloud cover formation and the abundant convective-type precipitation (e.g., thunderstorms). Thunderstorms are the most frequent type of severe storms, occurring an average of 74 days per year as reported by the NWS at MIA. These storms occur throughout the year, but about 82 percent occur from May through October.

Monthly and annual average precipitation data are presented in Table 3.3.3-2 (NOAA, 2007). Average annual precipitation measured at MIA is approximately 59 inches, varying from as little as about 43 inches to as much as about 80 inches in the past 65 years. The majority of rain is in the form of short-lived convection showers. Large amounts of rain are also produced during the late summer or fall when tropical storms or hurricanes may pass near southern Florida. 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 3.3.3-2 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. (NOAA, 2007). 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 Site 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 2001 through 2005 at MIA are presented in Figures 3.3.7-1 and 3.3.7-2a through 3.3.7-2d, respectively. A summary of the seasonal and annual average speeds, including calm conditions, is presented in Table 3.3.7-1.

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

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 2001 to 2005 at MIA are shown in Table 3.3.7-2.

During the summer months, unstable atmospheric stability conditions occur more than 30 percent of the time due to strong solar heating, whereas unstable atmospheric stability conditions occur less than 16 percent of the time in the winter months. Neutral stability occurs most frequently during the spring months due to the higher wind speeds that occur in this season. The occurrence of stable conditions is highest during the winter months.

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 emitted pollutants 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 at MIA for 2001 to 2005 determined using the convective and mechanical methods are listed in Table 3.3.7-3. The highest afternoon mixing heights occur in the spring and the lowest morning mixing heights occur in winter.

3.3.7.2 Ambient Air Quality

Ambient Standards

The National and Florida Ambient Air Quality Standards (AAQS) are presented in Table 3.3.7-4. Primary National AAQS were promulgated by the U.S. EPA to protect the public health with an adequate margin of safety, 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 PM with an aerodynamic particle size of 2.5 micrometers (μm) or less ($\text{PM}_{2.5}$), particulate matter with an aerodynamic particle size of 10 μm or less (PM_{10}), SO_2 , CO, nitrogen dioxide (NO_2), ozone (O_3), and lead (Pb). The State of Florida adopted the National AAQS for most pollutants, but for SO_2 , the Florida AAQS is more stringent than the National AAQS.

The O_3 standard was modified on July 18, 1997 by the EPA to be 0.08 parts per million (ppm) for an eight-hour average concentration (62 FR 138). This standard is achieved when the three-year average concentration of the 4th highest value is 0.08 ppm or less. In October 2006, EPA promulgated revised National AAQS for PM_{10} and $\text{PM}_{2.5}$ [Federal Register, October 17, 2006 (71 FR 61144)]. For PM_{10} , the annual standard was revoked and the 24-hour standard was retained. The 24-hour $\text{PM}_{2.5}$ standard was revised to 35 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) from 65 $\mu\text{g}/\text{m}^3$ in the promulgated 1997 AAQS. The 24-hour $\text{PM}_{2.5}$ standard is based on a three-year average of the 98th percentile of 24-hour average concentrations that must not exceed 35 $\mu\text{g}/\text{m}^3$ (from population-orientated monitors) and a 3-year average of annual average concentrations that must not exceed 15 $\mu\text{g}/\text{m}^3$ (from a single or community-orientated monitor). These AAQS were effective December 18, 2006.

Miami-Dade County has adopted AAQS for SO_2 . These SO_2 standards are 25, 110, and 350 $\mu\text{g}/\text{m}^3$ for the annual, 24-hr, and 3-hr averaging times [Miami-Dade Code of Ordinances, Chapter 24, Section 24-41.3(1), 2008]. The 24-hr and 3-hr averaging times are not to be exceeded more than once per year as stated in Chapter 24, Miami-Dade County Code of Ordinances.

Miami-Dade County is designated as an area that meets ambient air quality standards (i.e. an attainment area) for all criteria pollutants (i.e., an area with air quality that meets all AAQS) (Rule 62-204.340, F.A.C.).

FDEP has not yet adopted the revised O_3 or $\text{PM}_{2.5}$ National AAQS. Based on evaluations performed by FDEP and EPA, Miami-Dade County has been designated an attainment area for the revised 1997 O_3 National AAQS [Federal Register, April 30, 2004 (69 FR 23996)] as well as for the 1997 $\text{PM}_{2.5}$ National AAQS [Federal Register (FR), January 5, 2005 (70 FR 944)]. Although FDEP and EPA have not yet designated areas for $\text{PM}_{2.5}$ in Florida based on the 2006 $\text{PM}_{2.5}$ National AAQS, monitoring data collected over the last several years indicate that Miami-Dade County and adjoining counties would be classified as in attainment for the $\text{PM}_{2.5}$ National AAQS.

Prevention of Significant Deterioration

In the 1977 Clean Air Act (CAA) Amendments, Congress specified that certain increases above an air quality baseline concentration level of SO₂ and PM concentrations would constitute significant deterioration of air quality for sources located in attainment areas. On October 17, 1988 (53 FR 40670), EPA promulgated regulations to prevent significant deterioration due to NO_x emissions and established PSD increments for NO₂ concentrations. The magnitude of the allowable increases, or PSD increments, depends on the classification of the area in which a new source (or modification) will be located or have an impact. Initially, Congress established criteria to designate 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, have been designated.

The PSD class designations and allowable PSD increments are presented in Table 3.3.7-4. FDEP has adopted the EPA allowable increments for PM₁₀, SO₂, and NO₂ (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 Site is the ENP located about 21 km (13 miles) to the southeast of the Site.

Ambient Air Quality Data

The Site is located in a rural area of Miami-Dade County. Air monitoring data are collected for SO₂, PM₁₀, O₃, NO₂, and CO at monitoring stations located in the urban areas. These data are representative of air quality in the urban areas of Miami-Dade County.

A summary of the maximum pollutant concentrations measured in Miami-Dade County from 2005 through 2007 is presented in Table 3.3.7-5. These data indicate that the maximum air quality concentrations of pollutants measured in Miami-Dade County are in compliance with applicable AAQS.

Existing Air Pollutant Sources

The FPL Turkey Point Plant is an existing generating facility that has been in operation since the mid-1960s. (Commercial operations commenced for Units 1 and 2 in 1967 and 1968, respectively). Nuclear Units 3 and 4 were constructed in the early 1970s with commercial in-service dates of 1972 and 1973, respectively. Unit 5 was brought into commercial operation in 2007.

The following emission units exist at the Turkey Point Plant:

- Units 1 and 2 – 400 MW each (nominal capacity) – Steam electric generating units firing residual oil and natural gas.
- Unit 5 – 1,150 MW (nominal capacity) – Combined cycle unit consisting of 4 General Electric (GE) 7FA combustion turbines (CTs) and associated electric generators, 4 heat recovery steam generators (HRSGs), and single steam turbine with associated electric generator.
- Diesel generating units associated with steam electric Units 1 and 2 – 2.75 MW (nominal capacity).
- Emergency diesel generators associated with Units 3 and 4 – 2.5 MW (nominal capacity).
- Emergency diesel generators associated with Unit 5 – 2.25 MW (nameplate capacity).
- Emergency diesel generators and general-purpose diesel engines.
- Mechanical draft cooling tower and distillate storage tank for Unit 5.
- Five other emergency diesel generators for Units 3 & 4 security system, wastewater treatment and meteorological assessment and 13 miscellaneous diesel generators.

Collectively, the emission units on the Turkey Point plant property constitute a “major source of air pollution” or “Title V source” under FDEP Rule 62-210.200, F.A.C. Units 1, 2, and 5 are authorized to operate under Title V Permit 0250003-011-AV. The emission units associated with Units 3 and 4 are authorized to operate under Title V Permit 0250003-010-AV.

3.3.7.3 Measurement Programs

Meteorological data were obtained from the NWS surface and upper-air station at MIA. These data were obtained for a five-year period from 2001 through 2005 from which the joint frequency of wind direction, wind speed, atmospheric stability, and a five-year average of mixing heights were developed. The wind sensors at MIA are located 30 ft above grade. Regular surface observations are taken just before each hour, seven days per week. Upper-air soundings are conducted twice per day at 7:00 A.M. and 7:00 P.M. Eastern Standard Time.

All air quality data referenced in this section were compiled from monitoring stations maintained and/or operated by FDEP and DERM.

3.3.8 Noise

3.3.8.1 Background Information

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., by direct measurements or through predictive calculations), the effect 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 these levels.

Noise above certain levels can impact the health and welfare of plant employees, the general public and wildlife. 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:

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

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

P_o = reference effective pressure of 20 μPa .

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).

Noise has two different types of effects on people: the direct physical effects such as hearing loss and the less direct effects involving interference with activities such as sleep and conversation. In the early 1970s, the EPA established numerical noise standards (EPA, 1974). The noise standards were developed without considering cost or technical feasibility. In developing these standards, the EPA drew upon a large body of survey data describing the degree of activity interference and resulting annoyance for a variety of noise levels. However, these standards were not meant to be pragmatic or realistic for short-term noise control purposes (Harris, 1991). There are no State of Florida or Miami-Dade County numerical noise standards applicable to the Project.

3.3.8.2 Ambient Noise Measurements

Ambient noise monitoring was conducted in June 2008 to obtain baseline noise measurements for this Project. The equipment and procedures used to monitor the baseline noise levels described in detail in Appendix 10.7.3 Baseline Noise Report conformed with the requirements for procedures, methods, and equipment specified by the American National Standards Institute (ANSI) (1993, R2008). Specifically, the noise measurements followed the ANSI S12.9/Part 3-1993 (R2008): “Quantities and Procedures for Description and Measurement of Environmental Sound, Part 3: Short-term Measurements with an Observer Present.” The sound level meters and octave band analyzers were calibrated immediately prior to and just after the sampling period to provide a quality control check of the equipment operation during monitoring. The calibration certificates, field calibrations, and qualifications of the personnel conducting the monitoring are provided in Appendix 10.7.3.

3.3.8.3 Noise Monitoring Locations

Figure 3.3.8-1 presents the locations where SPLs and octave band data were collected during the June 2008 ambient noise monitoring. Six of the eight monitoring locations (Sites 1, 4, 5, 6, 7, and 8; designated as S1, S4, S5, S6, S7, and S8 on Figure 3.3.8-1) were selected to measure the existing baseline ambient noise levels at or near the Turkey Point plant property boundary, at the nearest permanent private residence, the FPL daycare center, and at the nearest public receptors (i.e. potential noise receptors). Additionally, Sites 2 and 3 were selected to measure the existing noise levels in the proximity of the existing generating units. These noise monitoring sites were closest to the operating units at the Turkey Point Plant and in the direction of the nearest public receptors.

3.3.8.4 Ambient Sound Pressure Levels

Table 3.3.8-1 presents the existing baseline ambient noise levels obtained in June 2008. SPL data shown in the tables for this section are integrated over the monitoring period, and reflect the “equivalent,” “minimum,” “maximum,” and “10th percentile” noise levels. These noise parameters are described below:

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

L_{90} = The SPL exceeded 90 percent of the time during the monitoring period (or the 10th percentile).

L_{min} = The minimum SPL observed during the monitoring period.

L_{max} = The maximum SPL observed during the monitoring period.

The L_{eq} noise levels reflect the total noise energy over the monitoring periods at each location. As a result, loud transient noises such as noise from traffic, aircraft, insects, and barking dogs all influence the observed values. The more persistent the transient loud noises, the higher the L_{eq} noise levels. For this reason, a more appropriate indicator of background noise levels is the L_{90} , which is the noise level exceeded 90 percent of the time. Transient noise is generally excluded unless almost continuous noise occurs during monitoring, such as along a heavily traveled highway. The L_{min} and L_{max} reflect the minimum and maximum observed noise levels, respectively. When the magnitude of the L_{max} noise level is close (within a few dBA) to the L_{eq} noise level, the observed noise levels are typically influenced by a continuous source of noise. When the magnitude of the L_{min} noise level is close (within a few dBA) to the L_{90} noise level, the observed noise levels typically indicate lower amounts of transient noises.

During the noise monitoring, FPL's nuclear units (i.e., Units 3 and 4) were operating at base load conditions (reactor full load for both units) for all the periods of daytime and nighttime noise monitoring. Unit 5 was operating a nominal full load for the turbine inlet conditions for all except three of the monitoring periods. For the latter, the operating loads reflected the operation of all combustion turbine and heat recovery steam generator trains. Units 1 and 2 operation during the noise monitoring reflects cycling with the higher loads occurring during the daytime and low load operation during the nighttime. Additional information on unit operation is presented in Appendix 10.7.3.

The ambient daytime L_{eq} noise levels observed in June 2008 are shown in Table 3.3.8-1 and reflect the influence of the operating units on observed noise levels within the Turkey Point plant property boundary and demonstrate the minor contribution of the existing plant operation to noise levels at locations outside the Turkey Point plant property boundary. The daytime L_{eq} noise levels for the property monitoring locations near the existing generating units ranged from 59.8 dBA at Site 2 to 67.6 dBA at Site 3. The nighttime L_{eq} noise levels ranged from 60.3 dBA at Site 2 to 66.7 dBA at Site 3. The ambient daytime L_{eq} noise levels for the monitoring locations at the noise receptors (Sites 1, 4, 5, 6, 7, and 8) ranged from 43.9 dBA at Site 5 to 66.7 dBA at Site 8. The nighttime L_{eq} noise levels ranged from 41.0 dBA at Site 7 to 58.5 dBA at Site 4.

The L_{90} excludes most of the transient noise and is more reflective of continuous noise sources, such as an operating power plant. For the on-site monitoring locations near the existing generating units, the daytime L_{90} noise levels ranged from 58.5 dBA at Site 2 to 66.5 dBA at Site 3. These L_{90} noise levels were a few dBA lower than the L_{eq} noise levels, indicating the influence of continuous

operating equipment (Turkey Point Unit 5). The nighttime L_{90} noise levels ranged from 59.0 dBA at Site 2 to 65.8 dBA at Site 3. The ambient daytime L_{90} noise levels for the monitoring locations at the noise receptors (Sites 1, 4, 5, 6, 7, and 8) ranged from 33.3 dBA at Site 1 to 43.8 dBA at Site 4. The nighttime L_{90} noise levels ranged from 39.6 dBA at Site 7 to 49.8 dBA at Site 4.

Noise levels generated from any noise source, such as operating equipment, are reduced by distance. Due to hemispherical spreading, noise is reduced by 6 dBA when the distance from the source is doubled. The following tables present the L_{eq} and L_{90} noise levels observed for monitoring Sites S1 through S8 during the daytime and nighttime in June 2008 as a function of distance from the center of Turkey Point Unit 5. The L_{eq} and L_{90} noise levels shown on the following tables are the logarithmic average of the two observed noise levels taken during the daytime and nighttime. Unit 5 was selected because this unit is the closest noise source to the monitoring locations at institutional and residential areas. The tables indicate that the influence of the existing Turkey Point Plant generating units is minor compared to existing ambient noise levels at monitoring Sites S1 and S4 through S8 based on the L_{90} noise levels, which represent continuous noise sources from an operating power plant.

2008 Daytime Noise Levels			
Distance (miles)	Monitoring Sites	Sound Levels (dBA)	
		L_{90}	L_{eq}
0.19	S3	66.1	67.2
0.26	S2	58.8	60.6
0.89	S5	42.1	44.1
1.10	S4	43.1	60.2
1.39	S6	42.5	48.6
1.97	S7	38.3	49.4
3.43	S8	37.9	64.4
4.44	S1	34.7	53.9

2008 Nighttime Noise Levels			
Distance (miles)	Monitoring Sites	Sound Levels (dBA)	
		L_{90}	L_{eq}
0.19	S3	65.7	66.9
0.26	S2	59.3	60.6
0.89	S5	46.9	47.9
1.10	S4	48.1	57.4
1.39	S6	46.2	49.0
1.97	S7	40.2	47.2
3.43	S8	46.7	54.1
4.44	S1	46.7	54.5

While there are no quantitative noise limits applicable to the Site, the observed L_{90} noise levels that exclude transient noise sources at the monitoring locations beyond FPL Turkey Point plant property (Sites 1, 5, 7, and 8) are well below 55 dBA, a typical nighttime noise limit established by municipalities (EPA, 1974) (see Table 3.3.8-1).

3.3.9 Lighting

3.3.9.1 Background

An ambient outdoor lighting study was conducted to evaluate the potential lighting impacts for the Project. Outdoor lighting will be necessary to satisfy OSHA (Occupational Safety and Health Administration), NRC and Miami-Dade County requirements for safety and security. Unconstrained lighting can cause “light pollution,” which includes “sky glow” and “light trespass.” Sky glow is the result of stray light being scattered in the atmosphere brightening the natural sky background level. Light trespass is the term used to describe light or illuminance that strays from its intended purpose and potentially becomes an annoyance.

Light is part of the electromagnetic spectrum, which ranges from radio waves to gamma rays. Electromagnetic radiation waves are fluctuations of electric and magnetic fields, which can transport energy from one location to another. Visible light is not inherently different from the other parts of the electromagnetic spectrum with the exception that the human eye has evolved to detect visible waves. The human eye responds to light based on its frequency. The frequency of light that is within the visible range establishes the observed color. While the response varies from person to person, the Commission Internationale de l’Eclairage (C.I.E., International Commission on Illumination) defined standard luminosity coefficients for the human eye in 1931.

A “candela” refers to the luminous intensity of a lighting source and is measured in candelas (cd). A “lumen” is the total luminous flux of a light source of one candela of luminous intensity. Illuminance is the total luminous flux incident on a surface per unit area. A “lux” is the measure of illumination (1 lumen) that falls on one square meter. The English measurement is the “foot-candle,” which is the same illumination (1 lumen) falling on one square ft. A lux is equivalent to 0.093 foot-candle; one foot-candle is 10.76 lux. Luminance is the perceived brightness of an object which has been illuminated by a source. Common examples of luminance are presented in Table 3.3.9-1. The luminance of an object depends on its material characteristics and reflectance and is measured in candelas per square meter (cd/m^2).

Light Trespass

Some municipalities and states have established programs to reduce light trespass. Light trespass standards are typically based on the amount of light from a light source that is transmitted onto adjoining properties. Light trespass standards are typically different for different land uses. The State of Florida does not have rules pertaining to outdoor lighting. Metropolitan Miami-Dade County has an outdoor lighting ordinance that restricts the amount of light trespass on certain adjoining properties to one-half foot-candle illumination in the vertical and horizontal. (Miami-Dade County Code, Section 33-4.1, Ordinance No. 95-215). This is equivalent to 5.4 lux. Since the Turkey Point Plant is quite remote, Units 6 & 7 are not expected to cause light trespass to adjoining properties.

Additionally, Metropolitan Miami-Dade County has enacted building security measures that set a standard for the minimum illumination levels for new construction and existing buildings from dusk to dawn. For example, open parking lots require an illumination level of 0.5 foot-candles, while a one foot-candle minimum illumination is required for parking lots under or within buildings (Code of Miami-Dade County Code, Section 8C-3(c), Ordinance No. 01-196).

Sky Glow

The earliest measures of sky glow, also called sky brightness, were based on a scale upon which the magnitude of stars visible to the human eye is divided into 6 levels. The brightest star is a magnitude 1 and the dimmest (faintest) star is a magnitude 6. More recently, the magnitude scale was modified to express astronomical surface brightness (stars, planets, etc.) in units known as magnitudes per square arcsecond ($\text{mag}/\text{arcsec}^2$). The measurement scale is inverse and logarithmic, and is generally used in small-area photometry and astronomy. When measuring sky glow using Unihedron's Sky Quality Meter (SQM), the fainter the sky glow (the darker the sky), the larger the measured value in $\text{mag}/\text{arcsec}^2$. Figure 3.3.9-1 shows how to interpret the SQM readings of estimated sky glow in $\text{mag}/\text{arcsec}^2$ values relative to how the sky is viewed and the amount of influences from the moon and other light influences. Additional examples of sky glow are described in Figure 3.3.9-1.

A difference of 1 $\text{mag}/\text{arcsec}^2$ is defined to be a factor of $100^{1/5}$ in received photons. Therefore, a sky brightness 5.0 $\text{mag}/\text{arcsec}^2$ fainter corresponds to a reduction in photon arrival rate of a factor of 100.

3.3.9.2 Ambient Illumination Measurements

Illuminance measurements were taken to assess the existing ambient conditions in the vicinity of the Site. Measurements were taken at locations within and beyond the Turkey Point plant property to determine ambient illumination conditions. The illumination monitoring field efforts were conducted

during June, July, and August 2008. The August 2008 baseline monitoring events were conducted to obtain ambient light (illuminance) measurements, sky glow measurements, and digital photographs. The June and July 2008 sampling events primarily focused on the nighttime measurements of sky glow (sky brightness) in the vicinity of the Site.

The equipment and procedures used to monitor the baseline illuminance measurements are described in Appendix 10.7.6. As described in this appendix, the equipment and procedures used for measuring sky glow using photometric devices conform to recognized practices.

The illuminance measurements collected in June 2008 were collected at eight locations. Two of the eight light monitoring locations (Light Monitoring Sites 2 and 3) were selected to measure the illuminance immediately adjacent to the existing Turkey Point generating units. Light Monitoring Sites 4 and 5 were selected to measure the illuminance at the facility's northern boundary adjacent to the BNP. Additionally, Light Monitoring Sites 1, 6, 7, and 8 were selected to measure the illuminance the Homestead Racetrack, the FPL daycare center to the west of the Plant, the BNP entrance, and the nearest permanent private residence, respectively.

The sampling locations for the sky glow measurements in July 2008 included the initial eight monitoring Sites identified in the June 2008 study, plus two additional Sites to the south and southwest of the Site. Light Monitoring Site 9 is located at the southernmost portion of the industrial wastewater facility and near to Card Sound. Light Monitoring Site 10 is located on the western edge and approximately one-third of the way up from the southern edge of the industrial wastewater facility. Figure 3.3.9-2 presents the ten locations where illuminance measurements were collected. Light Monitoring Sites 9 and 10 are open areas without light sources and located about 11 miles south and nine miles southwest of the Site, respectively.

The sampling locations for the sky glow measurements and digital photography in August 2008 included the initial 8 monitoring Sites identified in the June 2008 study, plus the 2 additional Sites to the south and southwest of the Site identified in the July 2008 study. Appendix 10.7.6 contains pictures of visible sky glows from each location.

Results from June 2008 Measurement Period

The daytime and nighttime ambient illuminance measurements for the June 2008 monitoring event are summarized in Table 3.3.9-2. The observations were collected over 2 days and the maximum

values observed during the daytime ranged from 13.65 to 121.94 klux, reflecting conditions ranging from direct sunshine to cloudy conditions that occurred during monitoring.

The nighttime illuminance ranged from 29.2 lux at Light Monitoring Site 6 to 0.0 lux recorded at several of the light monitoring Sites during the June 2008 sampling period. The elevated illuminance level measured at Light Monitoring Site 6 was due to the nearby bright street lights in the parking lot. The dominant source of background light observed at the other off-site locations (Light Monitoring Sites 1, 7, and 8) were the sky glow from the cities of Miami and Homestead extending far above the horizon. The existing Turkey Point Plant was observed to have a lower influence on sky glow and it occurred only in the direction of the Plant.

Results of July 2008 Measurement Period

The nighttime sky glow values ranged from 15.25 mag/arcsec² (0.0858 lux) at Light monitoring Site 6 to 20.39 mag/arcsec² (0.0008 lux) at Site 9. The measured values for all ten locations are provided in Table 3.3.9-3. The elevated illuminance levels measured at Light Monitoring Site 6 were due to the nearby street lights of the parking lot. The dominant source of background light observed at the off-site locations was the sky glow from the cities of Miami and Homestead that extended above the horizon. As observed in the June 2008 measurements, the lighting from the existing Turkey Point Plant had a lower influence on sky glow and it occurs only in the direction of the Plant. The values of sky brightness measured during the July period showed that the light monitoring Sites nearest to the Turkey Point Plant are influenced by the Plant as shown by the nighttime sky glow values of 17.01 and 18.28 mag/arcsec², and 16.31 and 17.49 mag/arcsec², observed at Light Monitoring Sites 2 and 3, respectively. In contrast, the sky glow measurements at the light monitoring Sites that were farther from the Turkey Point Plant (Light Monitoring Sites 1, 7, and 8) show less of an influence on light from the Plant and more influence from “localized” light sources (such as street lights and park signs). The “darkest” observations (i.e., highest nighttime sky glow values) were observed at Light Monitoring Sites 9 and 10. These light monitoring sites are located over four miles from the Site and over ten miles from the nearest development.

Results of August 2008 Measurement Period

The nighttime sky glow values ranged from 12.77 mag/arcsec² (0.8448 lux) at Light monitoring Site 6 to 20.40 mag/arcsec² (0.0007 lux) at Site 10. The measured values for all ten locations are provided in Table 3.3.9-4 showing sky glow of the plant and nearby urban areas for each monitoring Site can be seen in the photo log (Appendix 10.7.6). The elevated illuminance levels measured at Light Monitoring Site 6 were due to the nearby street lights of the parking lot. The dominant source of

background light observed at the off-site locations was the sky glow from the cities of Miami and Homestead that extended above the horizon. As observed in the June and July 2008 measurements, the lighting from the existing Turkey Point Plant had a lower influence on sky glow and it occurs only in the direction of the Plant. The values of sky brightness measured during the August period showed that the light monitoring sites nearest to the Turkey Point Plant are influenced by the Plant as shown by the nighttime sky glow values of 18.65 and 18.70 mag/arcsec² (0.0038 and 0.0036 lux), observed at Light Monitoring Sites 2 and 3, respectively. As can be seen in the photo log (Appendix 10.7.6), the sky glow measurements at the light monitoring sites that were farther from the Turkey Point Plant (Light Monitoring Sites 1, 6, 7, and 8) show less of an influence on light from the Plant and more influence from “localized” light sources (such as street lights and park signs). The “darkest” observations (i.e., highest nighttime sky glow values) were observed at Light Monitoring Sites 9 and 10. These light monitoring sites are located over eight miles from the existing Turkey Point Plant and over 10 miles from the nearest development.

TABLE 3.2.7-1
EMPLOYMENT TRENDS BY INDUSTRY
STATE OF FLORIDA AND MIAMI-DADE COUNTY
SHEET 1 OF 2

Industry Group	Florida	Miami-Dade County
Total Employment, All Industries	10,679,883	1,454,499
Wage and Salary employment	8,489,432	1,126,728
Proprietors employment	2,190,451	327,771
Farm proprietors employment	36,469	1,313
Nonfarm proprietors employment	2,153,982	326,458
Farm employment	83,692	6,992
Nonfarm employment	10,596,191	1,447,507
Private employment	9,387,207	1,287,164
Forestry, fishing, related activities, and other	91,671	4,373
Mining	14,807	965
Utilities	25,507	3,440
Construction	820,609	90,402
Manufacturing	420,891	52,240
Wholesale trade	401,595	84,018
Retail trade	1,206,428	149,120
Transportation and warehousing	325,046	84,932
Information	193,046	25,777
Finance and insurance	528,657	67,412
Real estate and rental and leasing	663,227	77,826
Professional and technical services	684,619	95,067
Management of companies and enterprises	87,534	9,367
Administrative and waste services	949,128	117,175
Educational services	171,652	34,180
Health care and social assistance	1,041,025	145,911
Arts, entertainment, and recreation	287,139	25,462
Accommodation and food services	801,915	97,647
Other services, except public administration	672,711	121,850
Government and government enterprises	1,208,984	160,343
Federal, civilian	128,181	19,751
Military	101,559	7,209
State and local	979,244	133,383
State government	204,838	15,767
Local government	774,406	117,616

TABLE 3.2.7-1
EMPLOYMENT TRENDS BY INDUSTRY
STATE OF FLORIDA AND MIAMI-DADE COUNTY
SHEET 2 OF 2

Industry Section Totals		
By Industry Sector	Florida	Miami-Dade County
Total Employment	10,679,883	1,454,499
Farm, Forestry and Fishing	175,363	11,365
Mining and Utilities	40,314	4,405
Construction	820,609	90,402
Manufacturing	420,891	52,240
Wholesale Trade	401,595	84,018
Retail Trade	1,206,428	149,120
Transportation and Warehousing	325,046	84,932
Finance, Insurance, Real Estate	1,119,884	145,238
Services	4,888,769	672,436
Federal and State Government	434,578	42,727
Local Government	774,406	117,616

Source: BEA, 2009. Total full-time and part-time employment by NAICS industry (Table CA25N) for the State of Florida and Miami-Dade County, 2007.

TABLE 3.2.8-1
TRAFFIC RESERVE CAPACITY FOR ROADS IN THE VICINITY
OF THE TURKEY POINT PLANT

Station No.	Location	Peak Hour Capacity¹	Peak Hour Trips²	Available Peak Hour Capacity³ (Level of Service)
9956	SW 344 th Street/Palm Drive west of SW 137 th Avenue	3,030	231	2,799
9952	SW 328 th Street/North Canal Drive west of SW 137 th Avenue	2,600	254	2,346
9944	SE 312 th Street east of HEFT ⁴	3,350	2,061	1,289

Source: Miami-Dade County (October 31, 2007)

Notes:

- 1 Maximum Level of Service (LOS) capacity
- 2 Existing traffic volumes plus peak hour trips associated with approved, but not built, developments
- 3 Total peak hour trips minus peak hour capacity (reserved trips)
- 4 HEFT = Homestead Extension of Florida's Turnpike

TABLE 3.3.1-1
AVERAGE GRAIN SIZE OF THE LITHOLOGY AT THE TURKEY POINT UNITS 6 & 7 SITE

		% Gravel	% Sand	% Fines
Muck	Minimum	0	35	14.3
	Maximum	46	55	45
	Average	27.1	46.8	26.1
Miami Limestone	Minimum	0	18	1
	Maximum	71	92	48.6
	Average	38.9	42.6	18.5
Tamiami Sand	Minimum	0	21.3	8
	Maximum	57	92	78.7
	Average	4	58.5	37.6
Hawthorn Sand/ Peace River Formation	Minimum	0	47.6	6
	Maximum	0	94	52.4
	Average	27.1	79.8	20.2

Note: The grain sizes for Muck, Miami Limestone, Tamiami Sand, and Hawthorn Sand/Peace River Formation were recovered from SPT sampling.

Source: MACTEC, Volume 1, 2008.

TABLE 3.3.1-2
REPRESENTATIVE HYDROGEOLOGIC PROPERTIES IN MIAMI-DADE COUNTY^(c)

Hydrogeologic Unit or Subunit	Hydraulic Conductivity (feet per day)		Porosity (n)	Approximate Depth (feet below land surface)	Unit Thickness (feet)
	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 ^(a)	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 ^(b)
Boulder Zone	6,540	65	0.2	2,750 - 3,250	500

(a) The vertical hydraulic conductivity included may be two to three orders of magnitude higher than other measurements in South Florida. Maliva, Guo and Missimer (2007) indicates a vertical hydraulic conductivity range of 3×10^{-04} to 3×10^{-05} ft per day based on core measurements.

(b) The Lower Floridan Aquifer extends below the Boulder Zone; the thickness presented is only for the portion above the Boulder Zone.

(c) Values in this table represent weights and averages for risk assessment for measurement of treated wastewater and thus may not be representative of actual conditions.

Adapted from EPA, 2003

TABLE 3.3.3-1
MONTHLY AND ANNUAL AVERAGE TEMPERATURES
MEASURED AT MIAMI INTERNATIONAL AIRPORT

Month	Daily Average Temperatures (°F)^a			Daily Extremes (°F)^b	
	Average	Maximum	Minimum	Maximum	Minimum
January	68.1	75.5	58.7	88	30
February	69.1	76.6	59.5	89	32
March	72.4	79.5	63.3	93	32
April	75.7	82.6	67.1	96	46
May	79.6	85.4	70.9	96	53
June	82.4	88.0	74.3	98	60
July	83.7	89.3	75.6	98	69
August	83.6	89.7	75.9	98	68
September	82.4	88.2	75.2	97	68
October	78.8	84.7	71.4	95	51
November	74.4	80.2	65.7	91	39
December	69.9	76.8	60.8	87	30
Annual	76.7	83.1	68.2	98	30

^a 30-year period of record, climatological normal, 1971 to 2000.

^b 65-year period of record, 1943 to 2007.

Source: National Oceanic and Atmospheric Administration (NOAA), 2007.

TABLE 3.3.3-2
MONTHLY AND ANNUAL AVERAGE PRECIPITATION AND RELATIVE HUMIDITY
MEASURED AT MIAMI INTERNATIONAL AIRPORT

Month	Precipitation (inches)			Humidity (%) hour (LST) ^a			
	Average ^a	Maximum ^b	Minimum ^b	1 a.m.	7 a.m.	1 p.m.	7 p.m.
January	1.88	6.66	0.04	81	85	59	70
February	2.07	8.07	0.01	80	84	57	68
March	2.56	10.57	0.02	78	82	56	66
April	3.36	17.29	0.05	76	79	54	64
May	5.52	18.54	0.44	79	80	58	69
June	8.54	22.36	1.81	83	83	65	74
July	5.79	13.51	1.77	82	83	63	72
August	8.63	16.88	1.65	83	85	65	75
September	8.38	24.40	2.63	84	87	66	77
October	6.19	21.64	0.72	82	85	63	73
November	3.43	13.84	0.09	81	84	63	72
December	2.18	6.39	0.12	80	84	60	71
Annual	58.53	79.56	42.63	81	83	61	71

^a 30-year period of record, climatological normal, 1971 to 2000.

^b 65-year period of record, 1943 to 2007 for monthly values; 30-year period of record, 1978 to 2007 for annual values.

Note: LST = local standard time.

Source: NOAA, 2007.

TABLE 3.3.3-3
SFWMD WATER USE PERMITS WITHIN 5-MILE RADIUS OF SITE

Permit Number	Project Name	Land Use ¹	Water Use ²	X Coord	Y Coord	Source	Section	Township	Range
13-00578-W	KRENG, DAVID	AGR	IRR	25.471759	-80.395348	Biscayne Aquifer	13	57	39
13-00578-W	KRENG, DAVID	AGR	IRR	25.471759	-80.395348	Biscayne Aquifer	13	57	39
13-00578-W	KRENG, DAVID	AGR	IRR	25.471759	-80.395348	Biscayne Aquifer	13	57	39
13-00578-W	KRENG, DAVID	AGR	IRR	25.471759	-80.395348	Biscayne Aquifer	13	57	39
13-00578-W	KRENG, DAVID	AGR	IRR	25.471759	-80.395348	Biscayne Aquifer	13	57	39
13-00578-W	KRENG, DAVID	AGR	IRR	25.471759	-80.395348	Biscayne Aquifer	13	57	39
13-01637-W	DIAZ NURSERY	AGR	IRR	25.490098	-80.366277	Surficial Aquifer System	6,7	57	40
13-01637-W	DIAZ NURSERY	AGR	IRR	25.487063	-80.374584	Surficial Aquifer System	6,7	57	40
13-00982-W	BERNECKER TRACT	AGR	IRR	25.480508	-80.38143	Biscayne Aquifer	12	57	39
13-00328-W	FARSOUTH GROVES	AGR	IRR	25.48402	-80.377759	Biscayne Aquifer	9,19,20,29-31	56	40
13-00982-W	BERNECKER TRACT	AGR	IRR	25.478439	-80.384581	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.479027	-80.384578	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.479619	-80.384575	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.480208	-80.384572	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.480797	-80.384569	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.480517	-80.383539	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.47989	-80.383543	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.479298	-80.383546	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.478709	-80.383549	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.478159	-80.383551	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.478468	-80.382516	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.47906	-80.382513	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.47961	-80.38251	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.480199	-80.382507	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.480788	-80.382504	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.479881	-80.381433	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.479289	-80.381436	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.478701	-80.381439	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.47815	-80.381442	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.47846	-80.380449	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.479051	-80.380446	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.479602	-80.380443	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.48019	-80.38044	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.480779	-80.380437	Biscayne Aquifer	12	57	39
13-00300-W	ALGER FARMS	AGR	IRR	25.487446	-80.369565	Biscayne Aquifer	3	56	39
13-00300-W	ALGER FARMS	AGR	IRR	25.480172	-80.376645	Biscayne Aquifer	3	56	39
13-00300-W	ALGER FARMS	AGR	IRR	25.474603	-80.38988	Biscayne Aquifer	3	56	39
13-00300-W	ALGER FARMS	AGR	IRR	25.468033	-80.393939	Biscayne Aquifer	3	56	39
13-00300-W	ALGER FARMS	AGR	IRR	25.464665	-80.393955	Biscayne Aquifer	3	56	39
13-00300-W	ALGER FARMS	AGR	IRR	25.468121	-80.397881	Biscayne Aquifer	3	56	39
13-00300-W	ALGER FARMS	AGR	IRR	25.464609	-80.397741	Biscayne Aquifer	3	56	39
13-00300-W	ALGER FARMS	AGR	IRR	25.46162	-80.402254	Biscayne Aquifer	3	56	39
13-00102-W	BOTANICAL GARDENS NURSERY, INC	NUR	IRR	25.463441	-80.380235	Canal	13	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.479793	-80.382852	Biscayne Aquifer	12	57	39
13-00982-W	BERNECKER TRACT	AGR	IRR	25.479793	-80.382852	Biscayne Aquifer	12	57	39

TABLE 3.3.3-3
SFWMD WATER USE PERMITS WITHIN 5-MILE RADIUS OF SITE

Permit Number	Project Name	Land Use ¹	Water Use ²	X Coord	Y Coord	Source	Section	Township	Range
13-00300-W	ALGER FARMS	AGR	IRR	25.474446	-80.391779	Biscayne Aquifer	3	56	39
13-02398-W	NATIVE TREE NURSERY INC	NUR	IRR	25.493288	-80.36135	Biscayne Aquifer	5,18	57	40
13-02398-W	NATIVE TREE NURSERY INC	NUR	IRR	25.493316	-80.360258	Biscayne Aquifer	5,18	57	40
13-02398-W	NATIVE TREE NURSERY INC	NUR	IRR	25.493622	-80.359705	Biscayne Aquifer	5,18	57	40
13-02398-W	NATIVE TREE NURSERY INC	NUR	IRR	25.473913	-80.371009	Biscayne Aquifer	5,18	57	40
13-02398-W	NATIVE TREE NURSERY INC	NUR	IRR	25.49311	-80.35972	Biscayne Aquifer	5,18	57	40
13-02398-W	NATIVE TREE NURSERY INC	NUR	IRR	25.473918	-80.36973	Biscayne Aquifer	5,18	57	40
13-02398-W	NATIVE TREE NURSERY INC	NUR	IRR	25.472483	-80.369298	Biscayne Aquifer	5,18	57	40
13-02398-W	NATIVE TREE NURSERY INC	NUR	IRR	25.473451	-80.369305	Biscayne Aquifer	5,18	57	40
13-02398-W	NATIVE TREE NURSERY INC	NUR	IRR	25.471539	-80.369239	Biscayne Aquifer	5,18	57	40
13-02398-W	NATIVE TREE NURSERY INC	NUR	IRR	25.472923	-80.37129	Biscayne Aquifer	5,18	57	40
13-02398-W	NATIVE TREE NURSERY INC	NUR	IRR	25.472905	-80.369535	Biscayne Aquifer	5,18	57	40
13-02398-W	NATIVE TREE NURSERY INC	NUR	IRR	25.470602	-80.37095	Biscayne Aquifer	5,18	57	40
13-02398-W	NATIVE TREE NURSERY INC	NUR	IRR	25.471588	-80.37053	Biscayne Aquifer	5,18	57	40
13-02398-W	NATIVE TREE NURSERY INC	NUR	IRR	25.47062	-80.369871	Biscayne Aquifer	5,18	57	40
13-00005-W	FLORIDA KEYS AQUEDUCT AUTHORITY	PWS	MON	25.421104	-80.412901	Biscayne Aquifer	26	57	38
13-03487-W	SALAZARS TWO SISTERS NURSERY 312/117, 310/142 AND 294/137	AGR	IRR	25.474676	-80.38175	Biscayne Aquifer	13	57	39
13-03487-W	SALAZARS TWO SISTERS NURSERY 312/117, 310/142 AND 294/137	AGR	IRR	25.471537	-80.38173	Biscayne Aquifer	13	57	39
13-04034-W	MEDALLION TREE FARMS	AGR	IRR	25.479985	-80.365179	Biscayne Aquifer	26	40	39
13-04034-W	MEDALLION TREE FARMS	AGR	IRR	25.479985	-80.365179	Biscayne Aquifer	26	40	39
13-04034-W	MEDALLION TREE FARMS	AGR	IRR	25.479985	-80.365179	Biscayne Aquifer	26	40	39
13-04034-W	MEDALLION TREE FARMS	AGR	IRR	25.479985	-80.365179	Biscayne Aquifer	26	40	39
13-04034-W	MEDALLION TREE FARMS	AGR	IRR	25.479985	-80.365179	Biscayne Aquifer	26	40	39
13-04034-W	MEDALLION TREE FARMS	AGR	IRR	25.479985	-80.365179	Biscayne Aquifer	26	40	39
13-04034-W	MEDALLION TREE FARMS	AGR	IRR	25.479985	-80.365179	Biscayne Aquifer	26	40	39
13-04034-W	MEDALLION TREE FARMS	AGR	IRR	25.479985	-80.365179	Biscayne Aquifer	26	40	39
13-04034-W	MEDALLION TREE FARMS	AGR	IRR	25.479985	-80.365179	Biscayne Aquifer	26	40	39
13-04034-W	MEDALLION TREE FARMS	AGR	IRR	25.479985	-80.365179	Biscayne Aquifer	26	40	39
13-04034-W	MEDALLION TREE FARMS	AGR	IRR	25.479985	-80.365179	Biscayne Aquifer	26	40	39
13-04034-W	MEDALLION TREE FARMS	AGR	IRR	25.479985	-80.365179	Biscayne Aquifer	26	40	39
13-04034-W	MEDALLION TREE FARMS	AGR	IRR	25.479985	-80.365179	Biscayne Aquifer	26	40	39
13-04034-W	MEDALLION TREE FARMS	AGR	IRR	25.479985	-80.365179	Biscayne Aquifer	26	40	39
13-04034-W	MEDALLION TREE FARMS	AGR	IRR	25.479985	-80.365179	Biscayne Aquifer	26	40	39
13-04034-W	MEDALLION TREE FARMS	AGR	IRR	25.479985	-80.365179	Biscayne Aquifer	26	40	39
13-04034-W	MEDALLION TREE FARMS	AGR	IRR	25.479985	-80.365179	Biscayne Aquifer	26	40	39
13-04034-W	MEDALLION TREE FARMS	AGR	IRR	25.479985	-80.365179	Biscayne Aquifer	26	40	39
13-03452-W	TARASSU NURSERY	AGR	IRR	25.470109	-80.390191	Biscayne Aquifer	13	57	39
13-03452-W	TARASSU NURSERY	AGR	IRR	25.468449	-80.390151	Biscayne Aquifer	13	57	39
13-03497-W	MIAMI-DADE 40 ACRE	AGR	IRR	25.473294	-80.375601	Biscayne Aquifer	18	57	40
13-03497-W	MIAMI-DADE 40 ACRE	AGR	OTR	25.473294	-80.375601	Biscayne Aquifer	18	57	40
13-04030-W	HIGH HOPE NURSERY	AGR	IRR	25.479967	-80.38293	Biscayne Aquifer	30	56	39
13-04034-W	MEDALLION TREE FARMS	AGR	IRR	25.479985	-80.365179	Biscayne Aquifer	26	40	39
13-04034-W	MEDALLION TREE FARMS	AGR	IRR	25.479985	-80.365179	Biscayne Aquifer	26	40	39
13-04030-W	HIGH HOPE NURSERY	AGR	IRR	25.487225	-80.373162	Biscayne Aquifer	30	56	39
13-04030-W	HIGH HOPE NURSERY	AGR	IRR	25.487254	-80.367687	Biscayne Aquifer	30	56	39
13-04030-W	HIGH HOPE NURSERY	AGR	IRR	25.484934	-80.369503	Biscayne Aquifer	30	56	39
13-04030-W	HIGH HOPE NURSERY	AGR	IRR	25.479888	-80.37658	Biscayne Aquifer	30	56	39
13-04030-W	HIGH HOPE NURSERY	AGR	IRR	25.472311	-80.372948	Biscayne Aquifer	30	56	39
13-04231-W	316TH AND 176TH	NUR	IRR	25.474714	-80.368001	Biscayne Aquifer	27	55	39

TABLE 3.3.3-3
 SFWMD WATER USE PERMITS WITHIN 5-MILE RADIUS OF SITE

Permit Number	Project Name	Land Use ¹	Water Use ²	X Coord	Y Coord	Source	Section	Township	Range
13-04231-W	316TH AND 176TH	NUR	IRR	25.474229	-80.36834	Biscayne Aquifer	27	55	39
13-04231-W	316TH AND 176TH	NUR	IRR	25.474233	-80.369404	Biscayne Aquifer	27	55	39
13-04231-W	316TH AND 176TH	NUR	IRR	25.474222	-80.370107	Biscayne Aquifer	27	55	39
13-04231-W	316TH AND 176TH	NUR	IRR	25.474213	-80.371086	Biscayne Aquifer	27	55	39
PA03-45A2*	FLORIDA POWER & LIGHT CO.	<Null>	Industrial Supply	25.43929	-80.32896	Upper Floridian Aquifer	27	57	40
PA03-45A2*	FLORIDA POWER & LIGHT CO.	<Null>	Industrial Supply	25.436896	-80.333665	Upper Floridian Aquifer	28	57	40
PA03-45A2*	FLORIDA POWER & LIGHT CO.	<Null>	Industrial Supply	25.440792	-80.337088	Upper Floridian Aquifer	30	57	40

NOTE: * This withdrawal approved by Site Certifications and not a separate SFWMD permit.

¹ AGR = agricultural use; NUR = nursery use.

² IRR = irrigation.

Source: SFWMD, 2008; FPL, 2009.

TABLE 3.3.4-1
BISCAYNE BAY WATER QUALITY

Parameter	Units	Count	Mean	Minimum	Maximum
Temp	Deg C	1406	25.5	13.7	35.0
Dissolved oxygen	mg/L	1376	6.1	1.9	9.4
SP Conductivity, Field	uS/cm	1266	51286	32000	69700
pH, Field	UNITS	1274	8.0	7.0	8.7
Turbidity	NTU	628	1.2	0.1	7.6
Color	PCU	446	3.9	0.0	24.0
SP Conductivity, Lab	uS/cm	81	48995	38200	56100
Nitrate as N	mg/L	366	0.03	0.01	0.34
Ammonia-N	mg/L	305	0.06	0.01	0.9
Phosphate, Total as P	mg/L	388	0.005	0.001	0.058
Chlorophyll-A	mg/M3	12	0.2	0.12	0.61
Salinity ¹	PSU	1422	34.2	0.9	46.8
Total Coliform, MF	CFU/100m	315	<0.1	0	32
Fecal Coliform, MF	CFU/100m	285	<0.1	0	20

Period of Record 1979 to 2003 (24 years)

¹PSU = Practical Salinity Units approximately equivalent to parts per thousand (ppt)

Source: SFWMD, DBHYDRO Database, Stations BB41, BB44 and BB45

TABLE 3.3.4-2
WATER QUALITY DATA FOR THE TURKEY POINT INDUSTRIAL WASTEWATER FACILITY

No.	Parameter	Unit	Max	Avg
1	pH	SU	8.21	8.02
2	TSS	mg/L	19	16
3	COD	mg/L	2100	1650
4	BOD (5-day)	mg/L	ND	ND
5	Soluble BOD	mg/L	ND	ND
6	Total Residual Chlorine	mg/L	0.8	0.8
7	Total Dissolved Solids (TDS)	mg/L	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
11	Nitrate as N	mg/L	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 CaCO ₃	10000	10000
15	Total Alkalinity	mg/L as CaCO ₃	170	165
16	Nitrogen (total)	mg/L	1.9	1.8
17	Fluoride	mg/L	ND	ND
18	Chloride	mg/L	33000	30000
19	Iron Total	mg/L	ND	ND
20	Magnesium	mg/L	2200	2050
21	Calcium	mg/L	760	720
22	Manganese	mg/L	0.0089	0.00855
23	Sulfate	mg/L	4200	3950
24	Temperature	°C	31.5	30.05
25	Antimony	mg/L	ND	ND
26	Arsenic	mg/L	0.042	0.0295
27	Beryllium	mg/L	ND	ND
28	Cadmium	mg/L	ND	ND
29	Chromium	mg/L	ND	ND
30	Copper	mg/L	0.021	0.0175
31	Lead	mg/L	0.0001	0.0001
32	Soluble Lead	mg/L	0.00021	0.000152
33	Mercury	mg/L	ND	ND
34	Molybdenum	mg/L	0.018	0.018
35	Nickel	mg/L	0.05	0.0395
36	Selenium	mg/L	0.67	0.3475
37	Silver	mg/L	ND	ND
38	Thallium	mg/L	0.0018	0.00107
39	Zinc	mg/L	0.019	0.019
40	Cyanide	mg/L	ND	ND
41	Phenols	mg/L	ND	ND
42	Oil & Grease	mg/L	ND	ND
43	Silica	mg/L	0.61	0.52
44	Ortho-Phosphate	mg/L	ND	ND
45	Alkalinity (Bicarbonate)	mg/L	170	165
46	Total- Phosphate	mg/L	NM	NM
47	Turbidity	NTU	2	1.915
48	Sulfides	mg/L	ND	ND
49	Aluminum	mg/L	0.017	0.014
50	Barium	mg/L	0.08	0.073
51	Iron (Dissolved)	mg/L	ND	ND
52	Potassium	mg/L	690	680
53	Vanadium	mg/L	0.0056	0.004

All tested as total unfiltered.

ND = non-detected.

NM = not measured

Source: FPL, 2003.

TABLE 3.3.6-1
SPECIES OBSERVED DURING TURKEY POINT UNITS 6 & 7 WILDLIFE SURVEYS
(NOVEMBER 2007, JUNE 2008, APRIL 2009)

Scientific Name	Common Name	Federal Status	State Status
<u>INVERTEBRATES</u>			
Mollusks			
<i>Busycon contrarium</i>	Lightning whelk	N	N
<i>Cerithium eburneum</i>	Ivory cerith	N	N
<i>Isognomon radiatus</i>	Lister's tree oyster	N	N
<i>Isognomon alatus</i>	Flat tree oyster	N	N
<i>Marisa cornuarietis</i>	Giant rams horn	N	N
<i>Melampus bidentatus</i>	Eastern Melampus	N	N
<i>Melongena corona</i>	Florida crown conch	N	N
<i>Pomacea</i> sp.	Apple Snail	N	N
<i>Tellin</i> sp.	Unidentified species of <i>Tellin</i>	N	N
Crustaceans			
<i>Cardisoma guanhumi</i>	Great land crab	N	N
<i>Uca</i> sp.	Fiddler crab	N	N
Insects			
<i>Argiope agentata</i>	Silver argiope	N	N
<i>Brephidium isophthalma</i>	Eastern pygmy blue	N	N
<i>Junonia coenia</i>	Common buckeye butterfly	N	N
Unidentified dragonfly sp.			
<u>VERTEBRATES</u>			
Amphibians			
<i>Acris gryllus</i>	Southern cricket frog	N	N
Fishes			
<i>Cyprinodon variegatus</i>	Sheepshead minnow	N	N
<i>Fundulus</i> sp.	Unidentified species of Killifish	N	N
<i>Gambusia</i> sp.	Mosquitofish	N	N
<i>Mugil</i> sp.	Mullet	N	N
<i>Poecilia latipinna</i>	Sailfin molly	N	N
<i>Strongylura</i> sp.	Needlefish	N	N
Reptiles			
<i>Alligator mississippiensis</i>	American alligator	T (SA)	SSC
<i>Crotalus adamanteus</i>	Eastern diamondback rattlesnake	N	N
<i>Crocodylus acutus</i>	American crocodile	T	E
<i>Hemidactylus</i> sp.	Gecko	N	N
<i>Iguana iguana</i>	Green iguana	N	N
Mammals			
<i>Sigmodon hispidus</i>	Cotton rat	N	N
<i>Rattus rattus</i>	Black rat	N	N
<i>Sylvilagus palustris</i>	Marsh rabbit	N	N
Birds			
<i>Actitis macularia</i>	Spotted sandpiper	N	N
<i>Agelaius phoeniceus</i>	Red-winged blackbird	N	N
<i>Ardea herodias</i>	Great blue heron	N	N
<i>Bubo virginianus</i>	Great horned owl	N	N
<i>Buteo lineatus</i>	Red-shouldered hawk	N	N
<i>Butoroides striatus</i>	Green heron	N	N
<i>Calidris alba</i>	Sanderling	N	N
<i>Calidris maurii</i>	Western sandpiper	N	N
<i>Calidris minutilla</i>	Least sandpiper	N	N

TABLE 3.3.6-1
SPECIES OBSERVED DURING TURKEY POINT UNITS 6 & 7 WILDLIFE SURVEYS
(NOVEMBER 2007, JUNE 2008, APRIL 2009)

Scientific Name	Common Name	Federal Status	State Status
<i>Casmerodius albus</i>	Great egret	N	N
<i>Catoptrophorus semipalmatus</i>	Willet	N	N
<i>Charadrius semipalmatus</i>	Semipalmated plover	N	N
<i>Charadrius vociferus</i>	Killdeer	N	N
<i>Charadrius wilsonia</i>	Wilson's plover	N	N
<i>Chordeiles minor</i>	Common nighthawk	N	N
<i>Coccyzus americanus</i>	Yellow-billed cuckoo	N	N
<i>Columba leucocephala</i>	White-crowned pigeon	N	T
<i>Coragyps atratus</i>	Black vulture	N	N
<i>Dendroica discolor</i>	Prairie warbler	N	N
<i>Egretta caerulea</i>	Little blue heron	N	SSC
<i>Egretta rufescens</i>	Reddish egret	N	SSC
<i>Egretta thula</i>	Snowy egret	N	SSC
<i>Egretta tricolor</i>	Tricolored heron	N	SSC
<i>Eudocimus albus</i>	White ibis	N	SSC
<i>Patagioenas leucocephalus</i>	Bald eagle	N	N
<i>Himantopus mexicanus</i>	Black-necked stilt	N	N
<i>Hirundo rustica</i>	Barn swallow	N	N
<i>Limnodromus griseus</i>	Short-billed dowitcher	N	N
<i>Megaceryle alcyon</i>	Belted kingfisher	N	N
<i>Mimus polyglottis</i>	Northern mockingbird	N	N
<i>Mycteria americana</i>	Wood stork	E	E
<i>Numenius americanus</i>	Long-billed curlew	N	N
<i>Numenius phaeopus</i>	Whimbrel	N	N
<i>Pelecanus erythrorhynchos</i>	White pelican	N	N
<i>Phalacrocorax auritus</i>	Double-crested cormorant	N	N
<i>Platalea ajaja</i>	Roseate spoonbill	N	SSC
<i>Pluvialis squatarola</i>	Black-bellied plover	N	N
<i>Polioptila caerulea</i>	Blue-gray gnatcatcher	N	N
<i>Petrochelidon pyrrhonota</i>	Cliff swallow	N	N
<i>Recurvirostra americana</i>	American avocet	N	N
<i>Riparia riparia</i>	Bank swallow	N	N
<i>Sterna antillarum</i>	Least tern	N	T
<i>Sterna maxima</i>	Royal tern	N	N
<i>Tringa flavipes</i>	Lesser yellowlegs	N	N
<i>Tringa melanoleuca</i>	Greater yellowlegs	N	N
<i>Tringa solitaria</i>	Solitary sandpiper	N	N

Notes:

N = Not currently listed, nor currently being considered for listing

SSC = Species of Special Concern

T = Threatened

T (SA) = Threatened due to similarity of appearance to the American crocodile

E = Endangered

**TABLE 3.3.6-2
THREATENED, ENDANGERED, AND SPECIES OF SPECIAL CONCERN
KNOWN TO OCCUR IN MIAMI-DADE COUNTY, FLORIDA**

Scientific Name	Common Name	Federal Status	State Status
Plants			
<i>Acrostichum aureum</i>	Golden Leather Fern	N	T
<i>Adiantum melanoleucum</i>	Fragrant Maidenhair Fern	N	E
<i>Adiantum tenerum</i>	Brittle Maidenhair Fern	N	E
<i>Aeschynomene pratensis</i>	Meadow Jointvetch	N	E
<i>Aletris bracteata</i>	Bracted Colic-root	N	E
<i>Alvaradoa amorphoides</i>	Everglades Leaf Lace	N	E
<i>Amorpha herbacea</i> var. <i>crenulata</i>	Crenulate Lead-plant	E	E
<i>Anemia wrightii</i>	Wright's Anemia	N	E
<i>Argusia gnaphalodes</i>	Sea Lavender	N	E
<i>Argythamnia blodgettii</i>	Blodgett's Wild-mercury	C	E
<i>Aristolochia pentandra</i>	Dutchman's Pipe	N	E
<i>Asplenium dentatum</i>	American Toothed Spleenwort	N	E
<i>Asplenium serratum</i>	American Bird's Nest Fern	N	E
<i>Asplenium verecundum</i>	Modest Spleenwort	N	E
<i>Basiphyllaea corallicola</i>	Rockland Orchid	N	E
<i>Beloglottis costaricensis</i>	Costa Rican Ladies'-tresses	N	E
<i>Bletia purpurea</i>	Pinepink	N	T
<i>Bourreria cassinifolia</i>	Smooth Strongbark	N	E
<i>Bourreria succulenta</i>	Bahama Strongbark	N	E
<i>Brassia caudata</i>	Spider Orchid	N	E
<i>Brickellia mosieri</i>	Florida Brickell-bush	C	E
<i>Byrsonima lucida</i>	Locustberry	N	T
<i>Calyptanthus zuzygium</i>	Myrtle-of-the-river	N	E
<i>Campyloneurum angustifolium</i>	Narrow-leaved Strap Fern	N	E
<i>Catopsis berteroniana</i>	Powdery Catopsis	N	E
<i>Catopsis floribunda</i>	Many-flowered Catopsis	N	E
<i>Chamaesyce deltoidea</i> ssp. <i>adhaerens</i>	Hairy Deltoid Spurge	E	E
<i>Chamaesyce deltoidea</i> ssp. <i>deltoidea</i>	Deltoid Spurge	E	E
<i>Chamaesyce deltoidea</i> ssp. <i>pinetorum</i>	Pinelands Spurge	C	E
<i>Chamaesyce garberi</i>	Garber's Spurge	T	E
<i>Chamaesyce portieriana</i>	Porter's Broad-leaved Spurge	N	E
<i>Coccothrinax argentata</i>	Silver Palm	N	T
<i>Colubrina cubensis</i> var. <i>floridana</i>	Cuban Snake-bark	N	E
<i>Crossopetalum ilicifolium</i>	Christmas Berry	N	T
<i>Crossopetalum rhacoma</i>	Rhacoma	N	T
<i>Ctenitis sloanei</i>	Florida Tree Fern	N	E
<i>Cyclopogon elatus</i>	Tall Neottia	N	E
<i>Cyrtopodium punctatum</i>	Cowhorn Orchid	N	E
<i>Dalea carthagenensis</i> var. <i>floridana</i>	Florida Prairie Clover	C	E
<i>Digitaria pauciflora</i>	Few-flowered Fingergrass	C	E
<i>Drypetes diversifolia</i>	Milkbark	N	E
<i>Eltroplectris calcarata</i>	Spurred Neottia	N	E
<i>Encyclia boothiana</i> var. <i>erythronioides</i>	Dollar Orchid	N	E
<i>Encyclia cochleata</i> var. <i>triandra</i>	Clamshell Orchid	N	E
<i>Epidendrum nocturnum</i>	Night-scented Orchid	N	E
<i>Ernodea cokeri</i>	Coker's Beach Creeper	N	E
<i>Eugenia confusa</i>	Tropical Ironwood	N	E
<i>Eugenia rhombea</i>	Red Stopper	N	E
<i>Eupatorium villosum</i>	Villose Fennel	N	E
<i>Euphorbia pinetorum</i>	Rockland Painted-leaf	N	E
<i>Exostema caribaeum</i>	Caribbean Princewood	N	E
<i>Galactia smallii</i>	Small's Milk Pea	E	E
<i>Galeandra bicarinata</i>	Two-keeled Helmet Orchid	N	E
<i>Glandularia maritima</i>	Coastal Vervain	N	E

**TABLE 3.3.6-2
THREATENED, ENDANGERED, AND SPECIES OF SPECIAL CONCERN
KNOWN TO OCCUR IN MIAMI-DADE COUNTY, FLORIDA**

Scientific Name	Common Name	Federal Status	State Status
<i>Govenia floridana</i>	Sheathing Govenia	N	E
<i>Guaiacum sanctum</i>	Lignum-vitae	N	E
<i>Guzmania monostachia</i>	Fakahatchee Guzmania	N	E
<i>Halophila johnsonii</i>	Johnson's Seagrass	T	N
<i>Harrisia simpsonii</i>	Simpson's Prickly Apple	N	E
<i>Hippomane mancinella</i>	Manchineel	N	E
<i>Hypelate trifoliata</i>	White Ironwood	N	E
<i>Ilex krugiana</i>	Krug's Holly	N	T
<i>Ipomoea microdactyla</i>	Wild Potato Morning Glory	N	E
<i>Ipomoea tenuissima</i>	Rocklands Morning Glory	N	E
<i>Jacquemontia curtissii</i>	Pineland Jacquemontia	N	T
<i>Jacquemontia pentanthos</i>	Skyblue Clustervine	N	E
<i>Jacquemontia reclinata</i>	Beach Jacquemontia	E	E
<i>Jacquinia keyensis</i>	Joewood	N	T
<i>Lantana canescens</i>	Small-headed Lantana	N	E
<i>Lantana depressa</i> var. <i>depressa</i>	Florida Lantana	N	E
<i>Lantana depressa</i> var. <i>floridana</i>	Atlantic Coast Florida Lantana	N	E
<i>Leiphaemos parasitica</i>	Ghost Plant	N	E
<i>Licaria triandra</i>	Gulf Licaria	N	E
<i>Linum arenicola</i>	Sand Flax	C	E
<i>Linum carteri</i> var. <i>carteri</i>	Carter's Small-flowered Flax	C	E
<i>Linum carteri</i> var. <i>smallii</i>	Small's flax	N	E
<i>Lomariopsis kunzeana</i>	Holly Vine Fern	N	E
<i>Microgramma heterophylla</i>	Climbing Vine Fern	N	E
<i>Odontosoria clavata</i>	Wedgelet Fern	N	E
<i>Okenia hypogaea</i>	Burrowing Four-o'clock	N	E
<i>Oncidium floridanum</i>	Florida Dancinglady Orchid	N	E
<i>Ophioglossum palmatum</i>	Hand Fern	N	E
<i>Opuntia corallicola</i>	Florida Semaphore Cactus	C	E
<i>Passiflora multiflora</i>	White Passionflower	N	E
<i>Passiflora pallens</i>	Pale Passionflower	N	E
<i>Passiflora sexflora</i>	Everglades Key Passion-flower	N	E
<i>Pavonia paludicola</i>	Mangrove Mallow	N	E
<i>Peperomia humilis</i>	Low Peperomia	N	E
<i>Peperomia obtusifolia</i>	Blunt-leaved Peperomia	N	E
<i>Phoradendron rubrum</i>	Mahogany Mistletoe	N	E
<i>Picramnia pentandra</i>	Bitter Bush	N	E
<i>Polygala smallii</i>	Tiny Polygala	E	E
<i>Polypodium lindenii</i>	Ghost Orchid	N	E
<i>Ponthieva brittoniae</i>	Britton's Shadow-witch	N	E
<i>Prescotia oligantha</i>	Small-flowered Prescotia	N	E
<i>Prunus myrtifolia</i>	West Indian Cherry	N	T
<i>Pseudophoenix sargentii</i>	Florida Cherry-palm	N	E
<i>Psidium longipes</i>	Mangrove Berry	N	T
<i>Psychotria ligustrifolia</i>	Bahama Wild Coffee	N	E
<i>Pteris bahamensis</i>	Bahama Brake	N	T
<i>Pteroglossaspis ecristata</i>	Giant Orchid	N	T
<i>Rhipsalis baccifera</i>	Mistletoe Cactus	N	E
<i>Roystonea elata</i>	Florida Royal Palm	N	E
<i>Sachsia polycephala</i>	Bahama Sachsia	N	T
<i>Sacoila lanceolata</i> var. <i>paludicola</i>	Fakahatchee Ladies'-tresses	N	T
<i>Schizaea pennula</i>	Ray Fern	N	E
<i>Scutellaria havanensis</i>	Havana Skullcap	N	E
<i>Selaginella eatonii</i>	Eaton's Spikemoss	N	E
<i>Solanum donianum</i>	Mullien Nightshade	N	T

**TABLE 3.3.6-2
THREATENED, ENDANGERED, AND SPECIES OF SPECIAL CONCERN
KNOWN TO OCCUR IN MIAMI-DADE COUNTY, FLORIDA**

Scientific Name	Common Name	Federal Status	State Status
<i>Spiranthes polyantha</i>	Green Ladies'-tresses	N	E
<i>Spiranthes torta</i>	Southern Ladies'-tresses	N	E
<i>Stylosanthes calcicola</i>	Pineland Pencil Flower	N	E
<i>Swietenia mahagoni</i>	West Indies Mahogany	N	T
<i>Tectaria fimbriata</i>	Least Halberd Fern	N	E
<i>Tectaria heracleifolia</i>	Broad Halberd fern	N	T
<i>Tephrosia angustissima</i> var. <i>angustissima</i>	Devil's Shoestring	N	E
<i>Tephrosia angustissima</i> var. <i>corallicola</i>	Rockland Hoary-pea	N	E
<i>Tephrosia angustissima</i> var. <i>curtissii</i>	Coastal Hoary-pea	N	E
<i>Thelypteris reptans</i>	Creeping Maiden Fern	N	E
<i>Thelypteris reticulata</i>	Lattice-vein Fern	N	E
<i>Thelypteris sclerophylla</i>	Stiff-leaved Maiden Fern	N	E
<i>Thelypteris serrata</i>	Toothed Maiden Fern	N	E
<i>Thrinax morrisii</i>	Brittle Thatch Palm	N	E
<i>Thrinax radiata</i>	Florida Thatch Palm	N	E
<i>Tillandsia flexuosa</i>	Banded Wild-pine	N	T
<i>Tragia saxicola</i>	Pineland Noseburn	N	T
<i>Trema lamarckianum</i>	Lamarck's Trema	N	E
<i>Trichomanes krausii</i>	Kraus' Bristle Fern	N	E
<i>Trichomanes punctatum</i> ssp. <i>floridanum</i>	Florida Filmy Fern	N	E
<i>Tripsacum floridanum</i>	Florida Gama Grass	N	T
<i>Tropidia polystachya</i>	Young-palm Orchid	N	E
<i>Vallesia antillana</i>	Pearl Berry	N	E
<i>Vanilla barbellata</i>	Worm-vine Orchid	N	E
<i>Vanilla inodora</i>	Fuch's Vanilla	N	E
<i>Vanilla phaeantha</i>	Leafy Vanilla	N	E
<i>Zanthoxylum coriaceum</i>	Biscayne Prickly Ash	N	E
<i>Zephyranthes simpsonii</i>	Rain Lily	N	T
<u>Gastropods</u>			
<i>Orthalicus reses reses</i>	Stock Island Tree Snail	T	E
<i>Liguus fasciatus</i>	Florida Tree Snail	N	SSC
<u>Butterflies and Moths</u>			
<i>Cyclargus thomasi bethunebakeri</i>	Miami Blue	C	E
<i>Papilio aristodemus ponceanus</i>	Schaus' Swallowtail	E	E
<u>Fish</u>			
<i>Rivulus marmoratus</i>	Mangrove Rivulus	C	SSC
<u>Amphibians</u>			
<i>Rana capito</i>	Gopher Frog	N	SSC
<u>Reptiles</u>			
<i>Alligator mississippiensis</i>	American Alligator	T (SA)	SSC
<i>Caretta caretta</i>	Loggerhead	T	T
<i>Chelonia mydas</i>	Green Turtle	E	E
<i>Crocodylus acutus</i>	American Crocodile	T	E
<i>Dermochelys coriacea</i>	Leatherback	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	T	T
<i>Eretmochelys imbricata</i>	Hawksbill	E	E
<i>Gopherus polyphemus</i>	Gopher Tortoise	N	T
<i>Lepidochelys kempii</i>	Kemp's Ridley	E	E
<i>Pituophis melanoleucus mugitus</i>	Florida Pine Snake	N	SSC
<i>Tantilla oolitica</i>	Rim Rock Crowned Snake	N	T

TABLE 3.3.6-2
THREATENED, ENDANGERED, AND SPECIES OF SPECIAL CONCERN
KNOWN TO OCCUR IN MIAMI-DADE COUNTY, FLORIDA

Scientific Name	Common Name	Federal Status	State Status
<u>Birds</u>			
<i>Ammodramus maritimus junciculus</i>	Wakulla Seaside Sparrow	N	SSC
<i>Ammodramus maritimus mirabilis</i>	Cape Sable Seaside Sparrow	E	E
<i>Aramus guarauna</i>	Limpkin	N	SSC
<i>Athene cunicularia floridana</i>	Florida Burrowing Owl	N	SSC
<i>Charadrius melodus</i>	Piping Plover	T	T
<i>Egretta caerulea</i>	Little Blue Heron	N	SSC
<i>Egretta rufescens</i>	Reddish Egret	N	SSC
<i>Egretta thula</i>	Snowy Egret	N	SSC
<i>Egretta tricolor</i>	Tricolored Heron	N	SSC
<i>Eudocimus albus</i>	White Ibis	N	SSC
<i>Falco peregrinus</i>	Peregrine Falcon	N	E
<i>Falco sparverius paulus</i>	Southeastern American Kestrel	N	T
<i>Grus canadensis pratensis</i>	Florida Sandhill Crane	N	T
<i>Haematopus palliatus</i>	American Oystercatcher	N	SSC
<i>Haliaeetus leucocephalus</i>	Bald Eagle	N	T
<i>Mycteria americana</i>	Wood Stork	E	E
<i>Patagioenas leucocephala</i>	White-crowned Pigeon	N	T
<i>Pelecanus occidentalis</i>	Brown Pelican	N	SSC
<i>Platalea ajaja</i>	Roseate Spoonbill	N	SSC
<i>Rostrhamus sociabilis plumbeus</i>	Snail Kite	E	E
<i>Rynchops niger</i>	Black Skimmer	N	SSC
<i>Sterna antillarum</i>	Least Tern	N	T
<u>Mammals</u>			
<i>Eumops floridanus</i>	Florida Bonneted Bat	N	E
<i>Mustela vison evergladensis</i>	Everglades Mink	N	T
<i>Podomys floridanus</i>	Florida Mouse	N	SSC
<i>Puma concolor coryi</i>	Florida Panther	E	E
<i>Trichechus manatus latirostris</i>	Florida manatee	E	E
<i>Ursus americanus floridanus</i>	Florida Black Bear	N	T

Notes:

N = Not currently listed, nor currently being considered for listing

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

SSC = Species of Special Concern

T = Threatened

T (SA) = Threatened due to similarity of appearance to the American crocodile

E = Endangered

Source: Florida Natural Areas Inventory, 2008; Florida Fish and Wildlife Conservation Commission, Florida's Endangered Species, Threatened Species, and Species of Special Concern, 2008; US Fish and Wildlife Service, Threatened and Endangered Species System, 2009; Rule 68A-27.003, Rule 68A-27.004, Rule 68A-27.005, and Rule 5B-40.0055, F.A.C.

TABLE 3.3.6-3
FURBEARER AND GAME SPECIES
REASONABLY EXPECTED TO OCCUR IN MIAMI-DADE COUNTY, FLORIDA

Scientific Name	Common Name	Rule 68A-1, F.A.C.
<u>Fish</u>		
<i>Acantharchus pomotis</i>	Mud Sunfish	Game
<i>Centrarchus macropterus</i>	Flier	Game
<i>Lepomis auritus</i>	Redbreast Sunfish	Game
<i>Lepomis gulosus</i>	Warmouth	Game
<i>Lepomis macrochirus</i>	Bluegill	Game
<i>Lepomis megalotis</i>	Longear Sunfish	Game
<i>Lepomis microlophus</i>	Redear Sunfish	Game
<i>Lepomis punctatus</i>	Spotted Sunfish	Game
<i>Morone chrysops</i>	White Bass	Game
<i>Morone chrysops</i> x <i>Morone saxatilis</i>	Sunshine Bass	Game
<i>Pomoxis nigromaculatus</i>	Black Crappie	Game
<u>Birds</u>		
Anatidae (family)	Geese, Ducks	Game
<i>Colinus virginianus</i>	Northern Bobwhite	Game
<i>Corvus spp.</i>	Crows	Game
<i>Fulica americana</i>	American Coot	Game
<i>Gallinago gallinago</i>	Common Snipe	Game
<i>Gallinula chloropus</i>	Common Moorhen	Game
<i>Meleagris gallopavo osceola</i>	Florida Wild Turkey	Game
Rallidae (family)	Rails	Game
<i>Scolopax minor</i>	American Woodcock	Game
<i>Zenaida asiatica</i>	White-winged Dove	Game
<i>Zenaida macroura</i>	Mourning Dove	Game
<u>Mammals</u>		
<i>Canis latrans</i>	Coyote	Furbearer
<i>Didelphis virginiana</i>	Virginia Opossum	Furbearer
<i>Lynx rufus</i>	Bobcat	Furbearer
<i>Mephitis mephitis</i>	Striped Skunk	Furbearer
<i>Odocoileus virginianus</i>	White-tailed Deer	Game
<i>Procyon lotor</i>	Raccoon	Furbearer
<i>Sciurus carolinensis</i>	Eastern Gray Squirrel	Game
<i>Spilogale putorius</i>	Eastern Spotted Skunk	Furbearer
<i>Sylvilagus floridanus</i>	Eastern Cottontail	Game
<i>Sylvilagus palustris</i>	Marsh Rabbit	Game

Notes:

F.A.C. = Florida Administrative Code; Rule 68A-1, F.A.C., was formerly Rule 39-1, F.A.C.

TABLE 3.3.7-1
SEASONAL AND ANNUAL AVERAGE WIND SPEEDS
AT MIAMI INTERNATIONAL AIRPORT

Season	Wind Speed ^a		Calm ^a
	(knots)	(mph)	(%)
Winter	6.99	8.0	10.1
Spring	7.80	9.0	8.8
Summer	6.23	7.2	16.1
Autumn	7.04	8.1	9.7
Annual	7.02	8.1	11.2

^a 5-year period of record, 2001 to 2005.

Source: NOAA, 2005.

TABLE 3.3.7-2
SEASONAL AND ANNUAL AVERAGE ATMOSPHERIC STABILITY CLASSES
AT MIAMI INTERNATIONAL AIRPORT

Season	Occurrence (%) of Stability Class					
	Very Unstable	Moderately Unstable	Unstable	Neutral	Stable	Slightly Stable
Winter	0.1	4.2	11.4	36.4	18.8	29.0
Spring	1.0	6.4	14.7	40.1	16.7	21.0
Summer	2.0	11.1	20.8	24.6	13.8	27.7
Autumn	0.6	5.7	13.2	34.5	18.0	27.9
Annual	0.9	6.9	15.0	33.9	16.8	26.4

^a 5-year period of record, 2001 to 2005.

Source: NOAA, 2005.

TABLE 3.3.7-3
SEASONAL AND ANNUAL AVERAGE
MORNING AND AFTERNOON MIXING HEIGHTS
AT MIAMI INTERNATIONAL AIRPORT

Season	Mixing Height (m)	
	Morning	Afternoon
Winter	684	1,771
Spring	1,114	2,158
Summer	865	2,098
Autumn	815	1,914
Annual	871	1,986

^a 5-year period of record, 2001 to 2005.

Based on surface and upper air data from the NWS station at Miami International Airport.

Source: NOAA, 2005.

TABLE 3.3.7-4
NATIONAL AND STATE AAQS, ALLOWABLE PSD INCREMENTS, AND SIGNIFICANT IMPACT LEVELS
($\mu\text{g}/\text{m}^3$)

Pollutant	Averaging Time	AAQS ^a				PSD Increments ^a		PSD Significant Impact Levels ^b	
		National Primary Standard	National Secondary Standard	Florida	Miami-Dade County ^a	Class I	Class II	Class I	Class II
Particulate Matter (PM ₁₀) ^c	Annual Arithmetic Mean	NA	NA	50	NA	4	17	0.2	1
	24-Hour Maximum	150	150	150	NA	8	30	0.3	5
Particulate Matter (PM _{2.5}) ^c	Annual Arithmetic Mean	15	15	NA	NA	NA	NA	NA	NA
	24-Hour Maximum	35	35	NA	NA	NA	NA	NA	NA
Sulfur Dioxide	Annual Arithmetic Mean	80	NA	60	25	2	20	0.1	1
	24-Hour Maximum	365	NA	260	110	5	91	0.2	5
	3-Hour Maximum	NA	1,300	1,300	350	25	512	1.0	25
Carbon Monoxide	8-Hour Maximum	10,000	10,000	10,000	NA	NA	NA	NA	500
	1-Hour Maximum	40,000	40,000	40,000	NA	NA	NA	NA	2,000
Nitrogen Dioxide	Annual Arithmetic Mean	100	100	100	NA	2.5	25	0.1	1
Ozone ^d	1-Hour Maximum ^d	NA	NA	235	NA	NA	NA	NA	NA
	8-Hour Maximum ^e	147	147	NA	NA	NA	NA	NA	NA
Lead	Calendar Quarter Arithmetic Mean	1.5	1.5	1.5	NA	NA	NA	NA	NA

Note: PM₁₀ = particulate matter (PM) with aerodynamic diameter ≤ 10 micrometers (μm). PM_{2.5} = PM with aerodynamic diameter ≤ 2.5 μm .

NA = Not applicable, i.e., no standard exists or not promulgated yet.

^a Short-term maximum concentrations are not to be exceeded more than once per year, except for PM₁₀, PM_{2.5}, and ozone AAQS, which are based on a number of expected exceedances.

^b Maximum concentrations are not to be exceeded.

^c PM_{2.5}: 24-hour standard based on the 3-year averages of the 98th percentile values; annual standard based on 3-year average at community monitors. These standards must be implemented in the 2007-2008 timeframe. On October 17, 2006, EPA finalized the PM AAQS (71 FR 61236). The 24-hour PM_{2.5} standard was changed to 35 $\mu\text{g}/\text{m}^3$. Annual PM₁₀ standard was revoked by EPA. The FDEP has not yet adopted the revised PM₁₀ or PM_{2.5} standards.

^d 1-hour standard of 0.12 ppm was revoked by EPA on June 15, 2005; FDEP has not yet adopted this change.

^e 8-hour standard was lowered by EPA from 0.08 to 0.075 ppm on March 27, 2008, achieved when the 3-year average of 99th percentile values is 0.075 ppm or less. FDEP had not yet adopted the revised standard.

Sources: Federal Register, Vol. 43, No. 118, June 19, 1978; 40 CFR 50; 40 CFR 52.21; Chapter 62.204, F.A.C.; Miami-Dade County Code of Ordinances, Chapter 24, Section 24-41.3(1).

TABLE 3.3.7-5
SUMMARY OF MAXIMUM MEASURED SO₂, PM₁₀, PM_{2.5}, O₃, NO₂, AND CO CONCENTRATIONS OBSERVED FROM REPRESENTATIVE MONITORING STATIONS
2005 THROUGH 2007

AIRS Site No.	Operator	Location	Measurement Period		Concentration							
					1-Hour		3-Hour		8-Hour	24-Hour		Annual
					Highest	2nd Highest	Highest	2nd Highest	3-year Average 99th Percentile	Highest	2nd Highest	Average
Sulfur Dioxide Florida AAQS					NA	NA	NA	0.5 ppm	NA	NA	0.1 ppm	0.02 ppm
12-086-0019	Miami - Dade County	FHP Route E US 27 Miami	2007	Jan-Dec	NA	NA	0.004	0.002	NA	0.002	0.001	0.001
			2006	Jan-Dec	NA	NA	0.002	0.001	NA	0.001	0.001	0.001
			2005	Jan-Dec	NA	NA	0.001	0.001	NA	0.002	0.002	0.001
PM ₁₀ Florida AAQS					NA	NA	NA	NA	NA	NA	150 µg/m³	50 µg/m³
12-086-1016	Miami - Dade County	NW 20th St & 12th Ave., Fire Station Miami	2007	Jan-Dec	NA	NA	NA	NA	NA	53	53	24.0
			2006	Jan-Dec	NA	NA	NA	NA	NA	53	43	26.3
			2005	Jan-Dec	NA	NA	NA	NA	NA	60	56	26.3
PM _{2.5} Florida AAQS					NA	NA	NA	NA	NA	NA	35 µg/m³ 98th Percentile	15 µg/m³
12-086-0033	Miami - Dade County	7700 NW 186th St.	2007	Jan-Dec	NA	NA	NA	NA	NA	31.9	20.0	7.57
			2006	Jan-Dec	NA	NA	NA	NA	NA	22.2	19.8	8.51
			2005	Jan-Dec	NA	NA	NA	NA	NA	17.9	17.9	8.48
12-086-1016	Miami - Dade County	NW 20th St & 12th Ave., Fire Station Miami Monitor 1	2007	Jan-Dec	NA	NA	NA	NA	NA	42.1	21.4	8.86
			2006	Jan-Dec	NA	NA	NA	NA	NA	22.5	18.4	9.50
			2005	Jan-Dec	NA	NA	NA	NA	NA	25.1	18.8	9.59
12-086-1016	Miami - Dade County	NW 20th St & 12th Ave., Fire Station Miami Monitor 2	2007	Jan-Dec	NA	NA	NA	NA	NA	43.8	20.7	9.36
			2006	Jan-Dec	NA	NA	NA	NA	NA	19.5	19.2	8.93
			2005	Jan-Dec	NA	NA	NA	NA	NA	18.7	18.4	10.41
12-086-6001	Miami - Dade County	Fire Station 325 NW 2nd St.	2007	Jan-Dec	NA	NA	NA	NA	NA	38.4	21.8	7.44
			2006	Jan-Dec	NA	NA	NA	NA	NA	20.5	18.0	8.25
			2005	Jan-Dec	NA	NA	NA	NA	NA	21.7	18.2	8.21
Ozone Florida AAQS					NA	0.12 ppm	NA	NA	0.08 ppm	NA	NA	NA
12-086-0027	Miami - Dade County	Rosentiel School	2007	Jan-Dec	0.097	0.090	NA	NA	0.074	NA	NA	NA
			2006	Jan-Dec	0.076	0.073	NA	NA	0.072	NA	NA	NA
			2005	Jan-Dec	0.092	0.087	NA	NA	0.068	NA	NA	NA
12-086-0029	Miami - Dade County	Perdue Medical	2007	Jan-Dec	0.097	0.093	NA	NA	0.070	NA	NA	NA
			2006	Jan-Dec	0.072	0.068	NA	NA	0.068	NA	NA	NA
Nitrogen Dioxide Florida AAQS					NA	NA	NA	NA	NA	NA	NA	0.053 ppm
12-086-0027	Miami - Dade County	Rosentiel School	2007	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	0.0050
			2006	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	0.0069
			2005	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	0.0061
12-086-4002	Miami - Dade County	Metro Annex Miami	2007	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	0.0110
			2006	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	0.0134
			2005	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	0.0135
Carbon Monoxide Florida AAQS					NA	35 ppm	NA	NA	9 ppm 2nd Highest	NA	NA	NA
12-086-0031	Miami - Dade County	1600 South Dixie Highway Miami	2007	Jan-Dec	1.8	1.8	NA	NA	1.1	NA	NA	NA
			2006	Jan-Dec	2.9	2.3	NA	NA	1.5	NA	NA	NA
			2005	Jan-Dec	2.9	2.8	NA	NA	1.8	NA	NA	NA
12-086-0034	Miami - Dade County	NW Corner of SW 88th St. Intersection	2007	Jan-Dec	2.2	2.1	NA	NA	1.6	NA	NA	NA
			2006	Jan-Dec	2.7	2.4	NA	NA	1.5	NA	NA	NA
			2005	Jan-Dec	2.6	2.5	NA	NA	1.8	NA	NA	NA
12-086-1019	Miami - Dade County	2201 SW 4th St. Miami	2007	Jan-Dec	4.7	3.7	NA	NA	2.0	NA	NA	NA
			2006	Jan-Dec	3.8	3.8	NA	NA	2.0	NA	NA	NA
			2005	Jan-Dec	4.8	4.1	NA	NA	2.4	NA	NA	NA
12-086-4002	Miami - Dade County	Metro Annex 864 NW 3rd St. Miami	2007	Jan-Dec	3.8	3.4	NA	NA	2.0	NA	NA	NA
			2006	Jan-Dec	5.2	4.2	NA	NA	2.2	NA	NA	NA
			2005	Jan-Dec	6.3	3.8	NA	NA	2.5	NA	NA	NA

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

Source: EPA Aerametric Information Retrieval System, Air Quality Subsystem, Quick Look Report, Florida, 2005-2007.

TABLE 3.3.8-1
BASELINE AMBIENT NOISE LEVEL DATA OBTAINED IN 2008 FOR THE FPL TURKEY POINT UNITS 6 & 7

Site	Location	Date	Time	Sound Levels (dBA)				Observations
				L _{min}	L _{max}	L ₉₀	L _{eq}	
S1	Southeast corner of the Racetrack on 344 Street/Palm Drive	June 3, 2008	Daytime	31.5	76.7	35.7	53.8	Wind, traffic, insects, birds, fish jumping, reeds rustling
		June 3, 2008	Nighttime	47.3	71.4	48.0	52.8	Insects, traffic, distant plant, distant traffic
		June 4, 2008	Daytime	29.8	75.4	33.3	54.0	Plane, wind, fish, insects, birds, traffic
		June 4, 2008	Nighttime	43.4	75.0	44.8	55.7	Insects, traffic, wind
S2	Gate of the transmission line northwest of Unit 5	June 3, 2008	Daytime	57.0	63.5	58.5	59.8	Unit 5, traffic, birds, wind
		June 3, 2008	Nighttime	56.9	63.6	59.0	60.3	Unit 5, traffic, insects
		June 4, 2008	Daytime	58.0	82.1	59.1	61.2	Unit 5, traffic, wind, birds
		June 4, 2008	Nighttime	58.3	68.4	59.6	60.8	Unit 5, insects, wind
S3	First transmission line tower west of Unit 5	June 3, 2008	Daytime	65.4	70.8	66.5	67.6	Unit 5, birds, wind, traffic
		June 3, 2008	Nighttime	64.4	70.0	65.6	66.7	Unit 5, wind, insects, traffic
		June 4, 2008	Daytime	64.3	69.0	65.7	66.7	Unit 5, wind, insects, birds, traffic
		June 4, 2008	Nighttime	64.5	70.0	65.8	67.0	Unit 5, wind, insects
S4	Main Entrance	June 3, 2008	Daytime	42.1	81.9	43.8	62.1	Traffic, Unit 5, wind, birds, hum of substation
		June 3, 2008	Nighttime	43.8	73.8	45.1	58.5	Frogs, Unit 5, traffic, insects
		June 4, 2008	Daytime	40.6	76.7	42.3	56.8	Traffic, wind, plant, insects, birds, hum of the substation
		June 4, 2008	Nighttime	47.9	71.3	49.8	55.8	Traffic, plant, wind, insects, frogs, hum of the substation
S5	North boundary on the transmission line	June 3, 2008	Daytime	40.4	53.0	42.2	43.9	Hum of the powerline, Unit 5, wind, birds
		June 3, 2008	Nighttime	45.6	52.1	46.4	47.3	Unit 5, hum of powerline, insects
		June 4, 2008	Daytime	39.5	53.6	42.0	44.3	Unit 5, wind, birds, insects, hum of powerlines
		June 4, 2008	Nighttime	45.6	51.0	47.3	48.5	Unit 5, hum of powerline, insects, wind
S6	Daycare center on 344 th Street/Palm Drive	June 3, 2008	Daytime	40.2	61.2	41.6	49.3	Traffic, people, wind, birds
		June 3, 2008	Nighttime	42.2	57.6	43.2	46.2	Insects, Unit 5, traffic, wind, frogs
		June 4, 2008	Daytime	41.2	61.4	43.2	47.8	People, wind, birds, traffic
		June 4, 2008	Nighttime	46.3	62.8	47.9	50.7	Wind, traffic, plant, birds, insects
S7	Homestead Bayfront Park Entrance	June 3, 2008	Daytime	33.0	60.3	36.0	46.0	Wind, traffic, birds, hum of power lines
		June 3, 2008	Nighttime	39.6	80.5	40.8	49.7	Wind, Unit 5, traffic, insects
		June 4, 2008	Daytime	33.7	72.4	39.8	51.3	Traffic, insects, fish jumping, birds
		June 4, 2008	Nighttime	38.6	46.1	39.6	41.0	Wind, traffic, insects, fish, people
S8	Nearest permanent private residence intersection of SW 117 th Ave and SW 328 th Street/North Canal Drive	June 3, 2008	Daytime	33.8	91.5	38.6	66.7	Traffic, birds, insects, winds in reeds, fish jumping
		June 3, 2008	Nighttime	47.3	77.2	48.7	55.6	Insects, frogs, traffic
		June 4, 2008	Daytime	33.3	78.0	37.1	59.2	Traffic, wind, distant lawn mower, birds, fish jumping
		June 4, 2008	Nighttime	39.5	72.6	42.7	51.7	Traffic, insects, wind, frogs, fish

TABLE 3.3.9-1
EXAMPLES OF TYPICAL ILLUMINANCE

		Illuminance (lux)
Outdoor	Bright Sun	100,000 - 130,000
	Hazy Day	32,000
	Partly Cloudy	25,000
	Cloudy	10,000
	Overcast	1,000
	Sunrise/Sunset on Clear Day	400
	Full Moon	0.1
	Moonless Clear Night Sky	0.001
	Moonless Overcast Night Sky	0.0001
	Starlight	0.00005
Indoor	Typical TV Studio	1,000
	Bright Office with Large Contrast	400
	Hall Way	80
	Living Room	50
	Good Street Lighting	20
	Poor Street Lighting	1

Source: Electro-Optics Handbook, 1979; Williams, 1999.

TABLE 3.3.9-2
BASELINE ILLUMINANCE IN THE VICINITY OF THE FPL TURKEY POINT POWER PLANT
JUNE 2008

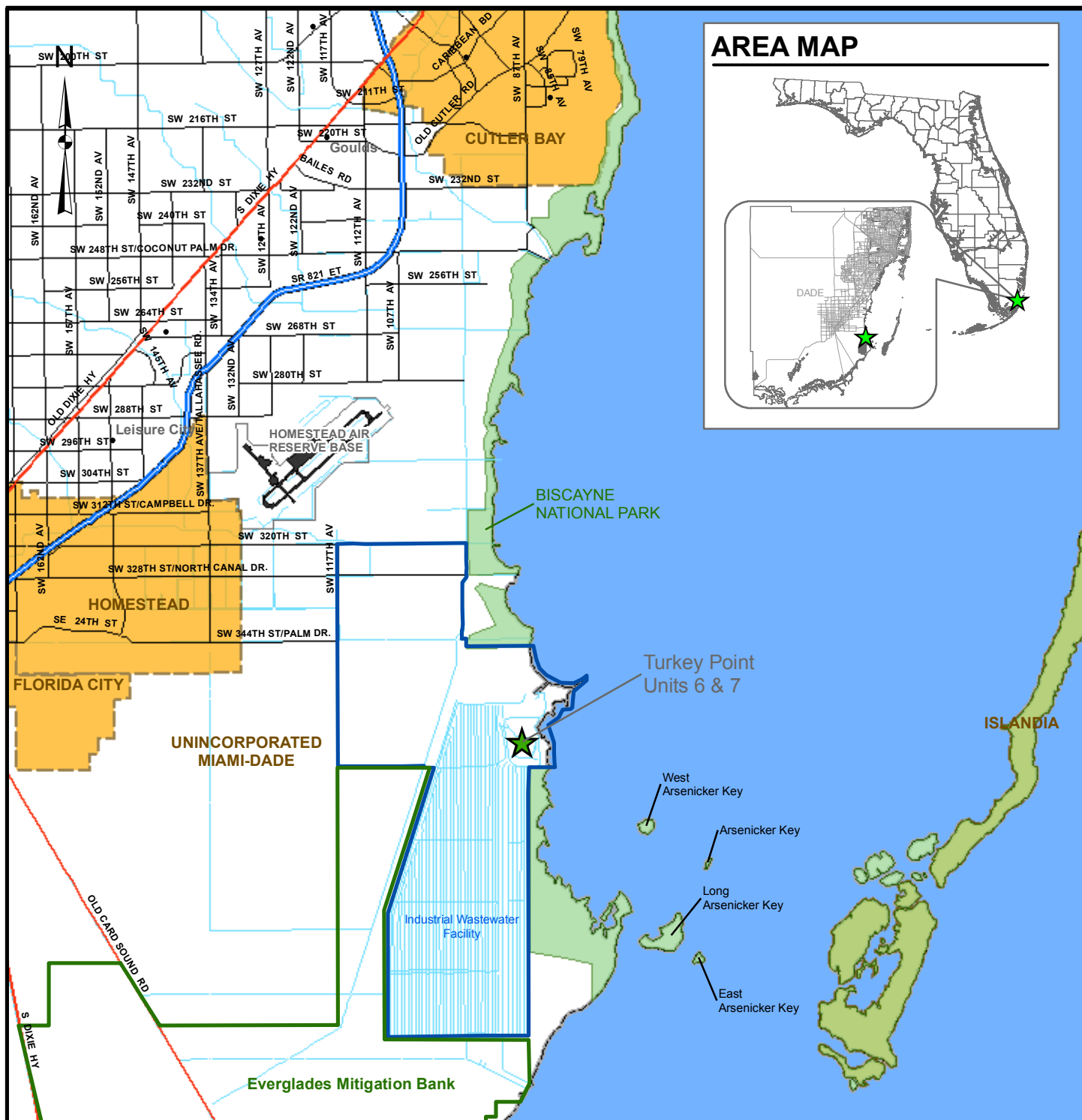
Site	Date	Weather	Day (klux)	Night (lux)	Observations
Site 1 - Southeast corner of the racetrack on SW 344 th Street/Palm Drive	3-Jun-08	Partly Cloudy	117.69	0.1	General glow from the Miami urban area. Visible lights from racetrack.
	4-Jun-08	Partly Cloudy	95.16	0.0	
Site 2 - Gate of the transmission line northwest of Unit 5	3-Jun-08	Partly Cloudy	88.10	0.1	Unit 5 lights clearly visible. General glow from the Miami urban area.
	4-Jun-08	Partly Cloudy	121.34	0.0	
Site 3 - Transmission line towers west of Unit 5	3-Jun-08	Partly Cloudy	91.05	2.0	Unit 5 lights clearly visible. General glow from the Miami urban area.
	4-Jun-08	Partly Cloudy	121.94	23.0	
Site 4 - Boundary A - Entrance to the facility	3-Jun-08	Partly Cloudy	56.07	0.0	Street lights visible.
	4-Jun-08	Partly Cloudy	90.73	0.3	Street lights and plant lights visible.
Site 5 - Boundary B - North boundary on the transmission line	3-Jun-08	Partly Cloudy	87.77	0.0	General glow around plant and surrounding Miami urban area. Lights clearly visible from plant and street lights.
	4-Jun-08	Partly Cloudy	113.49	0.0	
Site 6 - Southeast corner of the daycare center parking lot	3-Jun-08	Partly Cloudy	62.87	2.0	Overhead streetlight very visible, plant lights also visible. General glow from the Miami urban area.
	4-Jun-08	Partly Cloudy	103.56	29.2	
Site 7 - Parking lot of Biscayne National Park	3-Jun-08	Partly Cloudy	26.12	0.3	General glow from plant but a brighter glow from Homestead.
	4-Jun-08	Partly Cloudy	97.65	0.1	General glow from the plant and the Miami urban area. Visible street lights.
Site 8 - Nearest permanent private residence intersection of SW 117 th Ave and SW 328 th Street/ North Canal Drive	3-Jun-08	Partly Cloudy	13.65	0.0	General glow from the Miami urban area.
	4-Jun-08	Partly Cloudy	25.48	0.0	General glow from the Miami urban area.

TABLE 3.3.9-3
BASELINE ILLUMINANCE IN THE VICINITY OF THE FPL TURKEY POINT POWER PLANT
JULY 2008

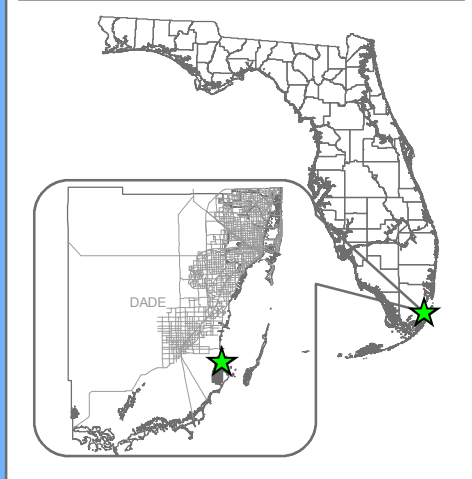
Site	Date	Weather	SQM Readings		Observations
			mags/arcsecond ²	lux	
Site 1 - Southeast corner of the racetrack on SW 344 th Street/Palm Drive	8-Jul-08	20% cloud cover and breezy	18.31	0.0051	General glow from the Miami urban area. Visible lights from racetrack.
	9-Jul-08	Clear with ~10% cloud cover	18.87	0.0031	Glow from Homestead City.
Site 2 - Gate of the transmission line northwest of Unit 5	8-Jul-08	20% cloud cover and breezy	17.01	0.0170	Unit 5 lights clearly visible. General glow from the Miami urban area.
	9-Jul-08	Clear with ~10% cloud cover	18.28	0.0053	Lights from guardhouse.
Site 3 - Transmission line towers west of Unit 5	8-Jul-08	20% cloud cover and breezy	16.31	0.0323	Unit 5 lights clearly visible. Light from the Miami urban area.
	9-Jul-08	Clear with ~10% cloud cover	17.49	0.0109	Lights from guardhouse.
Site 4 - Boundary A - Entrance to the facility	8-Jul-08	20% cloud cover and breezy	18.9	0.0030	Street lights visible.
	9-Jul-08	Clear with ~10% cloud cover	19.11	0.0025	Street lights and plant lights visible.
Site 5 - Boundary B - North boundary on the transmission line	8-Jul-08	20% cloud cover and breezy	18.66	0.0037	General glow around plant and surrounding town. Lights clearly visible from plant and street lights.
	9-Jul-08	Clear with ~10% cloud cover	18.28	0.0053	Lights from plant.
Site 6 - Southeast corner of the daycare center parking lot	8-Jul-08	20% cloud cover and breezy	15.93	0.0459	Overhead streetlight very visible, plant lights also visible. General glow from the Miami urban area.
	9-Jul-08	Clear with ~10% cloud cover	15.25	0.0858	Lights in parking lot.
Site 7 - Parking lot of Biscayne National Park	8-Jul-08	20% cloud cover and breezy	18.91	0.0029	General glow from plant but a brighter glow from Homestead.
	9-Jul-08	Clear with ~10% cloud cover	18.87	0.0031	General glow from the plant and the Miami urban area. Visible street lights.
Site 8 - Nearest permanent private residence intersection of SW 117 th Ave and SW 328 th Street/ North Canal Drive	8-Jul-08	20% cloud cover and breezy	18.36	0.0049	Light from the Miami urban area.
	9-Jul-08	Clear with ~10% cloud cover	18.89	0.0030	Light from the Miami urban area.
Site 9-Southernmost point of the industrial wastewater facility	8-Jul-08	20% cloud cover and breezy	20.39	0.0008	Low horizon glow from plant and the Miami urban area.
	9-Jul-08	Light sprinkle and 20% clouds	20.32	0.0008	Low horizon glow from power plant and the Miami urban area.
Site 10-Westernmost point of the industrial wastewater facility	8-Jul-08	20% cloud cover and breezy	19.56	0.0016	Slight glow from plant and the Miami urban area.
	9-Jul-08	Clear with ~10% cloud cover	19.65	0.0015	Glow from power plant and the Miami urban area.

TABLE 3.3.9-4
BASELINE ILLUMINANCE IN THE VICINITY OF THE FPL TURKEY POINT POWER PLANT
AUGUST 2008

Site	Date	Weather	SQM Readings		Observations
			mags/arcsecond ²	lux	
Site 1 - Southeast corner of the racetrack on SW 344 th Street/Palm Drive	5-Aug-08	50% cloud cover	19.36	0.0019	General glow from the Miami urban area. Visible lights from racetrack. Glow from Homestead City.
Site 2 - Gate of the transmission line northwest of Unit 5	5-Aug-08	50% cloud cover	18.65	0.0038	Unit 5 lights clearly visible. General glow from the Miami urban area. Lights from guardhouse.
Site 3 - Transmission line towers west of Unit 5	5-Aug-08	50% cloud cover	18.70	0.0036	Unit 5 lights clearly visible. Light from the Miami urban area. Lights from guardhouse and general glow from Homestead.
Site 4 - Boundary A - Entrance to the facility	5-Aug-08	50% cloud cover	17.60	0.0098	Street lights and plant lights visible. General glow from Miami and from Homestead.
Site 5 - Boundary B - North boundary on the transmission line	5-Aug-08	50% cloud cover	19.50	0.0017	General glow around plant and surrounding town. Lights clearly visible from plant and street lights.
Site 6 - Southeast corner of the daycare center parking lot	5-Aug-08	50% cloud cover	12.77	0.8448	Overhead streetlight very visible, plant lights also visible. General glow from the Miami urban area and from Homestead.
Site 7 - Parking lot of Biscayne National Park	5-Aug-08	50% cloud cover	19.88	0.0012	General glow from plant but a brighter glow from Homestead. General glow from the Miami urban area. Visible street lights.
Site 8 - Nearest permanent private residence intersection of SW 117 th Ave and SW 328 th Street/ North Canal Drive	5-Aug-08	50% cloud cover	19.62	0.0015	Light from the Plant. General glow from the Miami urban area and from Homestead.
Site 9-Southernmost point of the industrial wastewater facility	5-Aug-08	50% cloud cover	20.31	0.0008	Low horizon glow from plant and the Miami urban area. General glow from Homestead.
Site 10-Westernmost point of the industrial wastewater facility	5-Aug-08	50% cloud cover	20.40	0.0007	Slight glow from plant and the Miami urban area. General glow from Homestead.



AREA MAP



LEGEND

- Turkey Point Units 6 & 7
- Turkey Point Plant Property
- Everglades Mitigation Bank
- Municipal Boundaries

REFERENCES

1. Local City Boundaries, Municipal Boundaries, Major Roads, Miami-Dade County GIS, 2006.

12,000 0 12,000
Feet

PROJECT

TURKEY POINT UNITS 6 & 7
PROJECT

TITLE

LOCATION MAP



FILE No. 08387584B001

REV. 0

PLOT DATE 6/11/2009

FIGURE

3.1.1-1



LEGEND

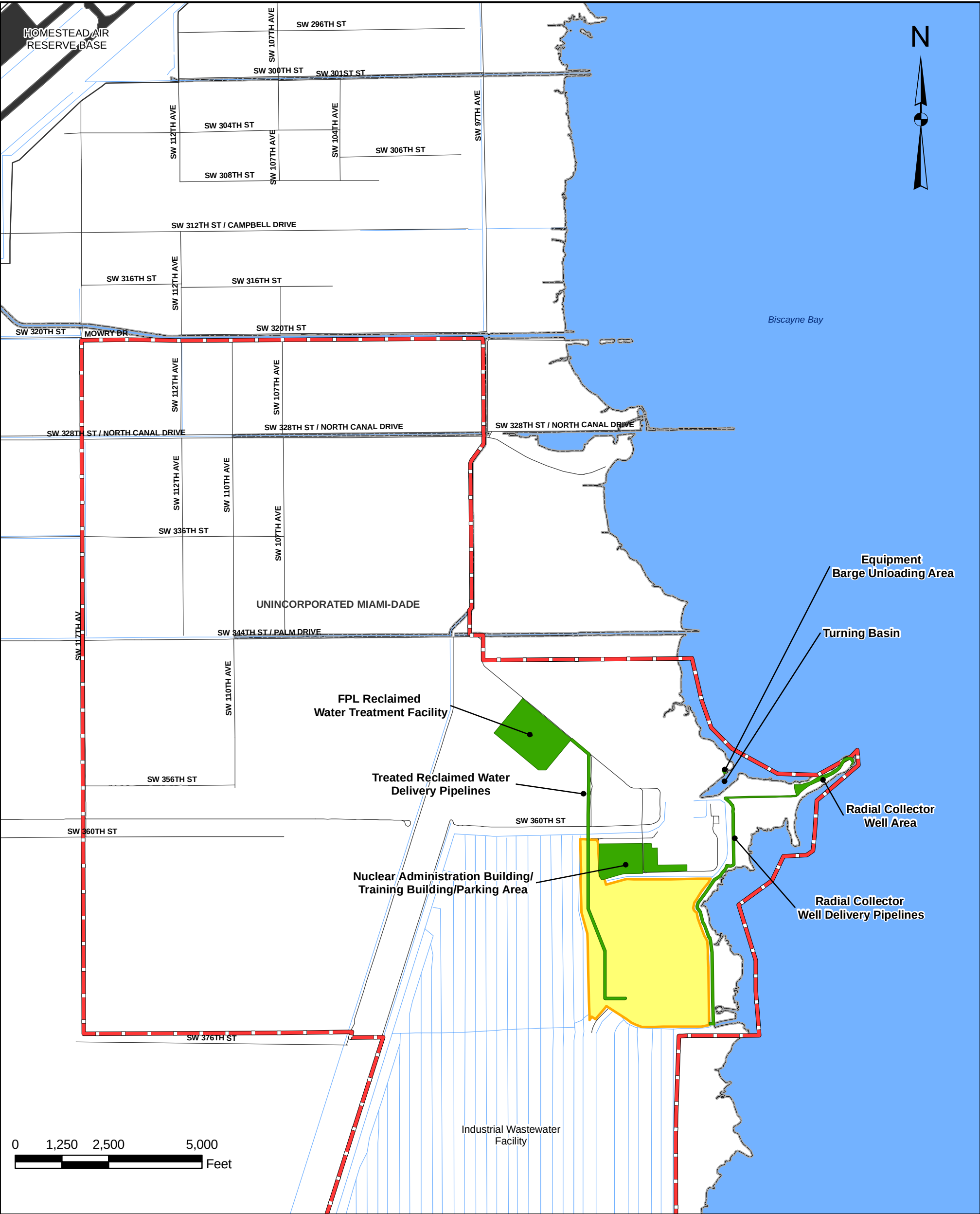
- Turkey Point Units 6 & 7 Plant Area
- Turkey Point Units 6 & 7 Site



REFERENCES

1. Imagery, Miami-Dade County, 2007.

PROJECT	TURKEY POINT UNITS 6 & 7 PROJECT	
TITLE	SITE TO BE CERTIFIED & PLANT AREA	
	FILE No.	08387584B002
	REV.	0
	PLOT DATE	6/11/2009
FIGURE 3.1.1-2		



LEGEND

- Associated Non-Linear Facilities
- Turkey Point Units 6 & 7 Site
- Turkey Point Plant Property

REFERENCES

1. Canals, Streets, Miami-Dade County, 2006.

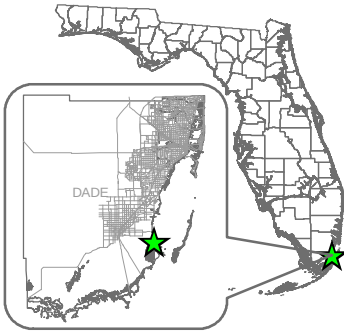
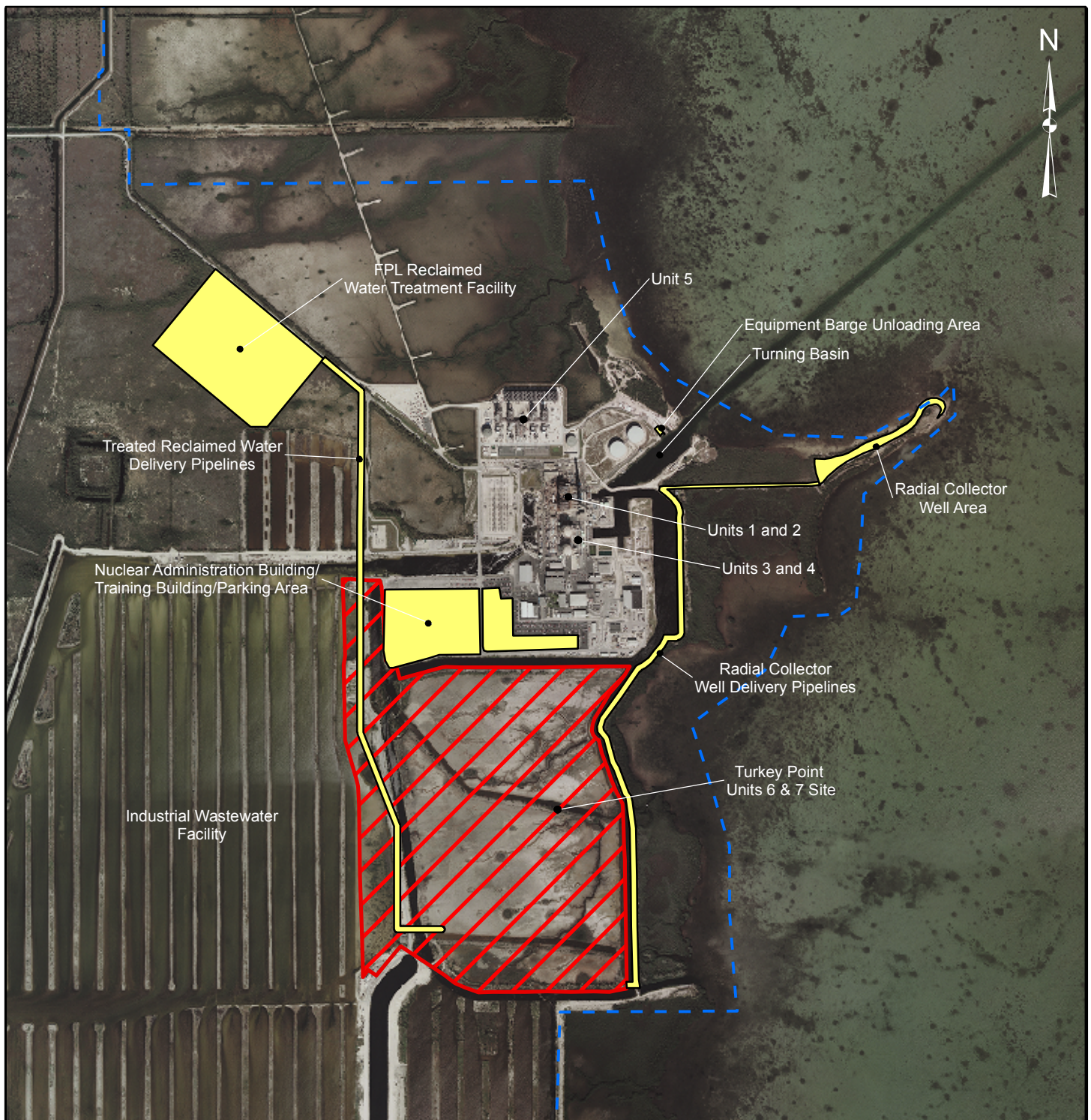


FIGURE 3.1.2-1	FILE NO. 08387594B005	TITLE	PROJECT	 FPL®
	REV. 1	ASSOCIATED NON-LINEAR FACILITIES	TURKEY POINT UNITS 6 & 7 PROJECT	
	PLOT DATE 6/11/2009			



LEGEND

- Turkey Point Plant Property
- Associated Non-Linear Facilities
- Turkey Point Units 6 & 7 Site

REFERENCES

1. Imagery, Miami-Dade County, 2007.



PROJECT	TURKEY POINT UNITS 6 & 7 PROJECT	
TITLE	EXISTING AND PROPOSED USES - FPL PLANT PROPERTY	
	FILE No.	08387584B003
	REV.	0
	PLOT DATE	6/11/2009
FIGURE 3.1.3-1		



LEGEND

- [] TP 3 and 4 Uprate Certified Site
- [] TP 5 Certified Site
- [] Turkey Point Units 6 & 7 Site

REFERENCES

1. Imagery, Miami-Dade County, 2007.



PROJECT	TURKEY POINT UNITS 6 & 7 PROJECT	
TITLE	CERTIFIED SITES	
	FILE No.	08387584B006
	REV.	0
	PLOT DATE	6/11/2009
FIGURE 3.1.3-2		

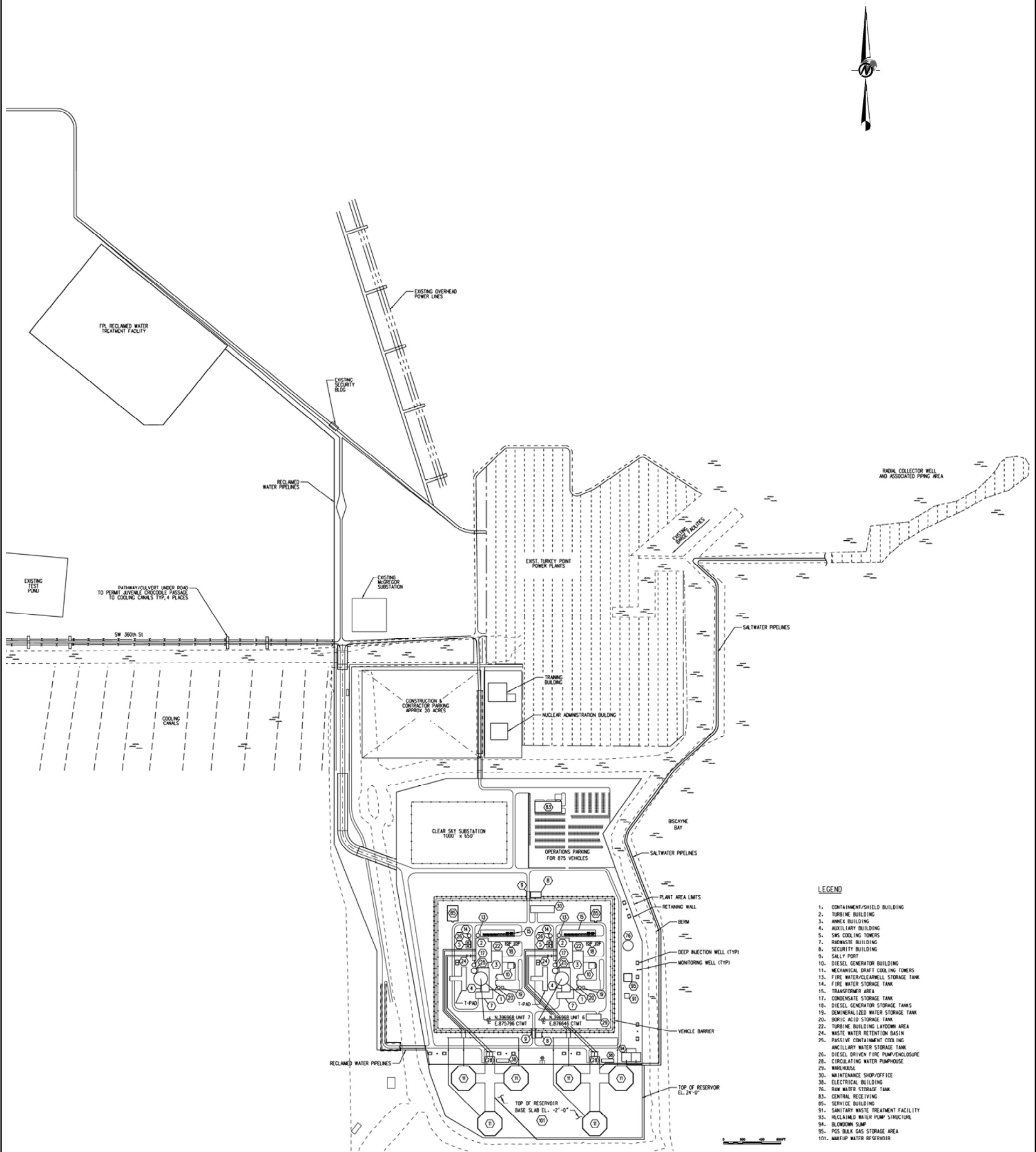


Figure 3.1.5-1
Plot Plan

Rev. 0





LEGEND

- 100-Year Flood Zone
- Turkey Point Units 6 & 7 Site



REFERENCES

1. Imagery, Miami-Dade County, 2007.

PROJECT

**TURKEY POINT UNITS 6 & 7
PROJECT**

TITLE

100-YEAR FLOOD ZONE



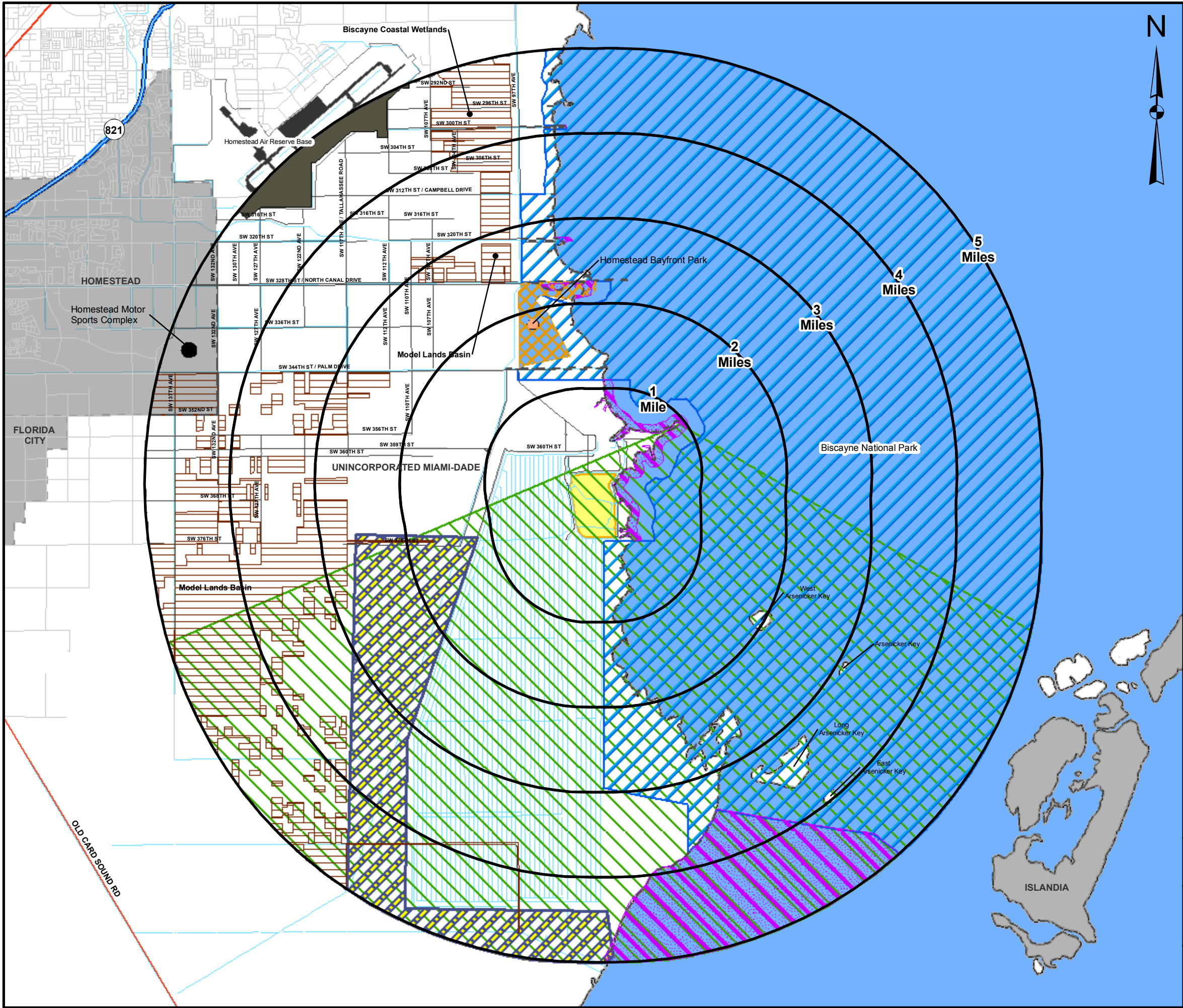
FILE No. 08387584B008

REV. 0

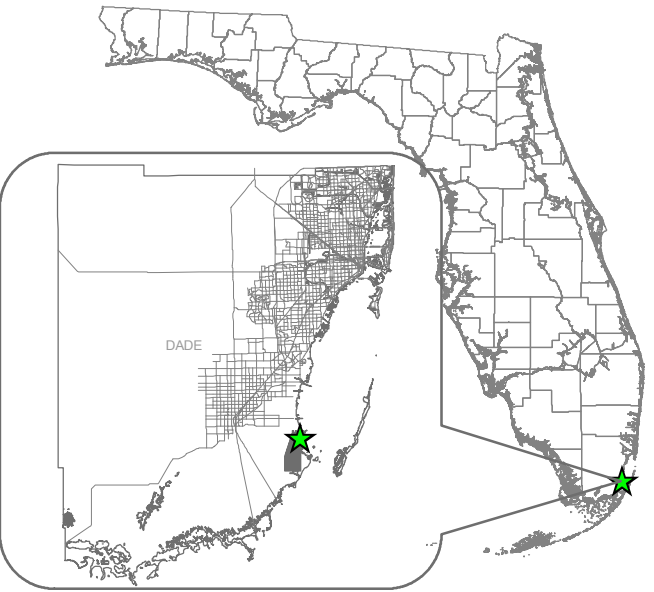
PLOT DATE 6/11/2009

FIGURE

3.1.6-1



AREA MAP

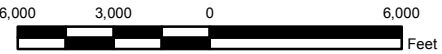


LEGEND

- Municipal Boundaries
- Municipal Managed Parks
- County Operated Trails
- County Operated Parks
- Biscayne Bay Aquatic Preserve (FDEP)
- Miami-Dade County Parks
- South Florida Water Management District
- US Dept. of Defense, Air Force
- US Dept. of the Interior, National Park Service
- Everglades Mitigation Bank
- American Crocodile Critical Habitat (USFWS)
- Turkey Point Units 6 & 7 Plant Area

REFERENCES

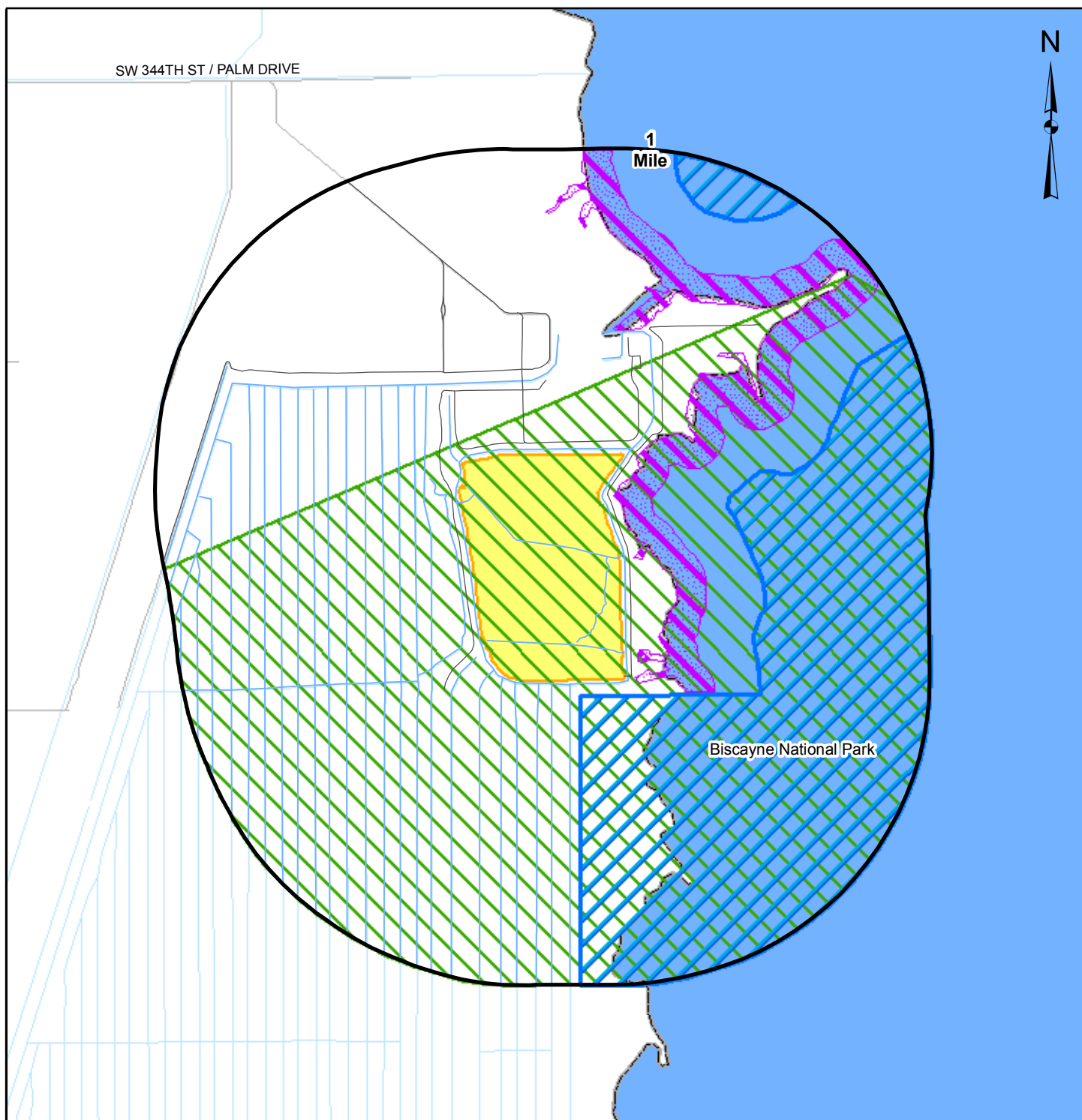
- Miami-Dade County, GIS 2007.
- Biscayne National Park, National Park Service, 2006.
- Biscayne Bay Aquatic Preserve, FDEP Office of Coastal and Aquatic Managed Areas (CAMA), 2008.
- American Crocodile Critical Habitat, United States Fish and Wildlife Service, 2003.



PROJECT
TURKEY POINT UNITS 6 & 7
PROJECT

TITLE
GOVERNMENTAL JURISDICTIONS
1, 2, 3, 4, AND 5-MILE RADIUS FROM PLANT AREA

	FILE No. 08387584B009	FIGURE 3.2.1-1
	REV. 0	
	PLOT DATE 6/11/2009	



LEGEND

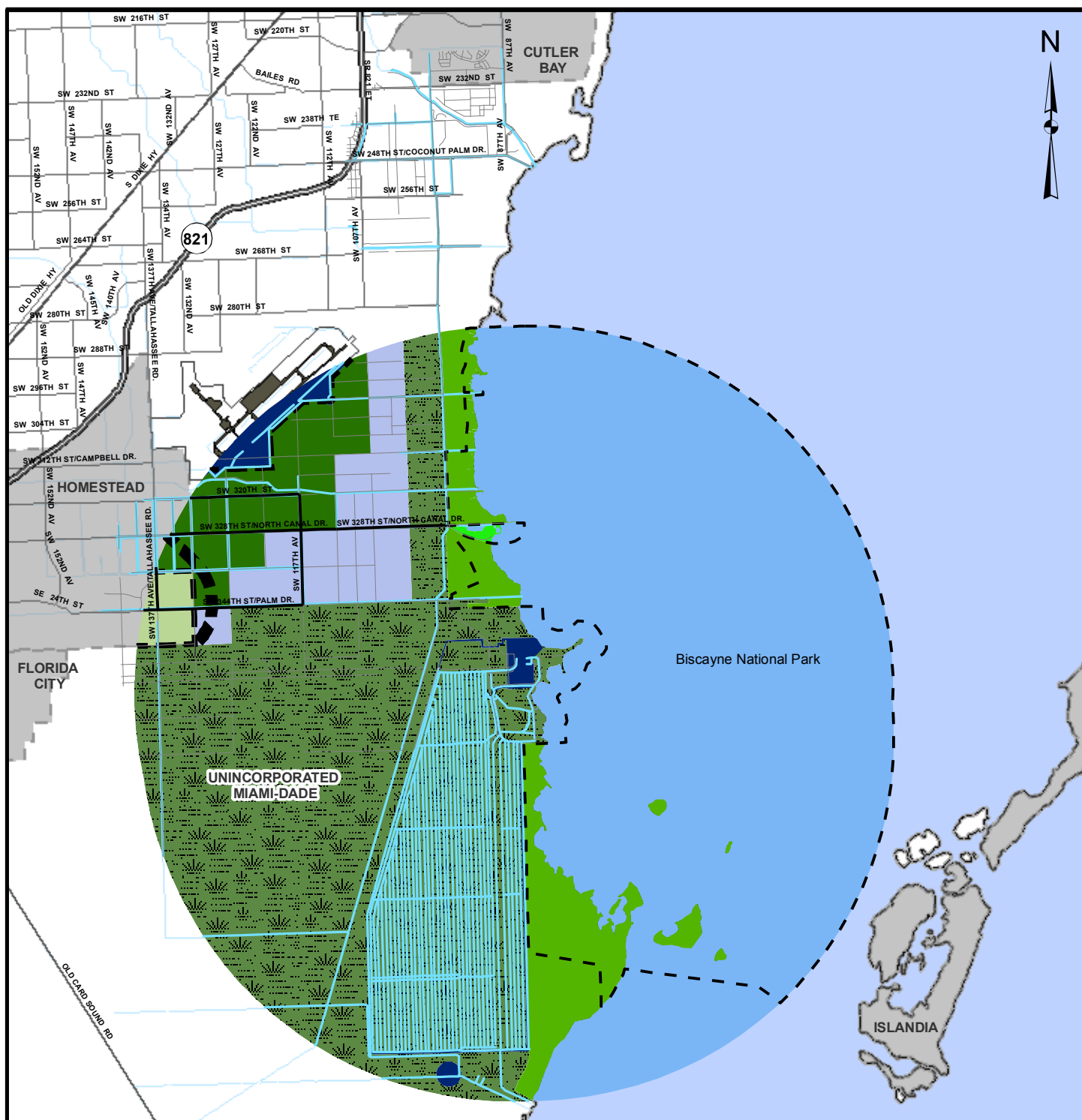
-  Biscayne Bay Aquatic Preserve (FDEP)
-  US Dept. of the Interior, National Parks Service
-  American Crocodile Critical Habitat (USFWS)
-  Turkey Point Units 6 & 7 Plant Area

REFERENCES

1. Biscayne National Park, National Park Service, 2008.
2. Biscayne Bay Aquatic Preserve, FDEP Office of Coastal and Aquatic Managed Areas, 2008.
3. American Crocodile Critical Habitat, United States Fish and Wildlife Service, 2003.



PROJECT	TURKEY POINT UNITS 6 & 7 PROJECT	
TITLE	GOVERNMENTAL JURISDICTIONS 1-MILE RADIUS FROM PLANT AREA	
	FILE No.	08387584B011
	REV.	0
	PLOT DATE	6/11/2009
		FIGURE 3.2.1-2



LEGEND

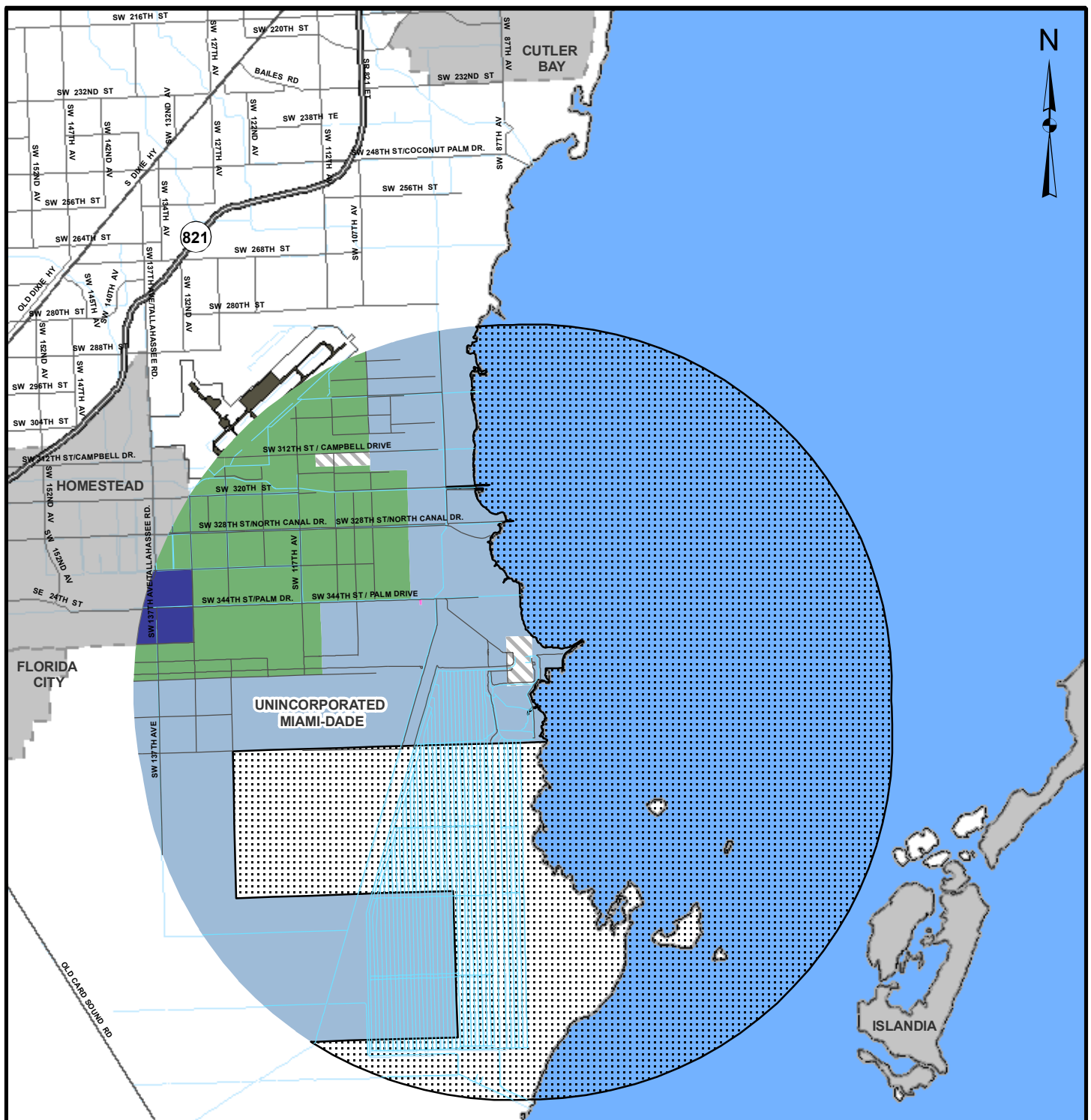
- | | |
|-----------------------------------|---|
| ■ 2025 Expansion Area Boundary | ■ Institutions, Utilities, and Communications |
| ■ 2015 Urban Development Boundary | ■ Open Land |
| ■ Agriculture | ■ PREC - Planned Regional Activity Center |
| ■ Conservation | ■ Parks and Recreation |
| ■ Environmental Protection | ■ Water |
| ■ Environmentally Protected Parks | |

REFERENCES

1. Future Land Use, Miami-Dade County Department of Planning and Zoning, 2015-2025 Comprehensive Development Master Plan, 2007, City of Homestead, 2009.



PROJECT		TURKEY POINT UNITS 6 & 7 PROJECT	
TITLE			
FUTURE LAND USE			
	FILE No. 08387584B013		FIGURE 3.2.2-1
	REV. 0		
	PLOT DATE 6/11/2009		



LEGEND

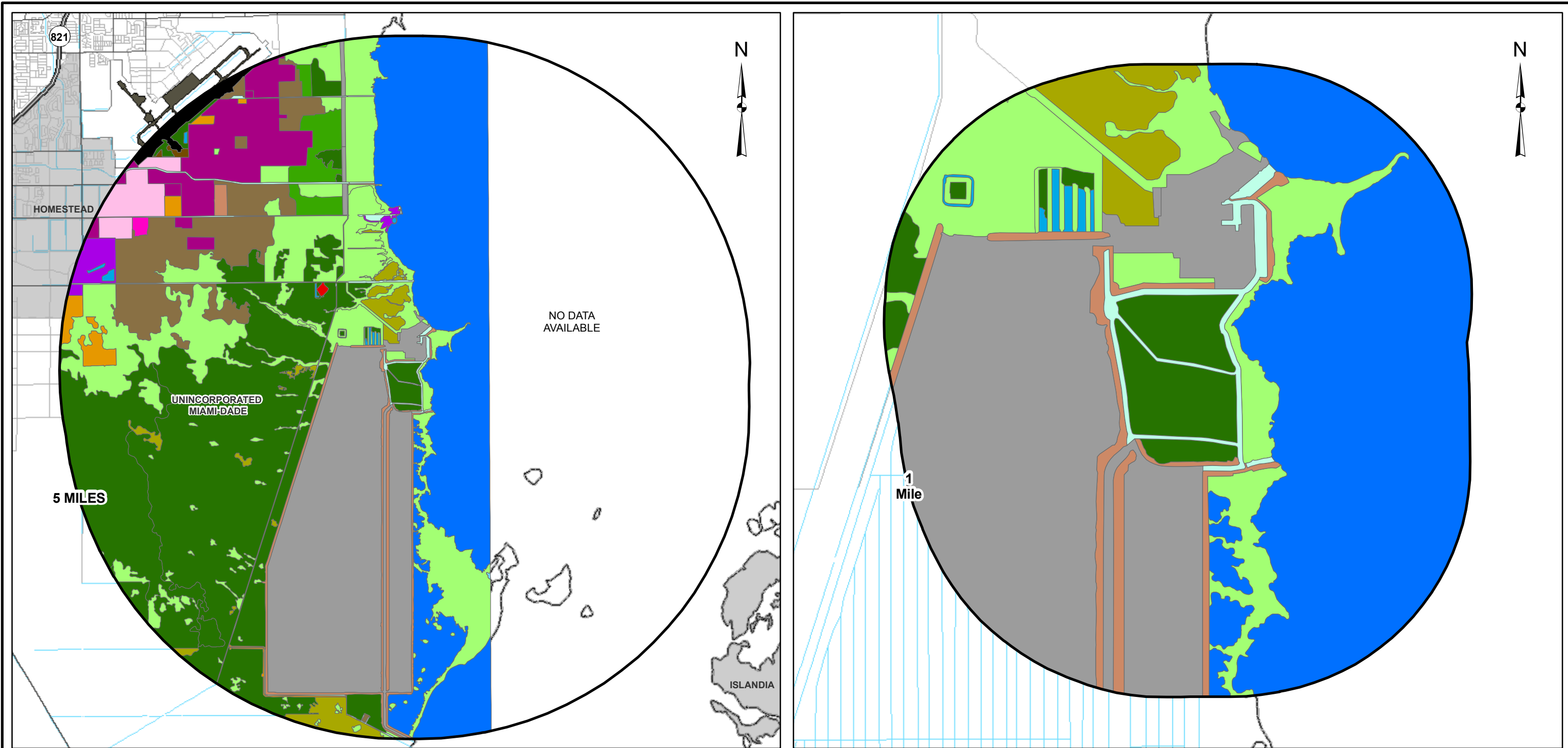
- AU Agricultural District
- BU-1 Neighborhood Business District
- GU Interim District
- IU-3 Industrial, Unlimited Manufacturing
- NONE No Zoning Designated
- PUD Planned Unit Development

REFERENCES

1. Zoning, Miami-Dade County Department of Planning and Zoning, 2007, City of Homestead, 2009.



PROJECT	TURKEY POINT UNITS 6 & 7 PROJECT	
TITLE	ZONING MAP	
	FILE No.	08387584B014
	REV.	0
	PLOT DATE	6/11/2009
FIGURE 3.2.2-2		



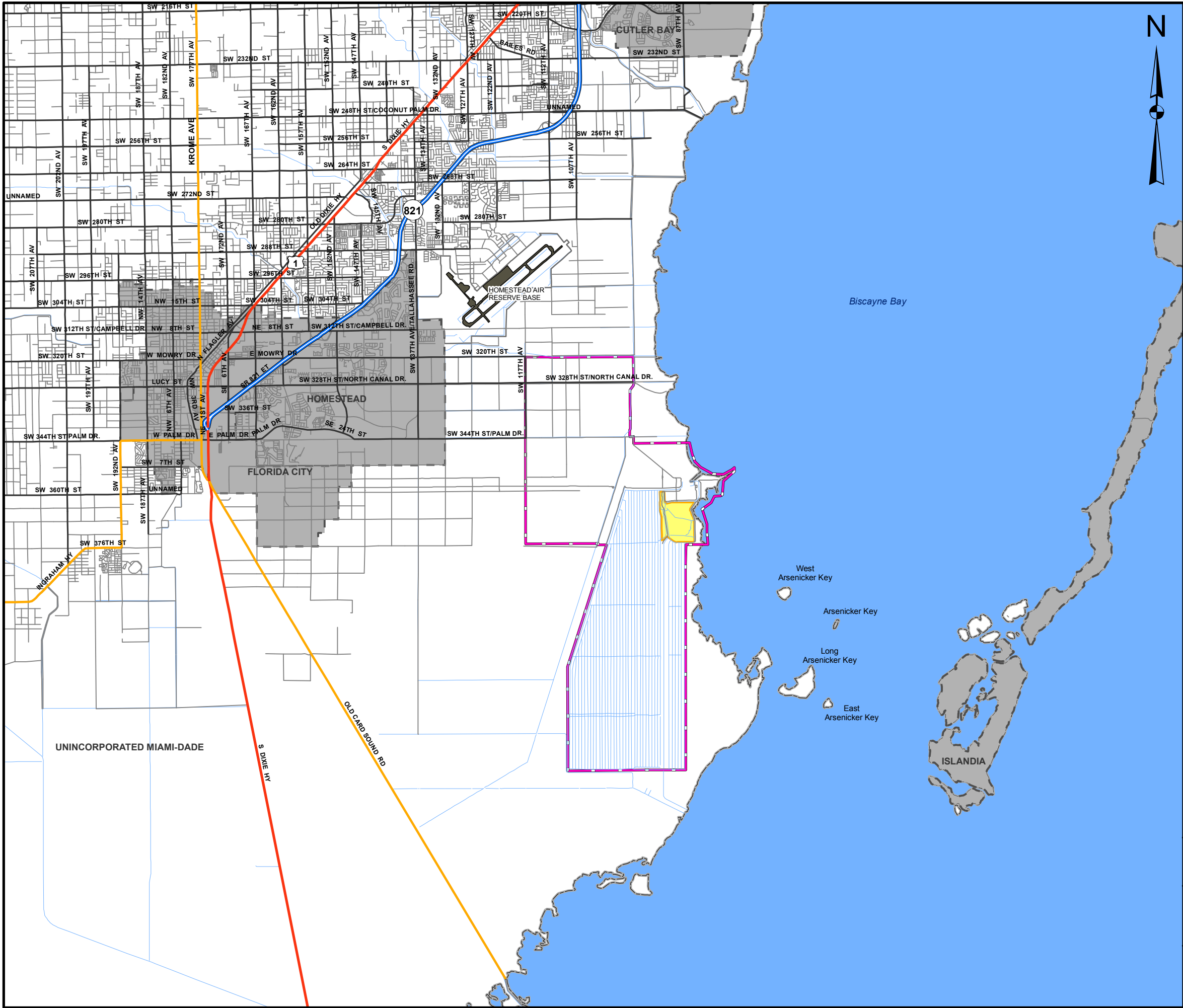
LEGEND

140 - COMMERCIAL AND SERVICES	530 - RESERVOIRS
180 - RECREATIONAL	540 - BAYS AND ESTUARIES
210 - CROPLAND AND PASTURELAND	610 - WETLAND HARDWOOD FORESTS
220 - TREE CROPS	620 - WETLAND CONIFEROUS FORESTS
240 - NURSERIES AND VINEYARDS	630 - WETLAND FORESTED MIXED
320 - SHRUB AND BRUSHLAND	640 - VEGETATED NON-FORESTED WETLANDS
420 - UPLAND HARDWOOD FORESTS	650 - NON-VEGETATED
430 - UPLAND HARDWOOD FORESTS CONTINUED	740 - DISTURBED LANDS
510 - STREAMS AND WATERWAYS	810 - TRANSPORTATION
520 - LAKES	830 - UTILITIES

REFERENCES

1. Existing Land Use, SFWMD FLUCFCS Codes, 2004.

PROJECT	TURKEY POINT UNITS 6 & 7 PROJECT	
TITLE	EXISTING LAND USE - FLUCFCS	
	FILE No. 08387584B015	FIGURE 3.2.3-1
	REV. 0	
	PLOT DATE 6/11/2009	



LEGEND

- Turkey Point Plant Property
- Turkey Point Units 6 & 7 Site
- Municipal Boundaries
- Limited Access
- Major Road
- Minor Road
- Local Roads
- Streets

REFERENCES

1. Limited Access, Major Roads, Minor Roads, Local Roads, Residential Roads, Municipal Boundaries, Miami-Dade County, 1998.

9,600 4,800 0 9,600 Feet

PROJECT
TURKEY POINT UNITS 6 & 7
PROJECT

TITLE
MAJOR ROADS



FILE No. 08387584B017
REV. 0
PLOT DATE 6/11/2009

FIGURE
3.2.8-1

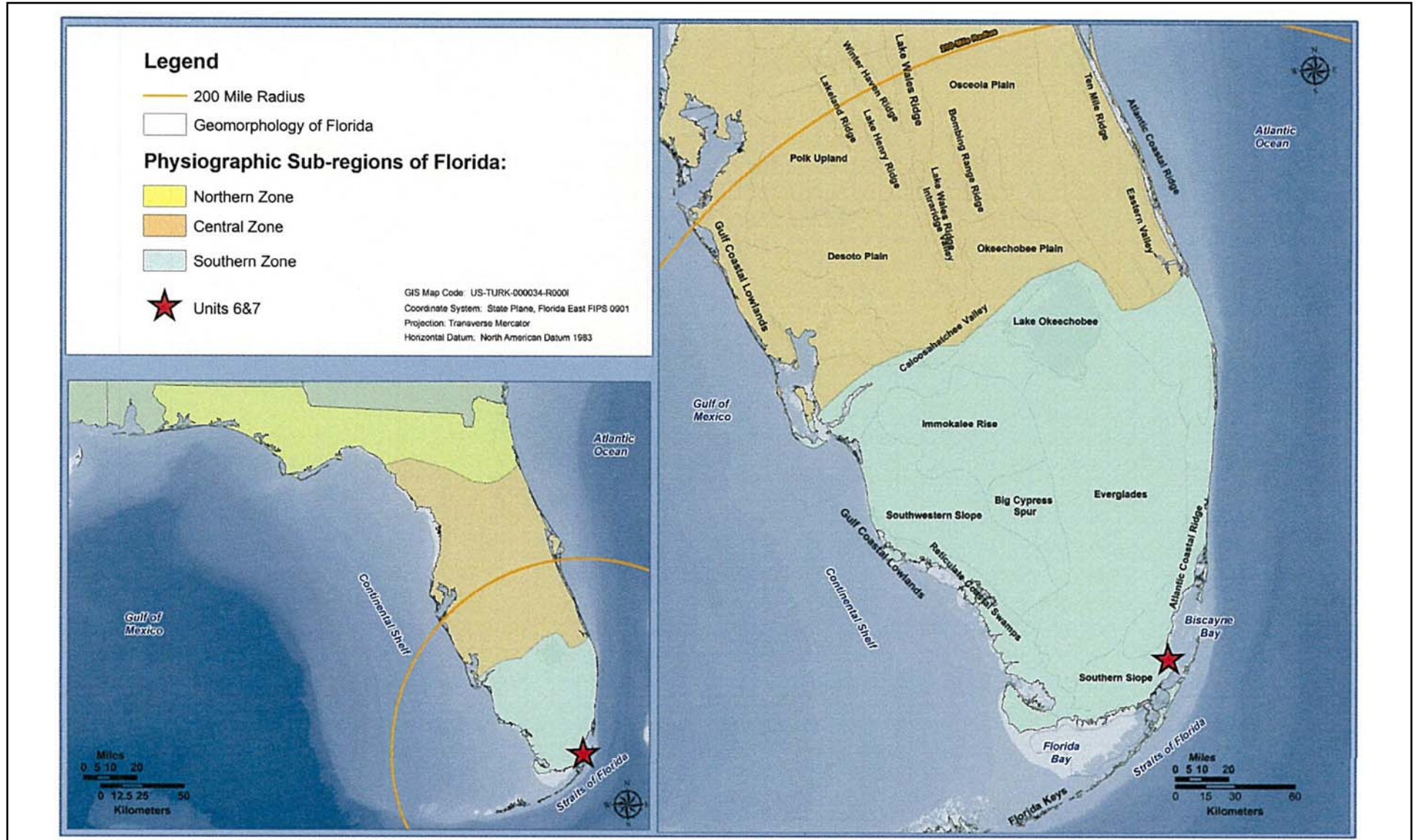


Figure 3.3.1-1
 Physiographic Features (modified from Randazzo and Jones 1997 and White 1970)

Rev. 0

ERA	SYSTEM	SERIES	STRATIGRAPHIC UNIT		LITHOLOGY	APPROXIMATE THICKNESS (ft)
MESOZOIC	CRETACEOUS	UPPER	Pine Key Formation		chalk, ls, dol	3000
		LOWER	Naples Bay Group	Corkscrew Swamp Fm	ls with anhyd & dol	450
				Rookery Bay Fm		500
				Panther Camp Fm		350
			Big Cypress Group	Dollar Bay Fm	ls w. dol & anhyd	450-620
				Gordon Pass Fm	anhyd w. ls & dol	475
				Marco Junction Fm	ls w. dol & anhyd	350
			Ocean Reef Group	Rattlesnake Hammock Fm	anhyd w. ls & dol	600
				Lake Trafford Fm	ls with anhyd, dol	150
				Sunniland Fm	ls with dol & anhyd	200-300
			Glades Group	Punta Gorda Anhydrite	salt with anhyd & dol	800
				Lehigh Acres Formation	anhyd, ls, dol	210
					ls, dol, brown dol zone	300
					sh	200
			Pumpkin Bay Formation	anhyd with ls	1200	
			Bone Island Formation	ls with anhyd & dol	1300-2000	
	JURASSIC	UPPER	Wood River Formation		dol, anhyd, salt, ss	1700-2100
		MIDDLE	basement volcanic province		felsic rocks: rhyolite porphyry	
		LOWER			mafic volcanics: basalt & diabase	
PALEOZOIC			Suwannee Terrane	Paleozoic sedimentary Suite	quartzitic sandstone & black shale	
				St. Lucie Metamorphic Complex	pan-African metamorphics	
				Osceola Granite	granite	
				Osceola volcanic complex	felsic meta-igneous	
TOTAL THICKNESS						12,750-14,300

Abbreviations:
ls = limestone
dol = dolomite
ss = sandstone
anhyd = anhydrite
sh = shale
Fm = formation

Figure 3.3.1-2
Generalized Paleozoic-Mesozoic Stratigraphic Column

Rev. 0

Source: Arthur, 1988; Dallmeyer, 1989; Applegate et al., 1981; Winston, 1987; Pollastro and Viger, 1998; Applegate, 1984; Pollastro et al., 2001.



ERA	SYSTEM	SERIES	STRATIGRAPHIC UNIT		LITHOLOGY	APPROXIMATE THICKNESS (ft)	
CENOZOIC	QUATERNARY	PLEISTOCENE	Miami Limestone / Key Largo Limestone/ Anastasia Formation		sandy, oolitic, coralline, shelly limestone	10-180	
			Caloosahatchee Formation/ Fort Thompson Formation		poor/well indurated sandy, fossiliferous limestone	50-100	
	NEOGENE	PLIOCENE	Tamiami Formation/ Cypresshead Formation (Long Key Formation)		fossiliferous sand & silt with limestone	25-220	
		MIOCENE	Hawthorn Group	Peace River Formation	sands, clays, & phosphatic carbonates	100-650	
				Arcadia Formation	fine crystalline limestone with sand/clay, phosphatic fossiliferous limestone, & dolomite	100-700	
		OLIGOCENE	Suwannee Limestone		poor/well indurated fossiliferous vuggy to moldic limestone	200-600	
	TERTIARY	PALEOGENE	EOCENE	Ocala Limestone		poor/well indurated fossiliferous limestone	200-400
				Avon Park Formation		poor/well indurated fossiliferous limestone & vuggy dolostone	400-1200
				Oldsmar Formation		vuggy limestone & dolomite	500-1500
				PALEOCENE	Cedar Keys Formation	dolomite, gypsum, & anhydrite	500-2000
TOTAL THICKNESS						5000-6000	

Figure 3.3.1-3
Generalized Cenozoic Stratigraphic Column

Rev. 0

Source: Halley et al., 1997; Missimer, 2001; Winston, 1987; Schroeder and Klein, 1954; Reese, 1994; Kindinger, 2002; Reese and Richardson, 2008; Ecology and Environment, Inc., 2001; Cunningham et al., 1998; Kindinger and Cunningham, 2003; Nobel et al., 1996.



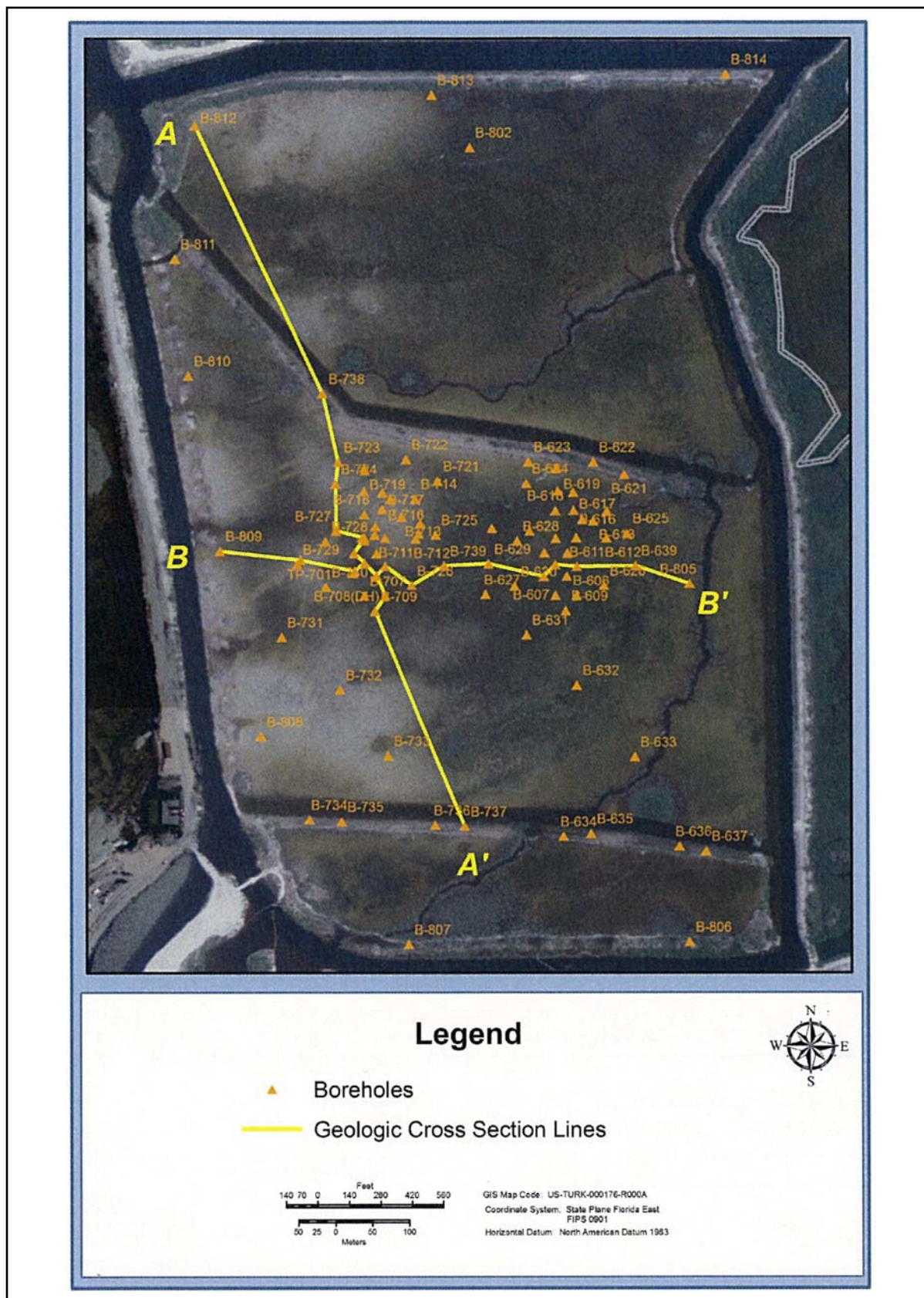


Figure 3.3.1-4
Bore Hole and Cross Section Locations at the Turkey Point Units 6 & 7 Site

Rev. 0



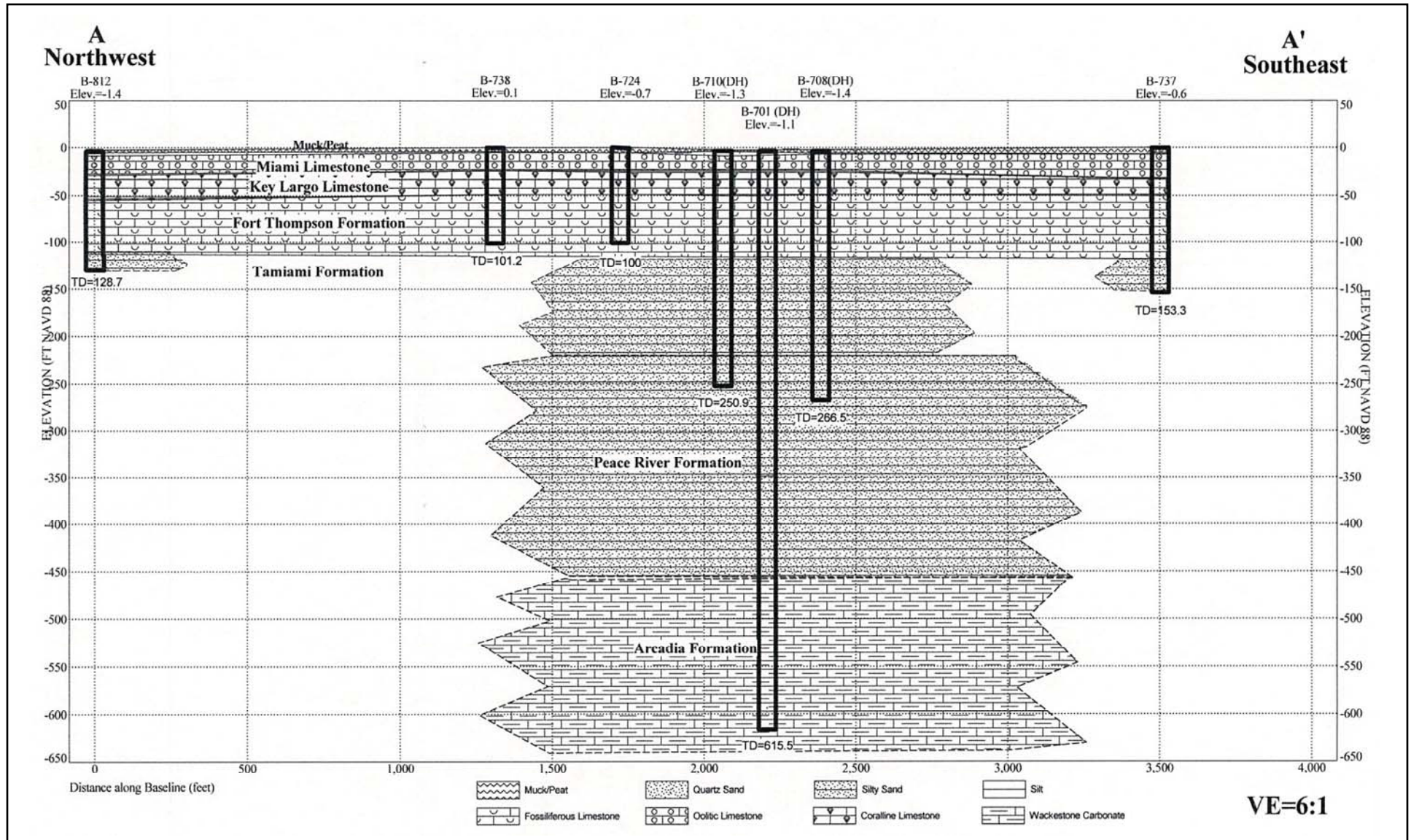


Figure 3.3.1-5
Geologic Cross Section A-A'

Rev. 0

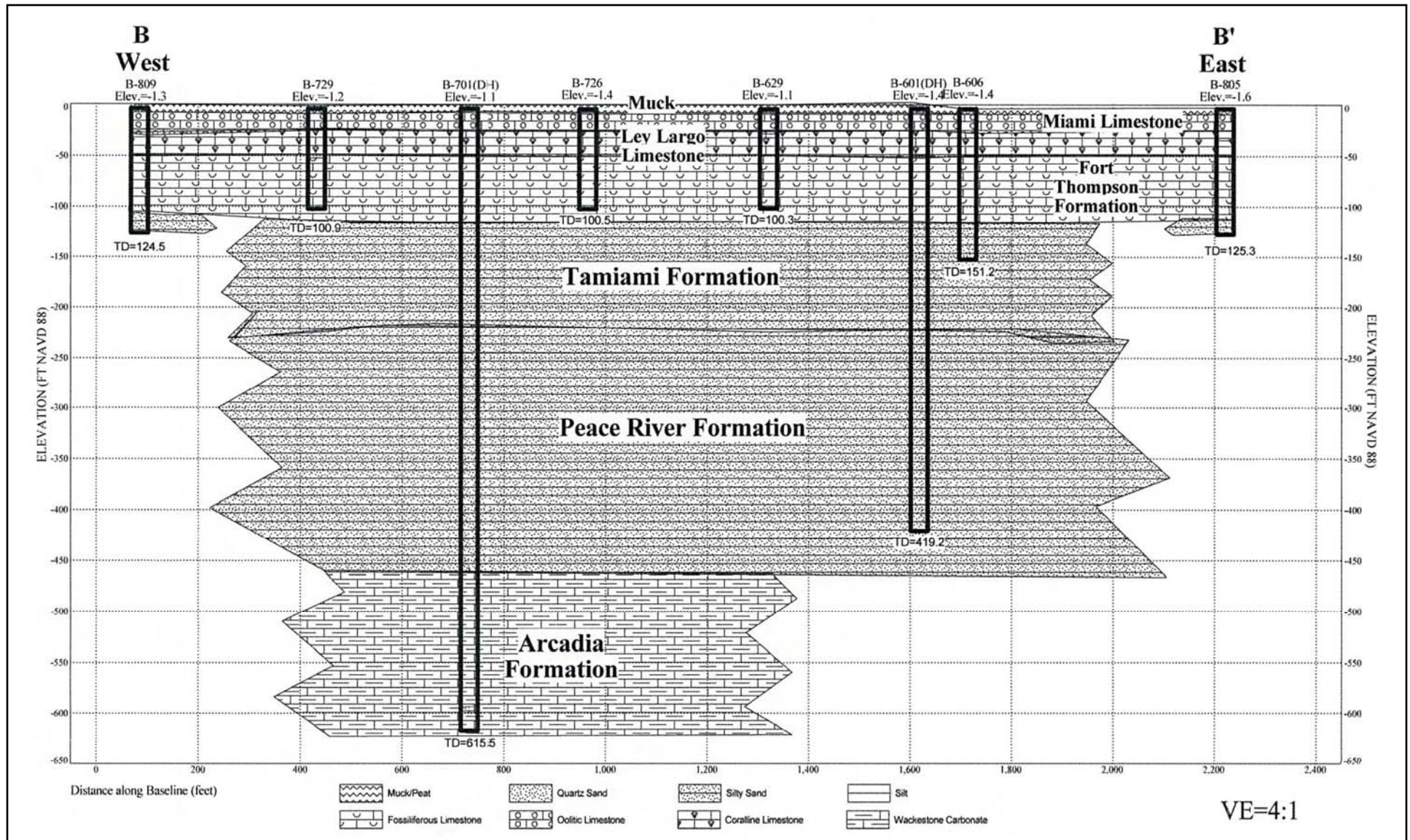


Figure 3.3.1-6
Geologic Cross Section B-B'

Rev. 0



LEGEND

- Turkey Point Units 6 & 7 Plant Area
- Pennsuco Marl, Tidal
- Terra Ceia Muck, Tidal
- Water

REFERENCES

1. Imagery, Miami-Dade County, 2007.
2. Soils Classifications, USDA NRCS, 1996.



PROJECT	TURKEY POINT UNITS 6 & 7 PROJECT		
TITLE	SOIL TYPES AT THE TURKEY POINT UNITS 6 & 7 PLANT AREA		
	FILE No.	08387584B029	FIGURE 3.3.1-7
	REV.	0	
	PLOT DATE	6/16/2009	

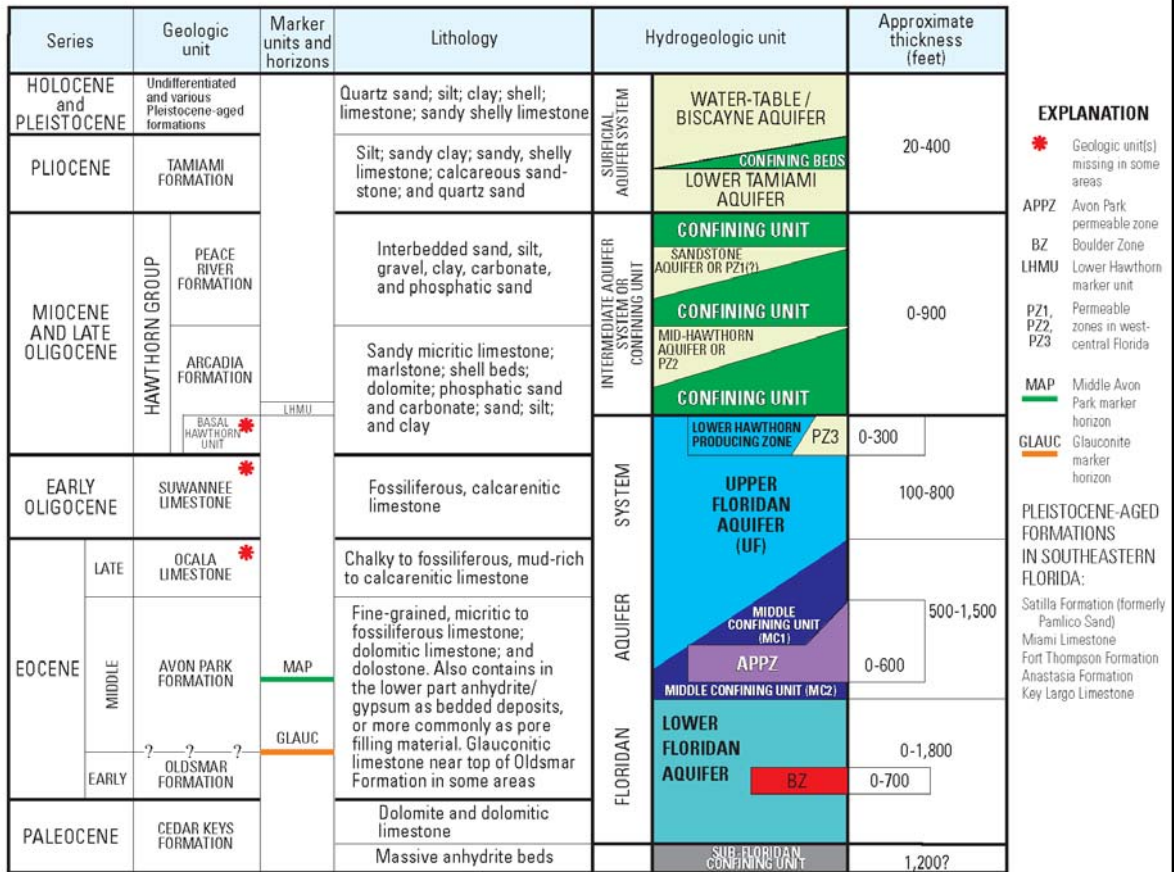


Figure 3.3.2-1
Regional Generalized Hydrostratigraphic Column

Rev. 0

Source: Reese and Richardson, 2008.

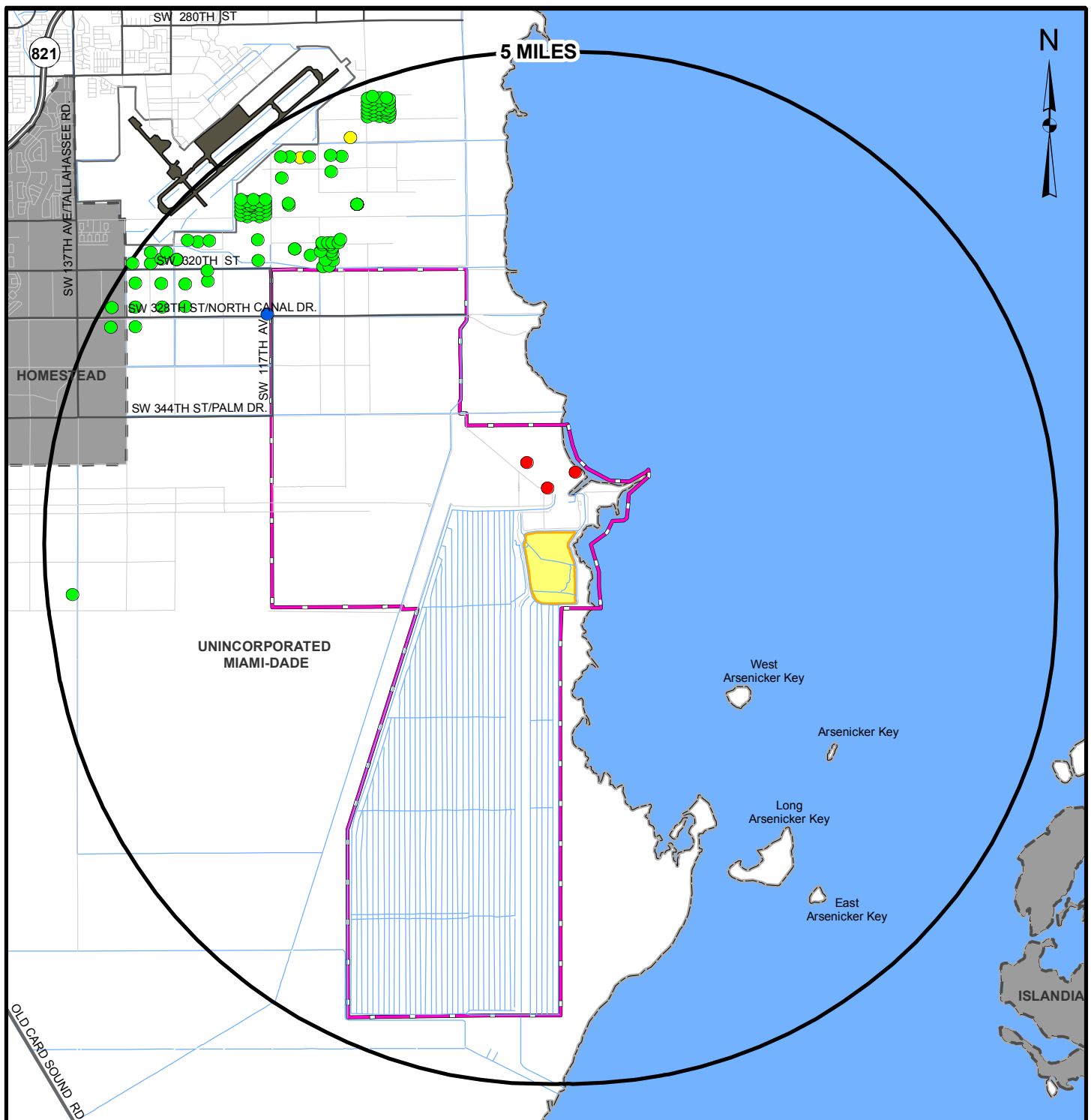


ERATHEM	SYSTEM	SERIES	HYDRO- GEOLOGIC UNIT		STRATIGRAPHIC UNIT		LITHOLOGY	APPROXIMATE TOP ELEVATION (ft NAVD 88)	APPROXIMATE THICKNESS (ft)
CENEZOIC	QUATERNARY	HOLOCENE			organic muck		organic soil and silt	0	3
		PLEISTOCENE	Surficial aquifer system	Biscayne aquifer	Miami Limestone		sandy, oolitic limestone	-3	25
					Key Largo Limestone		well indurated, vuggy, coralline limestone	-28	22
					Fort Thompson Formation		poor/well indurated fossiliferous limestone	-50	65
	TERTIARY	PLIOCENE			Semi-confining unit	Tamiami Formation		sand and silt with calcarenitic limestone	-115
		MIOCENE	Intermediate confining unit	Hawthorn Group	Peace River Formation		silty calcareous sand and silt	-220	235
					Arcadia Formation		calcareous wackestone with indurated limestones, sandstone, and sand	-455	>160
					drilling ended at -616.5 ft				

Figure 3.3.2-2
Site Hydrostratigraphic Column

Rev. 0





LEGEND

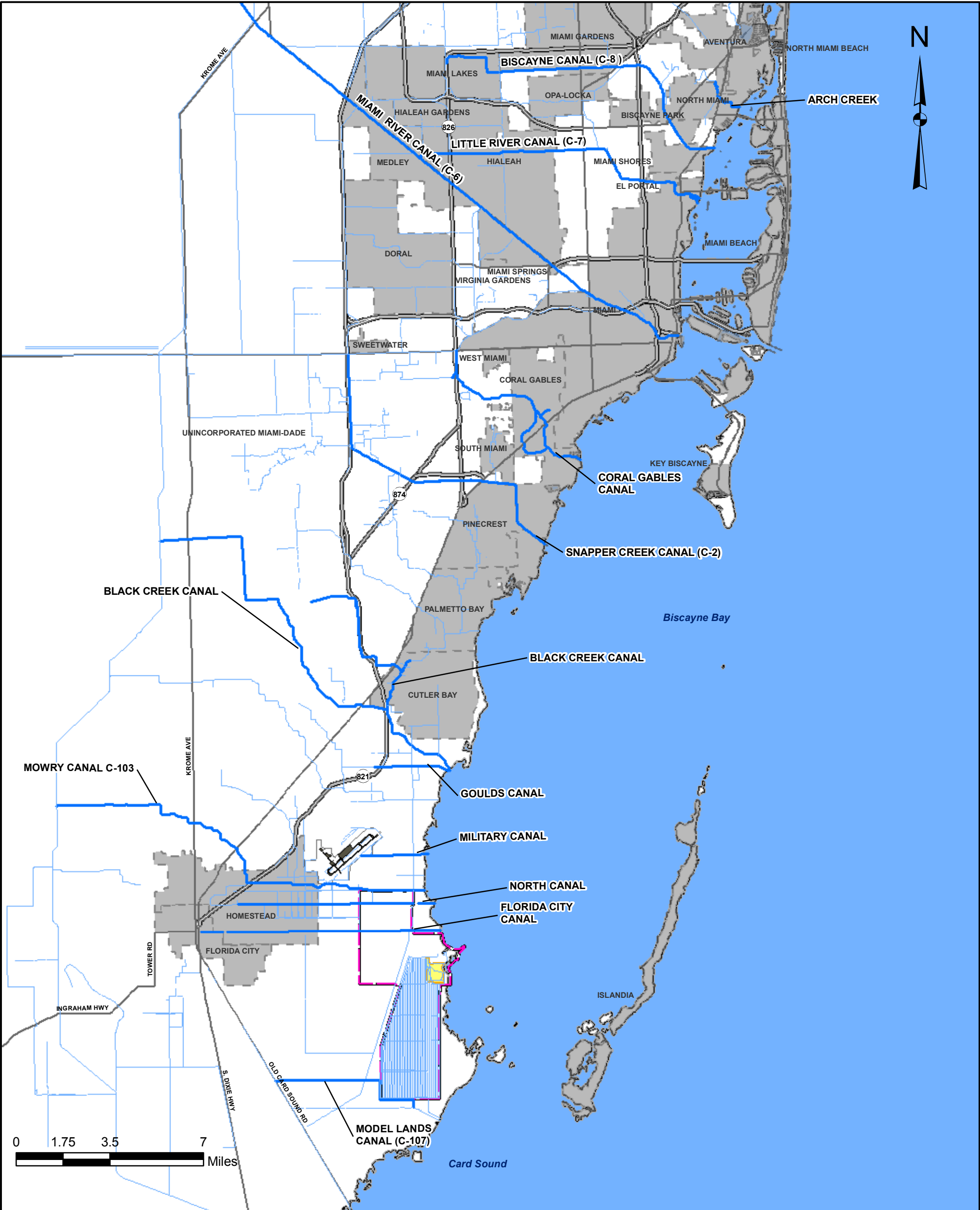
- Turkey Point Plant Property
- Turkey Point Units 6 & 7 Plant Area
- Biscayne Aquifer
- Canal
- Surficial Aquifer System
- Upper Floridan Aquifer

REFERENCES

1. Water Use Sources, SFWMD / FPL UIC Permit, 2009.



PROJECT	TURKEY POINT UNITS 6 & 7 PROJECT	
TITLE	PERMITTED WATER USES WITHIN 5-MILE RADIUS	
	FILE No.	08387584B018
	REV.	0
	PLOT DATE	6/11/2009
		FIGURE 3.3.3-1

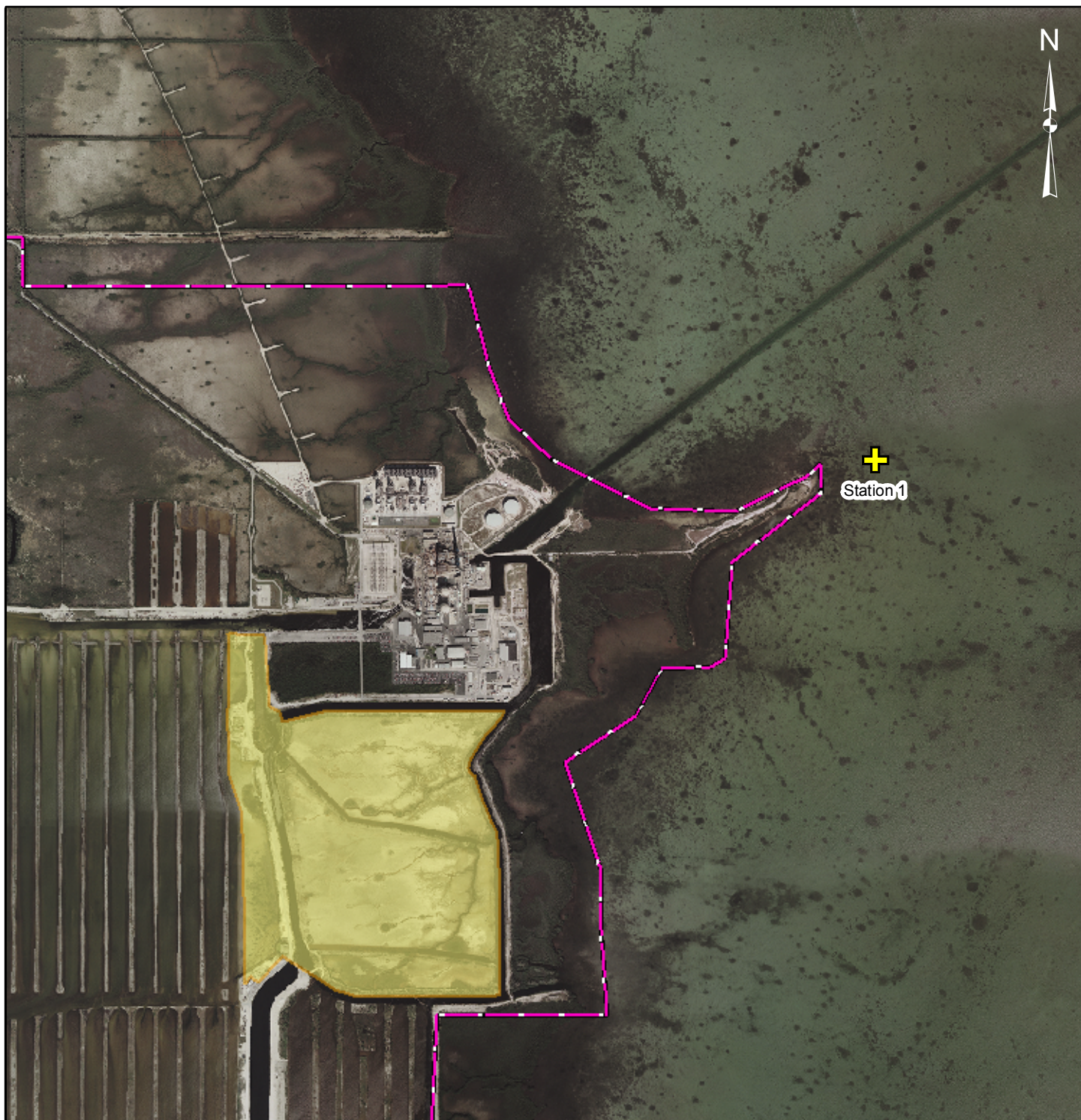


LEGEND

- Turkey Point Units 6 & 7 Site
- Turkey Point Plant Property
- Municipal Boundaries
- Major Tributaries
- Other Waterways

REFERENCES

1. Major Tributaries, Municipal Boundaries, Major Roads, Miami-Dade County, 2007.



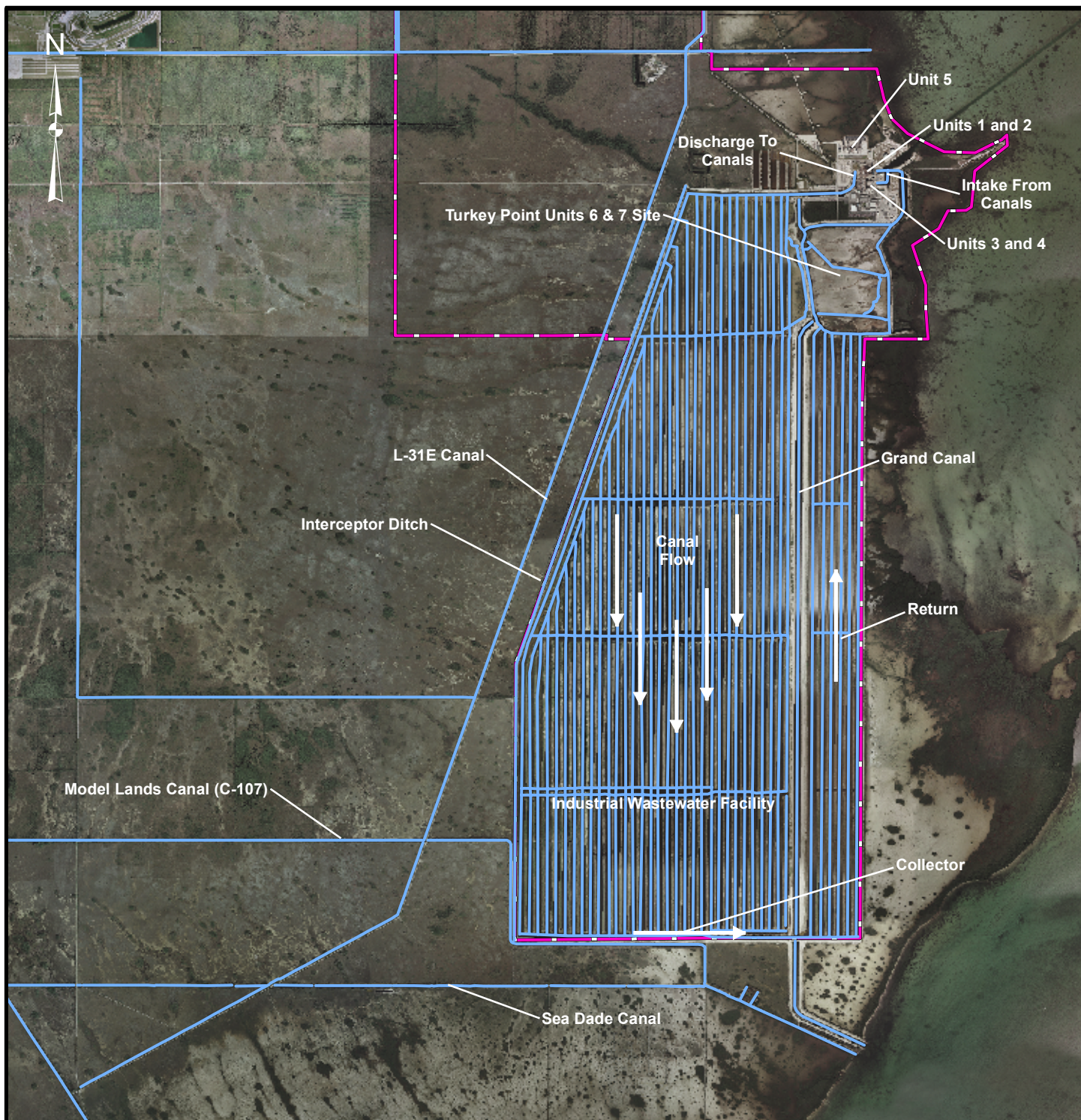
LEGEND

-  Water Sampling Location
-  Turkey Point Units 6 & 7 Site
-  Turkey Point Plant Property

REFERENCES

1. Imagery, Miami-Dade County, 2007.

PROJECT	TURKEY POINT UNITS 6 & 7 PROJECT	
TITLE	BISCAYNE BAY SAMPLING LOCATION	
	FILE No.	08387584B020
	REV.	0
	PLOT DATE	6/11/2009
FIGURE 3.3.4-2		



LEGEND

- Canals
- Turkey Point Plant Property

REFERENCES

1. Imagery, Miami-Dade County, 2007.

PROJECT

**TURKEY POINT UNITS 6 & 7
PROJECT**

TITLE

**TURKEY POINT COOLING CANALS/
INDUSTRIAL WASTEWATER FACILITY**



FILE No. 08387584B021

REV. 0

PLOT DATE 6/11/2009

FIGURE

3.3.4-3



LEGEND

- | | |
|--|-----------------------------------|
| Nuclear Administration Building/Training Building/Parking Area | 612-A - MANGROVE HEADS |
| TURKEY POINT UNITS 6 & 7 SITE | 612-B - DWARF MANGROVES |
| TURKEY POINT UNITS 6 & 7 PLANT AREA | 650 - MUD FLAT |
| 510 - CANAL | 743 - UPLAND SPOIL AREAS |
| 511 - DITCHES | 743 - WET - WETLAND SPOIL AREAS |
| 531 - OPEN WATER | 744 - FILL AREAS / ROADWAYS |
| 543 - RESERVOIRS <10 ACRES | 814 - ROADS AND HIGHWAYS |
| 612 - MANGROVE SWAMPS | 831 - ELECTRICAL POWER FACILITIES |
| 612 / 618 - MANGROVE SWAMP / WILLOW | |

REFERENCES

1. Imagery, Miami-Dade County, 2007.
2. Land Use Classification, SFWMD, 2004.

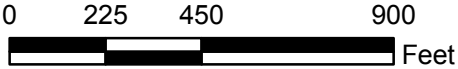


FIGURE 3.3.5-1	FILE No. 08387564B022	TITLE	PROJECT	
	REV. 0	VEGETATIVE COMMUNITIES & LAND USE MAP	TURKEY POINT UNITS 6 & 7	
	PLOT DATE 6/11/2009	SITE & ADJACENT AREAS	PROJECT	



LEGEND

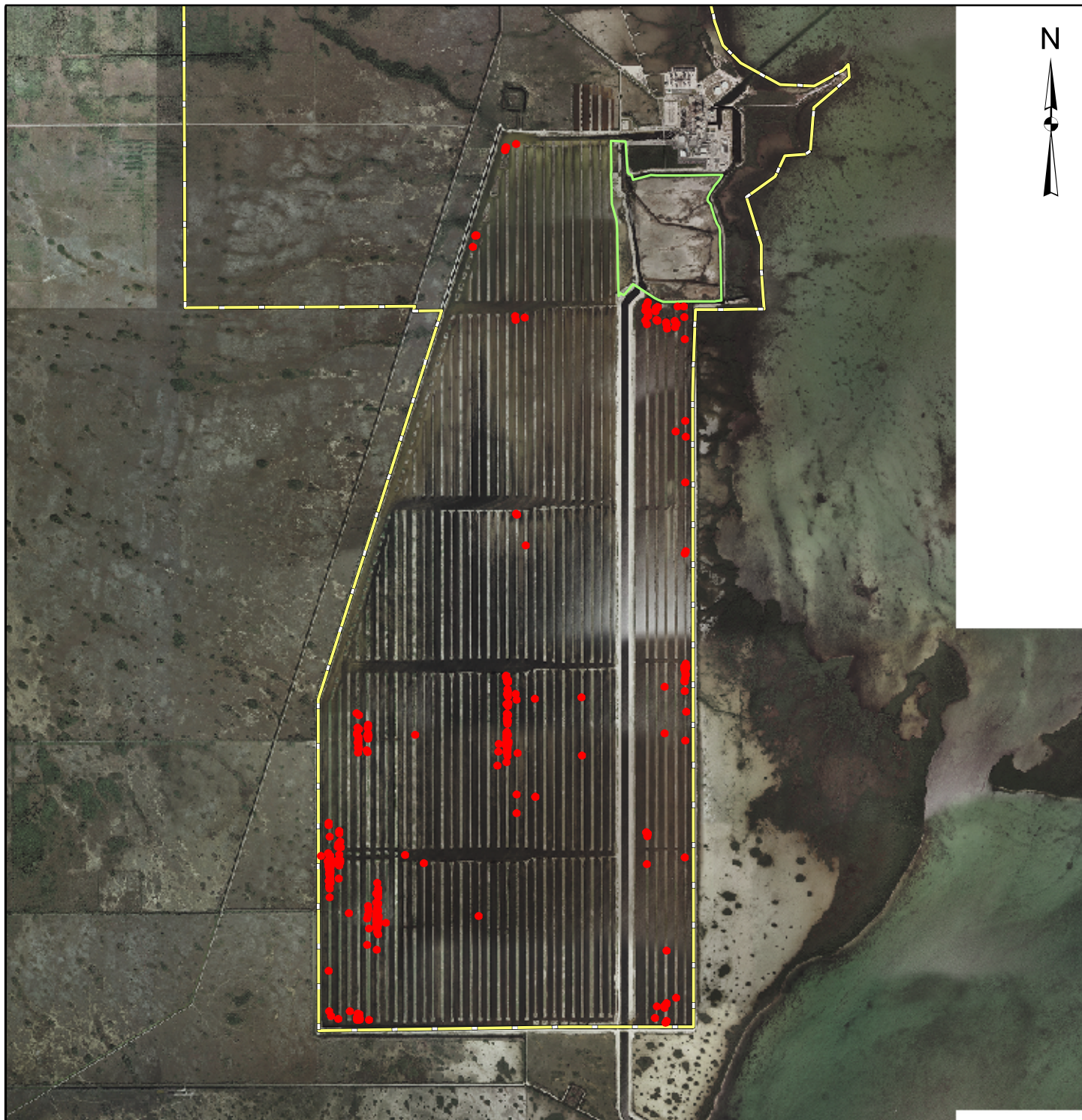
- Turkey Point Units 6 & 7 Plant Area
- Turkey Point Units 6 & 7 Site
- Associated Non-Linear Facilities
- 510 - CANAL
- 511 - DITCHES
- 531 - OPEN WATER
- 534 - RESERVOIRS < 10 ACRES
- 612 - MANGROVE SWAMPS
- 612 / 618 - MANGROVE SWAMPS / WILLOW AND ELDERBERRY
- 612-A - MANGROVE HEADS
- 612-B - DWARF MANGROVES
- 617 - MIXED WETLAND HARDWOODS
- 617-P - MIXED WETLAND HARDWOODS - PLANTED
- 619 - EXOTIC WETLAND HARDWOODS
- 641 - FRESHWATER MARSHES
- 650 - NON-VEGETATED MUD FLAT
- 740 - DISTURBED LANDS
- 743 - UPLAND SPOIL AREAS
- 743 - WET - WETLAND SPOIL AREAS
- 744 - FILL AREAS / ROADWAYS
- 814 - ROADS AND HIGHWAYS
- 831 - ELECTRIC POWER FACILITIES

REFERENCES

- Imagery, Miami-Dade County, 2007.
- Land Use, SFWMD, 2004.



PROJECT	TURKEY POINT UNITS 6 & 7 PROJECT	
TITLE	VEGETATIVE COMMUNITIES & LAND USE MAP ASSOCIATED NON-LINEAR FACILITIES	
	FILE No. 08387584B023	FIGURE 3.3.5-2
	REV. 0	
	PLOT DATE 6/11/2009	



LEGEND

- Crocodile Nesting Sites
- Turkey Point Units 6 & 7 Site
- Turkey Point Plant Property

REFERENCES

1. Crocodile Nest Locations, FPL 1978-2008, Turkey Point Plant Annual Crocodile Report Permit # TE092945-1.

PROJECT

TURKEY POINT UNITS 6 & 7
PROJECT

TITLE

CROCODILE NEST LOCATIONS
1978 THROUGH 2007



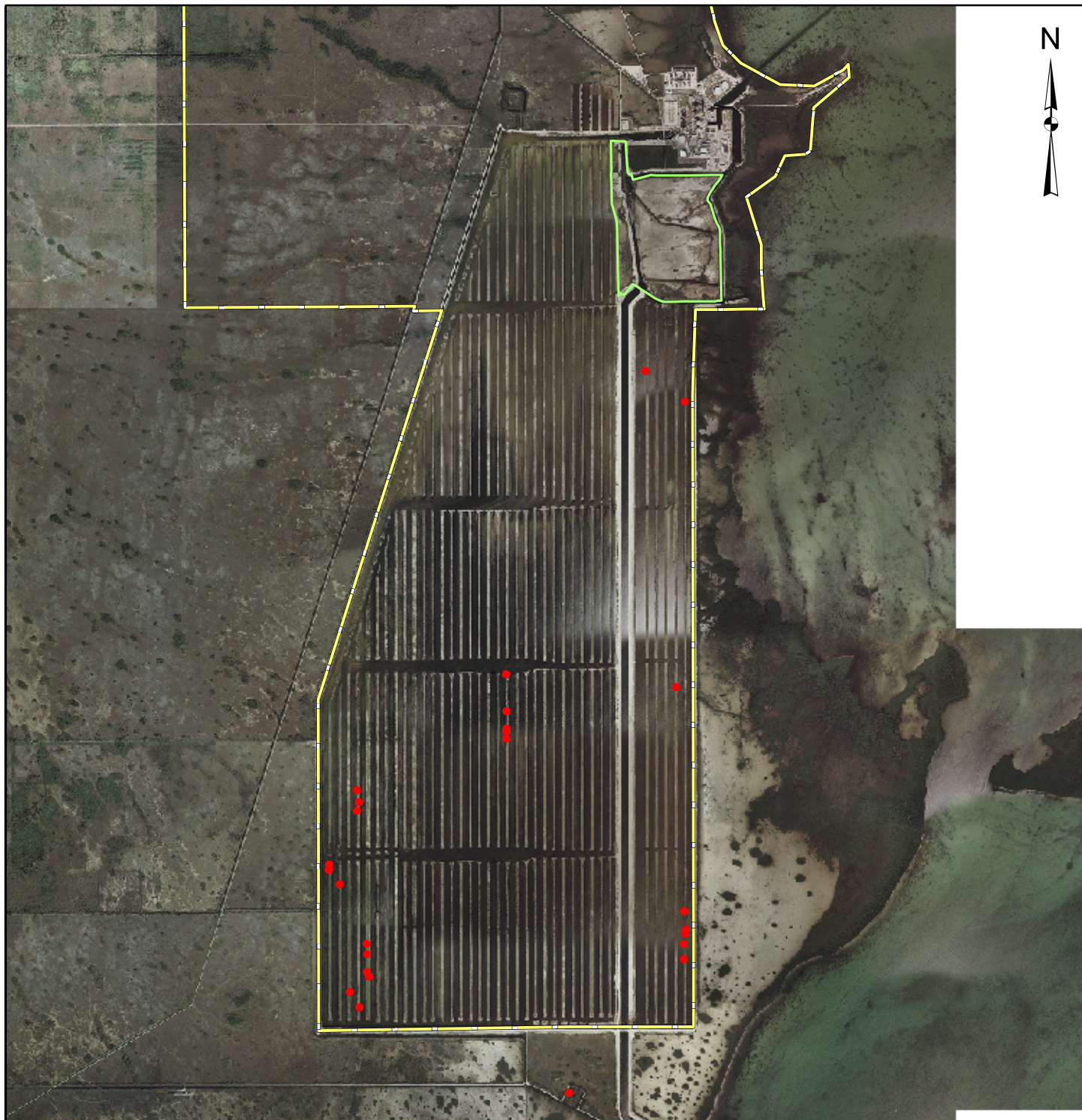
FILE No. 08387584B025

REV. 0

PLOT DATE 6/11/2009

FIGURE

3.3.6-1



LEGEND

- Crocodile Nesting Sites
- Turkey Point Units 6 & 7 Site
- Turkey Point Plant Property

REFERENCES

1. Crocodile Nest Locations, FPL 1978-2008, Turkey Point Plant Annual Crocodile Report Permit # TE092945-1.

4,500 0 4,500
Feet

PROJECT	TURKEY POINT UNITS 6 & 7 PROJECT	
TITLE	CROCODILE NEST LOCATIONS 2008	
	FILE No.	08387584B026
	REV.	0
	PLOT DATE	6/11/2009
		FIGURE 3.3.6-2

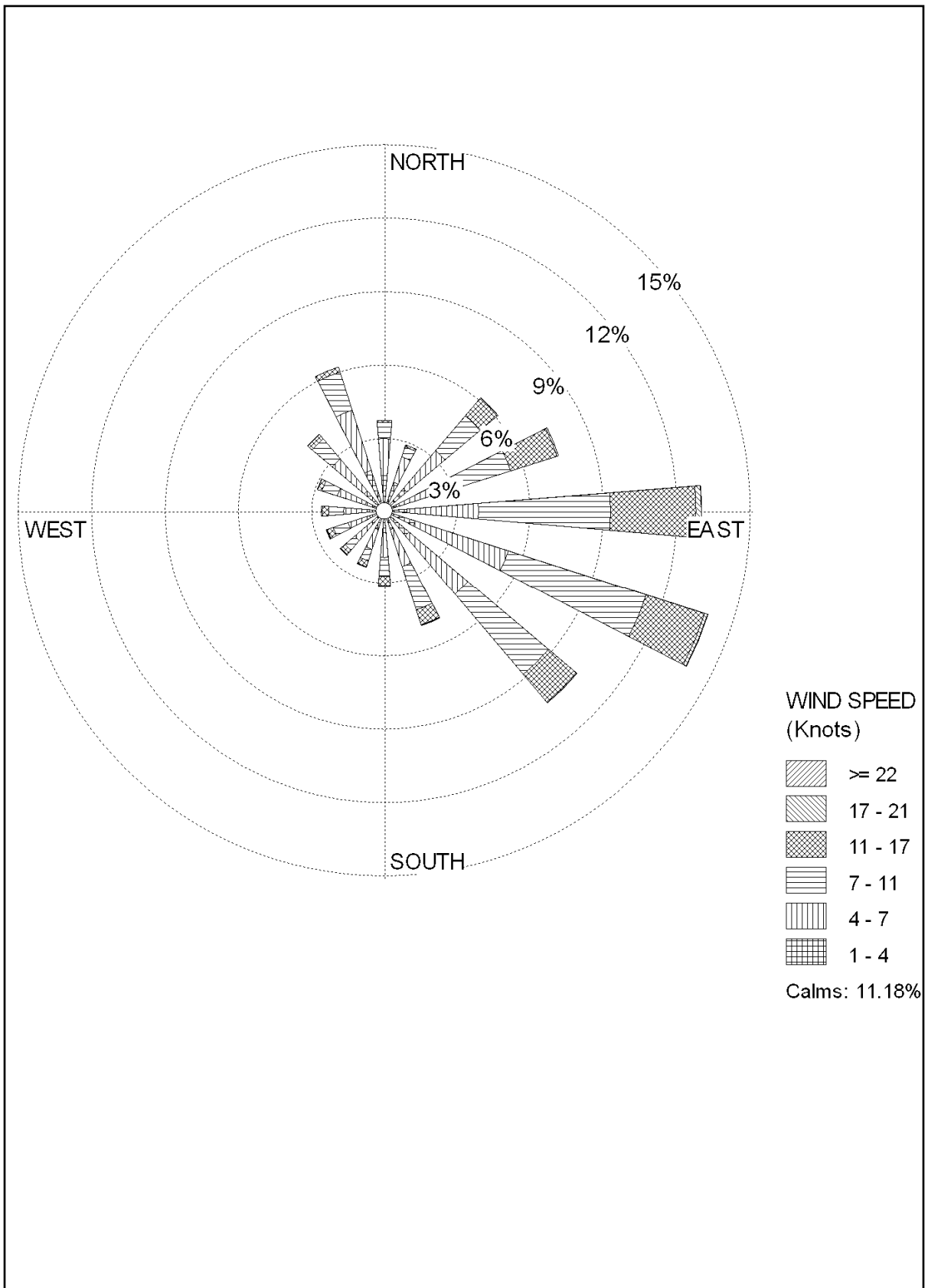


Figure 3.3.7-1
Annual Wind Rose for Miami International Airport, Florida

Source: National Climatic Data Center, 2001-2005.
Rev. 0



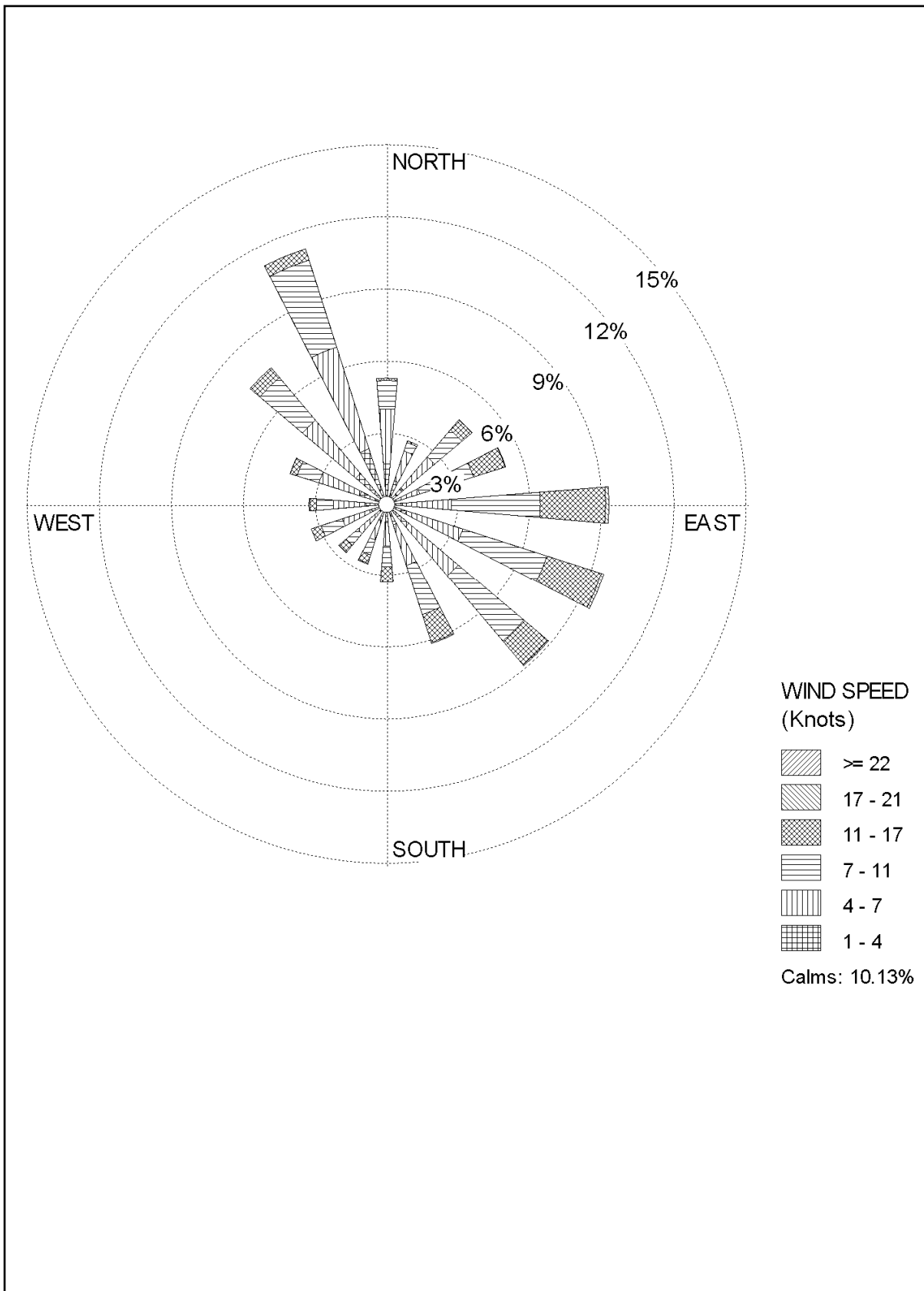


Figure 3.3.7-2a
Winter Wind Rose for Miami International Airport, Florida

Source: National Climatic Data Center, 2001-2005.
Rev. 0



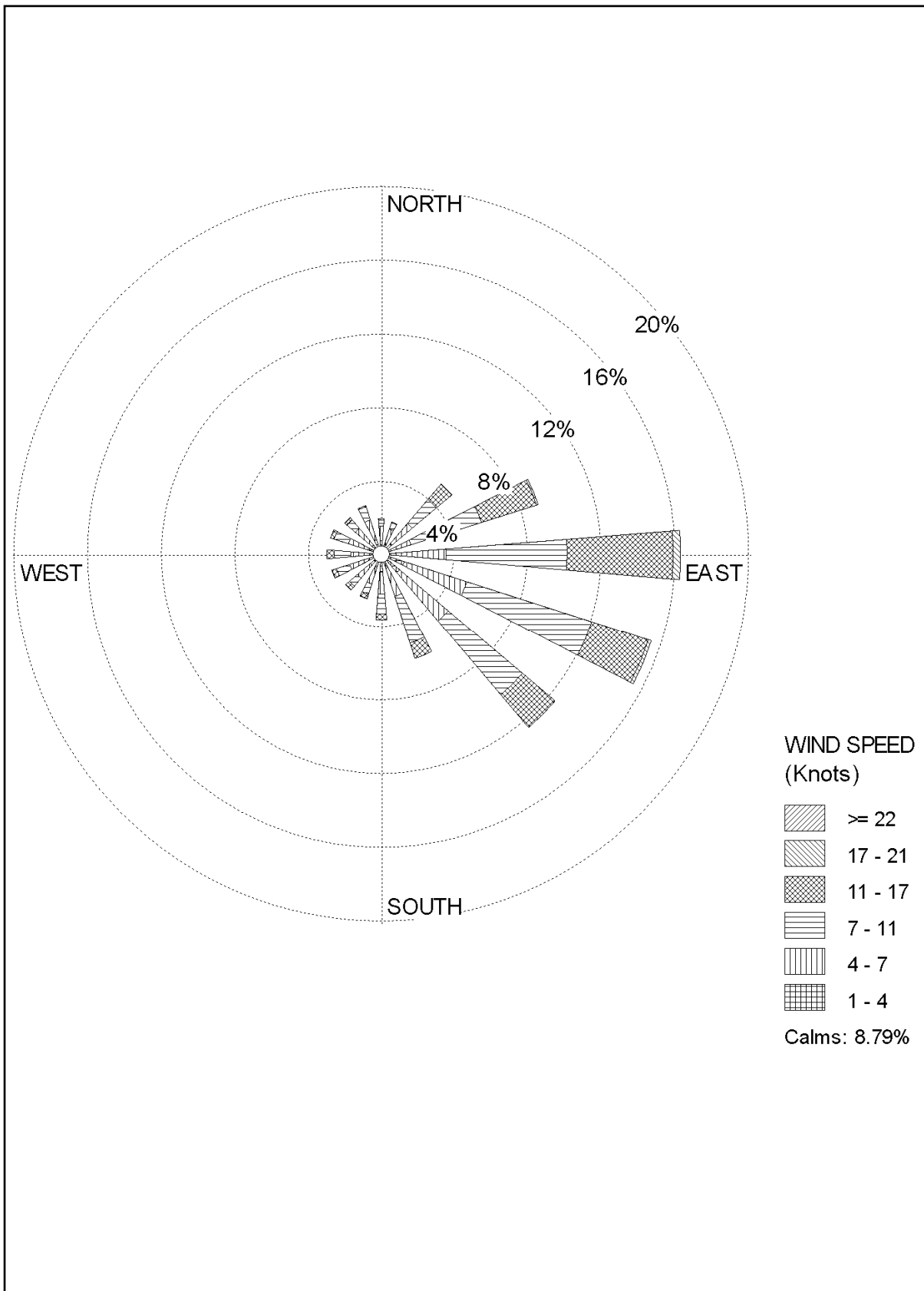


Figure 3.3.7-2b
Spring Wind Rose for Miami International Airport, Florida

Source: National Climatic Data Center, 2001-2005.
Rev. 0



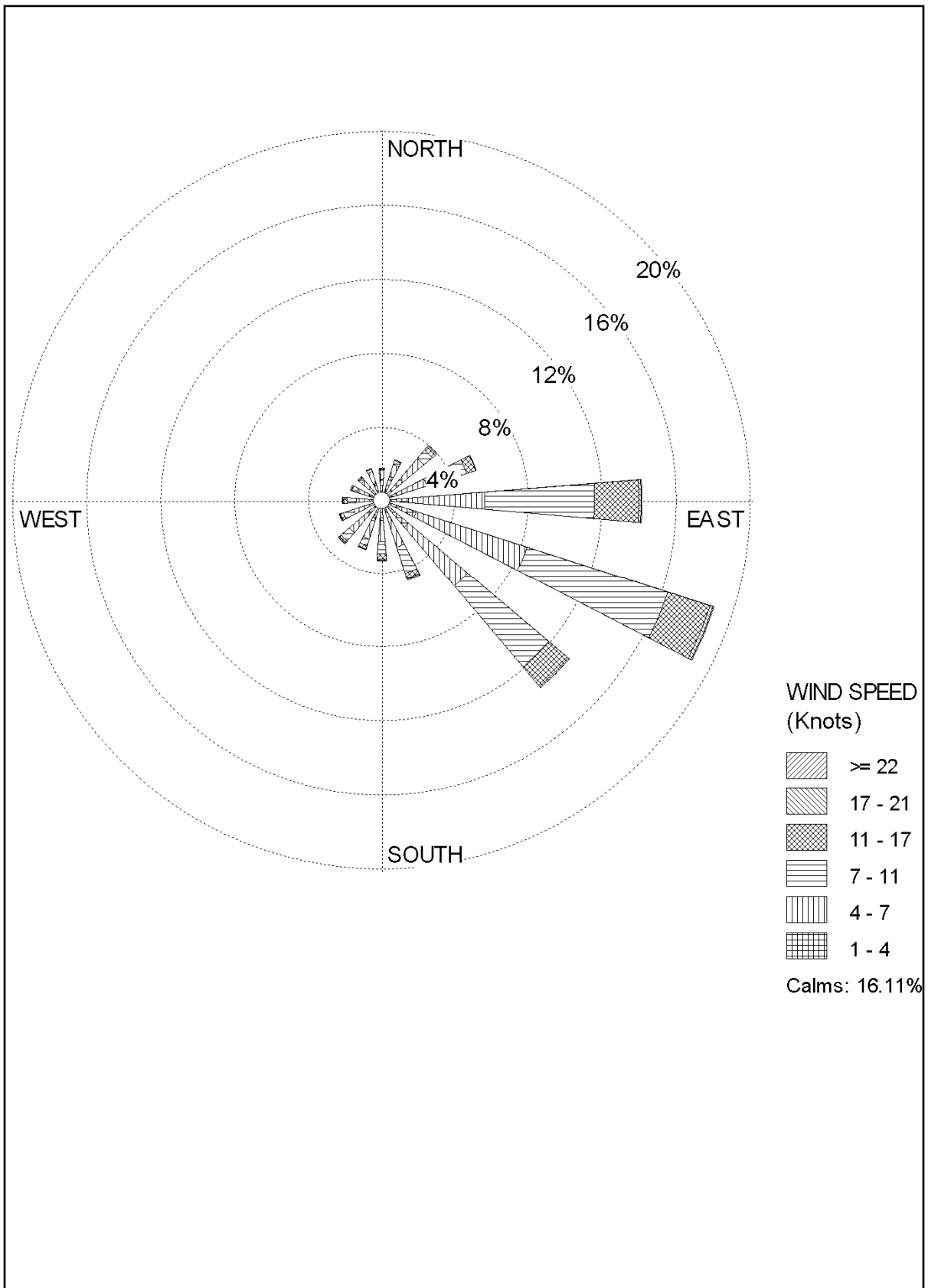


Figure 3.3.7-2c
Summer Wind Rose for Miami International Airport, Florida

Source: National Climatic Data Center, 2001-2005.
Rev. 0



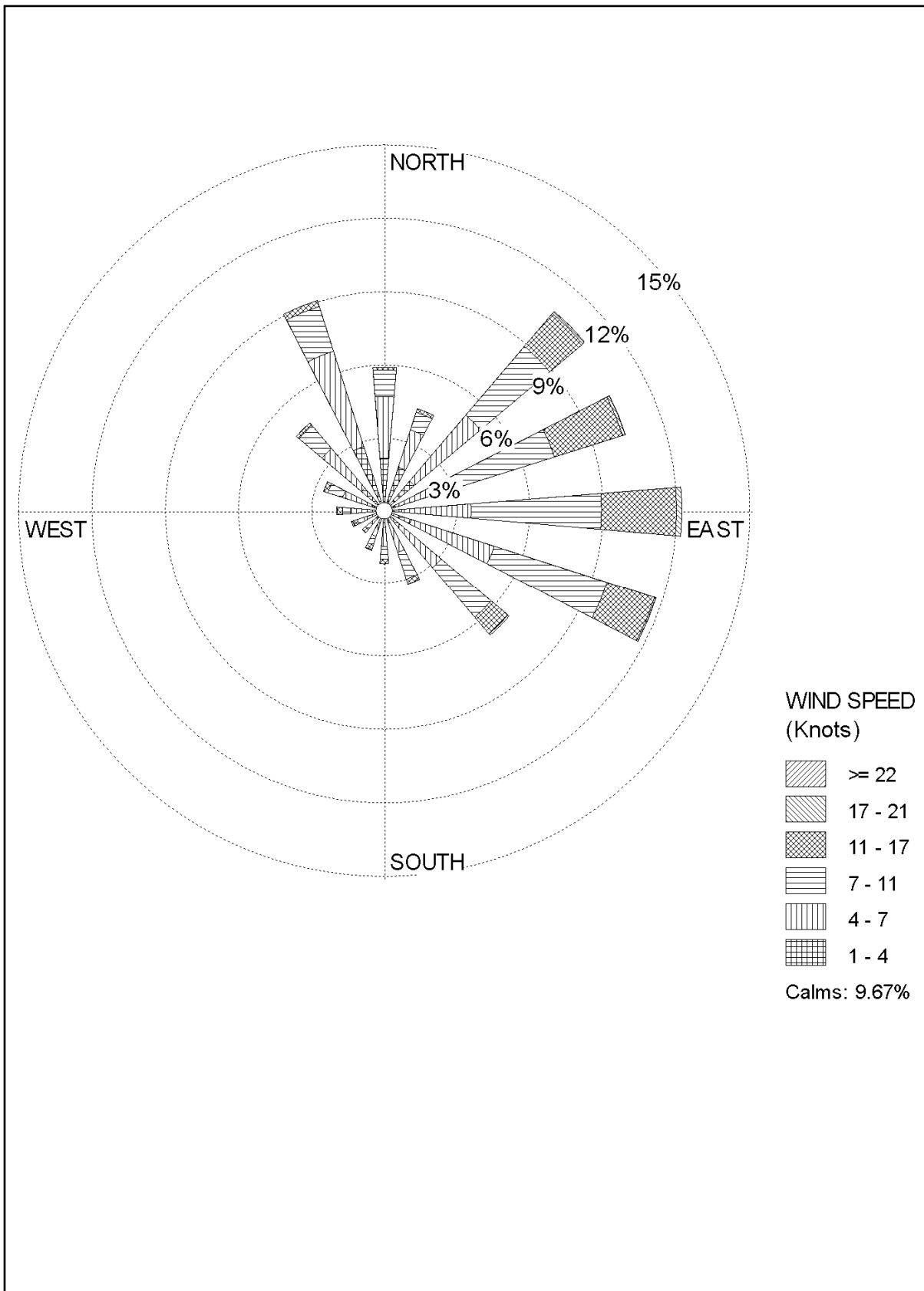
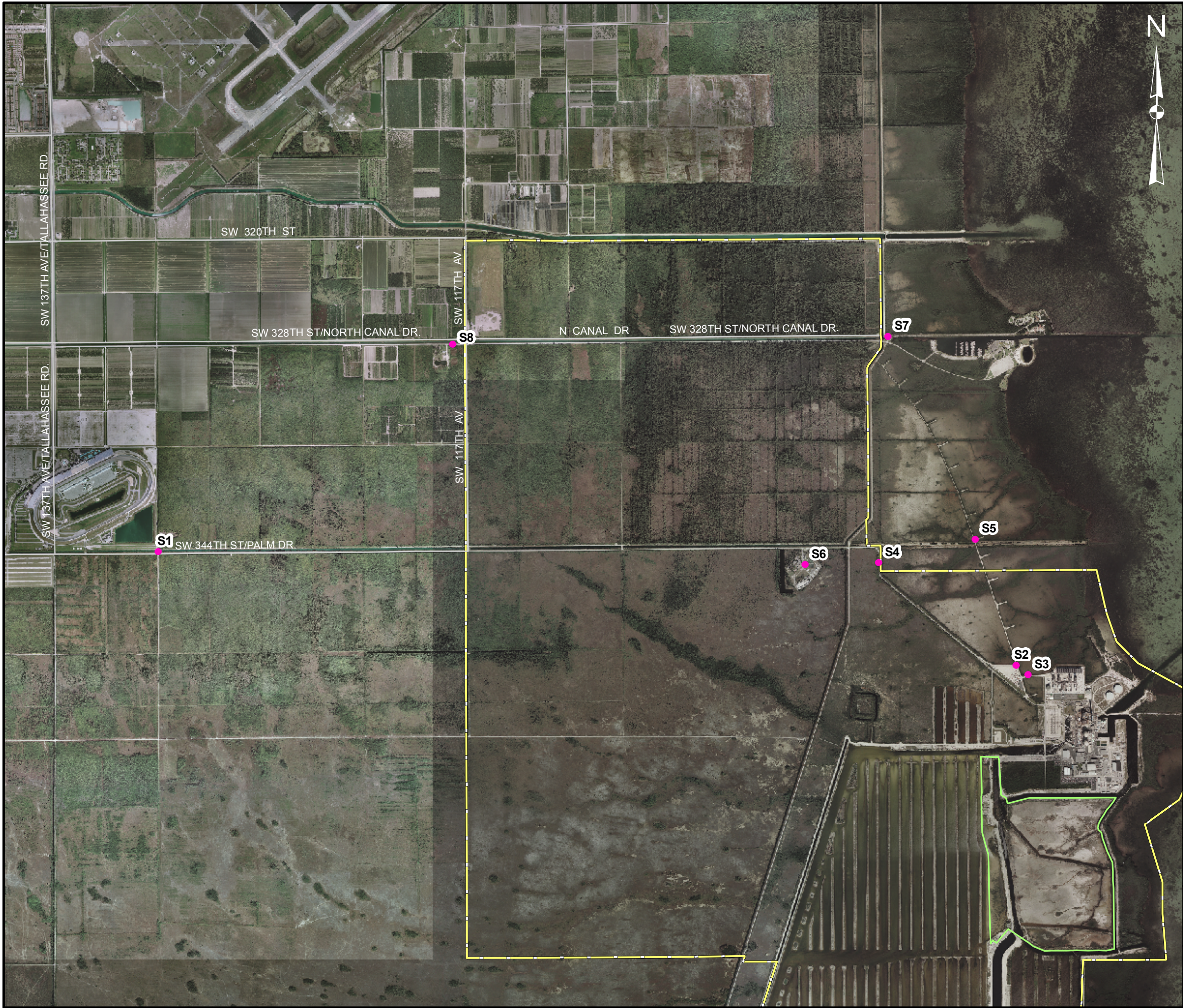


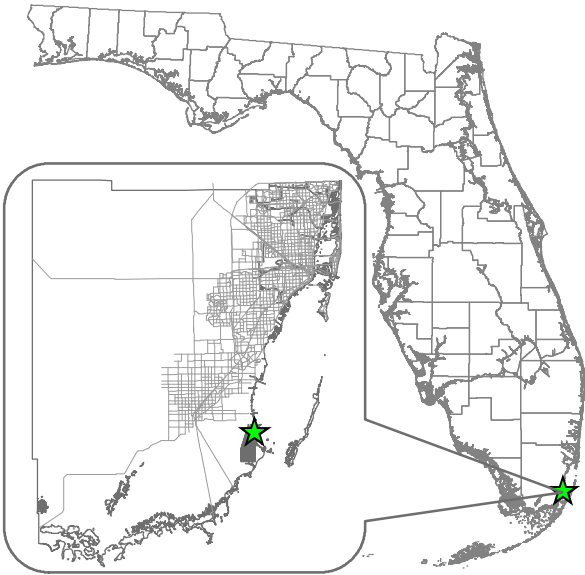
Figure 3.3.7-2d
Autumn Wind Rose for Miami International Airport, Florida

Source: National Climatic Data Center, 2001-2005.
Rev. 0





AREA MAP



LEGEND

- Noise Monitoring Locations
- Turkey Point Units 6 & 7 Site
- Turkey Point Plant Property

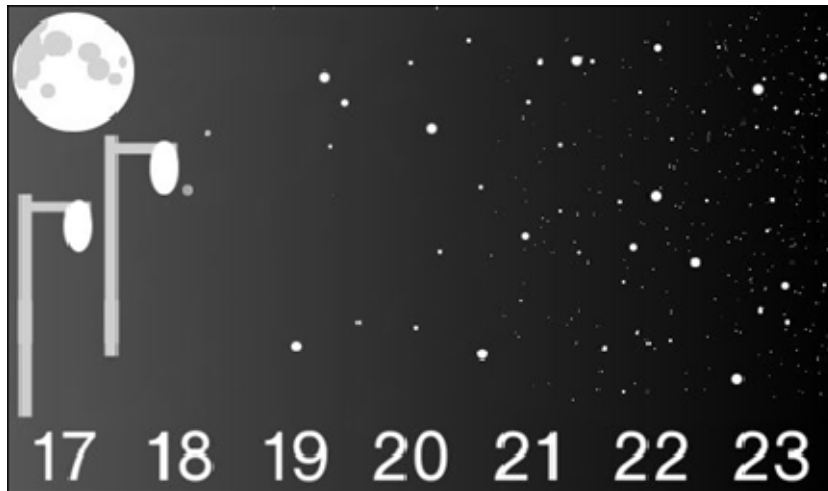
REFERENCES

1. Imagery, Miami-Dade County, 2007



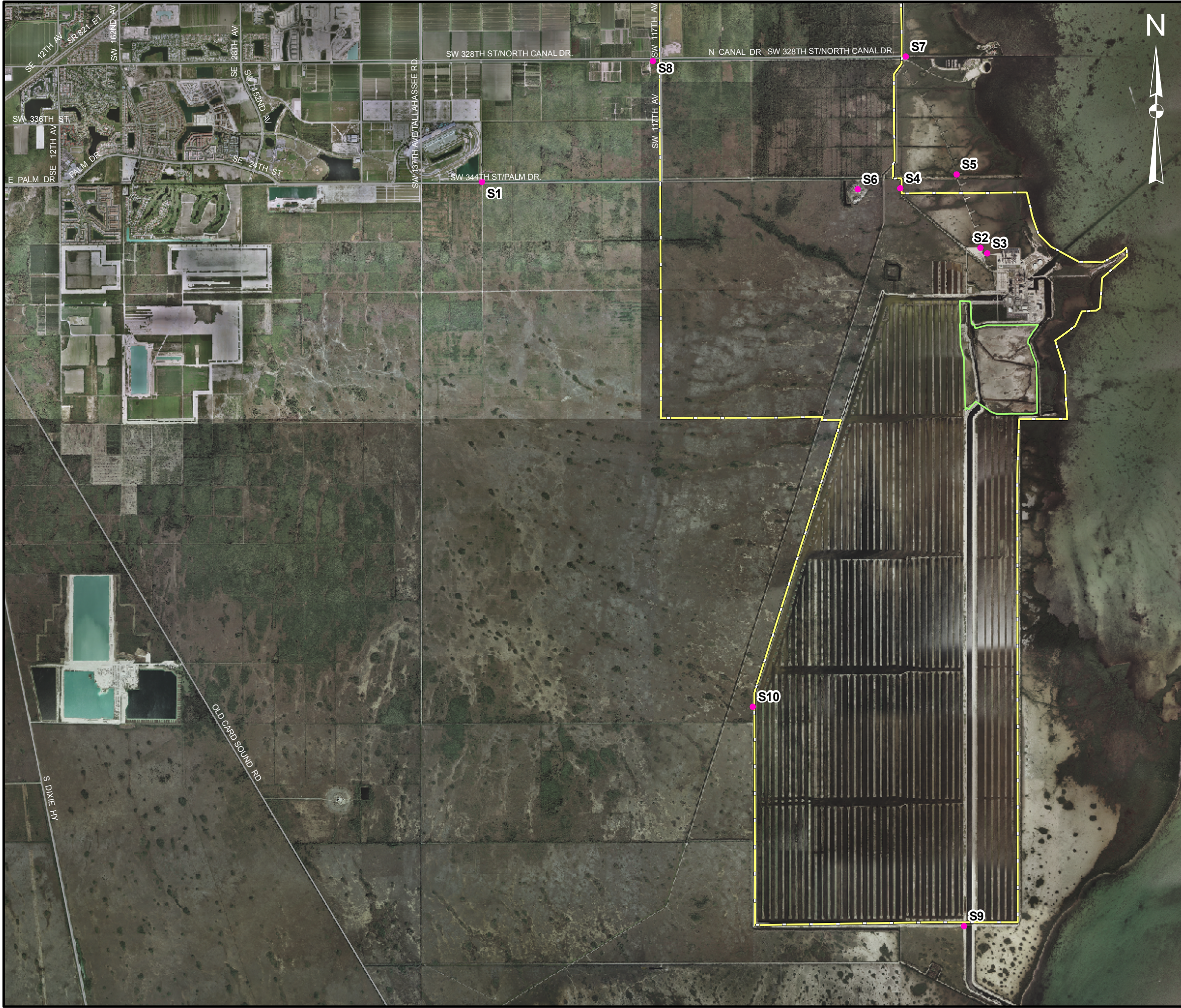
PROJECT	TURKEY POINT UNITS 6 & 7 PROJECT	
TITLE	NOISE MONITORING LOCATIONS	
	FILE No. 08387584B027	FIGURE 3.3.8-1
	REV. 0	
	PLOT DATE 6/11/2009	

**SQM Readings of Estimated Sky Glow in Mag/Arcsec² Values
Relative to how the Sky is Viewed with Other Light Influences and
Descriptions of Sky Glow Visual Measurements**

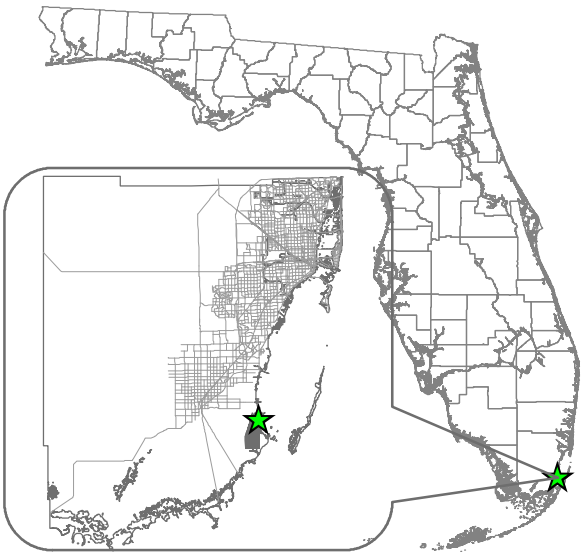


Visual Measurements (mag/arcsec ²)	Unaided Appearance of the Sky (M.W. = Milky Way)
21.7	The sky is crowded with stars, extending to the horizon in all directions. In the absence of haze the M.W. can be seen to the horizon. Clouds appear as black silhouettes against the sky. Stars look large and close.
21.6	Essentially as above, but a glow in the direction of one or more cities is seen on the horizon. Clouds are bright near the city glow.
21.1	The M.W. is brilliant overhead but cannot be seen near the horizon. Clouds have a greyish glow at the zenith and appear bright in the direction of one or more prominent city glows.
20.4	To a city dweller the M.W. is magnificent, but contrast is markedly reduced, and delicate detail is lost. Limiting magnitude is noticeably reduced. Clouds are bright against the zenith sky. Stars no longer appear large and near.
19.5	M.W. is marginally visible, and only near the zenith. Sky is bright and discolored near the horizon in the direction of cities. The sky looks dull grey.
18.5	Stars are weak and washed out, and reduced to a few hundred. The sky is bright and discolored everywhere.
18.0	Poor urban sky with moonless night and good transparency. Few stars to view.
17.0 and below	Full moon on a clear night. Some nearby artificial lighting. Stars hard to see.

Figure 3.3.9-1
SQM Readings of Estimated Sky Glow



AREA MAP



LEGEND

- Light Monitoring Locations
- Turkey Point Units 6 & 7 Site
- Turkey Point Plant Property

REFERENCES

- Imagery, Miami-Dade County, 2007.



PROJECT	TURKEY POINT UNITS 6 & 7 PROJECT	
TITLE	LIGHT MONITORING LOCATIONS	
	FILE No. 08387584B028	FIGURE 3.3.9-2
	REV. 0	
	PLOT DATE 6/11/2009	