3.0 Site Vicinity and Characterization

Chapter 3.0 provides descriptions of the existing sociological, physical, and biological characteristics of the SGS site and area that may be potentially affected by construction and operation of the SCCF. The environmental descriptions are organized into the following sections:

- 3.1—Site and Associated Facilities Delineation
- 3.2—Social and Political Environment
- 3.3—Physical and Biological Environment

The information in this chapter was developed from onsite field surveys and information and data compiled from literature and other publicly available sources. In particular, the previous SCA documents for Existing SGS Units 1 and 2 and Unit 3 (not built) and other permit applications for SGS provide useful information on environmental characteristics in the proposed Project area.

3.1 Site and Associated Facilities Delineation

In this SCA, SECI is seeking certification of the SCCF, a new combined-cycle electric generating unit and other onsite associated facilities, within the previously certified SGS site. SECI is also seeking to include an additional 79 acres of SECI-owned property within the certified site boundary. SECI is not seeking certification of any offsite associated linear facilities in this SCA.

3.1.1 Site Location

The approximately 1,996-acre SGS site is located in northeastern Putnam County, north of the city of Palatka. The site is located along the east side of U.S. Highway 17 (US 17) and approximately 0.5 mile north of the St. Johns River. CR 209 (or West River Road) runs between the southern site boundary and the river and connects to a roadway corridor accessing the site. A water intake and discharge pipeline corridor extends to the St. Johns River. At the end of the pipeline corridor, SECI also has a sovereign submerged land lease from the State of Florida in the St. Johns River for the plant's water intake structure and discharge pipeline and diffuser.

The main access road to the site is from US 17; there is a secondary access road from CR 209. A CSX Transportation, Inc. (CSXT), railroad line enters the SGS site along the western boundary running along the east side of US 17. An electrical transmission line corridor containing seven 230-kV transmission lines runs east-west, exiting in the southwest portion of the site.

The proposed SCCF will be located within an approximately 32-acre area in the south-central portion of the SGS site to the south of the Existing SGS Units. The two existing hyperbolic cooling towers are located northeast of the proposed SCCF. The proposed Project will also use an additional 23 acres for construction laydown and craft worker parking during construction. The parking area will be seeded and allowed to revegetate with grass upon completion of construction activities. The construction laydown area will be utilized for future outages.

Figure 3.1.1-1 shows the boundaries of the SGS site on a U.S. Geological Survey (USGS) 1:24,000-scale topographic quadrangle map, and Figure 3.1.1-2 shows the boundaries on a recent aerial photograph at the same scale.

3.1.2 Existing Site and Adjacent Property Uses

The approximately 1,996-acre SGS site currently contains two approximately 650-MW (winter net nominal) coal-fired electric generating units (SGS Units 1 and 2) and associated facilities. Existing facilities include boilers, steam turbine buildings, two 450′ hyperbolic natural draft cooling towers, and 695′ exhaust stacks within a single concrete structure. SGS Units 1 and 2 are equipped with air pollution control equipment to treat exhaust gas from the boilers prior to release to the atmosphere, including electrostatic precipitators (ESPs) to remove fly ash particulate matter (PM), selective catalytic reduction (SCR) for nitrous oxide (NO_x) reduction, and a flue gas desulfurization (FGD) system to remove sulfur dioxide (SO_2).

Onsite associated facilities for coal delivery and handling are located to the west of the generating units and include a rail spur/loop, unloading facilities, covered conveyor systems, and a lined coal storage area. The site also has solid waste disposal areas located north of SGS Units 1 and 2. Fly ash removed from the flue gas in the ESP systems is currently either disposed in the solid waste disposal area or sold for beneficial reuse in concrete production. Historically, the solid waste disposal areas were also used to dispose of calcium sulfite produced in the FGD systems. Since 2001, the gypsum byproduct has been sold to Continental Building Products (formerly Lafarge North America) for the production of wallboard at its plant adjacent to the west boundary of the SGS site along US 17. Other existing onsite facilities include a

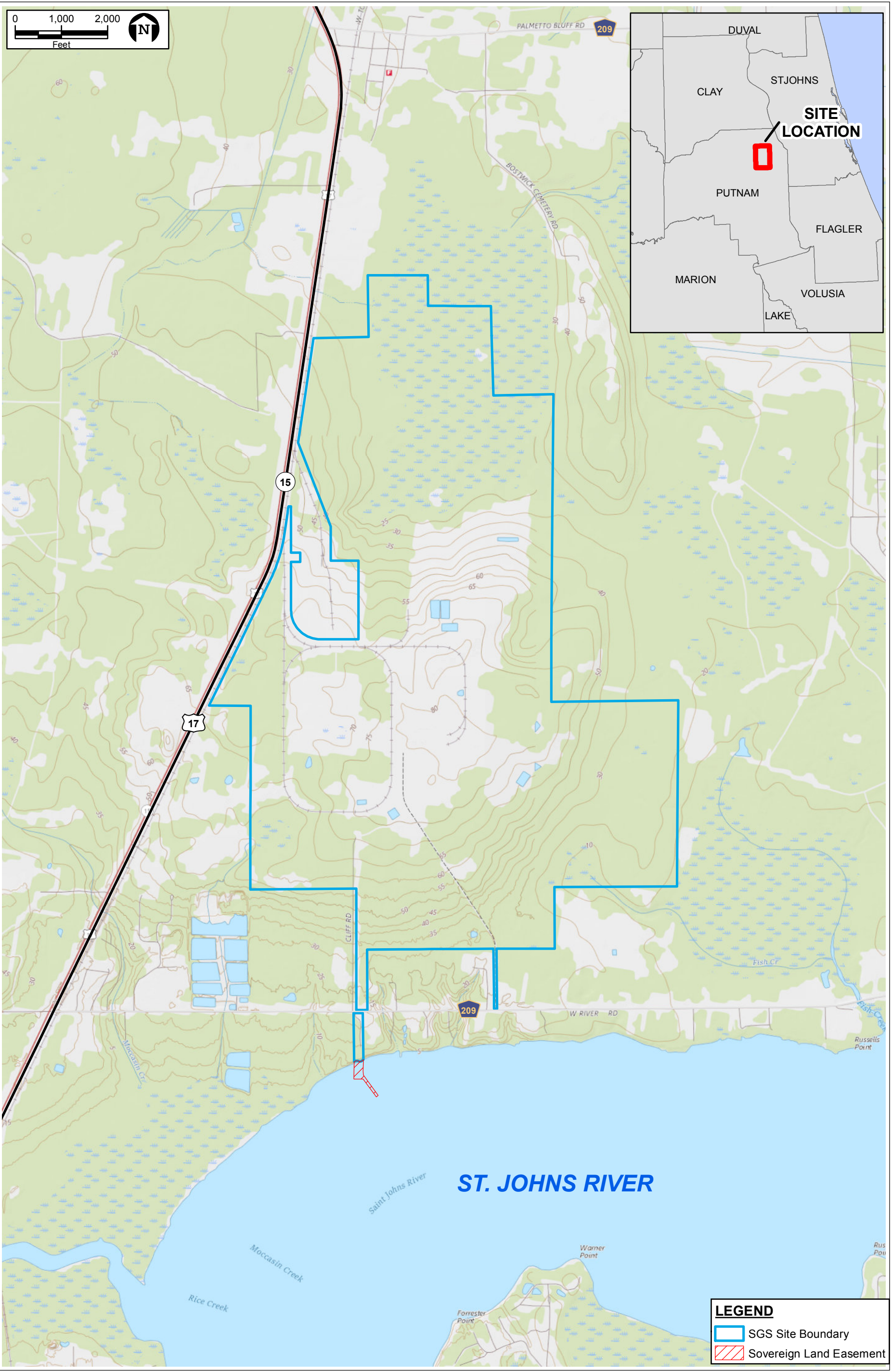


FIGURE 3.1.1-1.

TOPOGRAPHIC MAP OF SGS SITE AND GENERAL VICINITY

Sources: Putnam Co PA, 2016; FDOT, 2016; USGS, 2016; ECT, 2017.

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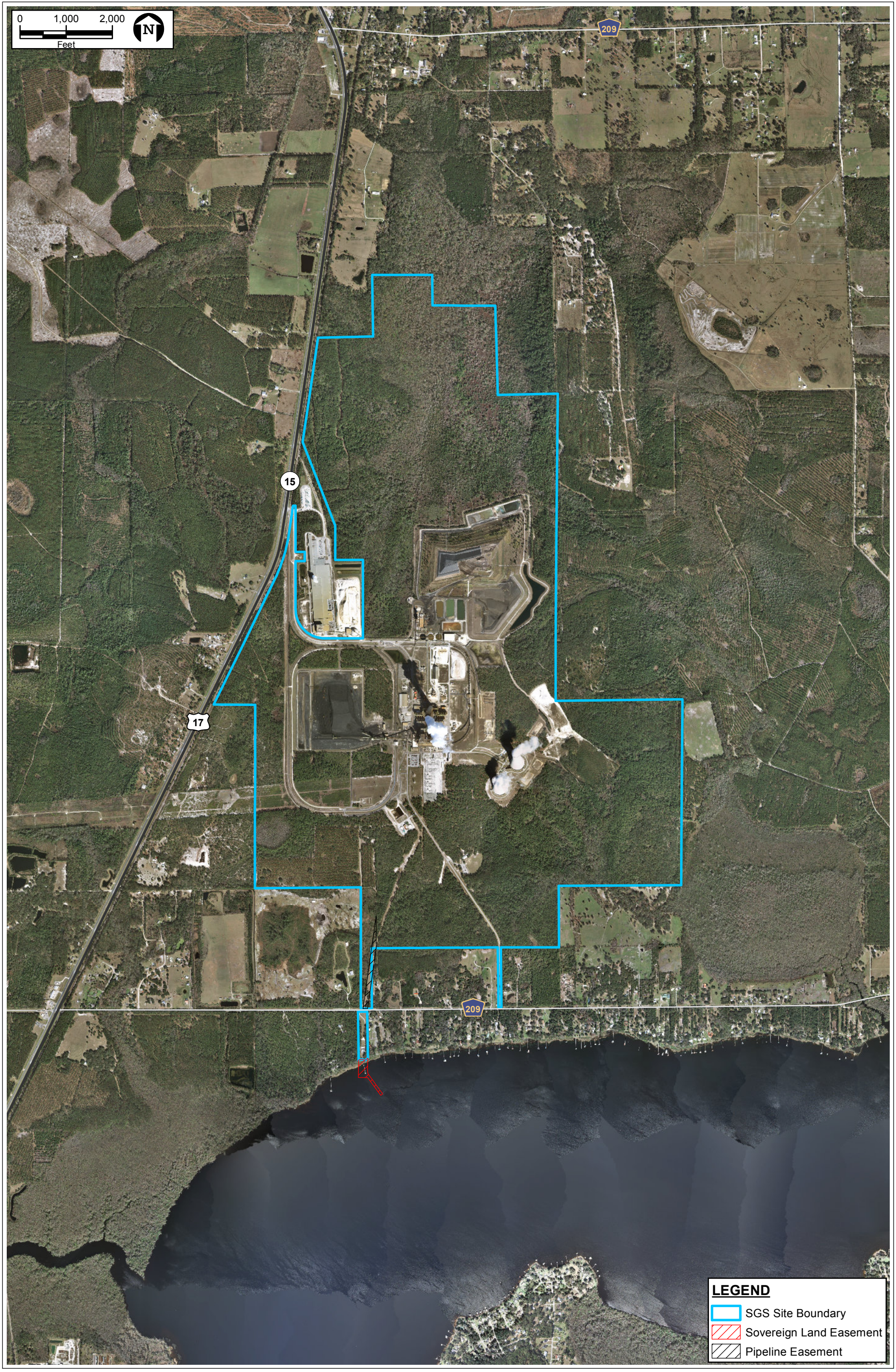


FIGURE 3.1.1-2.

AERIAL PHOTOGRAPH OF SGS SITE AND GENERAL VICINITY

Sources: Putnum Co PA, 2016; FDOT, 2017; ECT, 2017.

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limestone storage pile, switchyard, water treatment and storage facilities, wastewater treatment facilities, administration/control room building, and stormwater management system.

Undeveloped areas within the SGS site consist of primarily upland forested and forested wetland areas. An area of planted pines is located in the southwest area of the site, and a recreational pavilion is located in the south-central portion of the site, just south of the SCCF area. The specific area for the proposed SCCF currently consists of upland mixed forested lands.

Properties adjacent to the SGS site are predominantly undeveloped lands, consisting of upland and wetland forested areas with a few areas used for agricultural purposes. The Continental Building Products wallboard plant is located on an approximately 85-acre site adjacent to the northwestern SGS boundary on the east side of US 17. Nearby properties to the west of US 17 primarily consist of undeveloped lands with some scattered residential housing. Low-density residential uses are also located south of the SGS site along CR 209 and along the northern side of the St. Johns River. The St. Johns River is located approximately 0.5 miles south of the main SGS site area.

3.1.3 Proposed Site Uses

Figure 3.1.3-1 provides the site layout of the facilities for the SCCF overlaid on a recent aerial photograph. As shown in the figure, the main power plant facilities will be located just southeast of the existing SGS switchyard. The main combined-cycle power block will consist of two CTGs, two HRSGs, a STG, and two approximately 199′-high exhaust stacks. Other onsite associated facilities include electrical equipment enclosures, mechanical draft cooling tower, an administration building that will include a control room and a maintenance area, a warehouse, parking, fuel gas regulation station and heaters, diesel fuel-fired emergency fire water pump, stormwater management system/stormwater ponds, aboveground service/fire water storage tank, potable water and sanitary wastewater treatment facilities, aqueous ammonia tanks, a switchyard expansion, step-up transformers, and piping tie-ins and other facilities necessary to integrate with existing water intake and discharge infrastructure. The pipeline lateral gas yard shown on Figure 3.1.3-1 will not be owned or operated by SECI; therefore, SECI is not seeking certification of that facility. Water makeup and blowdown pipelines for the cooling tower will be interconnected to the existing SGS water supply and discharge pipelines and the existing water intake and discharge facilities in the St. Johns River. The existing SGS transmission switchyard will be extended on its south side to provide connection points for the new SCCF generators.

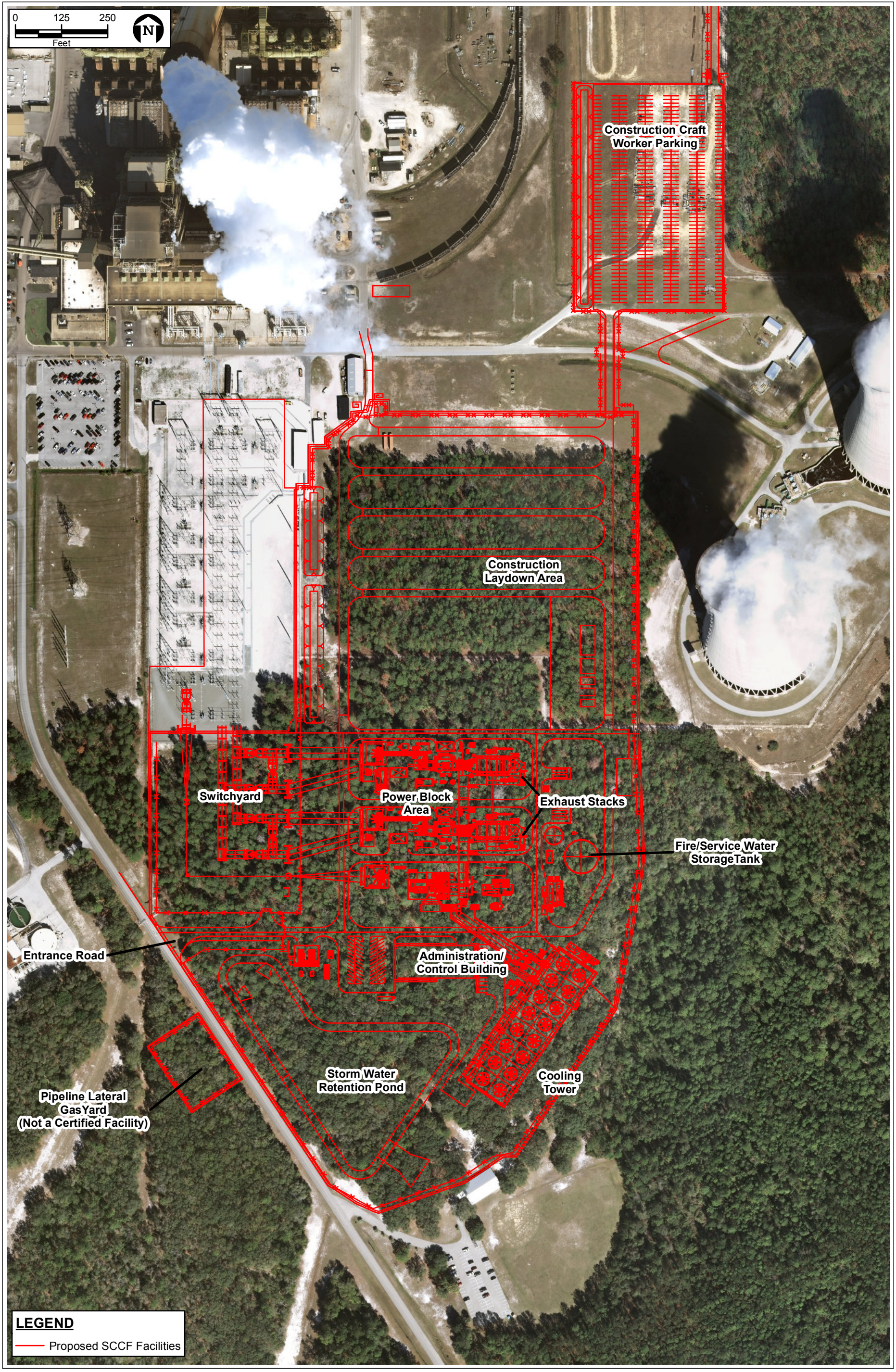


FIGURE 3.1.3-1.
LAYOUT OF SCCF FACILITIES

Sources: FDOT, 2017; Putnam Co PA, 2016; B & V, 2016; ECT, 2017.

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Figure 3.1.3-1 also shows the areas that will be used for construction laydown, located directly east of the existing SGS switchyard and north of the proposed SCCF. The laydown area will continue to be used for outages following SCCF construction. The construction parking area, located north of the laydown area, has been previously used for parking and material storage for maintenance activities at SGS. This area will be seeded and allowed to revegetate with grass after SCCF construction. Overall, the SCCF construction activities and facilities will affect approximately 55 acres of the SGS site.

3.1.4 Flood Zones

Figure 3.1.4-1 shows the 100-year flood zones on and in the vicinity of the SGS site overlaid on an aerial photograph based on the Federal Emergency Management Agency (FEMA) flood insurance rate map (FIRM). As shown in the figure, much of the northern portion of the SGS site north of the existing power plant facilities is designated as Flood Zone A. Flood Zone A is defined as areas subject to inundation by the 1-percent-annual-chance (100-year) flood event. A small area in the southwest portion of the site is also designated as Flood Zone A. The remainder of the SGS site containing the existing power plant facilities and the area for proposed SCCF facilities is designated as Flood Zone X, defined as areas subject to minimal flooding.

The Putnam County Floodplain Hazard Management and Floodplain Protection Ordinance (Land Development Code [LDC], Article 6.05) also references FIRMs and other maps as the basis for establishing flood hazard areas, and the floodplain map included in the appendix to the LDC also designates the area for SCCF as Flood Zone X, an area subject to minimal flooding.

The area of the sovereign submerged land easement for the existing water intake and discharge pipelines is designated as Flood Zone AE, defined as areas subject to the 100-year flood event. SCCF construction activities will not occur in this area.

3.2 Social and Political Environment

3.2.1 Governmental Jurisdictions

As shown on Figure 3.2.1-1, the SGS site on which the SCCF will be located lies within unincorporated Putnam County. The nearest community to the SCCF is unincorporated Bostwick, which lies approximately 3 miles to the north. The nearest incorporated municipality to the SCCF is Palatka, a city located approximately 4 miles to the southwest. The next closest municipality is the city of Hastings located approximately 7 miles east of the SCCF.

0 1,000 2,000 Feet N

Flood Zone	FEMA Definition
A	Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown.
AE	Areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. Base Flood Elevations (BFEs) are shown.
X	Areas subject to inundation by the 0.2-percent-annual-chance flood event.

15
17
209

LEGEND
- SGS Site Boundary
- Sovereign Land Easement
- Pipeline Easement

Flood Zone
- A
- AE
- X

FIGURE 3.1.4-1.
100-YEAR FLOOD ZONES ON SGS SITE

Sources: Putnam Co PA, 2016; FDOT, 2017; FEMA, 2016; ECT, 2017.

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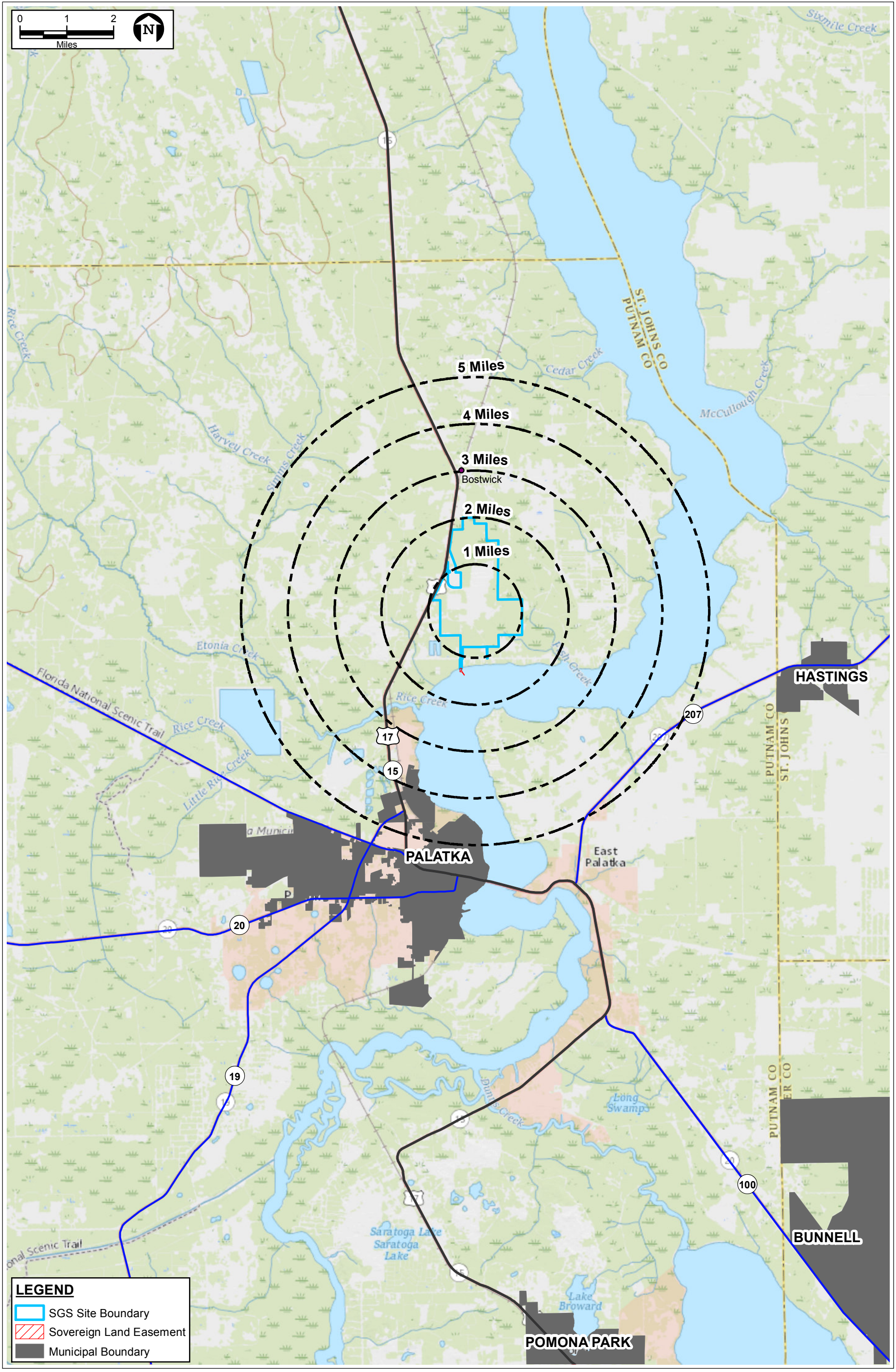


FIGURE 3.2.1-1.

GOVERNMENTAL JURISDICTIONS

Sources: Putnam Co PA, 2016; FDOT, 2016; USGS, 2016; ECT, 2017.

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The SGS site is within the Northeast Florida Regional Council (NEFRC) and the St. Johns River Water Management District (SJRWMD). As shown in Figure 3.2.1-2, the Putnam County-owned Tanglewylde Nature Park is located adjacent to the SGS site along the southern boundary. Opened in 2015, the park has an historical home (not open to the public), picnic facilities, restrooms, and wheelchair access. Other public lands located within 5 miles of the SCCF area are the Bostwick Community Center, two boat ramps, the John Theobold Sports Complex, the J. A. Ginn Jr. Parcel (approximately 71-acre resource-based management area owned and managed by SJRWMD), and the Edgefield Parcel (approximately 239 acres and part of the Deep Creek Conservation Area managed by SJRWMD). There are no regional, scenic, cultural, or natural landmarks within 5 miles of the proposed SCCF (see Section 3.2.5).

3.2.2 Comprehensive Plan and Land Development Code

On September 6, 2016, SECI submitted applications to Putnam County requesting to designate the entire SGS property Public Facilities (PF) on the future land use map (FLUM), redesignate all SGS properties to the Planned Unit Development (PUD) district, and amend the existing PUD to allow for construction and operation of the SCCF on the SGS site. Putnam County approved the requested changes, entering into a Development Agreement with SECI, on March 14, 2017. With the adoption of these changes, the SCCF is consistent with existing land use plans and zoning ordinances as contemplated in Section 403.50665(1), F.S.

The previous and current land use designations and zoning for the SGS site are described in the following subsections based on applicable sections of the Putnam County Comprehensive Plan and LDC.

3.2.2.1 Comprehensive Plan Future Land Use Map

SECI requested and received approval of an amendment to change the FLUM designation for the entire SGS site to PF (Figure 3.2.2-1). Under the Putnam County Comprehensive Plan, heavy infrastructure facilities, such as power generating plants, are identified as community facilities and services Type 4. The PF land use designation allows community facilities and services Types 1, 2, 3, and 4. The approved PF land use designation incorporates all of the SGS facilities and SECI property ownership into one land use category that allows power generation, which is consistent with construction and operation of the SCCF.

Appendix 10.5 provides copies of applicable portions of the Putnam County Comprehensive Plan.



FIGURE 3.2.1-2.

PUBLIC LANDS IN VICINITY OF SCCF AREA

Sources: SJRWMD, 2016; Putnam Co, 2016; FDEP, 2016; OpenStreetsMap, 2016; ECT, 2017.

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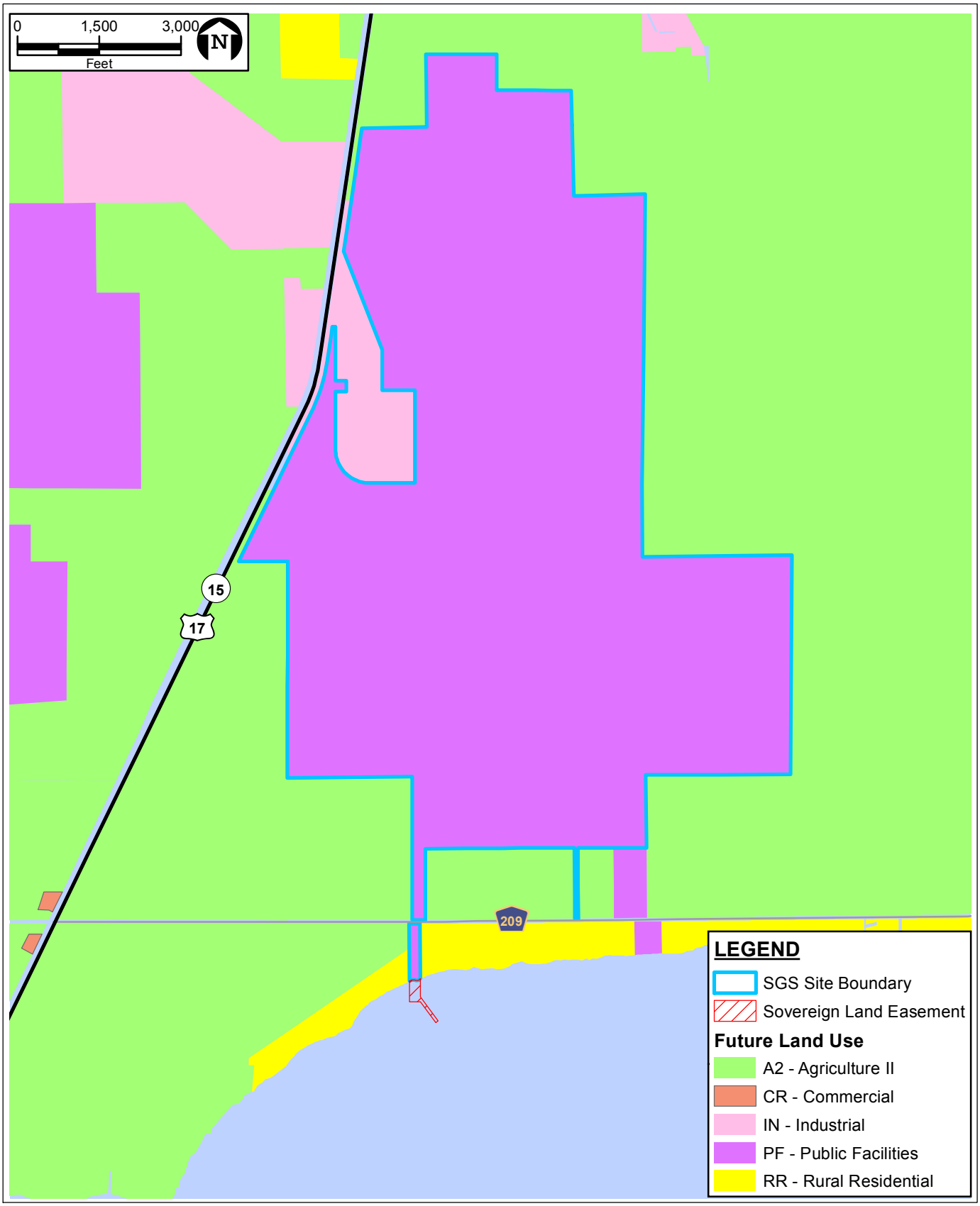


FIGURE 3.2.2-1.
CURRENT FUTURE LAND USE

Sources: Putnam Co PA, 2016; FDOT, 2016; ECT, 2017.

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3.2.2.2 Zoning

The Putnam County Board of County Commissioners (BOCC) approved the rezoning of parcels within Putnam County to PUD in anticipation of certification of SGS Units 1 and 2 in 1978. The BOCC amended the SGS PUD in 2006 to allow construction of a new coal-fired unit. Ultimately, that unit was not constructed. In 2017, the BOCC amended the SGS PUD to bring all SGS property within the existing SGS PUD and allow construction of the SCCF, adopting Ordinance No. 2017-6 (March 14, 2017) (see Figure 3.2.2-2).

SECI and Putnam County entered into a Development Agreement on March 17, 2017. In that Development Agreement, the County agreed that "[a]doption of an ordinance by the BOCC, approving the proposed amendment to the Seminole Generating Station PUD, serves as confirmation by the County that the proposed Site, for the purpose of adding potential combined cycle natural gas-fired generation and its accessory and associated facilities, is consistent and in compliance with existing land use plans and zoning ordinances of the County as required under the PPSA." The information presented in this SCA demonstrates consistency with the Development Agreement.

Appendix 10.3 provides copies of the applicable portions of the LDC, as well as the SGS PUD Ordinance and Development Agreement.

3.2.3 Demography and Ongoing Land Use

3.2.3.1 Demography and Existing Population

The University of Florida Bureau of Economic and Business Research (BEBR) estimates the 2017 population of Putnam County as 73,176 and that of Palatka as 10,662. Table 3.2.3-1 provides population trends for Putnam County, Palatka, and the state of Florida based on U.S. Census counts and BEBR estimates.

Table 3.2.3-1. Putnam County, Palatka, and Florida Population Trends

Area	Population 1990	Percent Change 1980 to 1990	Population 2000	Percent Change 1990 to 2000	Population 2010	Percent Change 2000 to 2010	Population 2017	Percent Change 2010 to 2017
Putnam County	65,070	28.7	70,423	8.2	74,364	5.6	73,176	-1.60
Palatka	10,944	7.6	10,033	-8.2	10,558	5.2	10,662	0.99
Florida	12,938,07 1	32.7	15,982,824	23.5	18,801,310	17.6	20,484,142	8.95

Source: BEBR, U.S. Census data.

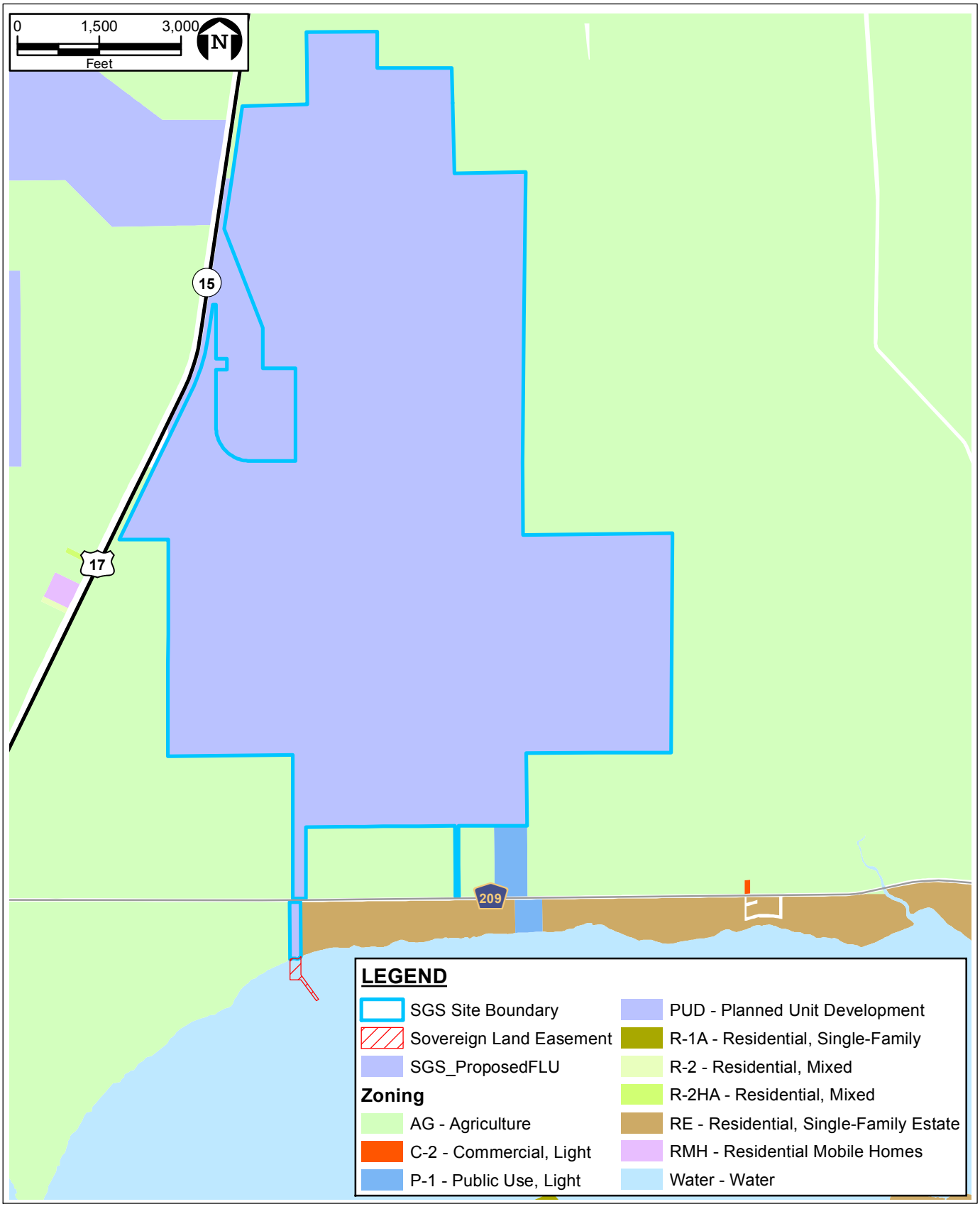


FIGURE 3.2.2-2.
CURRENT ZONING

Sources: Putnam Co PA, 2016; FDOT, 2016; ECT, 2017.

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The population has been growing in Putnam County at a rate lower than that for the state from 1990 until 2017. The 1990 population of Palatka was its peak. Approximately 86.7 percent of the growth in population from 2010 to 2015 occurred in the unincorporated county. However, this trend changed in the 2010 to 2017 period with Palatka gaining population while the overall county population declined. In 2010, Putnam County was the 37th most populous of the 67 counties in Florida, and it ranked 37th in density.

Table 3.2.3-2 provides median projections of the population for Putnam County and Florida prepared by the University of Florida Bureau of Economic and Business Research (BEBR).

Table 3.2.3-2. Median Projections of Population

Area	Population 2017	Population 2020	Population Change (percent) 2017 to 2020	Population 2030	Population Change (percent) 2020 to 2030	Population 2040
Putnam County	73,176	73,097	-0.1	73,972	1.4	74,558
Florida	20,484,142	21,438,743	4.7	24,244,326	12.6	26,426,375

Sources: BEBR Population Studies Program.
U.S. Census.

It is anticipated that Putnam County will experience a much lower growth rate than that of the state as a whole through 2040.

3.2.3.2 Existing Land Use

Figure 3.2.3-1 shows existing land use and land cover based on Level II categories of the Florida Land Use, Cover, and Forms Classification System (FLUCFCS) for the SGS Site and within a 5-mile radius of the SCCF area.

The specific location for the proposed SCCF is primarily undeveloped and wooded. The northern portion, to be used for craft construction personnel parking, is vacant and cleared. There are no structures on the proposed SCCF area. Existing SGS Units 1 and 2 and associated facilities are located to the north and northwest. Undeveloped land and the existing hyperbolic cooling towers are located to the east. A recreation area and undeveloped, wooded land is located to the south.

The only areas of residential development found within a 2-mile radius of the SCCF area are located along CR 209 and US 17 to the southeast, south, southwest, west, and northwest. Nonresidential development is

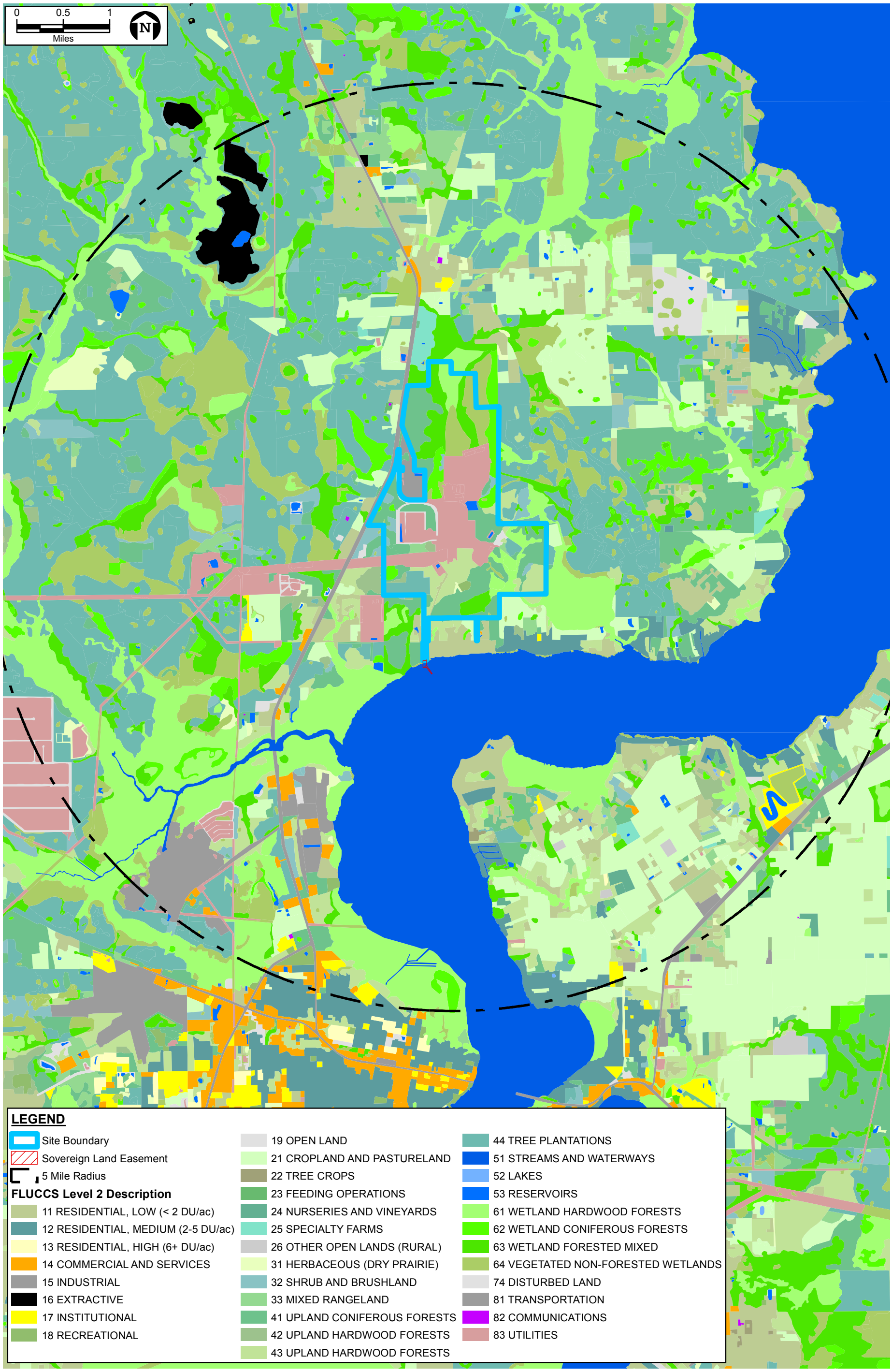


FIGURE 3.2.3-1

EXISTING LAND USE WITHIN 5 MILES OF SCCF SITE

Sources: SJRWMD, 2016; Putnam Co PA, 2016; ECT, 2017.

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located at the intersection of CR 209 and US 17 and north of the SGS facility associated with the Continental Building Products wallboard facility.

The SCCF is compatible with, and a logical expansion of, existing electrical power generating facilities at SGS. The proposed Project is likewise compatible with surrounding land uses coexisting with the electrical generating and associated facilities on the SGS site for over 30 years.

3.2.4 Leases, Easements, Title, Agency Works

The SCCF will be constructed on property owned by SECI and will utilize the existing SGS water intake and discharge facilities, which are located within an existing sovereign land easement from the state of Florida in the St. Johns River. No additional leases, easements, titles, or rights-of-way will be required for the proposed power plant. The Project will not require the use of any other state-owned lands. SECI is not seeking to use, connect to, or cross over any works or properties of any agencies for the Project.

3.2.5 Regional Scenic, Cultural, and Natural Landmarks

There are no regionally significant scenic, cultural, or natural landmarks on or adjacent to the SGS site. The NEFRC Strategic Regional Policy Plan does not identify any regionally significant natural resources on the SGS site. The St. Johns River is identified as a regionally significant blueway to the south of the SGS site.

The following areas are *not* found within a 5-mile radius of the SGS site:

- National parks
- National forests
- National seashores
- National wildlife refuges
- National wilderness areas
- National memorials or monuments
- National marine and estuarine sanctuaries
- National/Florida wild and scenic rivers
- Military lands
- Aquatic preserves
- Florida Springs
- State marine sanctuaries
- State archaeological landmarks or landmark zones
- State wildlife refuges
- State wilderness areas
- Save Our Rivers lands
- State conservation and recreation lands
- State parks
- State forests
- Areas of critical state concern
- Critical habitat of endangered species
- Native American reservations

Figure 3.2.1-2 shows the public lands within 5 miles of the SGS site.

3.2.6 Archaeological and Historical Sites

A cultural resource assessment survey (CRAS) of the SCCF area for the proposed Project within the SGS site was conducted in December 2016 by Janus Research. The objective of the survey was to identify cultural resources within the area to be disturbed by the Project and assess their eligibility for listing in the National Register of Historic Places (NRHP) according to the criteria set forth in Title 36, Part 60.4, Code of Federal Regulations (CFR). The CRAS was conducted in compliance with Chapter 267, F.S.; Chapter 1A-46 (Archaeological and Historical Report Standards and Guidelines), F.A.C.; as well as the standards embodied in the Florida Division of Historic Resources' (FDHR's) Cultural Resource Management Standards and Operational Manual (2003). The principal investigator meets the Secretary of the Interior's professional qualification standards (Volume 48, Page 44716, Federal Register [FR]).

A portion of the Project area is within the boundaries of a reconnaissance survey conducted by Janus Research in 2006. No archaeological sites were identified, and FDHR concurred with the results (see Appendix 10.7.1). Therefore, the December 2016 CRAS focused on those areas to be disturbed by the SCCF that are outside the boundaries of the 2006 reconnaissance survey.

A desktop analysis was conducted to identify previously recorded resources within the Project area and to determine the potential for unrecorded historical resources and archaeological sites. No previously recorded resources were identified, and the review of Putnam County property appraiser data and modern aerials identified no previously recorded historical resources or parcels with potential unrecorded historical structures. A pedestrian survey and subsurface archaeological testing was conducted using standard testing and recording methods.

A total of 28 shovel tests were excavated in the Project area, and three pre-Columbian artifacts were found in two of the tests. The artifacts include three flakes that measure between 1 and 2 millimeters in size, which are temporally and culturally nondiagnostic. Based on the FDHR's guidelines, they were documented as archaeological occurrences, which do not yield valuable information and are not considered NRHP-eligible. No historical resources were identified in the Project area.

The results of the survey were documented in a report submitted to FDHR. FDHR concurred that the Project "will have no effect on cultural resources listed, or eligible for listing in the NRHP, or otherwise of

archaeological, historical, or architectural significance within the survey area." Copies of the Janus Report and FDHR concurrence letter are included in Appendix 10.7.1.

3.2.7 Social and Economic Characteristics and Public Services

3.2.7.1 Social and Economic Characteristics

Employment and Income

The Florida Statistical Abstract (BEBR, online) and U.S. Bureau of Census provide employment and economic information at the county level. According to U.S. Census data, Putnam County had an estimated civilian labor force of 28,972 in October 2016. The unemployment rate at that time was 6 percent. The unemployment rate peaked in July 2010 at 14 percent. The statewide unemployment rate in October 2016 was 4.9 percent. The total number of Putnam County jobs was 22,892 in 2015, the most recent date BEBR data is available, indicating the County exports workers to surrounding counties. Major industries in terms of employment in Putnam County in 2015 were as follows:

Industry	Number of Persons Employed	Average Weekly Wages
Health care	2,383	$811
Retail trade	2,654	$629
Manufacturing	1,548	$1,218
Accommodation and food services	1,398	$287
Construction	719	$632
Utilities	376	$646

Per capita personal income in Putnam County in 2015 was $23,485 compared to the Florida per capita figure of $36,609. The median household income was $31,715 in 2015 in Putnam County and $47,507 in Florida. In 2015, 27.3 percent of Putnam County residents were in poverty compared to 15.8 percent of all Floridians.

The relationship between revenue and expenditure per capita is an indicator of the cost of providing services and the economic stability of a local government. For 2014-2015, Putnam County reported $1,502.77 per capita for expenditures, compared to $1,549.91 per capita income from revenues, equating to a surplus of $47.14 per capita. The comparable amounts for Florida for 2014-2015 are $1,990.97 (expenditures), $2,071.54 (revenue), and $80.67 (surplus).

Housing

The U.S. Bureau of the Census indicates that there were 36,528 housing units in Putnam County in 2015. Of the housing units in 2015, 69.6 percent were owner-occupied, and 22.9 percent were identified as vacant.

Using the U.S. Bureau of the Census 2000 housing units by tenure percentage, approximately 4,098 vacant housing units are likely in seasonal, recreational, or occasional use, leaving 7,372 full-time vacant housing units. In 2010-2015, the persons-per-household multiplier was 2.57. In 2011, the most recent data available, there were 61 total licensed lodgings with 2,097 units. Countywide building permit activity for 2015 was 15 single-family units and no multifamily units. For the fiscal year 2009-2010, again the most recent data available, there were 1,464 mobile home tags sold in Putnam County. The median value of owner-occupied housing in Putnam County in 2015 was $82,300, compared to the statewide median value of $179,800.

3.2.7.2 Area Public Service and Utilities

Transportation Facilities

The only transportation facilities required to serve the SCCF during construction and operation will be the existing roadway system. The existing rail line located on the SGS site will also be used during construction. No public or private airport facilities are located within a 5-mile radius of the SCCF area. The Palatka-Kay Larkin Airport is located approximately 5.25 miles to the southwest of the SCCF area.

The only major roadway within a 5-mile radius of the SGS site is US 17. Other roadways in the area are State Roads (SR) 19, 20, and 207 and CR 209. Figure 3.2.1-1 illustrates the regional roadway transportation facilities. The main access road to the site is from US 17; with a secondary access road from CR 209. The adopted levels of service for U.S. 17 and CR 209 are C and D, respectively (Putnam County Comprehensive Plan, Transportation Element, amended October 26, 2010).

Educational Facilities

According to the Putnam County School Board website, there are 10 elementary, 5 middle, and 5 high schools in the County. The estimated school population for the 2016-2017 school year is 11,622. The nearest schools to the SGS site are located in the city of Palatka. There are 5 elementary, 3 middle, 2 high schools, and 1 school with grades preschool through 12 located in Palatka. According to recent communication with the Putnam County School District (October 2017), all schools in the District have sufficient capacity with only 3 schools close to capacity.

Medical Facilities

Putnam County has 99 general hospital beds, which equals 137 beds per 100,000/person based on the County population (2014). The nearest hospital to the SGS site is Putnam Community Medical Center located on SR 20 in Palatka, approximately 7 miles to the southwest. The Putnam Community Medical Center is a private, for-profit, acute care hospital facility with 99 beds. The medical center has 24-hour

emergency room services. The emergency medical services facilities that would respond to the SGS site are located in Palatka at 130 Orie Griffin Road, approximately 3 miles from the site. The closest public, not-for-profit hospital is Flagler Hospital located in St. Augustine, approximately 35 miles to the east-northeast. This 335-bed facility has 24-hour emergency room service.

The nearest trauma centers are located in Alachua (UF Health Shands Gainesville), Volusia (Halifax Medical Center), Marion (Ocala Regional Medical Center), and Duval (UF Health Shands Jacksonville) counties, all located within an approximate 45-mile radius of the SGS site.

Fire Protection

The City of Palatka operates the only full-time fire department in Putnam County. This facility is located approximately 5 miles south of the SGS site. The residents of unincorporated Putnam County are served by 18 volunteer fire departments, the closest of which is located in Bostwick, approximately 3 miles north of the SGS site. Approximately 421 volunteers serve at least one of the fire stations. The Bostwick station has a fire engine, a brush truck, and a tanker (personal communication, 2016).

The existing SGS facilities have an onsite fire protection system consisting of storage tanks, an emergency fire water pump, and hydrants strategically located throughout the facilities. The SCCF will be equipped with similar fire protection equipment as well as fire suppression systems within the CTG and STG enclosures.

Police Protection

Unincorporated Putnam County is served by the Putnam County Sheriff's Department. The SGS site is located in the Central Patrol District. Deputies patrolling this area are based out of an office located at 120 Orie Griffin Road in Palatka, approximately 3 miles from the site. Twelve deputies are assigned to four sergeants in this district. Responses are prioritized according to urgency, with an average estimated response time of 10 to 15 minutes for a routine response, with a considerably shorter time expected for high-priority emergencies. The nearest incorporated municipality, the city of Palatka, has a police department with 35 sworn officers.

The existing SGS facilities have controlled access gates with security personnel at the main access on US 17. The SCCF will have controlled security access gates during construction and operation.

Potable Water, Sanitary Sewer, Electricity, Gas, and Solid Waste

The SGS site is located in unincorporated Putnam County, an area not provided with public potable water supply or sanitary sewer service. SECI will be its own provider for most utilities required by the SCCF and its employees. Potable water and sanitary sewage treatment/disposal services will be provided by onsite facilities appropriately designed to meet these expected service demands.

Potable water will be supplied from a new onsite well. Sanitary wastewater will be disposed in a new onsite package sanitary wastewater treatment facility. Solid wastes from the treatment system will be transported offsite for disposal at an appropriately permitted facility. The only public landfill in the County is the Putnam County Central Landfill. This Class I landfill is located at 140 County Landfill Road, approximately 2 miles west of the SGS site. According to the Putnam County Comprehensive Plan Solid Waste Sub-element, there is adequate landfilling capacity at the landfill through the planning period of 2025. Electricity is provided to the SGS site by Clay Electric Cooperative, Inc. Natural gas will be delivered to the SGS site via a new pipeline lateral from the FGT pipeline system.

Recreation and Open Space

The nearest public land to the SGS site is the Putnam County Tanglewylde Park located adjacent to the southern SGS property boundary and approximately 2,500 feet to the southwest of the nearest improvement associated with the SCCF. The closest land designated as Conservation on the FLUM is located south of Rice Creek approximately 2.2 miles southwest of the SGS site. The nearest recreational facility to the SGS site is Bostwick Community Park, one of 18 parks within the County. The park, located approximately three miles to the north, has a softball field, a basketball court and a playground. The nearest public boat ramp is located across the St. Johns River in East Palatka.

3.3 Physical and Biological Environment

3.3.1 Geology and Hydrology

The information presented in this section draws upon previous information submitted in the SGS Units 1 and 2 SCA and Environmental Analysis, March 1979, and the SGS Unit 3 SCA, March 2006. This section provides a general geological description of the site and adjacent area. The general geology of Putnam County is presented in the Soil Survey of Putnam County Area, Florida (U.S. Department of Agriculture [USDA] Soil Conservation Service [SCS], 1990). Site-specific subsurface information for the SCCF area was obtained from a report entitled Final Report of Geotechnical Exploration Seminole Electric – Combined-Cycle Study, prepared by Ellis & Associates, Inc. (Ellis), and dated August 19, 2016 (see Appendix 10.7.2).

3.3.1.1 Geological Description of the Site and Area

Several geomorphic features are recognized in Putnam County. The highland parts of the county include the Northern Highlands, Duval Upland, Crescent City Ridge, and relatively isolated features including the Teasdale, Palatka, San Mateo, and Welaka hills. The Marion Uplands and Mount Dora Ridge occur in a small section of southwestern Putnam County (Figure 3.3.1-1).

The lower-lying regions of Putnam County line in the Central Valley, St. Johns River Offset, and Eastern Valley. The Florahome Valley, which is near the edge of the Northern Highlands, is a unique and interesting geomorphic feature. This valley is a flat-floored basin surrounded by higher hills. Some believe the Florahome Valley was a large depression that resulted from the dissolution of the underlying limestone of the Eocene age.

Putnam County is underlain by sedimentary rocks with an average thickness of nearly 4,000′ that range in age from the early Paleozoic era to the Recent. The sediments of the Cenozoic era consist of carbonate sediments, mostly dolomite and limestone, which are dominant in the Paleogene section, and clastic sediments, mostly sand and clay, which are dominant in the Neogene section (Figure 3.3.1-2). The strata of the Cenozoic era are nearly 1,800′ thick in this area. The oldest Cenozoic era sediments in this area belong to the Cedar Keys Formation of Paleocene age. This formation consists of soft to hard, fossiliferous limestone and dolomite with variable percentages of anhydrite and gypsum. The Cedar Keys Formation is approximately 500′ thick. The top of the formation is approximately of 1,500′ to 1,700′ below sea level. This formation does not contain potable water.

Overlying the Cedar Keys Limestone is the Oldsmar Limestone of Early Eocene age. The Oldsmar Limestone consists of soft to hard, fossiliferous limestone and dolomite with minor amounts of evaporites (anhydrite and gypsum). It is separated from the Cedar Keys Limestone by color change and by its included fossil content. The Oldsmar Limestone ranges from 400′ to 500′ in thickness. The top of the unit is between depths of 1,000′ and 1,200′ below sea level. The Oldsmar Limestone also does not contain potable water.

The Middle Eocene age carbonates of northern Florida are referred to as the Avon Park Limestone. This unit consists of beds of soft to hard, variably fossiliferous, white to brown carbonates of limestone and dolomite. Grain size ranges from sand size to clay size. Some beds are porous and permeable, while others are impermeable. These sediments range from 450′ to 740′ in thickness. The top of the Avon Park Limestone generally is 250′ to 300′ below sea level in this area. This formation forms the lower part of the Floridan aquifer and supplies potable water to wells drilled into it.

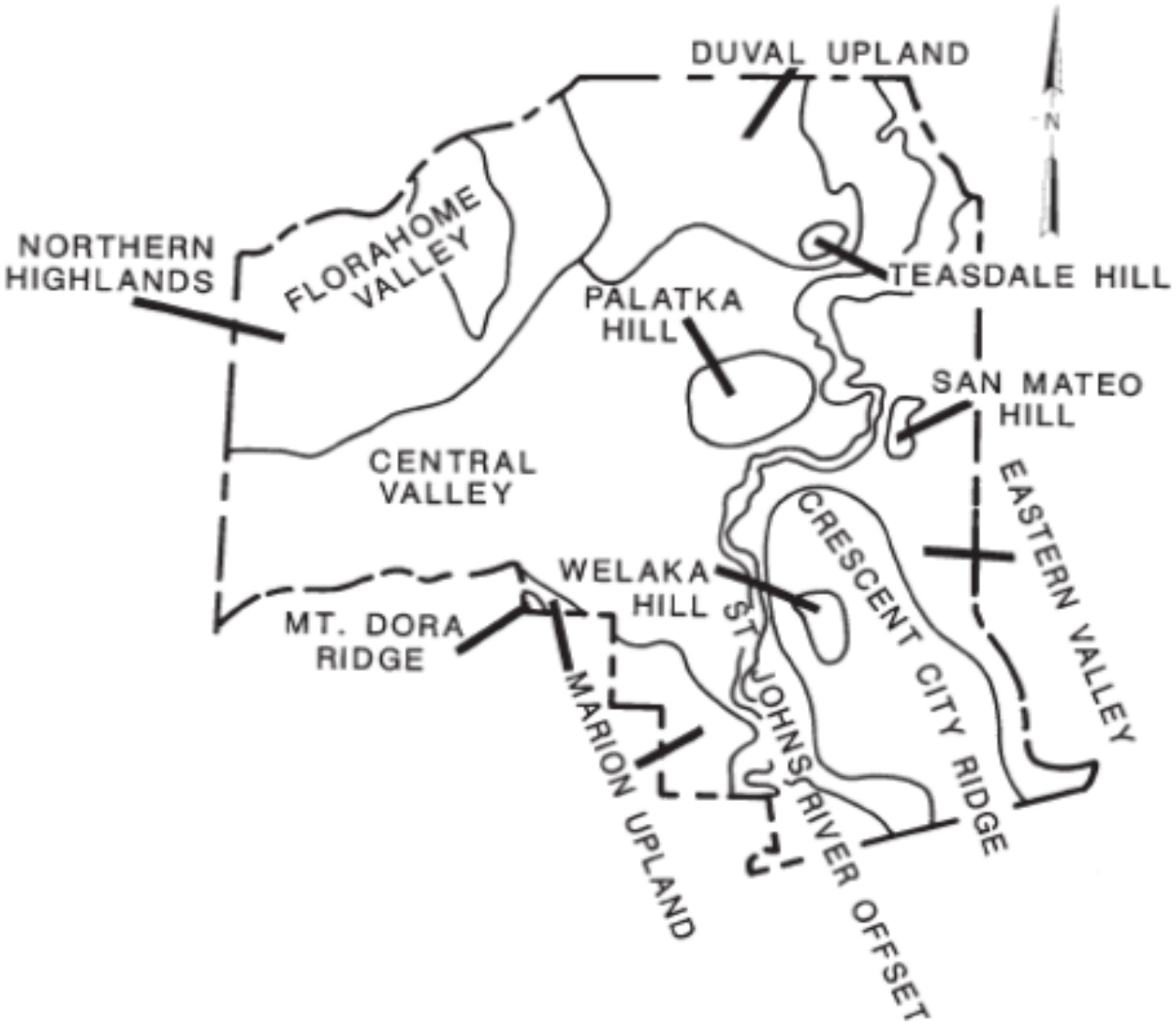


FIGURE 3.3.1-1.

GEOLOGIC FEATURES OF PUTNAM COUNTY

Source: USDA Putnam County Soil Survey, 1990.

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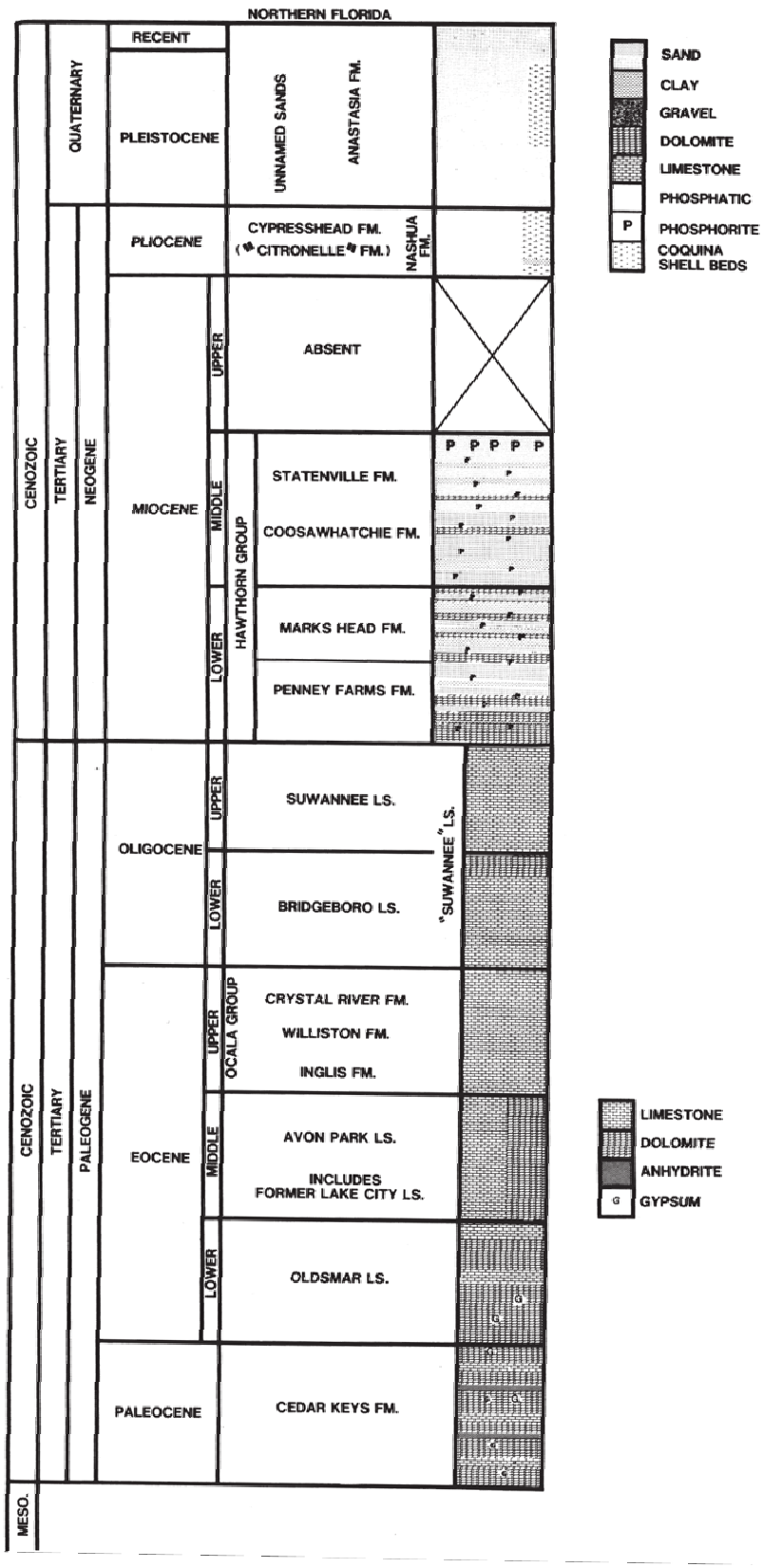


FIGURE 3.3.1-2.

CENOZOIC STRATIGRAPHIC COLUMN

Source: USDA Putnam County Soil Survey, 1990.

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The Late Eocene age Ocala Group limestones are underlain by the Avon Park Limestone in the Putnam County area. In ascending order, the Ocala Group consists of the Inglis, Williston, and Crystal River formations. The group is composed of white to buff limestones that are generally fossiliferous, poorly indurated, and granular. The limestones range from fine to coarse. Dolomite is not common in the Ocala Group.

The formations of the Paleocene section generally are considered to be unconformably related to each other; that is, the top of each unit has been subjected to erosion or nondeposition for some time before the overlying unit was deposited. These missing intervals may span millions of years. In these sediments, however, it is often difficult to recognize the unconformity because of the similar nature of the sediments on either side of the unconformity. The unconformity, however, at the top of the Ocala Group is easily recognized. The sandy, phosphatic dolomites of the basal Miocene age contrast markedly with the fossiliferous limestones of the Late Eocene age. The unconformity also represents the longest span of time of an unconformity encountered in this area. The amount of time missing from the sedimentary record may span as much as 15 million years, from the middle part of the Late Eocene age section to the base of the Miocene age section. The Oligocene age section is completely absent in the northeastern part of Florida.

Overlying the unconformity on the top of the Ocala Group are the sediments of the Miocene Hawthorn Group. The Hawthorn Group is characterized as a complex lithologic sequence of interbedded carbonates, generally dolomite, and clastics of quartz sands and clays. The Hawthorn Group is composed of, in ascending order, the Penney Farms, Marks Head, and Coosawhatchie formations.

The Early Miocene age Penney Farms Formation consists of quartz, sandy, phosphatic dolomites interbedded with dolomitic, clayey, phosphatic quartz sands and clays. Dolomite is most abundant in the lower part of the formation. The Penney Farms Formation is present over the entire County, ranging in thickness from a few feet to 50′. The top ranges from 25′ to 200′ below sea level.

The Early Miocene age Marks Head Formation is a complex, interbedded sequence of dolomites, clays, and quartz sands. Lithologically, the sediments range from quartz sandy, phosphatic dolomites to quartz sandy, dolomitic, phosphatic clays and clayey, dolomitic, phosphatic quartz sands. Because of erosion, this unit is absent in southeastern Putnam County. It ranges up to 75′ in thickness in other parts of the county. The top of the Marks Head Formation is between 50′ above mean sea level (ft-msl) and 100′ below mean sea level.

The Middle Miocene age Coosawhatchie Formation, the uppermost formation of the Hawthorn Group, consists of quartz sandy, clayey, phosphatic dolomites and dolomitic, clayey, phosphatic quartz sands with some clay beds, particularly near the base of the unit. Because of erosion, this formation is absent in the southeastern part of the County. It attains a maximum thickness of 50′ in other parts of the County. The top of the Coosawhatchie Formation ranges from 75 ft-msl to 74′ below mean sea level.

Sediments of the Hawthorn Group typically provide little water to wells. The Hawthorn Group typically is considered as the aquiclude or aquitard, sealing the underlying Floridan aquifer. The sediments overlying the Hawthorn Group have often been discussed as post-Hawthorn Undifferentiated because of the difficulties in identifying the individual formations. No sediments of known Late Miocene age have been recognized. However, zones of reworked Hawthorn Group sediments may represent the Late Miocene age.

Shelly sands and clays overlie the Hawthorn Group in eastern Putnam County. These sediments have been called the Nashua Formation of Pliocene age. The Nashua Formation consists of quartz sands with variable percentages of clay and carbonate in the matrix and common to abundant mollusk shells. The sediment is generally clayey and often is predominantly a clay with quartz sand and mollusk shells. The areal extent and thickness of this unit is not currently known.

In the western part of Putnam County, sands are underlain by the Hawthorn Group. These sands have been called Citronelle Formation and Cypresshead Formation. These sediments are thought to be the nonmarine to near-shore equivalent of the Nashua Formation. The sands are typically slightly clayey (kaolin), silty, poorly sorted, poorly indurated quartz sands. These formations range up to 130′ in thickness and are thin toward the west.

The Pleistocene age and recent deposits in the Putnam County area have not been accurately delineated or named. They consist of quartz sand, clay, and shell material. The thickness of these sediments is not accurately known.

3.3.1.2 Detailed Site Lithologic Description

Ellis performed a geotechnical field exploration between May 6 and 26, 2016. Figure 3.3.1-3 presents the field exploration plan. The area topography is provided in 5′ contours on Figure 3.3.1-4. Ellis conducted 15 standard penetration tests drilled to depths of approximately 90′ to 100′ below the existing ground surface, in general accordance with the methodology outlined in American Society for Testing and Materials (ASTM) Practice D 1586 to explore the subsurface conditions within the area of the proposed

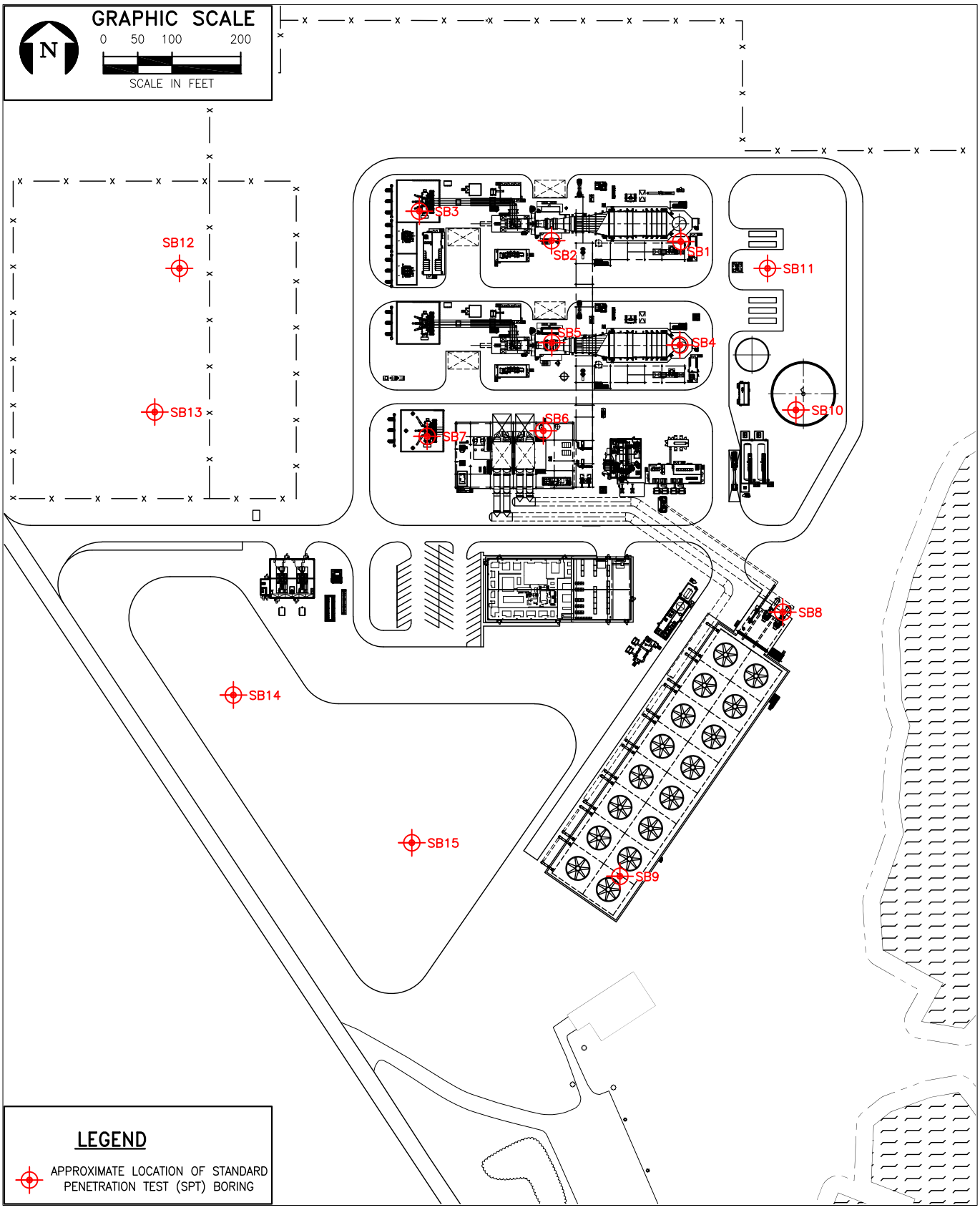


FIGURE 3.3.1-3.

FIELD EXPLORATION PLAN

Sources: Ellis & Associates Inc., 2016; ECT, 2017.

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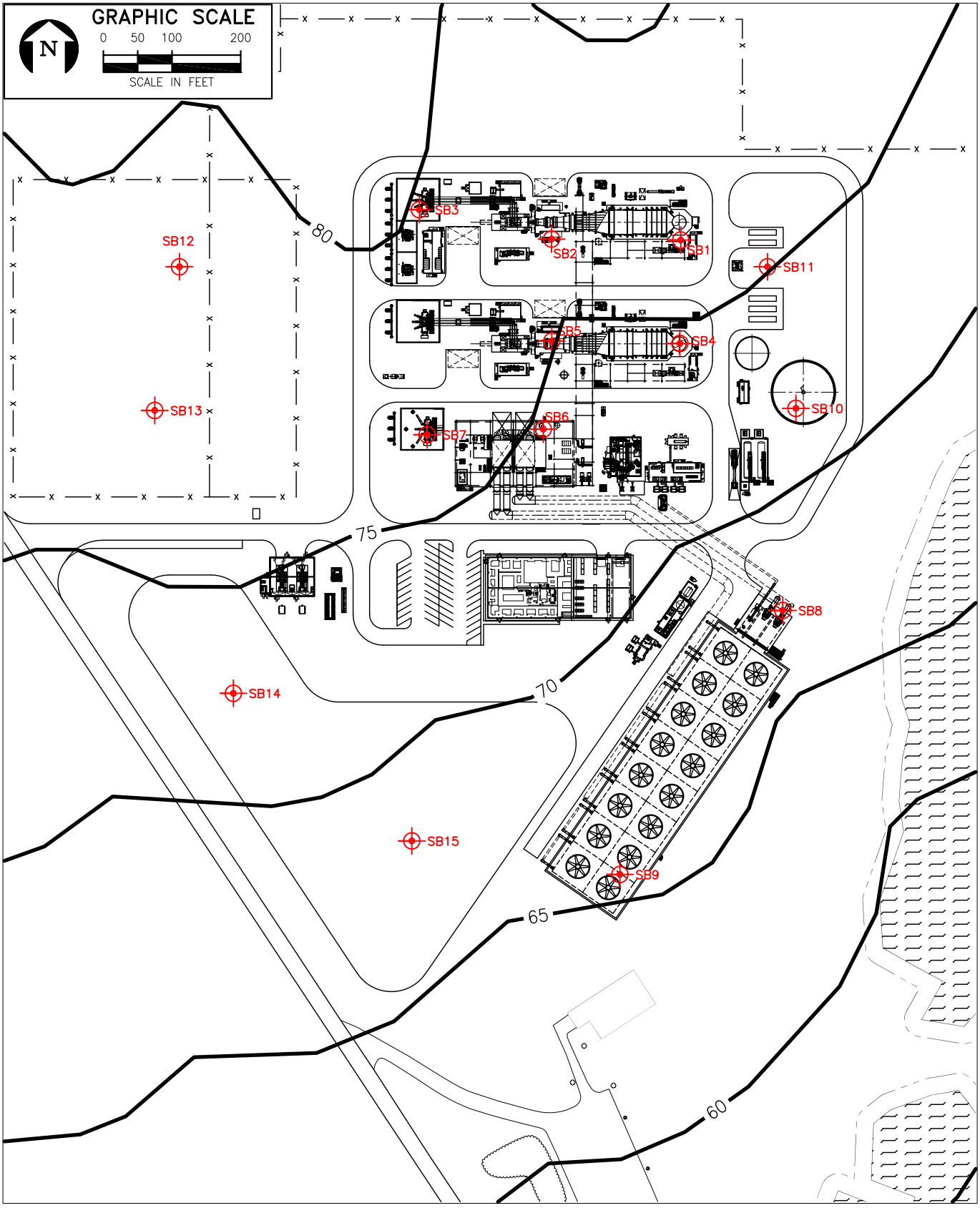


FIGURE 3.3.1-4.

DETAILED TOPOGRAPHY

Sources: Ellis & Associates Inc., 2016; ECT, 2017.

Seminole Electric COOPERATIVE, INC.

SCCF plant structures and pond areas. Split-spoon soil samples recovered during performance of the borings were visually classified in the field, and representative portions of the samples were transported to the geotechnical laboratory for further evaluation.

In general, the borings encountered approximately very loose to very dense fine sand (SP), fine sand with silt (SP-SM), fine sand with clay (SP-SC), silty fine sand (SM), and clayey fine sand (SC) and very soft to firm clay (CH) to depths of approximately 87′ below the existing ground surface. The borings then encountered medium dense to very dense marl and weathered limestone (SC, SM, CH, and ML, Marl) to the boring termination depths of 90′ to 100′ below the existing ground surface. Groundwater was encountered in the borings at depths ranging from 7′ to 11.5′ below the existing ground surface. Figures 3.3.1-5 through 3.3.1-8 present subsurface profiles from each boring. The following provides a general soil profile:

Typical Depth (ft) From	To	Soil Description Topsoil	USCS*
Ground surface	0.5	Topsoil	
0.5	5.0	Very loose to loose fine sand, fine sand with silt, and fine sand with clay	(SP, SP-SM, and SP-SC)
5.0	32.0	Loose to dense fine sand, fine sand with silt, and fine sand with clay, silty fine sand, and clayey fine sand	(SP, SP-SM, SP-SC, SM, and SC)
32.0	47.0	Very soft to firm clay Very loose to dense fine sand, fine sand with silt, and fine sand with clay, silty fine sand, and clayey fine sand	(CH, SP, SP-SM, SP-SC, SM, and SC)
47.0	72.0	Loose to dense fine sand, fine sand with silt, and fine sand with clay, silty fine sand, and clayey fine sand	(SP, SP-SM, SP-SC, SM, and SC)
72.0	87.0	Very loose to very dense fine sand, fine sand with silt, and fine sand with clay, silty fine sand, clayey fine sand, and weathered limestone	(SP, SP-SM, SP-SC, SM, and SC)
87.0	90 to 100	Medium dense to very dense marl and weathered limestone	(SC, SM, CH, and ML, Marl)

*Unified Soil Classification System.

Ellis reported a loss of drilling fluid circulation was encountered at soil borings SB12 and SB13 between 72′ to 87′. Also noted were weight-of-rod and weight-of-hammer resistances encountered at these depths. This could indicate a void or soft soil condition within this zone. Casing was installed at these borings to 85′ below the existing ground, and drilling continued to the boring termination depths of 90′ and 100′ below the existing ground surface. Also, losses of drilling fluid circulation were noted at soil borings SB15 and SB9 at depths of approximately 95′ and 97′ below existing ground surface, respectively. The borings were terminated at this depth.

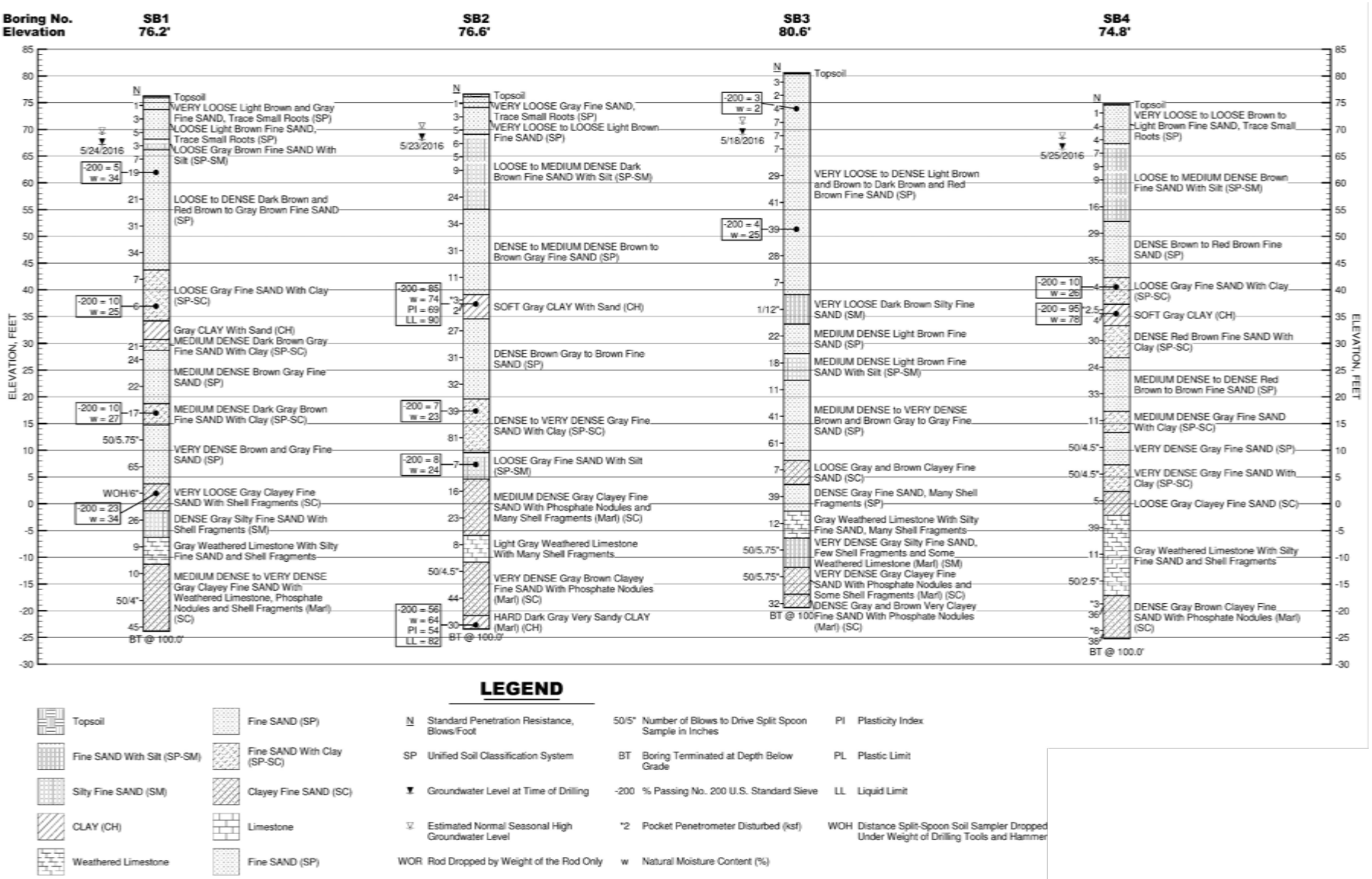


FIGURE 3.3.1-5.

GENERALIZED SUBSURFACE PROFILES
SB 1-4

Sources: Ellis & Associates Inc., 2016; ECT, 2017.

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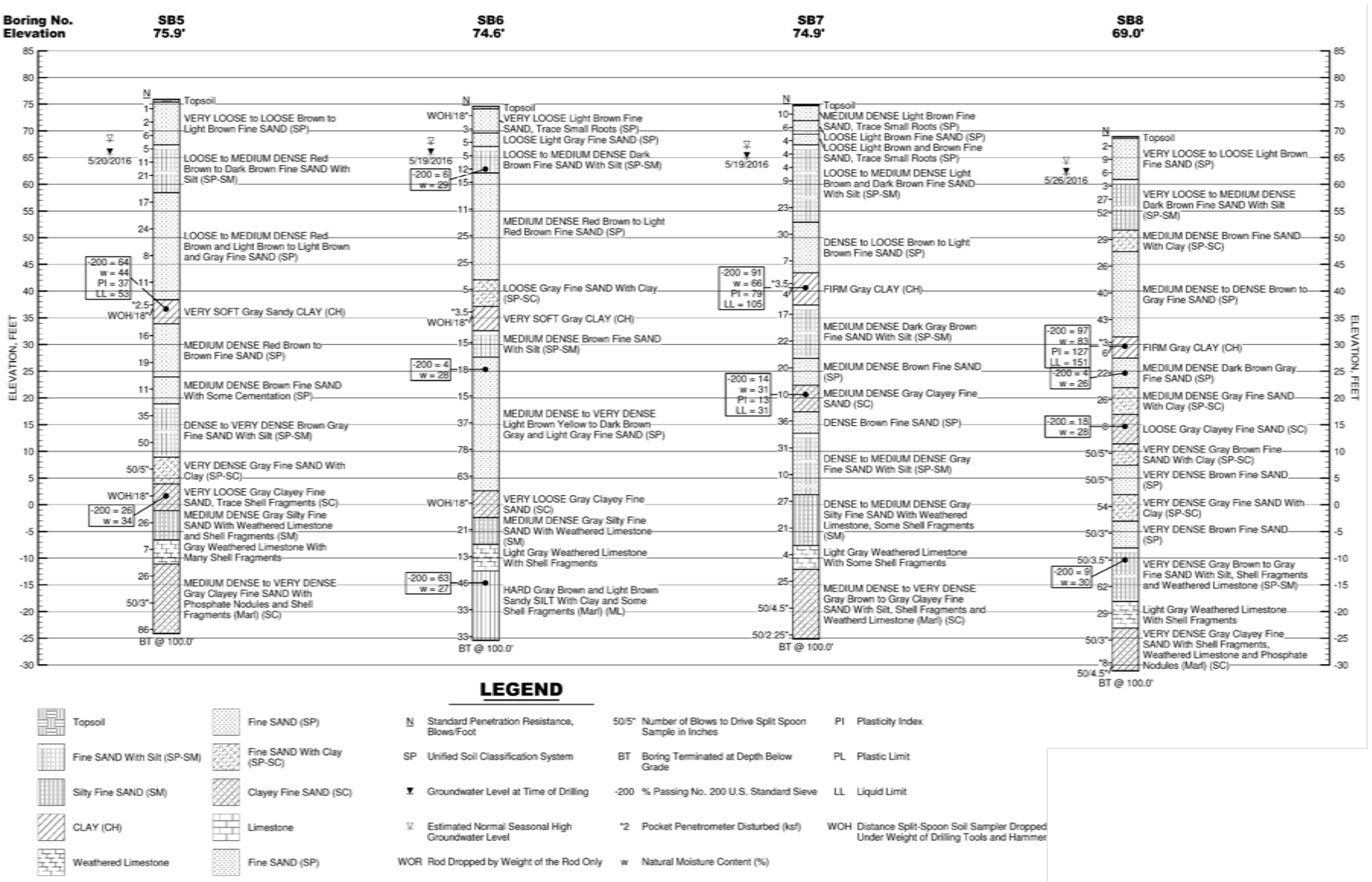


FIGURE 3.3.1-6.

GENERALIZED SUBSURFACE PROFILES
SB 5-8

Sources: Ellis & Associates Inc., 2016; ECT, 2017.

Seminole Electric COOPERATIVE, INC.

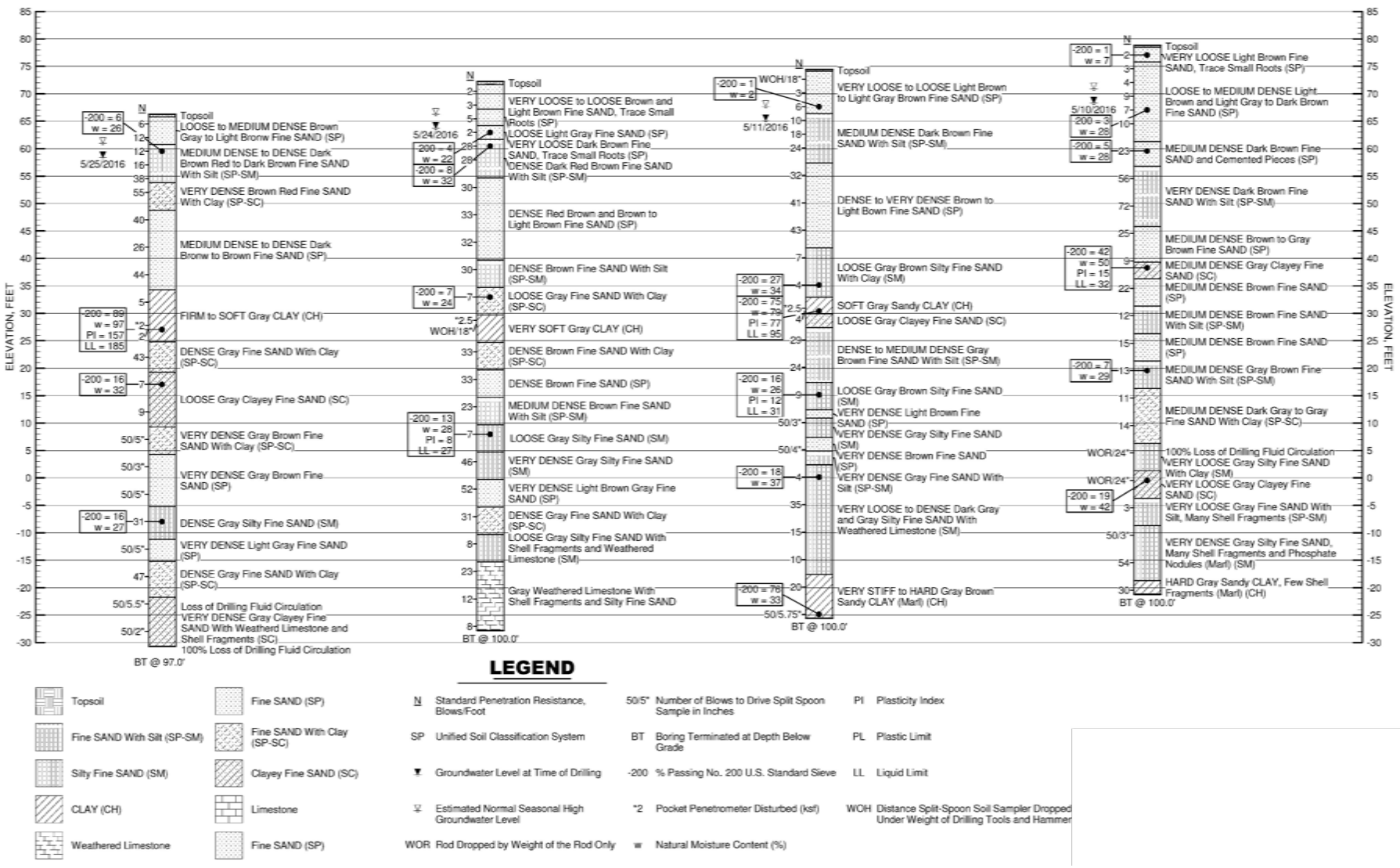


FIGURE 3.3.1-7.

GENERALIZED SUBSURFACE PROFILES
SB 9-12

Sources: Ellis & Associates Inc., 2016; ECT, 2017.

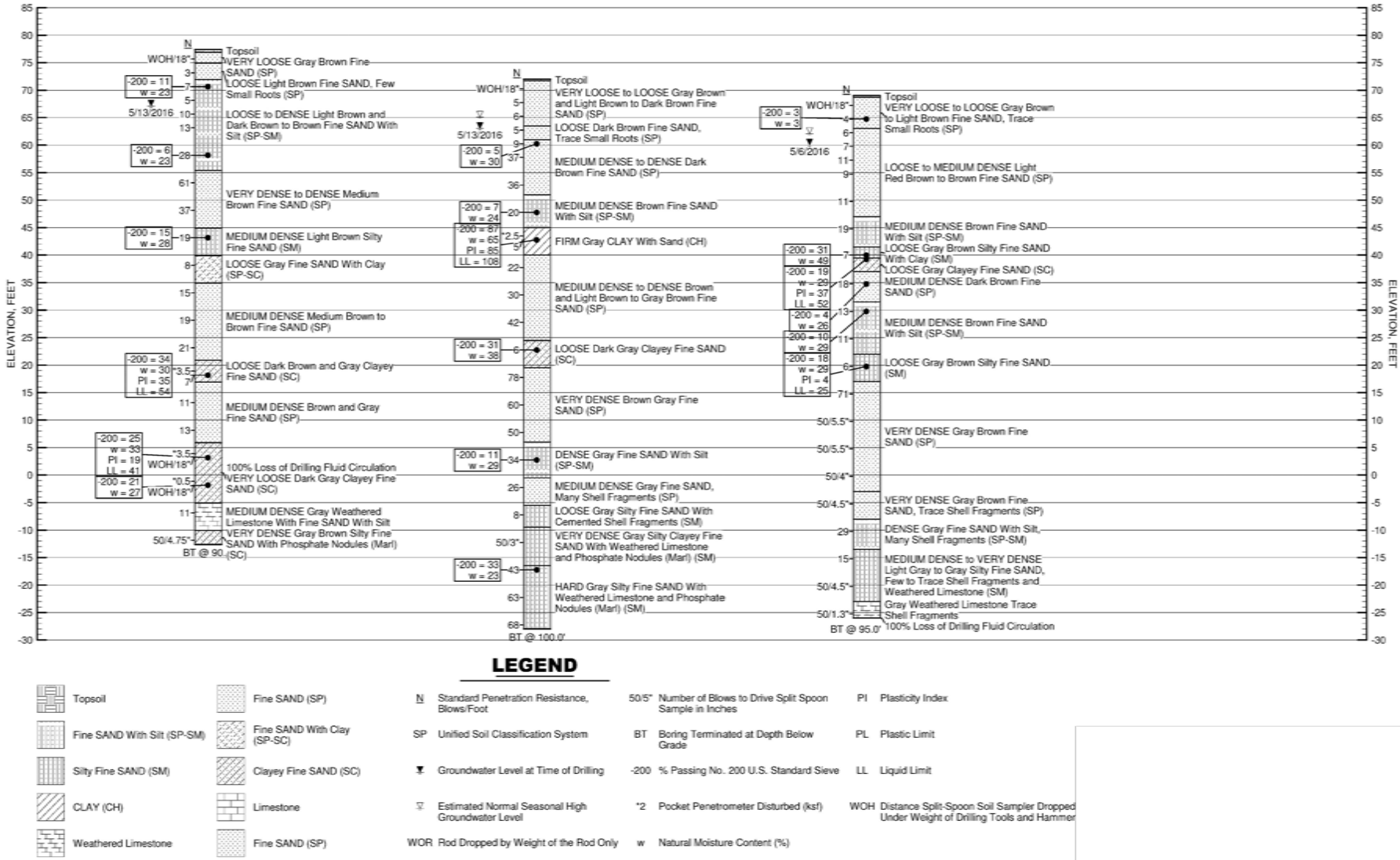


FIGURE 3.3.1-8.

GENERALIZED SUBSURFACE PROFILES
SB 13-15

Sources: Ellis & Associates Inc., 2016; ECT, 2017.

Selected samples of soils encountered during the field exploration were subjected to quantitative laboratory testing to better define the composition of the soils encountered and provide data for correlation to their anticipated strength and compressibility characteristics. Laboratory testing determined the Atterberg limits, hydrometer, gradation, percent fines, and moisture contents of selected soil samples. Laboratory testing results were provided in the Appendix B of their report, Summary of Laboratory Test Data (see Appendix 10.7.2). In addition, a one-dimension consolidation test was performed on an undisturbed Shelby tube clay sample collected at soil boring SB1.

3.3.1.3 Geologic Maps

Figure 3.3.1-1 presents a geologic map of Putnam County. The geologic base map of Putnam County, Florida, was developed using well cuttings, cores, natural and man-made exposures, and topographic maps. Geologic units identified include formal lithostratigraphic units and informal units.

The SGS site is located in the oldest stratigraphic unit mapped in Putnam County: the late Tertiary, Late Pliocene Cypresshead Formation. This formation consists of quartz sands ranging from fine to very coarse, moderately to well sorted, with common occurrences of quartz gravel. Clay is commonly present in minor amounts and is generally kaolinite. Mica often occurs in minor percentages, particularly in the finer grained sediments. Colors range from reddish-orange in exposed sections to olive grey in the subsurface. Occasionally, faint, poorly preserved mollusk molds can be seen in exposures. It unconformably overlies the Hawthorn Group and is overlain unconformably by the sands of Trail Ridge in western Clay County and thin surficial sands and soils elsewhere. The Cypresshead formation was deposited in a shallow, nearshore, marine setting.

The geological characterization of the SGS site was previously recorded for Seminole Plant Units 1 and 2 prepared by Dames & Moore dated August 4, 1978. Beneath surficial deposits, three broad geotechnically distinguishable and horizontally continuous layers were encountered. The geotechnical characteristics of these layers are described as follows:

- Layer 1—A clean fine to medium sand extending over most of the high ground of the site to a depth of approximately 40′ below surface. Based on typical standard penetration test ‘N’ values, this sand may be described for the most part as “medium dense” to “dense.” This sand layer constitutes an upper unconfined layer with an existing water table at approximately 8′ below land surface.
- Layer 2—An interbedded layer of silty and clayey sands and clean sands extending typically between approximately 40′ and 100′ below surface. This layer is distinguished from the clean

sands overlying it by its increasing content of fines and from the layer underlying it by that layer being more cohesive in makeup. The unit may be best described as "medium dense" to "dense." This layer was described as predominantly granular (nonplastic) materials with the exception of a clay lens at approximately 40′ to 45′ below surface as previously shown in Figures 3.3.1-5 through 3.3.1-8.

- Layer 3—The lowest overburden layer identified, extending from approximately 100′ below surface to the top of the limestone intersected at approximately 200′. This unit is characterized by interbedded layers containing an overall higher percentage of fines, a notable lack of clean sands, and significant thicknesses of cohesive materials. Materials within Layer 3 were described typically as hard sandy clays interbedded with lenses of clayey and silty sands, clayey silts, and occasionally with hard inorganic clays characterized as "very stiff" to "hard" for cohesive soils and "medium dense "to "dense" for granular soils. Layer 3 corresponds with the Miocene Hawthorn Formation. It constitutes the major confining layer or aquiclude to the underlying limestones which comprise the Floridan aquifer.

Site specific boring logs in the proposed SCCF location indicate a discontinuous clay layer approximately 30′ to 45′ below land surface that was recorded in ten of the 15 borings performed by Ellis.

3.3.1.4 Bearing Strength

SCCF construction will involve multiple structures, tanks, and stormwater retention ponds. Structures will include two CTGs, one STG, two HRSGs and stacks, and three generator step-up transformers. Based on preliminary information provided in Ellis' Final Report of Geotechnical Investigation, the following loads and structure dimensions were provided:

- CTG—Approximate foundation footprint of 46′ by 141′ 4″. Weight of foundation and equipment sustained dead load is 9,897 kips.
- STG—Approximate foundation footprint of 58′ 6″ by 130′ 9″. Weight of foundation, pedestal legs, and table top and equipment sustained dead load is 10,490 kips.
- HRSG and Stacks—Approximate foundation footprint of 56′ by 172′. Weight of foundation and structures is 15,813 kips.
- Water Storage Tank—Approximate 100′ in diameter and 40′ high. Ellis estimated the bearing pressure at tank to be 2,500 pounds per square foot.

Information provided indicates the CTG and STG will be dynamic equipment, and the foundation will be subjected to dynamic loading. Therefore, cut and fill will be required at different parts of the site. Based

on the results of their exploration, the subsurface conditions at the site are adaptable for support of the proposed structures with net soil bearing pressure loading conditions of 1.5 kips per square foot or less on a rigid mat or properly designed conventional shallow foundation system. The proposed structures may also be supported on a deep foundation system consisting of driven concrete piles or auger-cast-in-place piles.

Additional soil borings will be drilled to further assess subsurface conditions and foundation requirements prior to final design. Detailed foundation design will be completed during the final design of the SCCF, and appropriate methods will be employed to ensure foundation suitability.

3.3.2 Subsurface Hydrology

There are three major components to the subsurface hydrogeologic framework of northeastern Florida: the unconfined surficial aquifer system (SAS), intermediate aquifer system (IAS), and Floridan aquifer system (FAS).

The uppermost part of the SAS consists of unconsolidated quartz sand, with localized lenses of shell and clay. Sediments forming the SAS are undifferentiated sediments, Cypresshead and Nashua Formations, Caloosahatchee Formation-equivalent shell beds, and the Coosahatchee Formation of the Hawthorn Group (Florida Geological Survey [FGS], 1992). The SAS in the vicinity of the SGS site is approximately 100′ thick.

The intermediate confining unit and IAS are present throughout Putnam County and consist of interbedded siliciclastic and carbonate sediments of the Hawthorn Group and clay and limestone of the undifferentiated Hawthorn Group (FGS, 1992).

The FAS within the SGS site consists of the Upper Floridan aquifer (UFA), middle confining unit, and Lower Floridan aquifer (LFA). The Ocala Limestone is at the top of the aquifer, with the majority of the aquifer comprised of the Avon Park and Oldsmar Formations (FGS, 1992). Thickness of this aquifer is approximately 1,700′ (FGS, 1991). The sub-Floridan confining unit occurs within the Cedar-Keys Unit.

3.3.2.1 Subsurface Hydrologic Data for the Site

Figure 3.3.2-1 depicts a dry season horizontal water table contour map in the area for the proposed SCCF Project. Figure 3.3.2-2 presents a wet season water table contour map.[1]

A coefficient of permeability for the shallow sands is estimated at 0.001 centimeter per second (cm/s) based on site lithology as well as data presented in the previously referenced Dames & Moore report and environmental analysis. Using a modified form of Darcy's Law (V = Ki), the approximate groundwater velocity to southeast is calculated to be 0.0001 cm/s or 0.28′ per day.

Table 3.3.2-1 provides background water quality data representing water quality parameters collected from wells on the SGS site designated as the North Well and South Well, which provide service water for the Existing SGS Units 1 and 2 operations. The table also includes one of the three existing shallower wells on the site used for potable water. The North and South wells are 520′ and 570′ deep, respectively. Figure 3.3.2-3 presents well locations for the North Well and South Well as wells 450548 and 450549, respectively. The figure also shows the locations of the three existing potable water supply wells on the SGS site.

The depth to the top of the Ocala Limestone, which represents the UFA in Putnam County, is approximately 500′ and ranges from 130′ to 350′ thick in northeast Florida (Toth, 1990). Transmissivity ranges from 20,000 to 200,000 square feet per day (ft^2/day), with average transmissivity values of approximately 80,000 ft^2/day.

Recharge occurs wherever the water table is at an elevation above the potentiometric surface of the aquifer. The rate of recharge is dependent upon the difference in water levels between the Floridan and surficial aquifers and the confining characteristics of clays overlying the Floridan aquifer. In Putnam County, the Hawthorn Group acts as the confining unit for the Floridan aquifer with a thickness of approximately 100'. The hydraulic conductivity of the Hawthorn layer underlying the site is approximated as 10^{-8} cm/s, as reported in the previously referenced Dames & Moore report, and is considered relatively impermeable.

[1] Figures 3.3.2-1 and 3.3.2-2 based on data from the geotechnical report in Appendix 10.7.2. The dry season/minimum water table uses a depth to groundwater of approximately 9′ below land surface, with a gradient toward the southeast of approximately 0.01′ per foot, based on an approximate distance between soil borings SB-3 and SB-9 of 1,077′ and a 10′ change in groundwater elevation. The wet season water table uses a depth to groundwater of approximately 5′ to 7′ below land surface, with a gradient of approximately 0.009′ per foot, also in the southeasterly direction.

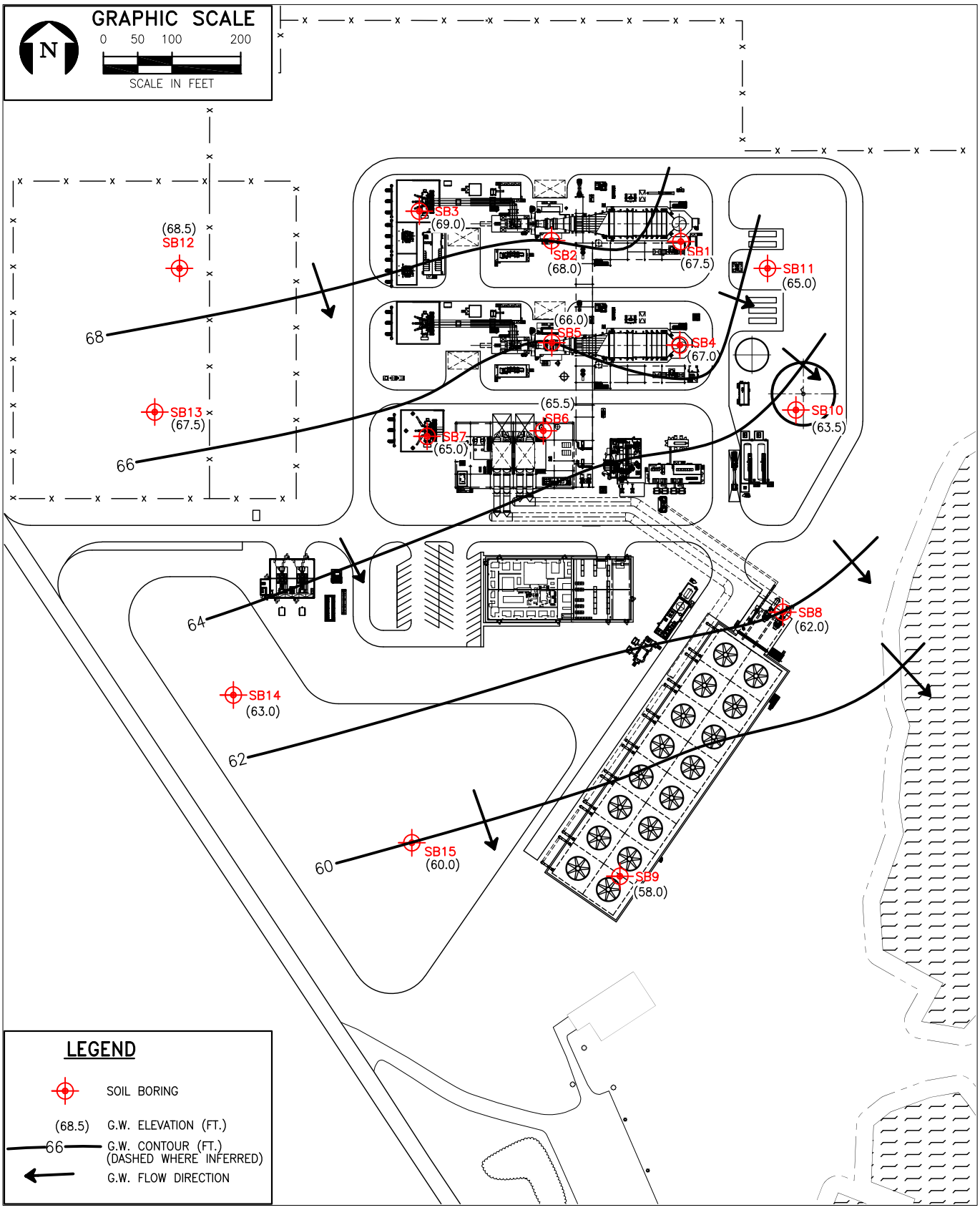


FIGURE 3.3.2-1.

DRY SEASON WATER TABLE CONTOUR MAP

Sources: Ellis & Associates Inc., 2016; ECT, 2017.

Seminole Electric COOPERATIVE, INC.

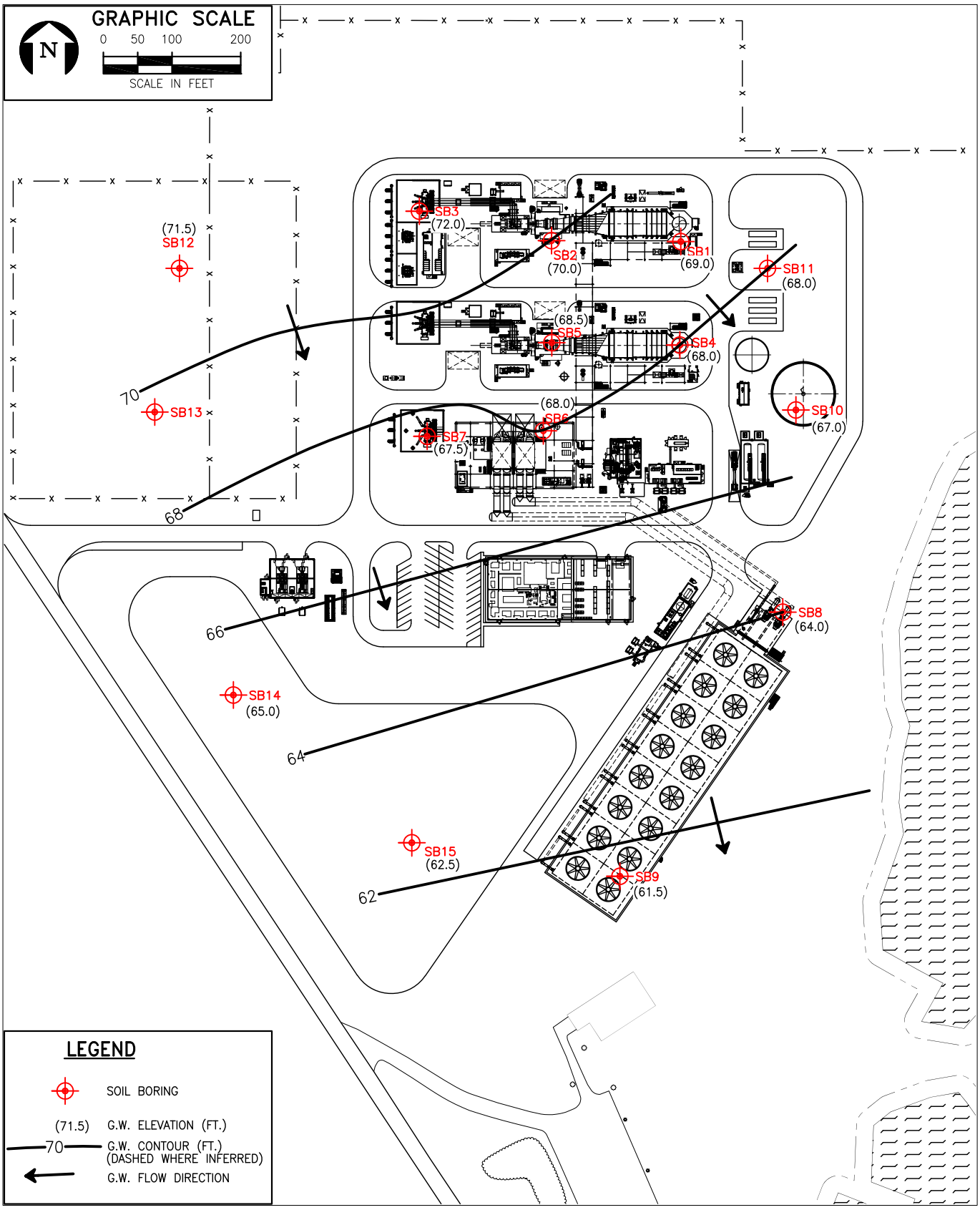


FIGURE 3.3.2-2.

WET SEASON WATER TABLE CONTOUR MAP

Sources: Ellis & Associates Inc., 2016; ECT, 2017.

Seminole Electric COOPERATIVE, INC.

Table 3.3.2-1. Background Groundwater Quality on SGS Site

Analyte	Units	Wells			Drinking Water Standards	
		North	South	Shallow	Primary	Secondary
Oil and grease	mg/L	5 U	5 U	0.8 U		
Aluminum, total recoverable	µg/L	100 U	100 U	20		200
Arsenic, total recoverable	µg/L	10 U	10 U	0.8 I	10	
Barium, total recoverable	µg/L	14	20	19	2,000	
Boron, total recoverable	µg/L	294	88	71		
Cadmium, total recoverable	µg/L	5 U	5 U	0.1 U	5	
Calcium, total recoverable	mg/L	49.6	69.7	37.2		
Chromium, total recoverable	µg/L	10 U	10 U	0.2 U	100	
Copper, total recoverable	µg/L	10 U	10 U	NS	1,300	1,000
Hardness, total as $CaCO_3$	mg/L	214	313	105		
Iron, total recoverable	µg/L	100 U	100 U	50 I		300
Lead, total recoverable	µg/L	10 U	10 U	0.14 I	15	
Magnesium, total recoverable	mg/L	22	33.9	15.9		
Manganese, total recoverable	µg/L	10 U	10 U	0.5 I		50
Molybdenum, total recoverable	µg/L	10 U	10 U	0.3 U		
Nickel, total recoverable	µg/L	10 U	10 U	0.5 U	100	
Potassium, total recoverable	mg/L	2 U	2.9	2.3		
Silver, total recoverable	µg/L	10 U	10 U	0.06 U		100
Sodium, total recoverable	mg/L	42.1	101	20.4	160	
Strontium, total recoverable	µg/L	1210	2230	983		
Tin, total recoverable	µg/L	40 U	40 U	0.2 U		
Titanium, total recoverable	µg/L	50 U	50 U	1.4 I		
Vanadium, total recoverable	µg/L	20 U	20 U	0.3 U		
Zinc, total recoverable	µg/L	20 U	20 U	823		5,000
Alkalinity as $CaCO_3$, total	mg/L	120	112	130		
Ammonia as nitrogen	mg/L	0.386	0.388	0.063		
Bicarbonate alkalinity as $CaCO_3$	mg/L	120	112	130		
Biochemical oxygen demand	mg/L	14 U	14 U	2.3		
Carbon, total organic	mg/L	1.2	1 U	1.2		
Carbonate alkalinity as $CaCO_3$	mg/L	5 U	5 U	5 U		
Cation/anion difference	Percent	1.2	0.047	1.8		
Chemical oxygen demand, total	mg/L	20 U	20 U	12 U		
Chloride	mg/L	93	223	33.6		250
Fluoride	mg/L	0.3	0.3	0.36	4.0	2.0
Hydroxide alkalinity as $CaCO_3$	mg/L	5 U	5 U	5 U		
Nitrate as nitrogen	mg/L	0.2 U	0.2 U	0.04 U	10	
Orthophosphate as phosphorus	mg/L	0.0082	0.0082	0.04 U		
Phenolphthalein alkalinity as $CaCO_3$	mg/L	5 U	5 U	5		
Phosphorus, total	mg/L	0.0122	0.0092	0.0133		
Silica, dissolved as SiO_2	mg/L	13.5	14.1	46.2		
Solids, total dissolved	mg/L	335	***606***	289		500
Solids, total suspended	mg/L	5 U	5 U	5 U		
Sulfate	mg/L	45.8	106	20.3		250

Note: $CaCO_3$ = calcium carbonate.

Source: SECI, 2016.

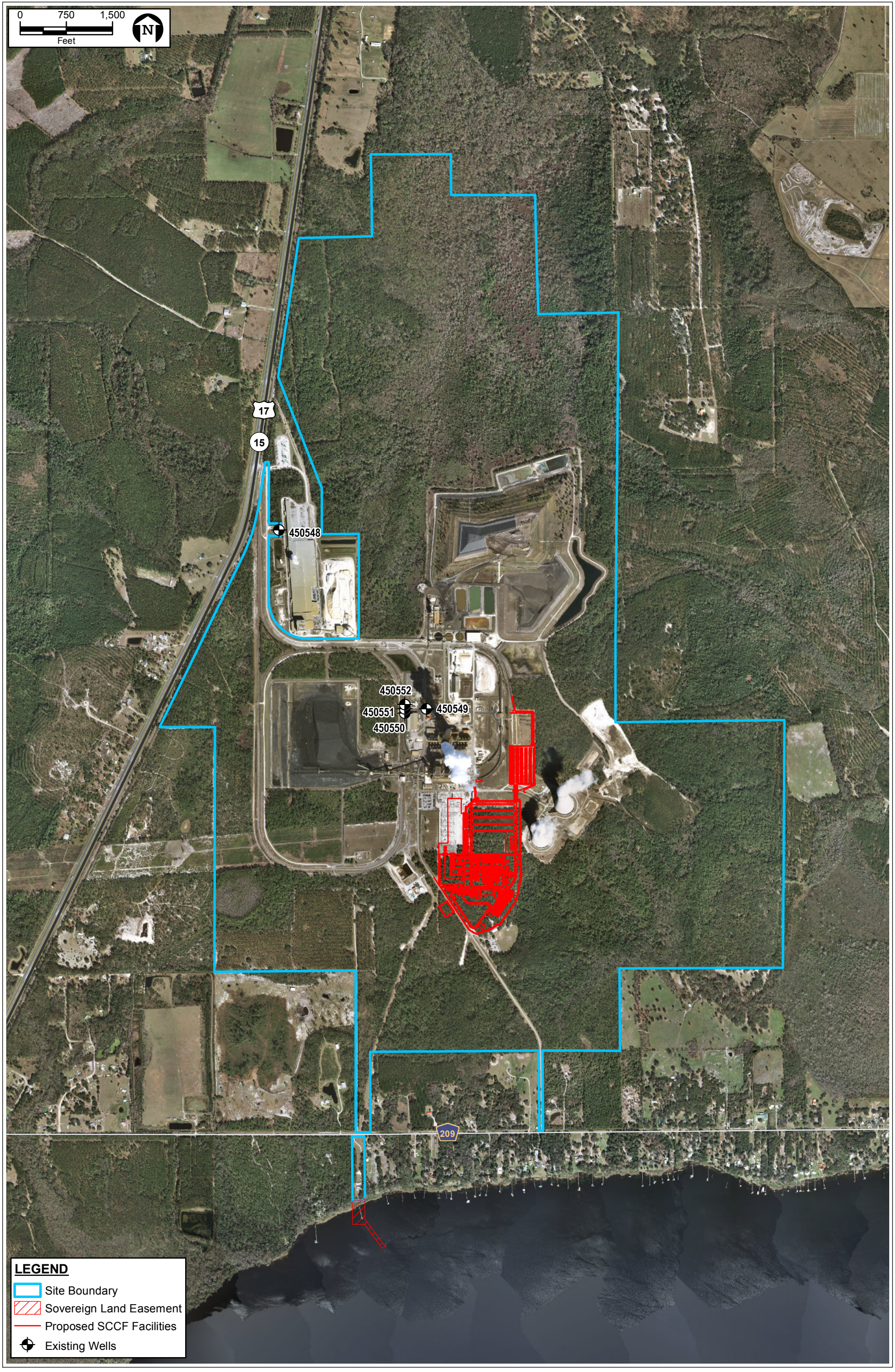


FIGURE 3.3.2-3.

EXISTING WATER SUPPLY WELLS

Sources: FDOT, 2017; SJRWMD, 2016; Putnam Co PA, 2016; ECT, 2017.

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The hydraulic head at the top of the Hawthorn group is driven by the overlying surficial aquifer and the shallow groundwater table and is expected to be approximately +60′ to +70′. The hydraulic head at the bottom of the Hawthorn group is based on the head of the confined UFA at approximately +40′.

3.3.2.2 Karst Hydrogeology

Karst terrains develop in areas underlain by carbonate rocks, primarily limestone and dolomite, and have drainage manifested by sinkholes, springs, caves, disappearing streams, and underground drainage channels. Karst topography is usually irregular because of the solution activity of acidic surface and groundwaters, which dissolve the carbonate rocks, forming cavities and allowing surficial sediments to collapse or subside.

Putnam County is generally located within a zone of low-permeability cohesive clayey sediments 30′ to 200′ thick. Figure 3.3.2-4 provides a map of known sinkholes in Putnam County, prepared by FDEP. The map shows the presence of eight identified sinkholes within Putnam County, four of which are less than 10′ in width, two between 10′ and 20′ in width, and two between 29′ and 72′ in width. As shown in this figure, the closest mapped sinkhole to the SGS site is located approximately 5 miles to the south. The Ellis Report (Appendix 10.7.2) found no evidence of near surface karst features within the geotechnical borings performed. Based on these findings, karst features are not expected to affect the hydrology of the site.

3.3.3 Site Water Budget and Area Users

3.3.3.1 Site Water Budget

The SGS site is located in northern peninsular Florida, which has a climate characterized as mild subtropical. Temperatures in the vicinity (measured at Federal Point, Florida)[2] range from an average low of approximately 47 degrees Fahrenheit (°F) in January to an average high of approximately 92°F in July, with an annual average of approximately 70.7°F. Average annual precipitation is 49.42″, with monthly averages as shown in Table 3.3.3-1.

[2] Based on data collected over the 1981 through 2010 period from the U.S. Department of Commerce National Oceanic and Atmospheric Administration (NOAA) National Environmental Satellite, Data, and Information Service. The Federal Point, Florida, weather station is located along the east side of the St. Johns River, approximately 3 miles east of the site. Temperature and rainfall data were collected from this dataset (https://www.ncei.noaa.gov/orders/cdo/831504.pdf).

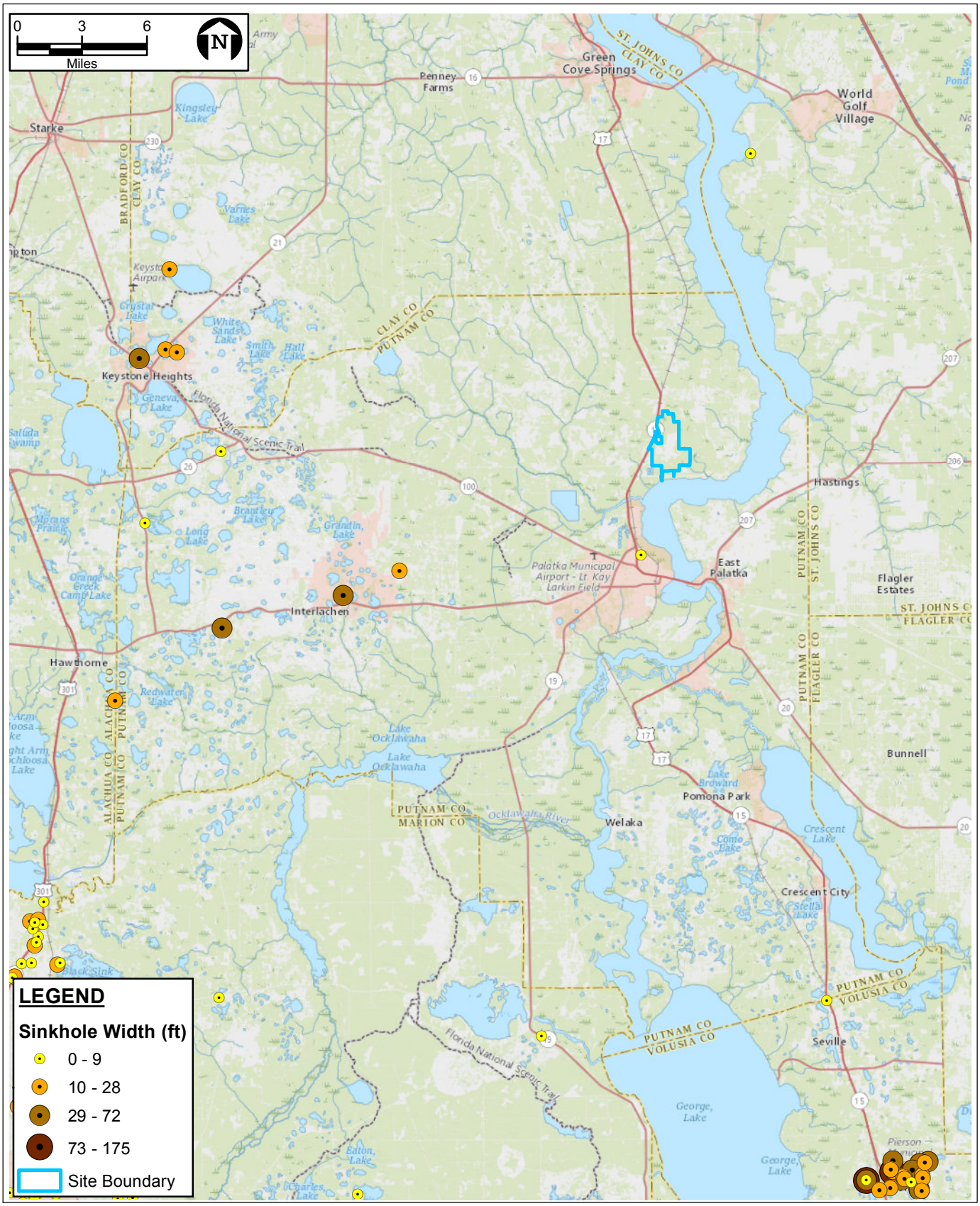


FIGURE 3.3.2.4.

KNOWN SINKHOLES WITHIN PUTNAM COUNTY

Sources: FDEP, 2016; FGS, 2016; USGS, 2016; ECT, 2017.

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Table 3.3.3-1. Average Climatological Data, Palatka Florida

Month	Average Temperature (°F)	Average Rainfall (inches)
January	56.5	2.82
February	59.7	3.06
March	64.5	3.80
April	69.8	2.06
May	76.2	2.74
June	80.9	6.42
July	82.4	6.30
August	81.8	6.72
September	79.2	7.66
October	73.1	3.50
November	65.4	2.33
December	58.7	2.01
Annual	70.7	4.12

Source: National Oceanic and Atmospheric Administration (NOAA), 2016.

The estimated yearly pan evaporation is approximately 65.99″.[3] The estimated yearly potential evapotranspiration is 58.95″.[4] The cumulative rainfall for Palatka, Florida, based on totaling the average monthly values presented in Table 3.3.3-1 is 49.44″. Therefore, the majority of precipitation falling within the site is lost to evaporation and evapotranspiration.

Due to the lack of karst features, sinkholes, and the consistent presence of an underlying clayey formation across the site, as reported in the Ellis Report, (Appendix 10.7.2) essentially no precipitation within the site acts as a source of recharge to the underlying Floridan aquifer. Estimated peak runoff from the site is calculated based on the site location within the 1997 Florida Department of Transportation Drainage Manual, page B-13. The total precipitation for a 24-hour event on a one-year recurrence interval is approximately 4.45″. The total precipitation for a 24-hour event on a 100-year recurrence interval is approximately 10.3″.

[3] Based on NOAA data collected for Gainesville, Florida located approximately 50 miles to the west of the site from 1953 to 1979 (NOAA, 1982).
[4] Based on data collected from the USGS weather station at Green Cove Springs, Florida (No. 295949081391400), for the years 2002 through 2004.

Potential discharge from the site was estimated using HydroCAD, a hydrologic/hydraulic modeling software. Using the HydroCAD software with the appropriate site runoff parameters and a rainfall depth of 4.45″ for the 2.33-year recurring storm, runoff from the site during a 24-hour, 2.33-year storm is approximately 2.11 acre-feet (ac-ft) with a peak runoff rate of 33.25 cubic feet per second (cfs). Applying this method to a 24-hour, 25-year event with a rainfall depth of 7.68″ yields a total runoff of 7.06 ac-ft and with a peak runoff rate of 63.28 cfs.

The estimated yearly total runoff was calculated as 98.08 ac-ft by using the annual runoff equation from the Simple Method to Calculate Urban Stormwater Loads from the Center for Watershed Protection Stormwater Manager's Resource Center (SMRC) (2016). Applying the average monthly rainfall listed in Table 3.3.3-1 to this method yields an annual runoff of 25.04″ over the proposed SCCF area or 98.07 ac-ft.

3.3.3.2 Area Water Uses

According to the Putnam County Soil Survey, the Floridan aquifer is the major source of potable ground water in Putnam County. This source consists of porous limestone formations 150′ to 200′ deep. Wells drilled into the aquifer yield large quantities of water for domestic, industrial, and agricultural uses. The shallow aquifer is a secondary source of water. This aquifer overlies the Floridan aquifer and is composed of unconsolidated sand, shells, and clay in and above the upper part of the Hawthorn Group. Most residential sites outside the larger cities are serviced by individual wells placed in the shallow aquifer. Larger cities with community or public water supplies generally obtain water from the deeper Floridan aquifer.

The St. Johns River and its tributaries, the Oklawaha River, Dunns Creek, and Rice Creek, are major streams in Putnam County. These streams provide recreation resources. The St. Johns River is a major barge route and water source for industry located on or near the river. These streams are not normally used for agricultural or domestic uses. These streams receive most of the surface drainage from the uplands. No major streams flow through the uplands, and drainage patterns are indistinct.

Putnam County has many freshwater lakes. These water areas range from a few acres to several square miles. Georges Lake in the northwestern part of Putnam County and Crescent Lake in the southeastern part are two of the largest lakes. Most of the lakes are on the uplands in the western and southeastern parts of the County. Water for irrigation of crops is pumped from many of these lakes (U.S. Department of Agriculture, 1990).

The SCCF will be located on the southeast portion of the SGS site. There are five wells, owned by SECI, extending into the UFA located on the SGS property as part of its consumptive use approval from SJRWMD. Three of these wells are designated as public supply wells, and two are designated as commercial/industrial water supply wells. Figure 3.3.2-3 graphically depicts the locations of these wells, and Table 3.3.3-2 provides details regarding these onsite wells.

Table 3.3.3-2. Well Details within One Mile of Project Area

Well Identification	Name	Diameter (inches)	Total Depth (ft)	Capacity (gpm)	Use/Type
450548	North Well	14	520	1,500	Commercial/industrial
450549	South Well	14	570	1,500	Commercial/industrial
450550	Potable 1	2	500	50	Public supply
450551	Potable 2	2	500	50	Public supply
450552	Potable 3	2	500	50	Public supply

Note: Casing depth unknown for all wells.
Water source for all wells is the UFA.
gpm = gallon per minute.

Source: SECI, 2016.

Within approximately 5 miles of the SGS site, there are 21 active consumptive use permits (CUPs). The CUPs within the 5-mile radius consist predominantly of agricultural facilities as well as a few commercial facilities and the Putnam County water system. Groundwater allocations range from 7.7 million to 1,680.65 million gallons per year. Figure 3.3.3-1 graphically presents the general locations of these permitted entities, and Table 3.3.3-3 provides details regarding these permits. Additional information regarding known wells within the Project area was provided by SJRWMD (2017). Based on this information, the majority of these wells are private wells serving individual residences that do not require CUPs. Figure 3.3.3-2 presents the general location of wells with well completion reports within a 5-mile radius.

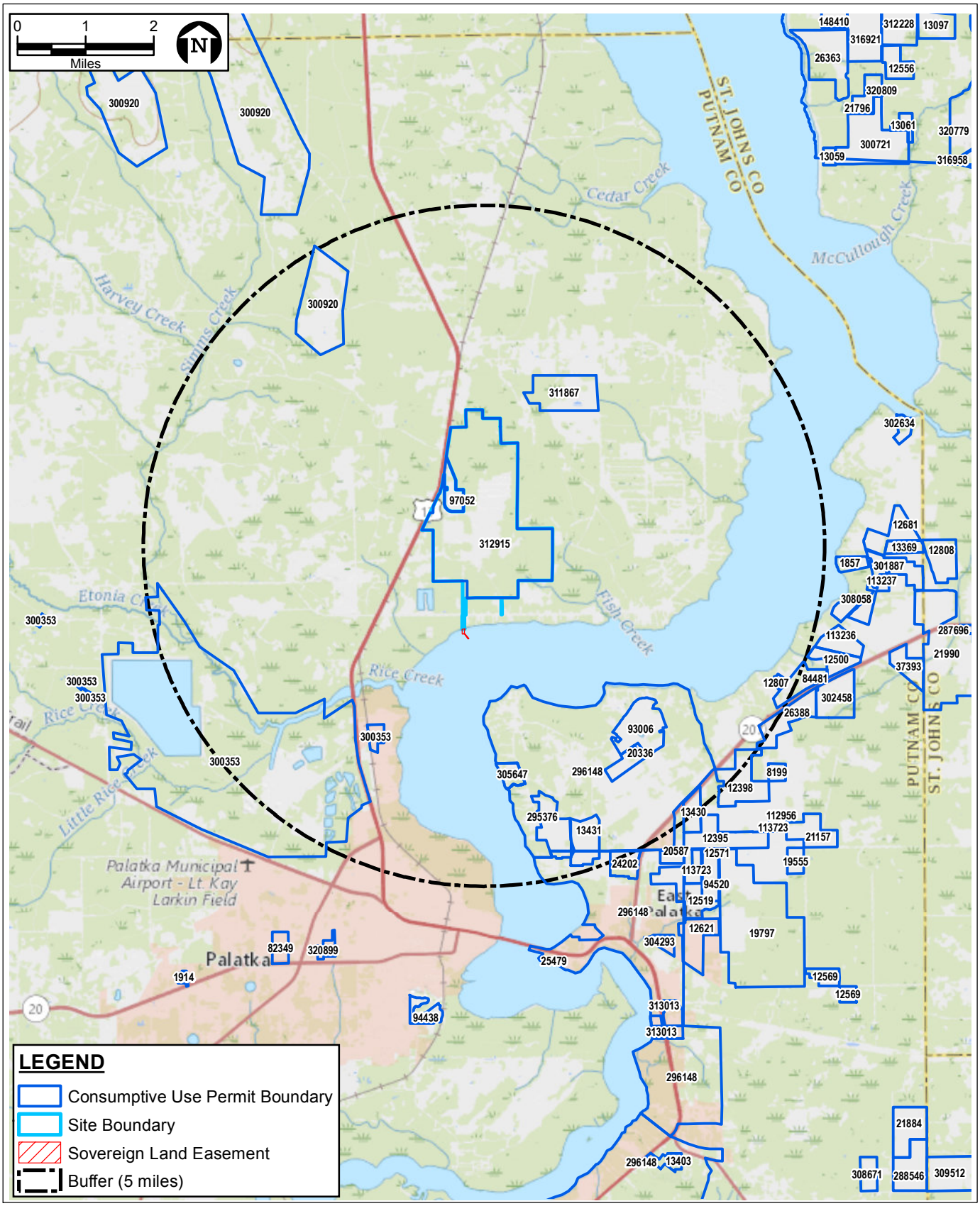


FIGURE 3.3.3-1.

CONSUMPTIVE USE PERMITS
WITHIN 5 MILES OF SGS SITE

Sources: SJRWMD, 2017; USGS, 2016; ECT, 2017.

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Table 3.3.3-3. Active CUPs within 5 Miles of the SGS Site

Permit ID	Project Name	Applicant Name	Issue Date	Expiration Date	Project Acreage	Total Number of Wells	Current Year Water Allocation (MGY)	Allocation Sources
422 7	Iluka Resources	Iluka Resources Inc.	05/17/12	05/17/22	17,183	5	35.8	Ground
3672 3	Ryan Farm	Byrnes Farms Inc.	01/31/02	06/25/18	100	4	84.6	Ground
3698 2	Hunt Farms	John R Hunt	10/29/99	10/29/19	55	3	30.9	Ground
7911 3	Stewart Farms	George E Stewart	06/06/98	06/06/18	155	8	163.3	Ground
7916 3	Don P Hunt farms	Don P Hunt Farms	06/06/98	06/06/18	90	3	90	Ground
7931 6	Mr Robert L Revels	Robert L Revels	05/12/98	05/12/18	760	12	545.8	Ground
7942 4	Shamrock Farms	L and M Farms	08/28/00	08/08/20	60	4	100.3	Ground
7964 6	Daniel L. Byrnes	Byrnes Farms Inc.	09/02/98	09/02/18	210	11	22.48	Ground
7969 6	Roberts Farm	Roberts Sod Co	10/04/05	09/28/25	210	10	539	Ground
7975 5	Jones Farm	Wilson Farm	02/18/03	08/17/18	230	9	129.3	Ground
8042 3	Battaglia Farms	Mary S Singleton Trust	08/26/99	08/26/19	62	2	34.8	Ground
8047 5	Barstow Farm	Sandy Hill Farm LLC	01/04/01	02/16/20	170	4	274.6	Ground
8122 3	Alford Farm	L & M Farms Inc.	09/30/99	09/30/19	81.8	2	46	Ground
8123 3	Cantrell Farm	L & M Farms Inc.	09/03/99	09/03/19	165.7	6	137.8	Ground
8127 5	Palm Port	Florida Governmental Utility Authority	05/02/13	05/02/21	0	1	7.7	Ground
50221 5	Georgia Pacific Kraft Pulp Mill	Georgia Pacific Consumer Operations LLC	06/12/13	06/11/33	5,414	33	1,680.65	Ground
							9,578	**Surface**
60663 2	Lafarge Gypsum	Lafarge Corporation - Gypsum Division	12/02/03	12/02/23	87.967	4	163.52	Ground
92165 3	East Putnam County Water System	Putnam County Board of County Commissioners	10/11/11	07/12/25	22	5	121.122	Ground
105068 2	Fulwood Farm	Palatka Land Fund LLC	08/04/10	06/07/26	168.5	6	205.25	Ground
135166 3	Towers Family Farm	Towers Family Farm LLC	10/16/14	09/06/33	30	4	38.31	Ground
140536 1	SGS	FDEP Siting Coordination Office	02/05/15	02/05/15	5	5	200.7	Ground
							15,783	**Surface**

Note: MGY = million gallons per year.
All permits are in active status.

Source: SJRWMD, 2016.

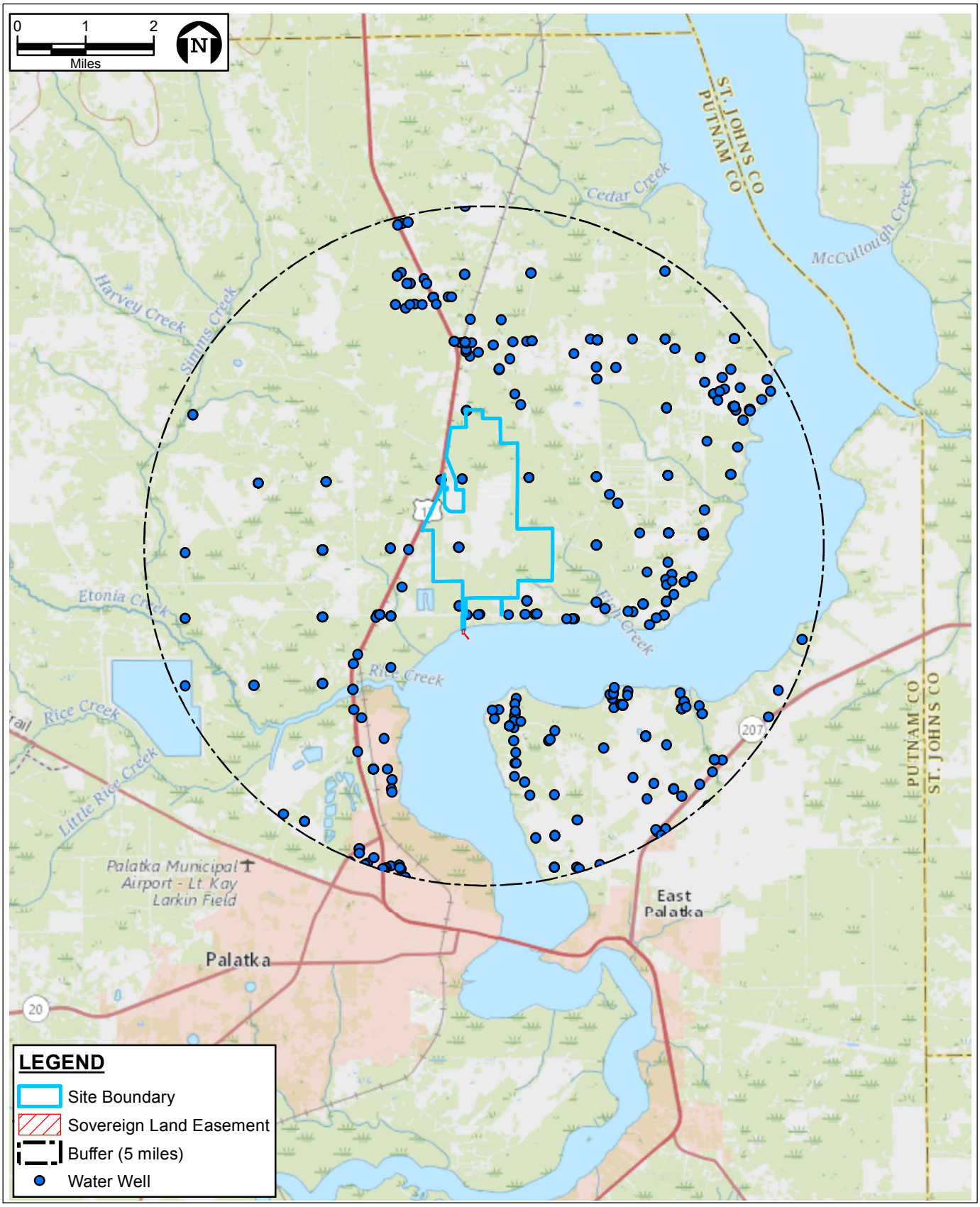


FIGURE 3.3.3-2.

GENERAL LOCATIONS OF WELLS WITH WELL COMPLETION REPORTS WITHIN 5 MILES OF SGS SITE

Sources: SJRWMD, 2017; USGS, 2016; ECT, 2017.

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3.3.4 Surficial Hydrology

3.3.4.1 Hydrologic Characterization

Prominent drainage features near the SGS site include the St. Johns River and its tributaries. Major tributaries, or smaller streams and rivers that flow into the St. Johns River, include the Wekiva, Econlockhatchee, and Ocklawaha rivers. None of these rivers or tributaries are in the vicinity of the SGS site. Minor tributaries in the vicinity of the site include Rice and Moccasin creeks to the southwest and Fish Creek to the southeast along the northern bank of the St. Johns River. Because the St. Johns River is tidally influenced, no seasonal fluctuation in the water level is anticipated.

The St. Johns River is a 300-mile-long, 9,430-square-mile basin, making it the largest watershed entirely within the state of Florida. The river rises in a poorly drained swamp in northwestern St. Lucie County and becomes a discernable channel in southern Brevard County. Downstream the river widens giving rise to eight lakes: Sawgrass, Washington, Winder, Poinsett, Puzzle, Hardey, Monroe, and George. At Palatka, the river widens; it is characterized generally by many deep and wide segments, low stream velocities, and flow reversals. The hydraulic gradient is 0.15′ per mile with a backwater effect from tidal and wind action (Reynolds, 1974). Combined wind and tidal effects influence river levels and flow a maximum of 161 miles upstream from the mouth. The large drainage basin, high annual rainfall, and artesian conditions in the area produce an estimated freshwater discharge of 3,700 cfs into the Atlantic Ocean at Jacksonville (USGS, 2003).

Surface water quality standards for the state of Florida consist of designated uses for water bodies, numerical and narrative criteria that correspond with the designated uses, and various policies, including moderating provisions. The St. Johns River in the vicinity of the SGS site is designated as a Class III water body. The corresponding uses are recreation and propagation and maintenance of a healthy, well-balanced population of fish and wildlife.

The St. Johns River in the vicinity of the SGS site normally experiences tide-influenced flow reversals twice a day. Consequently, there are instantaneous zero discharges and periods of upstream flows. The river functions similar to a reservoir with inflows from the basin and the ocean. Therefore, even during periods of near zero flows or upstream flow, the water volume in this area of the river may be increasing. Also, during periods of high flow, the volume in the river may be decreasing. As a result, the flow rates in the St. Johns River do not reflect the water supply potential, and the usual statistical analyses for low flows are meaningless.

Flow records for the lower St. Johns River have been collected by USGS at several sites, including Palatka and Jacksonville. Strong tidal actions at both stations limit the accuracy of mean daily flow data. The gauging station located near Palatka was installed in January 1968 and discontinued in February 1976. The published discharge data represent the net difference between much larger upstream and downstream discharge flows. The maximum downstream and upstream flows were 31,311 cfs on November 5, 1970, and 20,400 cfs on March 24, 1968, respectively. Average freshwater discharge at Palatka has been computed as 7,613 cfs with a mean tidal range of 1.2′ based on nine years of data. Average velocities are on the order of 0.2 feet per second (fps) with a maximum on the order of 1.0 fps.

Water supply potential and waste assimilation capacity are based on potential flow rates. Commonly a statistical frequency analysis determines the low flows and return periods. In addition to the low flow frequency, the duration of the low flow must also be identified. The waste assimilation capacity in this area of the St. Johns River is dependent on the dilution and dispersion characteristics during the design flow. For the St. Johns River at the Palatka station, the seven-day minimum absolute flow was determined to closely approximate oscillatory movement (SECI, 1979). The highest stage in the vicinity of the SGS site was determined to be 5.5 ft-msl in September 1964 (SECI, 1979). Also, SJRWMD Station No. 18964232 recorded monthly instantaneous elevations from June through October 2004 and daily elevation data from November 2004 through October 2017. This station is located at Riverdale Park northeast of the SGS site along the east side of the St. Johns River. The peak elevation recorded during this time period was comparable at 5.1 ft-msl on September 11, 2017 (http://webapub.sjrwmd.com/agws10/hdsnew/map.html).

Water quality data in the vicinity of the SGS site is available from intake samples collected from the existing SGS river water intake, designated as D-005. Limited historical data are available upstream and downstream from FDEP's STORET databases. Table 3.3.4-1 summarizes the relevant surface water quality data. In general, the St. Johns River has good water quality near Putnam County. Water quality in the river upstream has a few elevated metals levels and some pH exceedances. Downstream water quality improves, with metal concentrations dropping and pH exceedances reducing to within water quality standards.

Table 3.3.4-1. Background Water Quality Parameters for SGS Facility

Parameter		Ambient Water Quality			
		Average	Maximum	95th Percentile	5th Percentile
Beryllium	µg/L	0.0318	0.05	0.0500	
Copper	µg/L	1.00	6.00	2.07	
Cyanide	µg/L	1.94	16.00	2.50	
Total hardness	mg/L	213.6	2,800.0		110.0
Iron	mg/L	0.218	1.520	0.47	
Mercury	µg/L	0.0029	0.0099	0.0047755	
Selenium	µg/L	1.64	5.00	2.50	
Specific conductance	µmhos/cm	1,015	2,280	1,420	
Temperature	°F	74.51	94.35	88.06	
Oil and grease	mg/L	1.38	14.80	2.50	
Total nitrogen as N	mg/L	1.28	3.38	1.84	

Source: SECI, 2016.
ECT, 2009.

Based on USGS data and data collected by SECI at SGS, as part of its ongoing monitoring requirements, the average annual temperature in the St. Johns River is 74.51°F. The water temperature ranges from a low of 43.40° F in the winter to a high of 94.35° F in the summer.

3.3.4.2 Measurement Programs

In accordance with the National Pollutant Discharge Elimination System (NPDES) permit for existing SGS operations, background/intake water quality is monitored by sample collection from the existing SGS plant intake, designated as INT-1. Water quality parameters are monitored quarterly for total ammonia, unionized ammonia, nitrate+nitrite, total Kjeldahl nitrogen, specific conductance, copper, iron, and zinc.

The surface water discharge from the existing SGS plant to the St. Johns River is designated Outfall D-001 and is monitored quarterly for nitrate+nitrite, total Kjeldahl nitrogen, hardness, specific conductance, total

phosphorus, beryllium, and copper. The discharge from certain other internal outfalls are also monitored at various frequencies for various parameters.

3.3.5 Vegetation/Land Use

Land use and vegetation types at the SGS site consist of an existing electrical generating plant and associated facilities, such as solid waste disposal areas; wastewater/stormwater treatment areas; electrical transmission line corridors; road, rail, and pipeline corridors; and undeveloped land. These developed areas constitute approximately 26 percent of the approximately 1,996-acre site. Undeveloped portions of the site (74 percent) contain a variety of upland forests and forested wetland types.

Land use types and vegetation communities were mapped and described by ECT during field visits in the fall and spring of 2015 and 2016 (Figure 3.3.5 1). The quality and condition of each plant community was characterized, and existing stressors were noted. Community types are classified using the Florida Land Use, Cover, and Forms Classification System (FLUCFCS) Level III category (FDOT, 1999).

Vegetative species typically identified within each of the undeveloped communities were noted and are listed in Table 3.3.5-1. Overall, 11 upland vegetation communities and seven vegetated wetland communities were identified. Additionally, two open water community types are found on the site. Another 11 community types identified on Figure 3.3.5-1 are developed categories. Table 3.3.5-2 lists the community types by FLUCFCS category and the approximate acreage of each. Following is a description of each community type.

Barren land (700 series classifications) has little or no vegetation and limited potential to support vegetative communities. Disturbed land and spoil areas fall into this category and are present on the SGS site.

Transportation, communication, and utilities (800 series classifications) consist of land primarily occupied by man-made facilities, which are necessary for movement of people and goods, transmission lines, water supply, and treatment plants for the purposes of generating power. Specifically, this category includes roads and highways, railroads, electric power facilities, electrical power transmission lines, water supply plants, sewage treatment, solid waste disposal, and surface water collection basins.

More detailed descriptions of the upland communities (300 and 400 series classifications), aquatic communities (500 series classification), and wetland communities (600 series classifications) are presented in the following subsections.

FLUCCS	Description	Acreage	Percent Cover
186	COMMUNITY RECREATIONAL FACILITIES	5.6140	0.28%
190	OPEN LAND	5.8358	0.29%
310	HERBACEOUS UPLAND NONFORESTED	10.2417	0.51%
320	SHRUB AND BRUSHLAND	17.2824	0.87%
330	MIXED UPLAND NONFORESTED	15.0676	0.75%
411	PINE FLATWOODS	331.7602	16.62%
414	PINE MESIC OAK	38.0263	1.90%
420	UPLAND HARDWOOD FOREST	6.6667	0.33%
421	XERIC OAK	6.5593	0.33%
423	OAK PINE HICKORY	5.2382	0.26%
434	UPLAND MIXED CONIFEROUS/HARDWOOD	182.2314	9.13%
436	UPLAND SCRUB PINE HARDWOODS	53.5839	2.68%
441	PINE PLANTATION	74.5180	3.73%
512	CANALS AND DITCHES	0.5204	0.03%
530	RESERVOIRS - PITS, RETENTION PONDS, DAMS	27.0529	1.35%
611	BAY SWAMP (IF DISTINCT)	125.5572	6.29%
617	MIXED WETLAND HARDWOODS	84.4747	4.23%
621	CYPRESS	13.8891	0.70%
625	HYDRIC PINE FLATWOODS	110.1716	5.52%
630	WETLAND FORESTED MIXED	232.7606	11.66%
641	FRESHWATER MARSHES	1.3710	0.07%
646	MIXED SCRUB-SHRUB WETLAND	137.9196	6.91%
740	DISTURBED LAND	1.0261	0.05%
812	RAILROADS AND RAILYARDS	24.8908	1.25%
814	ROADS AND HIGHWAYS	20.3834	1.02%
831	ELECTRICAL POWER FACILITIES	224.5598	11.25%
832	ELECTRICAL POWER TRANSMISSION LINES	56.6861	2.84%
833	WATER SUPPLY PLANTS	7.5465	0.38%
834	SEWAGE TREATMENT	31.3082	1.57%
835	SOLID WASTE DISPOSAL	141.4131	7.08%
837	SURFACE WATER COLLECTION BASINS	2.5516	0.13%
	Total Acreage	1996.7082	100.00%

0 750 1,500 Feet N

17 15 209

LEGEND
- Site Boundary
- Sovereign Land Easement
- Pipeline Easement
- Land Use/Land Cover

FIGURE 3.3.5-1.

LAND USE / LAND COVER ON THE SGS SITE

Sources: SJRWMD, 2016; FDOT, 2017; Putnam Co PA, 2016; ECT, 2017.

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Table 3.3.5-1. Plant Species Observed on the SGS Site—Spring/Summer 2015 and 2016

Scientific Name	Common Name
Trees	
Acer rubrum	Red maple
Carya glabra	Pignut hickory
Cornus foemina	Stiff dogwood
Diospyros virginiana	Persimmon
Gordonia lasianthus	Loblolly bay
Ilex cassine	Dahoon holly
Ilex opaca	American holly
Juniperus virginiana	Red cedar
Liquidambar styraciflua	Sweetgum
Magnolia grandiflora	Southern magnolia
Nyssa sylvatica var. *biflora*	Swamp tupelo
Ostrya virginiana	American hophornbeam
Persea palustris	Swamp red bay
Pinus clausa	Sand pine
Pinus elliottii	Slash pine
Pinus glabra	Spruce pine
Pinus taeda	Loblolly pine
Quercus geminata	Sand live oak
Quercus incana	Bluejack oak
Quercus laevis	Turkey oak
Quercus laurifolia	Laurel oak
Quercus myrtifolia	Myrtle oak
Quercus nigra	Water oak
Quercus virginiana	Live oak
Sabal palmetto	Cabbage palm
Salix caroliniana	Carolina willow
Ulmus americana	American elm
Shrubs	
Asimina pygmaea	Dwarf pawpaw
Asimina reticulata	Netted pawpaw
Baccharis glomeruliflora	Silverling
Baccharis halimifolia	Groundsel tree
Callicarpa americana	Beautyberry
Cephalanthus occidentalis	Buttonbush
Cornus foemina	Stiff dogwood
Hypericum fasciculatum	Sandweed
Hypericum hypericoides	St. Andrew's cross
Ilex glabra	Gallberry
Ilex vomitoria	Yaupon holly
Indigofera suffruticosa	Wild indigo
Itea virginica	Virginia willow
Licania michauxii	Gopher apple
Quercus minima	Dwarf live oak

Table 3.3.5-1. Plant Species Observed on the SGS Site—Spring/Summer 2015 and 2016 (Continued, Page 2 of 4)

Scientific Name	Common Name
Sideroxylon tenax	Tough bully
Lyonia ferruginea	Rusty staggerbush
Lyonia lucida	Fetterbush
Myrica cerifera	Wax myrtle
Psychotria nervosa	Shiny-leafed wild coffee
Rhus copallina	Winged sumac
Rosa palustris	Swamp rose
Rubus cuneifolius	Sand blackberry
Rubus pensilvanicus	Sawtooth blackberry
Rubus trivialis	Southern dewberry
Serenoa repens	Saw palmetto
Stillingia sylvatica	Queensdelight
Vaccinium arboreum	Sparkleberry
Vaccinium corymbosum	Highbush blueberry
Vaccinium myrsinites	Shiny blueberry
Vaccinium stamineum	Deerberry
Viburnum obovatum	Small-leaf viburnum
Zamia pumila	Coontie
Herbs	
Ageratina aromatica	Lesser snakeroot
Andropogon brachystachys	Shortspike bluestem
Andropogon glomeratus	Bushy bluestem
Andropogon virginicus	Broomsedge bluestem
Anemia adiantifolia	Pineland fern
Aristida stricta	Wiregrass
Asclepias tuberosa	Butterfly weed
Berlandiera subacaulis	Florida greeneyes
Bidens alba	Beggarticks
Briza minor	Little quakinggrass
Buchnera americana	American bluehearts
Campanula floridana	Florida bellflower
Carphephorus corymbosus	Florida paintbrush
Carex lupuliformis	Caric sedge
Chamaecrista nictitans	Sensitive partridge pea
Chasmanthium sp.	Woodoats
Cirsium horridulum	Yellow thistle
Cirsium nuttallii	Thistle
Cladium jamaicense	Sawgrass
Coreopsis leavenworthii	Leavenworth’s tickseed
Dichanthelium commutatum	Variable witchgrass
Diodia virginiana	Virginia buttonweed
Eleocharis spp.	Spikerushes
Elephantopus elatus	Tall elephantsfoot
Eragrostis spp.	Lovegrass

Table 3.3.5-1. Plant Species Observed on the SGS Site—Spring/Summer 2015 and 2016 (Continued, Page 3 of 4)

Scientific Name	Common Name
Eryngium prostratum	Creeping eryngo
Eupatorium coelestinum	Blue mistflower
Eupatorium capillifolium	Dog fennel
Eupatorium compositifolium	Yankeeweed
Eustachys petraea	Pinewoods fingergrass
Galium tinctorium	Stiff marsh bedstraw
Geranium carolinianum	Carolina cranesbill
Helianthus radula	Rayless sunflower
Hydrocotyle umbellata	Dollar weed
Hydrocotyle verticillata	Whorled pennywort
Imperata cylindrica	Cogon grass
Iris hexagona	Dixie iris
Juncus effusus	Soft rush
Liatris chapmanii	Chapmans gayfeather
Lepidium virginicum	Virginia pepperweed
Ludwigia microcarpa	Smallfruit primrose-willow
Ludwigia palustris	Marsh seedbox
Mecardonia acuminata	Axilflower
Medicago lupulina	Black medic
Muhlenbergia capillaris	Muhly grass
Opuntia humifusa	Eastern prickly pea
Osmunda cinnamomea	Cinnamon fern
Osmunda regalis	Royal fern
Panicum rigidulum	Redtop panicum
Paspalum notatum	Bahia grass
Paspalum urvillei	Vasey grass
Phyla nodiflora	Frogfruit
Pluchea longifolia	Longleaf camphorweed
Pluchea odorata	Camphorweed
Polygala boykinii	Boykin’s milkwort
Polygala nana	Candyroot
Polygonum setaceum	Bog smartweed
Pontederia cordata	Pickerelweed
Ponthieva racemosa	Shadow witch
Proserpinaca pectinata	Combleaf mermaidweed
Pteridium aquilinum	Bracken fern
Pterocaulon pycnostachyum	Blackroot
Ptilimnium capillaceum	Mock bishopsweed
Rhynchospora caduca	Andlestem beaksedge
Rhynchospora inundata	Narrowfruit horned beaksedge
Rhynchospora miliacea	Millet beaksedge
Rudbeckia hirta	Black-eyed Susan
Ruellia caroliniensis	Carolina wild petunia
Sabatia sp.	Rosegentian

Table 3.3.5-1. Plant Species Observed on the SGS Site—Spring/Summer 2015 and 2016 (Continued, Page 4 of 4)

Scientific Name	Common Name
Setaria corrugate	Coastal bristlegrass
Sorghastrum secundum	Lopsided indiangrass
Stillingia sylvatica	Queensdelight
Thelypteris kunthii	Southern shield fern
Thelypteris palustris	Marsh fern
Sagittaria graminea	Grassy arrowhead
Salvia lyrata	Lyreleaf sage
Saururus cernuus	Lizard's tail
Scirpus cyperinus	Woolgrass
Setaria parviflora	Knotroot foxtail
Tripsacum dactyloides	Eastern gamagrass
Typha latifolia	Broadleaf cattail
Woodwardia virginica	Chain fern
Xyris brevifolia	Shortleaf yellow-eyed grasses
Vines	
Ampelopsis arborea	Pepper vine
Berchemia scandens	Rattan vine
Bignonia capreolata	Crossvine
Campsis radicans	Trumpet creeper
Centrosema virginianum	Spurred butterfly-pea
Galactia regularis	Eastern milkpea
Mitchella repens	Partridgeberry
Parthenocissus quinquefolia	Virginia creeper
Passiflora incarnata	Purple passionflower
Smilax bona-nox	Saw greenbrier
Smilax smallii	Lanceleaf greenbrier
Smilax tamnoides	Bristly greenbrier
Toxicodendron radicans	Poison ivy
Vitis aestivalis	Summer grape
Vitis rotundifolia	Muscadine grape
Epiphytes	
Pleopeltis polypodioides var. *michauxiana*	Resurrection fern
Tillandsia bartramii	Bartram's airplant
Tillandsia recurvata	Ball moss
Tillandsia usneoides	Spanish moss

Source: ECT, 2016.

Table 3.3.5-2. Land Use and Vegetation Classifications Occurring on the SGS Site

Community	Type	Acreage	Percentage of Total Site
186	Community recreational facilities	5.6	0.3
190	Open land	5.8	0.3
310	Herbaceous upland nonforested	10.2	0.5
320	Shrub and brushland	17.3	0.9
330	Mixed upland nonforested	15.1	0.8
411	Pine flatwoods	331.8	16.6
414	Pine mesic oak	38.0	1.9
420	Upland hardwood forest	6.7	0.3
421	Xeric oak	6.6	0.3
423	Oak pine hickory	5.2	0.3
434	Upland mixed coniferous/hardwood	182.2	9.1
436	Upland scrub pine hardwoods	53.6	2.7
441	Pine plantation	74.5	3.7
512	Canals and ditches	0.5	0.0
530	Reservoirs – pits, retention ponds, dams	37.7	1.4
611	Bay swamp (if distinct)	125.6	6.3
617	Mixed wetland hardwoods	84.5	4.2
621	Cypress	13.9	0.7
625	Hydric pine flatwoods	110.2	5.5
630	Wetland forested mixed	232.8	11.7
641	Freshwater marshes	1.4	0.1
646	Mixed scrub-shrub wetland	137.9	6.9
740	Disturbed land	1.0	0.1
812	Railroads and railyards	24.9	1.3
814	Roads and highways	20.4	1.0
831	Electrical power facilities	224.6	11.3
832	Electrical power transmission lines	56.7	2.8
833	Water supply plants	7.5	0.4
834	Sewage treatment	31.3	1.6
835	Solid waste disposal	130.7	7.1
837	Surface water collection basins	2.6	0.1
	Total	**1,996.7**	**100.0**

Source: ECT, 2016.

3.3.5.1 Upland Habitats

Herbaceous Dry Prairie—310

This plant association is dominated by a variety of herbs and may include scattered clumps of shrubs. Typical herbs include broomsedges (*Andropogon* spp.), bluestems (*Schizachyrium* spp.), bahia grass (*Paspalum notatum*), carpet grass (*Axonopus furcatus*), wire grass (*Aristida stricta* var. *beyrichiana*), crabgrasses (*Digitaria* spp.), love grasses (*Eragrostis* spp.), dog fennel (*Eupatorium capillifolium*), sweetbroom (*Scoparia dulcis*), goldenrod (*Solidago* spp.), smutgrass (*Sporobulis indicus*), finger grass (*Eustachys petraea*), buttonweeds (*Spermacoce* spp.), witchgrasses (*Dichanthelium* spp.), and blackberries (*Rubus cuneifolius* and *R. trivialis*). Shrubs are often present but not dominant. They include saw palmetto (*Serenoa repens*), wax myrtle (*Morella cerifera*), and groundsel tree (*Baccharis halimifolia*). This land cover occupies 10.2 acres (0.5 percent) of the SGS site.

Upland Shrub and Brushland—320

This plant association is dominated by a variety of weedy or adventive shrubs, including wax myrtle, groundsel tree, winged sumac (*Rhus copallina*), saw palmetto, and immature cabbage palm (*Sabal palmetto*). Herbs are usually abundant and similar to those described for herbaceous dry prairie (310). Upland shrub and brushland occupies 17.3 acres (0.9 percent) of the SGS site.

Mixed Upland-Nonforested—330

This classification describes an admixture of weedy shrubs and herbs, where shrubs and herbs comprise at least one-third of the total cover. Typical shrubs include wax myrtle, saw palmetto, and groundsel tree. Herbs include broomsedges, bahia grass, finger grass, beggarticks (*Bidens alba*), dog fennel, sweetbroom, and slender goldenrod (*Solidago erecta*). This community type is found on 15.1 acres (0.8 percent) of the SGS site.

Pine Flatwoods—411

Pine flatwoods habitat is common on the SGS site. These areas support a canopy dominated by slash (*Pinus elliottii*) and/or sand pine (*Pinus clausa*) and loblolly bay (*Gordonia lasianthus*) with an understory of saw palmetto. Additional canopy species include laurel oak (*Quercus laurifolia*), black cherry (*Prunus serotina*), spruce pine (*Pinus glabra*), Chapman oak (*Quercus chapmanii*), live oak (*Quercus virginiana*), and water oak (*Quercus nigra*). Shrub and groundcover species include wax myrtle (*Morella cerifera*), groundsel tree, gallberry (*Ilex glabra*), blackberry (*Rubus trivialis*), greenbrier (*Smilax* sp.), dog fennel, American beautyberry (*Callicarpa americana*), jointvetch (*Aeschynomene* sp.), blueberry (*Vaccinium*

corymbosum), and goldenrod. Pine flatwoods is a dominant vegetation community on the site, found on 331.8 acres (16.6 percent) of the SGS site.

Pine-Mesic Oak—414

This community type is characterized by deep sandy soils which support longleaf pine (*Pinus palustris*) and a variety of xeric oak species such as turkey oak (*Quercus laevis*), sand live oak (*Quercus geminata*), Chapman oak, and the like. The shrub layer is comprised of the same species as the canopy, with patches of blackberry and scattered saw palmetto. The herbaceous layer generally consists of broomsedge, wire grass, bracken fern (*Pteridium aquilinum*), and deer moss (*Cladina* spp.), which is scattered throughout the forest floor. Pine-mesic oak is found on 38 acres (1.9 percent) of the SGS site.

Upland Hardwood Forest—420

This is a catch-all designation for upland hardwood forests that are not easily classified under the classifications as defined by FLUCFCS, requiring at least 66-percent canopy dominance of hardwoods. Generally, these areas are a mixture of live oak, laurel oak, pignut hickory (*Carya glabra*), and water oak that is second-growth on land cleared in the past. Upland hardwood forest is found on 6.7 acres (0.3 percent) of the SGS site.

Xeric Oak—421

This forest community's overstory is dominated by turkey oak, live oak, with occasional American holly (*Ilex opaca*) and sand live oak. The shrub layer is comprised of the same species as the canopy, with patches of blackberry, Virginia creeper (*Parthenocissus quinquefolia*), and muscadine grape vine (*Vitis rotundifolia*). Herbaceous layer is generally sparse and includes broomsedge, wiregrass, bracken fern, pricklypear (*Opuntia humifusa*), and deer moss scattered throughout the forest floor. Xeric oak is found on 6.6 acres (0.3 percent) of the SGS site.

Oak-Pine-Hickory—423

This forest community's overstory is dominated by turkey oak, live oak, sand live oak, and pignut hickory. The shrub layer is comprised of the same species as the canopy with patches of dwarf live oak (*Quercus minima*), gopher apple (*Licania michauxii*), sparkeberry (*Vaccinium arboretum*), gallberry, and netted pawpaw (*Asimina reticulate*). The herbaceous layer is generally sparse and includes broomsedge, wiregrass, bracken fern, pricklypear, Florida chaffhead (*Carphephorus corymbosus*), and deer moss scattered throughout the forest floor. Oak-pine-hickory is found on 5.2 acres (0.3 percent) of the SGS site.

Hardwood-Conifer Mixed—434

Hardwood-conifer mixed forests are those that contain both pines and hardwoods with the trees of both categories comprising between 33 and 67 percent of the canopy cover, respectively. In many areas the hardwood component is the dominant canopy cover. Hardwood-conifer mixed forests may be derived from conversion of other plant communities owing to land use practices, such as timber harvest, fire suppression, drainage, and the sowing of forage grasses. Dominant canopy species for this land use type include live oak, laurel oak, sand live oak, slash pine, and loblolly pine (*Pinus taeda*). Other canopy species commonly observed include pignut hickory and southern magnolia (*Magnolia grandiflora*). A mid-story is comprised of young individuals of overstory tree species and saw palmetto, sparkleberry, and American beautyberry, among others. Density of palmetto and grassy forbs varies throughout the forested area, with herbs being prevalent if sufficient light reaches the ground. They include broomsedge, rabbit tobacco (*Pseudognaphalium obtusifolium*), queensdelight (*Stilingia sylvatica*), and numerous others. Common woody vines include saw greenbriers (*Smilax bona-nox*), Virginia creeper, muscadine grape, and Carolina jessamine (*Gelsemium sempervirens*). Upland mixed coniferous-hardwood forest is the dominant cover in the proposed SCCF area. This community type is found on 182.2 acres (9.1 percent) of the SGS site.

Upland Scrub, Pine and Hardwoods — 436

The upland scrub, pine and hardwoods are those that contain both pines and hardwoods with the trees of both categories comprising between 33 and 67 percent, respectively, of the canopy cover. The canopy composition is the distinguishing characteristic between these habitats and those classified as hardwood-conifer mixed (434). Dominant canopy species for this land use type include water oak, slash pine, and sand pine. Other canopy species commonly observed include pignut hickory, southern magnolia, and turkey oak. A mid-story is comprised of young individuals of overstory tree species and saw palmetto, sparkleberry, dwarf live oak, gopher apple, gallberry, and American beautyberry, among others. Density of palmetto and grassy forbs varies throughout the forested area, with herbs being prevalent if sufficient light reaches the ground. They include broomsedge, rabbit tobacco, queensdelight, lopsided Indiangrass (*Sorghastrum secundum*), witchgrass, and numerous others. Common woody vines include saw greenbriers, Virginia creeper, muscadine grape, and Carolina jessamine. This community type is found on 53.6 acres (2.7 percent) of the SGS site.

Pine Plantations—441

Pine plantation forests consist mainly of slash pine being planted for the purpose of timber production. These pine plantations can be easily distinguished from native communities due to the uniform appearance of the rows of even-aged pines. The understory layers typical of native pine communities have been cleared prior to planting. At present, the shrub layer and herbaceous layer are sparse and contain a variety of plant

species, including some scattered saw palmetto, shiny blueberry, sand blackberry, and Virginia creeper. There are some significant infestations of the invasive-exotic cogon grass (*Imperata cylindrical*) in the herbaceous stratum. Pine plantations are found on 74.5 acres (3.7 percent) of the SGS site.

3.3.5.2 Wetlands and Water Bodies

Wetland habitats are shown on Figure 3.3.5-2. Wetlands and water bodies are described in the following paragraphs. Wetland and water body communities comprise approximately 744.4 acres or 37 percent of the SGS site.

Canals and Ditches—512

This community type consists of man-made water conveyances onsite. They represent a small percentage of the site's land cover. Canals and ditches comprise only 0.5 acre (less than 0.1 percent) of the SGS site.

Reservoirs—530

This classification is used to describe open water areas created as part of the power plant facilities. Generally, they are square or rectangular deepwater pits with unvegetated margins. Reservoirs comprise 37.7 acres (1.4 percent) of the SGS site.

Bay Swamps—611

Bay swamps are forested wetlands whose soils are kept perennially wet or inundated from ground water seepage and whose soil surface is not subject to scouring. Owing to these constraints, organic matter accumulates as muck and releases strong organic acids of decomposition that drive the pH down to a point that few tree species or other plants can tolerate. Collectively, these are called bay trees and include sweetbay (*Magnolia virginiana*), loblolly bay, and dahoon holly (*Ilex cassine*). Another common tree of bay swamps is swamp tupelo (*Nyssa sylvatica biflora*), a deciduous tree that has other adaptations for survival. Several other kinds of hardwoods in much lower densities were observed, including cypress (*Taxodium distichum*), red maple (*Acer rubrum*), water oak, and slash pine. The shrub layer consists of fetterbush (*Lyonia lucida*) and occasional highbush blueberry. The herb stratum is sparse, although in the wetland interior some fern flora consisting of cinnamon fern (*Osmunda cinnamomea*), royal fern (*Osmunda regalis*), Virginia chain fern (*Woodwardia virginica*), and netted chain fern (*Woodwardia areolata*) was observed. Bay swamps occur on 125.6 acres (6.3 percent) of the SGS site.

FLUCCS	Description	Acreage
512	CANALS AND DITCHES	0.5204
530	RESERVOIRS - PITS, RETENTION PONDS, DAMS	37.7182
611	BAY SWAMP (IF DISTINCT)	125.5572
617	MIXED WETLAND HARDWOODS	84.4747
621	CYPRESS	13.8891
625	HYDRIC PINE FLATWOODS	110.1716
630	WETLAND FORESTED MIXED	232.7606
641	FRESHWATER MARSHES	1.3710
646	MIXED SCRUB-SHRUB WETLAND	137.9196
	Total	744.3824

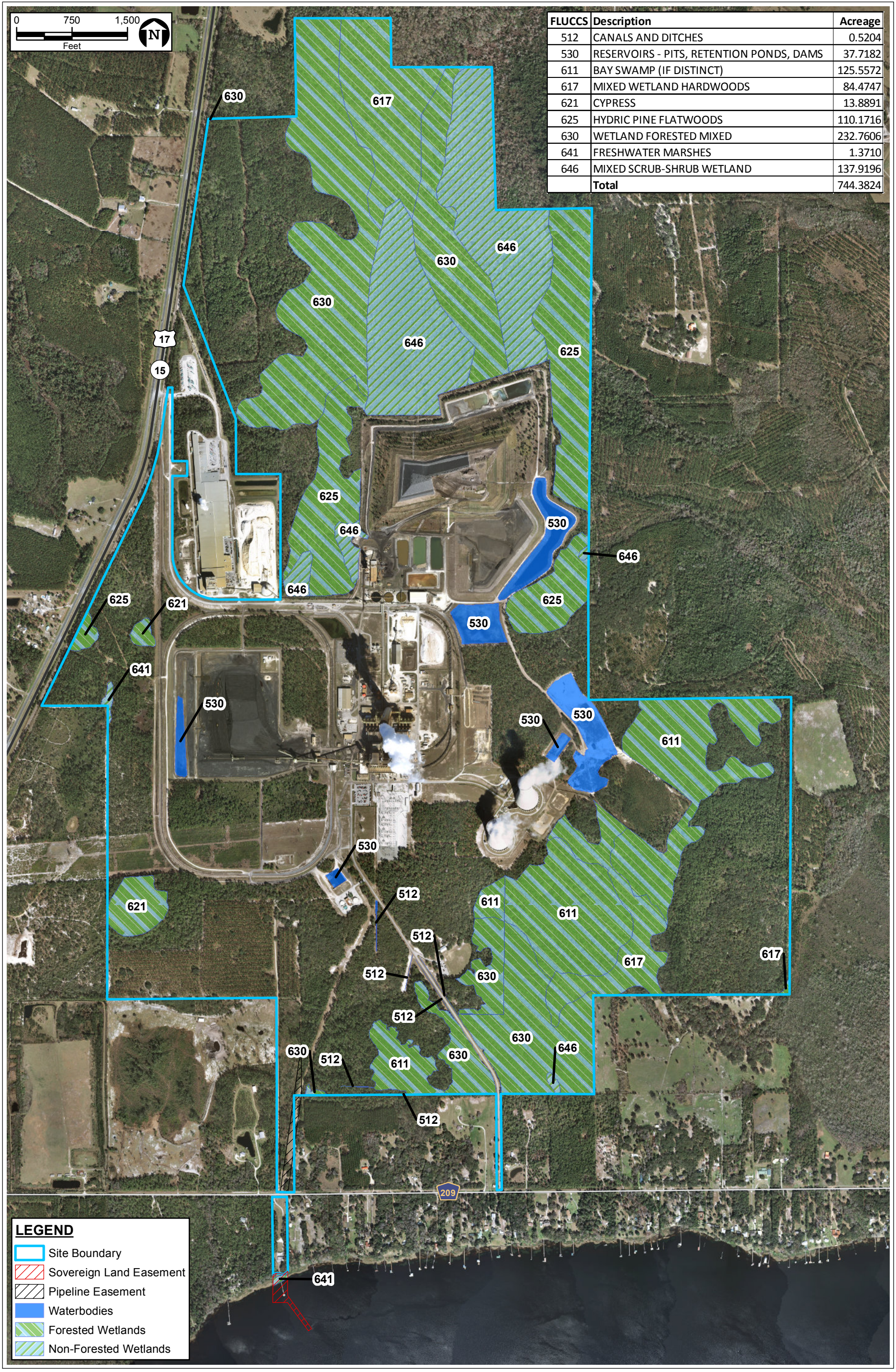


FIGURE 3.3.5-2.

WETLANDS AND WATER BODIES ON THE SGS SITE

Sources: SJRWMD, 2016; FDOT, 2017; Putnam Co PA, 2016; ECT, 2017.

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Mixed Wetland Hardwoods—617

Forested wetlands that contain a variety of hardwood tree species are designated as mixed wetland hardwood forests. Laurel oak, red maple, black gum (*Nyssa sylvatica*), and sweetgum (*Liquidambar styraciflua*) are the dominant canopy species. Common shrubs include wax myrtle, gallberry, and buttonbush (*Cephalanthus occidentalis*). Herbaceous strata mostly consist of Virginia chain fern, cinnamon fern, maidencane (*Panicum hemitomon*), beaksedges (*Rhynchospora* sp.), and redroot (*Lachnanthes caroliniana*), among others. Mixed wetland hardwoods occur on 84.5 acres (4.2 percent) of the SGS site.

Cypress—621

A forested wetland dominated by cypress is located in the southwestern corner of the SGS site adjacent to a parcel of planted pines. Additional canopy species include blackgum, slash pine, dahoon holly, and swamp bay. Herbaceous species associated with the cypress wetland include beaksedges and Virginia chain fern. The outer edges of the cypress area are vegetated by hardwoods and pine, while a small area of marsh is located in the northeastern edge of the wetland. This area supports ferns and herbaceous species including cinnamon fern, royal fern, Virginia chain fern, beaksedge, St. Johns wort (*Hypericum* sp.), marsh fleabane (*Pluchea odorata* var. *odorata*), and sphagnum moss (*Sphagnum* sp.). Cypress communities occur on 13.9 acres (0.7 percent) of the SGS site.

Hydric Pine Flatwoods —625

This land use category is reserved for forests dominated by a sparse to moderate canopy of slash pine with a thin cover of saw palmetto in the shrub layer and an understory of wiregrasses and forbs. Approximately 110.2 acres (5.5 percent) of hydric pine flatwoods are known to occur on the SGS site.

Wetland Forested Mixed—630

Wetland forests occur on approximately 232.8 acres (11.7 percent) of the SGS site and are scattered throughout the property. These areas are similar to pine flatwoods habitat but experience hydric soils and support a mixture of slash pine, pond pine (*Pinus serotina*), cypress, loblolly bay, red maple, and blackgum. Additional canopy species include laurel oak, water oak, swamp bay, and sweetbay. Shrub species include dahoon holly, fetterbush, saw palmetto, wax myrtle, gallberry, and blueberry, while common herbaceous species include Virginia chain fern, royal fern, cinnamon fern, netted chain fern, sphagnum moss, whitehead bogbutton (*Lachnocaulon anceps*), swamp doghobble (*Leucothoe racemosa*), catbrier (*Smilax* sp.), beakrushes, sedges, spikerush (*Eleocharis* spp.), and peppervine (*Ampelopsis arborea*).

Freshwater Marsh—641

Freshwater marshes are dominated by a wide assortment of herbaceous plant species growing on sandy or organic soils in areas of variable water depths and inundation regimes. Species characteristic of the marshes in the study area include pickerelweed (*Pontederia cordata*), maidencane, fireflag (*Thalia geniculata*), cattail (*Typha domingensis* and/or *T. latifolia*), smartweeds (*Polygonum* spp.), and sedges (*Cyperus haspan*, *C. odoratus*, and *C.* spp.). Freshwater marsh occurs on only 1.4 acres (less than 0.1 percent) of the SGS site.

Mixed Scrub Shrub Wetland—646

Wetlands classified as nonforested wetlands dominated by shrubs occur on approximately 137.9 acres (6.9 percent) of the SGS site. These wetlands are of average quality and contain some weedy shrubs and vines, primarily saltbush (*Atriplex* sp.) with scattered wax myrtle, patches of saw palmetto, muscadine grape, Virginia creeper, and purple passionflower (*Passiflora incarnata*). Seedlings and saplings of red maple, swamp tupelo, slash and loblolly pine, red cedar (*Juniperus virginiana*), and occasional saplings of elm (*Ulmus americana*) were noted. Carolina willow (*Salix caroliniana*) and buttonbush were present in wetter areas of the wetland. Many areas support invasive-exotic Peruvian primrose willow (*Ludwigia peruviana*). Herbaceous species included bog smartweed (*Polygonum setaceum*), whorled marshpennywort (*Hydrocotle verticillata*), Virginia chain fern, lateflowering thoroughwort (*Eupatorium serotinum*), mock bishopsweed (*Ptilimnium capillaceum*), and netted chain fern. Seedlings of pickerelweed were also noted.

As shown in Figure 3.3.5-1, the vegetative community type in the specific area for the proposed SCCF primarily consists of upland mixed coniferous hardwood forest. No wetland communities are located in the area.

3.3.6 Ecology

This section presents descriptions of the terrestrial and aquatic ecological communities located on and within the vicinity of the SGS site and its associated facilities. This section also provides an evaluation of the relationships of important floral and faunal species to the habitats on the SGS site.

3.3.6.1 Species—Environmental Relationships

Terrestrial System—Flora

The area surrounding the existing SGS power plant is undeveloped land, typical of the region, with several distinct upland and wetland community types as reflected in the land cover map (Figure 3.3.5-1). Plant

communities on the SGS site are typical of the region, and most are influenced by silvicultural activities. No unique vegetation assemblages are present.

Terrestrial System—Fauna

Wildlife resources on and in the vicinity of the SGS site were identified based on literature reviews and onsite reconnaissance visits conducted by Golder Associates in 2006 and ECT in 2015 and 2016. Site reconnaissance activities consisted of habitat characterizations, wetland delineations, and wildlife observations. ECT recorded direct observations of individuals, as well as signs of wildlife (e.g., tracks, scat), during field visits in fall 2015 and spring 2016.

Both upland and wetland communities interspersed within the SGS site provide habitat for many common mammal, bird, reptile, and amphibian species. Mammalian species that occur or are likely to occur on the SGS site are those widespread in the pine-mesic oak landscape mosaic of the area. These would include whitetail deer (*Odocoileus virginianus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), feral hog (*Sus scrofa*), nine-banded armadillo (*Dasypus novemeinctus*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), eastern cottontail rabbit (*Sylvilagus floridanus*), Sherman's fox squirrel (*Sciurus niger shermani*), and eastern gray squirrel (*Scuirus caroliniensis*). Most of the common mammals likely found on the SGS site are generalists, in that they are not exclusive to any one habitat type but use various habitats for different purposes.

Common avian species observed on the SGS site or considered likely to use the site include northern cardinal (*Cardinalis cardinalis*), black vulture (*Coragyps atratus*), turkey vulture (*Cathartes aura*), and northern mockingbird (*Mimus polyglottus*). Barred owls (*Strix varia*), red-shouldered hawks (*Buteo lineatus*), American crow (*Corvus brachyrhynchos*), and pileated woodpeckers (*Drycopus pileatus*) inhabit the wetter woodlands onsite. Other upland avian species include the mockingbird (*Mimus polyglottis*), blue jay (*Cyanocitta cristata*), red-tailed hawk (*Buteo jamaicense*), screech owl (*Otus asio*), bobwhite (*Colinus virginianus*), wild turkey (*Meleagris gallopavo*), pine warbler (*Dendroica pinus*), mourning dove (*Zenadia macroura*), ground dove (*Columbina passerina*), eastern kingbird (*Tyrannus tyrannus*), savannah sparrow (*Passerculus sandwichensis*), field sparrow (*Spizella pusilla*) and loggerhead shrike (*Lanius ludovicianus*).

No nesting colonies of wading birds have been recorded, nor is it likely any colonies will become established on the SGS site due to the absence of undisturbed open water habitats preferred by these species. Wading bird nesting colonies are typically located in tree islands over or near open water, which helps protect the nests from terrestrial predators, such as raccoons and rats. The ditches on the site may

occasionally be utilized for foraging by common species such as white ibis (*Eudocimus albus*), little blue heron (*Egretta caerulea*), great blue heron (*Ardea herodias*), and great egret (*Casmerodius albus*).

Common reptile and amphibian species that have been observed or are considered likely to occur on the site include gopher tortoise (*Gopherus polyphemus*), black racer (*Coluber constrictor*), American toad (*Bufo americanus*), southern toad (*Bufo terrestris*), southern fence lizard (*Sceloporus undulatus*), green anole (*Anolis carolinensis*), and ground skink (*Scincella lateralis*).

Wetland areas on the SGS site are likely to provide breeding and foraging habitat for such species as the Southeastern five-lined skink (*Eumeces inexpectatus*), mole salamander (*Ambystoma talpoideum*), oak toad (*Bufo quercicus*), southern leopard frog (*Rana utricularia*), cricket frog (*Acris gryllus gryllus*), and squirrel treefrog (*Hyla squirella*).

Table 3.3.6-1 lists wildlife species actually observed on the SCCF area in fall 2015 and spring 2016.

Threatened and Endangered Species—Flora

The important flora of the region was researched through a variety of data sources, including but not limited to the Florida Natural Areas Inventory (FNAI) and websites of the Florida Department of Agriculture and Consumer Services (FDACS) and U.S. Fish & Wildlife Service (USFWS). Element occurrence records for the SGS site and surrounding area are provided by FNAI's, FDACS's, and USFWS's list of protected species in Putnam County. Table 3.3.6-2 lists important flora species with the potential to occur on or in the immediate vicinity of the SGS site (FNAI); out of those species, 24 are state-listed threatened or endangered. **None of these species were observed on the SGS site during the field surveys conducted in 2006 or on the SCCF area during the 2015 and 2016 surveys.** Descriptions of these species, including key identifying characteristics and preferred habitats, are provided in the following paragraphs.

Incised Groove-bur (*Agrimonia incisa*)

This is a state-threatened perennial herb. It has short, knotty rootstocks with black roots. Stems are thick, measuring approximately 2′ to 4′ tall, with long and short hairs intermixed. It has 12 to 18 leaves per stem, pinnately compound, with small principal leaflets numbering 7 to 9, pubescent on both surfaces and with coarsely serrate margins. It occurs in mature pine woods with a weedy hardwood understory. Incised groove-bur has the potential to occur on the SGS site due to some suitable onsite habitat.

Table 3.3.6-1. Wildlife Species Observed on the SCCF Area, 2015 and 2016

Common Name	Scientific Name
Amphibians	
Green treefrog	*Hyla cinerea*
Reptiles	
Black racer	*Coluber constrictor*
Eastern fence lizard	*Sceloporus undulatus*
Five-lined skink	*Eumeces fasciatus*
Gopher tortoise*	*Gopherus polyphemus*
Ground skink	*Scinella lateralis*
Birds	
Black vulture	*Coragyps atratus*
Blue jay	*Cyanocitta cristata*
Blue-gray gnatcatcher	*Polioptila caerulea*
Common crow	*Corvus brachyrhynchos*
Ground dove	*Columbina passerina*
Mourning dove	*Zenaida macroura*
Northern cardinal	*Cardinalis cardinalis*
Northern mockingbird	*Mimus polyglottos*
Red-shouldered hawk	*Buteo lineatus*
Tufted titmouse	*Parus bicolor*
Turkey vulture	*Cathartes aura*
White-eyed vireo	*Vireo griseus*
Mammals	
Bobcat	*Felis rufus*
Coyote	*Canis latrans*
Feral hog	*Sus scrofa*
Nine-banded armadillo	*Dasypus novemcinctus*
Opossum	*Didelphis virginiana*
White-tailed deer	*Odocoileus virginianus*
Sherman's fox squirrel*	*Sciurus niger shermani*

*State-listed species.

Source: ECT, 2016.

Table 3.3.6-2. Federally and State-Listed Plant Species Potentially Occurring on or Near the SGS Site

Scientific Name	Common Name	Federal Status	State Status	Likelihood of Occurrence
Agrimonia incise	Incised groove-bur		T	Moderate
Andropogon arctatus	Pine-woods bluestem		T	Moderate
Arnoglossum diversifolium	Variable-leaved Indian-plantain		T	Low
Asclepias viridula	Southern milkweed		T	Moderate
Balduina atropurpurea	Purple honeycomb-head		E	Moderate
Calydorea coelestina	Bartram's ixia		E	Moderate
Carex chapmanii	Chapman's sedge		T	Moderate
Centrosema arenicola	Sand butterfly pea		E	Moderate
Ctenium floridanum	Florida toothache grass		E	Moderate
Hartwrightia floridana	Hartwrightia		T	Moderate
Helianthus carnosus	Lake-side sunflower		E	Moderate
Illicium parviflorum	Star anise		E	Moderate
Litsea aestivalis	Pondspice		E	Moderate
Lythrum curtissii	Curtiss' loosestrife		E	Moderate
Matelea floridana	Florida spiny-pod		E	Moderate
Monotropsis reynoldsiae	Pygmy pipes		E	Moderate
Nemastylis floridana	Celestial Lily		E	Moderate
Nolina atopocarpa	Florida beargrass		T	Moderate
Orbexilum virgatum	Pineland scurfpea		E	Moderate
Pteroglossaspis ecristata	Giant orchid		T	Low
Pycnanthemum floridanum	Florida mountain-mint		T	Moderate
Rudbeckia nitida	St. John's blackeyed susan		E	Moderate
Salix floridana	Florida willow		E	Low
Verbesina heterophylla	Variable-leaf crownbeard		E	Moderate

Note: E = Florida endangered.
T = Florida threatened.

Source: FNAI Biodiversity Index, 2016.

Pine-woods Bluestem (*Andropogon arctatus*)

The pine-woods bluestem is a state-listed threatened perennial grass, with either erect or ascending stems, which can sometimes root at the nodes. It grows in pine flatwoods. Because the SGS site supports appropriate habitat for this species, there is potential for the pine-woods bluestem to occur onsite.

Variable-leaved Indian-plantain (*Arnoglossum diversifolium*)

This state-listed threatened perennial herb occurs in floodplain forests with limestone and clayey, basic soils and is found among a hardwood canopy and bald cypress. It has an angled stem approximately 6.5′ tall and heart or lance shaped lower leaves up to 4″ long; upper stemmed leaves are smaller and more deeply toothed having shorter or no leaf stalks. The SGS site supports some habitat to host this species.

Southern Milkweed (*Asclepias viridula*)

This is a state-listed threatened perennial herb occurring in wet flatwoods and prairies, seepage slopes, and pitcher plant bogs. It has erect and slender, mostly smooth stems that are purple at the base. Leaves are smooth, opposite, very narrow, and approximately 2″ to 4″ long. There is limited habitat on the SGS site to support the species; therefore, its potential of occurring onsite is low.

Purple Honeycomb-head (*Balduina atropurpurea*)

This is a state-endangered perennial herb approximately 1′ to 3.25′ tall with erect angled stems purplish at the base. Basal leaves reach up to 5″ in length and 0.5″ in width and have dark red leaf stalks. The stem leaves are smaller, widely spaced, and alternate and dotted with tiny translucent glands. Its habitat includes wet pine flatwoods and savannas, seepage slopes, pitcher plant bogs, and wet ditches. Purple honeycomb-head has the potential to occur on the SGS site due to some suitable onsite habitat.

Bartram's Ixia (*Calydorea coelestina*)

This is a state-endangered perennial herb approximately 8″ to 16″ tall. Basal leaves are narrow and grasslike; the stem leaves are reach up to 3.5″. Wet to mesic flatwoods serve as habitat for this plant species, and potential habitat occurs on the SGS site.

Chapman's Sedge (*Carex chapmanii*)

This is a state-endangered sedge that can either occur as solitary or as loose-tufted clumps 4″ to 12″ tall, with lightly brown basal sheaths, and sheaths green to yellow-green in color. Inflorescence is generally approximately 2″ in length and is produced on a spike approximately 12″ tall. Well-drained hammock woodlands serve as habitat for this plant species, and potential habitat for it exists on the SGS site.

Sand Butterfly Pea (*Centrosema arenicola*)

The sand butterfly pea is a state-endangered vine that grows in open, mixed woodlands and pine or oak-saw palmetto thickets. Its stems are up to 10′ long, weaving over branches and other vegetation. The leaves are composed of three oval leaflets approximately 2″ long and are dark green on color. There is an FNAI record for sand butterfly pea occurring in close proximity of the SGS site. It is possible sand butterfly pea could exist on the SGS site.

Florida Toothache Grass (*Ctenium floridanum*)

This is a state-endangered perennial grass with flowering stalks up to 3′ tall. Basal leaves are 2″ to 15″ in length, 0.25″ in width, and are bright green in color with pubescent veins. Stem leaves are shorter than basal leaves, few, and scattered. The plant's inflorescence is a cob-like, dense, one-sided spike that curls as it dries. Sandhills and dry or moist pinelands serve as habitat to support this plant species. There is some potential habitat on the SGS site to support Florida toothache grass.

Hartwrightia (*Hartwrightia floridana*)

This is a state-threatened perennial herb with a single, erect stem approximately 2′ to 3′ tall, rising from a basal rosette. Rosette leaves are entire with rounded tips and are approximately 3″ to 10″ long, with leaf bases tapering to a long leaf stalk. Stem leaves alternate and reduce upward along the stem to bracts. Inflorescence is large and open with flat-topped clusters of pink to whitish disc flower heads. Hartwrightia occurs in wet flatwoods, bogs, seepage slope clearings, and wet pine woods, and potential habitat for it exists on the SGS site.

Lake-side Sunflower (*Helianthus carnosus*)

This is a state-endangered perennial herb with one to two mostly leafless stems, approximately 2′ to 2.5′ tall, having one to two yellow ray flowers and many yellow disk flowers on a slightly domed disk. Leaves are approximately 4″ to 10″ long and 0.5″ wide, opposite, smooth, hairless, and are mostly clustered around the base of the stem. Lake-side sunflower occurs in wet flatwoods and prairies, and potential habitat for it exists on the SGS site.

Star Anise (*Illicium parviflorum*)

This state-endangered endemic Florida shrub has alternate, evergreen, simple, entire, smooth leaves up to 6″ long, with upper surface glossy green and lower surface dotted with pale glands. Flowers are less than 1″ wide, with 6 to 12 rounded yellow petals set on drooping flower stalks. The fruit is woody and star-shaped and less than 1″ wide. The plant has a distinct anise smell. It occurs on the banks of spring-run or

seepage streams, bottomland forest, hydric hammock, and baygall dominated by red maple and sweetbay. This species has a potential to occur in wetlands on the SGS site.

Pondspice (*Litsea aestivalis*)

This is a state-endangered shrub or small tree that stands approximately 10′ tall with deciduous, simple, alternate, somewhat leathery leaves measuring approximately 0.5″ to 1.5″. Flowers are approximately 0.25″ wide, opening before leaves appear, with six yellow sepals and no petals, usually in clusters at the tips of twigs. The fruits are red and round, measuring at less than 0.5″. The plant's preferred habitat is at the edges of swamps, cypress ponds, sandhill depression ponds, and Carolina bays, sometimes forming thickets around pond margins. Potential habitat exists on the SGS site.

Curtiss' Loosestrife (*Lythrum curtissii*)

This is a state-endangered perennial herb rising from a woody base, having one or several erect, much-branched stems. The leaves are widely spaced with very short or no leaf stalks. Leaves on lower stems are approximately 2″ long, opposite, and usually shed by flowering time, while the leaves on upper branches are smaller and alternate. The plant's preferred habitats are swamps over limestone, clearings in wet pine flatwoods, sunny patches in stream thickets, and floodplain forests. The SGS site offers little potential habitat for this species to exist onsite.

Florida Spiny-pod (*Matelea floridana*)

The Florida spiny-pod is a state-endangered milky vine. The leaves are heart shaped and somewhat elongated, opposite, and several inches long. The flowers are somewhat flat and burgundy red and are comprised of five petals. Its preferred habitat is upland sites: open woodlands, sandhills, and open fields; therefore, it has the potential to occur on the SGS site.

Pygmy Pipes (*Monotropsis reynoldsiae*)

This state-endangered perennial herb is unique because it lacks chlorophyll and is parasitic on underground fungi that are associated with roots of the trees. Stems are usually in clusters, measuring approximately 1.5″ to 5″ tall, fleshy, and dull white, purplish, or brown. Leaves are scalelike, less than 0.25″ long, spiraled around the stem, having the same color as stem. The flowers are white or lavender, slightly fragrant, and bell-shaped. The plant's preferred habitat is upland mixed hardwood forest, mesic and xeric hammock, sand pine, and oak scrub, and potential habitat for it does exist on the SGS site.

Celestial Lily (*Nemastylis floridana*)

This is a state-endangered perennial herb rising from a single stem. It has few, grasslike basal leaves, sometimes measuring to more than 2′ long. Stem leaves are small and scattered along the stem. The flowers consist of six dark blue, spreading petals that are more than 1.5″ across. The stamens have three coiled, yellow anthers, and the style is divided into six narrow, pointed branches. They open around 4 p.m. and close by dusk. The plant's preferred habitat is wet flatwoods, prairies, marshes, and cabbage palm hammocks edges, and some potential habitat for it exists on the SGS site.

Florida Beargrass (*Nolina atopocarpa*)

This is a state-threatened perennial herb rising from a bulbous stem. The leaves are simple and alternate. The inflorescence is a raceme covered in small white flowers. The seed is encapsulated in tiny asymmetrical capsules. Florida beargrass is found in pine flatwoods, and some potential habitat for it exists on the SGS site.

Pineland Scurfpea (*Orbexilum virgatum*)

This is a state-endangered perennial herb with slender hairy and erect stems, measuring 1′ to 2′ tall. The leaves are approximately 1″ to 3″ long and less than 0.25″ wide at the base, tapering to a pointed tip. They possess a conspicuous midvein and a pubescent lower surface. Flower clusters are up to 2″ long, compact, on a stalk rising from the angle of leaf and stem, with purple or dark blue flowers measuring to less than 0.375″ long. The fruit is a rounded pod, with a ridged surface and short beak. The plant's preferred habitat includes dry to moist longleaf pine-wiregrass savannas and flatwoods, and some potential habitat for it does exist on the SGS site.

Giant Orchid (*Pteroglossaspis ecristata*)

This species is a state-threatened perennial orchid. Its leaves are long, narrow, and overlapping and clustered at the base. Its flowers are yellowish-green with dark purple markings and occur on a terminal cluster. The giant orchid flowers from June to September. It occurs in numerous coastal plain habitats and tolerates a wide range of moisture conditions but is most often found in upland areas. Typical habitats include old fields, fire-maintained pine flatwoods, and scrub oak lands. On the SGS site, marginal habitat for this species is present within the herbaceous dry prairie (310), scrub oak habitat, or along upland forest edges.

Florida Mountain-mint (*Pycnanthemum floridanum*)

This is a state-threatened, shrub-like perennial that grows up to 4′ tall. The leaves are approximately 2″ long and release an aroma when crushed. Like in most herbaceous mints, the stems are square in cross

section, and the leaves are opposite each other. The mature leaves are covered with a whitish bloom that makes them appear ashy gray in color. Lavender tiny flowers are arranged in dense terminal clusters approximately 1″ in diameter. Typical habitats include sandhills and dry woods, and some potential habitat for it exists on the SGS site.

St. John's Blackeyed Susan (*Rudbeckia nitida*)

This is a state-endangered perennial herb reaching up to 7′ tall. The leaves are deep green, toothed, and glossy and are approximately 3″ to 6″ long. Flowers bloom from mid- to late summer for up to eight weeks and form loose clusters of yellow ray flowers with large green cones that darken with age. The plant is widely used in gardening. Typical habitats include edges of a woods and open spaces in full sun ecotones, and potential habitat for it exists on the SGS site.

Florida Willow (*Salix floridana*)

This wetland species is a state-endangered shrub or small tree. Its leaves are 2″ to 6″ long and up to 2″ wide. They are deciduous, alternate, and lance-shaped with rounded base and pointed tip and toothed margins with tiny, knobbed glands. Their upper surface is bright green, while the lower surface is grayish-white with hairy, brown veins. The flowers are both female and male and appear as catkins on separate plants. Florida willow prefers to grow along springheads, edges of spring runs, hydric hammocks, and floodplains, and some marginal habitat exists on the SGS site.

Variable-leaf Crownbeard (*Verbesina heterophylla*)

This is a state-endangered perennial herb, with winged stems measuring from 16″ to 32″ tall. The plant's leaves are 1″ to 3″ long and up to 1″ wide. They are mostly opposite and lack leaf stalks, with bluntly rounded tips and low teeth along the margins. Both leaves and stems are pubescent. The flower heads are found in loose clusters containing three to nine heads at the tips of branches, each head with 5 to 10 yellow ray flowers up to 0.5″ long. The fruit is tiny, measuring approximately 0.25″ long, and dry, seedlike, and dark brown with narrow wings. Variable-leaf crownbeard prefers moist to dry pine flatwoods with wiregrass, saw palmetto, runner oak, and bracken fern, and potential habitat exists on the SGS site.

Threatened and Endangered Species—Fauna

A comprehensive database of biological resources for Florida is maintained by FNAI, whose mission is to "collect, interpret, and disseminate ecological information critical to the conservation of Florida's biological diversity. FNAI's database and expertise facilitate environmentally sound planning and natural resource management to protect the plants, animals, and communities that represent Florida's natural heritage." This includes the compilation of documented occurrences of both federally and state-listed

protected plant and animal species. To identify protected species that may occur on or around the SGS site, applicable agency databases (USFWS and FWC) and literature pertaining to the site were reviewed, an area within 5 miles of the site was identified, and a report was extracted from FNAI's biodiversity matrix for evaluation. Based on information extracted from FNAI's biodiversity matrix, several protected species are known to occur in the vicinity of the site, and the site has the potential to provide habitat for several additional protected species. Two state-listed species, including gopher tortoise, and Sherman's fox squirrel, were documented during a pedestrian survey of the SCCF area (ECT, 2016).

Table 3.3.6-3 lists wildlife and fish species that potentially occur on the SGS site vicinity, including the St. Johns River, from which the existing power plant uses makeup water and discharges back to the river. Following is a description of each of the animal species listed in the table and a discussion of their habitat and likelihood of occurrence onsite.

Eastern Indigo Snake (*Drymarchon corais couperi*)

This listed threatened snake is one of the largest North American snakes and is found in virtually all natural habitats in Florida except open water. It is considered a commensal species with gopher tortoises and, as such, would be considered to possibly occur on the SGS site due to a wide variety of natural upland and wetland habitats and documented presence of gopher tortoises.

Gopher Tortoise (*Gopherus polyphemus*)

This reptile is a state-threatened species and a candidate species for federal listing. The Florida gopher tortoise prefers upland, well-drained sandy habitats in Florida, where it can burrow into the ground for shelter. As such, this species is a host for a wide variety of commensal cohabitants in its burrow, including many other listed species. ECT documented the presence of several burrows (30) in the vicinity of the proposed SCCF. These were documented in informal site surveys, so there are likely more onsite. Figure 3.3.6-1 shows the locations of documented burrows in the vicinity of SCCF.

Florida Sandhill Crane (*Grus canadensis floridanus*)

Florida sandhill cranes are a nonmigratory species that inhabit freshwater marshes, prairies, and pastures primarily of Central and South Florida. The Florida sandhill crane is protected both by the U.S. Migratory Bird Treaty Act and as a state-designated threatened species by FWC. Threats to the sandhill cranes include degradation or loss of habitat due to wetland drainage and conversion of prairie for development or agricultural use. Known to occur in Putnam County, the Florida sandhill crane has a low likelihood of occurrence on the SGS site due to lack of agricultural fields and shallow marshes onsite.

Table 3.3.6-3. Listed Wildlife and Fish Species Potentially Occurring on the SGS Site and Vicinity

Scientific Name	Common Name	Federal Status*	State Status†	Likelihood of Occurrence
Acipenser brevirostrum	Shortnose sturgeon	E	FE	Unlikely to occur in St. Johns River
Acipenser oxyrinchus	Atlantic sturgeon	E	FE	Unlikely to occur in St. Johns River
Drymarchon corais couperi	Eastern indigo snake	T	FT	Likely—due to presence of suitable habitat and gopher tortoise burrows present onsite
Gopherus polyphemus	Gopher tortoise	C	ST	Present—several gopher tortoise burrows found onsite
Grus canadensis pratensis	Florida sandhill crane	N	ST	Low—few marshes onsite for foraging or nesting
Mycteria americana	Wood stork	T	FT	Likely—for foraging in shallow wetlands and ditches; no known nesting colonies onsite; Project does not fall within core foraging area of any known nesting colonies
Notophthalmus peristriatus	Striped newt	C	N	Low—site within range, but habitat requirements limited to isolated cypress and bay ponds within pine flatwoods; these habitats are marginal onsite; no known occurrences in the site vicinity
Picoides borealis	Red-cockaded woodpecker	E	FE	Unlikely—suitable old growth pine flatwoods used for nesting absent onsite
Sciurus niger shermani	Sherman's fox squirrel	N	SSC	Present
Trichechus manatus	West Indian manatee	E, PT	FE	Potentially present in the St. Johns River
Various wading birds	Numerous species including little blue heron, and tricolored heron	N	SSC	Moderate habitat for foraging; no nesting colonies onsite

*E, PT= listed endangered, proposed threatened.
E= endangered.
T= threatened.
C= candidate for listing.
N= not federally listed.

†FE= federal listed as endangered.
FT= federal listed as threatened.
ST= state population threatened.
SSC= species of special concern.
N= not state-listed.

Sources: FNAI, 2016. FWC, 2016.
USFWS, 2016. ECT, 2016.

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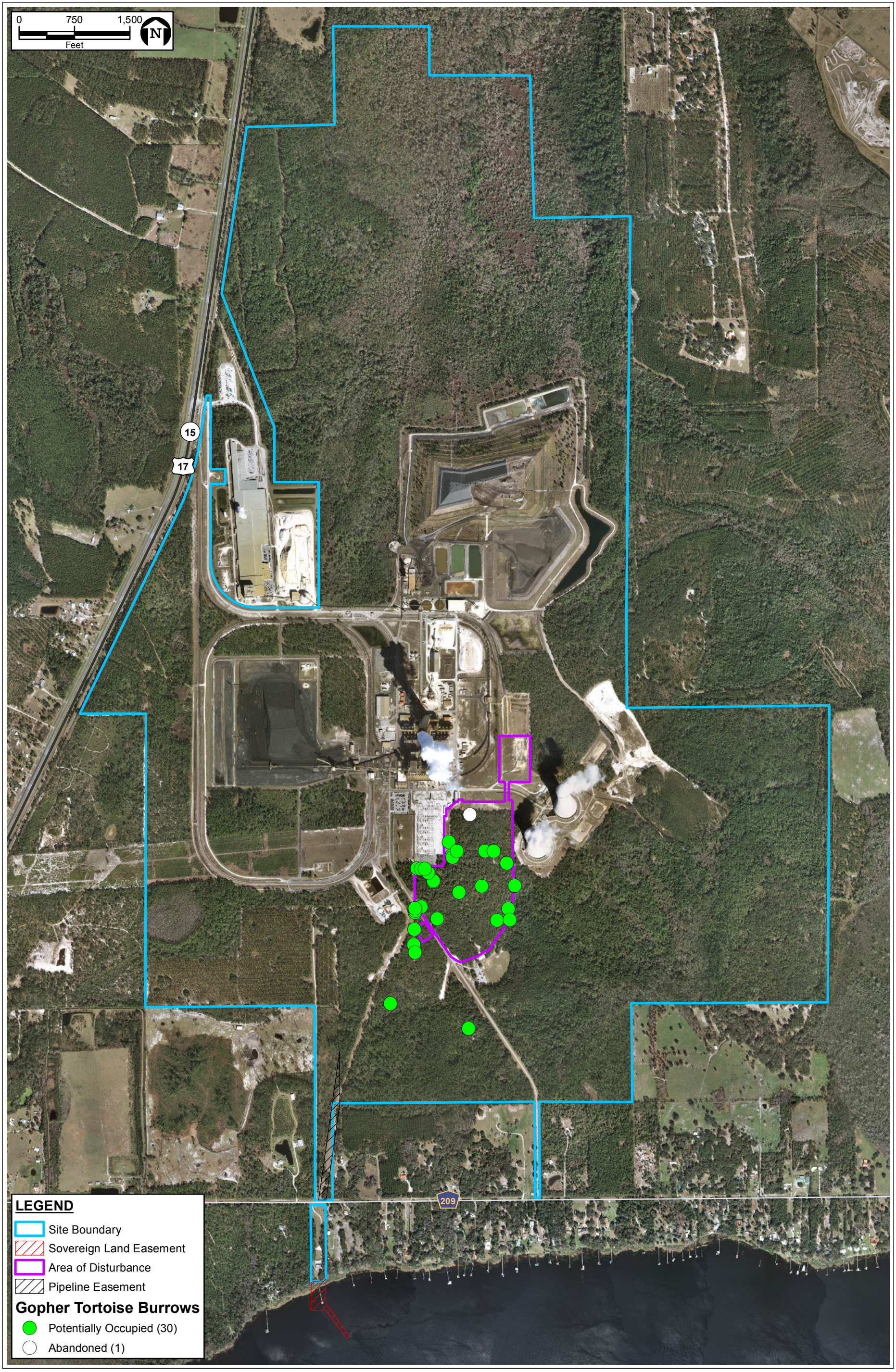


FIGURE 3.3.6-1.

GOPHER TORTOISE BURROWS IN THE SCCF VICINITY

Sources: FDOT, 2017; Putnam Co PA, 2016; ECT, 2017.

Seminole Electric COOPERATIVE, INC.

Wood Stork (*Mycteria americana*)

The wood stork is both federally and state-listed as an endangered species and is also protected by the U.S. Migratory Bird Treaty Act. These birds are large, long-legged, and white-bodied with black-edged wings. The adult birds have gray scaly skin on the upper neck and head instead of feathers. They nest in mixed colonies in tree islands surrounded by water in forested wetlands. Wood storks forage mainly on small fish, preferentially foraging in ditches or shallow marshes, where prey would be concentrated. Threats to wood stork population include fluctuations in hydrology, which affect the timing and success of nesting. While some suitable foraging habitat exists on the SGS site, no nesting colonies are known to occur within 5 miles. Their core foraging areas in north Florida are defined as a 15-mile radius around active colony sites. The SGS site does not intersect any known core foraging areas in North Florida.

Striped Newt (*Notophthalmus perstriatus*)

This salamander is proposed for federal listing (candidate species) and is found in southeastern Georgia and North Florida where it is habitat-restricted. It tends to occur only in sinkhole ponds in sandhill communities or bay ponds in pine flatwoods communities. Since these community types are both lacking on the SGS site, there is a low likelihood for its occurrence onsite, although it has been recorded in Putnam County.

Red-cockaded Woodpecker (*Picoides borealis*)

The red-cockaded woodpecker inhabits old-age pine flatwoods communities of North Florida and is federally listed as endangered. These birds typically nest in old, large pines inflicted with red-heart fungus, which allows the bird to form cavities in the tree for nesting. The nest cavities in living trees then produce a resin rim and flow from the cavity, which is believed to deter predators. Since no old age pine stands are documented onsite, it is unlikely this bird would occur there.

Sherman's Fox Squirrel (*Sciurus niger shermani*)

The Sherman's fox squirrel is a large, variably-colored rodent inhabiting open, fire maintained longleaf pine, turkey oak, sandhills, and flatwoods habitats throughout Florida and southern Georgia. Their diet consists of longleaf pine seeds and turkey oak acorns, but they will also forage for fungi, fruit, and tender plant buds. Designated as a state species of special concern and protected by Florida's Endangered and Threatened Species Rule, the main threat to the Sherman's fox squirrel population is habitat loss. Their habitat occurs onsite, and one individual was observed on the SCCF area, so it is documented as present.

Other Noteworthy Species

Wading birds—Several wading birds may be found on the SGS site foraging in some of the wetland habitats. These include the little blue heron (*Egretta caerulea*) and tri-colored heron (*Egretta tricolor*).

These birds are state-listed as species of special concern. There are no known wading bird colonies within 5 miles of the SGS site.

Bald eagle (*Haliaeetus leucocephalus*)—The bald eagle was delisted in 2008 but is still protected through the Migratory Bird Treaty Act and the Bald and Golden Eagle Act. The St. Johns River serves as foraging habitat, and potential nesting habitat exists all along its banks. The following nests are within 2 miles of the SGS site, but no nests are within 660′, which is the buffer recommended under the Bald Eagle Management Guidelines:

Nest ID	County	Latitude	Longitude	Last Surveyed-Active
PU194	Putnam	29 42.90	81 37.41	2014
PU192	Putnam	29 43.30	81 36.77	2013

Aquatic Systems—Habitat Types

Intake Structure

The current SGS and proposed SCCF intake structure is located in the St. Johns River (Figure 3.3.5-1). The portion of the river near the intake is characterized generally by many deep and wide segments, low stream velocities, and flow reversals due to diurnal tidal activity and, as such, is classified as a freshwater estuary. The portion of the St. Johns River at the cooling water intake system (CWIS) location is approximately 6,000′ wide with an average depth of 10′.

The CWIS is located approximately 6,561′ downstream of Rice Creek and 325′ offshore, beyond a noted eel grass bed (SECI, 1979). The CWIS is mounted on a bulkhead at the end of a 6′-wide concrete dock. The intake structure is located within a circular cofferdam made of sheet piling that is 1′ (-4′ elevation) above the river bottom (dredged to -5′ elevation) and provides a trough around the CWIS to ensure a constant supply of water for operation.

The 90th percentile water temperatures for St. Johns River near the CWIS of SGS is 88.06 and 45°F, summer and winter, respectively. St. Johns River salinity at Palatka is 0.4 practical salinity units (NOAA, 2016).

Discharge Structure

The current SGS and proposed SCCF discharge structure is also located in the St. Johns River (Figure 3.3.5-1). The point of discharge of Outfall D-001 is located approximately 900′ from the north shore of the St. Johns River. The discharge is through a 16″ diameter, submerged metal pipe. The end of the pipe is fitted with a 15-port diffuser. The submerged discharge pipe runs in a northwest to southeast direction. The discharge port is approximately 8′ below mean sea level.

The discharge pipe runs parallel to the intake pipe (under the access bridge). The discharge pipe is submerged for the length of the intake pipe. Following the intake structure, the discharge pipe follows the contours of the river bottom (exposed). The discharge pipe effectively avoids any sensitive vegetation beds that occur between the intake structure and the shoreline as it discharges at a depth that encourages mixing in deep waters (as compared to closer to shore).

The St. Johns River in the vicinity of the SGS site is designated as a Class III water body. This corresponds to uses such as recreation and propagation and maintenance of healthy and well-balanced fish and wildlife populations. Dames and Moore (1979) provided a detailed description of the river habitats in the vicinity of the intake and discharge structures. They found vegetation beds containing eel grass (*Vallisneria americana*) in the river near the structure . These grass beds can provide important nursery habitat for fish species. Vegetation surveys conducted then found beds from approximately 16.4′ to approximately 230′ offshore. This vegetation was found to be fairly continuous both upstream and downstream of the CWIS location, which is the closest structure to shore.

Aquatic Systems-Fauna

The St. Johns River is one of three coastal plain estuaries in Northeast Florida that is monitored by FWC through their Fisheries Independent Monitoring (FIM) Program. This program conducts intensive sampling of fish and selected invertebrates (started in 2001). Monthly stratified random sampling is completed in six geographically defined riverine zones. The SGS site is located within Zone F. Sampling within this zone is conducted using 21.3-meter river seines and 6.1-meter river otter trawls (FIM Program Staff, 2016).

During the FIM Program of 2015, 203 species were recorded to occur within St. Johns River, with 71 species being observed within Zone F (the zone that contains the SGS CWIS) (Table 3.3.6-4). None of the species identified to be present within the vicinity of the SGS site are considered rare or have state or federal protection.

Relative abundance data was collected for the taxa observed within Zone F of the FIM Program (Table 3.3.6-4). The numerically dominant taxa were anchovy (16.88 percent), followed by shad, silverside, Atlantic croaker, and mosquitofish, which together made up 55 percent of the total catch.

Table 3.3.6-4. Relative Abundance of Species Collected during Northeast Florida's Stratified Random Sampling in Zone F, 2015

Species	Number of Organisms per 192 Hauls	Relative Abundance (percent)
Agonostomus monticola	1	0.00
Alosa aestivalis	108	0.47
Alosa sapidissima	6	0.03
Ameiurus catus	408	1.77
Ameiurus nebulosus	3	0.01
Amia calva	2	0.01
Anchoa mitchilli	3,895	16.88
Anguilla rostrata	3	0.01
Bairdiella chrysoura	5	0.02
Brevoortia spp.	20	0.09
Callinectes sapidus	95	0.41
Centrarchidae spp.	3	0.01
Citharichthys spilopterus	25	0.11
Ctenogobius shufeldti	56	0.24
Cynoscion complex	15	0.07
Dasyatis sabina	45	0.20
Dormitator maculatus	3	0.01
Dorosoma cepedianum	3	0.01
Dorosoma petenense	76	0.33
Elops saurus	1	0.00
Enneacanthus gloriosus	69	0.30
Esox niger	7	0.03
Eucinostomus harengulus	8	0.03
Eucinostomus spp.	1	0.00
Farfantepenaeus aztecus	1	0.00
Fundulus chrysotus	5	0.02
Fundulus seminolis	557	2.41
Gambusia holbrooki	2,744	11.89
Gobionellus oceanicus	3	0.01
Gobiosoma bosc	4	0.02
Gobiosoma spp.	27	0.12
Heterandria formosa	372	1.61
Ictalurus punctatus	39	0.17
Labidesthes sicculus	118	0.51
Lagodon rhomboides	1	0.00
Leiostomus xanthurus	67	0.29
Lepisosteus osseus	1	0.00
Lepisosteus platyrhincus	14	0.06

Table 3.3.6-4. Relative Abundance of Species Collected during Northeast Florida's Stratified Random Sampling in Zone F, 2015 (Continued, Page 2 of 2)

Species	Number of Organisms per 192 Hauls	Relative Abundance (percent)
Lepomis auritus	122	0.53
Lepomis gulosus	24	0.10
Lepomis macrochirus	1,279	5.54
Lepomis microlophus	776	3.36
Lepomis punctatus	8	0.03
Lepomis spp.	652	2.83
Litopenaeus setiferus	159	0.69
Lucania goodei	1,042	4.52
Lucania parva	1,702	7.38
Lutjanus griseus	1	0.00
Membras martinica	9	0.04
Menidia spp.	3,250	14.09
Microgobius gulosus	265	1.15
Microphis brachyurus	1	0.00
Micropogonias undulatus	2,848	12.34
Micropterus salmoides	944	4.09
Morone saxatilis	1	0.00
Mugil cephalus	69	0.30
Mugil curema	4	0.02
Myrophis punctatus	3	0.01
Notemigonus crysoleucas	549	2.38
Notropis maculatus	2	0.01
Oreochromis aureus	30	0.13
Oreochromis spp.	129	0.56
Paralichthys lethostigma	32	0.14
Poecilia latipinna	184	0.80
Pomoxis nigromaculatus	25	0.11
Pterygoplichthys spp.	7	0.03
Sciaenops ocellatus	3	0.01
Strongylura marina	34	0.15
Strongylura spp.	18	0.08
Syngnathus scovelli	10	0.04
Trinectes maculatus	80	0.35
Totals	23,073	100.00

Source: ECT, 2016.

Aquatic Systems—Threatened and Endangered Species

Three aquatic species were listed in Table 3.3.6-3 that may have the potential to occur in the vicinity of the SGS CWIS and discharge structures and in this portion of St. Johns River: shortnose sturgeon, Atlantic sturgeon, and the West Indian manatee.

Shortnose Sturgeon (*Acipenser brevirostrum*)

The shortnose sturgeon is a state- and federally listed endangered fish occasionally but rarely found in St. Johns River. This is an anadromous species that spends most of its life in brackish water and then migrates into coastal rivers to spawn. This species has more affinity to fresh water than the Atlantic sturgeon does, and is rarely found in the St. Johns River. It is unlikely to occur in the vicinity of the SGS intake/outfall (FWC, 2016; USACE, 2013).

Atlantic Sturgeon (*Acipenser o. oxyrinchus*)

This federally endangered fish occurs along the Atlantic coast from Canada to Florida. It occasionally is found in inland waters, but few specimens have been documented in the St. Johns River, and it probably does not breed in Florida anymore due to the impoundment of the Oklawaha River. Based on its rarity inland, it is unlikely to occur near the SGS site (USACE, 2013).

West Indian Manatee (*Trichechus manatus*)

This large mammal occurs along Florida's coast and major inland waterways, including the St. Johns River. This species is listed as endangered and its presence is possible in the river near the SGS site. The St. Johns River is part of the designated (1976) critical habitat for the species. There is not a manatee protection plan in Putnam County, even though the County is shown as part of the USFWS range for the species (which extends down to Lake George). FWC conducted a survey in 1994/1995 and found a maximum of 28 manatees per day just upstream of the intake to SGS (FWC, 1995). The animals were focused on the western shore near the wetlands associated with Moccasin Creek.

The intake and discharge structures of SGS extend beyond any submerged aquatic vegetation areas. The structures are located in deeper (12′) water beyond the vegetation along the shore (as identified during the initial 316b study for SECI). For this reason, manatees are likely in the waters around the structures, but would not spend much time near them. Rather, they would simply be passing by on their way to suitable foraging areas.

3.3.6.2 Preexisting Stresses

The preexisting stresses to upland habitats and wildlife on the SGS site are noise, lighting, and human presence due to the existing power generation operations on the site. However, the site size is large (approximately 1,996 acres), and much of it is still in a natural state, which provides plenty of buffer to onsite wildlife and those species in the vicinity.

The primary preexisting stresses to aquatic systems in the vicinity of the site are associated with the electrical generation operations at SGS, particularly effects from potential impingement and entrainment on fish and shellfish associated with the CWIS and from thermal effects from the cooling water discharge. The CWIS has previously been determined to be best technology available (BTA) under Section 316(b) of the Clean Water Act (CWA). SECI is currently evaluating the new 316b rule for compliance at this facility (see Chapter 6.0).

3.3.7 Noise

3.3.7.1 Noise Regulations

The State of Florida has no applicable state noise laws or regulations. Putnam County's noise standards[5] apply only to "amplified sound," which is "any noise or sound that is artificially enhanced or increased in volume by means of amplifier, speaker, tape or disc player, radio, or any other mechanical or electronic device."[6] SCCF will not produce amplified sound; therefore, the Putnam County noise standards are not applicable for the Project, and the following noise limit discussions are provided for informational comparison purposes only.

Under the ordinance, the maximum permissible sound levels are specified by the day/time and sensitivity of the property experiencing the noise disturbance. Table 3.3.7-1 provides a summary of the maximum allowable amplified sound levels allowed.

Noise sensitive use means hospitals, nursing homes, schools, courts of law, or other areas designated by resolution of the Board of County Commissioners. There are no noise sensitive properties in the immediate vicinity of SGS; therefore, if applicable, the maximum permissible sound levels would be 65 dBA during the nighttime and either 70 or 75 dBA during the daytime.

[5] Article VII, Chapter 18, Putnam County Code,
[6] § 18-199, Putnam County Code.

Table 3.3.7-1. Maximum Allowable Amplified Sound Limits

Property Experiencing Noise Disturbance	Day of Week/Time of Day	Sound Level Limit, L_{eq} (dB)	
Noise sensitive	All day/any time	65 (A-wt)	70 (C-wt)
All others	Sunday-Thursday/8:01 a.m. – 10 p.m.	70 (A-wt)	75 (C-wt)
	Sunday-Thursday/10:01 p.m. – 8 am	65 (A-wt)	70 (C-wt)
	Friday-Saturday/8:01 a.m. – 11:30 p.m.	75 (A-wt)	80 (C-wt)
	Friday-Saturday/11:31 p.m. – 8 a.m.	65 (A-wt)	70 (C-wt)

Source: Putnam County Code of Ordinances, Chapter 18, Article VII, Section 18-201, amended March 8, 2016.

3.3.7.2 Ambient Noise Levels

An ambient noise survey was conducted to establish background or baseline ambient noise levels at various locations along the property boundary of the SGS site, in the general vicinity of the proposed SCCF location. Baseline ambient noise levels should be taken into account when assessing noise impacts from a potential new noise source, such as the SCCF Project. Baseline ambient noise measurements were conducted to capture ambient noise levels, both during daytime hours when businesses are in operation and truck traffic is more frequent, as well as during nighttime hours. The area surrounding the existing SGS site in the general vicinity of the SCCF Project is undeveloped and zoned agricultural. Anthropogenic (man-made) noise sources in the area include noise from the existing SGS and vehicle traffic on US 17 to the west and CR 209 to the south. Ambient noise measurement locations were selected to provide a representative sample of noise measurement locations along the existing SGS property boundary in the vicinity of the proposed SCCF location and are shown in Figure 3.3.7-1.

Noise measurements were conducted on Thursday, February 25, 2016, using a Larson-Davis Model 831 sound level meter and internal octave band analyzer. The sound level meter was set for a slow response using the linear integration method. The sound level meter was provided with a free field microphone. A microphone correction was programmed to provide each sound level meter with a random incidence response. These measurements were then recorded every 10 seconds, for a total duration of 30 minutes at each monitoring location.

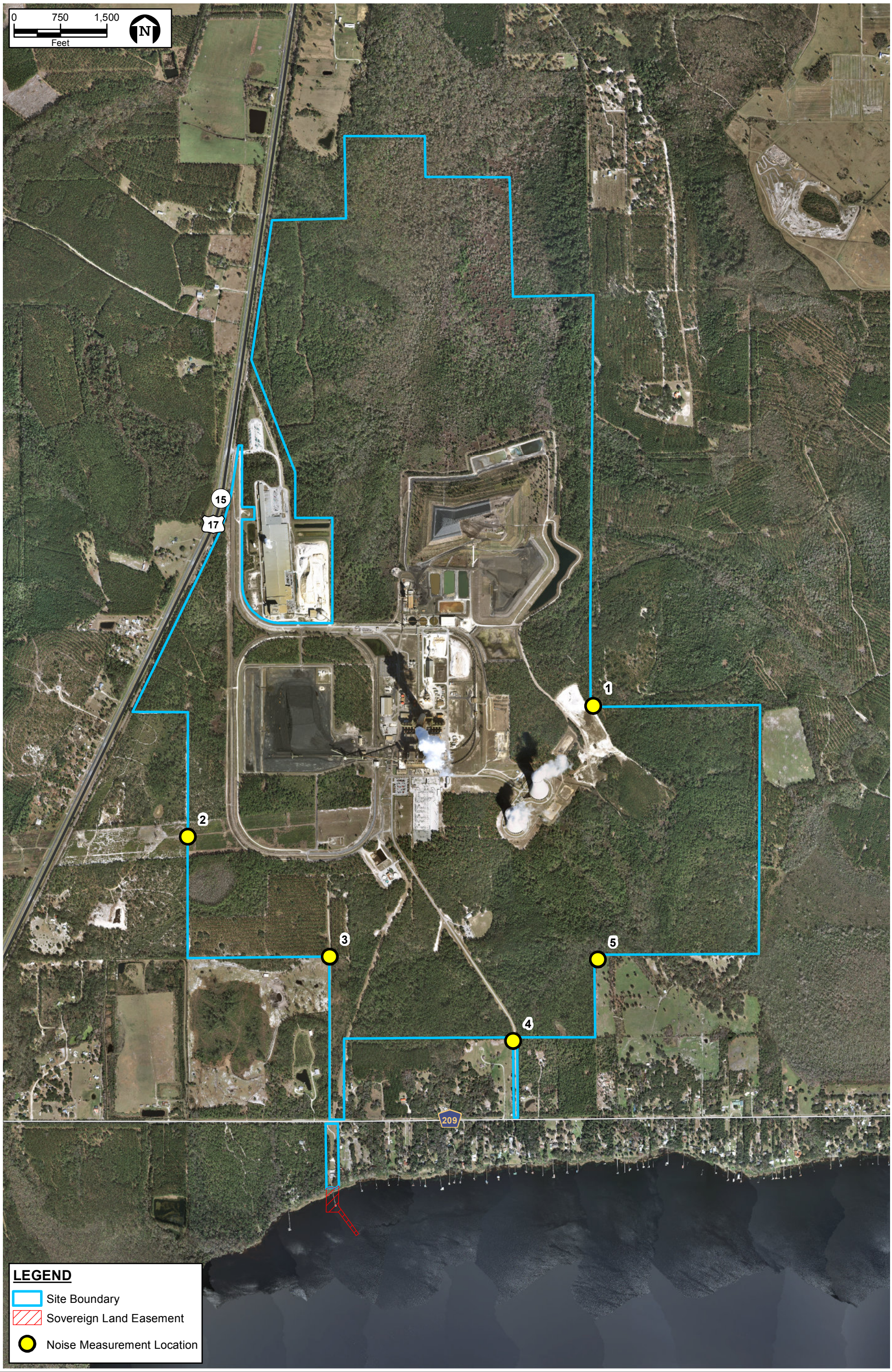


FIGURE 3.3.7-1.

AMBIENT NOISE MEASUREMENT LOCATIONS

Sources: FDOT, 2017; ECT, 2017.

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The instrument was equipped with circuitry and a microphone to meet the requirements of ANSI S1.4-1983 for Type I precision sound level meters. The microphone was positioned at a height of approximately 4′ to 5′ above the ground. A foam windscreen was used to reduce but not eliminate wind-generated noise. Calibration levels of the instrument were checked before and after the series of noise measurements using a Larson-Davis CAL200 sound level calibrator.

The sound level meter was programmed to measure and record the equivalent continuous sound level (L_{eq}) in dBA, C-weighted decibels (dBC), and flat-frequency weighting (dBZ) for each 10-second interval of the measurement period. Sound levels were also measured and recorded in frequencies corresponding to each full octave band and one-third octave bands. At the end of the measurement period, the data were downloaded directly into a computer for storage and further data analysis. While measurements were recorded in dBA, dBC, and dBZ (flat weighting), all sound level measurement results are presented in dBA.

The L_{eq} is a sound energy level averaged over a specified time period and represents, in a single constant numerical value, the amount of actual time-varying sound energy received during the time interval. The strength of the L_{eq} lies in the ability to assess the total time-varying effects of noise on sensitive receptors. LA_{eq} represents the L_{eq} measured in decibels on the A scale.

Daytime noise measurements started at approximately 7 a.m. and concluded at approximately 11 a.m. Weather conditions during daytime measurements were clear with an ambient temperature of 48°F throughout the morning. A weather front was moving through the area, and the wind was consistently blowing at 10 to 15 miles per hour (mph), with gusts greater than 15 mph. There was no precipitation during daytime noise measurements. High winds affected several daytime noise measurements by creating noise from movement and rustling of pine trees.

Nighttime noise measurements started at approximately 7 p.m. and concluded at approximately 11 p.m. The wind was considerably less during the nighttime measurements as compared to daytime noise measurements.

The Existing SGS Units were in operation during ambient noise measurements. Unit 1 was at full load for both daytime and nighttime ambient noise measurements. Unit 2 was at 95-percent load at the beginning of the daytime noise measurements and ramped up to full load by 7:46 a.m. Unit 2 load started ramping down at 10:46 a.m., three minutes before the end of daytime noise measurements. Unit 2 was at 96-percent load at the start of nighttime noise measurements and was at full load at 7:31 p.m. Unit 2 load started ramping down at 10:30 p.m., 11 minutes before the end of nighttime noise measurements.

Table 3.3.7-2 summarizes ambient noise measurement results. The LA_{eq} for ambient sound level measurements taken during daytime hours captured daytime operations. The measurements taken during nighttime hours did not include some noise levels associated with daytime operations, such as increased vehicle traffic.

As shown in Table 3.3.7-2, although not applicable, ambient noise level measurements were well below the Putnam County maximum sound level limits of 70/75 dBA daytime and 65 dBA nighttime for amplified sounds.

Table 3.3.7-2. Ambient Noise Measurements

Location	Description	Time	Duration (minutes)	LA_{eq} (dBA)
Daytime Operations				
1	Eastern boundary adjacent to cooling towers	7:06 to 7:36 a.m.	30	53.3
2	Western boundary in transmission line right-of-way	7:58 to 8:28 a.m.	30	48.9
3	Southern boundary	8:44 to 9:14 a.m.	30	50.5
4	Southern boundary along access road from West River Road	9:25 to 9:55 a.m.	30	52.0
5	Southeastern boundary	10:19 to 10:49 a.m.	30	50.8
Nighttime Operations				
1	Eastern boundary adjacent to cooling towers	7:46 – 8:16 p.m.	30	53.8
2	Western boundary in transmission line right-of-way	8:32 – 9:02 p.m.	30	41.9
3	Southern boundary	9:15 – 9:45 p.m.	30	45.0
4	Southern boundary along access road from West River Road	10:11 – 10:41 p.m.	30	46.3
5	Southeastern boundary	6:50 – 7:20 p.m.	30	44.6

Source: ECT, 2016.

3.3.8 Other Environmental Features—Meteorology and Ambient Air Quality

3.3.8.1 Meteorology/Climatology

The SGS site lies within the Northern Hemisphere's humid subtropical climate zone. This zone is noted for long, hot, humid summers and mild, wet winters. The north-central Florida climate is also affected by maritime influences from the Atlantic Ocean and the Gulf of Mexico. Summers are humid, warm to hot,

and long. Winters are typically mild with weak cold fronts occurring, which in rare instances produce brief freezing conditions.

Table 3.3.8-1 provides a summary of monthly mean and extreme temperatures based on National Weather Service (NWS) data collected at the Palatka station (NWS Cooperative Observer Identification No. 086753) located in Putnam County for the period of record from 1981 through 2010. The Palatka station is located approximately 3.5 miles south-southwest of the SGS site and is the most representative NWS surface observation station with available temperature and precipitation data. As shown in Table 3.3.8-1, there is only an approximately 26°F variation in the monthly mean temperatures. Temperatures at or above 90°F have occurred in every month except December, which had its highest recorded temperatures of 85°F. From 1971 through 2000, only 10.7 days per year (average) experienced below-freezing temperatures reported at some time during the day.

Table 3.3.8-1. Ambient Temperatures Measured at Palatka, Florida (1981 through 2010)

	Daily (°F)		Monthly (°F)		
Month	Mean Maximum	Mean Minimum	Lowest Mean	Mean	Highest Mean
January	67	47	47.3	56.5	65.8
February	72	48	49.9	59.7	69.5
March	77	52	54.3	64.5	74.6
April	84	57	58.9	69.8	80.6
May	89	62	65.4	76.2	87.0
June	91	69	71.5	80.9	90.2
July	92	73	73.1	82.4	91.8
August	92	73	73.2	81.8	90.5
September	89	69	71.4	79.2	87.0
October	85	61	65.0	73.1	81.1
November	77	54	57.1	65.4	73.8
December	70	48	50.2	58.7	67.3
Annual			61.4	70.7	79.9

Sources: NOAA Online Weather Data, 2017.
ECT, 2017.

Relative humidity values were not available from the Palatka station but were available from Gainesville Regional Airport (GRA) which is approximately 39 miles (63 kilometers [km]) west of the SGS site (see Table 3.3.8-2). Generally, winter temperatures are quite temperate and less humid. Wintertime temperatures generally range between approximately 50 and 70°F, with a relative humidity slightly lower than experienced in late summer. Typical monthly summertime temperatures range between 72 and 91°F,

with a relative humidity of 89 to 95 percent during the night and early morning and 57 to 64 percent in the afternoon. Relative humidity in the Gainesville area varies from 49 to 95 percent throughout the year. The highest relative humidity occurs in the early morning hours, with an annual average of 91 percent. The relative humidity during the daytime and early evening hours ranges from approximately 49 to 64 percent, with an average of 57 percent. The mild winter climate can be attributed to the relatively close proximity to both the Atlantic Ocean and the Gulf of Mexico. During the winter, relatively warm air from both bodies of water maintains the mild winter climate.

Table 3.3.8-2. Gainesville, FL Normal Relative Humidity Data (1981 through 2010)

Month	Morning (%)	Afternoon (%)
January	89	59
February	89	56
March	91	53
April	90	49
May	91	50
June	89	57
July	89	60
August	91	61
September	95	64
October	93	61
November	93	59
December	91	60
Annual	91	57

Sources: NCDC, Comparative Climate Data: For the United States through 2015, 2015. ECT, 2016.

Based on historical records, rainfall in the vicinity of the site is expected to vary widely from month to month. Table 3.3.8-3 presents 30-year rainfall records from the Palatka station. Average rainfall is greatest during the summer months, when convective thunderstorms are likely, and lower for the remainder of the year, especially in the winter and early spring months. Table 3.3.8-3 also presents the daily and maximum rainfall values. The maximum daily rainfall from 1971-2000 has ranged from 3.01″ to 8.56″. Monthly precipitation has varied from 0.05 to almost 15″.

Table 3.3.8-3. Precipitation Measured Palatka, Florida (1981 through 2010)

Month	Monthly Mean (inches)	Daily Normal Maximum (inches)
January	2.82	0.11
February	3.06	0.13
March	3.80	0.15
April	2.06	0.08
May	2.74	0.15
June	6.42	0.24
July	6.30	0.22
August	6.72	0.24
September	7.66	0.28
October	3.50	0.19
November	2.33	0.09
December	2.01	0.07

Sources: NOAA Online Weather Data, 2017.
ECT, 2017.

The normal annual precipitation recorded for Palatka, Florida, is 50.42″, with most of this precipitation occurring during the summer months. The winter months are much drier, with the monthly precipitation averaging 3.3″ per month. The large amount of summer rainfall is attributed to strong afternoon thunderstorms that can become extremely intense at times. These thunderstorms are a result of the moisture and heat introduced into the atmosphere during the hot summer days. Rainfall during the winter months results from low pressure frontal systems moving through the area.

The nearest station with detailed representative wind data is Jacksonville International Airport located approximately 50 miles north of the site. Figure 3.3.8-1 provides a 5-year annual wind rose based on wind speed and direction observed for the years 2010 through 2014. Figure 3.3.8-2 depicts 5-year seasonal wind roses for the same station. The information presented in Figures 3.3.8-1 and 3.3.8-2 provides a visual depiction of the wind speed and direction and represents the percent of time the wind blows from a particular direction at a given speed.

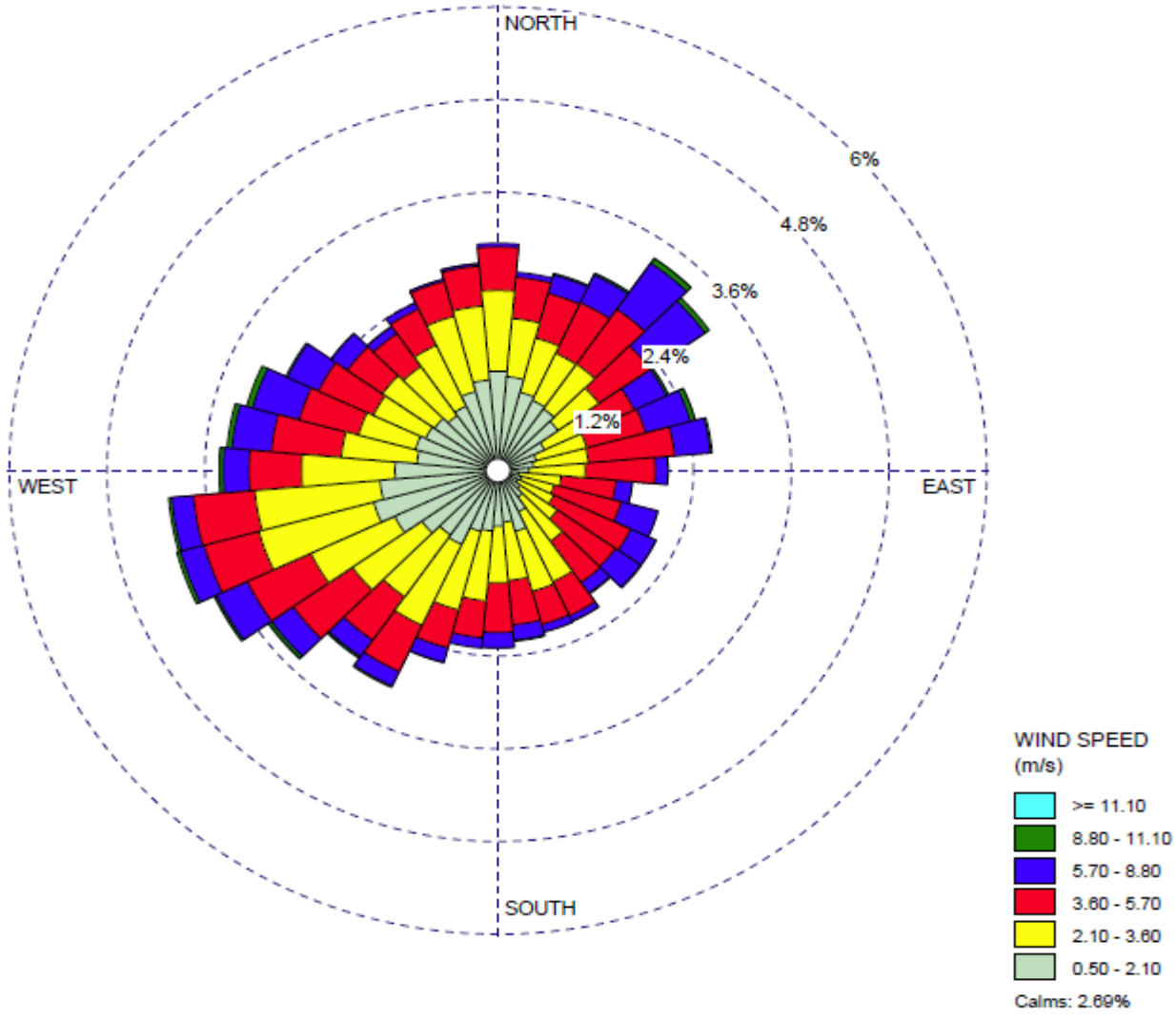


FIGURE 3.3.8-1.

FIVE-YEAR ANNUAL WIND ROSE, JACKSONVILLE INTERNATIONAL AIRPORT (2010 THROUGH 2014)

Source: ECT, 2016.

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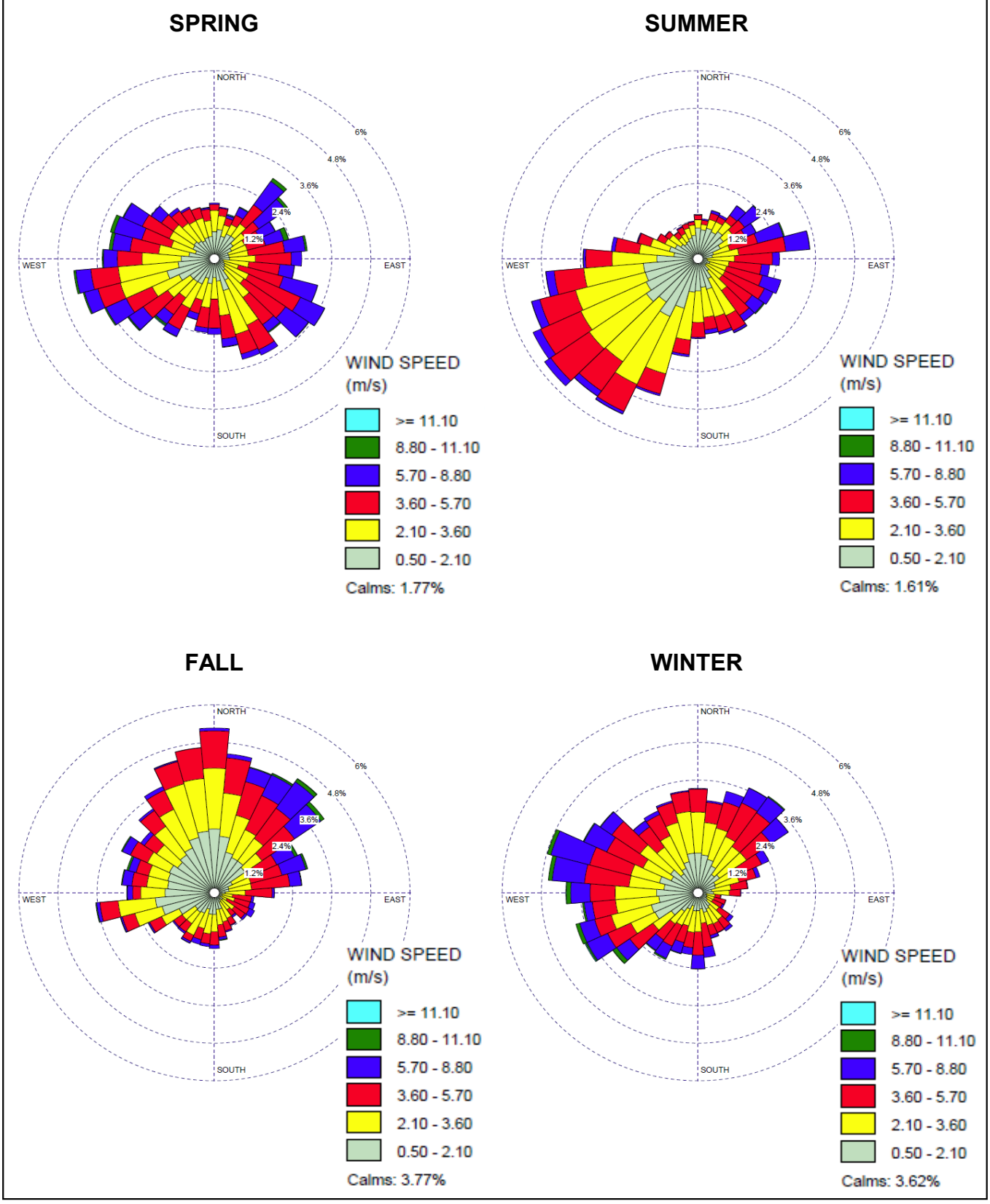


FIGURE 3.3.8-2.

FIVE-YEAR SEASONAL WIND ROSE, JACKSONVILLE INTERNATIONAL AIRPORT (2010 THROUGH 2014)

Source: ECT, 2016.

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Over the 5-year period, the wind direction is more predominant from the west sector, with the strongest and most prevalent winds from the east-northeast direction. Winds in the spring predominate from the eastern sector, and stronger winds from the west are common during summer months. In the fall, winds mostly occur from the northeast quadrant, and there is a strong northerly wind component in the winter. The average wind speed over the 5-year period was 7.07 mph. Spring recorded the highest average winds at 7.87 mph, while the lowest recorded average winds are in the fall at 6.46 mph.

3.3.8.2 Ambient Air Quality

Ambient air quality is affected by meteorology, atmospheric chemistry, and pollutant emissions. Meteorology controls the distribution, dilution, and removal (e.g., deposition) of pollutants. Atmospheric chemistry governs the reactions that transform primary pollutants into other chemical compounds referred to as secondary pollutants. The type, amount, and location of sources of pollutant emissions can affect ambient air quality. It is during periods of low wind speeds that the maximum ground level concentration of pollutants normally occurs. During the summer months, the intensity of sunlight is at its highest peak. A combination of high pollutant concentrations and an abundance of ultraviolet light can cause the production of photochemical smog, which contains pollutants such as ozone. Relative humidity also plays a factor in atmospheric dispersion and chemical transformation because of interactions between pollutants and water molecules.

Air pollutants are broken down into two different categories: primary and secondary. Primary pollutants are generated directly from the source (i.e., NO_x, sulfur oxides [SO_x], carbon monoxide [CO], and PM). Secondary pollutants are formed when primary pollutants react with atmospheric compounds (water, nitrogen, oxygen) under various atmospheric conditions (temperature, humidity, light intensity). An example of a secondary pollutant is ozone, which is formed when NO_x and organic compounds react producing free oxygen atoms in the presence of sunlight.

EPA has established national ambient air quality standards (NAAQS) for six different pollutants: SO_2, nitrogen dioxide (NO_2), CO, PM, lead, and ozone. These six pollutants are referred to as criteria pollutants. There are two sets of federal limits developed for each criteria pollutant, primary and secondary NAAQS. Primary NAAQS are health-based, with the principle objective being to protect human health. Secondary NAAQS were developed to protect human welfare, such as the environment and physical property. As a criteria pollutant, PM is further categorized into two different size categories, i.e., the NAAQS for particulate matter less than or equal to 10 micrometers (PM_{10}) and particulate matter less than or equal to 2.5 micrometers ($PM_{2.5}$).

Table 3.3.8-4 shows the primary and secondary NAAQS developed for different averaging times dependent on the characteristics of the pollutant. Florida adopted the federal limits for all pollutants and has not established more stringent ambient air quality standards (AAQS).

On October 1, 2015, EPA promulgated an 8-hour ozone NAAQS of 70 parts per billion (ppb), strengthening the 2008 8-hour ozone NAAQS of 75 ppb. On May 21, 2012, EPA issued initial designations for the 2008 8-hour ozone NAAQS. For Florida, Chapter 40, Part 81.310, Code of Federal Regulations (CFR), was revised to designate all areas of the state, including Putnam County, as unclassifiable/attainment for the 2008 8-hour ozone NAAQS.

Ambient air quality data collected from air monitoring stations are accessible online through FDEP's Air Resources Management. Based on such ambient air monitoring data, it is anticipated that all counties in Florida will be in attainment with the 2015 8-hour ozone NAAQS. On the federal level, the 8-hour ozone standard is in effect, and the 1979 1-hour ozone standard has been revoked, except in specific metropolitan areas (in Florida these are Jacksonville, Miami-Fort Lauderdale-West Palm Beach, and Tampa-St. Petersburg-Clearwater). The SGS site is outside these areas.

Except for portions of Hillsborough and Nassau Counties that have been designated as nonattainment for the 2010 1-hour SO_2 NAAQS, and portions of Hillsborough County designated as nonattainment for the Lead 8-hour standard, Putnam County and the entire state of Florida are designated as attainment or unclassifiable for all other AAQS.

Ambient air quality monitors collect data used to determine attainment status. Figure 3.3.8-3 shows the location of north and central Florida ambient air monitoring stations, which are the closest stations to the SGS site for the criteria pollutants. Table 3.3.8-5 provides the most recent monitored levels at the monitor locations in relation to the NAAQS. All of the monitored levels are less than NAAQS.

Table 3.3.8-4. NAAQS and Florida AAQS

Pollutant	Averaging Period	Florida and National Standards* Primary	Florida and National Standards* Secondary
SO_2	3-hour[1]		1,300 (0.5 ppm)
	1-hour[2]	196 (75 ppb)	
PM_{10}	24-hour[3]	150	150
$PM_{2.5}$	24-hour[4]	35	35
	Annual[5]	12	15
CO	1-hour[1]	40,000 (35 ppm)	
	8-hour[1]	10,000 (9 ppm)	
Ozone	2008 8-hour[6]	0.075 ppm	0.075 ppm
	2015 8-hour[6]	0.070 ppm	0.070 ppm
NO_2	Annual[7]	100 (53 ppb)	100 (53 ppb)
	1-hour[8]	188 (100 ppb)	
Lead	Rolling 3-month average	0.15	0.15

Note: $\mu g/m^3$ = microgram per cubic meter. ppm = part per million.
ppb = part per billion. ppmv = part per million by volume.

*$\mu g/m^3$ unless otherwise stated.

[1]Not to be exceeded more than once per calendar year.
[2]99th percentile of 1-hour daily maximum concentrations averaged over 3 years.
[3]The standards are attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$, as determined in accordance with 40 CFR 50, Appendix K, is equal to or less than 1.
[4]98th percentile concentration, as determined in accordance with 40 CFR 50, Appendix N.
[5]Arithmetic mean concentration, as determined in accordance with 40 CFR 50, Appendix N.
[6]Standard attained when the average of the annual 4th highest daily maximum 8-hour average concentrations over a 3-year period are less than or equal to the standard, as determined by 40 CFR 50, Appendix I.
[7]Arithmetic mean.
[8]Standard based on the 98th percentile of the 1-hour daily maximum NO_2 concentrations averaged over 3 years.

Sources: 40 CFR 50.
Section 62-204.240, F.A.C.

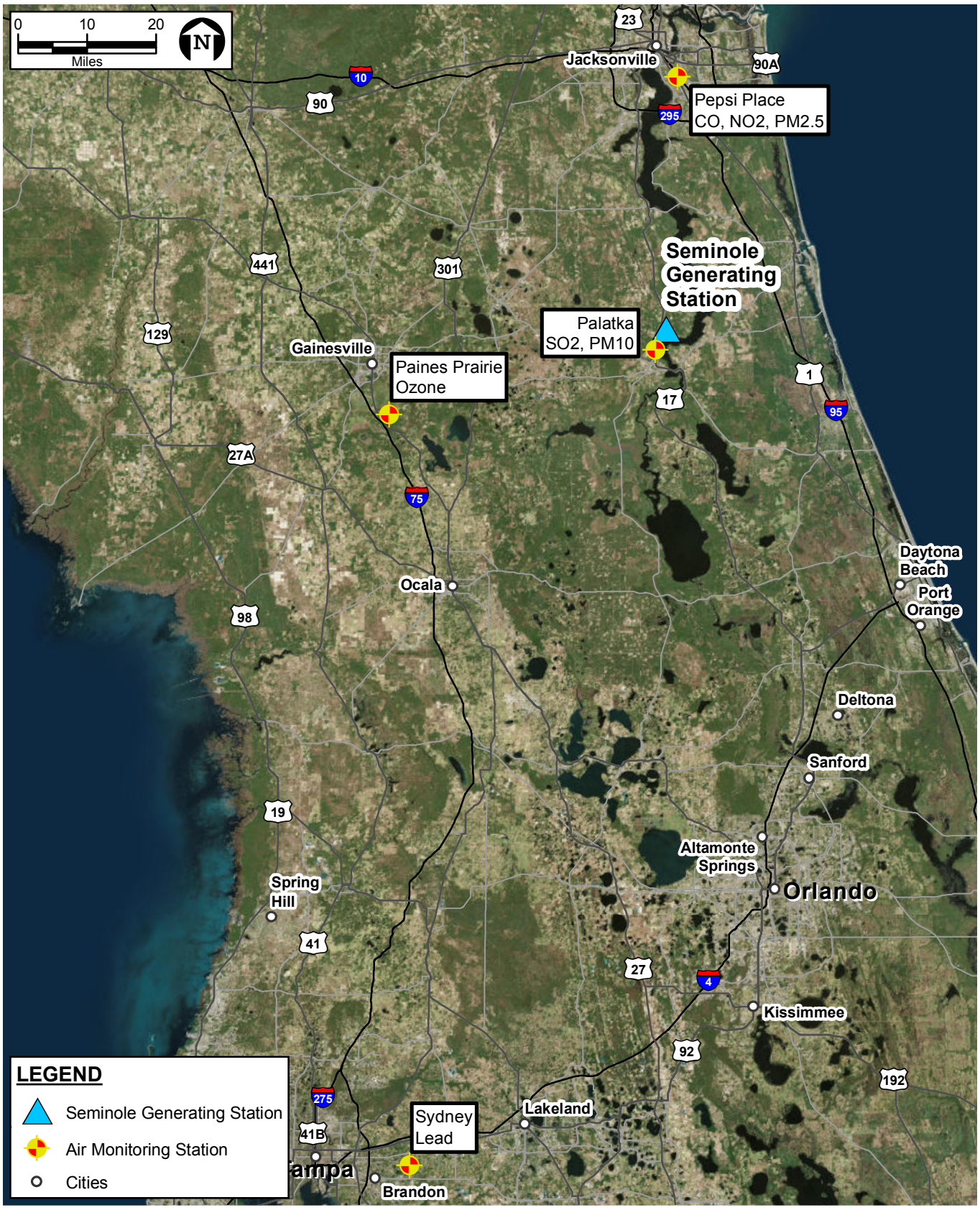


FIGURE 3.3.8-3.
LOCATION OF SEMINOLE GENERATING STATION AND AIR MONITORING STATIONS

Sources: USDA, 2015; FDOT, 2016; ECT, 2017.

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Table 3.3.8-5. NAAQS and Monitored Air Quality Concentrations

Pollutant and Averaging Time	Primary NAAQS[1]	2013 through 2015 Monitored Data[2]		Location of Monitor	
				Location/ Station Name	County
CO					
8-hour*	9 ppm	1.5 ppm	Highest hourly value	Pepsi Place	Duval
1-hour*	35 ppm	2.5 ppm	Highest 8-hour value		
NO_2					
Annual†	53 ppm	N/A	Annual mean	Pepsi Place	Duval
1-hour§	100 ppb	48 ppb	Three-year average of daily 98th percentile		
PM_{10}					
24-hour*	150 µg/m^3	53 µg/m^3	Highest daily maximum	Palatka	Putnam
24-hour*					
$PM_{2.5}$					
Annual	12 µg/m^3	6.9 µg/m^3	Three-year average	Pepsi Place	Duval
24-hour‡	35 µg/m^3	16 µg/m^3	Three-year average of 98th percentile		
Ozone					
8-hour (2015 standard)	0.070 ppm	0.059 ppm	4th maximum averaged over three years	Paynes Prairie	Alachua
SO_2					
1-hour¥	75 ppb	25 ppb	Three-year average of 99th percentile	Palatka	Putnam
Lead◊					
Rolling 3-month average	0.15 µg/m^3	0.004 µg/m^3	Maximum daily	Sydney	Hillsborough

Note: µg/m^3 = microgram per cubic meter.
ppm = part per million.
ppb = part per billion.

*Not to be exceeded more than once per year. Standard has been revoked for 24-hour SO_2.
†Arithmetic mean.
‡The 3-year average of the 98th percentile of 24-hour concentrations.
§The 3-year average of the 98th percentile of the daily maximum 1-hour average concentration is less than or equal to the standard.
£Standards attained when the 3-year average of the annual 4th highest daily maximum 8-hour average concentration is less than or equal to the standard.
¥The 3-year average of the 99th percentile of the daily maximum 1-hour average concentration is less than or equal to the standard.
◊Lead value from 2010 data.

Sources: [1]40 CFR 50.1-50.12.
[2]EPA, 2015; 2013 through 2015 data used for 3-year averages (www.epa.gov/airdata/).
ECT, 2014.

EPA has developed a descriptor of air quality that can be used to characterize the air quality in the Site vicinity. This descriptor is called the air quality index (AQI). Air quality is described over a range from *good* to *hazardous* based on a calculated numerical value, as follows:

AQI Values	Levels of Health Concern	Colors
When the AQI is in this range:	*...air quality conditions are:*	*...as symbolized by this color:*
0 to 50	Good	Green
51 to 100	Moderate	Yellow
101 to 150	Unhealthy for sensitive groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very unhealthy	Purple
301 to 500	Hazardous	Maroon

Each category corresponds to a different level of health concern. The following describes the six levels of health concern and what they mean:

- Good—The AQI value for the community is between 0 and 50. Air quality is considered satisfactory, and air pollution poses little or no risk.
- Moderate—The AQI for the community is between 51 and 100. Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people. For example, people who are unusually sensitive to ozone may experience respiratory symptoms.
- Unhealthy for Sensitive Groups—When AQI values are between 101 and 150, members of sensitive groups may experience health effects. This means they are likely to be affected at lower levels than the general public. For example, people with lung disease are at greater risk from exposure to ozone, while people with either lung disease or heart disease are at greater risk from exposure to particle pollution. The general public is not likely to be affected when the AQI is in this range.
- Unhealthy—Everyone may begin to experience health effects when AQI values are between 151 and 200. Members of sensitive groups may experience more serious health effects.
- Very Unhealthy—AQI values between 201 and 300 trigger a health alert, meaning everyone may experience more serious health effects.
- Hazardous—AQI values over 300 trigger health warnings of emergency conditions. The entire population is more likely to be affected.

The most recent monitoring in Putnam County was limited to SO_2 and PM_{10}. Figures 3.3.8-4 and 3.3.8-5 shows the percent of time that the air quality was within the various AQI ranges for PM_{10} and SO_2, respectively, from data collected from 2013 through 2015. As shown in the figure, the PM_{10} air quality was good for the entirety of the 3-year duration, while SO_2 levels registered moderate for only 2 days in 2013 followed by good records in 2014 and 2015.

Air quality is influenced by the emissions of pollutants into the air. Emissions come from a variety of sources, including the combustion of fuel by stationary sources (e.g., power plants, factories, home furnaces fired by natural gas), mobile sources such as automobiles and trucks, and manufacturing processes. There are several major sources of criteria pollutants in Putnam County with emissions of VOCs, PM, SO_2, and NO_x over 100 tons per year (tpy). These include the Georgia Pacific Palatka Mill, the SGS site, and several manufacturing plants. Figure 3.3.8-6 summarizes data on emissions of the six criteria pollutants (i.e., SO_2, NO_x, VOCs, CO, PM_{10} and $PM_{2.5}$) in Putnam County for the year 2014, the latest year for which such data are readily available. Most emissions of VOCs resulted from Biogenics. Fuel combustion accounted for almost all of the SO_2 emissions, and over half of the NO_x and $PM_{2.5}$ emissions. Mobile sources accounted for more than half of the CO and a large proportion of the NO_x. Fires were the biggest contributor to $PM_{2.5}$ emissions, and fugitive dust contributed to three-fourths of PM_{10} emissions. Even though there are no AAQS for VOCs, VOC emissions contribute to the formation of ozone, for which ambient standards do exist.

In addition to the six criteria pollutants, EPA regulates 187 other compounds categorized hazardous air pollutants (HAPs). HAPs are those pollutants known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. Examples of HAPs include: benzene, which is found in gasoline; perchlorethlyene, which is emitted from some dry-cleaning facilities; and methylene chloride, which is used as a solvent and paint stripper by a number of industries. Examples of other listed air toxics include dioxin, asbestos, toluene, and metals such as cadmium, mercury, chromium, and lead compounds. Given the relatively low population (i.e., 73,176 based on BEBR 2017) of Putnam County and the low number of major HAP-emitting sources, HAP emissions are expected to be relatively low throughout the County.

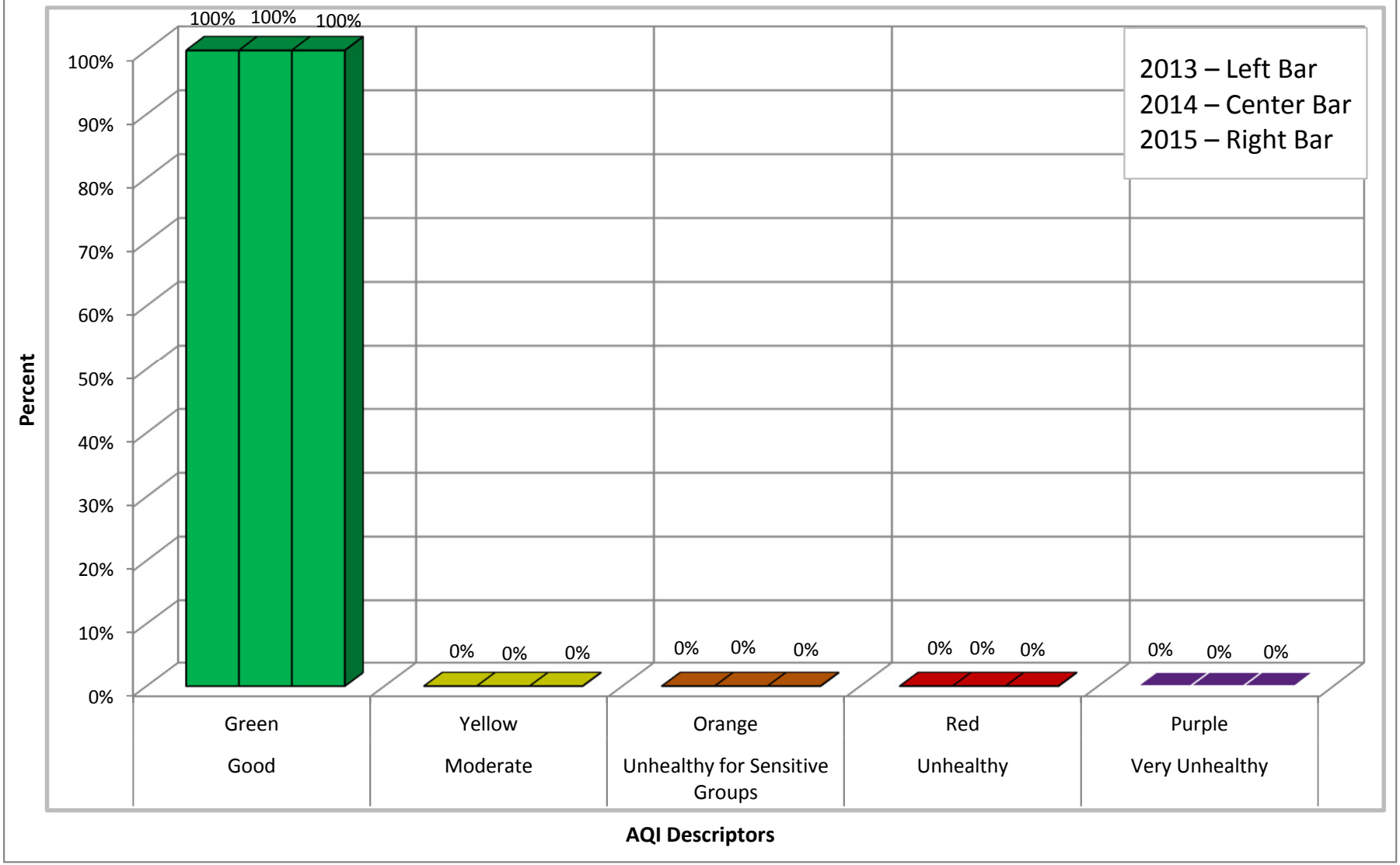


FIGURE 3.3.8-4.

PM_{10} AIR QUALITY FOR PUTNAM COUNTY, FLORIDA (2013 THROUGH 2015)

Sources: EPA AirData <http://www.epa.gov/airdata>, 2016. ECT, 2016.

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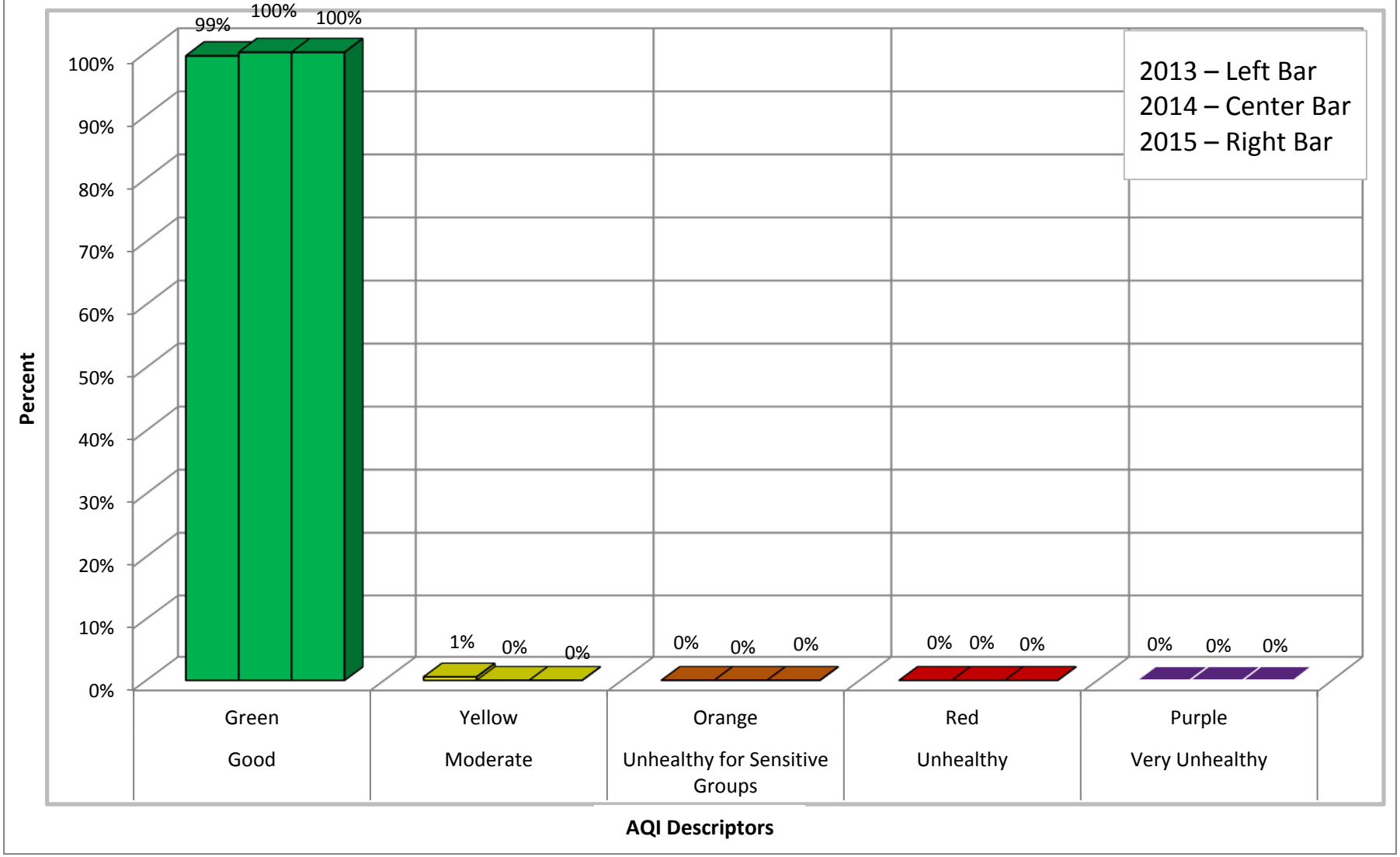


FIGURE 3.3.8-5.

SO_2 AIR QUALITY FOR PUTNAM COUNTY, FLORIDA (2013 THROUGH 2015)

Sources: EPA AirData <http://www.epa.gov/airdata>, 2016. ECT, 2016.

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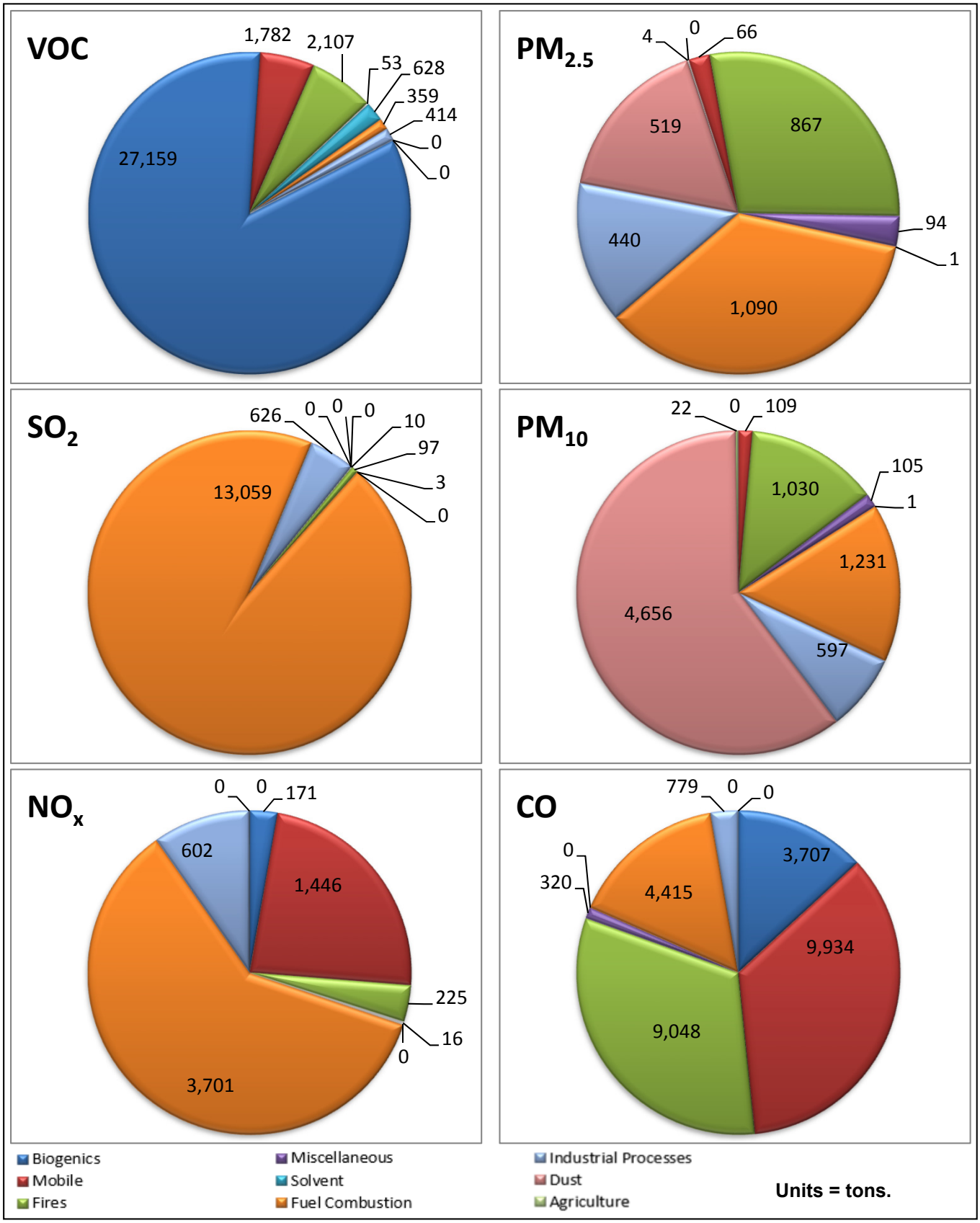


FIGURE 3.3.8-6.

EXISTING PUTNAM COUNTY EMISSIONS FOR 2014 VOC, SO_2, NO_x, $PM_{2.5}$, PM_{10}, AND CO

Sources: EPA AirData <http://www.epa.gov/air/emissions/>, 2016. ECT, 2017.

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