3.0 Site Vicinity Characterization

Chapter 3.0 provides descriptions of the existing sociological, physical, and biological characteristics of the area that may be potentially affected by the construction and operation of the Project. 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 on-site field surveys and information and data compiled from literature and other publicly available sources. In particular, the previous SCA documents for Crystal River Units 4 and 5 and the Crystal River Unit 3 Uprate and other permit applications for CREC provide useful information on the environmental characteristics in the proposed Project area. The SCA and environmental impact statement documents for DEF's proposed Levy Nuclear Plant also provide useful information for the area.

3.1 Site and Associated Facilities Delineation

In this SCA, DEF is seeking certification of the entire approximately 400-acre Site, including the two combined cycle electric generating units and the on-Site associated facilities, as well as the CCC off-Site associated facilities. As shown in Figure 3.1.0-1, the on-Site associated facilities include the cooling towers, administration/warehouse building, parking, site access roads, switchyard and transmission lines, stormwater detention basins, percolation pond, water treatment facilities and storage tanks, water pipelines, and other auxiliary equipment. The off-Site associated facilities include three 500-kV and four 230-kV transmission lines; pipelines for cooling tower makeup and blowdown water, blowdown augmentation water, and well water; and cooling water intake and discharge structures. These off-Site associated facilities will all be located on existing DEF-owned property within the existing CREC property boundary delineated on Figure 1.2.0-2. Chapter 9.0 of this SCA further describes the environmental characteristics of the corridor in which they will be located.

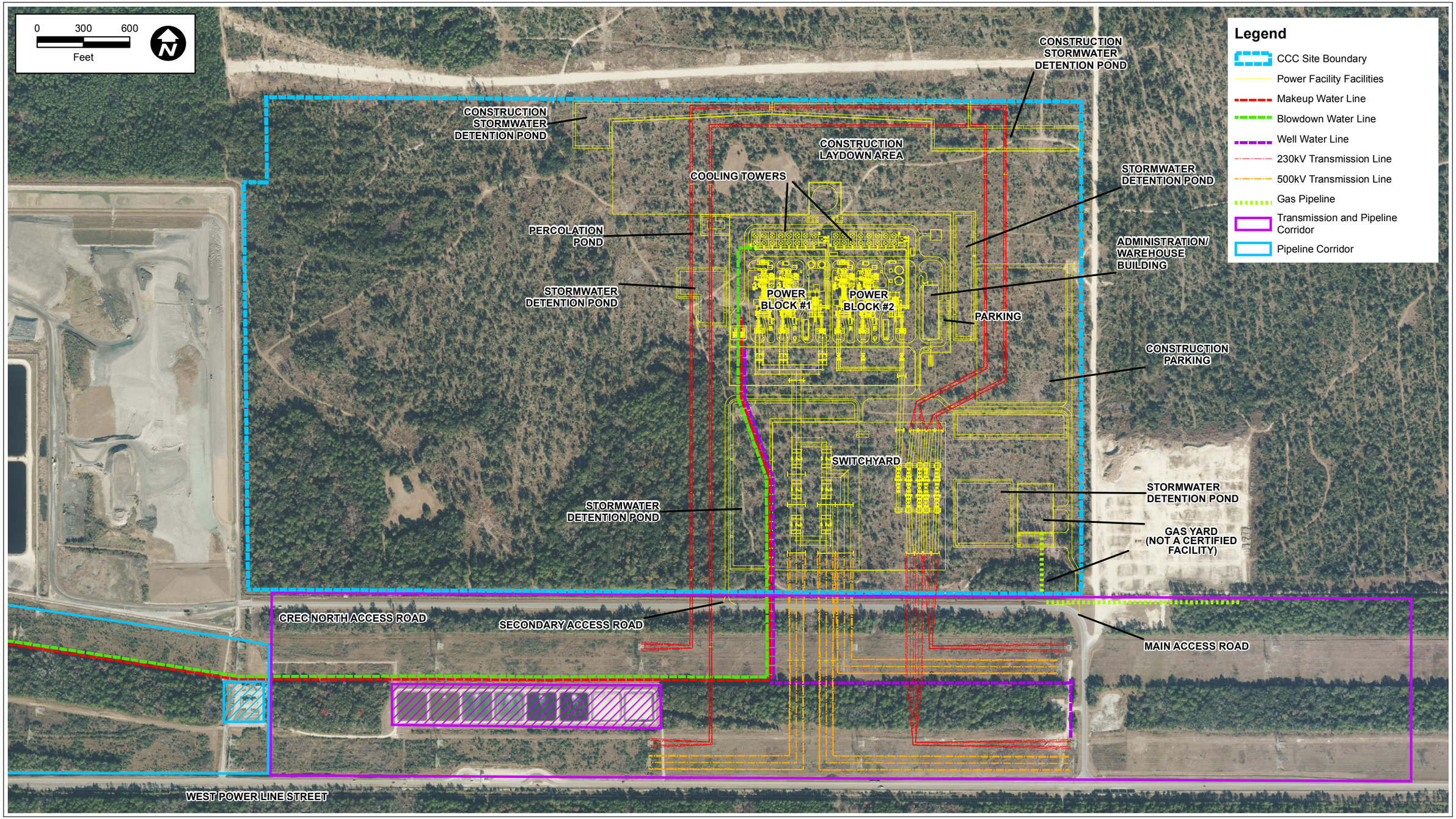

FIGURE 3.1.0-1.
SITE LAYOUT OF CCC ON-SITE FACILITIES

Sources: FDOT, 2011; AMEC, 2013; Burns & McDonell, 2014; ECT, 2014.

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Of note, the on-Site natural gas metering/regulating yard and the portion of the natural gas pipeline running to the yard will be permitted, owned, and operated by Sabal Trail and are not included as certified facilities in this SCA. In addition, if DEF is able to obtain the necessary permission from the underlying property owners, DEF may use an existing road running parallel to the eastern boundary of the Site for Site access during Project construction and operation rather than the Site access point in the southeastern corner of the Site identified in Figure 3.1.0-1 (identified as the "main access road"). That existing off-Site access road is not owned by DEF and, should DEF be able to obtain the necessary permission to utilize the roadway, will not be exclusively used by DEF. Therefore, pursuant to Section 403.503(14), F.S., DEF is not proposing certification of that roadway as an associated facility under this certification. Permits needed, if any, for improvements to that currently unpaved roadway will be separately obtained outside this certification. DEF is, however, seeking authorization under this certification to access the Site from that existing roadway as a potential alternative to the Site access point off the North Access Road in the southeastern corner of the Site.

3.1.1 Site Location

The CCC Site is located on approximately 400 acres owned by DEF in northwestern Citrus County, approximately 4 miles northwest of the city of Crystal River and approximately 4 miles southwest of the town of Inglis (see Figure 1.0.0-1). The Site is located adjacent to the eastern boundary of DEF's existing CREC property and adjacent to the northern boundary of the DEF-owned approximately 1,330-ft-wide existing transmission line corridor to CREC. DEF's existing Crystal River Units 4 and 5 are located to the west of the Site. Access to the Site will be provided from the CREC North Access Road to Units 4 and 5 from West Power Line Street, which is located along the southern boundary of the transmission line corridor. As stated in the previous section, DEF may also access the Site from an existing roadway running from North Access Road along the eastern boundary of the Site. West Power Line Street intersects with U.S. 19/North Suncoast Boulevard approximately 2 miles to the east of the Site.

Figure 3.1.1-1 shows the boundaries of the approximately 400-acre CCC Site and DEF's existing CREC property 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

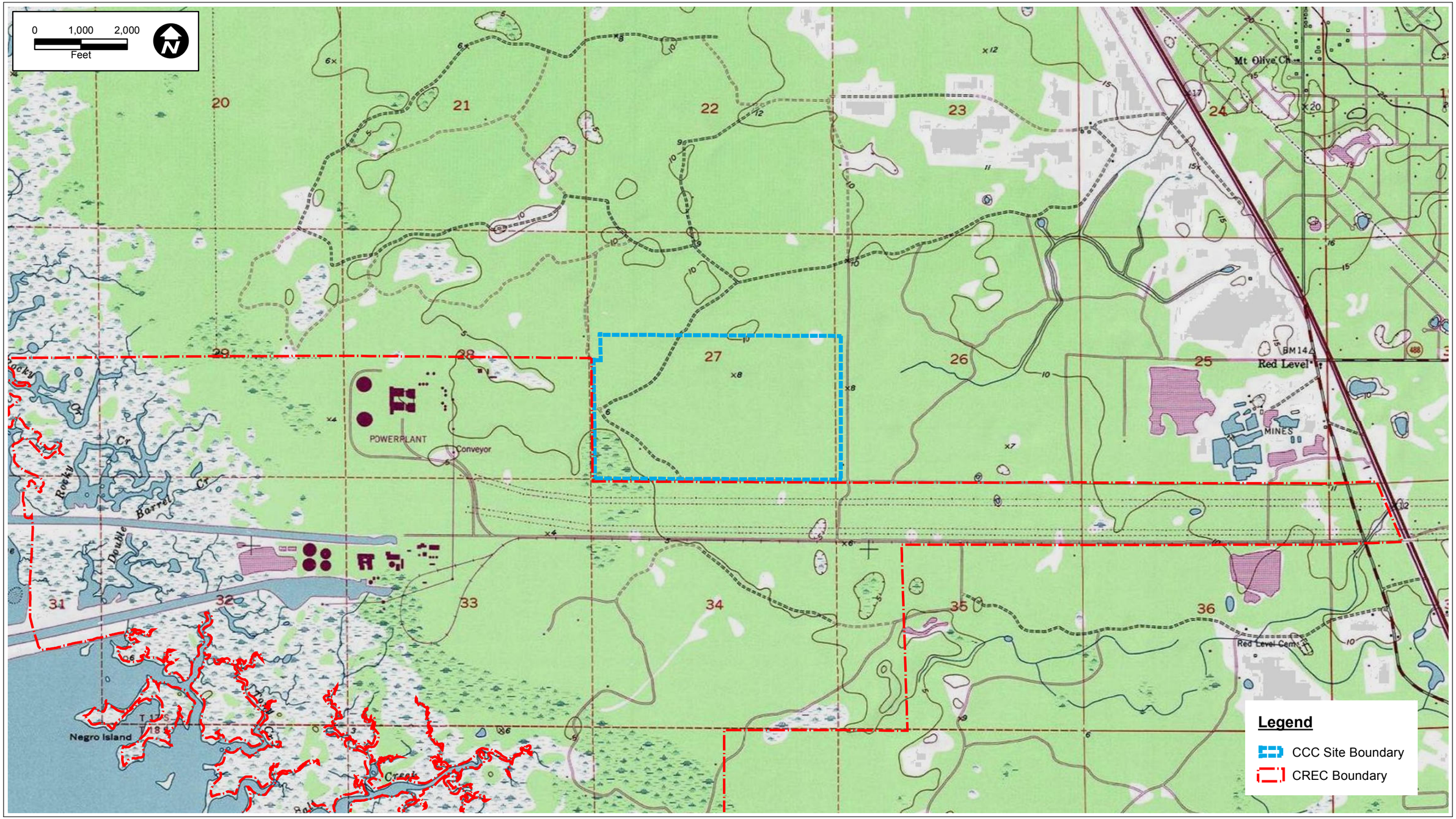

FIGURE 3.1.1-1.
TOPOGRAPHIC MAP OF CCC SITE AND GENERAL VICINITY

Sources: USGS, 2014; ECT, 2014.

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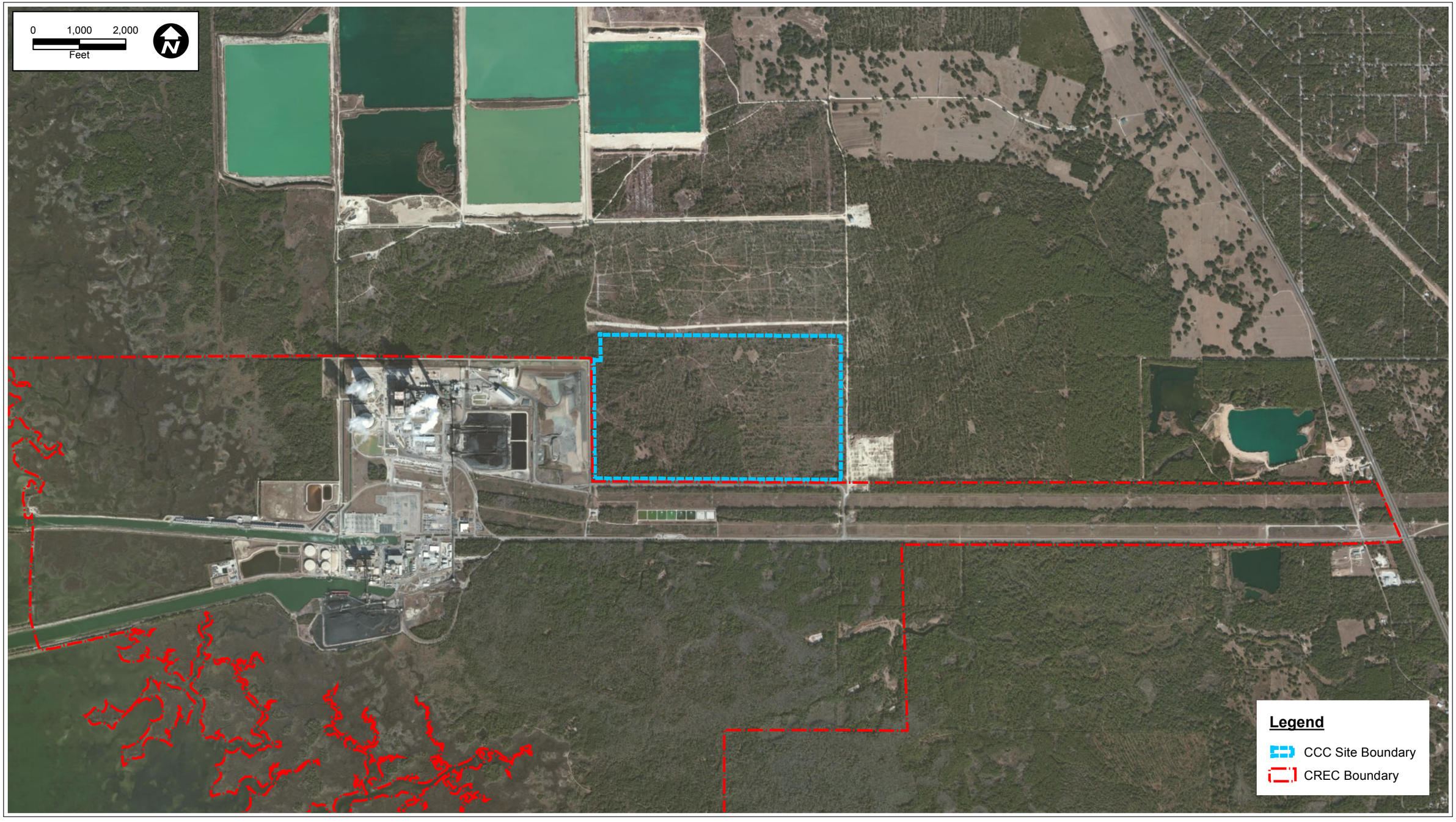

FIGURE 3.1.1-2.
AERIAL PHOTOGRAPH OF CCC SITE AND GENERAL VICINITY

Sources: USDA Aerials 2013; ECT, 2014.

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photograph at the same scale. The CCC Site is located in portions of Sections 26 and 27, Township 17 south, Range 16 east.

3.1.2 Existing Site and Adjacent Property Uses

The approximately 400-acre CCC Site is currently undeveloped and has historically been used for silviculture. Current land use and vegetation types on the Site consist of primarily forested communities, including planted pine, mixed pine and hardwoods, and forested wetlands. Nonforested communities include scattered cleared areas covered with grass and shrub vegetation, and unpaved roads and trails. The Site is relatively flat, ranging from approximately 3 to 10 feet above mean sea level (ft-msl) with a general gradient to the west toward the Gulf of Mexico. The current land use designation on the Citrus County General Land Use Map and the Land Development Code (LDC) Atlas Map for the Site is Extractive (EXT), which allows for surface mining operations.

The adjacent property to the north and east of the Site is also undeveloped and owned by Holcim (US), Inc. (Holcim). The Holcim property is part of its approximately 4,815-acre Crystal River Quarry, a permitted limestone mine. The Cross Florida Barge Canal is located approximately 2.5 miles to the north of the Site. The adjacent property to the west of the Site is part of the existing CREC, with the immediately adjacent area used as the ash disposal area for Crystal River Units 4 and 5. The DEF-owned approximately 1,330-ft-wide electrical transmission line/road corridor that serves CREC is located along the southern boundary of the Site. DEF's Crystal River Mariculture Center hatchery building and ponds are also located within the corridor south of the Site. Lands to the south of the corridor are vacant and part of DEF's CREC property. Lands farther south and southeast of the Site are owned by the State of Florida Board of Trustees for the Internal Improvement Trust Fund (TIITF) and are designated as conservation lands, which are part of the Crystal River Preserve State Park. The closest existing residential areas to the Site are located approximately 2 miles to the east along U.S. 19/North Suncoast Boulevard.

3.1.3 Proposed Site Uses

Figure 3.1.0-1 provides the site layout of the facilities on the Site after construction of the CCC Project overlaid on a recent aerial photograph. As shown on Figure 3.1.0-1,

the main power plant facilities will be located in the eastern half of the Site. The two combined cycle power blocks, cooling towers, administration/warehouse building, and main parking area will be located in the northeastern portion of the Site. The new 230- and 500-kV switchyard will be located in the southern portion. Other on-Site associated facilities include five stormwater detention basins at various locations to collect and treat stormwater runoff from the facilities. Figure 3.1.0-1 also shows the area that will be temporarily used for construction laydown and parking, as well as the temporary stormwater detention basins along the northern Site boundary. Overall, the CCC on-Site construction activities will impact approximately 193 acres of the approximately 400-acre Site.

As shown in Figure 3.1.0-1, the main access road from the CREC North Access Road will enter in the southeastern corner of the Site and run north to the plant facilities. A secondary access road will also enter the Site on the west side of the switchyard. As described in Section 3.1, as an alternative to the main access road, DEF may use an existing road running parallel to the eastern boundary of the Site for site access during Project construction and operation. Figure 3.1.0-1 also shows the on-Site 230- and 500-kV transmission lines running from the switchyard to interconnections with existing 230- and 500-kV lines in the existing CREC transmission corridor to the south of the Site. The off-Site portion of these new transmission lines, including potential upgrades to existing structures, will be located within a variable width transmission line/pipeline corridor approximately 1,240 ft wide and 14,000 ft long. The proposed corridor is all part of the existing CREC property boundary and includes much of the existing corridor to CREC. West Power Line Street and railroad rights-of-way along the southern edge of the existing corridor and the existing mariculture center are excluded from the corridor proposed to be certified for the transmission lines and water pipelines.

The cooling water intake and discharge pipelines will also initially run south and west within this proposed corridor and then will split and result in two smaller pipeline corridor extensions, one proceeding west to CREC's existing discharge canal and the other traversing south and then west to CREC's existing Unit 3 intake structure. The individual discharge and intake pipeline corridors are 250 and 350 ft wide, respectively. The well water pipeline will be totally located within the proposed corridor as well. All of the transmission lines and water pipelines and their proposed corridors will be located

within DEF-owned property. Chapter 9.0 more fully describes the off-Site associated linear facilities.

3.1.4 Flood Zones

Figure 3.1.4-1 shows the 100-year flood zones on the CCC Project Site overlaid on an aerial photograph based on a Federal Emergency Management Agency (FEMA) flood insurance rate map (FIRM). As shown on the FIRM, the entire Site is situated within Flood Zone AE except for the extreme southwest corner of the site, which is within Zone VE. Flood Zones AE and VE are areas determined to be inundated by 100-year flooding.

3.2 Social and Political Environment

3.2.1 Governmental Jurisdictions

As shown on Figure 3.2.1-1, the proposed CCC Project Site and existing CREC property, upon which some of the off-Site linear facilities will be located, lie within unincorporated Citrus County. The nearest community is unincorporated Red Level, which lies approximately 2 miles to the east and northeast. The nearest incorporated municipality to the CCC Site in Citrus County is the city of Crystal River, located approximately 4 miles to the southeast. The nearest incorporated area in Levy County is the town of Inglis, which lies approximately 4 miles to the northeast.

The Project Site lies within the jurisdiction of the Withlacoochee Regional Planning Council (WRPC) and the Southwest Florida Water Management District (SWFWMD). No public lands are located directly adjacent to the Site or the proposed locations of any of the off-Site associated linear facilities. There are two state parks (Crystal River Preserve State Park and Crystal River Archaeological State Park) and a state conservation area (Marjorie Harris Carr Cross Florida Greenway State Recreation and Conservation Area) located within 5 miles of the Project Site (see Figures 3.2.1-2 and 3.2.1-3). Also, three outstanding Florida waters areas (St. Martins Marsh Aquatic Preserve, Withlacoochee River System, and Crystal River) are located within 5 miles of the Site (see Figure 3.2.1-4). No Project facilities are proposed to be located within state parks, conservation areas, or outstanding Florida water areas. No national parks, memorials, or monuments are located within 5 miles of the Site.

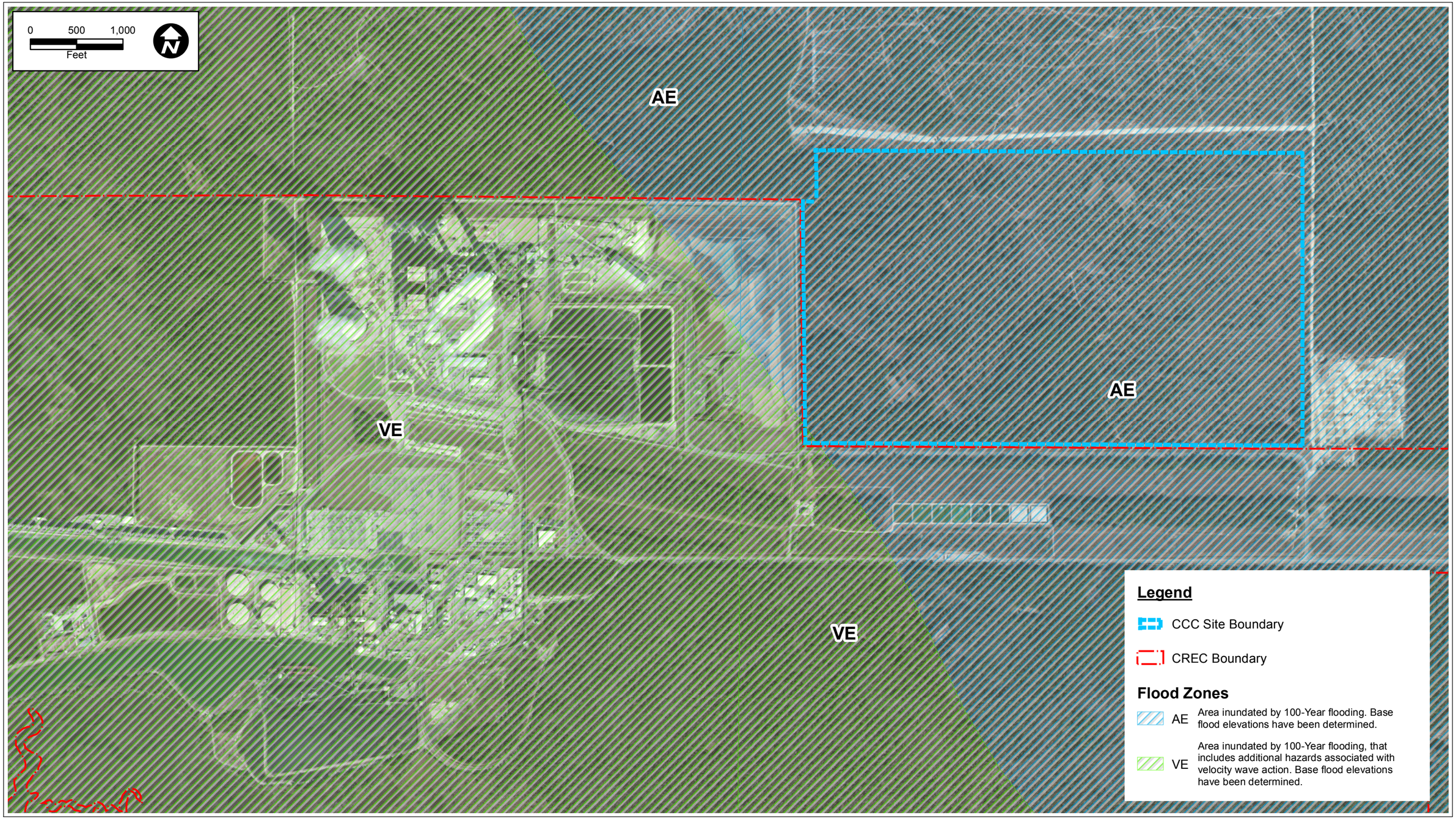

FIGURE 3.1.4-1.
100-YEAR FLOOD ZONES ON CCC SITE

Sources: FEMA Flood Insurance Maps (FIRM), 1996; USDA Aerials 2013; ECT, 2014.

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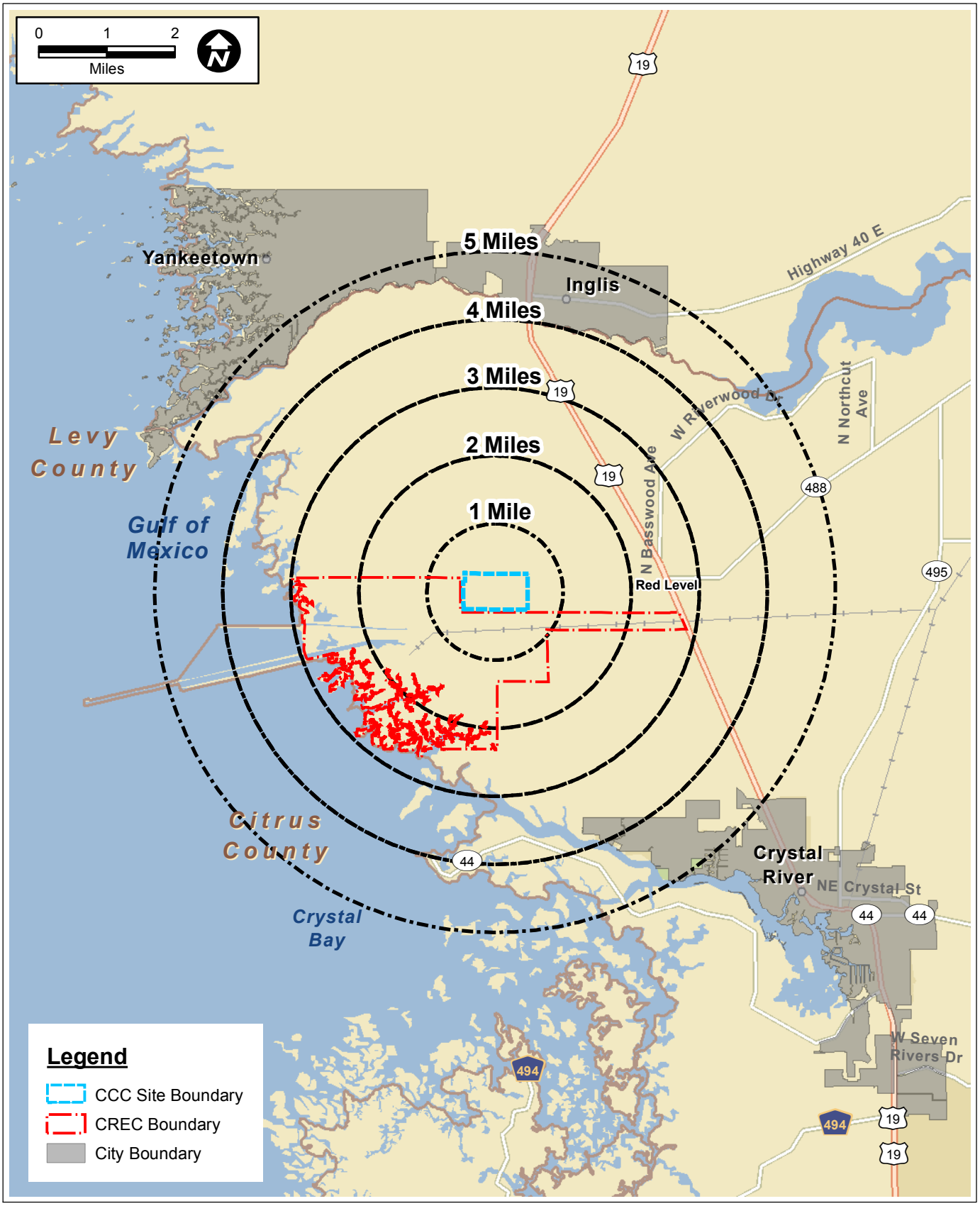

FIGURE 3.2.1-1.
GOVERNMENTAL JURISDICTIONS

Sources: ESRI Street Map, 2013; ECT, 2014.

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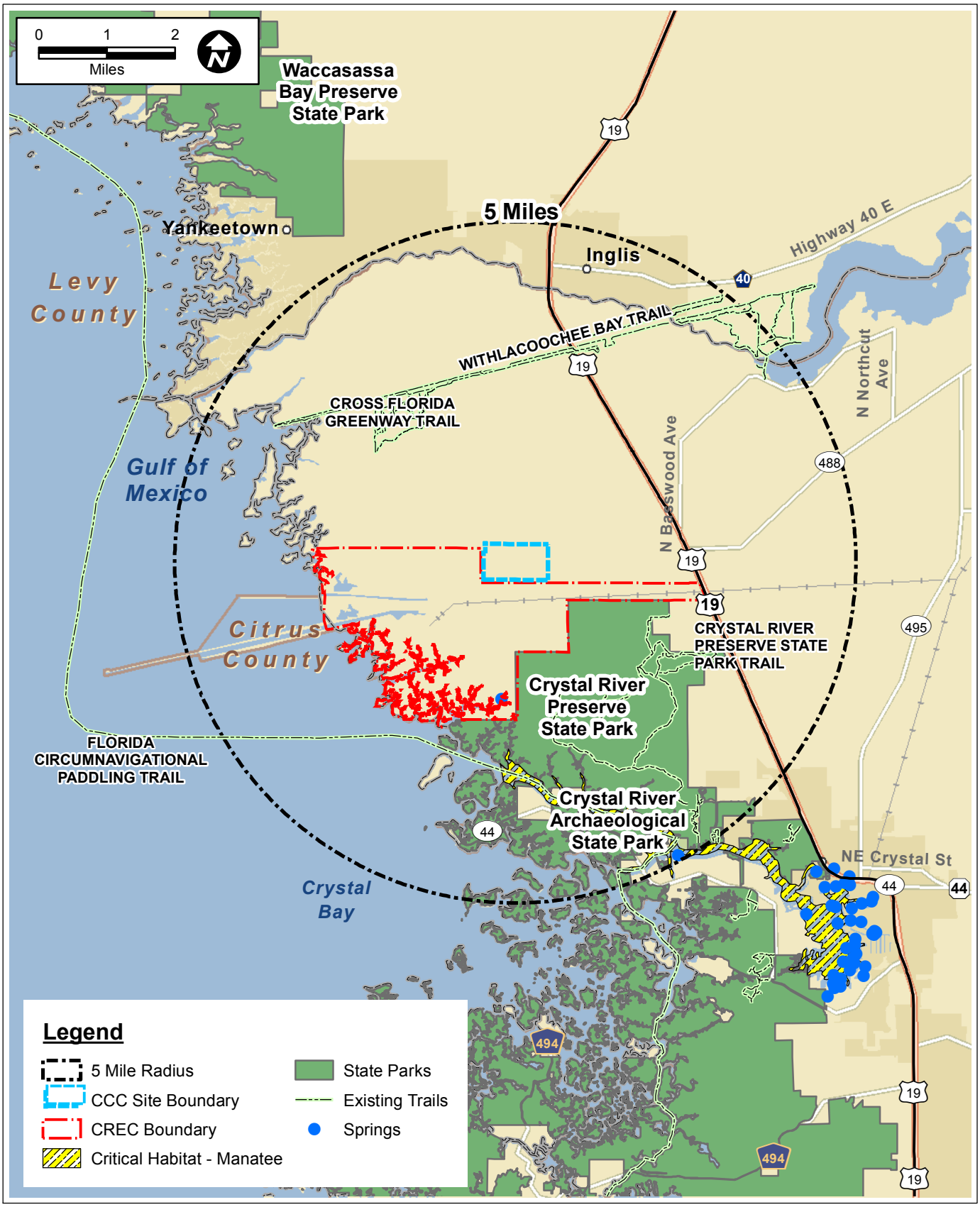

FIGURE 3.2.1-2.
STATE PARKS AND TRAILS WITHIN 5 MILES OF CCC SITE

Sources: ESRI Street Map, 2013; Florida Natural Areas Inventory (FNAI) 2013; ECT, 2014.

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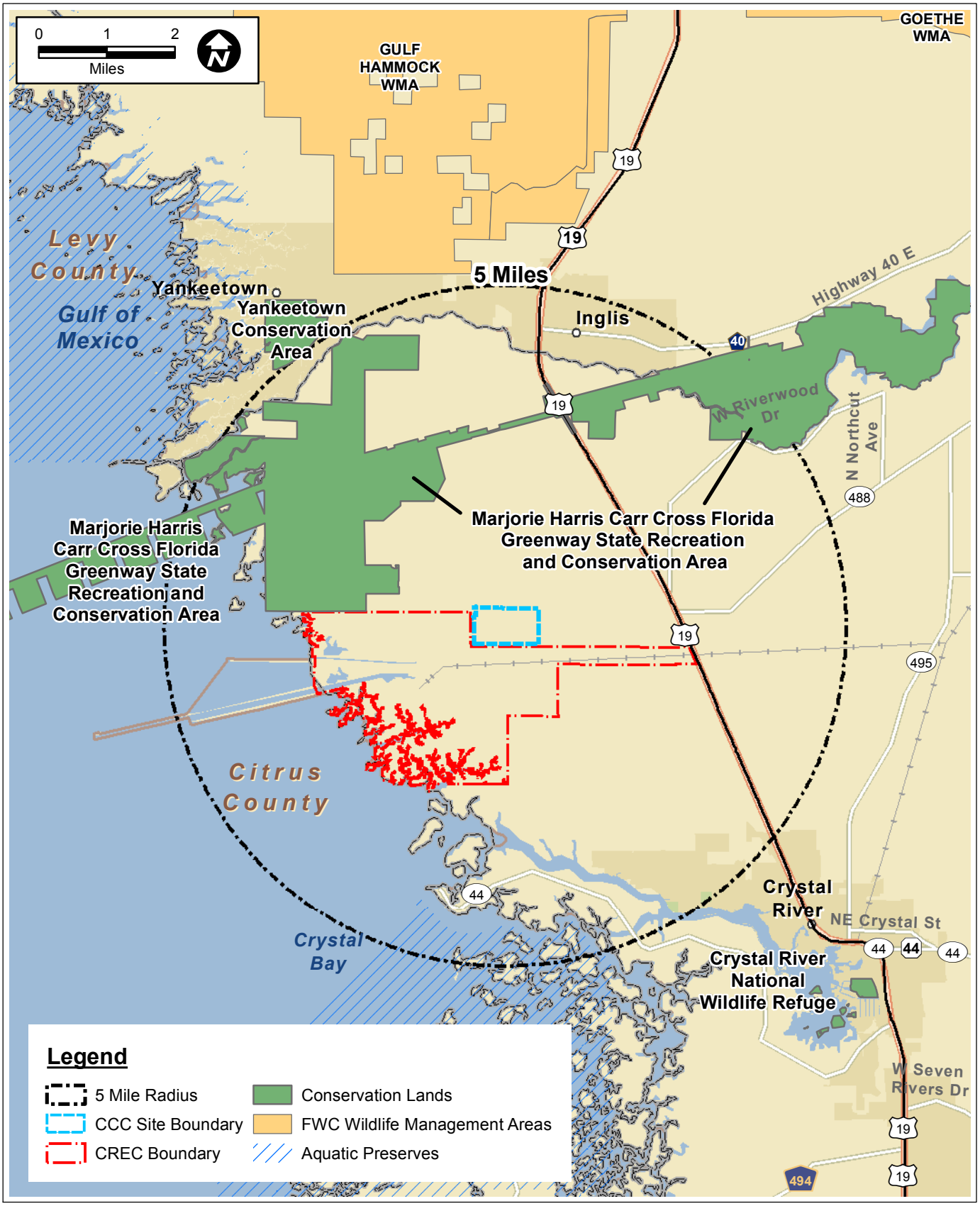

FIGURE 3.2.1-3.

CONSERVATION LANDS WITHIN 5 MILES OF CCC SITE

Sources: ESRI Street Map, 2013; Florida Natural Areas Inventory (FNAI) 2013; FGDL, 2013; ECT, 2014.

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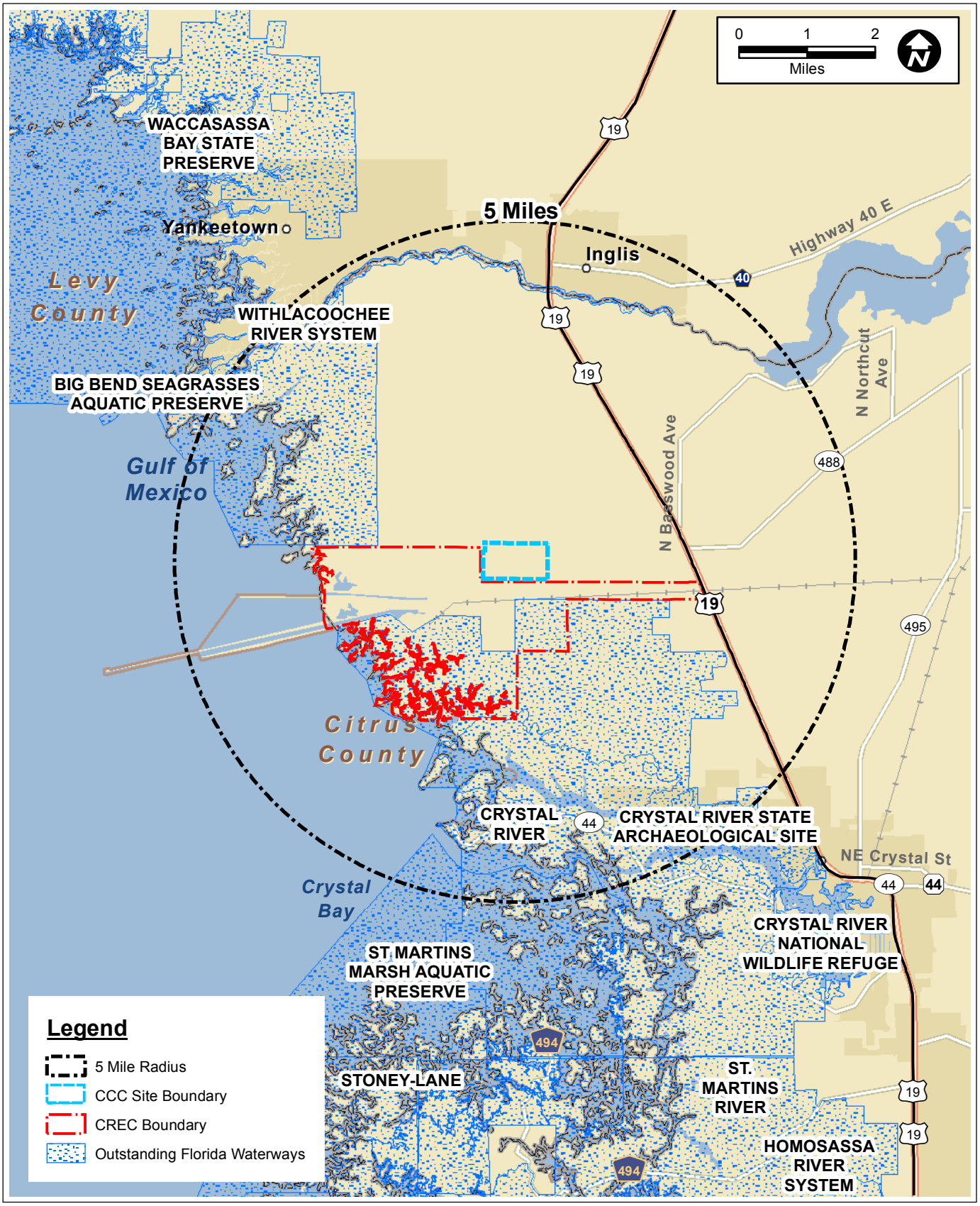

FIGURE 3.2.1-4.
OUTSTANDING FLORIDA WATERS WITHIN 5 MILES OF CCC SITE

Sources: ESRI Street Map, 2013; FDEP, 2013; ECT, 2014.

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3.2.2 Zoning and Land Use Plans

The current comprehensive plan land use designation and the current land atlas district (zoning) for the CCC Project Site are described in the following subsections based on the applicable sections of the Citrus County Comprehensive Plan and the Citrus County LDC. As explained in the following subsection, as of the date of the filing of the SCA, the Site is not consistent with Citrus County land use plans and zoning ordinances. DEF is, however, currently pursuing the necessary land use changes to render the Site consistent. The electrical transmission lines and water pipelines are exempt from the requirements of land use plans and zoning ordinances under Chapter 163 and Section 380.04, F.S.

3.2.2.1 Comprehensive Plan Future Land Use Map

Figure 3.2.2-1 depicts the current Site and surrounding general future land use map (FLUM) land use designations. The CCC Project Site is currently designated EXT. DEF is currently pursuing an amendment to the FLUM to change the current land use designation for the Site from EXT to Transportation, Communications, and Utilities (TCU). This proposed land use designation will then be consistent with the existing land use designations to the west and south for the CREC property. The TCU land use category allows for uses directly related to transportation, communications, and utilities and service and storage facilities necessary to support these uses. Power generation facilities are a permitted use in the TCU land use category. As of the date of the filing of the SCA, the Citrus County BOCC has approved the transmittal of the comprehensive plan land use amendment to state agencies for review. The adoption hearing on the land use amendment is anticipated to be held in September 2014, with the land use amendment becoming effective in mid-October 2014.

The adjacent land use designations are EXT to the north and east and TCU to the west and south. The TCU land use designation immediately to the south and west is DEF's CREC property. Farther to the south and to the southeast is land within the Conservation (CON) land use category. The closest land use designation that allows residential land uses is located approximately 0.7 mile to the west. The Low Intensity Coastal and Lakes Residential (CL) land use category allows one dwelling unit per 20 acres.

Appendix 10.5 provides copies of the currently applicable portions of the Citrus County Comprehensive Plan, as well as Citrus County BOCC Resolution 14-082 unanimously

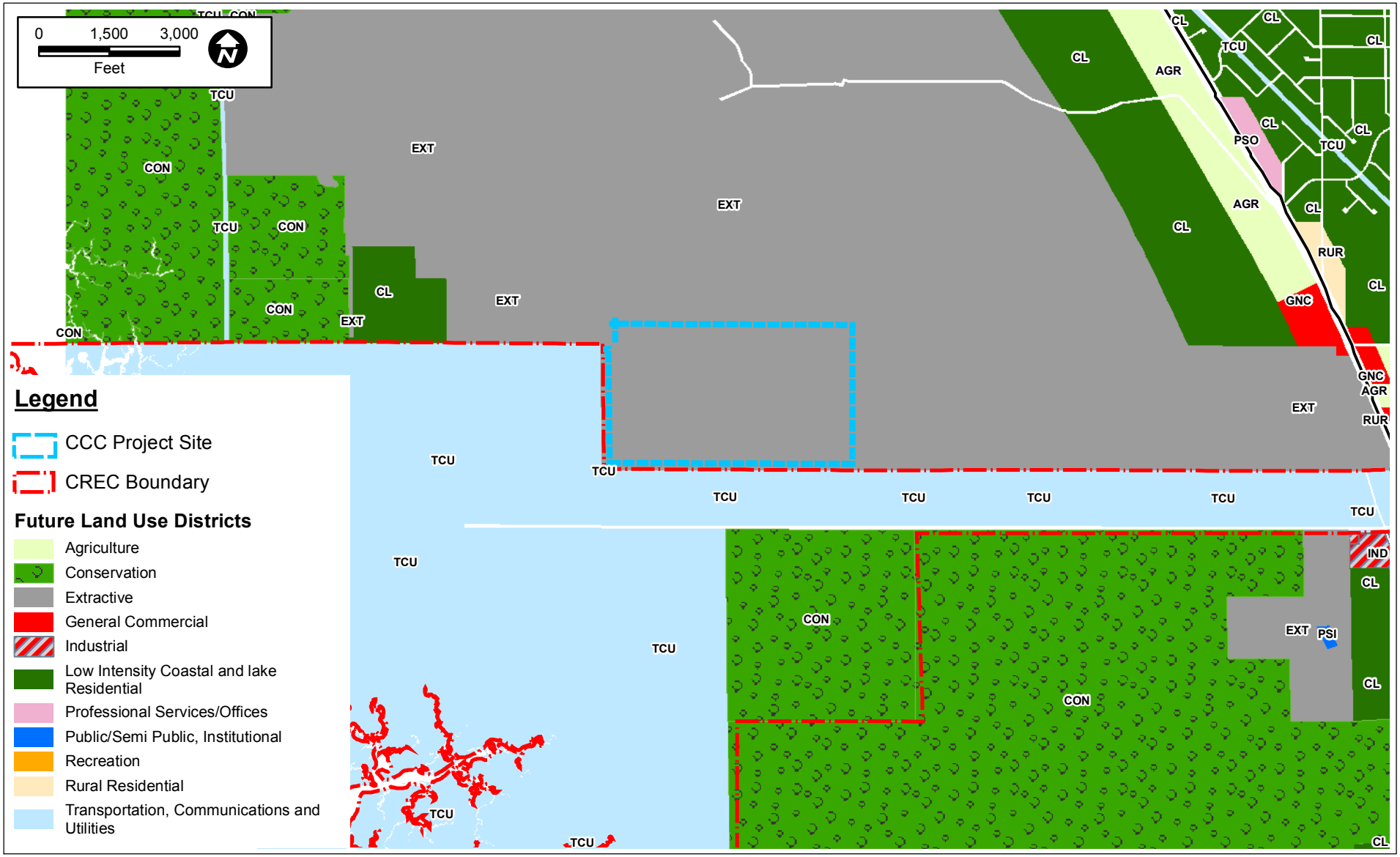

FIGURE 3.2.2-1.

GENERAL FUTURE LAND USE MAP DESIGNATIONS

Sources: Citrus County Land Development, 2014; ECT, 2014.

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authorizing transmittal of the proposed comprehensive plan amendment for the Site from EXT to TCU.

3.2.2.2 Land Atlas Map

Figure 3.2.2-2 depicts the land atlas map in the area of the CCC Site. The Site is currently shown as EXT. The adjacent land atlas districts are EXT to the east and north and TCU to the west and south. Other land use designations within 1 mile of the Site boundaries are CL to the west, Low Intensity Coastal and Lakes Residential with Mobile Homes (CL MH) to the west and CON to the south and west-northwest.

DEF is pursuing an amendment to the land atlas map to change the current land use district for the Site from EXT to TCU. This proposed land use district will then be consistent with the existing CREC property to the west and south. As of the date of the filing of the SCA, the Citrus County BOCC has approved the atlas amendment on first reading. The adoption hearing on the atlas amendment is anticipated to be held in September 2014, with the atlas amendment becoming effective in mid-October 2014.

Appendix 10.3.1 provides copies of the applicable portions of the LDC.

3.2.3 Demography and Ongoing Land Use

3.2.3.1 Demography and Existing Population

The Bureau of Economic and Business Research (BEBR) estimates the 2013 population of Citrus County as 140,519. Table 3.2.3-1 provides population trends for Citrus County and the city of Crystal River, Levy County and the towns of Inglis and Yankeetown, and the state of Florida.

The populations in Citrus and Levy Counties have been growing generally at a rate higher than that for the state from 1990 until 2010. Numerous sources indicate that the 1990 population of the city of Crystal River was its peak. Approximately 55.4 percent of the growth in population from 2000 to 2010 occurred in the unincorporated portion of Citrus County. In 2010, Citrus County was the 32nd most populous of the 67 counties in Florida, and it ranked 26th in density.

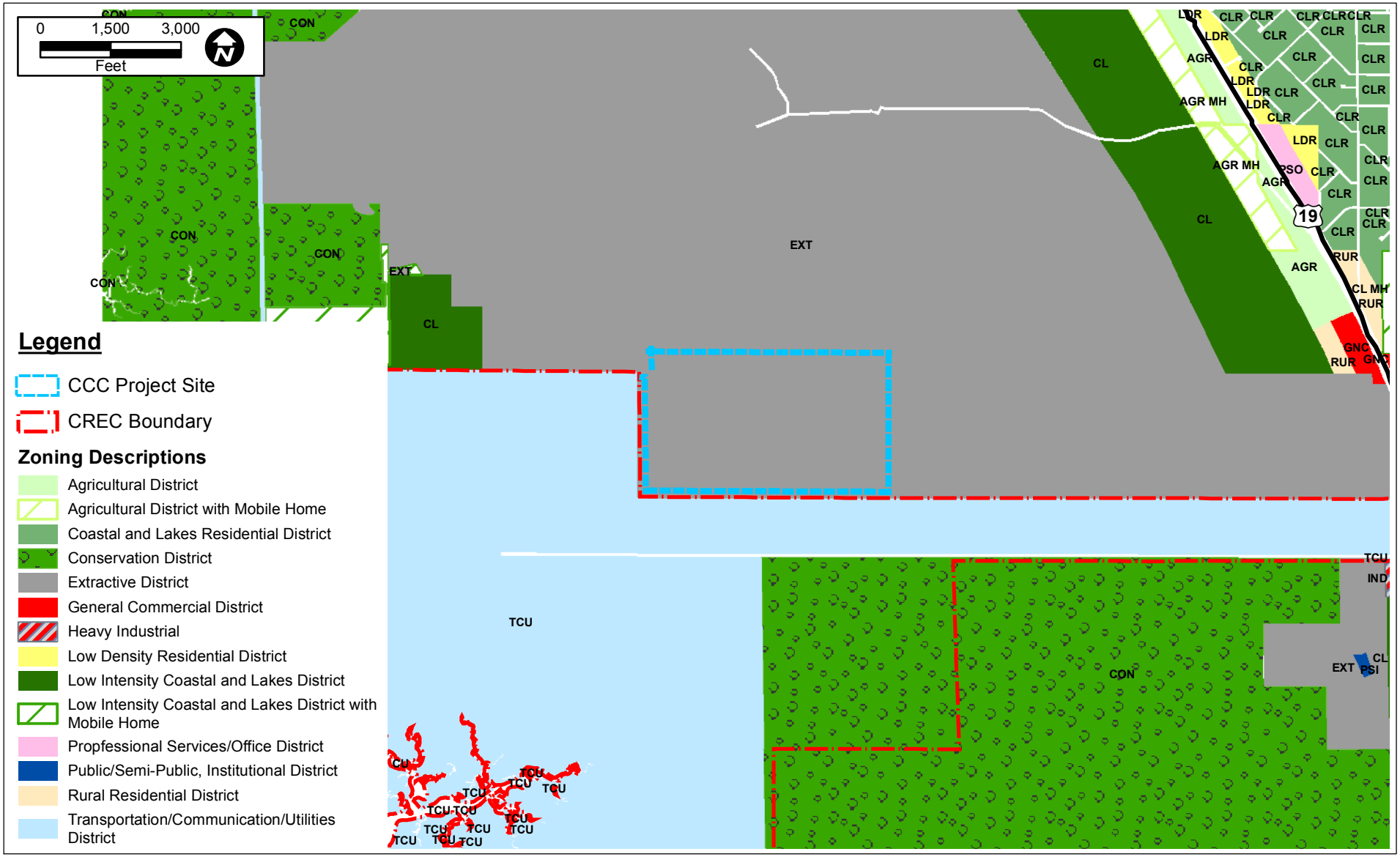

FIGURE 3.2.2-2.

LAND ATLAS MAP ZONING DISTRICTS

Sources: Citrus County Land Development, 2014; ECT, 2014.

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Table 3.2.3-1. Citrus County and Florida Population Trends

Area	Population 1990	Population 2000	Population Change 1990 to 2000 (percent)	Population 2010	Population Change 2000 to 2010 (percent)	Population 2013	Population Change 2000 to 2013 (percent)
Citrus County	93,513	118,085	26.3	141,236	19.6	140,519	-0.5
Crystal River	4,148	3,485	-16.0	3,108	-10.8	3,056	-1.7
Levy County	25,912	34,450	32.9	40,801	18.4	40,304	-1.2
Inglis	1,241	1,491	20.1	1,325	-11.1	1,314	-0.8
Yankeetown	635	629	-0.1	502	-20.2	495	-1.4
Florida	12,938,071	15,982,400	23.5	18,801,332	17.6	19,259,543	2.4

Sources: BEBR, www.bebr.ufl.edu, 2014.
U.S. Bureau of Census data, 2014.

Table 3.2.3-2 provides the median population projections prepared by the BEBR at the University of Florida.

Table 3.2.3-2. Median Projections of Population

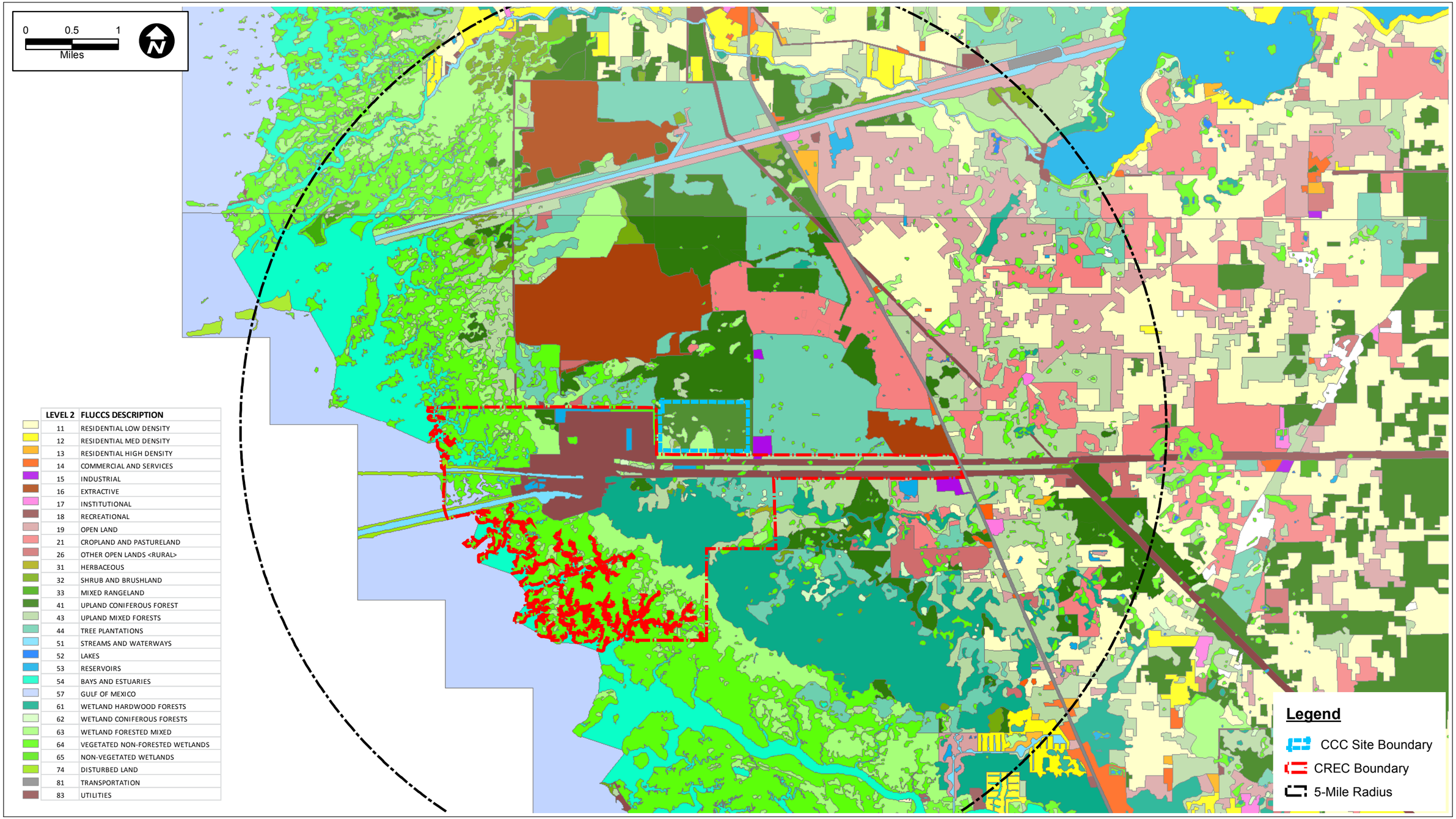
Area	Population 2010	Population 2020	Population Change 2010 to 2020 (percent)	Population 2030	Population Change 2020 to 2030 (percent)	Population 2040	Population Change 2030 to 2040 (percent)
Citrus County	141,236	156,300	10.7	174,600	11.7	188,500	8.0
Levy County	40,801	44,400	8.8	49,900	12.4	55,500	11.2
Florida	18,801,332	21,141,300	12.4	23,601,100	11.6	25,583,200	8.3

Sources: BEBR, www.bebr.ufl.edu, 2014.
U.S. Bureau of Census data, 2014.

It is anticipated that Citrus and Levy Counties will experience similar growth rates as that of the state as a whole through the year 2040.

3.2.3.2 Existing Land Use

Figure 3.2.3-1 shows the existing land use and land cover, based on Level II categories of Florida Land Use, Cover and Forms Classification System (FLUCFCS), for the CCC Site, the CREC property upon which the off-Site linear associated facilities will be located, and within a 5-mile radius of the Site.



LEVEL 2	FLUCCS DESCRIPTION
11	RESIDENTIAL LOW DENSITY
12	RESIDENTIAL MED DENSITY
13	RESIDENTIAL HIGH DENSITY
14	COMMERCIAL AND SERVICES
15	INDUSTRIAL
16	EXTRACTIVE
17	INSTITUTIONAL
18	RECREATIONAL
19	OPEN LAND
21	CROPLAND AND PASTURELAND
26	OTHER OPEN LANDS <RURAL>
31	HERBACEOUS
32	SHRUB AND BRUSHLAND
33	MIXED RANGELAND
41	UPLAND CONIFEROUS FOREST
43	UPLAND MIXED FORESTS
44	TREE PLANTATIONS
51	STREAMS AND WATERWAYS
52	LAKES
53	RESERVOIRS
54	BAYS AND ESTUARIES
57	GULF OF MEXICO
61	WETLAND HARDWOOD FORESTS
62	WETLAND CONIFEROUS FORESTS
63	WETLAND FORESTED MIXED
64	VEGETATED NON-FORESTED WETLANDS
65	NON-VEGETATED WETLANDS
74	DISTURBED LAND
81	TRANSPORTATION
83	UTILITIES

FIGURE 3.2.3-1.
EXISTING LAND USE WITHIN 5 MILES OF CCC SITE

Sources: NRCS, 2012; NA P, 2013; ECT, 2014.

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The entire CCC Site is undeveloped and predominantly wooded. There are no structures on-site. Undeveloped land is located to the north and east. An area used for material storage and contractor parking is located adjacent to the southeastern corner of the Site. Existing Crystal River Units 4 and 5 are located to the west. An electrical transmission line corridor, West Power Line Street, and North Access Road are located to the south. Undeveloped land is located farther to the south. The areas in which the off-Site linear facilities will be located are all currently in use for utilities, as shown on Figure 3.2.3-1.

The Site and the northern and eastern adjacent properties are part of a permitted limestone mining operation known as the Holcim Crystal River Quarry. Mining of the CCC Site was fully permitted and projected to commence in approximately 2050.

The closest areas of nonresidential development are located approximately 1.2 miles to the northeast along North Hollinswood Ranch Trail, approximately 2 miles to the east along U.S. 19, and approximately 2.2 miles to the east-southeast along North Tallahassee Road. The closest residential development is approximately 1.8 miles east along North Basswood Avenue, approximately 2.1 miles east along West Gallery Lane, and approximately 2.6 miles east-southeast along West Gem Street.

3.2.3.3 Proposed Development

The CCC Project is compatible with mining and electrical power generating facilities existing in the region. CREC is located immediately to the west. Currently four active coal-fired steam units are capable of producing approximately 2,295 MW (nominal net, summer). Two units were built in the 1960s, and the remaining two units were built in the 1980s.

3.2.4 Leases, Easements, Title, Agency Works

The CCC Project, including associated facilities, will be constructed on property that DEF currently owns. No additional leases, easements, titles, or rights-of-way will be required for the Project. The Project will not require the use of any state-owned lands. DEF is not seeking to use, connect to, or cross over any works of 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 CCC Site or the proposed locations of any off-Site facilities. The WRPC Strategic Regional Policy Plan does not identify any regionally significant natural resources on the Site or the proposed locations of any off-Site facilities. However, regionally significant natural areas are located within 5 miles of the CCC Site (see Figures 3.2.1-2, 3.2.1-3, and 3.2.1-4).

As shown on Figure 3.2.1-2, the Crystal River Preserve State Park is located approximately 0.25 mile southeast of the Site adjacent to the southern boundary of CREC and the existing CREC transmission line/road corridor. The approximately 27,000-acre park borders 20 miles of the Gulf Coast and offers hiking, bicycling, kayaking, and canoeing activities.

As shown on Figure 3.2.1-2, the Crystal River Archaeological State Park is located approximately 4.5 miles southeast of the Site along the Crystal River. The 61-acre park is a pre-Columbian and Native American national historic landmark. The park has burial mounds, temple/platform mounds, a plaza area, and a substantial midden and is one of the longest continuously occupied sites in Florida.

The approximately 90,000-acre Marjorie Harris Carr Cross Florida Greenway State Recreation and Conservation Area is located approximately 2 miles to the northwest of the Site (see Figure 3.2.1-3). The area stretches from the Gulf of Mexico to Lake Rousseau along the Cross Florida Barge Canal. Area recreational activities include hiking, bicycling, bird watching, and fishing.

As shown on Figure 3.2.1-4, the St. Martins Aquatic Preserve is located approximately 0.25 mile south of the Site. The preserve covers open water areas from north of Crystal River to the Homosassa River and includes inlet bays, creeks, salt marshes, upland hammock islands, as well as significant inland areas of wetlands.

The Withlacoochee River System, approximately 4 miles northwest of the Site; Crystal River, approximately 3 miles south of the Site; and St. Martins Aquatic Preserve, approximately 0.25 mile south of the Site are designated as Outstanding Florida Waters

(OFWs) (see Figure 3.2.1-4). OFWs are designated for special protection based on their natural attributes.

3.2.6 Archaeological and Historic Sites

A cultural resource assessment of the CCC Project Site was conducted in May 2014 by Southeastern Archaeological Research, Inc. (SEARCH). A review of the Florida Master Site File indicated that nine cultural resource surveys had been conducted in the area including the entirety of the Site. The previous surveys did not identify any cultural resources on the Site.

SEARCH conducted a review of the available and relevant archaeological literature, historical maps and aerial photographs, soil survey information and vegetation maps and documentation related to geology and physiography. Based on the background research, approximately 95 percent of the Site was deemed to have a low potential for containing archaeological or historic sites. A total of 230 shovel tests were performed. The shovel tests were conducted at 100-meter intervals and were 50 centimeters (cm) in size to a depth exceeding 100 cm. The excavated soils were screened through a 0.25-inch mesh hardware cloth.

The fieldwork identified one previously unrecorded archaeological site. No historic sites were found. The site, 8CI01456, is a low-density artifact scatter consisting of four flakes. The small size and the absence of temporally diagnostic artifacts indicate that the site does not meet the eligibility criteria for listing in the National Register of Historic Places. Appendix 10.7.1 provides the cultural resources assessment survey report. A copy of the report has been provided to the Florida Division of Historical Resources.

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, www.bebr.ufl.edu) provides employment and economic information at the county level. Citrus County had an estimated labor force of 56,579 in December 2013. Unemployed persons at that time totaled 3,845, for an unemployment rate of 6.8 percent. The unemployment rate in 2010 was 12.9 percent.

The statewide unemployment rate in December 2013 was 6.3 percent and 11.5 percent in 2010. The total number of Citrus County jobs was 31,247 in 2012, indicating the county exports workers to surrounding counties. Major industries in terms of employment in Citrus County in 2012 were as follows:

Industry	Number of Persons Employed	Percent of Total Persons Employed
Care and Social Health Assistance	7,616	23.6
Retail trade	5,103	15.8
Government	4,973	15.4
Accommodation and food services	2,787	8.6
Administration and support	2,377	7.4
Construction	2,308	7.2

Per capita personal income in Citrus County in 2012 was $34,184 compared to the Florida per capita figure of $41,012. The median household income was $39,034 in 2012 in Citrus County and $47,309 in Florida. In 2012, 18.7 percent of Citrus County residents were in poverty compared to 17.2 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 2011 through 2012, Citrus County reported $1,265.83 per capita for expenditures, compared to $1,250.58 per capita income from revenues, equating to a deficit of $15.25 per capita. The comparable amounts for Florida for 2011 through 2012 are $1,888.84 (expenditures), $1,891.00 (revenue), and $2.16 (surplus).

Housing

The U.S. Census Quick Facts indicates that there were 77,904 housing units in Citrus County in 2012. Of these, 63,304 were owner occupied (81.1 percent), and 11,204 were renter occupied. In 2010, there were 14,722 vacant housing units, of which 2,066 were for rent and 2,378 were for sale. This indicates that housing is readily available in Citrus County. In 2010, the persons-per-household multiplier was 2.33. In 2011, there were 87 total licensed lodgings with 2,606 units. Countywide building permit activity for 2010 was 468 single-family homes and 2 multifamily units. In the same year, there were 443 single-family construction starts and 2 multifamily construction starts. For the fiscal year 2009 through 2010, there were 4,958 mobile home tags sold in Citrus County. Of the single-family homes and multifamily units permitted in 2010, all but

four of the single-family homes and all of the multifamily units were in the unincorporated area.

The median value of owner-occupied housing in Citrus County between 2008 and 2012 was $126,000 compared to the statewide median value of $170,800.

3.2.7.2 Area Public Service and Utilities

Transportation Facilities

The only transportation facility required to service the CCC Project at operation will be roadways. It is possible that the existing railroad spur located south of the Project Site along the southern edge of the transmission line corridor could be used during construction. A heliport is located at CREC. No public or private airport facilities are located within a 5-mile radius of the CCC Site or associated off-Site facilities. Figure 3.2.1-1 shows the regional transportation facilities.

The only major roadways within a 5-mile radius of the CCC Site or associated off-Site facilities are U.S. 19/North Suncoast Parkway and County Road (CR) 488 (West Dunnellon Road). U.S. Highway 44 (U.S. 44) is located approximately 6 miles to the southeast, and U.S. Highway 41 (U.S. 41) is located approximately 16 miles to the east. Interstate 75 is located approximately 33 miles to the east.

As previously stated, no public or private aviation facilities are located within a 5-mile radius of the Site. The nearest private airports to the Site are J.R.'s Airport located approximately 7 miles to the northeast and Post Oak Ranch Airport located approximately 10 miles to the southeast. The nearest public airport is Crystal River Airport located approximately 8.5 miles to the southeast.

Traffic Volumes

Road access to the Site will be provided from North Access Road to CREC Units 4 and 5, which runs along the southern boundary of the Site and connects to West Power Line Street. West Power Line Street intersects with U.S. 19/North Suncoast Parkway approximately 2.3 miles east of the Site. U.S. 19 is classified as a principal arterial roadway. The adopted level of service (LOS) is B. This equates to 25,700 daily trips. The 2012 annual average daily traffic on this section of U.S. 19/North Suncoast Parkway was 17,600.

Educational Facilities

According to the Citrus County School Board Website, there are 11 elementary schools, 4 middle schools, and 3 high schools serving an estimated student population of 15,675 (2012 through 2013). The estimated school population for the 2013 through 2014 school year is 15,414.

The nearest Citrus County schools to the Site are in Crystal River. An elementary school, middle school, and high school are located in Crystal River.

Medical Facilities

The nearest hospital to the CCC Site is Seven Rivers Regional Medical Center located in Crystal River approximately 2.7 miles to the east-southeast on U.S. 19. Seven Rivers Regional Medical Center is a private, for-profit medical/surgical acute hospital facility with 128 beds. The medical center has 24-hour emergency room services.

The closest public, not-for-profit hospital is Citrus Memorial Hospital located in Inverness, approximately 22 miles to the southeast. This 198-bed facility has 24-hour emergency room service.

The closest trauma center is Ocala Regional Medical Center located approximately 35 miles to the northeast.

Citrus County has 229 general hospital beds per 100,000 population (2004). The emergency medical services (EMS) facilities that would respond to the CCC Site are located in Citrus County at the DeRosa Station No. 9 (primary) and Connell Heights Station No. 7 fire stations. In addition, the Crystal River Volunteer Station has EMS capabilities. These facilities include basic life support. The response time from the DeRosa Fire Station is estimated to be 5 to 8 minutes. Nature Coast EMS provides advanced life support and transports patients.

Fire Protection

The nearest fire station to the Site is the Crystal River Volunteer Station located approximately 6 miles to the southeast. While this station would not provide a first re-

sponse, the station has 15 on-call firefighters, two Class A fire engines, a 2,500-gallon tanker, a brush truck, a utility truck, and a marine unit.

The nearest full-time staffed facility is the Citrus County DeRosa Station No. 9 located approximately 6.3 miles to the northeast of the Site along Citrus Avenue. This station is manned by two full-time firefighters. This facility is a primary response unit and is equipped with a pumper/tanker truck capable of pumping a minimum of 1,000 gallons per minute (gpm). Estimated response times range from 5 to 8 minutes for responses by full-time firefighters. The next nearest facility is the Connell Heights Station No. 7, which is a county facility manned by two full-time firefighters. This station is also equipped with a pumper/tanker truck capable of pumping a minimum of 1,000 gpm. The first response to a fire at the CCC Site would involve five career engines and one tower truck. Additional county stations are located in nearby Homosassa, Lecanto, Beverly Hills, Pine Ridge, and Citrus Springs.

Police Protection

The CCC Site lies in unincorporated Citrus County and would receive police services from the Citrus County Sheriff's Department. The Site is located in the West District. Deputies patrolling this area are based out of the West District office located in Lecanto. A total of approximately 84 sworn officers are assigned to the West 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 Crystal River, does not have a police department.

Potable Water, Domestic Wastewater, Electricity and Gas, and Solid Waste

The CCC Site is located in unincorporated Citrus County in an area not provided with public potable water supply or domestic wastewater service. Because this area of the county is not provided with municipal service, relevant system capacities are not applicable or relevant in this area. DEF will be its own provider for most utilities required by the Project and its employees. Electricity, potable water, and domestic wastewater treatment services will be provided by DEF-owned and operated facilities appropriately designed to meet these expected service demands.

Natural gas will be delivered to the Site via a new pipeline, which will be permitted, owned, and operated by Sabal Trail.

Potable water will be supplied from wells located on the CREC property near U.S. 19 within the CREC transmission corridor and delivered to the Site via a potable water pipeline. The groundwater will be treated on-Site using a new water treatment system. The approximate potable water demand will be 1,440 gallons per day (gpd) for the CCC Project workforce.

Sanitary wastewater will be disposed in a new on-Site septic tank and drain field or via an on-Site package plant. The sanitary wastewater facilities, whether a septic system or on-Site package plant, will have a capacity capable of treating the estimated domestic wastewater generated by the up to approximately 75 full-time employees.

The Citrus County Central Landfill, a Class I landfill, is located on U.S. 44 between Lecanto and Inverness. Currently, this is the only operating public landfill in Citrus County. Domestic solid waste disposal services and recycling opportunities are available. Construction debris can be disposed at private facilities located within the county. According to the solid waste subelement of the comprehensive plan, there is adequate landfilling capacity at the landfill through the planning period of 2020. Also, according to a letter from the Citrus County Department of Public Works, Solid Waste Management Division, dated April 4, 2014, Citrus County's landfill has sufficient capacity to accommodate solid wastes from the Project operations.

Recreation and Open Space

No recreational areas, open space, or public lands are located adjacent to the Site or proposed off-Site associated facilities locations. Lands designated as CON on the FLUM are located south and southeast of the existing CREC electrical transmission line corridor and West Power Line Street. DEF owns the land to the south. TIITF owns the land to the southeast. This public property is known as Hollins' Addition to St. Martins Marsh Aquatic Preserve. Also located to the southeast are the Crystal River Preserve State Park and the Crystal River Archaeological State Park.

There are no nearby Citrus County parks or recreational facilities. The nearest recreational facility to the CCC Site is Copeland Park, approximately 6.5 miles southeast of

the Site, one of six parks within the Crystal River city limits. The city also maintains two boat ramps on Crystal River, approximately 6 miles southeast of the Site.

3.3 Physical and Biological Environment

3.3.1 Geology and Hydrology

3.3.1.1 Geological Description of the Site and Area

The geology of the CCC Site and surrounding area, including areas proposed for location of off-Site facilities, is described in terms of the physiography and stratigraphy. The physiography and stratigraphy are a function of the geologic history and processes that have occurred in the area. These geologic processes include tectonic forces and fluctuations of sea level, which are responsible for the deposition and erosion of sediments.

Regionally, Florida rests on a large, carbonate platform that extends northward into Georgia and Alabama. These carbonate rocks, as well as the relatively thin overlying siliciclastic sediments, comprise what is known as the Florida Platform. Over half of the Florida Platform lies underwater.

Carbonate deposition on the Florida Platform began during the mid-Mesozoic (approximately 145 million years ago), resulting in a thick accumulation of limestones and dolostones. In the lower portion of the carbonates, evaporite deposits are present. Throughout the Paleogene Period (67 to 24 million years ago), siliciclastic sediments were not available to be incorporated into the carbonate sediments. As a result, the carbonate sediments deposited during this time are relatively pure carbonates, as compared to carbonates deposited in the Neogene and Quaternary Periods.

The influx of siliciclastic sediments following the long period of carbonate deposition resulted in the deposition of sands, silts, and clays common throughout much of Florida. This stratigraphic sequence was modified by structural movements and the rise and fall of sea levels, most recently throughout the Pleistocene Epoch.

Figure 3.3.1-1 illustrates the hydrogeological framework for West-Central Florida. The significant geologic formations are Paleocene- and Eocene-Age formations. These formations include the following:

System	Series	Stratigraphic Unit	General Lithology	Major Lithologic Unit	Hydrogeological Unit
Quarternary	Holocene and Pliestocene	Undifferentiated sand and clay deposits	Predominantly fine quartz sand; shell interbedded clay, marl, peat, dolostone, sandstone, and phosphorite Shelly quartz sand, unfossiliferous quartz sand, and thin limestone beds	Sand	Surficial aquifer system
			Shelly quartz sand; thin, shelly limestone beds, and marl	Clastic	Confining unit
Tertiary	Pliocene		Sandy limestone, clayey and pebbly sand; clay, marl, shell, phosphatic		
	Miocene	Hawthorn Group: Peace River Formation*	Clayey, phosphatic, sandy beds; silty and sandy phosphatic clay beds, and clayey phosphatic quartz sand	Carbonate and clastic	Aquifer
		Hawthorn Group: Arcadia Formation†	Dolomite and clay, and limestone, silty, phosphatic		Confining unit
		Hawthorn Group: Tampa Member			
	Oligocene	Suwannee Limestone	Limestone, sandy limestone, fossiliferous	Carbonate	Floridan aquifer system
	Eocene	Ocala Group	Limestone, chalky, foraminiferal, dolomitic, near bottom		
		Avon Park Formation	Limestone and hard brown dolomite; intergranular evaporite in lower part in some areas		Upper Floridan aquifer Middle confining unit Lower Floridan aquifer
		Oldsmar Formation	Dolomite and limestone, with intergranular gypsum in most areas		
	Paleocene	Cedar Keys Formation	Dolomite and limestone with beds of anhydrite	Carbonate with evaporites	Sub-Floridan confining unit

*Peace River Formation includes Bone Valley Member and undifferentiated deposits.
†Arcadia Formation includes undifferentiated deposits, Tampa Member, and Nocatee Member.

FIGURE 3.3.1-1.

HYDROGEOLOGICAL FRAMEWORK FOR WEST-CENTRAL FLORIDA

Sources: Tihanski and Knochenmus, 2001. ECT, 2014.

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- The Cedar Keys Formation of Paleocene consists of dolomite and limestones with beds of evaporites.
- Overlying the Cedar Keys Formation is the lower Eocene Oldsmar Formation. The Oldsmar Formation consists of dolomite and limestone with intergranular gypsum in most areas.
- Overlying the Oldsmar Formation is the middle Eocene Avon Park Formation. The Avon Park formation consists of limestone and hard brown dolomite. Intergranular evaporites may be present in the lower portion of the Avon Park Formation in some areas.

The most significant structural feature in the area is the Ocala Platform. The Ocala Platform is believed to represent an uplift event and is characterized by the lack of significant accumulation of Miocene-age deposits. It is believed that the Miocene deposits had accumulated in the area, and, following an apparent uplift, erosion of the Miocene deposits resulted in the presence of Eocene limestones at or near land surface.

The unconsolidated sands and clays present in the area are believed to be late Pleistocene and Holocene sediments. These unconsolidated deposits are thin to nonexistent in the vicinity of the CCC Site and proposed locations for off-Site associated facilities.

The physiographic description addresses the geologic setting and identifies geomorphic or physiographic features. The physiographic features present in Citrus County include the Tsala Apopka Plain in the eastern portion of the county, Brooksville Ridge in the central portion of the county, and Gulf Coastal Lowlands in the western portion of the county. West of the Gulf Coastal Lowlands lies an area referred to as Coastal Swamps, and along the coast an area referred to as drowned karst.

The CCC Site and proposed locations for off-Site associated facilities lies in the western portion of Citrus County in the Gulf Coastal Lowlands and Coastal Swamps. The Gulf Coastal Lowlands are characterized by sands and clayey sands of variable thickness overlying Eocene and Oligocene limestone and dolomites as described previously.

Elevation of the Gulf Coastal Lowlands typically ranges from sea level to 100 ft above sea level, while elevations in the Coastal Swamps are generally less than 10 ft above sea level (Spencer, 1984). Figure 3.1.1-1 provides a reproduction of the Red Level, Florida, USGS topographic quadrangle map showing regional topographic characteristics. This figure shows that the topography in the area of the Site is relatively flat and varies between approximately 5 and 10 ft-msl. A detailed survey of the property conducted by Southern Resource Mapping, Inc., in November 2013 shows that the topography varies between 2 and 10 ft-msl (Figure 3.3.1-2).

3.3.1.2 Detailed Site Lithologic Description

Between October 30 and November 27, 2013, 25 standard penetration test (SPT) soil borings were completed at the Site to depths ranging from 26 feet below land surface (ft bls) to approximately 100 ft bls. The soil borings were logged by AMEC and provided in a report titled, "Site Characterization and Preliminary Geotechnical Design Recommendations," dated December 2013 (AMEC, 2013) (see Appendix 10.7.2). Figure 3.3.1-3 shows the locations where the soil borings were drilled.

According to AMEC (2013), the soil borings revealed three strata as described in the following:

- Stratum 1—A sand layer is present at land surface at most locations ranging in thickness from 0 to approximately 6 ft bls. The sand contains varying amounts of silts and clays and was not present at all drilling locations.
- Stratum 2—Immediately underlying the unconsolidated sands or exposed at land surface, a poorly to moderately indurated limestone is encountered. This limestone layer is referred to as the upper limestone and is characterized as hard and soft limestone interbedded with lenses of sand, silt, and clay of varying thicknesses. This limestone is encountered at depths from approximately 5 to 40 ft bls and occasionally extending to as deep as 60 ft.
- Stratum 3—Referred to as the lower limestone, this stratum consists of moderately to well indurated limestone. The limestone reportedly is pale brown to gray, dolomitic, and fine- to coarse-grained to depths of 100 ft bls. An interbedded layer of brown vuggy, fossiliferous, coarse-grained, very weakly indurated dolomitic limestone is occasionally encountered between 50 and 80 ft bls.

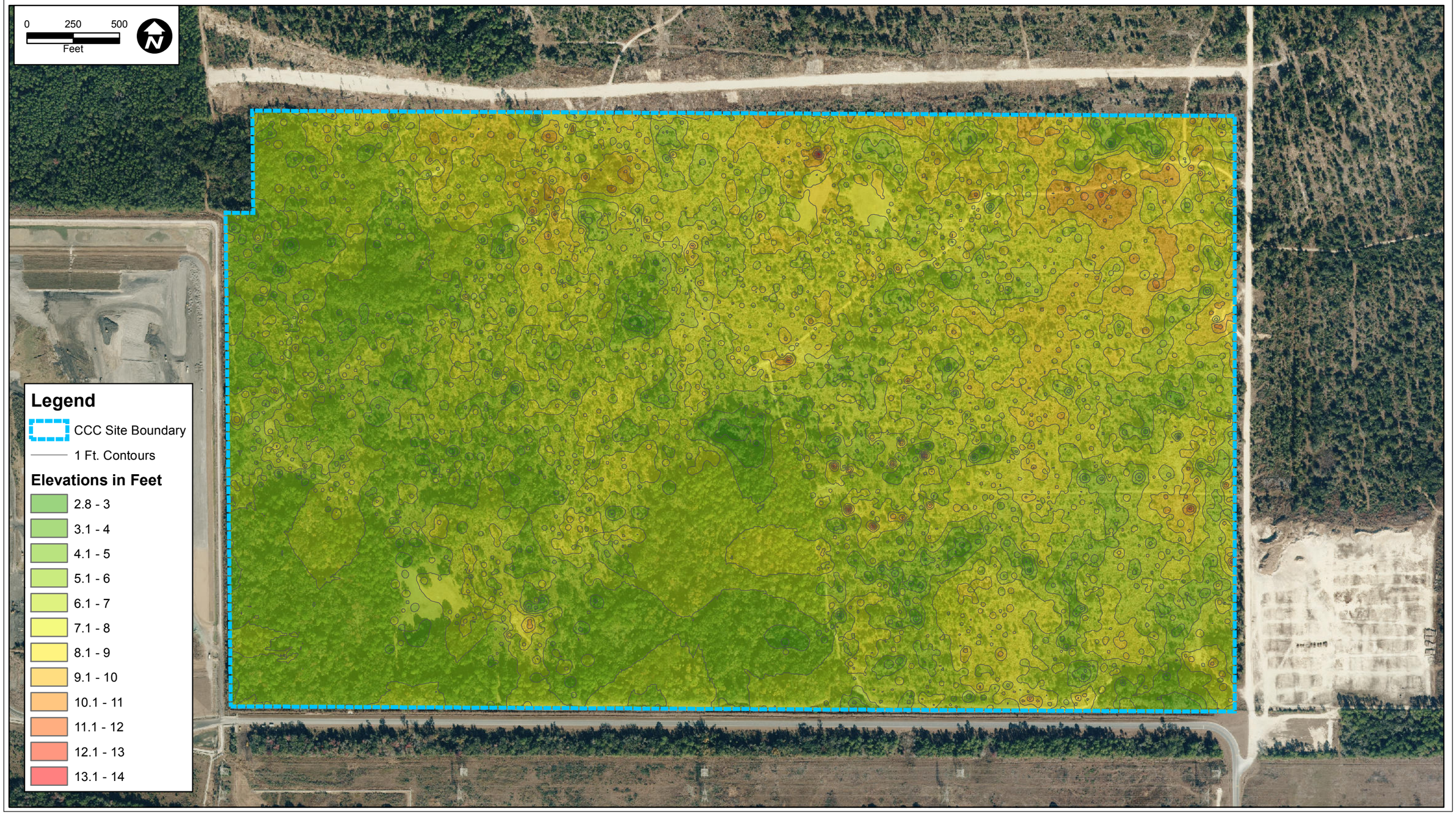

FIGURE 3.3.1-2.
DETAILED 1-FOOT TOPOGRAPHIC CONTOURS

Sources: USDA Aerials, 2013; Southern Research Mapping, Inc., 2013; ECT, 2014.

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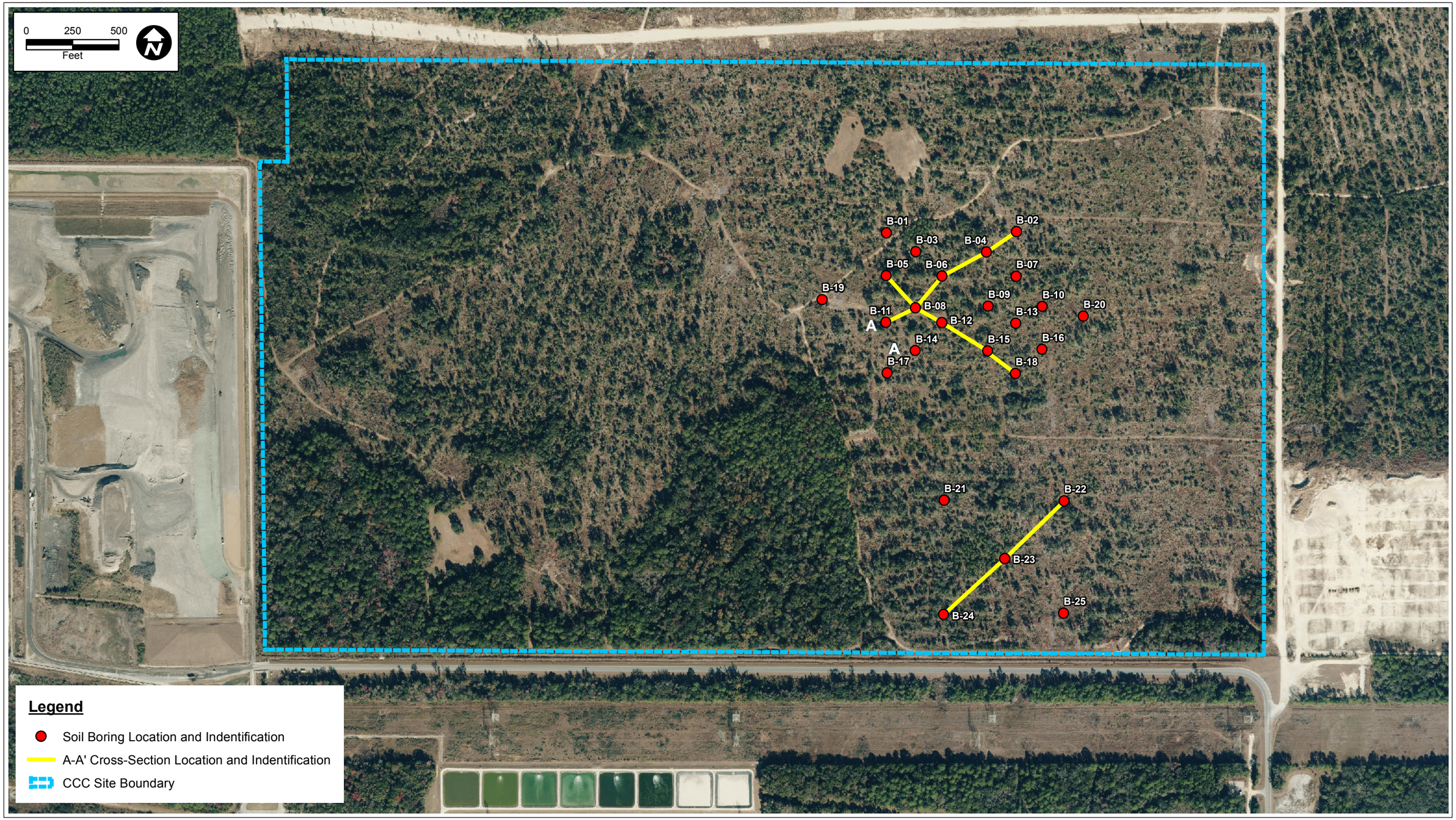

FIGURE 3.3.1-3.
SOIL BORINGS GEOLOGIC CROSS-SECTION LOCATION MAP

Sources: USDA Aerials, 2013; AMEC, 2013; ECT, 2014.

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AMEC (2013) reports that the soft and hard limestone encountered in the soil borings is predominantly from the lower Ocala Limestone; while the brown to gray dolomitic hard limestone is believed to represent limestone from the Avon Park Formation. The limestone from the Avon Park Formation is encountered in 7 of the 25 soil borings at depths ranging from 55 to 65 ft bls.

In 12 of the soil borings, the limestone is weak enough to allow the weight of a hammer or the weight of a rod to penetrate the subsurface without active pushing. In most cases, the zone ranges from 6 inches to 3 ft. However, at boring B-15, the weak zone was approximately 23 ft.

Figure 3.3.1-3 shows the locations of cross-sections prepared using stratigraphic information from the soil boring logs. Figures 3.3.1-4, 3.3.1-5, and 3.3.1-6 show the stratigraphic data. These data show that the sand layer is thin and not present at all locations, and limestone is present at land surface at some locations. These data also show that voids may be present in the shallow limestone. As more fully described in the following subsections, appropriate measures will be employed to ensure that the presence of voids/karst features will not adversely impact the safe construction and operation of the Project.

3.3.1.3 Geologic Maps

Figure 3.3.1-7 shows lineaments and photolinear features mapped by Vernon (1951) and the Florida Department of Transportation (FDOT) (1973) as observed on black-and-white photographs. Figure 3.3.1-8 depicts photolinear features mapped by AMEC as part of their geotechnical investigation. It should be noted that not all photolinear features represent fracture traces, and karst features could be present in the subsurface at locations not associated with mapped photolinear features. For example, Figure 3.3.1-8 shows the photolinear features mapped on the Site. Also shown on the figure is the location of a sinkhole and a ground-penetrating radar (GPR) anomaly associated with voids at the location where soil boring SB-15 was drilled.

The cross-sections provided as Figures 3.3.1-4 through 3.3.1-6 show that limestone is present at or near land surface and extends to depths greater than 100 ft bls.

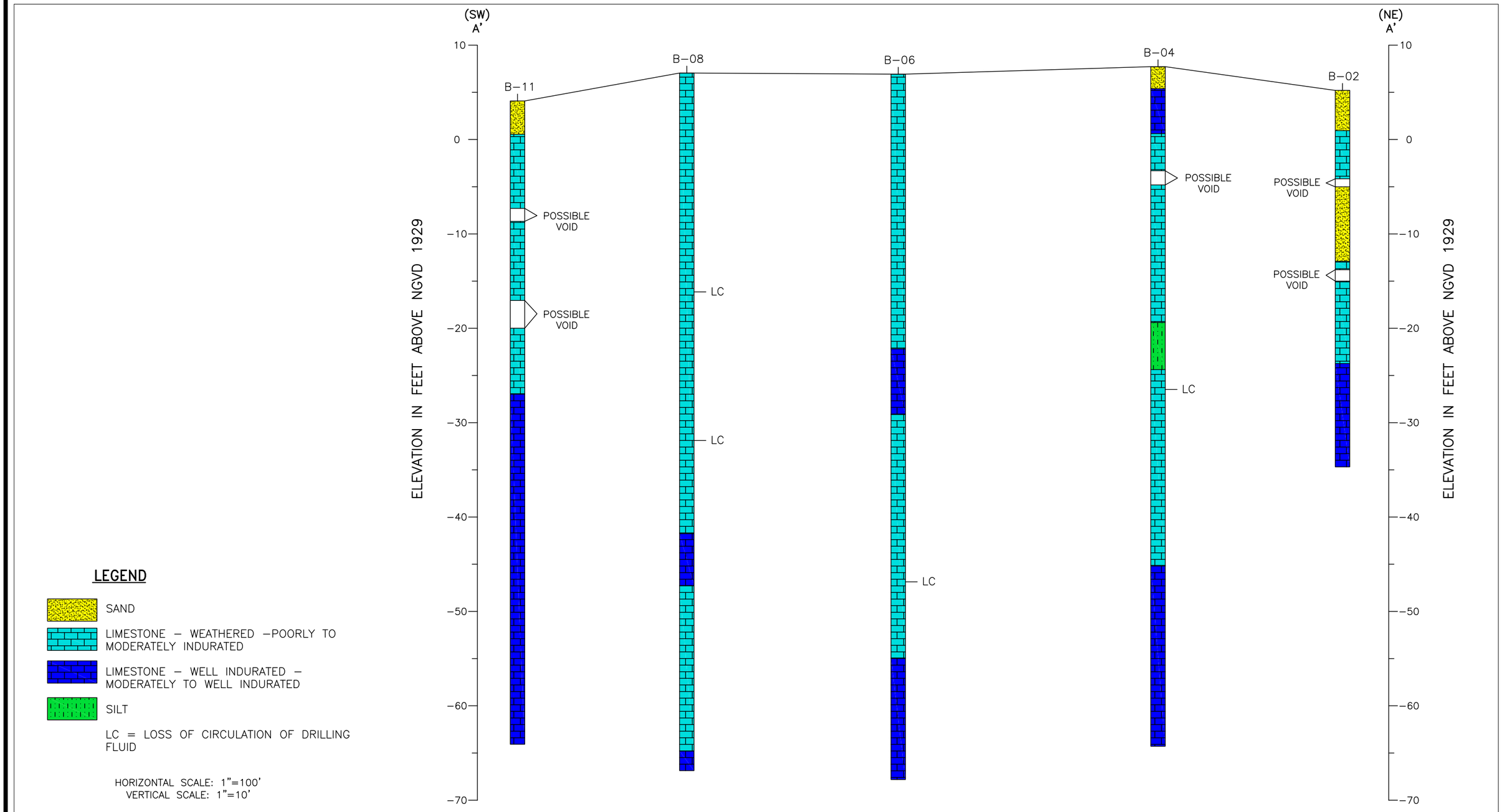

FIGURE 3.3.1-4.

GEOLOGIC CROSS-SECTION A-A' (NORTHEAST - SOUTHWEST)

Source: ECT, 2014.

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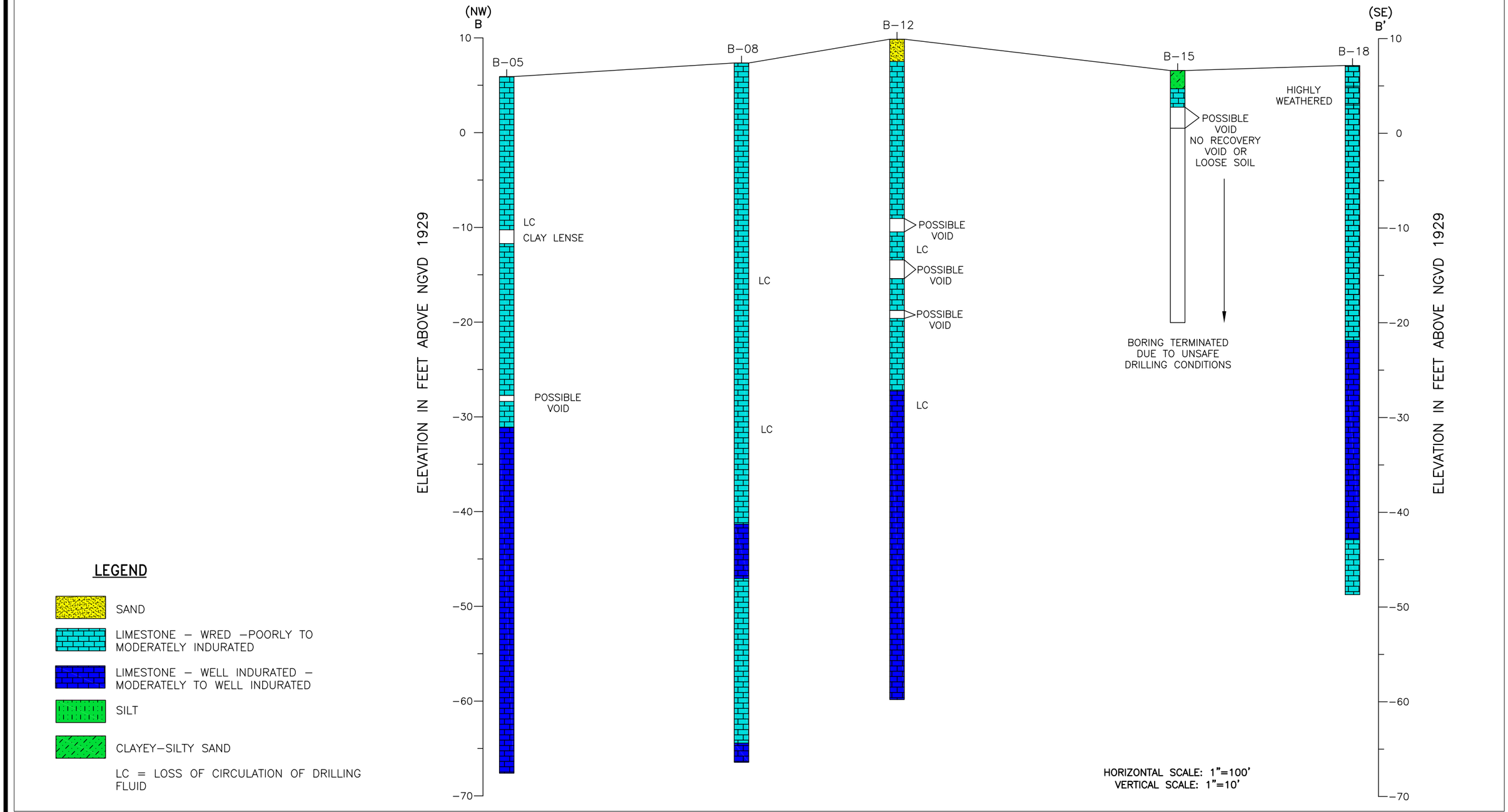
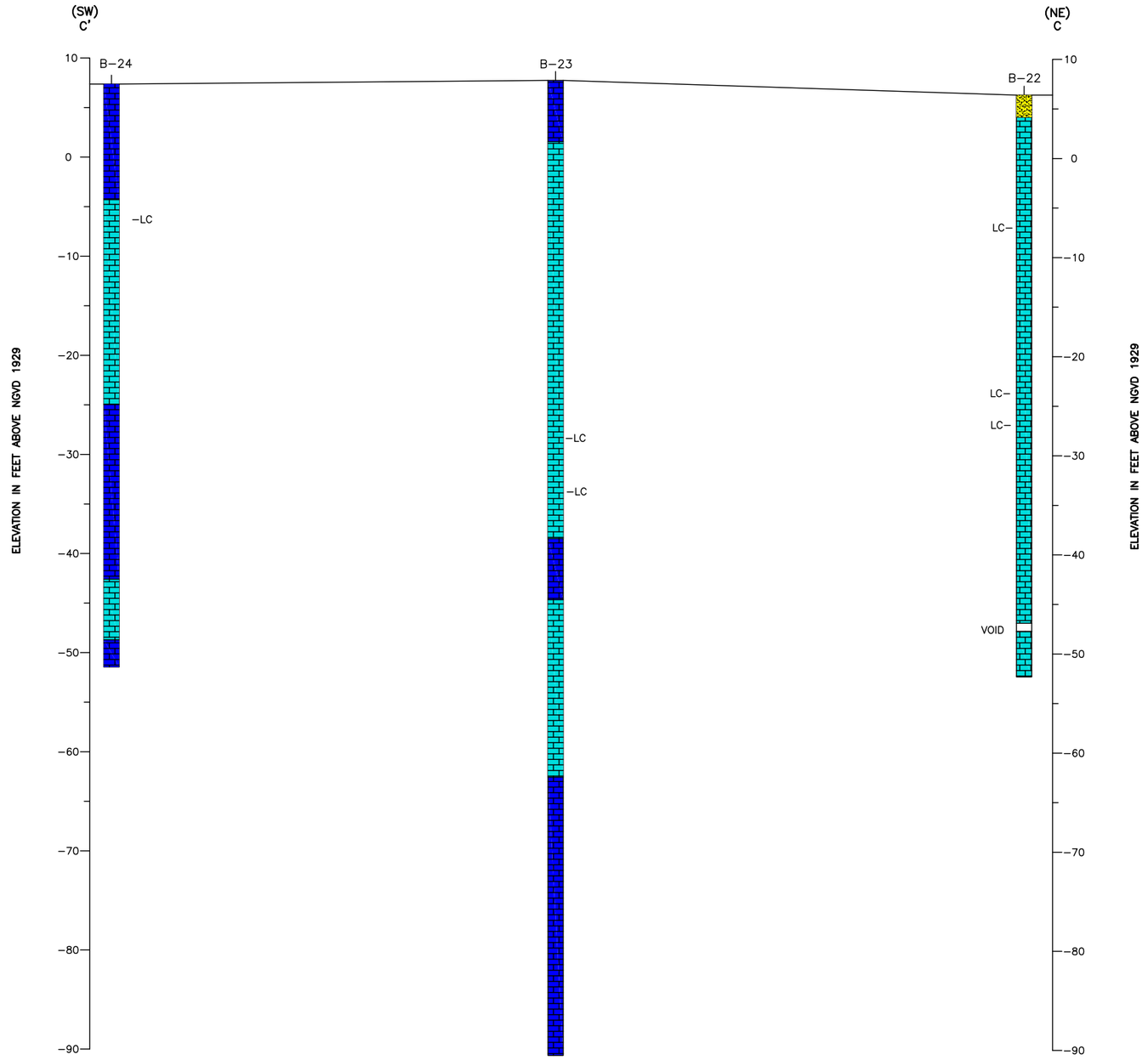


FIGURE 3.3.1-5.

GEOLOGIC CROSS-SECTION B-B' (NORTHWEST - SOUTHEAST)

Source: ECT, 2014.



LEGEND

- SAND
- LIMESTONE – WEATHERED –POORLY TO MODERATELY INDURATED
- LIMESTONE – WELL INDURATED – MODERATELY TO WELL INDURATED

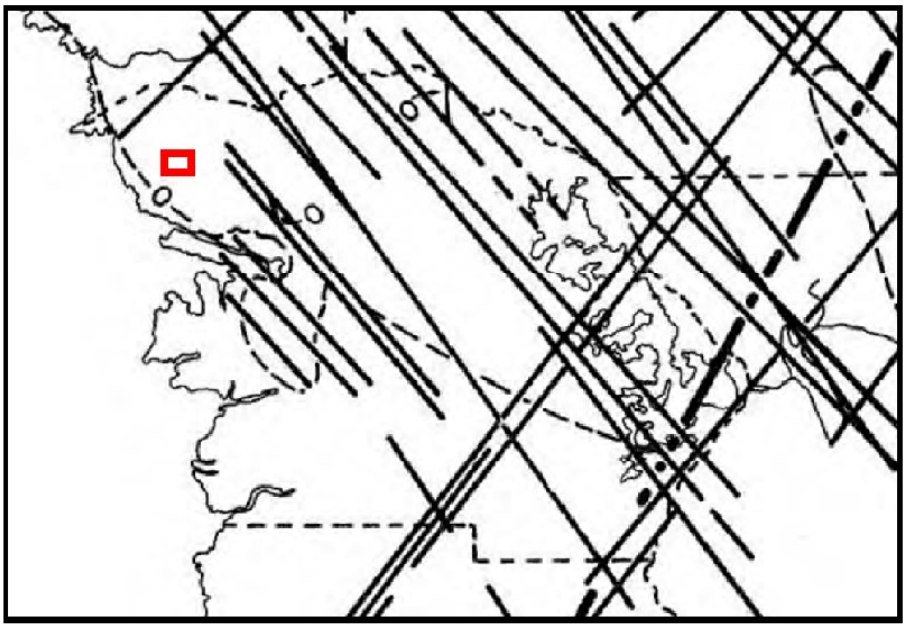
LC = LOSS OF CIRCULATION OF DRILLING FLUID

HORIZONTAL SCALE: 1"=130'
VERTICAL SCALE: 1"=10'

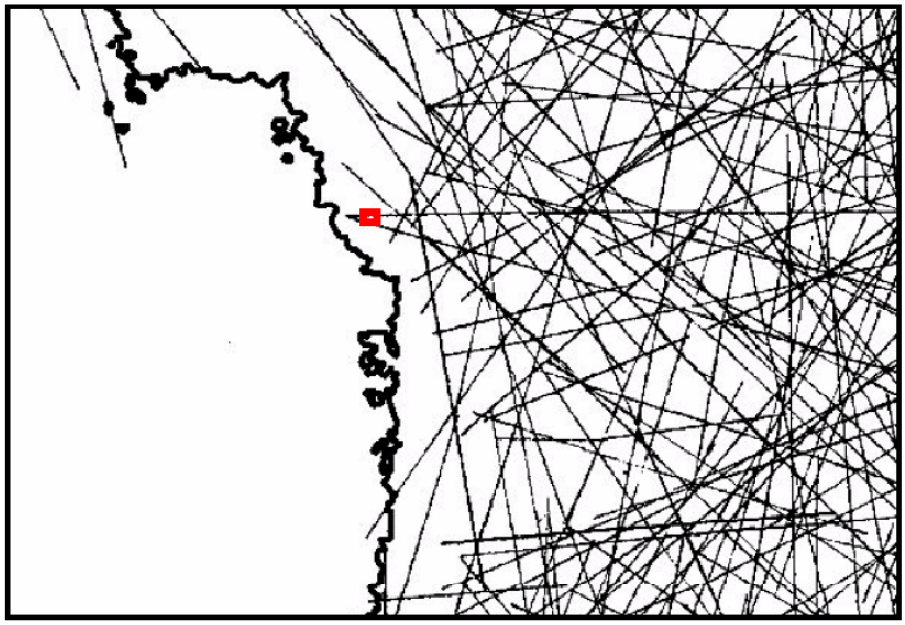
FIGURE 3.3.1-6.

GEOLOGIC CROSS-SECTION C-C' (NORTHEAST-SOUTHWEST)

Source: ECT, 2014.



Source:
Fracture Pattern of the Northern Portion of the Florida Peninsula
Taken from: Geology of Citrus and Levy Counties, Florida by R. O. Vernon
Published by Florida Geological Survey, 1951



Source:
Lineaments
Prepared by the Remote Sensing Section, State Topographic Office
Published by Florida Department of Transportation, 1973

APPROXIMATE PROJECT SITE

FIGURE 3.3.1-7.

PHOTOLINEAR MAP (VERNON & FDOT)

Source: ECT, 2014.

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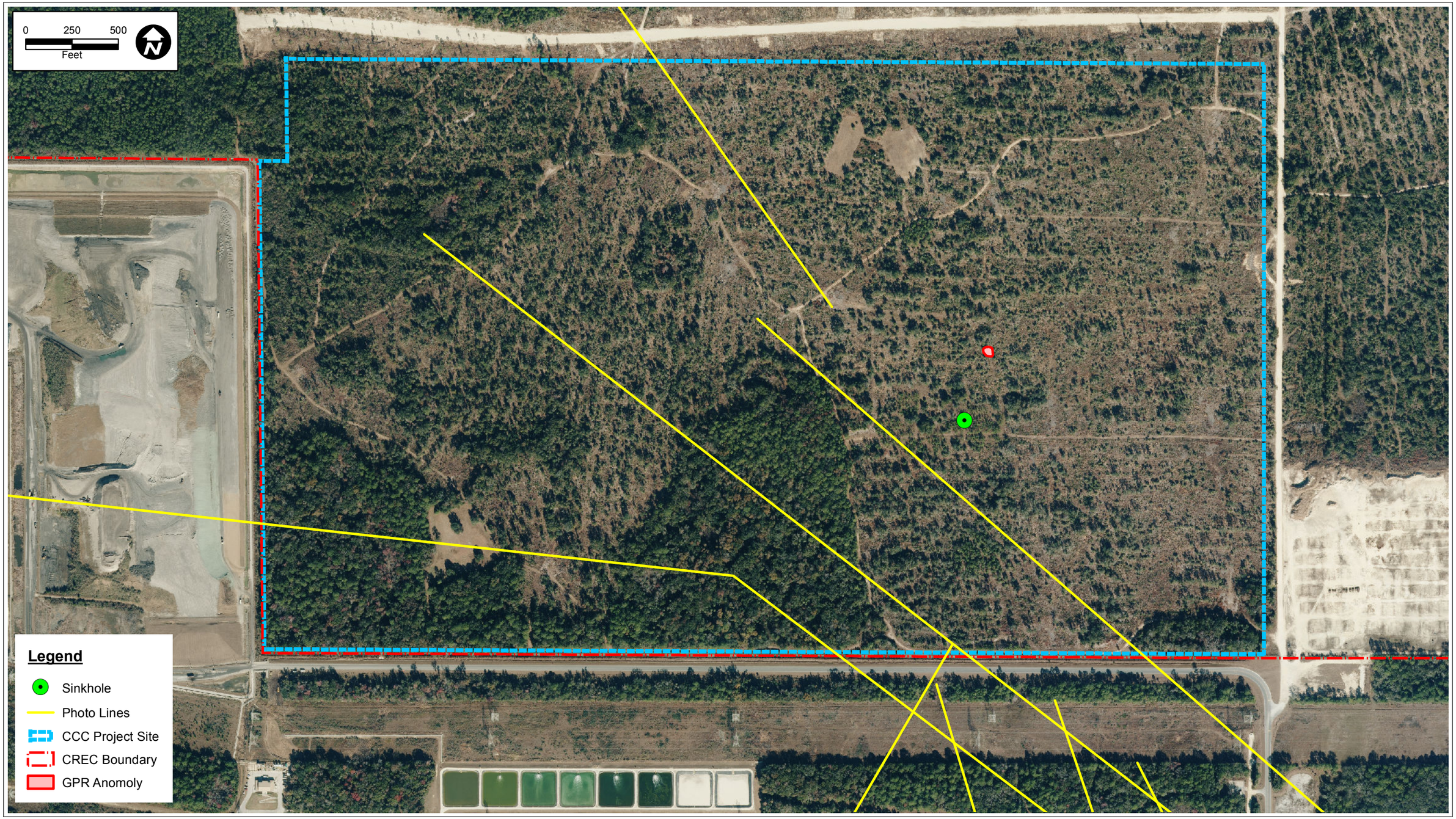

FIGURE 3.3.1-8.
MAP OF PHOTOLINEAR FEATURES

Sources: USDA Aerials 2013; AMEC, 2013, ECT, 2014.

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DEF will continue to monitor Site conditions for the presence of karst features and/or sinkholes during final design and throughout construction. Soil borings and GPR surveys will be the initial method for identifying voids and sinkholes. In addition, prior to placement of fill at the Site, the Site will be proof-rolled with heavy compaction equipment to identify areas susceptible to sinkhole formation.

Given the localized nature of the karst features observed at the Site, further geophysical surveys (including GPR survey and two-dimensional electrical resistivity imaging) will be conducted at the specific structure locations prior to foundation construction to identify any karst features and, if necessary, determine the appropriate ground treatment method.

Construction of facilities in areas with karst features is not unusual, especially in Central Florida. Various methods are available for sinkhole remediation, and the appropriate methods and procedures depend on the size, depth, and extent of each feature. No single method is proposed for remediation of sinkholes, but, instead, following additional geophysical surveys, each feature will be evaluated, and the most technical and cost-effective method will be performed based on the individual characteristics of each feature discovered.

Some potential subsurface treatment options include the following:

- Shallow sinkholes can be remediated by excavating and backfilling with a graded filter above a geotextile and geogrid.
- Stone columns (vibro-replacement) can be used to precollapse the subsurface voids, fill and densify the raveled zones, and improve soils to increase bearing capacity and reduce settlement potential.
- Compaction grouting can be used, which involves injecting low-strength cement grout into the karst features through hollow stem casing. The grout fills voids, densifies loose soils, and bridges weak zones.

3.3.1.4 Bearing Strength

Twenty five SPT soil borings were drilled during the geotechnical investigation on the CCC Site. These data are documented in a site characterization and preliminary geotechnical design recommendations report prepared by AMEC (2013). The SPT borings were drilled in general accordance with American Society for Testing and Materials

(ASTM) Practice D 1586. The locations and depths of the borings were specified by the owner's representatives. The borings extended to depths ranging from approximately 26 to 100 ft bls.

Figure 3.3.1-3 shows the location of the borings. The N-values (i.e., measures of penetration resistance) for the borings are graphically illustrated in Figure 3.3.1-9. Although intended for unconsolidated materials, the graphs are provided to illustrate the variable densities present in the shallow subsurface. As anticipated, the borings detected karst features.

AMEC (2013) reports that the foundations for the four CTGs and HRSGs and their associated equipment and the two STGs will be the most heavily loaded. It is expected that the CTGs and STGs will also produce dynamic loading. AMEC reports that these structures will be founded on large mat foundations supported by pilings or drilled shafts. Other structures are expected to be relatively light and may be founded on shallow spread footings or deep foundations, depending on soil conditions.

According to DEF's current plans, the plant facilities area is expected to be raised by approximately 8 to 9± ft for flood protection. Additional soil borings may be drilled to further assess the foundation and subsurface improvement requirements prior to final design.

Detailed foundation design will be completed during the final design of the Project. Due to the somewhat variable soil and rock conditions, it is anticipated that foundations for heavily loaded structures will consist of deep foundations (piles or drilled shafts) founded on competent rock at depths below the variable rock formations. Other foundation options that will be evaluated include grouting or stone columns to ensure suitable bearing for shallow foundations for lightly loaded structures.

As described in Section 5.1.1, approximately 8 to 9± ft of compacted structural fill will be placed over the plant facilities area. Prior to placement of the fill, surface vibratory compaction will be performed. Any ground improvement methods (e.g. vibro-replacement or compaction grouting) will be performed prior to the placement of permanent fill. When compacted, the fill will effectively seal off the limestone strata and reduce the risk of sinkhole activity.

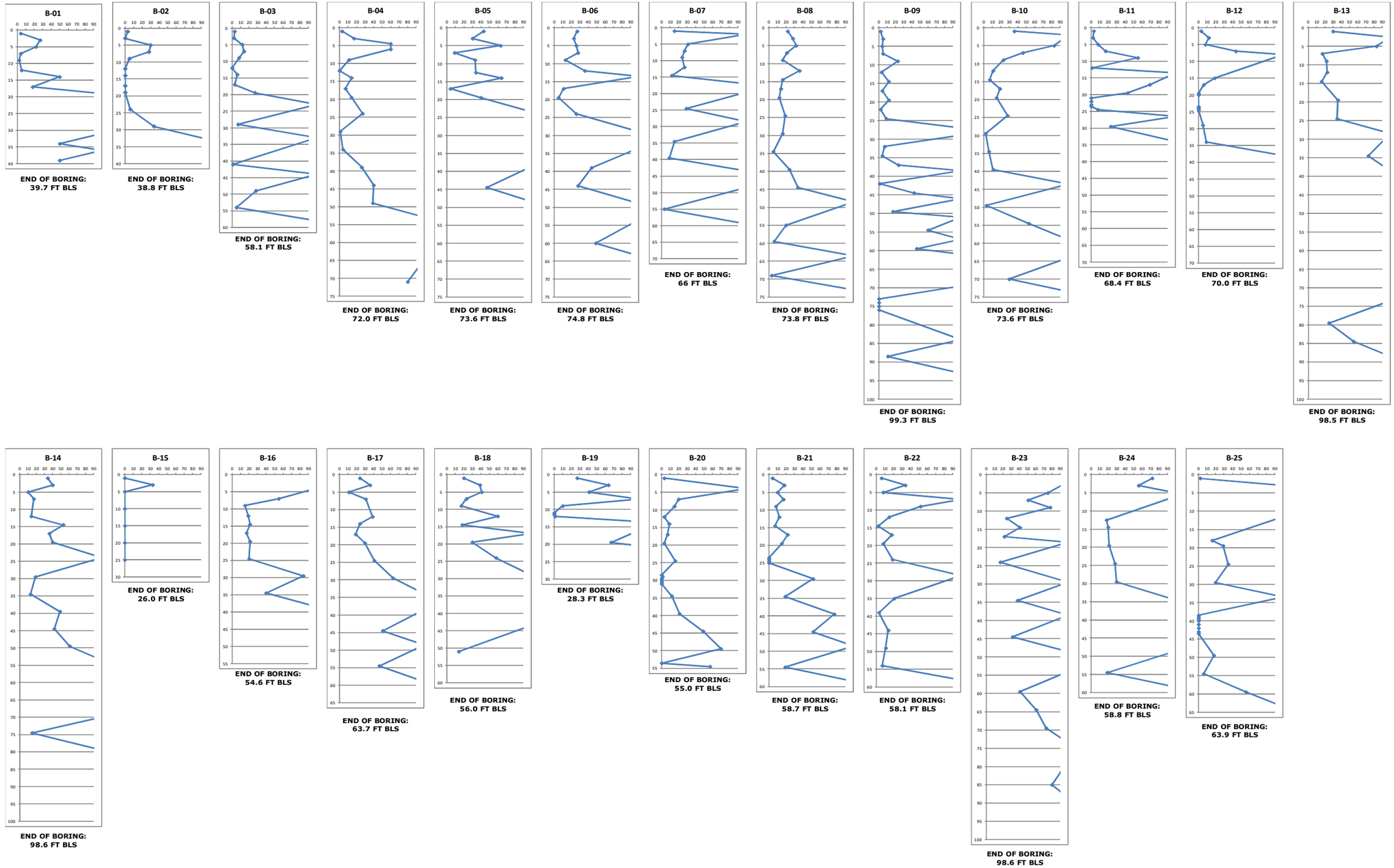

FIGURE 3.3.1-9.

STANDARD PENETRATION TEST "N" VALUES

Source: ECT, 2014.

As determined during the final Project design, appropriate methods will be employed to address any karst features and ensure foundation suitability.

3.3.2 Subsurface Hydrology

There are two aquifer systems within Citrus County: the Surficial aquifer system (SAS) and the Floridan aquifer system (FAS). The SAS in Citrus County has a thickness ranging from 0 to 50 ft and may be used to supply domestic wells and irrigation systems, where it is of sufficient thickness and extent to yield adequate quantities of water for these purposes.

The FAS is divided into the Upper Floridan aquifer system (UFAS) and the Lower Floridan aquifer system (LFAS). Figure 3.3.1-1 illustrates the hydrostratigraphic sequence in West-Central Florida. In Citrus County, the Miocene-Age deposits are mostly missing due to postdeposition erosion, resulting in the Eocene-Age limestones being present at/or near land surface throughout much of the area. In the coastal areas of Citrus County, the UFAS is unconfined, and recharge occurs through infiltration of rainwater through the subsurface.

The UFAS is the water source for the first magnitude springs in Citrus County. The UFAS is separated from the LFAS by the dolomites and intergranular evaporates in the lower portions of the Avon Park Formation. The LFAS is generally nonpotable and not utilized. There are no first magnitude springs located within 5 miles of the CCC Site.

Regionally, Florida groundwater flows from the center of the state outward toward the coastlines. Being located near the Gulf of Mexico in the western portion of the county, the Site lies near the transition between fresh water and salt water. The position of the freshwater and saltwater interface is influenced by lack of a confining layer over the FAS and the resulting lower potentiometric pressures in the aquifer; and the position of coastal springs. The location of the CCC Site is at the end of the flow path for potable water in the Floridan aquifer. Downgradient, the groundwater becomes brackish, and the quality of the water from a potable water perspective degrades naturally. However, the mixing of freshwater and saltwater creates and supports the nearshore brackish ecosystem.

Smaller springs present in the general area south of the Site in Citrus County discharge to surface water bodies that flow into the Gulf of Mexico. At the Site, the fresh water in the unconfined aquifer is subject to evapotranspiration and mixing with salt water.

3.3.2.1 Subsurface Hydrologic Data for the Site

Surficial Aquifer System

This portion of Citrus County does not have sufficient unconsolidated sands, underlain by clays to support an SAS above the Floridan aquifer. Along the western coastline of Citrus County, the UFAS is at or near the surface and is in hydraulic connection with saturated sands, where they exist. Along the coastal portions of Citrus County, the SAS is coincident with the UFAS.

Upper Floridan Aquifer System

The UFAS is the predominant source of groundwater of domestic and public supply wells and is the source of groundwater discharged at the coastal springs. The karst nature of the limestone comprising the UFAS provides for excellent water-bearing properties for the aquifer.

Potable and plant process water for the CCC Project operations will be provided by groundwater withdrawals from the three existing or replacement wells (CR-3, -4, and -5) that provide the freshwater supply for the existing Crystal River Units 1, 2, and 3. As shown in Figure 3.3.2-1, these wells are located east of the CCC Site and west of U.S. 19 in the existing CREC transmission line corridor. Geraghty and Miller, Inc. (1979) provided oversight of drilling replacement production well CR-4P east of the CCC Project Site and replacement production well CR-3P 933 ft east of CR-4P. The specific yield at CR-4P, based on pumping tests, was calculated to be 725 gallons per minute per foot (gpm/ft) of drawdown. The specific yield at CR-3P, based on a short-term pumping test, was 317 gpm/ft of drawdown.

During the on-Site geotechnical investigation, AMEC installed seven piezometers. The elevation of the groundwater in these piezometers ranged from 2.2 to 4.8 ft bls (-2.7 to -3.5 feet North American Datum of 1983 (ft-NAD83). AMEC reports that these water levels were measured in a dry season, and that, during wet seasons, water levels could be expected to be higher. The Natural Resources Conservation Service (NRCS) reports

FIGURE 3.3.2-1.
LOCATION OF EXISTING WELLS FOR CRYSTAL RIVER UNITS 1, 2, AND 3

Sources: USDA Aerials, 2013; AMEC, 2013; ECT, 2014.

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a seasonal high groundwater table of 0.5 ft bls. It is likely that the water levels at the site are tidally influenced, resulting in a variable direction of groundwater flow.

Groundwater for this area was sampled and tested in 1978 at well locations CR-3P and CR-4P. Groundwater in the vicinity of the Site is a calcium bicarbonate type, with relatively low dissolved solids of approximately 250 milligrams per liter (mg/L) in each well; relatively high iron content of 1.35 mg/L in CR-3P and 2.5 mg/L in CR-4P; chloride contents of 7 and 8 mg/L, respectively; sulfate content of 10 and 15 mg/L, respectively; and fluoride contents of 0.1 mg/L in each well (see Table 3.3.2-1).

While the limestones comprising the Floridan aquifer in this area exceed 1,000 ft in thickness, the thickness of fresh water in the aquifer in this area may be only a couple of hundred feet.

Lower Floridan Aquifer System

Groundwater in the LFAS is generally nonpotable and not utilized.

Table 3.3.2-1. 1978 Groundwater Sampling Results

Parameter	Well CR-3P (mg/L)	Well CR-4P (mg/L)
pH at 25°C	7.4	7.5
Dissolved solids	245	255
Suspended solids	5 to 10*	5 to 10*
Turbidity (Jackson turbidity unit)	10	15
Bicarbonate	262	270
Chloride	7	8
Sulfate	10	15
Silica	5	5
Nitrate	<5	<5
Organic phosphorous	0.05	0.05
Hardness (as calcium carbonate)	209	213
Fluoride	0.1	0.1
Magnesium	8.5	9.5
Sodium	4	4.3
Potassium	0.3	0.3
Total organic compounds	5	3
Iron	1.35	2.5
Calcium	70	70

*Estimated.

Source: Geraghty & Miller, Inc., 1979.

3.3.2.2 Karst Hydrogeology

The Citrus County Comprehensive Plan identifies the coastal areas of Citrus County, extending to the east of U.S. 19, as karst-sensitive areas. Being characterized as having bare or thinly covered limestone at land surface, the coastal area of Citrus County is subject to karst processes. These karst processes influence the hydrology of the area. This includes the CCC Site and locations proposed for associated off-Site facilities.

The most common and recognizable karst features are sinkholes and springs. Figure 3.3.2-2 shows the locations of mapped springs and sinkholes based on the most recent geographic information systems (GIS) data from SWFWMD.

The most significant karst feature identified at the Site is a sinkhole located slightly southeast of the center of the Site. Figure 3.3.1-8 illustrates the approximate location of the sinkhole.

Sections 3.3.1.2 and 3.3.1.3 address potential karst features and voids. As described, as part of the site characterization and preliminary geotechnical design recommendations, AMEC reviewed fracture trace maps and lineament maps prepared by others. In addition, AMEC mapped fracture traces at the Site using 1944 aerial photographs. Figure 3.3.1-8 shows these fracture traces. It is possible that at locations along these fracture traces, vertical erosional and karst activity may be encountered.

GPR was used to investigate the area around the sinkhole and around soil boring B-15. Anomalies were reportedly observed around both features. Figure 3.3.1-8 depicts the extent of the geophysical anomalies.

These types of features are not unusual in this area and will be appropriately addressed as described in Sections 3.3.1.3 and 3.3.1.4 of the SCA.

3.3.3 Site Water Budget and Area Uses

3.3.3.1 Site Water Budget

Meteorological data representative of the hydrological characteristics of the CCC Project Site were obtained from the Southeast Regional Climate Center (SRCC) Website (www.sercc.com/climateinfo/historical/historical_fl.html). These data contain

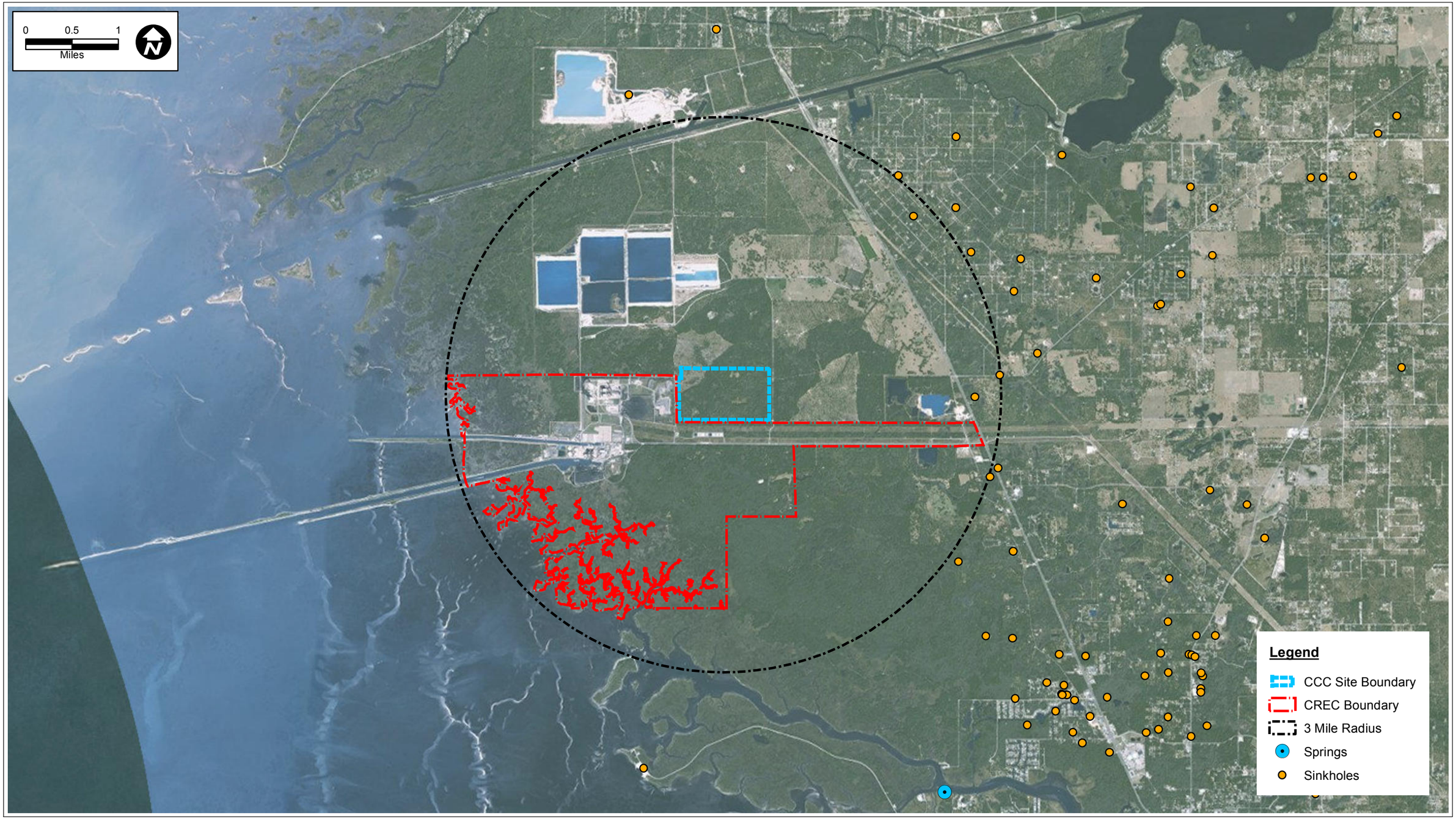

FIGURE 3.3.2-2.
MAP SHOWING SPRINGS AND SINKHOLES IN VICINITY OF CCC SITE

Sources: USDA Aerials 2013; SWFWMD, 2012, DOH, 2012; ECT, 2014.

historical monthly average precipitation and temperatures measured at stations throughout the southeast. There were no stations in Crystal River; therefore, the data used are from Weeki Wachee (Station No. 089430) and Cedar Key (Station No. 081432). Both of these stations are in coastal areas relatively close (30 and 24 miles, respectively) to the Site and are representative of the meteorological conditions in the Crystal River and Project area.

The temperature data provided by SRCC include data from 1969 to 2012. Table 3.3.3-1 summarizes these data for each station.

Table 3.3.3-1. SRCC Temperature Data Summary

	Temperature (°F)						
	Weeki Wachee Station 089430			Cedar Key Station 081432			
	Low	High	Mean	Low	High	Mean	Average
January	13	88	57.3	8	88	57.6	57.4
February	21	91	59.5	20	85	59.0	59.2
March	21	92	64.6	23	89	63.7	64.2
April	34	97	69.4	37	90	70.5	70.0
May	44	100	75.1	47	98	76.7	75.9
June	47	100	80.1	58	100	81.4	80.8
July	60	105	81.3	62	102	82.4	81.8
August	63	98	81.3	64	99	82.5	81.9
September	48	98	79.8	46	103	80.9	80.4
October	32	97	73.1	38	99	74.1	73.6
November	23	91	65.8	25	92	65.1	65.4
December	19	90	59.5	15	86	58.9	59.2
Annual	13	105	70.6	8	103	71.1	70.8

Note: °F = degree Fahrenheit.

Source: SRCC, 2014.

These data show that the average annual temperature for the period of record based on the two stations is 70.8 degrees Fahrenheit (°F). The minimum average monthly temperature is 57.4°F and occurs in January. The maximum average monthly temperature is 81.9°F and occurs in August.

The precipitation data provided by SRCC include data from 1969 to 2012. Table 3.3.3-2 summarizes these data for each station.

Table 3.3.3-2. SRCC Precipitation Data Summary

	Precipitation (inches)						
	Weeki Wachee Station 089430			Cedar Key Station 081432			
	Low	High	Mean	Low	High	Mean	Average
January	0.26	11.24	3.55	0	8.35	2.70	3.13
February	0.12	12.05	3.21	0	6.96	2.84	3.03
March	0	12.62	4.18	0	12.47	3.19	3.69
April	0	5.38	2.27	0	11.20	2.46	2.37
May	0	11.95	2.65	0	8.25	2.30	2.48
June	0.4	24.59	6.73	0	12.18	4.32	5.53
July	3.39	16.31	8.51	0.10	25.57	7.64	8.08
August	1.75	12.99	7.34	0.60	18.20	7.78	7.56
September	0.12	18.35	6.38	0.30	28.14	5.82	6.10
October	0	8.82	2.35	0	12.15	2.75	2.55
November	0	6.95	1.90	0	7.14	1.62	1.76
December	0.25	8.1	2.51	0	8.20	2.66	2.59
Annual	38.13	74.62	51.57	27.41	83.4	46.07	48.82

Source: SRCC, 2014.

These data show that the annual average precipitation for the period of record is 48.82 inches per year. The average monthly minimum precipitation rate is 3.03 inches and occurs in February. The average monthly maximum precipitation rate is 8.08 inches and occurs in July.

Evapotranspiration data based on estimates of solar radiation in the Project area obtained from Geostationary Operational Environmental Satellites (GOES) were obtained from USGS (www.usgs.gov). Table 3.3.3-3 presents both potential evaporation (ET_P) and reference evapotranspiration (ET_O) data for the period 2000 through 2012.

Based on the topography of the Site and the lack of surface water features draining the Site, surface water runoff from the Site is negligible.

Table 3.3.3-3. GOES Evapotranspiration Data Summary

Year	Evapotranspiration (inches per year)	
	ET_P	ET_O
2000	52.03	53.68
2001	50.30	51.03
2002	49.88	49.96
2003	47.34	47.92
2004	49.38	50.77
2005	49.61	52.59
2006	53.75	57.98
2007	52.85	56.89
2008	50.13	54.60
2010	51.56	53.60
2011	54.84	55.25
2012	52.63	52.74

Source: USGS, 2014.

The data in Table 3.3.3-2 show that the average precipitation for the area is approximately 48.82 inches per year. Based on the GOES data, the estimated potential evapotranspiration for the area is approximately 47.34 to 54.84 inches per year. Given these data, it is expected that net yearly recharge to the Floridan aquifer at the CCC Project area is minimal and that, based on these numbers, there may be no net recharge to the aquifer.

3.3.3.2 Area Uses

SWFWMD periodically summarizes and analyzes freshwater use in the 16 full and partial counties that are within its jurisdiction. Data for each partial county only include the water use for that portion of the county that is within SWFWMD's area.

Water use within SWFWMD's area is analyzed according to six specific water use categories: public supply, domestic self-supply, recreation/aesthetic, agriculture, mining/dewatering, and industrial/commercial (SWFWMD, 2010). Domestic self-supply refers to nonpermitted individual wells that provide potable water for indoor and outdoor domestic uses, which are not regulated by SWFWMD. In 2010, an average of 1.16 billion gallons of fresh water was withdrawn each day within the SWFWMD area. Approximately 83 percent of this amount was from groundwater sources, with the re-

mainder coming from surface water sources. According to SWFWMD (2010), Citrus County is one of the lowest freshwater users in the SWFWMD area, accounting for approximately 34 million gallons per day (MGD), or approximately 3 percent of the total freshwater withdrawn in the SWFWMD area in the year 2010.

In Citrus County, decreases in water use are projected in the agriculture, mining/dewatering, and industrial/commercial categories, as shown in Table 3.3.3-4. Table 3.3.3-4 compares calendar year 2010 water use data from SWFWMD (2012 report) with the projected 2025 water use data provided in the 2007 report from Water Resource Associates (for the Withlacoochee Regional Water Supply Authority) for each category for Citrus County.

Table 3.3.3-4. Water Use Comparison Data

Water Use Type	2010 Water Use (MGD)	Projected 2025 Water Use (MGD)	% Change
Agriculture	2.1	0.5	-76
Industrial/commercial/mining/dewatering	3.1	2.2	-29
Public supply	13.2	17.7	34
Domestic self-supply	9.2	9.5	3
Recreation/aesthetic	4.6	6.3	37

Sources: SWFWMD, 2010.
Water Resource Associates, 2007.

It should be noted that the projected water use data provided by the Water Resource Associates 2007 report for the Withlacoochee Regional Water Supply Authority was based on actual year 2000 demand data, but year 2005 to 2025 were projected. The projections for the 2010 Citrus County water demands did not match the actual SWFWMD 2010 water use data. The 2010 SWFWMD water use data for agricultural, industrial/commercial/mining/dewatering, domestic self-supply, and the overall total daily use were actually higher than the projected use values shown in the Water Resource Associates 2007 report. The 2010 SWFWMD water use data for both public supply and recreation/aesthetics were actually lower than the projected uses shown in the Water Resource Associates 2007 report. Therefore, the percentage increase/decrease should be taken as an estimate.

The projected average daily water use in Citrus County is expected to slightly increase from 34 MGD in 2010 to 36.2 MGD in 2025. Agricultural water use by 2025 is predicted to decrease by 76 percent as compared to 2010 water use. Public supply is expected to increase 34 percent by 2025. Combined water use in industrial, commercial, mining, and dewatering is expected to decrease 29 percent by 2025. Domestic self-supply and recreational/aesthetic water uses are expected to increase 3 and 37 percent by 2025, respectively.

Figure 3.3.3-1 illustrates the permitted wells and groundwater users within a 5-mile radius of the Site. The figure shows both larger wells with water use permits (WUPs) and smaller wells (i.e., less than 4 inches) for which well construction permits (WCPs) were issued. WUPs were extracted from the SWFWMD GIS database (SWFWMD, 2007).

Table 3.3.3-5 lists the 40 WUP groundwater users located within a 5-mile radius of the proposed Site location. There are 15 public supply, 18 industrial/commercial, 5 mining/dewatering, and 2 recreation/aesthetic water use permits. Of these 40 WUPs, only four utilize surface waters for their supply: two owned by Florida Gas and two owned by Citrus Mining. No potable wells are located within a 1-mile radius around the CCC Site. There are only two permitted wells located within this 1-mile radius. Both are in the industrial/commercial category, and both are owned by Florida Power Corporation (dba Progess Energy, now DEF).

3.3.4 Surficial Hydrology

3.3.4.1 Hydrological Characterization

Site Hydrology

The Site, which is approximately 400 acres, is located just east of the approximately 4,394-acre CREC. It is situated adjacent to the CREC Units 4 and 5 coal combustion residual storage area to the west and is bordered on the north and east by undeveloped lands that are part of the Holcim limestone mine and on the south by a drainage ditch, the CREC North Access Road, and two existing transmission line rights-of-way.

As shown in Figure 3.1.1-1, there are no blue-line streams or open water indicated on the 7.5-minute USGS quadrangle map (Red Level, Florida, Quadrangle, 1961). Given the absence of significant streams and the gently sloping topography of the Site,

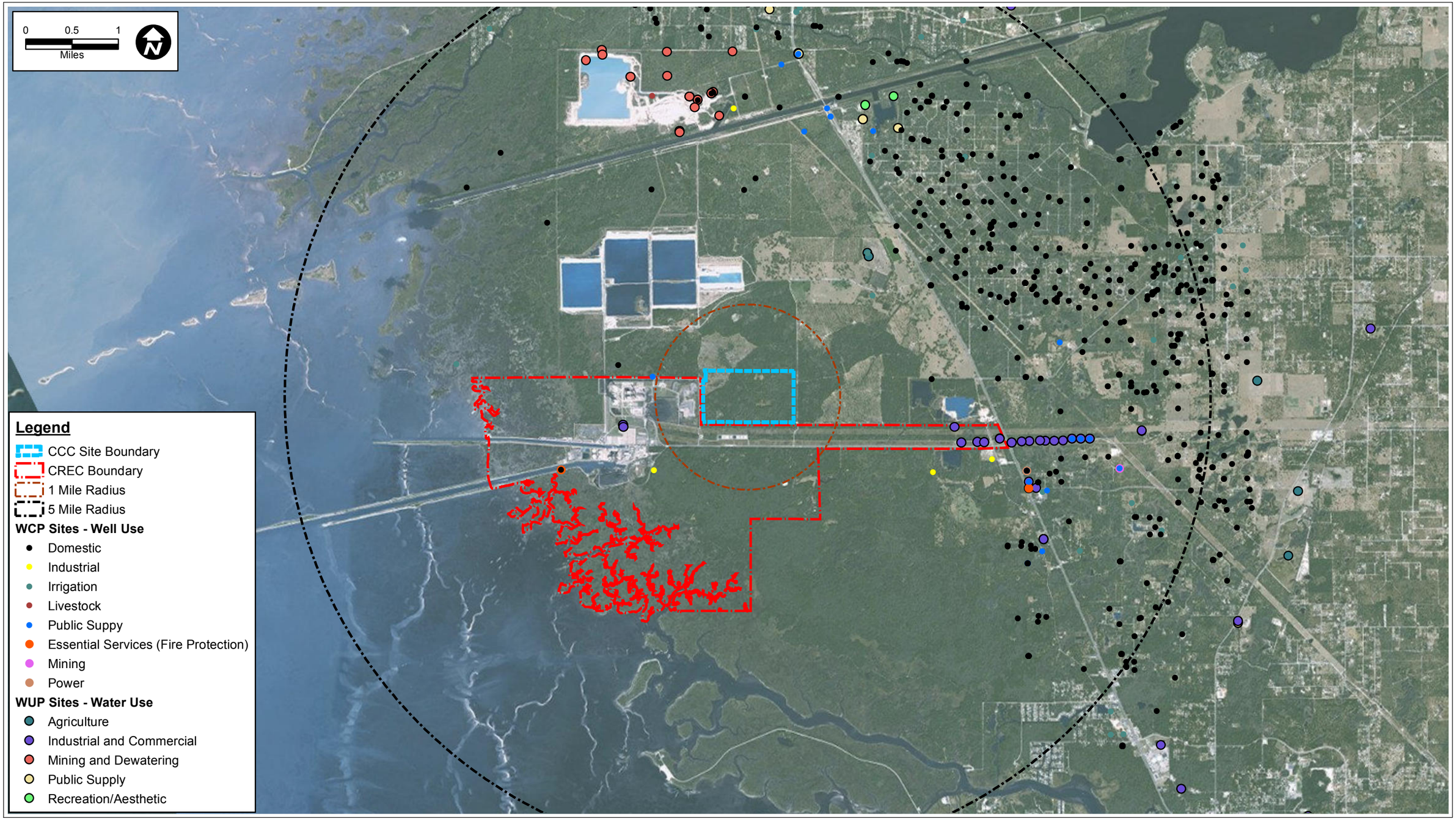

FIGURE 3.3.3-1.
MAJOR GROUNDWATER USERS IN THE VICINITY OF THE CCC SITE

Sources: USDA Aerials 2013; SWFWMD, 2014, ECT, 2014.

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Table 3.3.3-5. WUP Groundwater Users within 5-Mile Radius of the Site

WUP Permit Number	WUP Rev	Owner's Name	Water Use Category	Permitted Withdrawal Rate (gpd)		Casing Depth (ft)	Well Casing Diameter (in)	Permitted Well Depth (ft)	Latitude	Longitude
				Average	Peak					
7819	9	Citrus Mining and Timber Inc./Attn: Dixie M. Hollins	Mining and dewatering	38,137	117,463	0	12	0	29 01 01.00	82 41 52.99
4695	4	Florida Power Corp dba Progress	Industrial and commercial	25,000	37,500	42	8	42	28 57 44.59	82 41 56.39
4695	4	Florida Power Corp dba Progress	Industrial and commercial	25,000	37,500	42	8	42	28 57 43.30	82 41 56.18
4695	4	Florida Power Corp dba Progress	Industrial and commercial	285,000	427,500	37	10	125	28 57 36.05	82 38 08.88
8953	4	Town of Inglis	Public supply	74,000	114,000	60	12	249	29 02 03.30	82 38 35.80
3672	1	Florida Power Corp dba Progress	Industrial and commercial	250,000	0	60	10	200	28 57 36.62	82 37 35.35
3672	1	Florida Power Corp dba Progress	Industrial and commercial	551,520	0	50	10	200	28 57 36.88	82 37 19.63
3672	1	Florida Power Corp dba Progress	Industrial and commercial	551,520	0	50	12	200	28 57 38.15	82 36 56.81
7755	5	Town of Yankeetown	Public supply	0	0	59	10	80	29 02 12.90	82 42 00.80
20072	0	Florida Gas Transmission Company	Industrial and commercial	18,500	225,000	0	8	0	29 01 49.06	82 40 48.63
7819	9	Citrus Mining and Timber Inc./Attn: Dixie M. Hollins	Mining and dewatering	0	0	31	4	38	29 00 52.63	82 40 59.73
4695	4	Florida Power Corp dba Progress	Industrial and commercial	380,000	570,000	36	10	90	28 57 35.96	82 38 04.53
7819	9	Citrus Mining and Timber Inc./Attn: Dixie M. Hollins	Mining and dewatering	300	1,000	25	4	30	29 00 52.00	82 41 01.00
12506	0	Ellie Schiller & FDEP Office of Greenways & Trails	Recreation/aesthetic	3,900	11,400	100	6	150	29 00 37.75	82 39 23.54
12506	0	Ellie Schiller & FDEP Office of Greenways & Trails	Public supply	3,900	11,400	100	6	150	29 00 37.75	82 39 23.54
7755	5	Town of Yankeetown	Public supply	0	0	0	6	53	29 02 01.88	82 42 12.56
3672	1	Florida Power Corp dba Progress	Industrial and commercial	551,520	0	50	12	200	28 57 38.15	82 37 08.06
3672	1	Florida Power Corp dba Progress	Industrial and commercial	551,520	0	50	10	200	28 57 37.01	82 37 13.84
3672	1	Florida Power Corp dba Progress	Industrial and commercial	551,520	0	35	10	200	28 57 36.84	82 37 25.33
3672	1	Florida Power Corp dba Progress	Industrial and commercial	250,000	0	35	10	200	28 57 35.87	82 37 46.97
8953	4	Town of Inglis	Public supply	0	0	82	4	82	29 01 39.53	82 40 23.76
20072	0	Florida Gas Transmission Company	Industrial and commercial	18,500	225,000	0	8	0	29 01 50.79	82 40 48.85
7819	9	Citrus Mining and Timber Inc./Attn: Dixie M. Hollins	Mining and dewatering	0	0	65	16	200	29 00 48.22	82 41 09.70
7819	9	Citrus Mining and Timber Inc./Attn: Dixie M. Hollins	Mining and dewatering	38,137	117,463	0	12	0	29 00 50.00	82 41 15.00
8874	2	GTE Federal Credit Union/Stephen A Foster	Recreation/aesthetic	1,700	4,300	67	6	76	28 56 41.37	82 37 25.97
8874	2	GTE Federal Credit Union/Stephen A Foster	Industrial and commercial	1,700	4,300	67	6	76	28 56 41.37	82 37 25.97
8953	4	Town of Inglis	Public supply	0	0	0	12	125	29 02 03.04	82 38 35.29
8953	4	Town of Inglis	Public supply	0	0	49	4	49	29 01 45.26	82 40 18.46
8953	4	Town of Inglis	Public supply	0	0	50	4	50	29 01 47.92	82 40 21.29
7755	5	Town of Yankeetown	Public supply	42,800	62,800	65	10	140	29 02 12.50	82 42 00.60
7755	5	Town of Yankeetown	Public supply	0	0	0	6	54	29 02 04.24	82 42 15.05
4695	4	Florida Power Corp dba Progress	Industrial and commercial	285,000	427,500	0	10	72	28 57 35.75	82 38 19.13
7755	5	Town of Yankeetown	Public supply	0	0	0	4	54	29 02 05.73	82 42 12.79
7755	5	Town of Yankeetown	Public supply	42,600	62,600	60	10	100	29 02 14.10	82 42 00.80
8953	4	Town of Inglis	Public supply	75,000	113,000	50	12	230	29 02 04.60	82 38 30.00
8953	4	Town of Inglis	Public supply	75,000	113,000	50	12	230	29 02 00.10	82 38 30.10
3672	1	Florida Power Corp dba Progress	Industrial and commercial	551,520	0	50	12	200	28 57 38.15	82 37 02.43
3672	1	Florida Power Corp dba Progress	Industrial and commercial	250,000	0	47	10	200	28 57 36.34	82 37 40.31
3672	1	Florida Power Corp dba Progress	Industrial and commercial	250,000	0	41	10	200	28 57 36.94	82 37 28.60
7755	5	Town of Yankeetown	Public supply	42,600	62,600	48	6	83	29 02 11.50	82 42 01.30

Source: SWFWMD, 2007.

drainage occurs as sheet flow toward the southwest. Groundwater level measurements in the vicinity of CREC have indicated groundwater elevations range between 0.5 and 9 ft below ground level and can vary with season, proximity to the Gulf of Mexico, and tidal stage (Progress Energy Florida [PEF], 2013).

The drainage ditch that parallels the Site's southern boundary along the CREC North Access Road intercepts flow from the south side of the property. The ditch drains in a westerly direction and then is directed to the south under the access road and across the two transmission line rights-of-way. The drainage then joins another ditch on the north side of West Power Line Street to CREC that ultimately flows into the head of the CREC discharge canal.

Receiving Waters

Figure 3.3.4-1 shows the surface water bodies in the vicinity of the CCC Site. The existing CREC discharge canal, which will be utilized in connection with the CCC Project conveys wastewater from CREC to the Gulf of Mexico (the receiving water), located approximately 1.4 miles to the west of the Site and immediately west of CREC. The intake canal conveys cooling water from the Gulf of Mexico to the CREC cooling water intake structure. The shallow embayment adjacent to CREC is referred to as Crystal Bay, with depths typically less than 10 ft (below mean lower low water) for more than 3 miles offshore (National Oceanic and Atmospheric Administration [NOAA], 2013). The mean tidal range at the Shell Island tide station (approximately 3 miles south of CREC) is 2.36 ft, with a diurnal range of 3.03 ft (NOAA, 2014). Near-shore habitats in the bay include rocky reef areas, oyster bars, seagrass beds, and salt marshes.

With some exceptions at the south of CREC near the mouth of the Crystal River, the waters of Crystal Bay are designated as Class II Coastal Waters under Rule 62-302.400(16)(b)9, F.A.C. This classification includes waters suitable for shellfish propagation or harvesting, in addition to fish consumption, recreation, and the propagation and maintenance of a healthy, well-balanced population of fish and wildlife.

Crystal Bay receives freshwater discharges from the Cross Florida Barge Canal and Withlacoochee River approximately 2.5 and 4 miles, respectively, north of CREC and

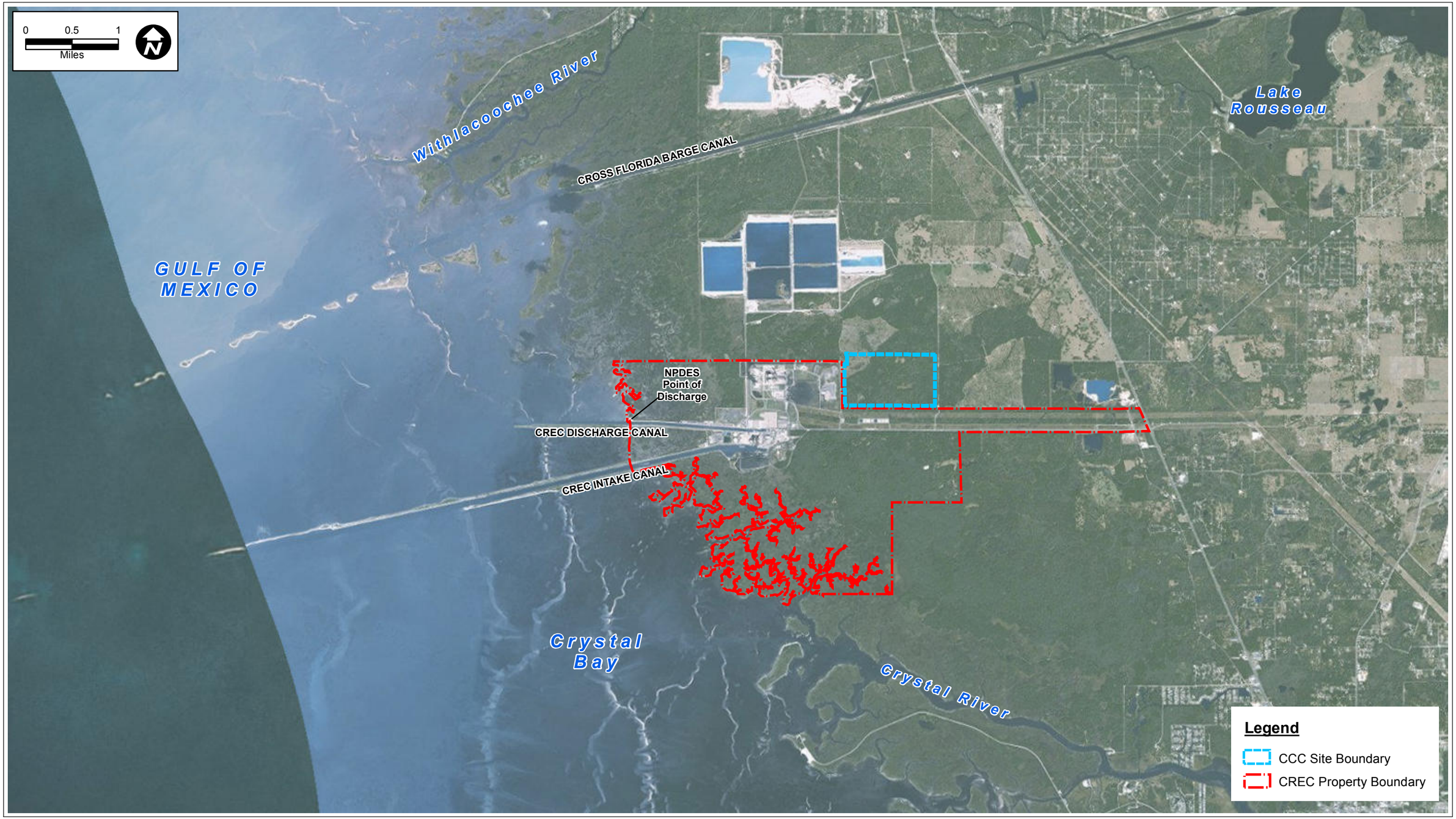

FIGURE 3.3.4-1.
SURFACE WATERS IN VICINITY OF THE CCC SITE

Sources: USDA Aerials 2013; ECT, 2014.

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from the Crystal River approximately 2.4 miles to the south. The Cross Florida Barge Canal was originally begun as a project to connect the Gulf of Mexico to the Atlantic Ocean but was never completed. A small section of approximately 10 miles in length was completed in the 1960s from Lake Rousseau to the Gulf, and flow out of the lake is directed to both the canal and the natural river channel.

The average flow from the Withlacoochee River for the period 1970 to 2012 is 1,010 cubic feet per second (cfs) (USGS Station 02313250 at bypass canal) (USGS, 2014). The average flow from the barge canal for the same period is 392 cfs (USGS Station 02313230 at Inglis Dam), yielding a combined average flow from these two features of 1,402 cfs. The Crystal River had an average flow of 470 cfs at Bagley Cove for the years 2002 through 2013 (USGS Station 02310747). In addition to groundwater flows from upstream springs included in these surface water measurements, an earlier study estimated that unrecorded springs between Crystal River and the Cross Florida Barge Canal could discharge as much as 387 cfs into Crystal Bay (Florida Power Corporation [FPC], 1977a).

Salinity in the vicinity of CREC varies with freshwater input from these rivers, as well as from groundwater discharges from the many springs. An FDEP water quality monitoring station on the western end of the discharge canal has an average surface salinity of 24.7 parts per thousand (ppt) with a range of 10 to 33.3 for the years 1995 to 2004 (U.S. Environmental Protection Agency [EPA] Storage and Retrieval [STORET], 2014). Water temperatures fluctuate throughout the year with the highest temperatures in late summer (July through September) and lowest in December through January. The annual average water temperature at the intake is 71.2°F, with a range from 43 to 94.6°F (PEF, 2007).

The circulation in Crystal Bay is primarily driven by wind and tides and is also minimally influenced by the channels that extend out into receiving water from the CREC intake and discharge canals. The dredged channel begins at the mouth of the discharge canal and extends 5 miles into the Gulf of Mexico. The other dredged channel extends approximately 1.3 miles from the end of the canal.

CREC Intake and Discharge

Prior to the retirement of Crystal River Unit 3, the CREC intake was permitted to withdraw up to 2,937 cfs (1,898 MGD) of once-through cooling water through the intake canal for Units 1 through 3 from May 1st through October 31st of each year and 2,496 cfs (1,613 MGD) during the remainder of the year. With the cooling water system for Crystal River Units 1 through 3 operating at design capacity, during low tide the induced velocity in the intake and discharge canals was approximately 1.3 and 2.4 feet per second (fps), respectively (PEF, 2007). Crystal River Units 4 and 5 use saltwater cooling towers for condenser heat dissipation. Makeup water for the cooling towers is withdrawn from the CREC discharge canal, downstream from the cooling water discharges from Units 1, 2, and 3. At design capacity, the makeup water flow for each unit is 34,000 gpm (49 MGD), for a total withdrawal rate of 68,000 gpm (98 MGD).

Cooling water for Crystal River Units 1 and 2 is withdrawn from eight intake bays on the northern side of the intake canal near its terminus. Cooling water and service water for retired Crystal River Unit 3 was withdrawn from an additional eight bays at the head of the intake canal. With the retirement of Unit 3, the maximum permitted May-to-October withdrawal was reduced to 1,421 cfs (918.7 MGD).

The discharge from CREC is regulated by FDEP under its EPA-approved authority to administer the NPDES program. Units 1 through 3 are regulated under permit No. FL0000159, with the discharge primarily consisting of once-through condenser cooling water from Units 1 and 2, along with relatively small flows from low-volume wastewaters, stormwater, and service water for Unit 3. A linear array of mechanical draft helper cooling towers is located along the north side of the discharge canal. The helper towers are used seasonally (i.e., summer) and withdraw water directly from the canal to provide additional cooling and return the cooled water to the discharge canal upstream from the final outfall.

The discharge canal also receives 136 cfs (88 MGD) of blowdown from the saltwater cooling towers for Units 4 and 5 under NPDES permit No. FL0036366. Makeup water for these cooling towers uses the once-through cooling water from the other units and is withdrawn from the discharge canal upstream of the blowdown discharge. Stormwater associated with industrial activity from the operation of Units 4 and 5 is also regulated under Permit No. FL0036366.

3.3.4.2 Measurement Programs

The hydrologic and water quality data for this section of the application have been obtained from the literature and extensive studies and monitoring required for nuclear licensing of Crystal River Unit 3 (U.S. Atomic Energy Commission [AEC], 1973), the SCA for Crystal River Units 4 and 5 (No. PA 77-09; FPC, 1977b), and site certification for Crystal River Unit 3 (PEF, 2007). In addition, CREC's two NPDES discharge permits require continuous monitoring of flow and temperature and quarterly monitoring for nutrients at the combined CREC discharge point.

The licensing and siting studies included numerous modeling studies of the discharge of cooling water into Crystal Bay conducted in support of CREC's 316(a) thermal variance, approved by EPA in 1988 and summarized in relatively recent SCA filings for DEF's proposed Levy Nuclear Plant. Additional modeling studies for salinity effects were conducted to assess the potential effects from an additional saltwater cooling tower proposed as part of the Crystal River Unit 3 Uprate project. This information provided the background for the water quality analyses for the impact assessments presented in Subsections 6.1 and 6.2.

3.3.5 Vegetation/Land Use

Land use and vegetation types at the CCC Site consist of undeveloped land with mainly forested communities, including pine and mesic oak, mixed hardwoods, and several wetland types. Nonforested communities include trails/roads and herbaceous dry prairie (old field). Most of the CCC Site has been managed for timber production in the past and altered by land preparation (furrowing) and periodic timber harvesting.

Land use types and vegetation communities were mapped and described by ECT during field visits in the spring and summer of 2014 (Table 3.3.5-1). The quality and condition of each plant community was characterized, and existing stressors were noted. Florida Land Use, Cover, and Forms Classification System (FLUCFCS) GIS data were overlain on a 1-inch-to-400-ft scale aerial photograph and used as a base map for the fieldwork. Community types are classified using the FLUCFCS Level III and IV categories (FDOT, 1999).

Table 3.3.5-1. Plant Species Observed on the CCC Site—Spring/Summer 2014

Scientific Name	Common Name
Trees	
Acer rubrum	Red maple
Carya glabra	Pignut hickory
Cercis Canadensis	Eastern redbud
Chionanthus virginicus	White fringetree
Cornus foemina	Stiff dogwood
Diospyros virginiana	Persimmon
Fraxinus pennsylvanica	Green ash
Gleditsia aquatica	Water locust
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 elliottii	Slash pine
Quercus geminata	Sand live oak
Quercus incana	Bluejack 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
Tilia americana var. *caroliniana*	Carolina basswood
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
Sideroxylon tenax	Tough bully

Table 3.3.5-1. Plant Species Observed on the CCC Site—Spring/Summer 2014 (Continued, Page 2 of 4)

Scientific Name	Common Name
Lyonia ferruginea	Rusty staggerbush
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
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
Eryngium prostratum	Creeping eryngo
Eupatorium coelestinum	Blue mistflower

Table 3.3.5-1. Plant Species Observed on the CCC Site—Spring/Summer 2014 (Continued, Page 3 of 4)

Scientific Name	Common Name
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
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 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
Thelypteris kunthii	Southern shield fern
Thelypteris palustris	Marsh fern

Table 3.3.5-1. Plant Species Observed on the CCC Site—Spring/Summer 2014 (Continued, Page 4 of 4)

Scientific Name	Common Name
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
Yucca filamentosa	Spanish bayonet
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*	Reserection fern
Tillandsia bartramii	Bartram's Airplant
Tillandsia recurvata	Ball moss
Tillandsia usneoides	Spanish moss

Source: ECT, 2014.

Overall, seven vegetation communities/land uses were identified on the CCC Site. Figure 3.3.5-1 shows the location and extent of each of the vegetation/land use types identified on the CCC Site, and Figure 3.3.5-2 presents photographs of the various land use and vegetation communities on-Site. The following paragraphs provide descriptions of each. Chapter 9.0 provides descriptions of the vegetation/land use types in the corridors for the off-Site associated facilities.

3.3.5.1 Herbaceous Dry Prairie—310

Herbaceous dry prairie covers approximately 5 acres or 1.2 percent of the CCC Site and is limited to two locations, one in the northeast and one in the southwest portions of the property. It is establishing as an old field community, vegetated with a variety of mainly herbaceous species like bahiagrass (*Paspalum notatum*), carpet grass (*Axonopus furcatus*), broomsedge (*Andropogon* spp.), frogfruit (*Phyla nodiflora*), black-eyed Susan (*Rudbeckia hirta*), sensitive partridge pea (*Chamaecrista nictitans*), beak rushes (*Rhynchospora* spp.), Leavenworth's tickseed (*Coreopsis leavenworthii*), dog fennel (*Eupatorium capillifolium*), and occasional cutleaf evening primrose (*Oenothera laciniata*). Scattered clumps of blackberry (*Rubus cuneifolius*), Virginia creeper (*Parthenocissus quinquefolia*), grape (*Vitis rotundifolia*), and a few slash pine (*Pinus elliottii*) saplings are also present. There are signs of past hunting activities (blinds and tree stands) and vehicular use through this community, although no obvious graded roads are present.

3.3.5.2 Pine-Mesic Oak—414

This classification describes those areas on the CCC Site that have not been used for timber production in the past 100+ years and are presently comprised of a combination of pine and hardwood species. This community occurs on approximately 53 acres (13.3 percent) of the Site. The canopy is characterized by numerous mature oaks, primarily laurel and live oaks (*Quercus laurifolia* and *Q. virginianna*), slash pines, and cabbage palms (*Sabal palmetto*). Subcanopy and shrub species include Carolina basswood (*Tilia americana* var. *caroliniana*), common persimmon (*Diospyros virginiana*), winged sumac (*Rhus copallina*), saw palmetto (*Serenoa repens*), beautyberry (*Callicarpa americana*), and blackberries (*Rubus* spp.), among others. Herbs include broomsedge, wiregrass (*Aristida stricta*), bracken fern (*Pteridium aquilinum*), and numerous more.

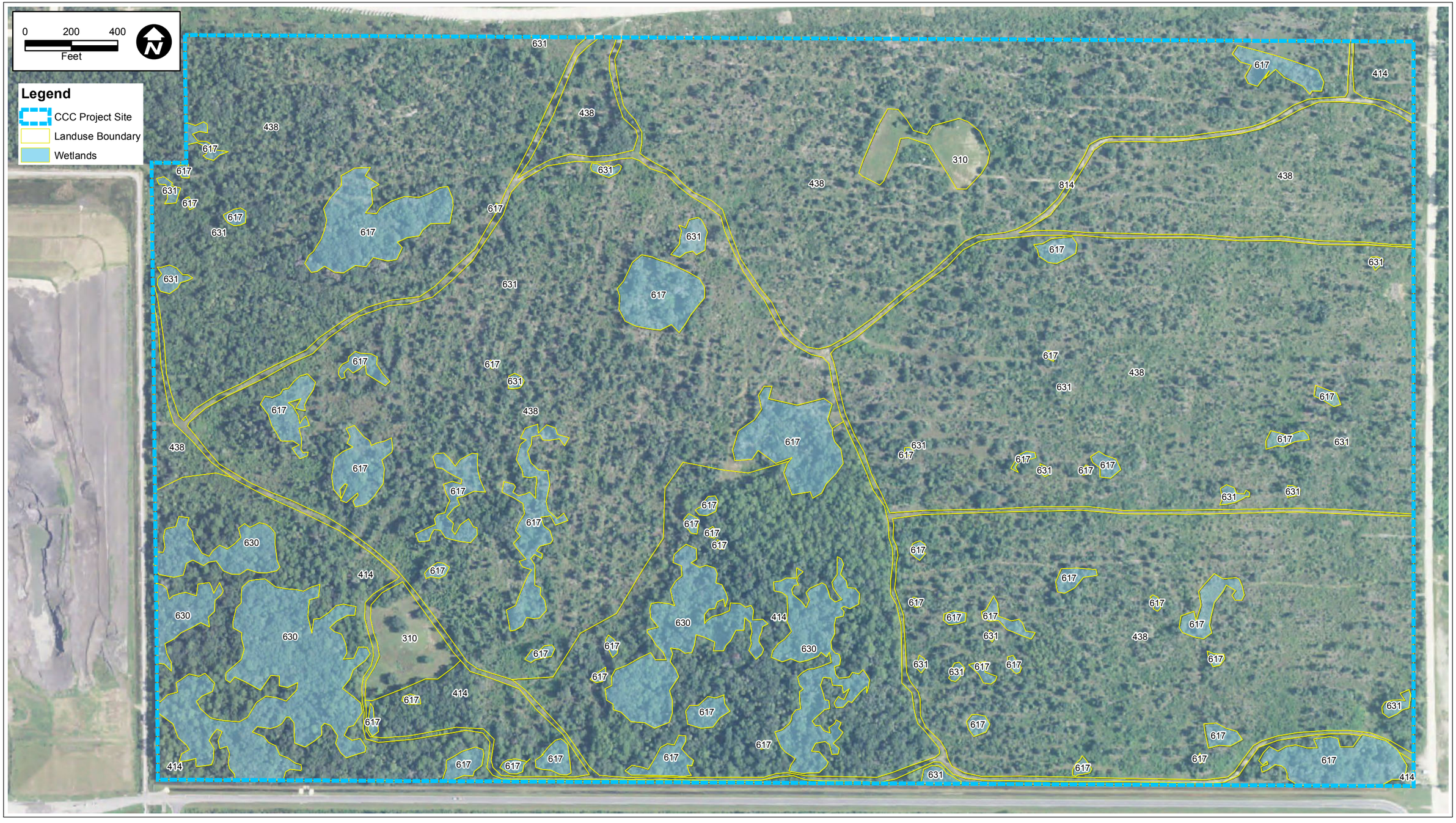


FIGURE 3.3.5-1.
FLUCFCS LAND USE/COVER TYPES ON CCC SITE

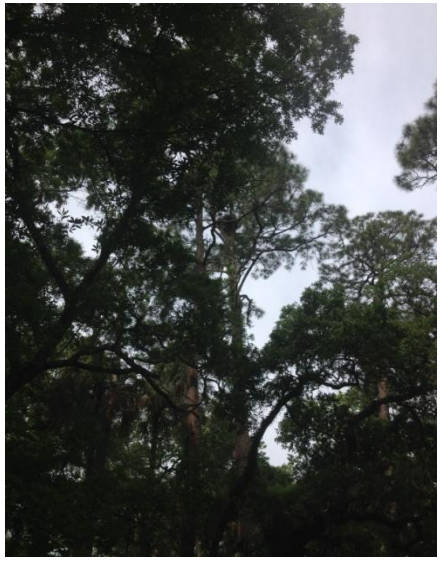
FLUCFCS	Description	Acreage	%		FLUCFCS	Description	Acreage	%
310	Herbaceous (Dry Prairie)	4.91	1.2%		630	Wetland Forested Mixed	19.9	5.0%
414	Pine-Mesic Oak	53.00	13.3%		631	Wetland Shrub	1.77	0.4%
438	Mixed Hardwoods	286.43	71.6%		814	Road	10.68	2.7%
617	Mixed Wetland Hardwoods	23.26	5.8%					
						Total	**399.95**	**100%**

Sources: NRCS, 2013; ECT, 2014.

DUKE ENERGY® FLORIDA

Herbaceous dry prairie—310 (in foreground)

Mixed hardwoods—438



Pine mesic oak—414

Mixed wetlands hardwoods—617

FIGURE 3.3.5-2. (Page 1 of 2)

PHOTOGRAPHS OF VEGETATION COMMUNITIES AND LAND COVER TYPES AT THE CCC SITE

Source: ECT, 2014.

DUKE ENERGY FLORIDA

Wetland forested mixed—630

Wetland scrub—631

Roads/trails—814

FIGURE 3.3.5-2. (Page 2 of 2)

PHOTOGRAPHS OF VEGETATION COMMUNITIES AND LAND COVER TYPES AT THE CCC SITE

Source: ECT, 2014.

3.3.5.3 Mixed Hardwoods—438

Mixed hardwoods is the dominant upland community on the CCC Site, accounting for approximately 286 acres or 72 percent of the Site. This classification describes those areas on the CCC Project Site that used to be managed for timber and have since been allowed to recruit a variety of oak species and a few patches reseeding with slash pine. Dominant canopy species for this land use type include live oak, laurel oak, and sand live oak (*Quercus geminata*). Other canopy species commonly observed include cabbage palm, pignut hickory (*Carya glabra*), slash pine, and southern magnolia (*Magnolia grandiflora*). Understory and ground cover species include younger cabbage palm, saw palmetto, winged sumac, wax myrtle (*Morella cerifera*), groundsel tree (*Baccharis halimifolia*), broomsedge, and vines.

3.3.5.4 Mixed Wetland Hardwoods—617

Forested wetlands that contain a variety of hardwood tree species are designated as mixed wetland hardwood forests. Hardwood forests occupy approximately 23 acres or 6 percent of the CCC Site. Laurel oak, red maple (*Acer rubrum*), black gum (*Nyssa sylvatica* var. *biflora*), and sweetgum (*Liquidambar styraciflua*) are the dominant canopy species. Subcanopy species include stiff dogwood (*Cornus foemina*), myrtle dahoon (*Ilex myrtifolia*), and cabbage palms. Shrubs include wax myrtle, gallberry (*Ilex glabra*), and buttonbush (*Cephalanthus occidentalis*). Herbaceous strata mostly consist of smallfruit primrose-willow (*Ludwigia microcarpa*), sawgrass (*Cladium jamaicense*), and Dixie iris (*Iris hexagona*) among others. Mixed wetland hardwood forest community occurs throughout the Site and is mostly surrounded by mixed hardwoods, described in the previous section.

3.3.5.5 Wetland Forested Mixed—630

Wetland forests classified as FLUCFCS 630 occur on approximately 20 acres (5 percent) of the CCC Site and are scattered throughout the southern and central portions of the property. Some wetlands in this category include mature swamp forests with little disturbance except for the access road just south of the property boundary and mining activity to the west of the property boundary. Dominant canopy and subcanopy species for this cover type include laurel and live oak, loblolly bay (*Gordonia lasianthus*), black gum, sweet gum, and scattered slash pine. The shrub and groundcover consists of dwarf palmetto (*Sabel minor*), pickerelweed (*Pontederia cordata*), St. Johns wort

(*Hypericum fasciculatum*), royal fern (*Osmunda regalis*), sawgrass, and scattered lizard's tail (*Saururus cernuus*).

3.3.5.6 Wetland Shrub—631

A few small isolated wetlands on-Site are classified as nonforested wetlands dominated by shrubs. These nonforested wetlands occupy approximately 2 acres (less than 0.4 percent) of the property. These wetlands are of average quality, with evidence of silvicultural activity, and contain some weedy vegetation. The dominant species include button bush, St. Johns wort, soft rush (*Juncus effusus*), dollarweed (*Hydrocotyle umbellate*), cat and saw greenbriers (*Smilax glauca* and *bonanox*), sand blackberry (*Rubus cuneifolius*), dog fennel, and carpet grass.

3.3.5.7 Road and Highway (Unpaved Road, Logging Road, and Trail)—814

This classification is used to designate all interior roads on the CCC Site. Roads occupy approximately 10.7 acres or 2.7 percent of the Site. The roads on-Site are ungraded dirt trails likely created for past silvicultural activities.

3.3.6 Ecology

This section provides descriptions of the terrestrial and aquatic ecological communities located on and within the vicinity of the CCC Site and its associated facilities. The following subsections provide a description of the terrestrial and aquatic ecology on and in the vicinity of the CCC Site. Descriptions of these resources in the areas of off-Site associated linear facilities are described in Chapter 9.0. This section also provides an evaluation of the relationships of important floral and faunal species to the habitats on the CCC Site.

The following subsections include descriptions of flora and fauna on the Site, locations for associated nonlinear facilities, and surrounding areas. This discussion includes information related to the abundance of species found and the value of the habitats present by FLUCFCS Level III and IV categories.

Terrestrial ecological resources were evaluated through scientific literature, published reports, and consultation with agencies and were verified through field review in spring 2014. Field review was performed by ESI in 2013, and their report resulting from

those surveys was used to supplement this section. Additional field surveys were conducted by ECT in spring 2014.

3.3.6.1 Species—Environmental Relationships

Terrestrial System—Flora

The Site consists of undeveloped land, typical of the region, with several distinct upland and wetland community types as reflected in the land use map (Figure 3.3.5-1). Plant communities on the CCC Site are typical of the region, and most are influenced by silvicultural activities. No unique vegetation assemblages are present.

As described in Section 3.3.5, upland community types include herbaceous (dry prairie), pine-mesic oak, mixed hardwoods, and roads, and wetland community types consist of mixed wetland hardwoods, wetland forested mixed, and wetland shrub. Descriptions of existing vegetative cover types on the CCC Site are based on FLUCFCS, as interpreted and mapped and field-verified during ecological surveys performed by ECT ecologists in 2014.

Terrestrial System—Fauna

Wildlife resources on and in the vicinity of the CCC Site were identified based on literature reviews and on-Site reconnaissance visits conducted by ECT in 2014 and ESI in 2013. Site reconnaissance activities consisted of habitat characterizations, wetland delineations, and wildlife observations. Direct observations of individuals, as well as signs of wildlife (e.g., tracks, scat), were recorded by ESI during a site review in 2013 and supplemented by ECT during field visits in the spring of 2014.

The landscape of herbaceous (dry prairie), pine-mesic oak, mixed hardwoods, and wetland communities interspersed within the CCC Site provides for habitat for many common mammal, bird, reptile, and amphibian species. Mammalian species that occur or are likely to occur on the CCC 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*), and gray squirrel (*Scuirus caroliniensis*).

Most of the common mammals likely found on the CCC Site are generalists, in that they are not exclusive to any one habitat type but use various habitats for different purposes.

Common avian species that were observed on the CCC Site or are considered likely to use the Site include northern cardinal (*Cardinalis cardinalis*), eastern kingbird (*Tyrannus tyrannus*), black vulture (*Coragyps atratus*), turkey vulture (*Cathartes aura*), and northern mockingbird (*Mimus polyglottus*). Barred owls (*Strix vamria*), red-shouldered hawks (*Buteo lineatus*), hairy woodpeckers (*Picoides villosus*), and pileated woodpeckers (*Drycopus pileatus*) inhabit the wetter woodlands on-Site. Several common species of wading birds may forage in wetland areas, such as great blue heron (*Ardea herodias*), little blue heron (*Ardea caerulescens*), and white ibis (*Eudocimus albus*).

No nesting colonies of wading birds have been recorded, nor is it likely that colonies will become established on the CCC Site due to the absence of the 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 Site is situated near the Gulf of Mexico and along the path of the Eastern Atlantic Flyway, which makes it potentially well located as a stopover for migratory birds; although, the proximity of more suitable natural areas such as Goethe State Forest, Crystal River Preserve State Park, or Chassahowitska National Wildlife Refuge may make the CCC Site comparably less desirable to some avifauna. Common migratory bird species likely to occur on the CCC Site may include the American robin (*Turdus migratorius*), yellow-rumped warbler (*Dedroica coronata*), yellow-throated warbler (*Dendroica dominica*), and cedar waxwing (*Bombycilla cedrom*).

Common reptile and amphibian species that have been observed or are considered likely to occur on the Site include black racer (*Coluber constrictor*), cottonmouth (*Agkistrodon piscivorus*), common kingsnake (Lampropeltis getula), southern leopard frog (*Rana utricularia*), and ground skink (*Scincella lateralis*). Wetland areas on the CCC 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*), cricket frog (*Acris gryllus gryllus*), and squirrel treefrog (*Hyla squirella*).

Wildlife species actually observed on-Site in spring 2014 are listed in Table 3.3.6-1 and include those mentioned in the 2013 ESI field surveys.

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 Fish and Wildlife Conservation Commission (FWC), U.S. Fish and Wildlife Service (USFWS), and Florida Department of Agriculture and Consumer Services (FDACS). Specific information on listed plant species is provided in the following paragraphs.

Element occurrence records for the CCC Site and surrounding area are provided by FNAI, FWC, and USFWS list of protected species in Citrus County. Table 3.3.6-2 lists important flora species with the potential to occur on or within 5 miles of the CCC Site (FNAI); out of those species, 2 are federally listed and 17 are state-listed threatened or endangered. Only one of these species, a state-endangered coastal vervain, was observed on the CCC Site during the field surveys. Descriptions of these species, including key identifying characteristics and preferred habitats, are provided in the following subsections.

Celestial Lily (*Nemastylis floridana*)

This is a state-endangered perennial herb, which forms a single, tall, and slender stem from a bulb. Its basal leaves are few and grass-like, sometimes more than 2 ft long; stem leaves are small and scattered along the stem. This lily produces stunning large deep blue flowers, measuring more than 1.5 inches across, with six spreading petals. The flowering time is August through October, with flowers being open in the afternoon. Its fruit is an erect, oval capsule approximately 0.5 inch long. Celestial lily occurs in open sunny wetlands, particularly wet flatwoods, prairies, marshes, and cabbage palm hammock edges. Because the CCC Site supports some of this habitat, this species has a potential to occur on-Site, although none of the species were observed during the site survey.

Table 3.3.6-1. Wildlife Observed on the CCC Site, 2014

Common Name	Scientific Name
Amphibians	
Bullfrog	*Rana catesbeiana*
Green treefrog	*Hyla cinerea*
Squirrel treefrog	*Hyla squirella*
Reptiles	
Black racer	*Coluber constrictor*
Eastern fence lizard	*Sceloporus undulatus*
Five-lined skink	*Eumeces fascatus*
Gopher tortoise *	*Gopherus polyphemus*
Ground skink	*Scinella lateralis*
Birds	
Bald eagle	*Haliaeetus leucocephalus*
Black vulture	*Coragyps atratus*
Blue jay	*Cyanocitta cristata*
Blue-gray gnatcatcher	*Polioptila caerulea*
Carolina chickadee	*Parus carolinensis*
Carolina wren	*Thryothorus ludovicianus*
Common bobwhite	*Colinus virginianus*
Common crow	*Corvus brachyrhynchos*
Common nighthawk	*Chordeiles minor*
Eastern phoebe	*Sayornis phoebe*
Great-crested flycatcher	*Myiarchus crinitus*
Ground dove	*Columbina passerina*
Mourning dove	*Zenaida macroura*
Northern cardinal	*Cardinalis cardinalis*
Northern mockingbird	*Mimus polyglottos*
Osprey	*Pandion haliaetus*
Red-bellied woodpecker	*Melanerpes carolinus*
Red-shouldered hawk	*Buteo lineatus*
Red-winged blackbird	*Agelaius phoeniceus*
Rufous-sided towhee	*Pipilo erythrophthalmus*
Swallow-tailed kite	*Elanoides forficatus*
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*

*State-listed species.

Source: ECT, 2014.

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

Scientific Name	Common Name	Federal Status	State Status	Likelihood of Occurrence	Notes
Nemastylis floridana	Celestial Lily		LE	Moderate	Potential to occur (FNAI biodiversity matrix)
Glandularia maritima	Coastal vervain		LE	Present	Documented within 5 miles of the Site (FNAI biodiversity matrix)
Justicia cooleyi	Cooley's water-willow	LE	LE	Moderate	Potential to occur (FNAI biodiversity matrix)
Leitneria floridana	Corkwood		LT	Moderate	Potential to occur (FNAI biodiversity matrix)
Matelea floridana	Florida spiny-pod		LE	Moderate	Potential to occur (FNAI biodiversity matrix)
Pteroglossaspis ecristata	Giant orchid		LT	Low	Potential to occur (FNAI biodiversity matrix)
Forestiera godfreyi	Godfrey's swampprivet		LE	Moderate	Potential to occur (FNAI biodiversity matrix)
Agrimonia incise	Incised groove-bur		LT	Moderate	Potential to occur (FNAI biodiversity matrix)
Dicerandra cornutissima	Longspurred mint	LE	LE	Low	Potential to occur (FNAI biodiversity matrix)
Lechea divaricata	Pine pinweed		LE	Low	Potential to occur (FNAI biodiversity matrix)
Phyllanthus liebmannianus ssp. *Platylepis*	Pinewoods dainties		LE	Low	Documented within 5 miles of the Site
Spigelia loganioides	Pinkroot		LE	Moderate	Potential to occur (FNAI biodiversity matrix)
Litsea aestivalis	Pondspice		LE	Low	Potential to occur (FNAI biodiversity matrix)
Centrosema arenicola	Sand butterfly pea		LE	Low	Potential to occur (FNAI biodiversity matrix)
Chamaesyce cumulicola	Sand-dune spurge		LE	Low	Potential to occur (FNAI biodiversity matrix)
Glandularia tampensis	Tampa vervain		LE	Moderate	Documented within 5 miles of the Site
Arnoglossum diversifolium	Variable-leaved Indian-plantain		LT	Low	Potential to occur (FNAI biodiversity matrix)

Note: FL (E) = Florida endangered.
FL (T) = Florida threatened.
LE = federal endangered.
LT = federal threatened.

Sources: FNAI, 2014.
USFWS, 2014.
FDACS, 2014.

Coastal Vervain (*Glandularia maritima*)

The coastal vervain is a state-endangered plant species that has been documented within 5 miles of the proposed Site by the FNAI Biodiversity Matrix analysis. Known habitat for this species includes dune sand, roadsides, and coastal hammocks. A few populations of this species were observed along the roadside in the northeastern portion of the CCC Site.

Cooley's Water Willow (*Justicia cooleyi*)

This plant species is federally and state-listed as endangered. Cooley's water willow is a short perennial herb, less than 16 inches tall, having upright, quadrangular, stems and leaves up to 2 inches long. Flowers are borne on forked, zigzag branches that are slightly longer than the leaves. The petals are fused into a two-lipped corolla with a slightly longer lower lip, which is mottled lavender and white in color. The rest of the corolla is bright lavender-rose.

Flowering takes place from August to December (Kral,1983; Perkins, 1979). Although none were observed during the field surveys, this species has the potential to occur within the CCC Site because of its habitat, which includes moist to seasonally wet rocky woods, mesic hardwood, or hardwood pine forests.

Corkwood (*Leitneria floridana*)

This deciduous shrub or small tree is federally and state-listed as threatened. Corkwood is named for its characteristically light wood. It usually produces large multistemmed colonies or thickets raging from 5 to 20 ft in height. Although this plant was not observed during the field surveys, it has the potential to occur within the proposed CCC Site because of its preferred habitat of coastal hammocks, sawgrass, and cabbage palm communities.

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. This species is known to occur in Citrus County and has the potential to occur within the CCC Site because of its preferred habitat, which includes riparian mesic forests, open woodlands, sandhills, and open fields.

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 CCC Site, marginal habitat for this species is present within the herbaceous dry prairie (310) or along upland forest edges. However, this species was not observed during the site visits, and the likelihood of occurrence is low.

Godfrey's Swamp Privet (*Forestiera godfreyi*)

This is a state-endangered deciduous shrub to small tree that occurs in uplands. It reaches heights of 16 ft and has main stems that are arching or leaning. Its leaves are 2 to 3 inches long, opposite, simple, oval, toothed above the middle, and hairy beneath. Flowers are tiny and yellow; fruits are waxy and blue. Godfrey's swamp privet flowers between January and February with fruits present through May. It occurs in upland hardwood forests with limestone just beneath the surface, frequently on sloping land above rivers or lakes. This species is known to occur in Citrus County, with suitable habitat for this plant being found on the CCC Site, although it was not observed during the site visits.

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 ft 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 coarsely serrate margins. It occurs in mature pine woods with a weedy hardwood understory. Incised groove-bur has the potential to occur on the property due to some suitable on-Site habitat. However, this species was not observed during the site visits.

Longspurred Mint (*Dicerandra cornutissima*)

This plant species is federally and state-listed as endangered. It grows up to 1.6 ft tall, with erect, nonwoody flowering shoots coming up from a woody base. The leaves are approximately 0.5 inch long and linear, with entire margins, and covered with con-

spicuous sunken glands. They are arranged opposite one another on the stems, often with two smaller leaves at each node. Longspurred mint flowers in September and produces fruits in the form of four small nutlets. While its preferred habitat includes open areas in sand pine scrub, oak scrub, and turkey oak communities, it can also colonize the edges of road rights-of-way. This species has a limited and low potential to occur within the proposed Site. Longspurred mint has not been observed on-Site during field surveys.

Pine Pinweed (*Lechea divaricata*)

This is a state-endangered perennial herb. Pine pinweed has slender, erect flowering stems rising from a dense mat of spreading, older stems. The leaves are less than 0.4 inch long, alternate, narrowly oval with pointed tips, and disappear by flowering time (May to October). Flowers are arranged in tight clusters at the ends of short branches, with three tiny purple or green petals, dropping quickly after opening. Preferred habitat for this species includes scrub and scrubby flatwoods. While there is some potential for this plant to be found in Citrus County, there is a low likelihood of occurrence on the CCC Project Site, because true scrub and scrubby flatwoods communities are not represented on-Site. This plant species was not observed during the site visits

Pinewoods Dainties (*Phyllanthus liebmannianus* subsp. *Platylepis*)

Pinewoods dainties is a state-endangered perennial herb. Its leaves are spirally arranged and distributed uniformly on the stem. Its habitat includes moist sandy peat of pine flatwoods roadside, thin soil over limestone, coastal hammock, and moist streamside limestone in hardwood forest. This plant species is not known to occur in Citrus County but has been documented within 5 miles of the proposed Site by the FNAI Biodiversity Matrix analysis. There is low potential of pinewoods dainties occurring on the CCC Site; it has not been noted during field surveys.

Pinkroot (*Spigelia loganioides*)

Pinkroot gentian is a state-endangered small (1 ft tall) herb, which blooms April to July. Its leaves are opposite and sessile with entire margins. This species is not known to occur in Citrus County, but has the potential to occur within the CCC Site due to its known habitat, which includes floodplain forests and upland or mesic hardwood hammocks over limestone. This species has not been noted the during field surveys.

Pond Spice (*Litsea aestivalis*)

This is a state-endangered shrub or small tree that occurs in wetlands. It reaches heights of 15 ft and has zigzag odorless twigs. Leaves are 0.5 to 1.5 inches long, deciduous, simple, alternate, somewhat leathery, smooth, oblong to lance shape, entire margins, and slightly thickened. Tiny flowers with six yellow sepals are located at the tips of the branches. Fruits are fleshy, red, and round. It flowers in late winter through early spring and fruits throughout the fall. Preferred habitats include edges of baygalls, flatwood ponds, and cypress domes; it may also form thickets around the edges of ponds. This species is known to occur in Citrus County, but the optimal habitat for this plant is lacking on-Site. Therefore, the possibility for the species to occur on-Site is low. Pond spice was not observed during the site surveys.

Sand Butterfly Pea (*Centrosema arenicola*)

This is a state-endangered perennial vine with stems up to 10 ft long. Its leaves are actually three oval- or lance-shaped leaflets about 2 inches long, dark green in color, and somewhat leathery. Flowers are 1.5 inches wide, purplish-blue, sometimes pink or white, twisted so that a large, notched banner petal is the lowest. Known habitat for this species includes sandhill, scrubby flatwoods, and dry upland woods. Therefore, the sand butterfly pea has low potential of occurring on the CCC Site; this species was not observed during the site visits.

Sand-Dune Spurge (*Chamaesyce cumulicola*)

Sand-dune spurge is a state-endangered herb. Its habitat includes high-shaded sand dune, oak scrub, and scrubby flatwoods. While there is a potential for this plant to occur in Citrus County, the probability of this plant occurring on-Site is low, because the CCC Site does not support optimal habitat to harbor this plant, and no sightings of this species were observed during the field surveys.

Tampa Vervain (*Glandularia tampensis*)

This is a state-endangered perennial herb with four-sided, sprawling stems reaching to approximately 2 ft long. Its leaves are 1.5 to 2.5 inches long, margins coarsely toothed, although sometimes entire below the middle; leaf tips are broadly pointed, with the upper leaf surface being dark green, and the lower surface being pale green. This species is known to occur in Citrus County and has been documented within

5 miles of the proposed Site by the FNAI Biodiversity Matrix analysis. Because known habitat for this species includes disturbed sand areas of live oak-cabbage palm hammocks and pine-palmetto flatwoods, there is potential for this species to occur on the CCC Site. However, this species was not observed during the site visits.

Variable-Leaved Indian-Plantain (*Arnoglossum diversifolium*)
This is a state-threatened herb. Its stems are proximally ribbed and purplish. The leaves are petiolate, deltate-hastate, with dentate margins. It blooms from mid-May to early July and prefers wet or mucky soils along streams, swamps, woodlands, and mesic hammock. This species is not known to occur in Citrus County and has a low potential to occur within the proposed Site. However, this species was not observed during the site visits.

Threatened and Endangered Species—Fauna

A comprehensive database of biological resources for the state of 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 CCC Site, applicable agency databases and literature pertaining to the Site were reviewed, and an area within 5 miles of the Site was identified and a report 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. Several species, including bald eagle, gopher tortoise, and eastern Indigo snake, were documented during a pedestrian survey of the site (ESI, 2013). Other species, including Florida mouse, Hawksbill sea turtle, little blue heron, piping plover, snowy egret, and wood stork, were documented as occurring within 5 miles of the site (FNAI).

Table 3.3.6-3 presents state- or federally listed wildlife species potentially occurring within 5 miles of the CCC Site. Also shown in Table 3.3.6-3 are the species' current

Table 3.3.6-3. Federally and State-Listed Wildlife Species Potentially Occurring on or Near the CCC Site

Scientific Name	Common Name	Federal Status	State Status	Likelihood of Occurrence	Notes
Alligator mississippiensis	American alligator	FT (S/A)	FT (S/A)	High	Known to occur in Citrus County
Haematopus palliatus	American oystercatcher		SSC	Moderate	Coastal
Haliaeetus leucocephalus	Bald eagle			Present	Several active nests documented within 5 miles of the Site (FWC nest locator, accessed 4-15-2014); p**robable** active nest observed onsite during ESI pedestrian survey in fall 2013 and during ECT survey in spring 2014
Rynchops niger	Black skimmer		SSC	Moderate	Coastal
Pelecanus occidentalis	Brown pelican		SSC	Moderate	Coastal
Caracara cheriway	Crested caracara	LT	FT	Low	
Drymarchon couperi	Eastern indigo snake	LT	FT	Present	Observed onsite during pedestrian survey (ESI, 2013)
Ursus americanus floridanus	Florida black bear			Low	Not listed but still protected by FWC
Athene cunicularia floridana	Florida burrowing owl		SSC	Low	
Podomys floridanus	Florida mouse		SSC	Moderate	Documented within 5 miles of the Site
Puma concolor coryi	Florida panther	LE	FE	Unlikely	
Pituophis melanoleucus mugitus	Florida pine snake		SSC	Moderate	
Grus canadensis pratensis	Florida sandhill crane		F	Moderate	Known to occur in Citrus County
Aphelocoma coerulescens	Florida scrub-jay	LT	FT	Low	Unlikely; scrub habitat lacking onsite
Rana capito	Gopher frog		SSC	Moderate	
Gopherus polyphemus	Gopher tortoise		F	Present	Documented occurrence within 5 miles of the Site; several burrows observed during ESI pedestrian survey of property in fall 2013; four active burrows confirmed by ECT in spring 2014
Chelonia mydas	Green sea turtle	LE	FE	Low	Potential for occurrence in coastal area within 5 miles of the Site
Acipenser oxyrinchus desotoi	Gulf sturgeon	LT	FT	Low	Potential for occurrence in coastal area within 5 miles of the Site
Eretmochelys imbricata	Hawksbill sea turtle	LE	FE	Low	Documented occurrence within 5 miles of the Site
Sorex longirostris eionis	Homosassa shrew		SSC	Low	Known to occur in Citrus County
Lepidochelys kempii	Kemp's Ridley sea turtle	LE	FE	Low	Known to occur in Citrus County
Sternula antillarum	Least tern		F	Low	
Dermochelys coriacea	Leatherback sea turtle	LE	FE	Low	Potential for occurrence in coastal area within 5 miles of the Site

Table 3.3.6-3. Federally and State-Listed Wildlife Species Potentially Occurring on or Near the CCC Site (Continued, Page 2 of 2)

Scientific Name	Common Name	Federal Status	State Status	Likelihood of Occurrence	Notes
Aramus guarauna	Limpkin		SSC	Low	Known to occur in Citrus County
Egretta caerulea	Little blue heron		SSC	High	Documentation of occurrence within 5 miles of the Site
Caretta caretta	Loggerhead sea turtle	LT	FT	Low	Potential for occurrence in coastal area within 5 miles of the Site
Trichechus manatus	Manatee	LE	FE	Low	Potential for occurrence in warm waters within 5 miles of the Site; critical habitat (Crystal River) located south of Site
Cistothorus palustris marianae	Marian's marsh wren		SSC	Low	Coastal marshes
Charadrius melodus	Piping plover	LT	FT	Low	Documentation of occurrence within 5 miles of the Site; critical habitat north of Site
Picoides borealis	Red-cockaded woodpecker	LE	FE	Unlikely	Old-age pines not present
Platalea ajaja	Roseate spoonbill		SSC	Low	Known to occur in Citrus County
Ammodramus maritimus peninsulae	Scott's seaside sparrow		SSC	Low	Coastal marshes
Sciurus niger shermani	Sherman's fox squirrel		SSC	Moderate	Some limited habitat exists onsite
Lampropeltis extenuata	Short-tailed snake		F	Low	
Egretta thula	Snowy egret		SSC	High	Documentation of occurrence within 5 miles of the Site
Falco sparverius paulus	Southeastern American kestrel		F	Moderate	Known to occur in Citrus County
Egretta tricolor	Tricolored heron		SSC	High	Known to occur in Citrus County
Eudocimus albus	White ibis		SSC	High	Documentation of occurrence within 5 miles of the Site
Mycteria americana	Wood stork	LE	FE	High	Documentation of occurrence within 5 miles of the Site

Note: FT(S/A) = federal threatened due to similarity of appearance.
SSC = species of special concern.
FE = Florida endangered.
FT = Florida threatened.
LE = federal endangered.
LT = federal threatened.

Sources: FNAI, 2014.
USFWS, 2014.
FWC, 2014.

status and their likelihood of occurrence in the Project Site. Species documented on or near the Site or considered likely to occur on the Site based on habitat preferences are discussed in the following paragraphs.

Marine mammals like the manatee and coastal nesting species such as American oystercatcher, black skimmer, brown pelican, least tern, Marian's marsh wren, piping plover, Scott's seaside sparrow, Gulf sturgeon, and several species of sea turtles (green sea turtle, Hawksbill sea turtle, Kemp's Ridley sea turtle, leatherback sea turtle, loggerhead sea turtle) have a low likelihood of occurrence on the CCC Site; however, these species may be affected by the off-Site associated linear facilities (i.e., intake/discharge structures) associated with the Project (see Chapter 9.0).

American Alligator (*Alligator mississippiensis*)
The American alligator is a large, semi-aquatic reptile that is related closely to crocodiles. Due to its similarity in appearance to the endangered American crocodile (*Crododylus acutus*), the American alligator is listed as threatened by both USFWS and FWC. Common in Florida, the American alligator can be found in most types of freshwater bodies in the state, including marshes and swamps such as those in Citrus County, and is therefore considered highly likely to occur on the CCC Site.

Bald Eagle (*Haliaeetus leucocephalus*)
This large raptor has been delisted (2007) under the Endangered Species Act due to successful population recovery efforts; however, it still remains federally protected under the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act. The largest raptor that breeds in Florida, bald eagles are locally common, preferring to live near rivers, lakes, marshes, coastal areas, or inland waterways where fish, their food staple, are plentiful. Bald eagles will also prey on waterfowl, turtles, snakes, rabbits, and other small animals and carrion.

Several active bald eagle nests are located within 5 miles of the Site, as recorded in FWC's eagle nest locator accessed by ECT ecologists on April 15, 2014 (last survey date, 2011). A nest location was identified on the CCC Site during pedestrian surveys in the fall of 2013 (ESI, 2013) and substantiated in spring 2014 by ECT. Historical and anecdotal evidence further suggests that this particular nest is active.

Crested Caracara (*Caracara cheriway*)

While a member of the falcon family and a strong flier, the caracara spends much of its time on the ground, scraping for insects or hunting around shallow ponds or marshes for snakes, frogs, turtles, or fish. These large, boldly patterned raptors are opportunistic feeders that may be observed along roadways on fence posts or utility poles, where they can scan for carrion. The Caracara is both a federally and state-listed threatened species because of loss of habitat from conversion of native prairies to agriculture and development. While there is some potential for the caracara to be found in Citrus County, there is a low likelihood of occurrence on the CCC Site.

Eastern Indigo Snake (*Drymarchon corais couperi*)

The eastern indigo snake is both federally and state-listed as a threatened species. The longest of North American snakes, it is iridescent black or bluish-black, smooth-scaled, heavy-bodied, and often with red-tinged chin and throat. Eastern indigo snakes inhabit pine habitats and scrub communities, as well as mesic communities such as wet prairies and swamps during warmer months. Common prey animals include fish, frogs, toads, lizards, snakes, birds, and small mammals. The indigo snake frequently uses gopher tortoise burrows for shelter. The indigo snake was observed on the CCC Site during the fall 2013 pedestrian surveys, and its presence is considered likely given the presence of gopher tortoise habitat. Threats to this species include road mortality, habitat loss, and habitat fragmentation.

Florida Black Bear (*Ursus americanus floridanus*)

As of 2012, the Florida black bear is no longer listed as a state-threatened species by FWC; however, this bear continues to be protected under the Florida Black Bear Protection Rule, which makes it illegal to kill or injure a bear or sell its parts. Further protections are covered by the Florida Black Bear Management Plan, which guides bear management. Black bears are the largest land mammals in Florida and are powerful with large canine teeth. In Florida, bears do not have extended hibernation periods. Males and nonpregnant female bears may den-up in dense vegetation for only a few weeks or a month. Because their cubs are born in the den (late January to early February), pregnant female bears will den-up for the entire winter and often select more protected sites. Dens may be tree cavities, blown down or fallen trees, or ground nests in dense vegetation.

Because of its large home range and low population density, the Florida black back is particularly susceptible to habitat loss. While there is some potential for Florida black bear presence in Citrus County, there is a low likelihood of occurrence on the CCC Site.

Florida Burrowing Owl (*Athene cunicularia floridana*)

The Florida burrowing owl can be found throughout much of the state, where its habitat is available. Burrowing owls prefer native prairies and cleared areas with short groundcover, including pastures, fields, airports, golf courses, and vacant lots in residential development areas. Human development has encroached on historical burrowing owl territory. Florida burrowing owls typically dig their own burrows but will also use gopher tortoise or armadillo burrows, which they use year-round. Burrowing owls eat predominantly insects, grasshoppers, and beetles, as well as small lizards, frogs, snakes, birds, and rodents. The causes of population decline are not known but may include absence of suitable nesting sites and increased mortality from vehicle collision. FWC lists the Florida burrowing owl as a species of special concern, protecting the owls, their eggs, and their burrows from harassment and/or disturbance by state law. Burrowing owls are further protected by the federal Migratory Bird Treaty Act. They have a low likelihood of occurrence on the CCC Site.

Florida Mouse (*Podomys floridanus*)

The Florida mouse is native to Florida and only occurs in the northern two-thirds of peninsular Florida and is state-listed as a species of special concern. They occupy fire-maintained, xeric upland habitats such as scrub, scrubby flatwoods, and sandhill ecosystems. The Florida mouse has one of the smallest geographic ranges of any species of North American mammals. Because the Florida mouse depends on gopher tortoise burrows as sites for excavation of its own burrows, this commensal species is highly vulnerable to loss or decline of gopher tortoises. The Florida mouse has been documented in Citrus County within 5 miles of the Site and has a moderate likelihood of occurrence on the CCC Site because of the presence of gopher tortoise habitat.

Florida Panther (*Puma concolor coryi*)

The Florida panther is a large, slender carnivore that lives in sizeable forested communities and wetlands in South and parts of Central Florida. Because large carnivores require spacious areas to roam, the Florida panther home ranges average 75 to

150 square miles. FWC estimates there are only 100 to 160 Florida panthers left in the wild, and they are protected under federal and state laws as a federally endangered species. Florida panthers were hunted to near extinction in the 1800s and early 1900s, and while genetic restoration efforts are underway, habitat loss and highway collisions continue to be major threats to the panthers' continued existence. While there is some likelihood of occurrence within 5 miles of the CCC Site, their likelihood of presence on-Site is considered low.

Florida Pine Snake (*Pituophis melanoleucus mugitus*)

The Florida pine snake is a large, nonvenomous snake with dark brown or reddish blotches, typically ranging in length from 48 to 66 inches. Florida pine snakes occupy large areas of fire-maintained, open canopy and dry habitats that include sandhill, old fields, pastures, sand pine scrub, and scrubby flatwoods. In drought conditions the Florida pine snake will seek out open habitats surrounding wetlands. A commensal species, the Florida pine snake uses gopher tortoise burrows, pocket gopher burrows, and stump holes to forage, nest, and escape adverse weather conditions or fire, with 70 to 80 percent of their time being spent underground. Major threats to the Florida pine snake include road mortality, excessive collecting, and habitat loss, resulting in the species' serious decline.

The Florida pine snake is currently listed by FWC as a species of special concern but was recommended to be relisted as threatened by staff after a biological status review was conducted in 2009. When the management plan for this species is approved, the Florida pine snake listing status will become threatened under FWC rule. The Florida pine snake has a moderate likelihood of occurrence on the CCC Site.

Florida Sandhill Crane (*Grus canadensis pratensis*)

Florida sandhill cranes are a nonmigratory species that inhabit freshwater marshes, prairies, and pastures 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 Citrus County, the Florida sandhill crane has a moderate likelihood of occurrence on the CCC Site.

Florida Scrub-Jay (*Aphelocoma coerulescens*)

The Florida scrub-jay is the only bird species that is unique to Florida. Scrub-jays inhabit sand pine and xeric oak scrub and scrubby flatwoods, old sand dunes along the coasts, and sandy deposits along rivers in the interior of the state. Scrub-jays prefer areas that contain large quantities of oak shrubs. Major threats to scrub-jays include habitat loss and fragmentation as well as fire suppression, which is essential to maintaining scrub-jay habitat. The Florida scrub-jay is protected by the U.S. Migratory Bird Treaty Act as well as being protected as a threatened species by the Federal Endangered Species Act and as a federally-designated threatened species by FWC. Because scrub habitat is lacking on the CCC Site, there is a low likelihood of the species presence on-Site.

Gopher Frog (*Rana capito*)

A commensal species, the gopher frog is known only in habitats that support gopher tortoises. While they occupy a variety of fire-maintained xeric habitats, particularly sandhill, the gopher frog can also be found in pastures and other open disturbed areas where gopher tortoises are found. Historically, the gopher frog has occurred throughout Florida except for the Everglades region. Because the habitat on the CCC Site is known to be conducive to gopher tortoises and their burrows, there is moderate likelihood that the gopher frog would also be found present.

The gopher frog is currently listed as a species of special concern by FWC; however, it was recommended to be delisted by staff after a biological status review was conducted in 2009. When the management plan for this species is approved, the gopher frog will be likely removed from FWC imperiled species lists.

Gopher Tortoise (*Gopherus polyphemus*)

The gopher tortoise is currently classified by FWC as a threatened species, its status having been elevated in 2007 from a Florida species of special concern. Gopher tortoises prefer dry upland habitats such as sandhills, scrub oak, xeric oak, and dry pine flatwoods, as well as disturbed sites such as pastures, old fields, and road shoulders. They are considered a keystone species due to the fact that they excavate burrows that serve as refuge for many other commensal species.

Gopher tortoises and burrow locations were documented on the CCC Site by ESI's fall 2013 pedestrian surveys. Four active burrows were identified by ECT in spring 2014. Several listed species known to coexist in gopher tortoise burrows are considered likely to be found on-Site, including the eastern indigo snake, gopher frog, and Florida mouse.

Homosassa Shrew (*Sorex longirostris eionis*)

The Homosassa shrew is currently protected under FWC's designation of state species of special concern. This shrew has been reported to occur in a wide variety of habitats, including hardwood swamp/mixed wetland forest, hydric and xeric hammocks, industrial/commercial pineland, mixed hardwood-pine forest, natural pineland, and disturbed/transitional habitat ranging from North-Central to South-Central Florida. While known to occur in Citrus County (FNAI), the likelihood of Homosassa shrew presence on the CCC Site is considered low.

Threats to Homosassa shrew populations include human encroachment and degradation and fragmentation of their habitats from agriculture and development. Other threats include the increase of predators in their habitat, such as the introduction of domestic cats.

Red-Cockaded Woodpecker (*Picoides borealis*)

The red-cockaded woodpecker is listed as endangered by USFWS and threatened by FWC. This small, nonmigratory woodpecker has a black-and-white-barred back and wings, black cap and nape, and white cheek patches. Its preferred habitat in Florida is open, mature, longleaf pine flatwoods. It forages in forested community types with pines of various ages but only within a small radius from its nest. The red-cockaded woodpecker is a cooperative breeder and habitat specialist that excavates cavities in live, usually mature pine trees. Major threats to the success of the red-cockaded woodpecker include loss or fragmentation of specialized nesting habitat because of commercial silviculture practices. Because the Site does not contain living, old-growth pine trees for cavity-tree clusters, the likelihood of red-cockaded woodpeckers to be found on-Site is considered low.

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. They are considered to have a moderate likelihood for occurrence on the CCC Site.

Short-Tailed Snake (*Lampropeltis extenuate*)

Short-tailed snakes are endemic to Florida and can primarily be found burrowed in sandy soils, particularly longleaf pine and xeric oak sandhills, and scrub and xeric hammock habitats from the Suwannee River south to Highlands County. These slender, smooth-scaled snakes prey on other snakes. The short-tailed snake is protected as a state-designated threatened species, and their greatest threat is habitat loss caused by destruction of xeric upland habitats. Adapted to digging and living underground, these snakes are seldom seen. They have a low likelihood of occurrence on the CCC Site.

Southeastern American Kestrel (*Falco sparverius paulus*)

The southeastern American kestrel is protected by the U.S. Migratory Bird Treaty Act and as a state-designated threatened species by FWC. The smallest species of the falcon family to occur in the United States, the southeastern American kestrel is a nonmigratory subspecies that inhabits Florida open woodlands, sandhill, and fire-maintained savannah pine habitats. Their diet consists of grasshoppers, lizards, spiders, and frogs. They have a short life expectancy in the wild, averaging approximately 15 months. The main threats to the southeastern American kestrel are loss of habitat because of development and alteration and decline of fire-maintained pine habitats for nesting and foraging. Kestrels are also vulnerable to pollutants. While known to occur in Citrus County, the southeastern American kestrel has only a moderate likelihood of occurring on the CCC Site.

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.

No known nesting colonies have been observed or have been recorded on the CCC Site based on field surveys and according to the Florida Waterbird Colony database. However, there is documentation of wood stork presence within 5 miles of the CCC Site (FNAI); for that reason, the likelihood of occurrence on-Site is considered high for foraging, because they typically feed great distances from colony sites and use any shallow wetlands and ditches. There is a lack of suitable nesting habitat on the CCC Site.

Other Wading Birds

Several species of wading birds, including the tricolored heron, white ibis, snowy egret, little blue heron, roseate spoonbill and limpkin, are known to occur in Citrus County wetland areas. These species are all classified by FWC as species of special concern and are locally common. These species are considered to have a high likelihood of occurrence for foraging on the Site, with the exception of the limpkin.

Aquatic Systems—Habitat Types

There are no open surface water bodies on-Site that provide habitat to support aquatic life. Off-Site, aquatic habitats near the Site include artificial structures and coastal tidal rivers and embayments in proximity to CREC. The latter contain habitats such as oyster reefs, salt marshes, submerged aquatic vegetation, and subtidal areas that support numerous species assemblages. The following habitat descriptions include information from the FWC State Wildlife Action Plan (2011) and include site-specific information from CREC-related studies.

Artificial structures, including hardened shorelines and artificial reefs, are generally created for shoreline stabilization and wave protection or to improve reef fish habitat

to enhance recreational fishing opportunities. Hardened shorelines also provide habitat for sessile bivalves, crustaceans, and some fish. Artificial structures in the vicinity of CREC include intake and discharge structures and piers, seawalls, and navigational structures associated with the coal terminal; dikes and spoil islands that parallel the intake and discharge canals; and spoil islands located at the mouth of the South Florida Barge Canal.

Canals are linear waterways typically constructed for drainage, flood control, irrigation, navigation, and recreation. They usually have steep sides, little to no emergent vegetation, and provide limited habitat for aquatic species. The intake and discharge canals at CREC fall into this category, as does the Cross Florida Barge Canal. The intake and discharge canals were dredged through the sediment layer and have hard rock bottoms. Dredged material was sidecast along the length of the canals, with periodic openings along the intake canal for navigation. The intake canal has a depth of approximately 20 ft, while the depth in the discharge canal is approximately 14 ft. The banks of the intake and discharge canals are routinely mowed and maintained.

Coastal tidal rivers and streams are the segments of rivers and streams that are influenced by the tidal cycle. The tidal influence affects water levels, flow rates, and salinity. Salinity can range from freshwater to brackish, and flows can reverse with the tides. Tidal rivers and streams near the Site include the Withlacoochee River, Cross Florida Barge Canal, Crystal River, and Salt Creek (an outlet of Crystal River south of its mouth).

Oyster reefs are composed of attached oysters and shell fragments. Although mapping of this type of habitat is not complete, approximately 13,586 acres of oyster reefs are mapped in Florida. Reefs can range from small patches to long ridges that can extend several miles. They provide nursery grounds, refugia, and foraging areas for a variety of species, as well as dissipating wave energy and maintaining water quality. Intertidal oyster reefs (described in earlier studies as predominantly broken shell) with a north-south orientation are prevalent in Crystal Bay in the vicinity of the intake and discharge canals.

Subtidal unconsolidated marine/estuary sediments consist of open areas of mineral substrates within tidal zones (i.e., less than 10 percent of the bottom is covered by

submerged aquatic vegetation [SAV] or corals). Unconsolidated sediments are mud, mud/sand, sand, or shell and occur throughout coastal Florida. Large populations of infaunal and epifaunal organisms occur in these habitats such as tube worms, sand dollars, mollusks, isopods, amphipods, burrowing shrimp, and crabs. In addition, these areas are important feeding grounds for bottom-feeding fish and invertebrate species. Infaunal organisms can be found in subtidal zones in extremely high densities, reaching to the tens of thousands per square meter.

Aquatic Systems—Flora

Salt marshes occur along the shoreline where wave action is low. They consist of mostly herbaceous plants, primarily grasses, sedges, and rushes, such as smooth cordgrass (*Spartina alterniflora*) and needle rush (*Juncus roemerianus*). Larger salt marshes usually contain numerous tidal creeks. Salt marshes are highly productive areas that provide habitat for a variety of fish and invertebrates. They also provide foraging and nesting habitat for a variety of shore birds (e.g., herons and rails), reptiles (e.g. alligators, water snakes, and turtles), and small mammals.

CREC is located along the West-Central Florida coastline that features extensive salt marshes. The shoreline adjacent to CREC has a 0.5- to 1-mile-wide band of salt marsh habitat. Salt marsh species include needle rush, smooth cordgrass, salt grass (*Distichlis spicata*), bushy seaside oxeye (*Borrichia frutescens*), annual glasswort (*Salicornia bigelovii*), marsh elder (*Iva annua*), and occasional red cedar (*Juniperus virginiana*) and cabbage palm (*Sabal palmetto*). The marshes and tidal creeks serve as nursery areas for fish, including mullet (*Mullus* spp.), spot (*Leiostomus xanthurus*), black drum (*Pogonias cromis*), red drum (*Sciaenops ocellatus*), and croaker (*Sciaenops ocellatus*).

SAV habitat includes subtidal areas covered by seagrasses, attached macroalgae, and drift algae. Florida's estuaries and coastal waters contain more than 2 million acres of SAV beds. Seagrass beds occur in areas of low wave energy, often near tidal flats, salt marshes, and mangroves. Seagrasses provide food, substrate, and shelter for a wide variety of flora and fauna, as well as stabilizing sediments and improving water quality. This type of habitat occurs within the shallow areas of Crystal Bay and the Gulf of Mexico.

Five species of seagrasses were documented adjacent to CREC in early studies for the addition of Crystal River Unit 3 (U.S. Atomic Energy Commission [AEC], 1973) and in support of the Crystal River Section 316 Demonstration in 1983 and 1984 (FPC, 1985): shoal grass (*Halodule wrightii*), widgeon grass (*Ruppia maritima*), turtle grass (*Thallassia testudinum*), manatee grass (*Syringodium filiforme*), and stargrass (*Halophila englemanni*). The seagrass beds also contain assemblages of rooted green algae, dominated by *Caulerpa* spp.

Aquatic Systems—Fauna

The aquatic systems in the vicinity of the Site support a variety of fauna, including benthic invertebrates, fish and shellfish, sea turtles, and manatees. The aquatic fauna near CREC have been studied since the 1970s for construction of different parts of the existing facility and in response to permitting requirements.

Benthic Macroinvertebrates

Surveys were conducted at CREC prior to operations at Unit 3, with 286 taxa identified consisting mostly of widely distributed invertebrates capable of tolerating the wide variation in environmental variables (i.e., salinity, temperature) found in estuaries (AEC, 1973). Mollusk species included 22 common marine snails dominated by variable bittium (*Bittium varium*), gulf dovesnail (*Anachis semiplicata*), lunar dovesnail (*Mitrella lunata*), common eastern nassa (*Nassarius vibex*), scorched mussel (*Brachidontes exustus*), and lateral mussel (*Musculus lateralis*). The eastern oyster (*Crassostrea virginica*) and seven other bivalves were prevalent in the samples. Other taxa included polychaetes, isopods, and decapods, including pink shrimp (*Farfantepenaeus duorarum*).

Fish and Shellfish

Important fish and shellfish commonly found in preoperational surveys at CREC included spot, croaker, silver perch (*Bairdiella chrysoura*), pigfish (*Orthopristis chrysoptera*), pinfish (*Lagodon rhomboides*), eastern oyster, blue crab (*Callinectes sapidus*), stone crab (*Menippe mercenaria*), and pink shrimp (AEC, 1973). AEC's 1973 study listed red drum, spotted seatrout (*Cynoscion nebulosus*), sheepshead (*Archosargus probatocephalus*), black drum, jack crevalle (*Caranx hippos*), and croaker as species sought by anglers in the plant's intake and discharge canals.

Extensive studies of the fish and shellfish populations were also conducted in support of the Crystal River 316 Demonstration (FPC, 1985). A number of the species listed previously were evaluated as representative important species in these 316 studies. In trawl samples, 98 species of fish and 108 species of invertebrates were collected in the vicinity of the facility, including spot, pigfish, and pinfish. Seine samples along the shoreline included 49 species of fish and 15 invertebrate species, while samples collected in the tidal creeks included 43 fish species and 7 invertebrate species.

Aquatic Systems—Threatened and Endangered Species

Federally and state-listed threatened and endangered aquatic species potentially present in the vicinity of the Site were researched using FNAI's Biodiversity Matrix. Table 3.3.6-3 includes species that have some potential to occur within 5 miles of the CCC Site, along with their federal and state listing status and habitat requirements. The following provides a discussion of the listed marine species in the area of CREC.

Sea Turtles

Five species of sea turtles may be found in the vicinity of the Site and associated off-Site facilities. Four of these species have been observed at or near CREC: Kemp's ridley (*Lepidochelys kempii*), green (*Chelonia mydas*), loggerhead (*Caretta caretta*), and hawksbill (*Eretmochelys imbricata*). The fifth is the leatherback (*Dermochelys coriacea*), which generally inhabits more pelagic waters and has not been observed near CREC. All five species are highly migratory, and none of the five species are considered likely to have individuals present year-round by the National Marine Fisheries Service (NMFS). There are no designated critical habitats for sea turtles in the vicinity of the Site or CREC.

Manatees

Members of the Florida subspecies of the West Indian manatee (*Trichechus manatus latirostris*) have historically inhabited the large natural springs in Crystal River and elsewhere on the west coast of Florida and are sometimes found in the canals at CREC. Crystal Bay, including the intake and discharge canals, is designated as a year-round Manatee Protection Zone under Section 68C-22.011, F.A.C. Also, as shown in Figure 3.2.1-2, portions of Crystal River within 5 miles of the Site are designated as critical habitat for manatees because of the natural thermal effects of springs discharging into the river. The CREC cooling water discharge provides for a secondary thermal ref-

uge for the local population but is not considered a primary refuge because of the presence of the springs (FDEP, 1995). FWC stated in 1999, "We do not believe a specific manatee protection plan condition requiring the Crystal River Power Plant to produce warm water during the winter is currently warranted" (FWC, 1999).

CREC's Manatee Protection Plan (FPC, 2001, as amended) establishes various precautions to minimize hazards to manatees at the intake and outfall areas, such as inspections at the intakes and having observers on board vessels associated with in-water work, operating vessels at no-wake/idle speeds while in the warm water refuge area, and avoiding major in-water work in the discharge canal from November 15 through March 31 unless approved by FWC's Bureau of Protected Species Management (BPSM). Appendix 10.6.6 contains a copy of the existing manatee protection plan.

Gulf Sturgeon

Gulf sturgeon forage on mud and sand bottoms along the eastern Gulf of Mexico and migrate up tidal rivers to spawn. There are no designated critical habitats for gulf sturgeon in the vicinity of CREC. NMFS's 2002 biological opinion for CREC (NMFS, 2002) included consideration of potential effects from operation of the cooling water intakes on gulf sturgeon. The opinion considered it unlikely that gulf sturgeon would enter the rock-bottomed intake canals and thus be susceptible to impingement or entrainment. Together with this species' absence in impingement and entrainment sampling conducted at the intakes, NMFS concluded that the potential for impacts from the cooling water intakes was "discountable."

Although not included in Table 3.3.6-3 as potentially occurring near the Site, the smalltooth sawfish (*Pristis pectinata*) was listed as endangered in the United States in 2003. Its habitat range in the United States was historically from North Carolina to Texas; however, its range is currently restricted to southwest Florida. The primary cause of the decline in this species is by-catch in commercial and recreational fisheries; of secondary importance is habitat loss and degradation along the coastline. The smalltooth sawfish's preferred habitat is shallow, coastal waters close to shore over muddy or sandy bottoms. Surveys conducted by NOAA fisheries show a high site fidelity for juveniles and indicate that shallow mudflats lined with mangroves may be important as nursery areas. These surveys supported the September 2009 designation of two critical habitat units in southwest Florida, including the Charlotte Harbor Estuary

Unit (221,459 acres) and the Ten Thousand Islands/Everglades Unit (619,013 acres). While mature sawfish may potentially occur in the shallow areas of Crystal Bay during warmer seasons, it is believed that, similar to gulf sturgeon, it is unlikely they would enter the hard-bottom intake or discharge canals and potentially interact with the intake or discharge structures.

3.3.6.2 Preexisting Stresses

The primary preexisting stresses to aquatic systems in the vicinity of the Site are associated with the electrical generation operations at CREC, particularly effects from impingement and entrainment on fish and shellfish associated with the cooling water intake systems and from thermal effects from the cooling water discharge. These stresses have diminished with the cessation of steam electric generation operations at Crystal River Unit 3. The cooling water intake system has previously been determined to be best technology available (BTA) under Section 316(b) of the Clean Water Act (CWA). However, additional BTA assessments of the intakes are currently required under the CREC Units 1, 2, and 3 renewed NPDES permit (dated April 7, 2014), and the cooling water intake system will be required to comply with the new 316(b) Existing Facilities Rule, which was released initially on May 19, 2014, and will go into effect 60 days subsequent to publication in the Federal Register (FR).

Studies of the historical thermal discharges at CREC have shown localized effects on the distribution of seagrasses, benthic macroinvertebrates, and fish. The thermal discharge has been deemed adequately protective of a balanced indigenous population of aquatic life under Section 316(a) of the CWA and deemed to meet Florida's thermal standards. The current NPDES permit also includes a requirement to continue to assess thermal effects on aquatic biota.

Preexisting stresses to sea turtles include disease, illegal harvesting, habitat encroachment, artificial lighting impacting nesting beaches, cold stress, entanglement in fishing gear, and pollution (particularly solid waste and oil byproducts) (FWC, 2014a). Manatees are subject to mortality from disease, cold stress, collisions with watercraft, and red tide-related poisoning (FWC, 2014b).

3.3.6.3 Measurement Programs

As discussed in Section 3.3.4.2, extensive studies on the aquatic flora and fauna have been conducted over the past decades in the vicinity of CREC. Ongoing monitoring required by CREC's NPDES permits requires compliance with the monitoring and notification requirements of its FDEP-approved manatee protection plan (June 22, 2001, as amended). Since 1998, CREC also implemented a sea turtle rescue and handling guidance, which includes protocols for sea turtle observation, rescue, handling, notifications, and reporting requirements. The bar racks at the intakes are continuously inspected during times of high turtle concentrations in the intake canal. Monitoring of the bar racks is reduced to once every 2 hours during periods of low turtle activity.

Florida Fish and Wildlife Research Institute (FWRI) began a three-year monitoring program for seagrasses along the Springs Coast in 2012 (Yarborro and Carlson, 2013). FWRI has conducted fisheries independent monitoring at Cedar Key just since 1996 (FWRI, 2012), consisting of stratified random sampling with a variety of gear types.

3.3.7 Noise

3.3.7.1 Noise Regulations

Citrus County's noise regulations are contained in the Citrus County Code of Ordinances, Chapter 21, Noise, Vibration and Air Pollution, Article II, Noise. This ordinance regulates noise or sound within the unincorporated area of Citrus County. Florida has no applicable state noise laws or regulations. The Citrus County noise ordinance states that the noise from any activity or from any permissible use of property within the applicable land use district classifications of Citrus County be deemed a violation if the total noise level as measured on the A-scale due to both ambient noise and the alleged source of the offensive noise exceed the noise levels in Table 3.3.7-1. The minimum measurement period is 10 minutes.

This noise standard also states that the noise from any activity or permissible use of property within the applicable land use district classifications of Citrus County are deemed a violation if the noise level exceeds the noise levels in Table 3.3.7-2 at any time during the measurement period. The minimum measurement period is 10 minutes.

Table 3.3.7-1. Maximum Sound Levels for Receiving Land Use Districts

Receiving Land Use District	Sound Level Limit (dBA)*	
	Daytime	Nighttime
Residential	60	55
Government-owned buildings or property, institutional or recreational	55	50
Commercial or business	65	60
Industrial or manufacturing	75	75
Agricultural	75	75

Note: dBA = A-weighted decibel.

*For the purposes of this chapter, daytime is defined as the hours between 7 a.m. and 10 p.m. of the same day. Nighttime is defined as the hours between 10 p.m. of one day and 7 a.m. of the next day.

Source: Citrus County Ord. No. 2010-A05, §1, February 9, 2010.

Table 3.3.7-2. Maximum Instantaneous Sound Levels for Receiving Land Use Districts

Receiving Land Use District	Sound Level Limit (dBA)*	
	Daytime	Nighttime
Residential	70	60
Government-owned buildings or property, institutional or recreational	65	55
Commercial or business	75	65
Industrial or manufacturing	85	85
Agricultural	85	85
Multiple-family dwelling units	60	50

Note: dBA = A-weighted decibel.

*For the purposes of this chapter, daytime is defined as the hours between 7 a.m. and 10 p.m. of the same day. Nighttime is defined as the hours between 10 p.m. of one day and 7 a.m. of the next day.

Source: Citrus County Ord. No. 2010-A05, §1, February 9, 2010.

Sound level is defined as the weighted sound pressure level as measured in A-weighted decibels (dBA) by a sound level meter and as specified in the American National Standards Institute (ANSI) specifications for sound level meters (ANSI S1.4—1971; Revised 1976). For purposes of demonstrating compliance with the Citrus County ordinance, the measurement represents the A-weighted sound pressure level that is exceeded 10 percent of the time (L_{10}) during the observation period.

3.3.7.2 Ambient Noise Levels

An ambient noise survey was conducted to establish background or baseline ambient noise levels at various locations both on and off the CCC Site. Baseline ambient noise levels should be taken into account when assessing noise impacts from a potential new noise source such as the CCC Project. Baseline ambient noise measurements were conducted to capture the 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 CCC Site is generally developed with industrial uses, including the existing CREC to the south and west and mining operations to the north. Anthropogenic (man-made) noise sources in the area include noise from the existing CREC and traffic on the access road immediately south of the southern Site boundary and along West Power Line Street.

The ambient noise measurement locations were selected to provide a representative sample of noise measurement locations both on and off the CCC Site and are shown in Figure 3.3.7-1. While other temporary construction-related activities, such as land clearing and soil borings, were being conducted on the Site during the ambient noise measurements, the noise measurement locations were selected to minimize impacts from these temporary noise sources.

Noise measurements were conducted on Thursday, May 22, 2014, 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 5 or 10 minutes. Noise measurements, taken during the daytime when intermittent noise sources such as truck or vehicle traffic were present, were taken for a duration of 10 minutes.

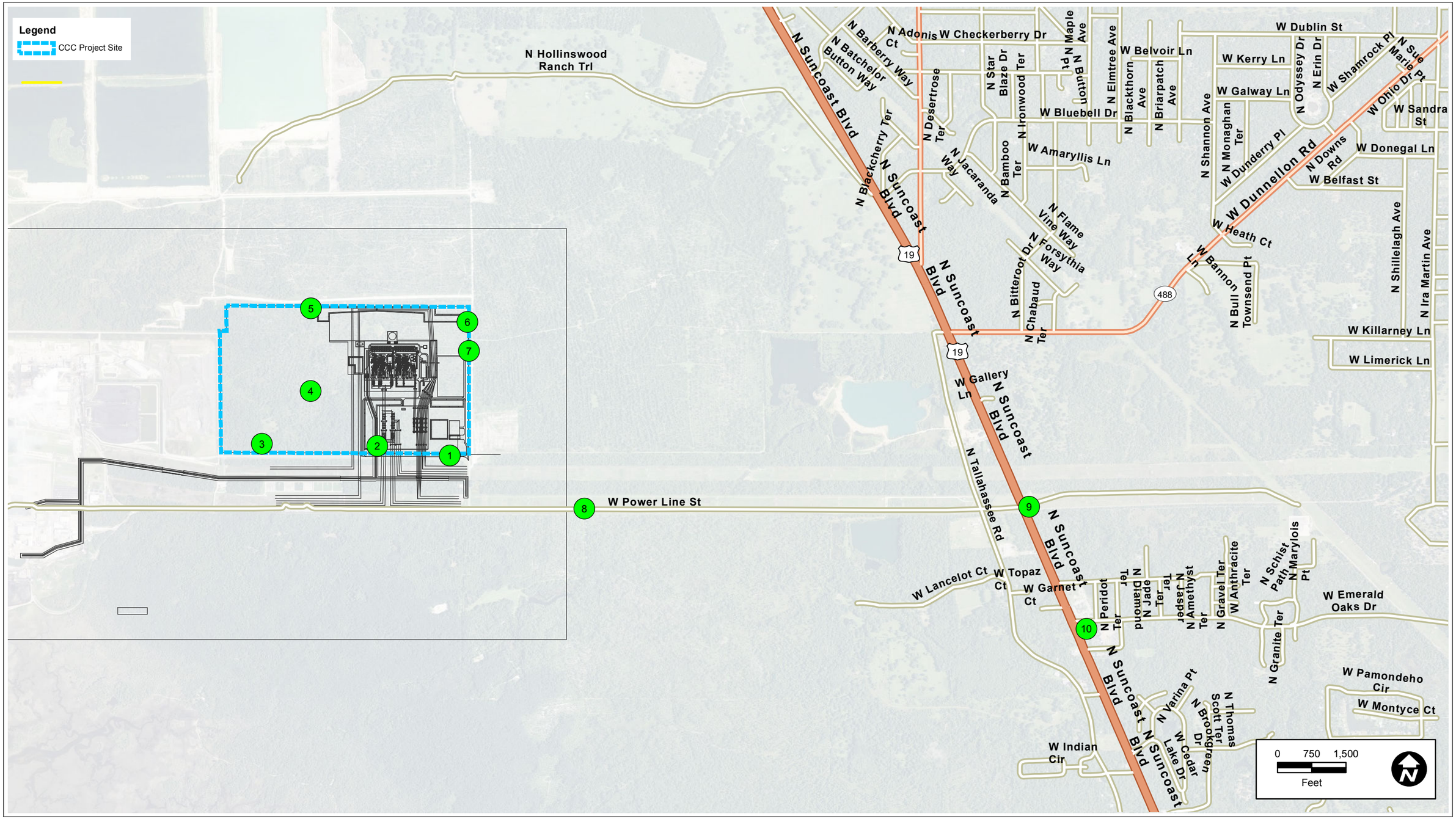


FIGURE 3.3.7-1.
AMBIENT NOISE MEASUREMENT LOCATIONS

Sources: FDOT, 2011; AMEC, 2013; Burns & McDonell, 2014; ECT, 2014.

DUKE ENERGY FLORIDA

(Note: The minimum measurement period in accordance with the Citrus County ordinance is 10 minutes.) Noise measurements taken when no intermittent noise sources were present were recorded for 5 minutes. These noise measurements had consistent noise levels throughout the measurement period.

Weather conditions were clear with temperatures in the high 80s during the day and in the mid-70s at night. The wind was estimated to be less than 5 miles per hour (mph), and there was no precipitation during the entire ambient noise measurement period.

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 ft above the ground. A foam windscreen was used to reduce but not eliminate wind-generated noise. The 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, including computation of the 24-hour equivalent sound level (L_{eq}[24]), L_{10}, maximum sound level (L_{max}), and minimum sound level (L_{min}). While measurements were recorded in decibels on the A, C, and Z scale (flat weighting), all sound level measurement results are presented in decibels on the A scale.

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 Leq lies in the ability to assess the total time-varying effects of noise on sensitive receptors. Leq represents the Leq measured in decibels on the A scale.

Tables 3.3.7-3 and 3.3.7-4 summarize the ambient noise measurement results. Table 3.3.7-3 presents the L_{eq} and L_{10} for ambient measurements that represented day-

time noise levels, which captured daytime operations. Table 3.3.7-4 presents the L_{eq} and L_{10} for ambient measurements that represented nighttime noise levels when daytime operations, such as truck traffic and increased vehicle noise, were not present.

Table 3.3.7-3. Ambient Noise Measurements during Daytime Operations

Location	Description	Time	Duration (minutes)	L_{eq} (dBA)	L_{10} (dBA)
1	Outside fenceline along access road	1:42 to 1:52 p.m.	10	69.2	66.2
2	Southern Site boundary	2:09 to 2:19 p.m.	10	57.9	56.9
3	Southern Site boundary	2:30 to 2:40 p.m.	10	51.5	54.9
4	Mid-Site	2:50 to 3:00 p.m.	10	46.0	49.0
5	Northern Site boundary	3:46 to 3:51 p.m.	5	41.5	42.7
6	Northeast Site boundary	4:15 to 4:20 p.m.	5	46.0	47.7
7	West Power Line Road	4:42 to 4:52 p.m.	10	62.7	67.9
8	West Power Line Road and U.S. 19	4:59 to 5:09 p.m.	10	64.6	67.9
9	Seven Rivers Medical Center	5:57 to 6:07 p.m.	10	54.4	57.6

Source: ECT, 2014.

Table 3.3.7-4. Ambient Noise Measurements during Nighttime Operations

Location	Description	Time	Duration (minutes)	L_{eq} (dBA)	L_{10} (dBA)
1	Along access road	5:34 – 5:44 p.m.	10	53.4	48.0
2	Southern Site boundary	9:10 – 9:15 p.m.	5	40.5	41.4
3	Southern Site boundary	9:26 – 9:31 p.m.	5	43.7	44.8
5	Northern Site boundary	9:49 – 9:54 p.m.	5	38.7	40.6
6	Northeast Site boundary	10:05 – 10:10 p.m.	5	38.2	41.9
7	West Power Line Road	10:28 – 10:34 p.m.	6	60.1	62.9
8	West Power Line Road and U.S. 19	10:39 – 10:34 p.m.	5	56.0	60.8

Source: ECT, 2014.

As shown in these tables, all of the ambient noise level measurements were well below the Citrus County maximum sound level limits of 75 dBA daytime and nighttime for the industrial land use district.

3.3.8 Other Environmental Features—Meteorology and Ambient Air Quality

3.3.8.1 Meteorology/Climatology

The CCC 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 Central Florida climate is also affected by maritime influences from the Atlantic Ocean and the Gulf of Mexico. With the Gulf of Mexico nearby, only relatively slight variations in humidity and temperature result through the seasons. Summers are humid, warm to hot, and long. Winters are typically mild with weak cold fronts occurring, which in rare instances produce frost.

Table 3.3.8-1 provides a summary of monthly mean and extreme temperatures based on National Weather Service (NWS) data collected at the Inverness station (NWS Cooperative Observer Identification No. 084289) located in Citrus County for the period of record from 1971 through 2000. The Inverness station is located approximately 45 miles east-southeast of the CCC Site and is considered to be 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 20°F variation in the monthly mean temperatures. Temperatures above 90°F have occurred in every month except January, February, and December, which had highest recorded temperatures of 88 to 89°F. From 1971 through 2000, there were only an average of 13.6 days with below-freezing temperatures reported at some time during the day.

Table 3.3.8-1. Ambient Temperatures Measured at Inverness, Florida

Month	Daily (°F)				Monthly (°F)		
	Mean Maximum	Mean Minimum	Highest	Lowest	Lowest Mean	Mean	Highest Mean
January	69.9	44.0	88	15	48.9	57.0	70.2
February	71.9	45.5	89	21	50.8	58.7	65.9
March	77.2	51.0	93	24	58.2	64.1	70.9
April	81.9	55.8	95	32	63.1	68.9	72.9
May	87.6	62.9	100	42	71.6	75.3	78.9
June	90.5	69.6	101	40	77.7	80.1	83.6
July	91.6	71.3	100	61	78.2	81.5	83.6
August	91.3	71.4	99	61	78.1	81.4	83.1
September	89.7	69.5	105	51	76.8	79.6	82.0
October	84.0	61.3	97	33	68.0	72.7	77.8
November	77.7	52.9	92	23	59.3	65.3	71.9
December	71.7	46.1	89	15	49.2	58.9	66.8
Annual	82.1	58.4	105	15	48.9	70.3	83.6

Note: Highest and lowest daily temperatures based on complete station record (i.e., 1948 to 2001).
Mean temperatures based on years 1971 through 2000.

Sources: National Climatic Data Center (NCDC), Climatography of the United States: No. 20, 1971 through 2000.
ECT, 2014.

Relative humidity values were not available from the Inverness station but were available from the Tampa International Airport (TIA), which is approximately 77 miles (123 kilometers [km]) south of the 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 75 and 90°F, with a relative humidity of 86 to 90 percent during the night and early morning and 60 to 65 percent in the afternoon. Relative humidity in the Tampa area varies from 52 to 91 percent throughout the year. The highest relative humidity occurs in the early morning hours, with a range of 85 to 91 percent and an average of 88 percent. The relative humidity during the daytime and early evening hours ranges from approximately 52 to 65 percent with an average of 59 percent. The mild winter climate can be attributed to the close proximity of the Site to the Gulf of Mexico, which is approximately 30 miles to the west. During the winter, relatively warm air from the Gulf of Mexico maintains the mild winter climate.

Table 3.3.8-2. TIA Normal Relative Humidity Data (1963 through 2002)

Month	Morning (%)	Afternoon (%)
January	87	60
February	86	57
March	87	55
April	86	52
May	85	53
June	86	60
July	87	64
August	90	65
September	91	63
October	89	58
November	88	58
December	88	60
Annual	88	59

Source: NCDC, 2014.

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 Inverness 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 months. Table 3.3.8-3 also presents the daily and maximum rainfall values. The maximum daily rainfall has ranged from 3.25 to 9.54 inches. Monthly precipitation has varied from 0 to more than 17 inches.

Table 3.3.8-3. Precipitation Measured Inverness, Florida (1971 through 2000)

Month	Monthly (inches)			Daily Maximum (inches)
	Mean	Maximum	Minimum	
January	3.55	9.56	0.26	3.25
February	2.96	6.62	0.46	3.90
March	4.17	11.13	0.85	5.73
April	2.40	5.89	0.07	3.55
May	3.33	11.97	0.20	4.96
June	7.40	17.44	1.69	9.54
July	7.05	11.24	3.71	5.35
August	7.52	15.03	2.43	6.12
September	5.93	13.15	1.25	7.20
October	2.63	9.04	0.00	6.20
November	2.27	7.73	0.00	4.72
December	2.56	10.46	0.11	4.41

Sources: NCDC, Climatography of the United States: No. 20, 1971 through 2000.
ECT, 2014.

The normal annual precipitation recorded for Inverness, Florida, is 51.77 inches, with most of this precipitation occurring during the summer months. The winter months are much drier, with the monthly precipitation averaging 3.0 inches 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 frontal systems moving through the area.

The nearest representative station with detailed wind data is the TIA located approximately 75 miles south of the CCC Site. There are several of other weather stations a similar distance from the Site, but they are not considered to be as representative because of their inland locations. The TIA and the CCC Site are both located near to the Gulf of Mexico and thus expected to experience similar wind conditions. Therefore, the TIA is expected to have wind patterns more representative of the CCC Site's location. Figure 3.3.8-1 provides a 5-year annual wind rose based on wind speed and direction observed for the years 2006 through 2010. 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

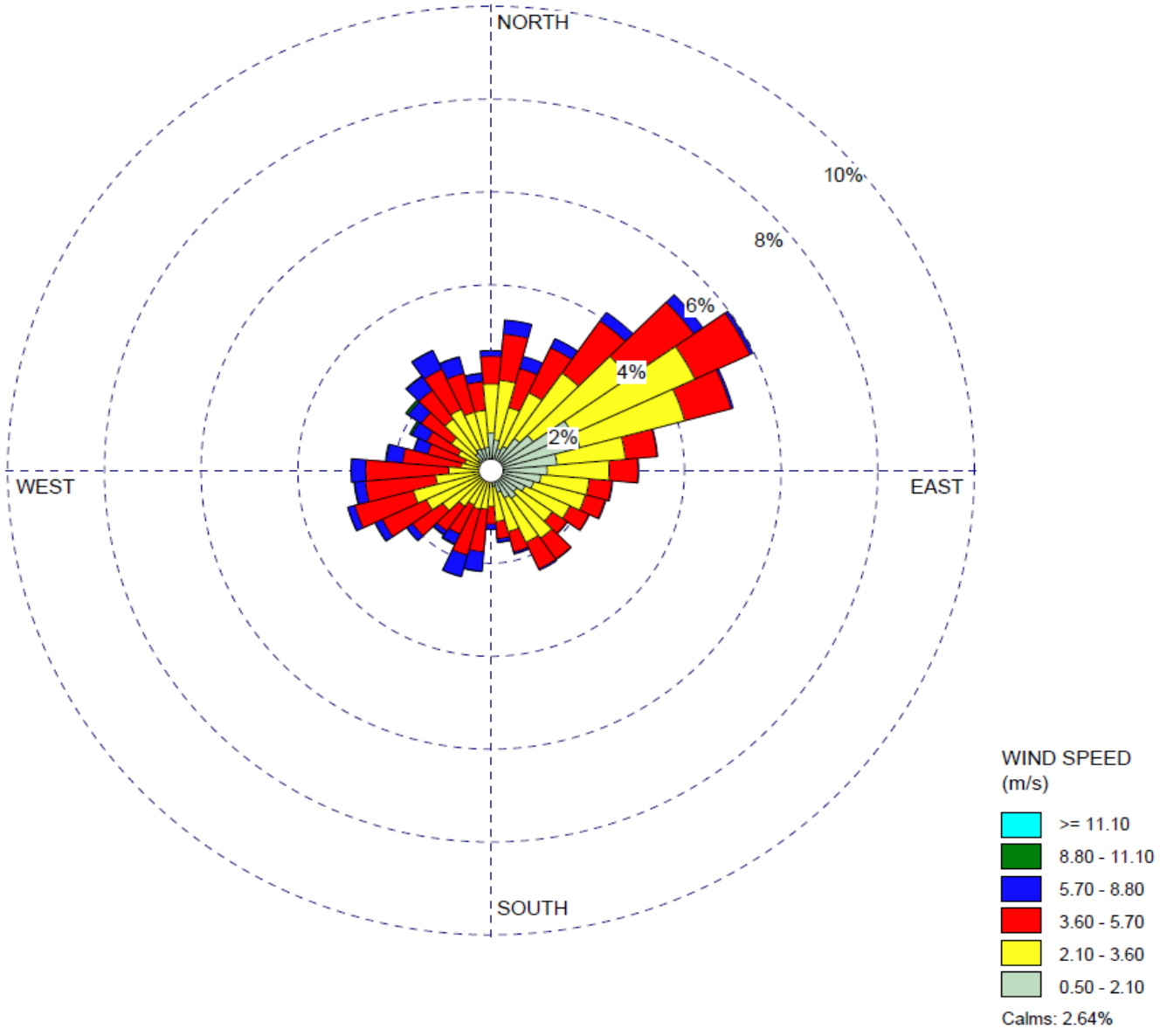


FIGURE 3.3.8-1.

5-YEAR ANNUAL WIND ROSE, TAMPA INTERNATIONAL AIRPORT (2006 THROUGH 2010)

Sources: ECT, 2014.

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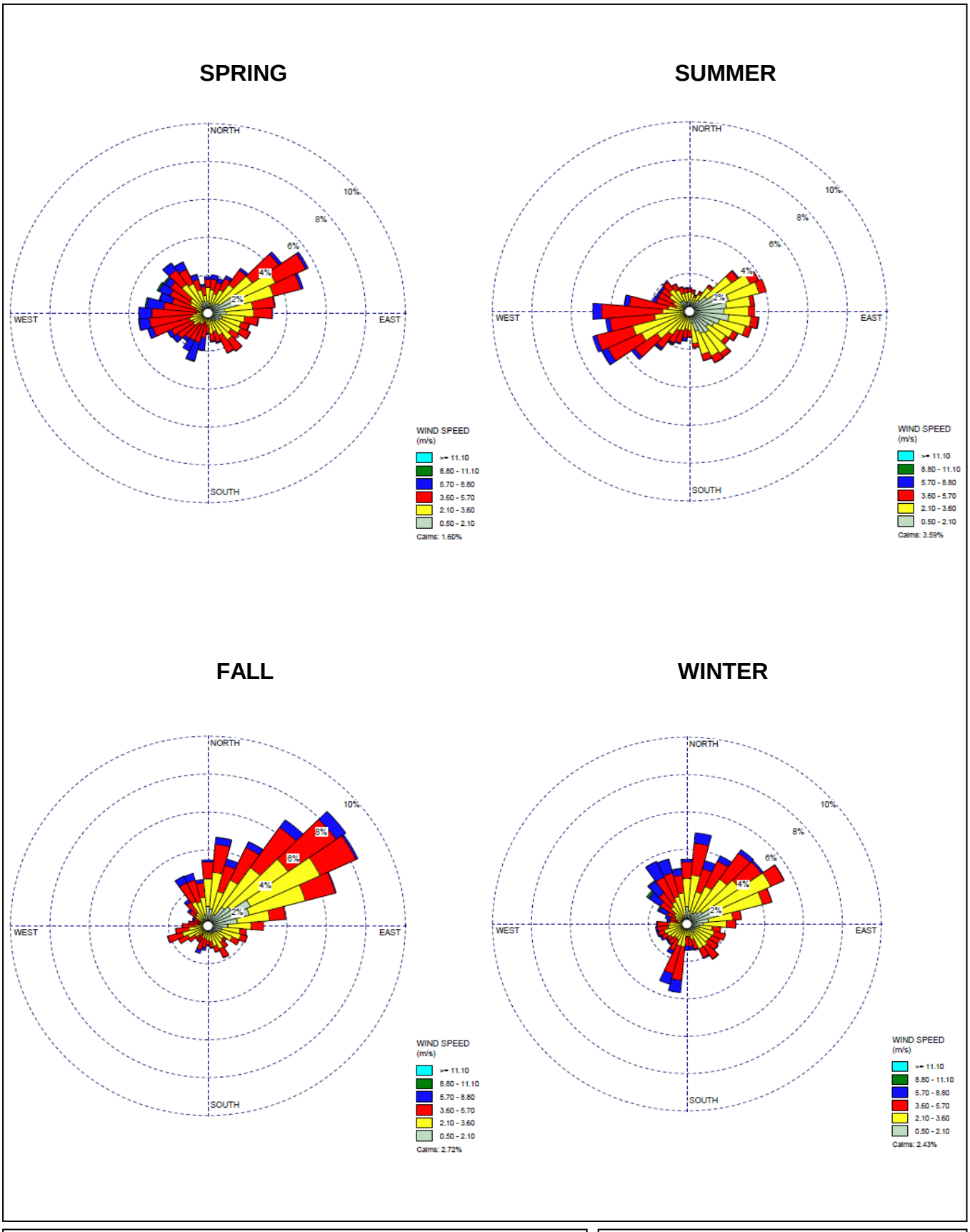

FIGURE 3.3.8-2.

5-YEAR SEASONAL WIND ROSE, TAMPA INTERNATIONAL AIRPORT (2006 THROUGH 2010)

Sources: ECT, 2014.

3.3.8-2 represents the percent of time the wind blows from a particular direction at a given speed.

Over the 5-year period, the wind direction is more predominant from the east 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 7.27 mph. Spring has the highest winds at 8.12 mph. The lowest average winds are in the summer at 6.4 mph.

3.3.8.2 Ambient Air Quality

Ambient air quality is affected by meteorology, atmospheric chemistry, and pollutant emissions. The type, amount, and location of sources of emissions affect ambient air quality. 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. 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 causes the production of photochemical smog, which contains pollutants such as ozone. Relative humidity is important to atmospheric dispersion and chemical transformation because of the interaction 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], CO, and particulates). 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 combine 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 the environment and physical property.

As a criteria pollutant, PM is separated 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 ($PM_{2.5}$).

An 8-hour ozone NAAQS replacing the existing 1-hour standard was promulgated in July 1997. On the federal level, the 8-hour ozone standard is in effect, and the 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 Site is outside these areas.

Table 3.3.8-4 shows the primary and secondary NAAQS developed for different averaging times dependent on the characteristics of the pollutant. The states have the right to establish more stringent ambient air quality standards (AAQS). Florida has adopted the federal limits for all pollutants.

Except for limited areas in Hillsborough and Nassau Counties that were recently designated as being in nonattainment of the SO_2 1-hour standard, Citrus County and the entire state of Florida are designated as attainment for all AAQS. On April 30, 2004, EPA issued final designations for the 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 Citrus County, as unclassifiable/attainment for the 8-hour ozone NAAQS.

Ambient air quality monitors collect data used to determine attainment status. Figure 3.3.8-3 shows the locations of the ambient monitors near to the CCC Site. Table 3.3.8-5 shows the most recent monitored levels at selected monitor locations in relation to the NAAQS.

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

Table 3.3.8-4. NAAQS and Florida AAQS

Pollutant (units)	Averaging Period	Florida and National Standards*	
		Primary	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 (ppmv)	8-hour[6]	0.075 ppm	0.075 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.

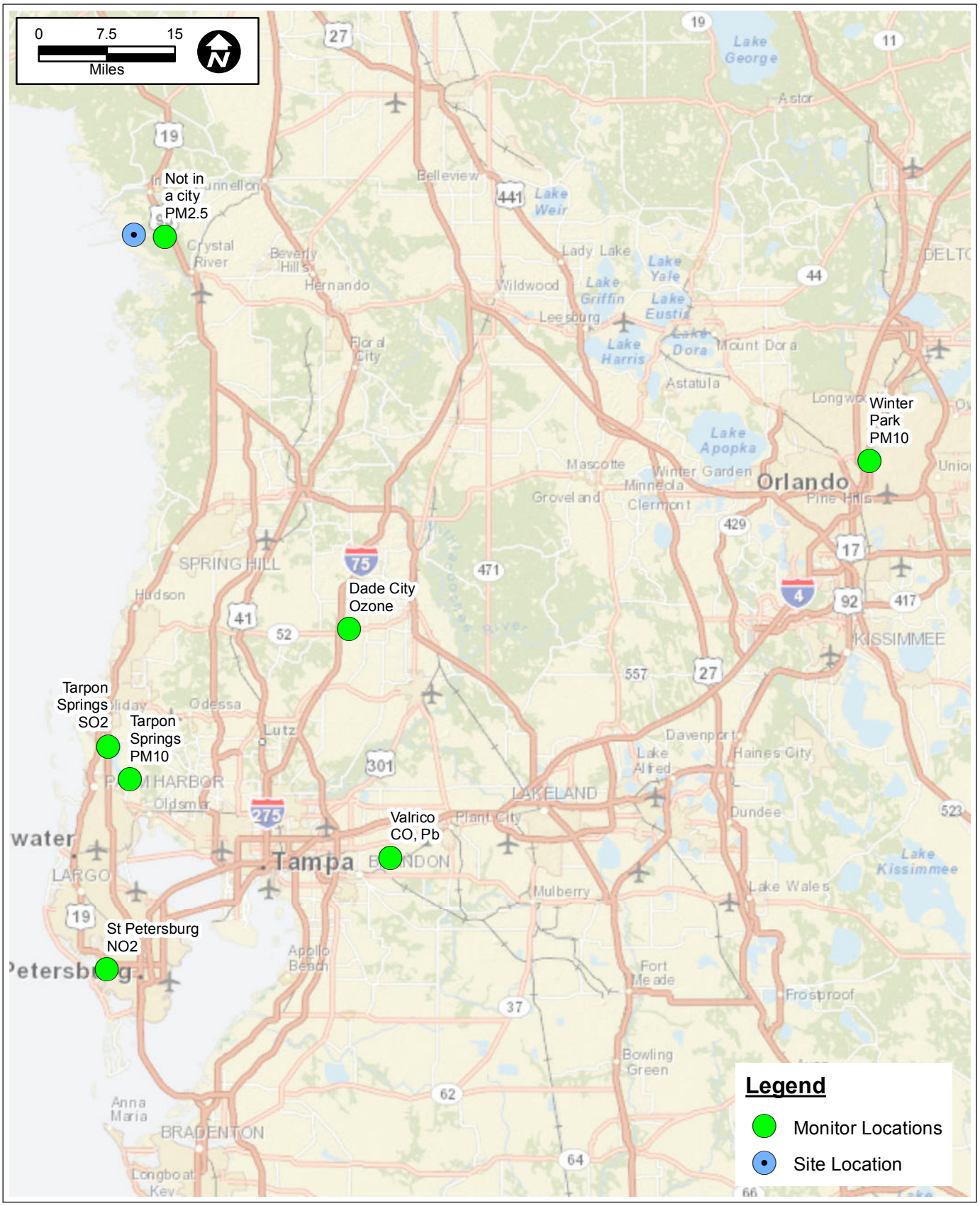

FIGURE 3.3.8-3.
LOCATION OF CCC SITE WITH MONITOR LOCATIONS

Sources: ESRI, 2013; ECT, 2014.

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Table 3.3.8-5. NAAQS and Monitored Air Quality Concentrations

Pollutant and Averaging Time	Primary NAAQS[1]	2013 Monitored Data[2]		Location of Monitor	
				City	County
CO					
8-hour*	9 ppm	0.4 ppm	2nd Maximum	Valrico	Hillsborough
1-hour*	35 ppm	0.8 ppm	2nd Maximum		
NO_2					
Annual†	53 ppb	N/A	Annual Mean	St. Petersburg	Pinellas
1-hour§	100 ppb	34 ppb	3-year average of daily 98th percentile		
PM_{10}					
24-hour*	150 µg/m^3	24 µg/m^3	2nd Maximum	Winter Park	Orange
24-hour*	150 µg/m^3	19 µg/m^3	2nd maximum	Tarpon Springs	Pinellas
$PM_{2\ 5}$					
Annual	12 µg/m^3	7.1 µg/m^3	3-year average	Not in a city	Citrus
24-hour‡	35 µg/m^3	20.5 µg/m^3	3-year average of 98th percentile		
Ozone					
8-hour (2008 standard)£	0.075 ppm	0.063 ppm	4th Maximum Averaged over 3 years	Dade City	Pasco
SO_2					
24-hour*	0.14 ppm	0.003 ppm	2nd Maximum	Tarpon	Pinellas
1-hour¥	75 ppb	20 ppb	3-year average of 99th percentile	Springs	
Lead◊					
Rolling 3-month average	0.15 µg/m^3	0.004 µg/m^3	Maximum daily	Valrico	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, 2011; 2009 through 2011 data used for 3-year averages (www.epa.gov/airdata/).
ECT, 2014.

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.

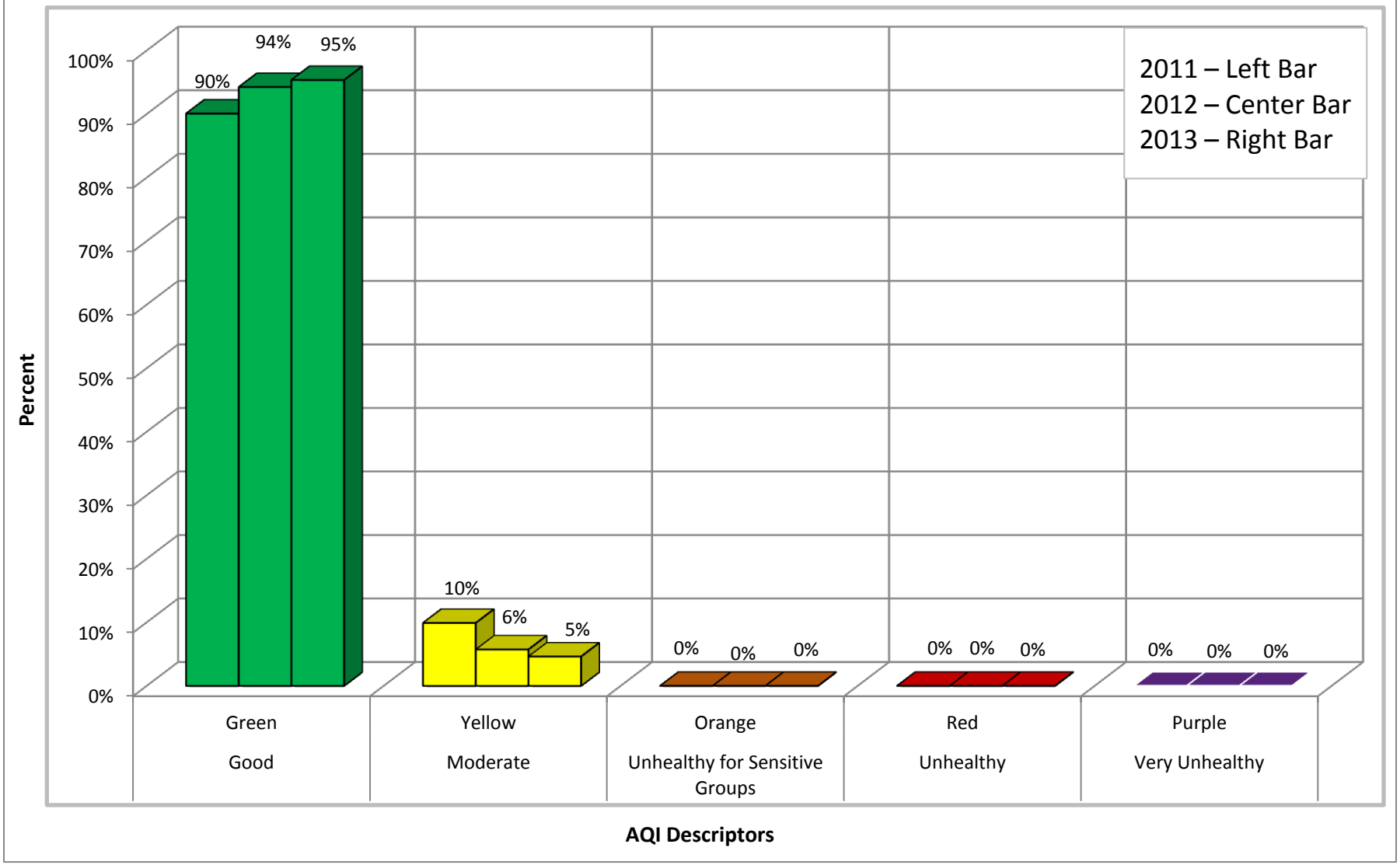
The higher the AQI value, the greater the level of air pollution and the greater the health concern. For example, an AQI value of 50 represents good air quality with little potential to affect public health, while an AQI value more than 300 represents hazardous air quality.

An AQI value of 100 generally corresponds to the NAAQS for the pollutant, which is the level EPA has set to protect public health. AQI values below 100 are generally thought of as satisfactory. As AQI values go above 100, air quality is considered to be unhealthy—at first for certain sensitive groups of people, then for everyone as AQI values get higher.

The most recent monitoring in Citrus County was limited to $PM_{2.5}$. Figure 3.3.8-4 shows the percent of time that the air quality was within the various AQI ranges for data collected from 2011 through 2013. As can be seen, the $PM_{2.5}$ air quality was good for the majority of the time (i.e., 90 to 95 percent of the time), and never worse than moderate. Also, the $PM_{2.5}$ levels are showing a decreasing trend toward better air quality.

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), automobiles, and manufacturing processes. Figure 3.3.8-5 summarizes data on emissions of five criteria pollutants (i.e., SO_2, NO_x, VOCs, CO, and $PM_{2.5}$) in Citrus County for the year 2011, the latest year for which such data are readily available. Most emissions of VOC were a result of industrial processes. 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 also contributed to CO and $PM_{2.5}$. Fugitive dust also contributed significantly to $PM_{2.5}$. There are no AAQS for VOC; rather, VOC emissions contribute to the formation of ozone, for which ambient standards have been set.

In addition to the six criteria pollutants, EPA categorizes 188 other compounds as *noncriteria* air pollutants, or 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



Note: Limited number of days of monitored AQI data available for Citrus County. Number of days of available data for Citrus County totaled 121 days for 2011, 122 days for 2012, and 108 days for 2013.

FIGURE 3.3.8-4.

$PM_{2.5}$ AIR QUALITY FOR CITRUS COUNTY, FLORIDA (2011 THROUGH 2013)

Sources: EPA AirData <http://www.epa.gov/airdata>, 2014. ECT, 2014.

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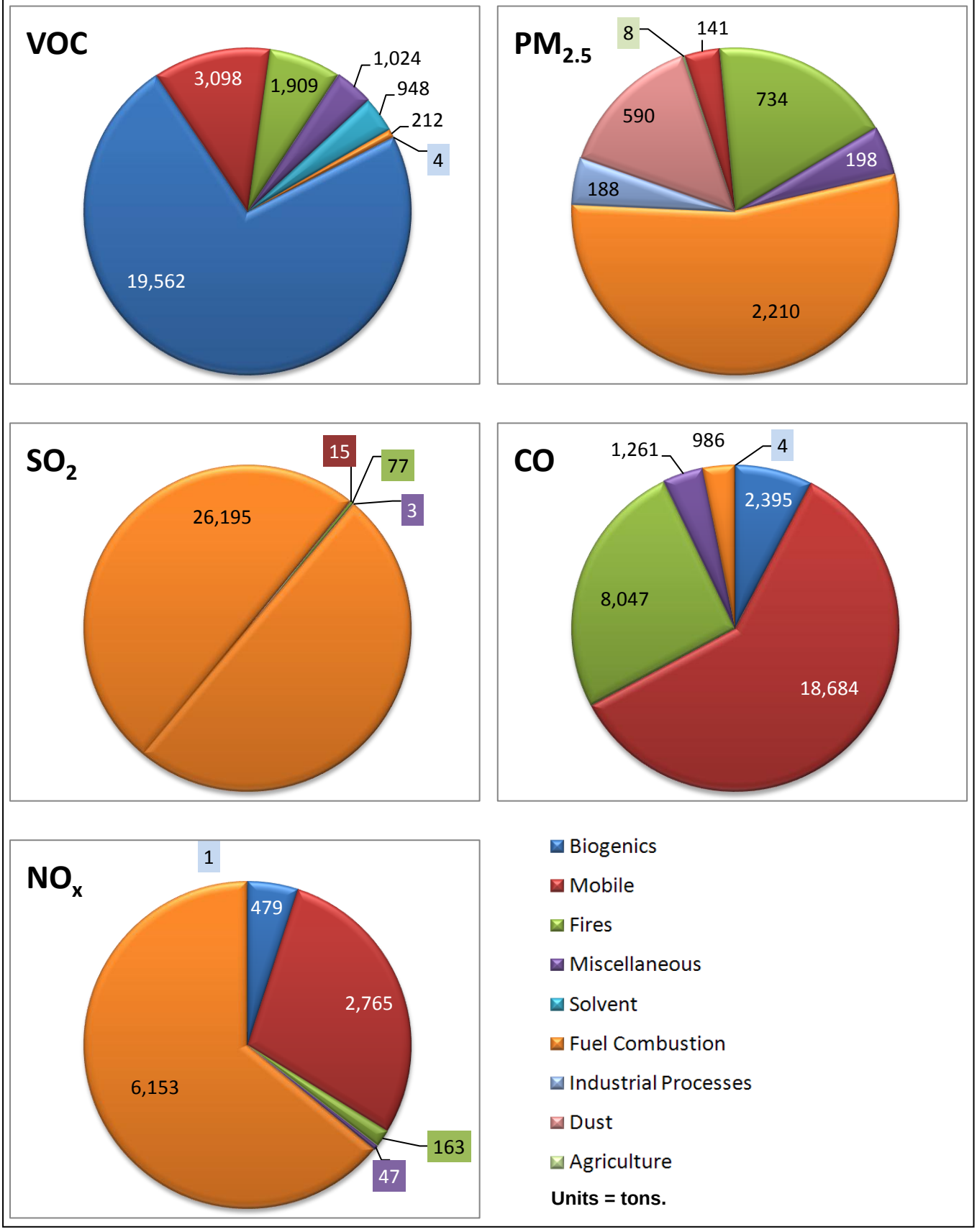

FIGURE 3.3.8-5.

EXISTING CITRUS COUNTY EMISSIONS FOR 2011
VOC, $PM_{2.5}$, SO_2, CO, NO_x

Sources: EPA AirData <http://www.epa.gov/air/emissions/>, 2014. ECT, 2014.

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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. Recent data for air toxics emissions in Citrus County were not readily available. However, given the relatively low population (i.e., 141,236 based on 2010 census) of Citrus County and the lack of large manufacturing industries, HAP emissions are expected to be relatively low.

Large point sources of emissions may contribute to air quality in a given area at a given time, depending on wind direction and other meteorological variables. CREC is the largest stationary source of criteria pollutants in Citrus County and is classified as a major source with allowable emissions of PM, SO_2, and NO_x that are over 100 tons per year (tpy). Only one other source, Pro-Line Boats, Inc., in Homosassa, was found to have potential emissions (i.e., VOC only) greater than 100 tpy.

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