

SHADY HILLS COMBINED CYCLE FACILITY



SITE CERTIFICATION APPLICATION

Volume I of II

February 2018

**Shady Hills Energy Center, LLC
901 Main Avenue, Norwalk, CT 06851**

February 16, 2018

Via Overnight Delivery

Cindy Mulkey, P.E.
Program Administrator
Siting Coordination Office
Department of Environmental Protection
2600 Blair Stone Road, MS 5500
Tallahassee, Florida 32399-2400

RE: Shady Hills Combined Cycle Facility, Pasco County
Site Certification Application, PA 18-59

Dear Ms. Mulkey:

Shady Hills Energy Center, LLC (SHEC) is pleased to submit its Site Certification Application (SCA) for a new natural gas-fired combined cycle facility, known as the Shady Hills Combined Cycle Facility (SHCCF) to be located at the existing Shady Hills Generating Station site in Pasco County. SHEC is submitting the SCA to the Department of Environmental Protection for processing under the Florida Electrical Power Plant Siting Act, Sections 403.501-403.518, Florida Statutes, and Chapter 62-17, Florida Administrative Code. As requested, we are providing one hard copy of the SCA along with two electronic versions.

SHEC is also providing electronic and hard copies of the SCA to other reviewing agencies as noted in the attached distribution list, based on their stated preferences, and additional copies of the SCA are available upon request.

Earlier this week, SHEC sent the \$125,500 SCA processing fee through an electronic funds transfer to the Department, to the attention of Chris Chamelin, Bureau of Finance and Accounting. The transfer should have noted that the cash list area for this processing fee is "3757," and that the object code is "001075."

Under separate cover, SHEC is submitting an air construction permit application for the SHCCF Project to the Department's Division of Air Resource Management. The air construction permit application is also included as Appendix 10.2.5 in the SCA.

Cindy Mulkey, P.E.
Program Administrator
Siting Coordination Office
Department of Environmental Protection
February 16, 2018
Page 2

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SHEC looks forward to working with the Department and the other participating agencies in the site certification process. If you or your staff have any questions regarding the SCA or the wire transfer of funds, please contact me at roy.belden@ge.com or (203) 357-6820.

Sincerely,

Shady Hills Energy Center, LLC

A handwritten signature in black ink that reads "Roy Belden". The signature is written in a cursive, flowing style.

Roy S. Belden
Vice President

cc: Ankur Mathur, SHEC
Manitia Moultrie, Golder
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Distribution List - Attached

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List of Acronyms and Abbreviations

°C	degrees Celsius
°F	degrees Fahrenheit
AAQS	Ambient Air Quality Standards
AERMOD	American Meteorological Society and EPA Regulatory Model
AM	amplitude-modulated
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
BACT	Best Available Control Technology
bgs	Below ground surface
BHP	brake-horsepower
BMPs	Best Management Practices
BSER	Best System of Emission Reduction
Btu/kWh	British thermal units per kilowatt-hour
Btu/lb	British thermal units per pound
CadnaA	Computer Aided Noise Abatement
CDP	Census Designated Places
CCD	Census County Division
CFR	Code of Federal Regulations
CH ₄	Methane
CO	carbon monoxide
CO ₂	carbon dioxide
CO ₂ e	CO ₂ equivalent emissions
CTEMISS	Cooling Tower Emissions Processor
CTG	combustion turbine generator
dB	Decibels
dBA	A-weighted decibels
DEF	Duke Energy Florida
DHR	Florida Division of Historical Resources
DLN	Dry low-NO _x
EDTA	Ethylene diamine tetra-acetic acid
eGRID	Emissions & Generation Resource Integrated Database
EIA	U.S. Energy Information Administration
EPA	U.S. Environmental Protection Agency
EPC	Engineer, Procure and Construct
ERP	Environmental Resource Permit
ET	evapotranspiration
F.A.C.	Florida Administrative Code
FADS	Florida Acid Deposition Study
FAMS	Florida Atmospheric Mercury Study
FCPA	Florida Community Planning Act
FDACS	Florida Department of Agriculture and Consumer Services
FDEO	Florida Department of Economic Opportunity
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
FGT	Florida Gas Transmission
FLU	Future Land Use
FLUCFCS	Florida Land Use, Cover and Forms Classification System
FM	frequency-modulated

FMSF	Florida Master Site File
FNAI	Florida Natural Areas Inventory
FPSC	Florida Public Service Commission
F.S.	Florida Statutes
FWC	Florida Fish and Wildlife Conservation Commission
ft	feet
ft/day	feet per day
ft ² /day	square feet per day
GHG	greenhouse gas
GIS	geographic information systems
gpm	gallons per minute
gr/100 scf	grains per 100 standard cubic feet
GSU	generator step-up transformer
GWP	Global Warming Potential
H ₂ SO ₄	sulfuric acid
HAP	hazardous air pollutant
HHV	higher heating value
hp	horsepower
hr/yr	hours per year
HRSG	heat recovery steam generator
Hz	hertz
ICU	Intermediate Confining Unit
ISCST	Industrial Source Complex Short-Term
ISO	International Organization for Standardization
IWW	Industrial Wastewater
kg	kilograms
kg/ha/month	kilograms per hectare per month
km	kilometer
kV	kilovolts
kWe	kilovolt-electric
L ₅₀	sound pressure level exceeded 50 percent of the time
L ₉₀	sound pressure level exceeded 90 percent of the time
lb/MMBtu	pounds per million British thermal units
lb/MWh	pounds per megawatt-hour
LDC	Land Development Code
Leq	equivalent sound pressure level
LFA	Lower Floridan Aquifer
LHV	lower heating value
L _{max}	maximum sound pressure level
L _{min}	minimum sound pressure level
LOS	Level of Service (traffic)
L _w	octave band sound power levels
MACT	maximum achievable control technology
MCU	Middle Confining Unit
MECL	minimum emission compliance level
MFL	minimum flows and levels
mg/L	milligrams per liter
MGD	million gallons per day
MGY	million gallons per year
MHz	megahertz

MMBtu/hr	million British thermal units per hour
MSW	municipal solid waste
MW	Megawatt
N ₂ O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NERC	National Electric Reliability Council
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NGVD 29	National Geodetic Vertical Datum 1929
NHPA	National Historic Preservation Act
NO ₂	nitrogen dioxide
NO _x	nitrogen oxides
NRCS	Natural Resources Conservation Service
NSPS	New Source Performance Standards
NSR	New Source Review
NWS	National Weather Service
O ₂	Oxygen
OSHA	Occupational Safety and Health Administration
PCMRS	Pasco County Master Reuse System
PCSWRRF	Pasco County Solid Waste Resource Recovery Facility
PM	particulate matter
PM ₁₀	particulate matter with an aerodynamic diameter of 10 micrometers or less
PM _{2.5}	particulate matter with an aerodynamic diameter of 2.5 micrometers or less
PPA	power purchase agreement
ppm	parts per million
ppmvd	parts per million by volume dry
PPSA	Florida Electrical Power Plant Siting Act
PSD	Prevention of Significant Deterioration
RICE	reciprocating internal combustion engines
RO	reverse osmosis
ROW	right-of-way
SR	State Road
SCA	Site Certification Application
SCR	selective catalytic reduction
SER	significant emission rates
SHCCF	Shady Hills Combined Cycle Facility
SHEC	Shady Hills Energy Center, LLC
SHGS	Shady Hills Generating Station
SHPC	Shady Hills Power Company
SHWWTF	Shady Hills Wastewater Treatment Facility
SWFWMD	Southwest Florida Water Management District
SO ₂	sulfur dioxide
SPL	sound pressure level
STG	steam turbine generator
SWPPP	Storm Water Pollution Prevention Plan
TDS	total dissolved solids
TPY	tons per year
TSP	total suspended particulates
UFA	Upper Floridan Aquifer
UHF	ultra high frequency
ULSD	Ultra-low sulfur distillate
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

VHF	very high frequency
VOC	volatile organic compound
WWTP	wastewater treatment plant
ZLD	zero liquid discharge

EXECUTIVE SUMMARY

Shady Hills Energy Center, LLC (SHEC) is filing a Site Certification Application (SCA) for the construction and operation of the proposed Shady Hills Combined Cycle Facility (SHCCF) Project in Shady Hills, Pasco County, Florida. In accordance with the Florida Electrical Power Plant Siting Act (PPSA), Chapter 403, Part II, Florida Statutes, and Chapter 62-17, Florida Administrative Code, SHEC is filing an application for certification with the Florida Department of Environmental Protection (FDEP) and other state and local agencies.

Description of the SHCCF Project

SHEC, the applicant, is a privately-owned power producer that will construct, own, operate, and maintain the proposed SHCCF.

Adjacent to the proposed SHCCF Project, is the existing, non-certified, power plant, Shady Hills Generating Station (SHGS). SHGS is owned and operated by the Shady Hills Power Company, LLC. (SHPC). SHEC is not seeking certification of the existing SHGS. Only the proposed SHCCF, the subject of this application, is sought to be certified under the PPSA. Both SHEC and SHPC are wholly-owned, indirect subsidiaries of GE Capital US Holdings, Inc. An organizational chart depicting this corporate structure is included in Figure 1.1-3.

The SHCCF Project involves the construction and operation of a new, state-of-the-art natural gas-fired 573 megawatt (MW) (winter), combined-cycle generating facility and associated facilities to be constructed, owned, and operated by SHEC. The SHCCF Project will consist of one combined cycle combustion turbine/steam turbine system equipped with advanced emission control equipment.

The SHCCF Certified Site is proposed to be located on approximately 14 acres in Shady Hills, Pasco County, Florida, located approximately 30 miles north of Tampa and approximately 4.7 miles south of the Pasco / Hernando County line. The proposed SHCCF Certified Site is located on Merchant Energy Way, north of Hudson Avenue, immediately adjacent to the existing SHGS, east of the Pasco County's Shady Hills Wastewater Treatment Facility (SHWWTF), and south of the Pasco County Solid Waste Resource Recovery Facility.

Off-site associated facilities include a new approximately 0.6-mile 230-kV interconnection tie-line and an off-site temporary construction parking and laydown area. On-site associated facilities include an on-site natural gas metering station and lateral to be constructed, owned, and operated by Florida Gas Transmission, and reclaimed water, sanitary sewer, and potable water conveyance infrastructure. SHEC is currently negotiating a utility services agreement with Pasco County for the provision of reclaimed water, potable water, and sanitary sewer services to be provided by the Pasco County Utilities Division.

Additional details describing the Applicant, SHEC, the SHCCF Project and the public outreach program are provided in Section 1.0 of the SCA.

Need for the SHCCF Project

SHEC will sell 100 percent of SHCCF's capacity, energy, and ancillary services to Seminole Electric Cooperative, Inc. under a Tolling Agreement. Need is being determined through a separate Florida Public Service Commission (PSC) proceeding. Pursuant to Section 403.519, Florida Statutes, and Rule 25-22.081, F.A.C., Seminole and SHEC jointly filed, on December 21, 2017, a Petition for Determination of Need for the Shady Hills Combined Cycle Facility with the PSC. (Docket No. 20170267). The details on the need determination proceeding are provided in Section 2.0 of the SCA.

SHCCF Project Site and Vicinity

The proposed SHCCF Certified Site is currently vacant and undeveloped and portions have been previously cleared for temporary laydown, temporary parking, and equipment storage for the SHGS. No wetlands are present on-site and no state lands will be affected by the Project. Adjacent properties include industrial uses to the north, south, and west, and vacant land to the east. The details on the Project site and vicinity are provided in Section 3.0 of the SCA.

Pasco County zoning and land use requirements have been met and the proposed development of the SHCCF project is consistent with the Pasco County Land Development Code. The County's Zoning map identifies the SHCCF Certified Site within an Agricultural (A-C) zoning district. Public and private utility facilities are allowed within this district as a special exception use if the use is in conformance with standards established by the County, State, and Federal government. SHCCF has received a special exception use approval from the County. Additionally, the SHCCF is being designed to meet all applicable Pasco County land development standards. Land use considerations are further explained in Section 3.2.2.

There are no federally-governed regional, scenic, cultural or natural landmarks within a five-mile radius of SHCCF. There is one state-owned preserve, the Starkey Wilderness Preserve and Park, managed by the Southwest Florida Water Management District, within five miles of SHCCF. There are also several Pasco County owned parks and preservation areas within five miles of SHCCF. These are further discussed in Section 3.2.5.

The ecological characteristics of the SHCCF Certified Site and the vicinity are provided in Section 3.4. Due to the Site's previously developed and disturbed nature, there is minimal potential habitat for listed species. A noise study was conducted, analyzing the applicable noise standards. Additional details on the noise study is provided in Section 3.4.2.

The SHCCF and Directly Associated Facilities

The SHCCF will be a natural-gas-fired, high-efficiency plant that involves the generation of energy in two stages. This combined-cycle capability makes the most of the input fuel, by consuming it in the combustion turbine and using the waste heat from that process to generate electricity using the steam turbine. As a result, combined cycle technology is one of the more efficient power production technologies available today.

The SHCCF will include electrical equipment enclosures; a mechanical draft cooling tower; an exhaust stack; an administration building that will include a control room and maintenance area; a warehouse; parking; a diesel-fired emergency fire water pump; a diesel-fired emergency generator; one or more aboveground diesel fuel storage tanks; an aboveground service/fire water storage tank; one or more aqueous ammonia tanks; a step-up transformer; potable water and sanitary wastewater conveyance infrastructure; reclaimed water treatment facilities; and a zero liquid discharge (ZLD) system.

SHCCF will exclusively utilize natural gas, advanced technology considered by FDEP as Best Available Control Technology (BACT) with combined cycle technology that will make SHCCF among the cleanest and most efficient fossil fuel electric-generating units in Florida. The technology proposed to control emissions from the combined cycle unit includes dry low-NO_x burners and selective catalytic reduction (SCR) for the control of nitrogen oxides (NO_x), the use of natural gas, and good combustion controls to reduce carbon monoxide (CO), particular matter (PM) / PM with an aerodynamic diameter of 10 microns or less (PM₁₀) / PM with an aerodynamic diameter of 2.5 microns or less (PM_{2.5}), sulfur dioxide (SO₂), and Sulfuric Acid Mist (SAM) emissions. The exclusive use of natural gas coupled with the latest combined cycle technology also results in low emissions of greenhouse gases (GHGs) compared to other fossil fuel generation technologies and fuels. A detailed analysis of air quality impacts was performed that determined the maximum air quality impacts will be much lower than FDEP's and U.S. Environmental Protection Agency's (EPA) Prevention of Significant Deterioration (PSD) significant impact levels. This demonstrates that SHEC will be much less than the PSD increments that determine whether the air quality is degraded. The air quality impacts of SHCCF in the nearby Chassowitzka National Wilderness Area (CNWA), a designated PSD Class I area, will not result in a deterioration of air quality or air quality values (such as impacts to vegetation and visibility) in the CNWA. In addition, the maximum air quality impacts will be significantly less than the National Ambient Air Quality (NAAQS) designed by EPA to protect public health and welfare.

Primary water uses for SHCCF will include cooling, process, service (including fire protection), irrigation, and potable water. The primary water source for cooling, process use, and irrigation will be reclaimed water from the Pasco County Master Reuse System (PCMRS). The County's reuse water system is robust and capable of meeting the Project's water needs. The Project's expected annual average daily use of reclaimed water is estimated to be about 2.5 MGD. The Project will use County potable water as a back-up water

source. SHEC is currently negotiating an agreement with Pasco County for reclaimed water, a back-up potable water supply, and other utility services needed to support the construction and operation of the Project.

A detailed description of the SHCCF including the site layout, fuel, air emissions and controls, plant water use, waste, on-site drainage systems, construction materials and equipment, and associated linear facilities are provided in Section 4.0 of the SCA.

SHCCF Construction and Operational Environmental Effects

The potential environmental effects from site preparation and construction of the SHCCF Project are analyzed and detailed in Section 5.0 of the SCA. The potential effects of the SHCCF's operations are analyzed in Section 6.0 of the SCA. The potential effects analyzed include land impacts, impacts to surface water bodies, groundwater and water supplies, ecological impacts, air impacts, solid and hazardous wastes, effects on human populations, noise, landmarks and sensitive areas, and archaeological and historic sites.

No adverse effects from any of the above factors are expected from the construction or operation of the SHCCF Project. The Site contains no surface waters or wetlands and SHCCF will not affect any surrounding water bodies or water supplies, due in part, to the state-of-the-art ZLD system and use of reclaimed water. The Project contains minimal listed species habitat and will adhere to the State's gopher tortoise permitting requirements, as well as the Eastern Indigo Snake Standard Protection Measures. SHEC will design a stormwater management system to treat the 100 year/24-hour storm event, in accordance with the State's Environmental Resource Permit Criteria (ERP) and Pasco County's requirements. While discussions remain ongoing with the Division of Historical Resources, no adverse effects to cultural resources are expected.

Where applicable, monitoring programs and control measures are described in SCA Sections 5.0 and 6.0. The benefits from construction, with both short and long term economic benefits, are described in Section 5.11.

Economic and Social Effects of SHCCF Construction and Operation

SHCCF is anticipated to have a net social and economic benefit on the surrounding area by providing economic output and creating community growth and employment opportunities. These benefits include capital expenditures, operation and maintenance expenditures, employment, and property tax revenues. The economic and social benefits and costs associated with the SHCCF Project construction and operation are provided in Section 7.0 of the SCA. Site alternatives were not considered as explained in Section 8.0 of the SCA.

Electrical Transmission Lines

The electrical interconnection for SHCCF will consist of a single circuit 230-kV interconnection tie-line that will extend from the middle of the north boundary of the SHCCF Certified Site, to the west across Pasco County-owned property, to a new substation. The new substation, to be named Hudson North, will be located adjacent to Duke Energy Florida's existing 230 and 500 KV transmission corridor, and will be owned, designed, permitted, constructed and operated by Duke Energy Florida. The transmission corridor is about 0.6 mile in length, 200-feet wide, and traverses a single property owner, Pasco County. Once the exact route is determined, the transmission line right-of-way within the corridor will be approximately 100-feet wide. This right-of-way will provide direct access between the SHCCF Certified Site boundary and Duke Energy Florida's existing 230 and 500 KV transmission right-of-way, while minimizing impacts to the existing physical and biological resources and land uses. The activities proposed within the corridor and analysis of potential impacts are contained in Section 9.0 of the SCA.

Conclusion

SHEC will construct and operate a state-of-the-art natural gas-fired combined cycle generating facility to supply electric power to Seminole Electric Cooperative, Inc. The SHCCF Project is consistent with Pasco County land use requirements and meets all the applicable requirements for Power Plant Certification. SHEC looks forward to completing the certification review process with all the state and local agencies, and starting construction in mid-2019, with targeted commercial operation beginning on December 1, 2021.

SITE CERTIFICATION APPLICATION DEFINITIONS

Shady Hills Energy Center, LLC (SHEC) – is the “Applicant” that will construct, own and operate the Shady Hills Combined Cycle Facility.

Shady Hills Combined Cycle Facility (SHCCF) – refers to the 573 MW (winter) combined cycle unit including all major electric generation equipment such as combustion turbine/heat recovery steam generator, and steam turbine generator, as well as onsite associated facilities to be owned and operated by SHEC, including the maintenance and an administration building, switchyard, and stormwater management system.

SHCCF Project (Project) – refers to the SHCCF Certified Site and certain offsite associated facilities addressed in this application for certification, including a 230-kV interconnection tie-line and a temporary construction parking and laydown area.

SHCCF Certified Site (Certified Site) or (Site) – refers to the 14-acre area proposed for certification that will be occupied by the new SHCCF. The Site is located adjacent to and east of the existing Shady Hills Generating Station.

SHCCF Project (Certified Project) or (Project) – refers to the SHCCF and certain on-Site and off-Site associated facilities proposed for certification, including a 230-kV interconnection tie-line and a temporary construction parking and laydown area.

Shady Hills Power Company, L.L.C. (SHPC) – refers to the owner and operator of the SHGS and the owner of the existing 30-acre parcel.

Shady Hills Generating Station (SHGS) – refers to the existing Shady Hills Generating Station which consists of three, dual-fuel, 170 MW (nominal) simple cycle combustion turbines owned and operated by SHPC, which is located on approximately 16 acres of the 30-acre parcel.

Shady Hills Wastewater Treatment Facility (SHWWTF) – Pasco County’s wastewater treatment plant which produces up to 14 MGD Annual Average Daily Flow (AADF) of reclaimed water for public access and use and is part of the Pasco County Master Reuse System. The SHWWTF is permitted under FDEP Permit #FLA012741.

Pasco County Master Reuse System (PCMRS) – a system of reclaimed water storage facilities and reservoirs which have a combined storage capacity of 622 MGD and high service pumps, filtration and distribution to serve Pasco County. The PCMRS is interconnected to the SHWWTF. The PCMRS is permitted under FDEP Permit #FL0127272.

Tolling Agreement – refers to the 30-year contract entered by and between SHEC and Seminole Electric Cooperative, Inc. (Seminole) under which SHEC will provide capacity, energy and ancillary services to Seminole, and Seminole will provide fuel and receive the energy generated.

1.0 INTRODUCTION AND GENERAL INFORMATION

This Site Certification Application (SCA) is filed by Shady Hills Energy Center, LLC (the SHEC or Applicant), for the construction and operation of the proposed Shady Hills Combined Cycle Facility (SHCCF) Project in Shady Hills, Pasco County, Florida (see Figure 1.1-1).

This SCA is being filed with Florida Department of Environmental Protection pursuant to Section 403.5064, F.S., and Chapter 62-17, Florida Administrative Code (F.A.C.). This SCA describes the Project and addresses the environmental and socioeconomic aspects of the SHCCF Project and associated facilities proposed for construction and operation, and the impacts of the Project on the existing natural and human environment.

1.1 Introduction

SHEC seeks to certify the SHCCF Project under the Florida Electrical Power Plant Siting Act (PPSA), Chapter 403, Part II, Florida Statutes. The PPSA provides a centralized review and licensing process for new steam electrical generating facilities in Florida of 75 MW or greater, balancing “the increasing demand for electrical power with the broad interests of the public.” The Florida Department of Environmental Protection (FDEP) acts as the coordinator of the PPSA Site Certification process with input from various state, regional and local agencies, along with interested citizens and stakeholders.

The SHCCF Project involves the construction and operation of a new, state-of-the-art natural gas-fired 573 megawatt (MW) (winter), combined-cycle generating facility and associated facilities to be constructed, owned and operated by SHEC. The SHCCF Certified Site is proposed for approximately 14 acres on portions of the 30-acre parcel of land owned by Shady Hills Power Company, L.L.C. for power generation in Shady Hills, Pasco County, Florida, approximately 30 miles north of Tampa and approximately 4.7 miles south of the Pasco / Hernando County line (see Figure 1.1-1). The SHCCF Certified Site is located on Merchant Energy Way, north of Hudson Avenue, east of the Pasco County’s Shady Hills Wastewater Treatment Facility (SHWWTF) and south of the Pasco County Solid Waste Resource Recovery Facility.

The SHCCF Certified Site is the approximately 14-acre area that will be occupied by the new SHCCF. The area is currently vacant and undeveloped and was previously used as temporary laydown and equipment storage for the SHGS. The SHCCF Project will consist of a single combined cycle combustion turbine system equipped with advanced emission control equipment and off-site associated facilities and includes a new approximately 0.6-mile 230-kV interconnection tie-line and an offsite temporary construction parking and laydown area. On-site associated facilities include an on-site natural gas metering station and lateral to be constructed, owned, and operated by Florida Gas Transmission, and reclaimed water, sanitary sewer, and potable water conveyance infrastructure. The natural gas metering station and associated natural gas pipelines owned and operated by FGT will not be part of the SHCCF Certified Project. The SHCCF Certified Site will be located adjacent to and east of the existing SHGS.

All of the generation capacity from SHCCF has been committed to Seminole Electric Cooperative, Inc. (Seminole) for its generation portfolio, which, in turn, supplies Seminole's Members with wholesale power for their retail service to end-use consumers. In connection with this SCA, a Petition for Determination of Need for the SHCCF Project was filed jointly by SHEC and Seminole with the Florida Public Service Commission on December 21, 2017.

Background on Existing SHGS

The existing SHGS is located to the west of the proposed SHCCF Certified Site and has been in operation since 2002. SHGS currently contains three 170 MW GE Frame 7FA combustion turbines in simple-cycle configuration capable of producing a total of 510 MW (nominal) (See Figure 1.1-2). The existing SHGS has access to transmission facilities, roadways, parking, administrative offices, and a natural gas lateral pipeline and metering station. SHGS is authorized to operate under a FDEP Title V Air Operating Permit No. 101073-018 AV, Industrial Wastewater Facility Permit No. FLA280674-004 and Southwest Florida Water Management District Water Use Permit #12052. SHEC is not seeking certification for the existing SHGS.

1.2 The Applicant - SHEC

The SHCCF will be owned and operated by Shady Hills Energy Center, LLC (SHEC). The SHGS will continue to be owned and operated by Shady Hills Power Company, LLC. SHEC and SHPC are both wholly-owned, indirect subsidiaries of GE Capital US Holdings, Inc., which is a wholly-owned, indirect subsidiary of the General Electric Company (See Figure 1.1-3).

SHEC, the applicant, is a privately-owned power producer that will construct, own, operate, and maintain the proposed SHCCF and will sell 100 percent of SHCCF's capacity, energy and ancillary services to Seminole under the Tolling Agreement.

The following information provides the Applicant identification requirements:

Applicant's Official Name:	Shady Hills Energy Center, LLC
Address:	901 Main Avenue Norwalk, CT 06851
Address of Official Headquarters:	901 Main Avenue Norwalk, CT 06851
Business Entity (corporation, partnership, co-operative):	Corporation
Name and Title of Chief Executive Officer:	Ankur Mathur Vice President Shady Hills Energy Center, LLC c/o GE Energy Financial Services 901 Main Avenue Norwalk CT 06851
Name, Address, and Phone Number of Official Representative responsible for obtaining certification:	Roy Belden Vice President Shady Hills Energy Center, LLC c/o GE Energy Financial Services 901 Main Avenue, Norwalk, CT 06851 Phone: 203-357-6820
Site Location (county):	Pasco County
Nearest Incorporated Cities:	Port Richey
Latitude and Longitude	Lat: 1466330.19401807 Long: 477111.237054579
UTM Coordinates	Northing: 3138776.71112968 Easting: 347444.57777615
X and Y: (Decimal Degrees)	X: -82.5567736929199 Y: 28.3664037797058
Section, Township, Range:	Portions of Section 25, Township 24S, Range 17E
Name Plate Generating Capacity:	573 megawatt (winter)

1.3 Overview of the SHCCF Project

The SHCCF will be an advanced class combustion gas turbine, one-on-one ("1x1") configuration, 573 MW (winter) combined-cycle power plant built in a single stage with commercial operation anticipated in December 2021. The combined cycle generation technology is one of the most efficient power production technologies currently available. The configuration will include one combustion turbine generator (CTG), one heat recovery steam generator (HRSG), one steam turbine generator (STG), and one generator step-up transformer (GSU). The SHCCF Project also includes one auxiliary boiler, one emergency generator, one fire pump, and one cooling tower.

The SHCCF will burn only natural gas in the combined cycle combustion turbine and in the auxiliary boiler. Natural gas will be transported to the SHCCF by the pipeline lateral owned and operated by Florida Gas Transmission (FGT). The SHCCF will be connected to a new natural gas metering station that will be constructed within the Certified Site boundary. FGT will connect its the existing 12" Shady Hills gas lateral owned by FGT to the SHCCF. The natural gas metering station and associated natural gas pipelines owned and operated by FGT will not be part of the SHCCF Certified Project.

Typically, steam from the HRSG will be used during operation to heat the natural gas. An electric natural gas heater will be used during start up and shutdown when steam from the HRSG is not available.

Emissions of nitrogen oxides (NOx) will be controlled using dry low NOx (DLN) combustion technology and selective catalytic reduction (SCR) system.

The SHCCF Project also includes the following associated facilities:

- a) An approximately 0.6-mile interconnection tie-line to a new Duke Energy Florida (DEF) substation, to be designated Hudson North, which will connect the SHCCF to the DEF 230 kilovolt (kV) high voltage transmission grid in Pasco County, Florida.
- b) Water uses for SHCCF will include cooling, process, service, firewater, irrigation and potable water. The primary water source for power generation purposes will be from the Pasco County Master Reuse System (PCMRS), which includes the adjacent Shady Hills Wastewater Treatment Facility (SHWWTF). If reclaimed water is not available at the required quality or quantity, potable water from the Pasco County Municipal Water Supply system will provide backup water supply. Existing groundwater wells located within the proposed SHCCF Certified Site boundary will continue to serve the SHGS and potentially provide supplemental back-up water supply to SHCCF under a service agreement between SHEC and SHPC. While these existing wells are located within the Site boundary, the wells are not intended to be part of the Project or to be included in what is "certified." Off-Site conveyance systems to connect the SHCCF to the SHWWTF and the PCMRS to support the use of reclaimed water, and county potable water and wastewater treatment systems will be constructed but are not part of the Project to be certified. Potable water, firewater and sanitary sewer services will be provided by the Pasco County Utilities Division, and these water lines are also not part of the Project to be certified.
- c) A temporary construction parking and laydown area (approximately 20 acres) is located adjacent to and east of the SHCCF. The area will be used for construction parking, equipment and materials storage and the location of office trailers and sanitary facilities. Stormwater runoff management systems will be provided to control stormwater runoff and temporary sediment and erosion impacts. The temporary construction parking and laydown area will be used by SHEC, only during construction of SHCCF, under an agreement with Seminole.

Construction activities for the SHCCF are anticipated to begin in mid-2019, with targeted commercial operation by December 1, 2021.

1.4 Summary of Public Outreach Program

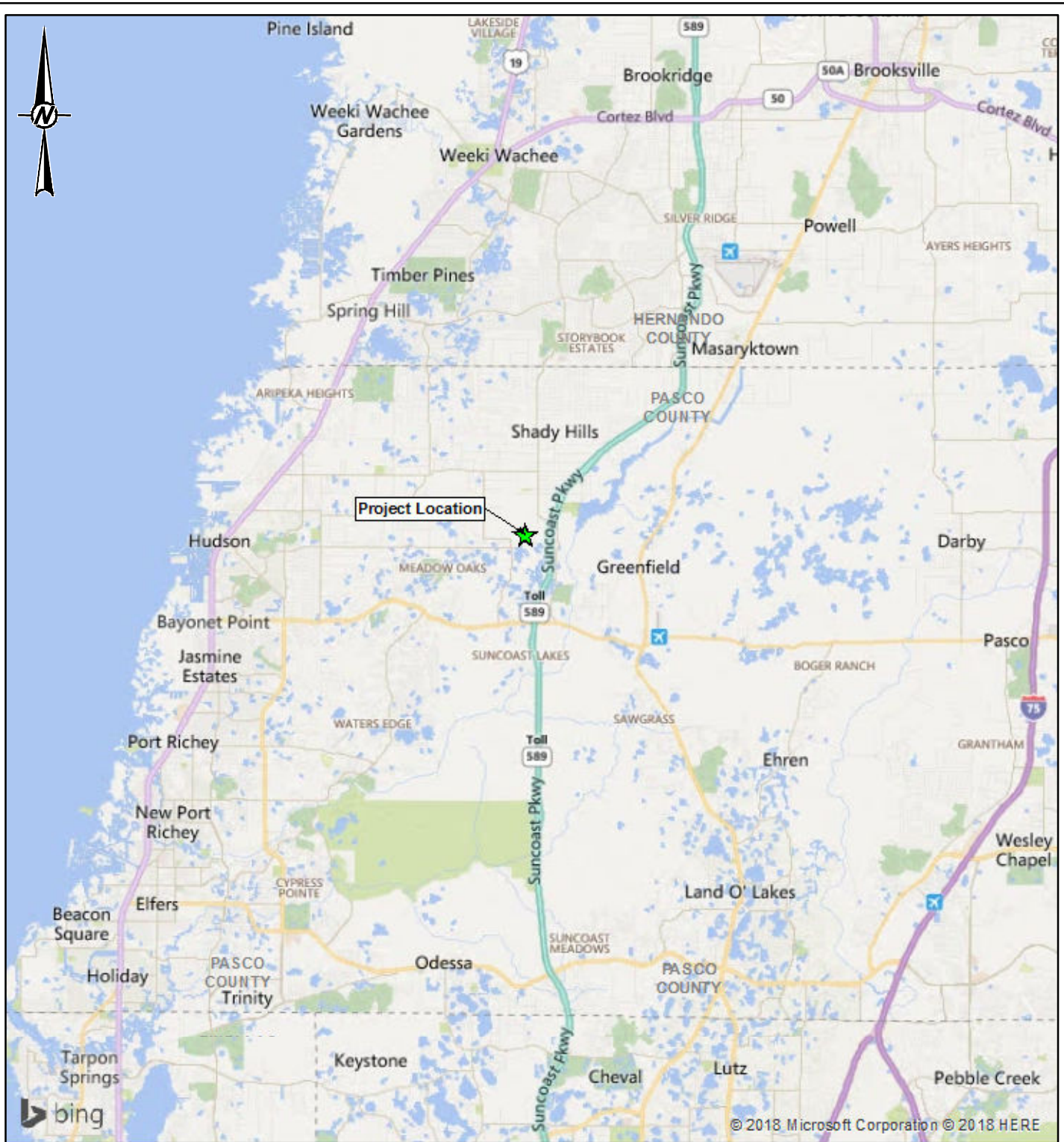
The Project was officially announced in November 2017. Since that time, and leading up to the submittal of the SCA, SHEC has reached out to stakeholder groups including site neighbors, and county and state government agencies (see Appendix 10.1 Coordination).

An application for Special Exception Use for the remaining 10 acres of the 30-acre parcel owned by SHPC (but not already included in the original Special Exception Use permit) was submitted to Pasco County in November 2017 and was approved by the Pasco County Planning Commission on January 10, 2018 (a copy of the Order (No. 7295) is provided in Appendix 10.3). The SHCCF Certified Site will comprise approx. 14 of the 30-acre parcel currently owned by SHPC

In addition, SHEC intends to hold a public informational meeting in late spring 2018. This meeting is optional and will provide SHEC an opportunity to share detailed Project information with the local community, obtain feedback, and answer questions. The mailing area associated with this meeting will include an area up to 3 miles from the SHCCF Certified Site boundary and $\frac{1}{4}$ mile from the 230-kV interconnection tie-line and will include property owners, parcels residents, elected/appointed governmental officials, governmental employees, and local non-governmental organizations. Project information provided at the informational meeting will also be made available to the public on a Project website which will include a Project Factsheet; a PowerPoint presentation (for stakeholder briefings); and numerous informational maps and figures.

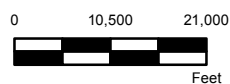
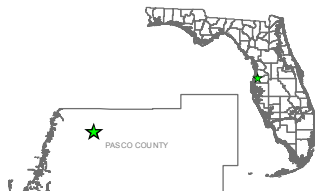
SHPC has been a presence in the community since 2000, and together with SHEC as the new owners of SHCCF, are committed to maintaining a presence and communicating with officials and the community in a timely manner.

FIGURES



LEGEND

★ Project Location



REFERENCE(S)

PROJECT LOCATION, GOLDER ASSOCIATES INC., 2017

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE

SHCCF GENERAL LOCATION MAP

CONSULTANT



YYYY-MM-DD 2018-02-12

DESIGNED NRL

PREPARED NRL

REVIEWED RAZ

APPROVED MM

PROJECT NO.
1779520

CONTROL
H001

REV.
0

FIGURE
1.1-1



Proposed Shady Hills Combined Cycle Facility

Existing Shady Hills
Generating Station

REFERENCE(S)
EXISTING FACILITY FENCELINE, CERTIFIED SITE BOUNDARY, SHCCF PROJECT, GOLDER ASSOCIATES INC., 2017
PARCEL BOUNDARY, PASCO COUNTY, 2017
SHCCF MAJOR COMPONENTS, POWER ENGINEERS, 2017

CLIENT
SHADY HILLS ENERGY CENTER, LLC

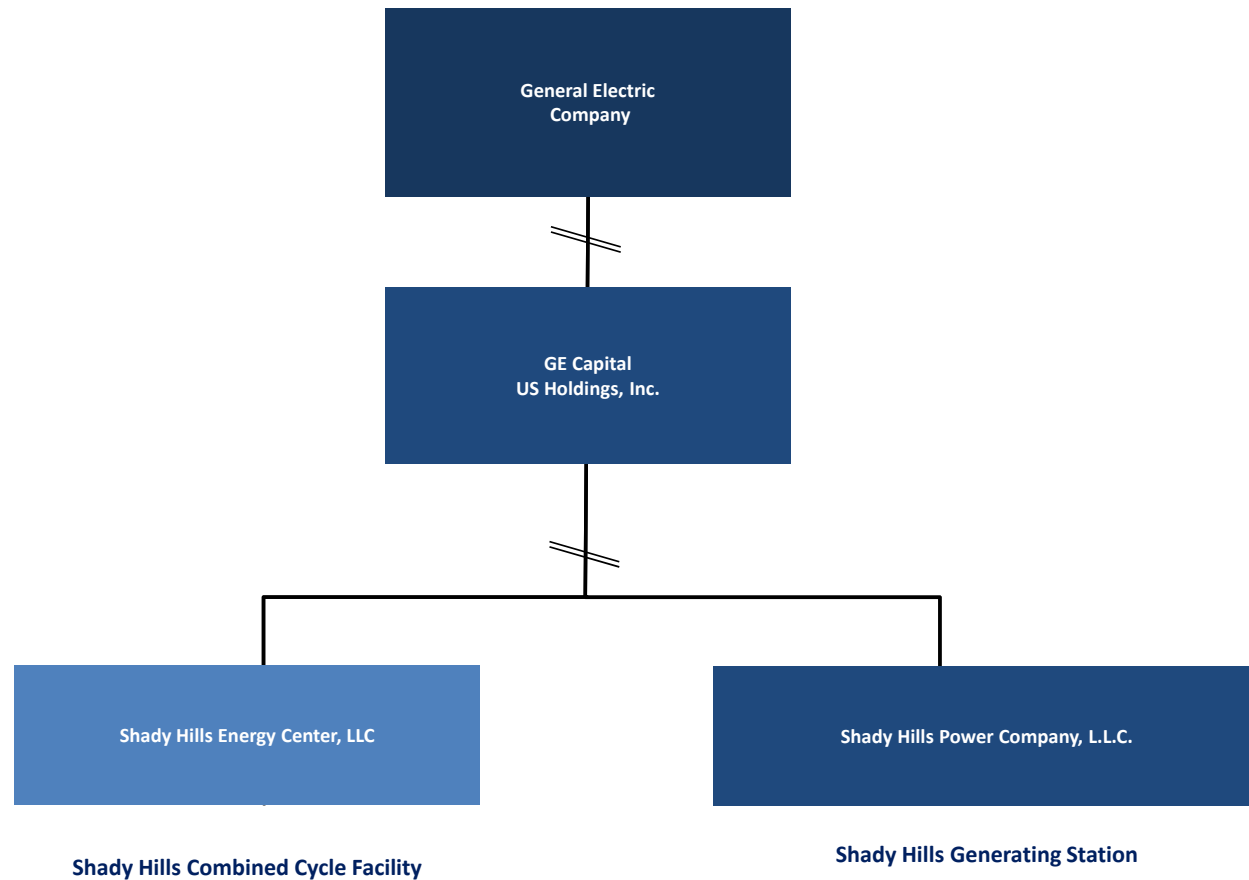
PROJECT
SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE
CONCEPTUAL RENDERING OF
SHCCF AND EXISTING SHGS

CONSULTANT	YYYY-MM-DD	2018-02-15
	DESIGNED	NRL
	PREPARED	NRL
	REVIEWED	RAZ
	APPROVED	MM



PROJECT NO. 1779520	CONTROL H040	REV. 0	FIGURE 1.1-2
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CLIENT SHADY HILLS ENERGY CENTER, LLC			PROJECT SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)		
CONSULTANT 	YYYY-MM-DD	2018-02-12	TITLE THE APPLICANT		
	PREPARED	NRL	PROJECT No. 1779520 CONTROL H027 Rev. 0 FIGURE 1.1-3		
	DESIGN	NRL			
	REVIEW	RAZ			
	APPROVED	MM			

IF THIS REQUIREMENT DOES NOT MATCH WHAT IS SHOWN THE SHEET HAS BEEN MODIFIED FOLLOW AND B



LEGEND

- SHCCF Project
- SHCCF Certified Site Boundary
- 230-kV Interconnection Tie-Line
- Construction Parking and Laydown Area
- Parcel Boundary

0 200 400 800
Feet

REFERENCE(S)
CERTIFIED SITE BOUNDARY, SHCCF PROJECT, GOLDER ASSOCIATES INC., 2017
PARCEL BOUNDARY, PASCO COUNTY, 2017

CLIENT
SHADY HILLS ENERGY CENTER, LLC

PROJECT
SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE
SHCCF PROJECT OVERVIEW

	CONSULTANT	YYYY-MM-DD	2018-02-12
	DESIGNED	NRL	
	PREPARED	NRL	
	REVIEWED	RAZ	
	APPROVED	MM	

PROJECT NO. 1779520	CONTROL H023	REV. 0	FIGURE 1.14
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2.0 NEED FOR THE PROPOSED FACILITY

Pursuant to Section 403.519, Florida Statutes, and Rule 25-22.081, F.A.C., Seminole and SHEC (collectively, “Petitioners”), filed on December 21, 2017 a Petition for Determination of Need for the Shady Hills Combined Cycle Facility with the Florida Public Service Commission (“Commission”) (Docket No. 20170267). Seminole and SHEC jointly filed the Petition, which included a Need Study and supporting testimony, and requested that the Commission make an affirmative determination of need for the SHCCF. Because SHEC is proposing to construct, own, operate, and maintain the proposed SHCCF and to sell 100 percent of the energy produced by the SHCCF to Seminole under the Tolling Agreement, SHEC is a co-applicant in the need determination proceeding.

Seminole is a not-for-profit rural electric cooperative organized under Chapter 425, Florida Statutes and provides wholesale electric power to its nine Member cooperatives. The Member cooperatives, in turn, distribute the electricity to their retail, residential, commercial, and industrial consumers. Seminole's nine Member cooperatives provide electricity to approximately 1.6 million people and businesses within 42 of Florida's 67 counties. Seminole serves its Members' system load needs with a combination of owned generation and power purchase contracts. All of the generation capacity from SHCCF will be committed to Seminole's generation portfolio, which, in turn, supplies Seminole's Members with power for their end use consumers.

Seminole identified a need for approximately 901 MW of additional generating capacity beginning in 2021, and that need was projected to grow to approximately 1,265 MW by the end of 2022 as a result of moderately increasing load growth and the expiration of several purchased power and tolling contracts. Seminole has determined that the most cost effective, risk-managed resource plan to meet this projected capacity need is a mix of resources which consist of:

- Existing generation resources
- Additional solar resources
- The self-build 1,050 MW (net nominal) Seminole Combined Cycle Facility in conjunction with the removal from service of one of the two existing 664 MW Seminole Generating Station coal units
- Several power purchase agreements (PPAs) for generating resources, including a tolling agreement supporting the SHCCF project a new 573 MW (winter) 1x1 combined cycle facility to be constructed by SHEC

By providing capacity necessary to meet Seminole's reliability criteria, the 573 MW (winter) of generating capacity associated with the SHCCF will contribute to the reliability and integrity of Seminole's system.

The Commission determination is anticipated in May 2018.

3.0 SITE AND VICINITY CHARACTERIZATION

3.1 Site and Associated Facilities Delineation

SHEC is proposing to construct and operate SHCCF, which will be located adjacent to the existing SHGS, in unincorporated Pasco County, Florida. The SHCCF Certified Site is proposed for approximately 14 acres. The Site is located off Hudson Avenue on Merchant Energy Way, which is situated approximately 30 miles north of the city of Tampa, Florida (Figure 3.1-1 and 3.1-2).

As presented in Figure 3.1-2, the SHCCF will be situated directly adjacent to SHGS and will share certain facilities, including site access and security infrastructure facilities. Existing groundwater wells located within the SHCCF Certified Site boundary will continue to serve the SHGS, but are not intended to be included in the certification. Off-site associated facilities that are being certified include the 0.6-mile 230-kV interconnection tie-line, which will be approximately one-mile in length and connect with a new DEF (Hudson North) substation (which is in the process of being sited) and an offsite temporary construction parking and laydown area. On-site associated facilities to be owned by SHEC include the maintenance and an administration building, switchyard, and stormwater management system. Other associated facilities constructed, owned, and operated by other entities include an FGT gas metering station which will connect to an existing gas lateral, and onsite and offsite reclaimed water, potable water and wastewater infrastructure up to the meter on the SHCCF Certified Site. The natural gas metering station and associated natural gas pipelines owned and operated by FGT will not be part of the Certified Project. The offsite reclaimed water, potable water, and wastewater infrastructure will not be owned or operated by SHEC and will not be part of the SHCCF Certified Project. The onsite reclaimed water, potable water and wastewater infrastructure will be owned and operated by SHEC and will be part of the SHCCF Certified Site and SHCCF Certified Project.

3.1.1 Existing Site Uses

The majority of the approximately 14-acre Site proposed for certification is currently undeveloped and predominately vacant, except for equipment storage containers. Portions of the SHCCF Certified Site had previously been used as temporary laydown, temporary parking, and equipment storage associated with the construction of the SHGS and houses the existing SHGS groundwater supply wells.

3.1.1.1 Adjacent Properties and Nearby Areas

As depicted in Figure 3.1-1, most of the area adjacent to the SHCCF Certified Site is developed with industrial/utility uses to the north, south, and west. The area to the east is vacant. The existing SHGS, west of the Site, has been in operation since 2002 and currently contains three combustion turbines in simple-cycle configuration that are permitted and capable of producing a total of 510 MWs (nominal). The existing SHGS includes access to electrical transmission facilities, roadways, parking, administrative offices, and a natural gas metering station (owned and operated by FGT) and is not a PPSA-certified facility.

The SHWWTF, part of the Pasco County Utilities Division, is a 78-acre plant that is situated adjacent to and west of SHGS. The SHWWTP is part of the County's reuse system, which currently sends reclaimed water to the County's Resource Recovery Facility. This WWTP has percolation ponds (i.e., - rapid infiltration basins) that serve as a backup effluent disposal system.

The 316-acre Pasco County Solid Waste Resource Recovery Facility (PCSWRRF) including a 30 MW waste-to-energy facility, located to the north of the SHWWTP, SHGS, and the SHCCF Certified Site, has been in operation since 1991. This facility serves as the primary disposal site for municipal solid waste (MSW) generated in the County.

A 43.25-acre vacant parcel, owned by Seminole, is adjacent to and east of the SHCCF Certified Site. Approximately 20 acres of this parcel will be used for the temporary construction parking and equipment laydown area.

To the south of SHGS and the SHCCF Certified Site is a 5-acre vacant parcel owned by Ewell Industries, Inc., a 4.31-acre vacant parcel owned by Suncoast Lots 579, LLC, and a 5.01-acre parcel owned by Stonecap, LLC, with a single-story 31,000-square-foot warehouse (i.e., Managed Asset Recovery Services Center).

3.1.1.2 One Hundred Year Flood Zone

The Federal Emergency Management Agency (FEMA) maps for the SHCCF Certified Site are shown as an overlay to the aerial image of the Site in Figure 3.1.2-1. As recorded on the Flood Insurance Rate Map (Panel No. 12101C0206F, effective 9/26/2014), the SHCCF Certified Site is situated within Zone X, which is an area that is determined to be outside of the 100- and 500-year flood zones.

3.2 Social and Political Environment

The PPSA is a comprehensive and coordinated review process involving multiple agencies and local governments coordinated by the FDEP Siting Coordination Office. Through the PPSA, the State has preempted the certification of electrical power plants for which the PPSA applies, and the certification issued pursuant to that process is the sole non-federal license necessary to construct, operate, and maintain an electrical power plant, including certain associated facilities. As a result, the licensing process is conducted pursuant to the PPSA and applicable PPSA Act rules, rather than the procedural requirements of the individual agencies or local governments. Applicable non-procedural requirements of reviewing agencies, including local governments, are considered during the SCA review and may be proposed for application to the Project via the conditions of certification.

The following sub-sections describe governmental jurisdictions within five miles of the SHCCF Certified Site, the relevant and applicable provisions of the Florida Community Planning Act (FCPA), and the Pasco County Comprehensive Plan, Land Development Code and Code of Ordinances.

3.2.1 Governmental Jurisdictions

The SHCCF Certified Site and the area extending one-mile in radius are located within unincorporated Pasco County, Florida. Within a five-mile radius of the Site, the study area extends into Hernando County, Florida to the north, but there are no municipalities. Within a five-mile radius of the Site, there are six Census Designated Places (CDP): Shady Hills, Meadow Oaks, Quail Ridge, Moon Lake, Connerton, and Spring Hill. Figure 3.2.1-1 depicts an area map showing a 1-mile radius around the Site. Figure 3.2.1-2 depicts an area map with 1-, 2-, 3-, 4-, and 5-mile radii around the Site for state, county, and municipal jurisdictions, respectively. Tables 3.2.1-a and 3.2.1-b provide a description of these areas.

Within five miles of the Site there are four Pasco County parks (Crews Lake Wilderness Park, Arthur F. Engle Memorial Park, Elsie Logan Memorial Park and the Concourse Nature Center) and three Florida Department of Transportation (FDOT) recreational trails (Suncoasts Recreation Trail, SR52 Trail and Suncoast Scenic Trail). Within the five mile area, there are several County conservation and preserve areas: Cross Bar Ranch Environmental Education Center, Upper Pithlachascotee River Preserve, and Jumping Gully Conservation Area. The area also contains several state, county and private land holdings that serve the purpose of environmental conservation, education, and protection; the Starkey Wilderness Preserve and Park, Lone Star Ranch Conservation Easement, Morsani Conservation Easement, Morsani Ranch, the Concourse Nature Center, Masaryktown Canal, and Old Florida Mitigation Bank. Pasco County also has two Ecological Planning Units: Anclote/Cotee Watersheds and Hernando Sandhills located within five miles of the Site (See Section 3.2.5).

All of these areas are within the Pasco County governmental jurisdiction.

None of the following governmental jurisdictions are located within five miles of the Site:

- National Parks
- National Forests
- National Seashores
- National Wildlife Refuges
- National Wilderness Areas
- National Memorials or Monuments
- National Marine Sanctuaries
- National Marine or Estuarine Sanctuaries
- Roadless Area Review and Evaluation Areas
- National Wild and Scenic Rivers
- State Forests
- State Archaeological Landmarks or Landmark Zones
- Aquatic Preserves
- Military Lands
- Save Our Rivers Lands
- Native American Reservations

- Florida Wild and Scenic Rivers
- Florida Springs
- Outstanding Florida Waters
- Areas of Critical State Concern
- Game Management Area

3.2.2 Zoning and Land Use Plans

Applicable land use and zoning requirements are presented in Appendix 10.3 – Zoning Descriptions and Appendix 10.5 – Land Use Descriptions.

The following subsections present a summary of the comprehensive plan and zoning requirements for Pasco County.

3.2.2.1 Comprehensive Plans

The Local Government Comprehensive Planning and Land Development Regulations Act of 1985 (also referred to as Florida's Growth Management Act) required each county and municipality in Florida to adopt a local comprehensive plan. The Florida Local Government Comprehensive Planning and Land Development Regulation Act was re-designated as the Community Planning Act on June 2, 2011 (Chapter 163, F.S., as amended). The Community Planning Act provides long-range policy guidance for the orderly social, economic, and physical development within the State. The Community Planning Act does not create regulatory authority that is not otherwise authorized by State law (FLSCPA, 2015). The Community Planning Act maintained the requirement that each county and municipality in Florida adopt a local comprehensive plan. Comprehensive plans which were adopted prior to June 2, 2011 remain valid. Counties and municipalities must also meet the minimum criteria rule for local government comprehensive plans (Chapter 9J-5, F.A.C., as amended).

3.2.2.1.1 Pasco County

The original Pasco County Comprehensive Plan was adopted June 15, 1989 (#89-13). In accordance with state law (Chapter 73C-49, F.A.C.), at least every seven years local governments are required to review their plan to determine if revisions are necessary to reflect applicable changes. In addition, as a county's vision changes and as the county grows, so too will the plan grow through a series of amendments. The most recent amendments to the Pasco County 2025 Comprehensive Plan became effective February 15, 2014.

According to the Pasco County Future Land Use Map, the Site is located within a Residential future land use designation (RES-1). The area surrounding the Site is within Major Public/Semi-Public and Industrial Heavy future land use designations. As indicated in the Future Land Use Element of the Comprehensive Plan, specifically, Policy FLU 3.2.2 "Private electric public utilities needed to support growth may be permitted in all land use designations." These needed utilities are then subject to the following, "c) All new

power plants and transmission lines shall be subject to applicable State and Federal siting regulations and shall be consistent with the Goals, Objectives and Policies of this Comprehensive Plan.”

SHCCF is located outside of sensitive lands and areas of special concern, such as rivers, lakes, wetlands, floodplains, natural vegetation communities, wells, wellfields, and 5 and 10-year protection areas, coastal high hazard areas, and evacuation routes.

The Site is encircled by industrial and utility-type existing land uses, with which the SHCCF Project will be compatible. Specifically, to the north is the Pasco County Solid Waste Resource Recovery Facility. To the east is vacant land, which is currently planned for another recently approved electric utility use (Special Exception Use No.7290, dated December 13, 2017), and beyond that, there is a Withlacoochee Electric Cooperative, Inc. substation. To the south is a warehouse (managed asset recovery services center) that is currently inactive and other properties within North Suncoast Industrial Park. To the west are the existing SHGS, SHWWTF, DEF’s 230 and 500 kV transmission lines and Hudson Substation, and FGT’s natural gas transmission line.

Importantly, FLU Policy 1.4.6 entitled “Utility Compatibility” only prohibits electric transmission corridors, natural gas pipeline easements, and similar facilities from being located “through or immediately adjacent to” existing neighborhoods. It does not prohibit utility uses such as the SHCCF from being located within properties bearing a Residential land use classification nor does it label the same as being inconsistent therewith. Rather, the fact that the surrounding uses are industrial in nature and not existing neighborhoods conforms with the requirements of FLU Policy 1.4.6 and demonstrates consistency with the County’s FLU policies.

Future Land Use Element, Policy FLU 1.10.1 identifies the County’s intent to review proposed uses for their compatibility and appropriate timing pertaining to the intended use and location. This review is typically conducted through the [special exception] zoning application process and considers the existing uses and the potential changes to the existing densities and intensities, the changes to development patterns in the area, the anticipated transitions between land uses, the potential changes to environmental, cultural features, and community character, and the timing of available public facilities/services associated with change in uses. Similar to the SHCCF Project, the existing surrounding uses have each been reviewed under similar processes and have demonstrated compliance with the intent of these provisions. The Special Exception Order was issued on January 10, 2018. The approval includes Finding of Fact 3j, which reads in part ... “[t]he proposed request is consistent with the LDC, Chapter 400, Permit Types and Applications; Section 402.4.E, Special Exception, Review Considerations; and the applicable provisions of the County’s Comprehensive Plan”, and Finding of Fact 5, which reads “[t]he special exception requested is consistent with the adopted Pasco County Comprehensive Plan and would not have an adverse effect on the health, safety, and welfare of the public.”

3.2.2.2 Zoning

Relevant provisions of the Code of Ordinances and Land Development Regulations for Pasco County are provided in Appendix 10.3.

The County's Zoning map identifies the Site as within the Agricultural (A-C) zoning district (Figure 3.2-2). Public and private utility facilities are an allowed use within this district as a special exception use when the use is in conformance with standards established by the County, State and Federal government. Specifically, Section 504.5 of the Pasco County Land Development Code permits "public and private utilities" as a special exception use in the A-C zoning district. In addition, A-C zoning uses are permitted within the Residential land use classification, provided they prove consistency with applicable provisions of the Comprehensive Plan's Goals, Objectives and Policies, and the A-C zoning designation.

The SHCCF is proposed for approximately 14 acres of a 30-acre parcel of land that was acquired for power generation. The westernmost 20 acres, where SHGS is located, was the subject of Special Exception review (#RZ5528), which was approved in December 1999 (Appendix 10.3). During that approval process, the applicant advised that a potential expansion of the power generation facility was contemplated upon the easternmost 10 acres. The proceeding of Special Exception Use approval no. RZ5528 resulted in the following findings:

- A Zoning Petition Review Report was submitted from Pasco County Zoning/Code Compliance Administrator Fred Lowndes to the Pasco County Planning Commission with staff recommendation to approve the existing Shady Hills facility with conditions. Findings of Fact included:
 - The Development Review Committee, at its meeting on November 4, 1999, unanimously found the proposed request consistent with the Pasco County Comprehensive Plan and land use designation of RES-1 (Residential-I; one dwelling unit/gross acre).
 - The Pasco County Planning Commission unanimously adopted the report and recommendations of the staff as its own and recommended approval with signature by Planning Commission chairman dated December 8, 1999.

An application for Special Exception Use for the easternmost 10 acres to be used for the SHCCF was submitted to Pasco County on November 14, 2017 and was approved by the Planning Commission on January 10, 2018.

The Pasco County Order approving the Special Exception Use includes a determination that the proposed use is consistent with the Goals, Objectives, and Policies of the adopted Comprehensive Plan elements or applicable portions thereof. The Special Exception Order was issued on January 10, 2018. The approval includes Finding of Fact 3j, which reads in part ... "[t]he proposed request is consistent with the LDC, Chapter 400, Permit Types and Applications; Section 402.4.E, Special Exception, Review Considerations; and the applicable provisions of the County's Comprehensive Plan", and Finding of Fact 5, which reads "[t]he special exception requested is consistent with the adopted Pasco County Comprehensive Plan and

would not have an adverse effect on the health, safety, and welfare of the public.” A copy of the Order is contained in Appendix 10.3.

3.2.3 Demography and Ongoing Land Use

3.2.3.1 Demography

The Site is located within unincorporated Pasco County. Within a five-mile radius of the Site, there are no incorporated areas. Within a five-mile radius of the Site, there are a total of five Census Designated Places (CDP) and one Census County Division (CCD), which is split between Pasco and Hernando counties. Within the five-mile radius there is also property within unincorporated Hernando County (See Figure 3.2.1-2).

CDPs are place-level statistic areas that are well-known, closely settled localities, with a mixture of residential, commercial, and retail areas. These locations are not part of an incorporated place, but are the center of a relatively high residential population density. CCDs are a set of sub-county units that have stable boundaries and recognizable names. They generally represent one or more communities, trading centers, or major land uses. These areas are commonly recognizable within the area around the Site.

Located within Pasco County:

- Shady Hills (CDP)
- Meadow Oaks (CDP)
- Quail Ridge (CDP)
- Moon Lake (CDP)
- Connerton (CDP)

Located within Pasco and Hernando County:

- Spring Hill (CCD)

Using the available U.S. Census data, Table 3.1-1 depicts the populations of the three relevant governmental jurisdictions for the SHCCF Project (State of Florida, Pasco County, and Hernando County) for both 2010 and 2016. All three jurisdictions showed population growth over the past six years, with Florida's population growing by 9.63%, Hernando County's population growing by 5.82%, and Pasco County's population growing by 10.26%.

Table 3.1-1 Population Data

Jurisdiction	U.S. Census 2010 Population	U.S. Census 2016 Population Estimates	Percent Population Change
State of Florida	18,801,310	20,612,439	+ 9.63%
Hernando County, Florida	172,778	182,835	+ 5.82%
Pasco County, Florida	464,697	512,368	+ 10.26%

US Census Bureau, 2017, 2010 and 2016 estimates obtained from DP-1 and B01003 datasets
2016 estimates, based on 2016 American Community Survey, 1-year estimate

According to the University of Florida Bureau of Economic Business Research (UF/BEER, 2017), the median population projections for Pasco County indicates continued growth, with an estimated population of approximately 715,774, a 44% increase from the 2016 estimates by 2045. Hernando County is anticipated to experience a 36% population growth, while the State is anticipated to experience a 36% population growth between 2016 and 2045.

3.2.3.2 Ongoing Land Use

Existing land uses in the area directly surrounding the Site consists primarily of utilities, industrial, and open land. The land proposed for the SHCCF is currently vacant/un-developed and is designated for utilities through a Special Exception. As depicted in Figure 3.2.3-1, there is a wide range of land uses within a five-mile radius of the Site. The nearest existing residence is 0.19 miles east northeast of the northeast corner of the Site.

Based on the population data and existing land use data, both Pasco and Hernando Counties are projected to gradually increase in population with increased development and changes in land use patterns anticipated, to accommodate the increased populations in the vicinity of the Site. State, county, and local recreational areas are situated throughout the county in areas designated and used for parks and recreation. These areas are not in the immediate vicinity of the Site and would not be affected by the construction or operation activities associated with the Project.

3.2.4 Leases, Easements, Title, Agency Works

SHEC will own or lease the SHCCF Certified Site and have easements across the existing 30-acre parcel as necessary to support the needs of the SHCCF Project.

SHCCF will connect to the PCMRS within county rights-of-way to support the use of reclaimed water and County potable water and wastewater conveyance systems under a utility service agreement that is currently under negotiation.

In addition, an easement from Pasco County for the proposed 230-kV electrical interconnection tie-line that will run from the northern boundary of the SHCCF to the existing Duke Energy DEF transmission corridor is currently under negotiation (Figure 3.1-1).

The need for additional public leases, easements, titles or agency works approvals is not anticipated.

3.2.5 Regional, Scenic, Cultural, and Natural Landmarks

There are no federally-governed regional, scenic, cultural, or natural landmarks within a five-mile radius of the Site. There is one state-owned preserve, four Pasco County parks, and several County conservation and preserves within five miles of the Site (See Figure 3.2.1-1). These consist of:

- Crews Lake Wilderness Park consists of 113 acres, and provides an observation tower, bird houses, natural trails, and a botanical garden. The park also has an outdoor amphitheater, as well as picnic areas.

- Arthur F. Engle Memorial Park is a 40-acre community park that offers athletic fields and concession stands.
- Elsie Logan Memorial Park is a 28-acre neighborhood park that includes athletic fields as well as a community center.
- Concourse Nature Center is a 216-acre community, recreational and cultural center.
- Starkey Wilderness Preserve and Park, a state-owned preserve that is managed by the Southwest Florida Water Management District. This preserve is one of the largest undeveloped tracts in Pasco County and protects sensitive areas in western Pasco County. The preserve includes Starkey Wilderness Park, Serenova Tract, and the Anclote River Ranch Tract, which provides amenities such as camping, bicycling, and bird watching.
- The Upper Pithlachascotee River Preserve, a County Preserve, is located within five miles of the Site. The Preserve occupies 129 acres near the south end of Crews Lake Park and contains 69 acres of bottom land forest at the head of the River and contains a large expanse of sandhill habitat along the freshwater marshes. The preserve offers hiking trails, a boardwalk, environmental education facilities, recreation and picnic areas, and opportunities to view various threatened and endangered species.
- The Cross Bar Ranch Environmental Education Center is located on a 12,500-acre well-field and is used for environmental educational activities. The Center contains 17 wells that contribute to the region's drinking water supply.
- The Jumping Gully Conservation Area is a 1,289-acre conservation area that supports the restoration of marshes, wet prairies, and pasture. Use of the area for cattle ranching is being phased out in an attempt to restore 40 acres of pasture to native plant species, which will increase habitats for species such as the gopher tortoise and the burrowing owl.

In addition, Pasco County has identified unique areas that warrant special consideration due to their ecological significance. These areas are representative of the historic biological diversity in the County and therefore, the County has identified these areas as Ecological Planning Units and established methods for protection and conservation of ecologically significant natural resources including acquisition, Comprehensive Plan restrictions, developer incentives, and partnership with other resource agencies. Within one mile of the Site there are three Ecological Planning Units: Anclote/Cotee Watersheds, Crossbar Sandhills, and Hernando Sandhills. The Anclote/Cotee Watersheds and the Hernando Sandhills extend into the five mile radius of the Site.

3.2.6 Archaeological and Historical Sites

The SHCCF Certified Site and the SHGS consist of lands that are privately owned. These lands have been utilized for power generation and activities to support construction and equipment storage associated with the existing SHGS since 2002.

In 2012, a cultural resource desktop analysis was conducted by Shady Hills Power Company, L.L.C. with the intent to expand the existing SHGS. The analysis consisted of the research and review of the Florida Master Site File (FMSF). The FMSF serves as an archive and repository of information about Florida's recorded cultural resources that are listed, eligible, or potentially eligible for the National Historic Preservation Act (NHPA) and resources with potential or confirmed human remains. In addition, SHPC coordinated with the Florida Division of Historical Resources (DHR) regarding use of the Site to expand

SHGS and provided DHR with the findings from the desktop analysis. A letter of concurrence was obtained from the DHR that there were no indications of significant archaeological or historical resources recorded in the project area. The letter noted that there was some potential for undiscovered archaeological resources and the DHR recommended that special conditions should be implemented if discoveries were made during construction activities (See Appendix 10.7.1).

The location of the proposed 230-kV interconnection tie-line is owned by Pasco County and has been previously evaluated for cultural resources and archaeological significance associated with Pasco County's Shady Hills Wastewater Treatment Facility, located to the west, and the Pasco County Solid Waste Resource Recovery Facility, located to the north, of the Site. Under these development projects, DHR had determined that this area had no significant archaeological and/or historical sites recorded or considered likely to be present (See Appendix 10.71).

Based on the location of the temporary parking and construction laydown area, preliminary findings indicate that these areas may have significant archaeological or historical resources recorded with DHR. Based on these preliminary findings, coordination with DHR is ongoing to review and assess potential conditions pertaining to the proposed uses of those designated areas.

3.2.7 Social and Economic Characteristics and Public Services

A discussion on labor, income, and housing is provided in the following sub-sections. The discussion on labor pertains to labor force characteristics, employment by occupation or employment by industrial sector groups, and baseline employment projections. The discussion on income includes general income characteristics, source of income, average wage and salary income by sector, and baseline income projections. Housing information including the existing housing stock, building activity, and housing costs, which are provided in the following sections below.

3.2.7.1 Labor Force

Pasco County's labor force was reported at 225,905 in November 2017, with approximately 216,915 residents listed as employed [Florida Department of Economic Opportunity (FDEO), 2017.] The unemployment rate for Pasco County, as of November 2017, was 4.0%, with 8,990 residents designated as unemployed; this is a decrease of 1.1% from November 2016. Hernando County's labor force was reported at 69,987 in November 2017, with approximately 65,741 residents listed as employed. Hernando County had an unemployment rate of 4.7% as of November 2017, down 1.3% from November 2016. The unemployment rate as of November 2017 for the State of Florida and the United States (seasonally adjusted) was 3.6% and 4.1%, respectfully. This places Pasco County at 0.1% below the national average for unemployment and 0.34% above the state average for unemployment. Hernando County, however, is 0.6% higher the national average and 1.1% higher the state average for unemployment.

3.2.7.2 Employment by Occupation / Industrial Section / Projections

Pasco County and Hernando County are identified as “Workforce Development Area 16” by FDOE. The employment estimates by major industry groups for Workforce Development Area 16 and the state of Florida are depicted in the following table. The construction industry provides approximately 7.04% of the areas employment, respectively, while a large portion of the area’s employment is supplied by trade, transportation, and utilities (21.84%); education, health care, and social assistance (18.336%); and government (13.62%).

As indicated in Table 3.2.7-1, the construction industry is anticipated to experience a 17% increase in employment opportunities, with a 15.7% increase across the state by 2025 based on the employment projections for Workforce Development Area 16 (FDEO, 2017).

3.2.7.3 Income Characteristics

The following presents the median income, per capita income, and poverty percentages for the state of Florida, Hernando County, and Pasco County as reported by the U.S. Census Bureau (Table 3.2.7-2). In addition, the sources of income, average wage per job and by industrial group, and income projections are discussed below

The median household income for Pasco County was estimated at \$46,264 in 2016, which is a 9.58% increase from the 2010 estimates, while Hernando County had a reported median household income of \$47,253 in 2016, which is a 26.15% increase from 2010 estimates. The Pasco County median household income estimate is 9.04% lower than the state, while the Hernando County income estimate is 7.09% below the state of Florida’s median household income level (\$50,860).

Based on 2016 estimates, Pasco County had an estimated per-capita personal income of \$26,199, which is an increase of \$3,686 from 2010. Hernando County had an estimated per-capita personal income of \$24,867, which is an increase of \$5,258 from 2010. Compared to the State of Florida’s, per capita personal income of \$28,621, Pasco County has a per-capita personal income that is 8.46% lower and Hernando County has a per-capita personal income that is 13.12% lower. (US Census, 2017).

Table 3.2.7-2 Income Characteristics

Statistic ¹	Florida		Hernando County		Pasco County	
	2010	2016	2010	2016	2010	2016
Median Household Income	\$ 44,409	\$ 50,860	\$ 37,459	\$ 47,253	\$ 42,220	\$ 46,264
Per Capita Income	\$ 24,272	\$ 28,621	\$ 19,609	\$ 24,867	\$ 22,513	\$ 26,199
Persons in Poverty (with related children under 18 years)	19.50%	17.1%	21.3%	16.8%	17.8%	14.2%

Source: US Census Bureau, 2017, 2010 and 2016 estimates obtained from DP-3 dataset
2016 estimates, based on 2016 American Community Survey, 1-year estimate

As previously indicated (within the Workforce Development Area 16), construction employment currently makes up approximately 7.04% of the civilian employed population (FDEO, 2017), with the median yearly wage (per construction job) of \$34,165 (FDEO, 2017).

3.2.7.4 Housing

In 2016, the total number of households in Pasco County, Hernando County and the state of Florida were 195,628, 74,262 and 7,573,456, respectively. In 2016, the total number of housing units were reported at 236,491 in Pasco County, Hernando County had 85,066, and the state of Florida had 9,302,140, respectively. Between 2010 and 2016, Pasco County had a 3.17% increase in housing units compared to 0.67% in Hernando County and 3.43% in the state of Florida (Table 3.2.7-3).

In 2016, 71.9% of the housing units were owner-occupied in Pasco County, with a homeowner vacancy rate of 2.8. Rental-occupied units made up 28.12% of the housing units, with a rental vacancy rate of 7.5 (U.S. Census, 2017).

In 2016, 78% of the housing units were owner-occupied (compared to 64.1% in the state of Florida), with a homeowner vacancy rate of 2.4 (while in the state of Florida was 2.5). Rental-occupied units made up 21.6% of the housing units in Hernando County (while in the state of Florida it was 35.9%), with a rental vacancy rate of 3.5 (while in the state of Florida it was 8.3) (U.S. Census, 2017). Between 2010 and 2016, owner-occupied units experienced less than a 4% change in Hernando County, while Pasco County experienced a decrease of almost 2.5%. While the rental-occupied units experienced greater than 15% increase between 2010 and 2016; specifically, Pasco County saw a 40% increase, Hernando County saw a 17.2% increase, and the state of Florida saw a 21.2% increase between 2010 and 2016.

In Pasco County, 65.3% of the housing stock was built after 1980, with 47.4% built between 1980 and 1989. In Hernando County, 77.9 % of the housing stock was built after 1980, with 32.5% built between 1980 and 1989. In the state of Florida, 59.6% of housing stock was built after 1980, with 21.6% built between 1980 and 1989.

The estimated median home values in 2016 in Pasco County, Hernando County and the state of Florida were \$145,000, \$126,800 and \$197,700, respectively (U.S. Census, 2017). These reported estimates increased greater than 15% between 2010 and 2016 in Pasco County and the state of Florida, while Hernando County only saw a less than 1% increase. The rents within these jurisdictions averaged less than \$1000, with an increase of approximately 13% between 2010 and 2016 in Pasco County and the state of Florida (in Hernando County an almost 8% increase was reported).

In Pasco County, transient accommodations (i.e., public lodgings, transient or non-transient to include vacation rental properties, motels, and hotels, rooming houses, and bed & breakfasts establishments) are plentiful with approximately 266 establishments providing 17,917 units based on 2015 information. In

addition, the County has approximately 168 apartment establishments, with approximately 14,331 apartment units in the County based on 2015 information (UF/BEBR, 2017).

In Hernando County, transient accommodations (i.e., public lodgings, transient or non-transient to include vacation rental properties, motels, and hotels, rooming houses, and bed & breakfasts establishments) are plentiful with approximately 91 establishments providing 4,251 units based on 2015 information. In addition, the County has approximately 59 apartment establishments, with approximately 3,234 apartment units in the County based on 2015 information (UF/BEBR, 2017).

3.2.7.5 Area Public Service and Utilities

3.2.7.5.1 Education

Pasco County public schools have a total enrollment of 73,673 for the 2017-2018 school year, which is an increase of 1.63 % from the 2016-2017 school year (72,490 enrollment) (FLDOE, 2017). The majority of the students within the district (62.3%) are white, and 22.4% of the student body are Hispanic. Pasco County schools employed approximately 10,629 personnel (5,155 instructional employees, 3,664 instructional support employees, and 331 administrators) during the 2016-2017 school year.

The closest public schools to the Site are as follows:

- to the northeast - Mary Giella Elementary School (0.68 miles)
- to the northeast - Crews Lake Middle School (0.60 miles)
- to the southeast - Classical Preparatory school (1.6 miles)
- to the south (and adjacent to Hays Road) - Bishop McLaughlin Catholic High School (0.39 miles)

Public schools within five miles of the Site include Shady Hills Elementary (3.5 miles to the north), Moon Lake Elementary (3.8 miles to the southwest) and Suncoast Elementary (4.8 miles to the north in Hernando County). Private schools within five miles of the Site include Bishop McLaughlin Catholic High School (0.39 miles), Hope Ranch Learning Academy (4.3 miles), Hope Ranch Learning Academy, New Hope Campus (4.6 miles), and Faith Christian Academy (4.6 miles).

The Hernando County schools district includes:

- 10 elementary schools
- 4 middle schools
- 6 high schools
- 3 K-8 schools
- 3 Charter schools
- 4 “other” schools
- 10 private schools

Hernando County public schools had a total enrollment of 22,448 for the 2017-2018 school year, which is an increase of 0.67% from the 2016-2017 school year (22,298 enrollment). The majority of the students within the district (65.42%) are white and 19.97% of the student body are hispanic. Hernando County schools employed approximately 4,187 personnel (1,452 instructional employees, 1,697 instructional support employees, and 1038 administrators) during the 2016-2017 school year (FLDOE, 2017).

3.2.7.5.2 Transportation

The Site is accessible from Merchant Energy Way, which is located off of Hudson Avenue and Hays Road, north of State Road (SR) 52. SR52 is an arterial roadway, operated and maintained by the Florida Department of Transportation (District 7). Hudson Avenue is a collector roadway that is maintained by Pasco County. Hays Road is a collector roadway that is maintained by Pasco County. Merchant Energy Way is a local roadway, providing access to the SHEC property (See Figure 3.2-1).

The section of SR52 where it intersects with Hays Road is a divided six-lane roadway (three lanes in each direction) with dedicated turn lanes, where applicable. SR52 (between SR589 and Hays Road) has an Annual Average Daily Trips of 29,000 vehicles. With a Level-Of-Service (LOS) Standard of D, SR52 roadway functions at LOS B. SR52 is also a designated truck route that services local industrial plants and material suppliers in the area. The posted speed limit is 50 miles per hour.

Hays Road is a paved two-lane collector roadway, operated and maintained by Pasco County. Hays Road has an Annual Average Daily Trips of 6,900 vehicles, with an approximate volume of 3,175. With a LOS Standard of D, Hays Road functions at an existing LOS B. The posted speed limit is 45 miles per hour. Truck traffic makes up approximately 11% percent of the total traffic on SR52 and Hays Road.

Hudson Avenue is a paved two-lane collector roadway, operated and maintained by Pasco County. Hudson Avenue has an Annual Average Daily Trips of 3,542 vehicles. With a LOS Standard of D, Hudson Avenue functions at an existing LOS B. The posted speed limit is 35 miles per hour.

At the SR52/Hays Road intersection there is a traffic light and dedicated turn lanes. On SR52 there are dedicated turn lanes for SR52 westbound traffic making right-turns north onto Hays Road and for eastbound traffic making left-turns onto Hays Road. On Hays Road, there is a dedicated turn lane for southbound traffic turning both eastbound and westbound onto SR52. Hays Road is a collector roadway, operated and maintained by Pasco County. Hays Road has an Annual Average Daily Trips of 7,500 vehicles. With a LOS Standard of D, Hays Road functions at an existing LOS B.

The existing SHGS, adjacent and west of the SHCCF Site, has been in operation since 2002 and currently contains three combustion turbines in simple-cycle configuration that are permitted and capable of producing a total of 510 MW (nominal). Access to SHGS is provided from Merchant Energy Way and is a

secured access facility. The existing SHGS operates 24 hours per day/7 days per week and has 11 employees and receives between 1 and 3 truck deliveries daily.

Primary construction access to the SHCCF Site will be from the SR52, which is identified as a major truck route by Pasco County.

3.2.7.5.3 Medical Facilities

The closest trauma center to the Site is the Bayonet Point Regional Medical Center in Hudson, Florida. This Level 2 trauma center is approximately 9 miles from the Site and provides support for devastating injuries, if necessary. Bayfront Health in Spring Hill is located approximately 6 miles from the Site, but it is not a trauma center.

Based on 2016 estimates, Pasco County had approximately 711 licensed physicians of medicine, 115 licensed physicians of osteopathy, 6,751 registered nurses, and 2,176 licensed practical nurses in the County (UF/BEER, 2017).

3.2.7.5.4 Police Protection

The Pasco County Sheriff's Office provides law enforcement, fire rescue, dispatch, and emergency services. The Field Operations Bureau is the most visible division, providing law enforcement services throughout the County. This Bureau is composed of three districts (1, 2, and 3), which geographically divide the areas of the County. Each district also includes specialized units, such as: property crimes, strategic targeted area response, an intelligence liaison officer, and code enforcement.

This Bureau consists of 1,254 employees, which includes full-time sworn, part-time sworn, and civilian officers. The Site is located within District 1. The closest County Sheriff's Office is located approximately 13 miles to the south-west of the Site.

3.2.7.5.5 Fire Fighting and Emergency Medical Services

The Fire Rescue Department of Pasco County provides fire protection for all the unincorporated areas of the County and advanced life support level emergency medical ambulance services to the entire County. The Department operates 26 (23 career and 3 volunteer) stations with over 420 paid professionals, with a support staff of 26 people, which include administration, ambulance billing, and supply. The Department is a cross-trained agency, where all paid firefighters are required to be trained as EMTs or paramedics. All Public Safety Emergency Communications for the Department and the County are handled by the County's Emergency Communication division. Pasco County has a total of 476 career firefighters, 213 of which are EMTs and 263 are paramedics. The County also has 105 volunteers and 17 cadets.

The closest County fire station is station no. 21, which is located approximately seven miles south-west of the Site.

3.2.7.5.6 Recreation Facilities

As previously discussed, three Pasco County Parks are located within five miles of the Site: Crews Lake Wilderness Park, Arthur F. Engle Memorial Park and Elsie Logan Memorial Park. All of these areas are within Pasco County's governmental jurisdiction.

3.2.7.5.7 Electric and Gas

Electricity is provided to retail customers in the area by DEF and Withlacoochee River Electric Cooperative, Inc. (a member of the Seminole Electric Cooperative, Inc.). Natural gas is supplied to retail customers in the region by Florida Public Utilities Company and TECO Peoples Gas (FPU, 2017 and TECO, 2017).

Currently, electric and natural gas demands at the adjacent SHGS are provided by Withlacoochee River Electric Cooperative, Inc. and Florida Gas Transmission.

3.2.7.5.8 Water Supply and Domestic Wastewater Treatment Facilities

Potable water in Pasco County is withdrawn, treated, and transmitted throughout the unincorporated areas through either private or public water systems. Most of the public potable water supply in Pasco County is provided by Tampa Bay Water, a regional water-supply authority, which is contractually obligated to meet the needs of the County. Together, these systems in Pasco County are either permitted to withdraw, are purchasing under an agreement, or have the capacity to supply 39.92 MGD of potable water on an average daily basis (Pasco County Comprehensive Plan (Public Utilities Element), 2017).

The Pasco County Utilities Division divides the unincorporated areas of the county into service areas. The area boundary does not encompass all the unincorporated areas, but only those areas in which the County has identified an existing or future demand for wastewater treatment facilities. The Site is located within the Shady Hills service area. Wastewater in the unincorporated area of the County is handled and treated through public or private wastewater collection, treatment and disposal systems. Private systems consist of either septic tanks or privately owned and operated package plants. Public systems are owned and operated by the Pasco County Utilities Division and the Cities of Port Richey, New Port Richey, Zephyrhills, Dade City, St. Leo, and San Antonio. Approximately 71% of the County's wastewater collection and disposal comes from private systems, with private septic tanks providing the majority of the capacity.

Due to the vacant and undeveloped nature of the approximately 14-acre Site, there are no current water demands or activities that generate wastewater. At the adjacent SHGS, potable water is provided by an onsite groundwater well and treatment /chlorination system. Sanitary wastewater is conveyed off-site to the county sewer system for treatment and disposal.

3.2.7.5.9 Solid Waste Disposal

The solid waste management system is the responsibility of the Pasco County Utilities Division. The management system consists of the East Pasco Class I Sanitary Landfill, the East Pasco Solid Waste Transfer Station, the West Pasco Class I and Class III Sanitary Landfills, and the PCSWRRF. The County also provides hazardous waste drop-off locations and recycling centers located throughout the County. The PCSWRRF has a design capacity of 1,050 tons per day and has a current average daily demand of 956 tons. Approximately 238 tons per day is received from surrounding counties and communities (Pasco County Comprehensive Plan (Public Facilities Element), 2018). Waste generated in Pasco County is collected by several licensed private waste collection companies. Currently, waste collection at the adjacent SHGS is handled by a private licensed contractor for collection and transport to an offsite disposal facility. The SHCCF Certified Site does not currently generate solid waste.

3.3 Physical and Biological Environment

3.3.1 Geology and Hydrology

The SHCCF Certified Site is located in northwest Pasco County, within the Gulf Coastal Lowlands Physiographic Region. The Site is approximately 9 miles from the coast and 4.7 miles south of the Pasco/Hernando County line. Ground surface elevations are between 49 and 54 feet national geodetic vertical datum 1929 (NGVD 29), and average approximately 52 feet NGVD 29. Based on the Natural Resources Conservation Service (NRCS) Soil Survey (NRCS, 2017), the surface soils are predominately Candler fine sand, with 0 to 5 percent (%) slopes. These soils are typical eolian deposits and/or marine deposits, excessively drained, with no restrictive layer in the top 6.5 feet, and with very low runoff potential (Hydrologic Soil Group A). The saturated hydraulic conductivity of the soils is between 10 and 20 feet/day. Based on geotechnical reports for the Site and the adjacent SHGS, the water table is between 14 and 22 feet below ground surface. The average depth is approximately 17 feet below ground surface (bgs) (35 feet NGVD 29).

The geology in the vicinity of the Site, starting at the surface and moving down, includes surficial deposits of undifferentiated sediments predominately comprised of sand with some silt and clay. In Pasco County, these deposits range in thickness from 0 to approximately 100 feet, averaging approximately 25 feet (USGS, 1990). These deposits are composed of very loose to very dense, variably dark to pale brown, grayish brown, dark gray, and white fine-grained sand. At the Site, the surficial deposits are approximately 20 feet thick (Golder, 2010).

Underlying the surficial sediments is a layer that consists predominately of clay but also contains sand, marl, calcareous sandstone, and limestone. This layer is referred to in the scientific literature as the intermediate confining unit (ICU), the intermediate aquifer, or the upper confining unit. This layer is composed of soft to very stiff, mottled gray and yellowish brown to orange plastic clay with varying amounts of fine-grained sand. At the Site, the thickness of this unit ranged from 2 feet to more than 17 feet thick, the average thickness is approximately 10 feet (Golder, 2010).

The Floridan aquifer system underlies the ICU and consists of a thick sequence of carbonate rocks underlain by either low-permeability clastic rocks or evaporate deposits. The Floridan aquifer system is further divided into the Upper Floridan Aquifer (UFA) and the Lower Floridan Aquifer (LFA), which are separated by the Middle Confining Unit (MCU). In Pasco County, the fresh water part of the Floridan aquifer system is limited to the UFA. The Upper Floridan Aquifer consists of a series of continuous carbonate rocks that include (in descending order) the Tampa Member of the Arcadia Formation, Suwannee Limestone, Ocala Limestone and Avon Park Formation. At the Site, the top of the UFA is approximately 22 feet NGVD 29 and the thickness is estimated to be approximately 800 feet (Golder, 2010).

3.3.2 Subsurface Hydrology

As discussed above in Section 3.3.1, soils at the Site are classified as Hydrologic Soil Group A, slopes are small, and runoff potential is very low. Because the soils are permeable and well drained, stream drainage is not well developed, and closed basins exist in some areas. Consequently, surface recharge moves rapidly down into the surficial aquifer. Furthermore, because the ICU in this area is relatively thin and has a high leakance [$L = 0.001/\text{day}$ (Golder, 2010)], the surface recharge quickly moves down and recharges the UFA. Recharge to the surficial aquifer and the UFA is estimated to be between 10 and 20 inches per year in the vicinity of the Site (USGS, 1990 and Stewart, 1980). Based on the estimated leakance and the recharge rates, the average water level in the surficial aquifer should be between 2.5 and 4.5 feet above the average potentiometric water level in the UFA. Based on site-specific piezometer data, water levels in the UFA range from 28 to 34 feet NGVD 29; averaging approximately +31 feet NGVD 29.

While the surficial sand layer is estimated to be approximately 20 feet thick, the water table is between 14 and 22 feet bgs, averaging approximately 17 feet bgs. Consequently, the surficial aquifer is between 0 and 6 feet thick, averaging approximately 3 feet thick. The hydraulic conductivity (vertical and horizontal) of the surficial sands is estimated to be approximately 15 feet/day, and the specific yield is estimated to be approximately 0.2 (Golder, 2010). Consequently, the surficial aquifer transmissivity is approximately 45 ft^2/day . Because of low yields, the surficial aquifer is not generally used for groundwater supply in this area.

The most productive source of groundwater in the vicinity of the Site is the UFA. The transmissivity of the UFA in this area is between 55,000 ft^2/day and 65,000 ft^2/day (Golder, 2010). As discussed above, inflow to the UFA is primarily from rainfall recharge. Outflow occurs as point discharges at pumping wells and at springs along the rivers and near the coast. Discharge also occurs as diffused upward leakage into swamps adjacent to streams and coastal marshes (USGS, 1990). The Site is located in the upper reaches of the Aripeka springshed (see Figure 3.3.3-2). Consequently, flow in the UFA in the vicinity of the Site generally moves to the northwest toward the Aripeka spring and the Gulf coast. Since the UFA is only slightly confined by the upper confining unit, drawdowns in the surficial aquifer generally reflect drawdowns in the UFA near production wells.

3.3.3 Site Water Budget and Area Users

Based on water use permits issued by the Southwest Florida Water Management District (SWFWMD), existing and proposed groundwater withdrawals within a 5-mile radius of the SHCCF Certified Site are shown in Figure 3.3.3-1. Data available from the District's database for these users is summarized in Table 3.3.3-1. The Cross-Bar Ranch public supply well field and some Pasco County public supply wells are located between 3 and 5 miles east of the Site. Permitted surface water withdrawals and Minimum Flows and Levels (MFL) water bodies (lakes and wetlands) with adopted levels are shown in Figure 3.3.3-2. The Pithlachascotee River is highlighted because it is currently proposed for MFL development. There are only 3 permitted surface water users within 5 miles of the SHCCF Certified Site, and all are approximately 3 or more miles from the SHCCF Certified Site. These existing users are summarized in Table 3.3.3-2.

Using approximately 20 years of daily rainfall data from the SWFWMD gage at Shady Hills (Station 20552), which is located approximately 3 miles north of the Site, the average annual precipitation in the vicinity of the Site is 64.6 inches per year. Based on approximately 19 years of daily evapotranspiration (ET) data from the SWFWMD Brooksville site (Station 20881), the average annual ET is approximately 46.6 inches per year. The SWFWMD Brooksville station is approximately 7 miles northwest of the Shady Hills gage station. Therefore, in the vicinity of the Site surface recharge and surface runoff combined is approximately 18.0 inches per year (64.6-46.6). As discussed above, surface recharge in this area is estimated to be between 10 and 20 inches per year, and runoff is very limited. Using a water budget approach, a reasonable estimate of annual average recharge is between 12 to 18 inches per year (best estimate approximately 15 inches/year), and annual average runoff is between 0 and 6 inches per year (best estimate approximately 3 inches/year).

Average annual lake evaporation in vicinity of the Site is approximately 49.5 inches/year (Fernald and Patton, 1983). Another important component of the water budget in a developed area, with a significant percent impervious area, is the rate of evaporation from impervious surfaces. Using daily rainfall data from the SWFWMD Shady Hills station and the curve number method, with a curve number of 98 assigned to an impervious surface (surface storage 0.2 inches), the average annual evaporation from an impervious surface can be estimated by subtracting the daily runoff from the daily precipitation and summing over the period of record. This calculation gives 17.6 inches as the average annual impervious surface evaporation. These hydrologic values will be used to evaluate the technical and economic feasibility of stormwater capture and reuse at the Site in Section 4.5.

3.3.4 Surficial Hydrology

Since surface runoff is very limited, natural surface drainage features in the vicinity of the SHCCF Certified Site are not well developed. The Site is located in the upper reaches of the Bear Creek Basin very near the drainage divide between the Pithlachascotee River and Double Hammock Creek drainage basins. Crews Lake and the Pithlachascotee River are more than 1 mile east of the Site, and east of Highway 589 (see Figure 3.3.3-2). No surface drainage features could be traced from the site to the streams or the river.

South of the Site, within approximately 2 miles, there are numerous relatively small lakes and wetland features that likely are associated with closed drainage basins. Further south-southwest and southeast there are extensive wetland areas.

3.3.5 Vegetation/Land Use

Characteristic vegetative communities/land uses were classified utilizing the Florida Land Use, Cover and Forms Classification System (FLUCFCS) Level III (FDOT, 1999) data from the SWFWMD that were updated based on field reconnaissance efforts conducted in August and October 2017 (Figure 3.3.5-1).

The SHCCF Certified Site, which is comprised of approximately 14 acres, is primarily comprised of existing utilities (FLUCFCS 830) and vacant land (FLUCFCS 190), with additional areas of coniferous plantation (FLUCFCS 441) as illustrated in Figure 3.3.5-1. The temporary construction parking and laydown area associated with the development of the SHCCF Certified Site comprises approximately 20 acres, is primarily comprised of coniferous plantation (FLUCFCS 441) and improved pasture (FLUCFCS 211), with a minor association of live oak hammock (FLUCFCS 427). The Site and temporary construction parking and laydown area are surrounded by a mixture of industrial land uses, historically disturbed and altered vegetative communities, and areas of forested uplands. Vegetative communities within and adjacent to the SHCCF Certified Site and temporary parking and construction laydown area are discussed in detail in Subsection 3.3.6.1.

3.4 Ecology

3.4.1 Species-Environmental Relationships

The following subsections include descriptions of flora and fauna within the SHCCF Certified Site, temporary parking and construction laydown area, and surrounding vicinity. This discussion includes information related to the species found and the value of the habitats present, by FLUCFCS Level III codes. Descriptions of the flora and fauna within the 230-kV interconnection tie-line corridor is discussed in Chapter 9.3.7.

3.4.1.1 Vegetative Communities of the SHCCF Project Area

Vacant Land (FLUCFCS 190) – Approximately 8 acres of the SHCCF Certified Site are classified as vacant land (Figure 3.3.5-1). This area was previously cleared and utilized as a temporary laydown and equipment storage area associated with the construction of the existing SHGS. Vegetation present in this area is dominated by ruderal native and non-native invasive/exotic groundcover species such as bahia grass (*Paspalum notatum*), beggar ticks (*Bidens* sp.), cogon grass (*Imperata cylindrica*), Durban crowfoot grass (*Dactyloctenium aegyptium*), and annual phlox (*Phlox drummondii*). A small wooded strip exists on the extreme southern periphery of this area and includes common species such as live oak (*Quercus virginiana*), southern red cedar (*Juniperus silicicola*), and grapevine (*Vitis rotundifolia*).

Coniferous Plantation (FLUCFCS 441) – Approximately 2 acres within the northern portion of the SHCCF Certified Site consists of pine plantation (Figure 3.3.5-1). The canopy is dominated by planted slash pine, with a variety of subdominant native and non-native invasive/exotic species such as planted southern red cedar, laurel oak, beautyberry (*Callicarpa americana*), caesarweed (*Urena lobata*), slender flattop goldenrod (*Euthamia caroliniana*), dogfennel (*Eupatorium capillifolium*), prickly pear cactus (*Opuntia humifusa*), Virginia creeper (*Parthenocissus quinquefolia*), cogon grass, bahia grass, beggar ticks, and grapevine.

Utilities (FLUCFCS 830) – Approximately 4 acres within the western portion of the SHCCF Certified Site consists of utilities (Figure 3.3.5-1). This area is part of the existing SHGS and is dominated by ruderal native and non-native invasive/exotic herbaceous groundcover species species such as bahia grass and beggar ticks.

3.4.1.2 Vegetative Communities of the SHCCF Temporary Construction Parking and Laydown Area

Improved Pastures (FLUCFCS 211) – Approximately 11.25 acres within the temporary parking and construction laydown area associated with the SHCCF Certified Site consists of improved pastures which have been historically utilized for cattle grazing (Figure 3.3.5-1). Although mainly dominated by groundcover species, scattered canopy species are present and include live oak, southern red cedar, and American sycamore (*Platanus occidentalis*). The remainder of the vegetation consists of species such as beautyberry, bahia grass, dog fennel, caesarweed, and common ragweed (*Ambrosia artemisiifolia*).

Live Oak (FLUCFCS 427) – Approximately 0.25 acre within the temporary parking and construction laydown area associated with the SHCCF Certified Site consists of a live oak hammock which has historically been utilized for cattle grazing (Figure 3.3.5-1). This area is dominated by mature live oaks, with a sparse understory consisting mainly of beautyberry, caesarweed, grapevine, dog fennel, and saplings.

Coniferous Plantation (FLUCFCS 441) – Approximately 4.25 acres within the temporary parking and construction laydown area associated with the SHCCF Certified Site consists of pine plantation (Figure 3.3.5-1). The canopy consists solely of planted slash pine, with a variety of subdominant native and non-native invasive/exotic species in the understory and groundcover such as persimmon (*Diospyros virginiana*), beautyberry, tropical soda apple (*Solanum viarum*), common ragweed, caesarweed, and grapevine.

3.4.1.3 Vegetative Communities Adjacent to the SHCCF Certified Site and Temporary Construction Parking and Laydown Area

The area surrounding the Site is dominated by existing industrial uses, although parcels of pine plantation and xeric upland forest occur adjacent to the north and east of the SHCCF Certified Site. The surrounding vicinity is dominated by a variety of urban and suburban environments comprised of industrial, utility, and commercial uses. Residential land uses (Figure 3.3.6-1) are limited to areas west of Pasco County's Shady Hills Wastewater Treatment Plant. The temporary parking and construction laydown area is dominated by

existing agricultural uses and native upland and wetland habitats. Parcels of xeric upland forest and open fields exist to the north and south of this area, respectively.

3.4.1.4 Terrestrial Ecology Systems – Fauna

The disturbed nature of the SHCCF Certified Site area and temporary parking and construction laydown area provides poor quality wildlife habitat utilized by avian species and herpetofauna common to disturbed upland fields, cattle pasture, xeric upland forests, and coniferous plantations in central Florida.

A summary of non-listed terrestrial wildlife observed or likely to occur within the Site and temporary construction parking and laydown area is provided in Table 3.3.6-1, including avian species and herpetofauna. Non-listed terrestrial wildlife directly observed, indirectly observed (via tracks, scat, dens, and/or burrows), or likely to occur are discussed below based on primary habitat types within the Site and temporary construction parking and laydown area. Species classified as threatened, endangered, species of special concern (listed species) are discussed in Section 3.3.6.4.

Vacant Land, Improved Pasture, Live Oak, Coniferous Plantation, and Utilities (FLUCFCS 190, 211, 427, 441, and 830) – Although these upland habitats have been historically altered and do not provide quality native wildlife habitat, they are occasionally used by common resident and migratory non-listed avian species such as blue jay (*Cyanocitta cristata*), northern cardinal (*Cardinalis cardinalis*), northern mockingbird (*Mimus polyglottos*), Carolina wren (*Thryothorus ludovicianus*), Carolina chickadee (*Poecile carolinensis*), tufted titmouse (*Baeolophus bicolor*), blue-gray gnatcatcher (*Poliophtila caerulea*), pine warbler (*Setophaga pinus*), northern parula (*Setophaga americana*), black-and-white warbler (*Mniotilta varia*), yellow-throated warbler (*Setophaga dominica*), red-bellied woodpecker (*Melanerpes carolinus*), and downy woodpecker (*Picoides pubescens*), as well as common mammals and herpetofauna such as nine-banded armadillo (*Dasypus novemcinctus*), black racer (*Coluber constrictor*), and brown anole (*Anolis sagrei*).

3.4.1.5 Aquatic Ecology Systems – Fauna

No wetlands or aquatic systems exist within the SHCCF Certified Site or the temporary parking and construction laydown area. Therefore, no aquatic or wetland dependent fauna were observed within these areas.

3.4.1.6 Threatened and Endangered Species – Flora and Fauna

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

Only one state-listed faunal species was observed during the field reconnaissance efforts, the gopher tortoise (*Gopherus polyphemus*). This species is common to the area and uses other upland habitats that are found throughout the surrounding region. No state or federal listed plant species were observed during the field reconnaissance efforts which occurred in August and October 2017.

3.4.1.7 Threatened and Endangered Species - Methodology

Prior to field reconnaissance efforts, county-specific lists of threatened and endangered species were obtained from the Florida Natural Areas Inventory (FNAI, 2017). In addition, geographic information system (GIS) data was obtained from the FNAI, which maintains a database of known occurrences of listed species throughout the State of Florida.

The FNAI database was queried, and documented locations of listed species within the Site, temporary parking and construction laydown area, and surrounding vicinity were identified. Listed and non-listed wildlife species observed during field reconnaissance were recorded. The field effort was supplemented by evaluation of habitat conditions suitable for listed species to help identify additional species that were not observed but are likely to occur.

3.4.1.8 Plant and Animal Surveys

Because of the rarity and seasonality of threatened and endangered species, either multi-season surveys or an evaluation of threatened and endangered species habitat conditions are typically used to determine possible presence or absence of listed species within a site. For this study, field reconnaissance efforts were combined with the evaluation of habitat conditions to determine the presence or absence of threatened and endangered species within the SHCCF Certified Site and temporary parking and construction laydown area.

The potential for utilization of the Site and temporary parking and construction laydown area by most terrestrial listed species for foraging, roosting, or breeding is limited due to the significant alteration of the upland habitats present, as well as the surrounding industrial, utility, commercial, and (limited) residential development. Table 3.3.6-2 reports occurrences of threatened and endangered species known to occur in Pasco County from the FNAI database review. Federal and state-listed species that were observed or are likely to occur within the area due to information on available habitats within the Site, temporary construction parking and laydown area, and surrounding areas as discussed below.

Flora - Threatened, endangered, and/or plant species of special concern known to occur in Pasco County and their probability of occurrence in the Site and temporary parking and construction laydown area are listed in Table 3.3.6-2. The FNAI database review indicated one reported occurrence of listed plant species within 5 miles of the Project, pondspice (*Litsea aestivalis*). No listed plant species were observed within the Site or temporary parking and construction laydown area during field reconnaissance efforts in August and October 2017. Furthermore, due to the lack of suitable upland and wetland habitats and significant alteration of the upland habitats present, it is not likely any listed plant species potentially occurring within

Pasco County are present within the SHCCF Certified Site or the temporary parking and construction laydown area. Federally and state-listed plant species that were identified from the FNAI database review as occurring within 5 miles of the Site or have the potential to occur within the Site or temporary parking and construction laydown area based on the presence of suitable habitat are discussed below.

Pondspice (E) - Pondspice is classified at endangered in the State of Florida, but is not listed by the USFWS. It is a shrub which is found in wetland habitats such as cypress domes, freshwater ponds and shrub marshes in pine flatwoods, and along the edges of baygalls (FNAI, 2001). No individuals were observed on the Site or the temporary parking and construction laydown area during field reconnaissance, and no areas of suitable wetland habitat is present, therefore there is no likelihood of occurrence within these areas.

Fauna - Threatened, endangered, and/or animal species of special concern known to occur in Pasco County and their probability of occurrence within the Site are listed in Table 3.3.6-2. The FNAI database review indicated reported occurrences of four listed animal species in the vicinity of the Site – Southeastern American kestrel (*Falco sparverius paulus*), Florida pine snake (*Pituophis melanoleucus mugitus*), short-tailed snake (*Lampropeltis extenuate*), and gopher tortoise.

According to the FWC wading bird rookery and nest colony locator, two wading bird rookeries were identified approximately 1-mile from the Project Area, Atlas #611143 and #611144 (Figure 3.3.6-2). Atlas #611143 was documented as inactive from the last survey in the 1990's while Atlas #611144 was documented as active from the last survey in the 1990's. The Site is located within the core foraging area of six wood stork (*Mycteria americana*) colonies – Anclote River, Embassy-Shoppers Way, Greenbrooke, Heron Island, Heron Point-Land O' Lakes, and Seven Springs. However, the closest wood stork colony (Embassy – Shoppers Way) is located approximately 10 miles to the southwest of the Site.

Although no longer classified as threatened or endangered, the bald eagle (*Haliaeetus leucocephalus*) is protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. According to the FWC bald eagle nest location database, the closest documented bald eagle nests (nest ID #PS008 and PS031) are approximately 3 miles to the northeast and southwest, respectively, of the Site. Additionally, no bald eagle nests were observed within the Site or the temporary parking and construction laydown area during the field reconnaissance.

The only listed species observations within the Site or temporary parking and construction laydown area during the field reconnaissance efforts were burrows of the state-listed gopher tortoise. A brief description of species observed, identified from the FNAI database review as occurring within 5 miles of the Site, or with a potential to occur within the Site or temporary parking and construction laydown area is provided below.

Gopher Tortoise (T) – The gopher tortoise is classified as threatened by the FWC but is not listed federally by the USFWS in Florida. The gopher tortoise is a large terrestrial turtle that primarily forages on herbs and forbs. Its carapace is a dark brown or grayish brown color, while the plastron is much lighter in color, typically yellow or somewhat tan. Gopher tortoises have stumpy, elephant-like hind feet and flattened, shovel-like forelimbs that are used for digging burrows (FWC, 2017). It excavates burrows with these forelimbs for shelter from temperature extremes, predators, and refuge from fires. Burrows are excavated in well-drained, sandy soils typically associated with upland habitats such as palmetto prairies, dry pine flatwoods, turkey oak sandhills, and xeric scrub throughout peninsular Florida. It will also excavate burrows in disturbed habitats such as pastures and old fields (FNAI, 2001). It is considered a keystone species as hundreds of commensal species, such as the listed eastern indigo snake and Florida pine snake, have been documented to utilize their burrows for their own survival needs. During the field reconnaissance of the Site, several gopher tortoise burrows were observed within areas classified as Vacant Land (FLUCFCS 190). Potential habitat for the species exists throughout the Site and the temporary parking and construction laydown area.

Florida Pine Snake (T) – The Florida pine snake is classified as threatened by the FWC, but is not listed federally by the USFWS. The Florida pine snake is a large, non-venomous snake which can be found throughout most of the panhandle and peninsular Florida. It has a brown back with dark blotches, white belly, ridged scales, small head, and pointed snout (FNAI, 2001). It prefers open xeric habitats with well-drained, sandy soils such as longleaf pine-turkey oak sandhill, sand pine scrub, and scrubby flatwoods. Similar to the eastern indigo snake, they are known commensal species of gopher tortoise burrows. The FNAI database review indicated one reported occurrence of the species within 5 miles of the Site. Although no individuals were observed during the field reconnaissance and their probability of occurrence is low, potential refugia in the form of gopher tortoise burrows were observed and adjacent areas to the north and east of the Site may provide suitable habitat.

Short-tailed snake (T) – The short-tailed snake is classified as threatened by the FWC but is not listed federally by the USFWS. It is a small, non-venomous snake which is endemic to Florida. The species is cryptic and fossorial in nature. It can be found mainly from the north central to central portion of peninsular Florida. It prefers xeric habitats such as longleaf pine flatwoods, turkey oak sandhills, and scrubby oak communities (FWC, 2017). The FNAI database review indicated one reported occurrence of the species within 1.5 miles of the Site. No individuals or signs of their presence were observed during field reconnaissance. The mixed hardwood-conifer (FLUCFCS 434) habitat in the northeastern portion of the Site and the live oak hammock (FLUCFCS 427) in the eastern portion of the temporary parking and construction laydown area may provide suitable habitat for the species, but the likelihood of its presence is low due to the extensive hog rooting and proximity to industrial development. Suitable habitat for the species may exist in adjacent areas to the north and east of the Site.

Southeastern American Kestrel (T) – The Southeastern American kestrel is classified as threatened by the FWC, but is not listed federally by the USFWS. The Southeastern American kestrel is a small raptor which

preys upon insects, small mammals, and small birds. It prefers to nest in open fields and woodlands and pine savannah habitats with large, dead trees containing excavated cavities (FWC, 2017). The FNAI database review indicated one reported occurrence of the species within 1 miles of the Site. However, since the Site and temporary parking and construction laydown area lacks large dead trees with cavities suitable for nesting by the species, nesting habitat is not present in these areas. Therefore, the likelihood of it occurring in these areas is low.

Eastern Indigo Snake (T) – The eastern indigo snake is classified as threatened by both the FWC and USFWS. The eastern indigo snake is a non-venomous, bluish-black colored snake that can reach lengths of eight feet. Its chin, cheek, and throat are mostly red or brown, but can also be white or black. Most indigo snakes have smooth scales, although adults do have keels (ridges) on the front of some of their scales (FNAI, 2001). Eastern indigo snakes inhabit pine flatwoods, hardwood forests, moist hammocks, and areas that surround cypress swamps. They can be found throughout Peninsular Florida (FWC, 2017). This species occasionally utilizes gopher tortoise burrows as refugia, especially during the winter months in the northern portion of the state. No individuals were observed during the field reconnaissance of the Site and the temporary parking and construction laydown area, and the FNAI GIS database did not report any occurrences of the species within 5 miles of the Site. Although the potential of occurrence is low, potential refugia in the form of gopher tortoise burrows were observed within the Site and temporary parking and construction laydown area, and adjacent areas to the north and east of the Site may provide suitable habitat for the species.

3.4.1.9 Pre-Existing Stresses

The greatest pre-existing stress to ecological systems within the Site and surrounding vicinity is the result of industrial, utility, commercial, and (limited) residential development. The natural topography and soils have been previously altered due to vegetation clearing and topographic grading. The majority of natural ecosystems and wildlife habitat which may have previously been located within the Site has been lost.

3.4.1.10 Measurement Programs

Terrestrial ecological resources were evaluated through field reconnaissance, habitat classification, database queries, aerial photography, and literature searches. Vegetative communities, wildlife utilization, and potential for threatened and endangered wildlife occurrence were addressed during field reconnaissance conducted in October 2017.

3.4.2 Noise

In December 2017, Golder performed a comprehensive baseline noise study at the SHCCF Certified Site. From a noise perspective, the Site is located in a moderate-level ambient noise environment with mixed industrial and residential land uses in the immediate vicinity. The overall sound pressure levels were variable throughout the monitoring periods, with greater incidence of transient noise from human activities during the daytime hours than nighttime hours.

Golder utilized sound measurement techniques set forth by the American National Standards Institute (ANSI) S12.9-1993/Part 3, including:

- Short-term measurements with an observer present, and
- Use of a Type - 1 sound level meter set to the fast response mode to obtain consistent, integrated, A-weighted sound pressure levels (SPLs).

Golder also measured concurrent one-third octave band frequencies at all monitoring locations. The octave band data from each monitoring location were measured and stored during each monitoring period.

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

- L_{eq} – The SPL averaged over the measurement period; this parameter is the continuous steady SPL that would have the same total acoustic energy as the real fluctuating noise over the same time period.
- L_{max} – The maximum SPL for the sampling period.
- L_{min} – The minimum SPL for the sampling period.
- L_n – The SPLs that were exceeded n percent of the time during the sampling period. For example, L_{90} is the level exceeded 90 percent of the time.

The SPL data were analyzed in both decibels (dB) and A-weighted decibels (dBA). All data in this SCA will be showing in dBA. The higher the decibel value, the louder the sound.

The SPL averages were calculated using the following formula:

$$\text{Average SPL} = 10 \log \frac{\sum_{i=1}^N 10^{(SPL_i/10)}}{N}$$

where: N = number of observations
 SPL_i = individual SPL in data set

The noise monitoring equipment used during the study included:

- Larson Davis Model 831 Precision Integrating Sound Level Meters with Real Time Frequency Analyzers
- Larson Davis Model PRM902 Microphone Preamplifier
- Larson Davis Model 2560 Pre-polarized ½-inch Condenser Microphone
- Windscreen, tripod, and various cables
- Larson Davis Model CAL200 Sound Level Calibrator (CAL200), 94/114 dB at 1,000 Hz

Monitoring was conducted using the sound level meter mounted on a tripod at a minimum height of 1.5 meters (5 feet) above grade. A windscreen was used since measurements were taken outdoors. The windscreen protects the microphone from interference from wind up to a constant wind speed of 12 miles per hour (mph). The microphone was positioned so that a random incidence response was achieved. The

sound level meter and octave band analyzer were calibrated immediately prior to and just after each sampling period using the CAL200 to provide a quality control check of the sound level meter's operation during monitoring.

The operator recorded detailed field notes during monitoring that included major noise sources in the area. The Larson Davis sound level meters comply with Type I – Precision requirements set forth for sound level meters and for one-third octave filters. All equipment used was up-to-date with required calibrations, and certifications can be provided upon request from Golder.

Monitoring locations were chosen based on the proximity to the closest identified receptors with priority given to sensitive receptors. Sensitive receptors include residential land uses, hospitals, and schools. The locations also had to be secure, accessible, and at appropriate distances from barriers that may interfere with sound propagations (such as buildings or wooded areas) and from localized noise sources (such as roadways or agricultural equipment) that do not represent the typical acoustical makeup of the location.

The monitoring was conducted during two daytime periods (morning and afternoon) and once during nighttime hours at each of the 6 monitoring locations illustrated in Figure 3.4.2-1. The monitoring locations selected represent the following:

- The SHCCF Certified Site (On-Site Receptor)
- The closest residential receptor to the east (Receptor 1)
- The closest residential receptor to the west (Receptor 2)
- Nearest school southwest of the site (Receptor 3)
- Nearest school northeast of the site (Receptor 4)
- A location within the North Suncoast Industrial Park (Receptor 5)

The On-Site monitoring was set up as a continuous monitoring program to collect data over a 24-hour period and the measurements at the five off-site receptors were collected for three 15 minute periods per receptor. All measurements were collected using 1-minute intervals. The monitoring locations are numbered to correspond with the receptor that they represent. Monitoring location 1 was relocated during the daytime hours to avoid construction activities adjacent to the planned location that would have interfered with baseline data collection. The nighttime measurement was collected at the original location. The two monitoring locations near Receptor 1 are presented in Figure 3.4.2-1.

3.4.2.1 Noise Standard

There are no Florida or federal non-OSHA noise regulations applicable to the Project. SHGS and SHCCF are located within unincorporated Pasco County Florida, which has a noise ordinance codified in Article IV, Division 2, Section 66-91 – 66.97 in the Code of Ordinances – Pasco County, Florida (see Appendix 10.3). The noise code establishes maximum permissible sound levels for residential and commercial (zoning) districts as received at the property line. Maximum permissible sound levels are established for uses in

Industrial and Commercial districts. For the purposes of compliance, the SHCCF Certified Site is considered an industrial land use authorized through special exception. The Project should be subject to the following maximum noise level limits:

Time of Day	Adjoining Commercial District	Adjoining Residential District ^a
Daytime (7:00 a.m. to 6:00 p.m.) Monday through Saturday	72 dBA	66 dBA
Nighttime (6:00 p.m. to 7:00 a.m.) Monday through Saturday	72 dBA	55 dBA
All day Sunday		
Construction General	Power-driven equipment must have a muffler or noise-reduction device	
Construction equipment operated near a residentially zoned area on a 24-hour basis Nighttime (6:00 p.m. to 7:00 a.m.) daily	NA	55 dBA with or without an acoustical barrier or shielding
Construction Nighttime (10:00 p.m. to 7:00 a.m.) Monday through Saturday	NA	55 dBA
All day Sunday		

^a Measured at the nearest property line of the closest adjacent residentially zoned property line.

No noise shall be created in an industrial or commercial zone which exceeds those levels identified above, as measured on the adjoining commercial or residentially zoned property line.

For impulsive noise sources, such as a pile driver, the noise standards are increased by 10 dBA during the daytime hours, but may not exceed the limits during Nighttime hours. Under the Pasco County noise ordinance, "impulsive noises are those "characterized by brief excursions of sound pressure which significantly exceed the ambient noise level." Section 66.91, Pasco County Code of Ordinances.

There is no specific noise limit for schools, but for the purposes of this study we assumed the residential standards apply during school hours.

3.4.2.2 Baseline Sound Monitoring Results

The monitoring was conducted during two daytime periods (morning and afternoon) and once during nighttime hours at each of the 6 monitoring locations illustrated in Figure 3.3.7-1. The existing SHGS simple cycle units were not operating during this monitoring period.

Table 3.4.2-1 shows a summary of the data collected at the monitoring locations and a description of the noise technician's observations. The summary includes: (a) the average L_{eq} for each measurement, (b) the sound level that is exceeded 90 percent of the time (L_{90}), (c) the instantaneous minimum sound level; and (d) the instantaneous maximum sound levels. Because transient sound sources can vary from hour to hour or even minute to minute, the L_{90} is better used for comparing noise levels between times of day or between study areas. Additionally the noise sources generated by the Site will operate constantly and therefore will

have more impact on the L_{90} noise level than the L_{eq} . The results show that existing sound levels at the monitored locations are affected by transient noise sources, mostly traffic noise, and that sound levels decreased during the nighttime hours when traffic volume decreased. While the L_{eq} indicate that the county daytime standard was exceeded at monitoring locations 1 and 2, these exceedances were caused by the noted transient noise sources.

One-minute average noise levels were plotted graphically for the On-Site monitoring location and can be found in Figure 3.3.7-2.

At the monitoring locations for the four sensitive receptors, including the closest schools and residences, the daytime L_{90} noise levels ranged from 41.0 dBA at Receptor 3 to 52.1 dBA at Receptor 2, compared to the most limiting daytime (Sunday) standard of 55 dBA applicable to residentially zoned land.

At the monitoring locations for the two industrial receptors, the daytime L_{90} noise levels ranged from 44.5 dBA at Receptor 5 to 47.0 dBA at the On-Site location, which are below the standard of 72 dBA.

At the monitoring locations for the four sensitive receptors, the nighttime L_{90} noise levels ranged from 36.7 dBA at Receptor 3 to 51.2 dBA at Receptor 2 which are below the nighttime standard of 55 dBA. At the industrial receptors, the nighttime L_{90} noise levels ranged from 41.0 dBA at Receptor 5 to 45.7 dBA at the On-Site location, which are below the standard for commercial receptors of 72 dBA.

Sound measurements were mostly dominated by local traffic, existing industrial noise sources, and occasional sounds of nature including bird and insect noise. Receptor 2 was located the closest to the existing wastewater treatment plant and this noise source dominated the noise level there during both the daytime and nighttime hours. In general, the noise levels decreased the further away from the industrial area the measurements were collected.

The monitored noise levels reflect existing conditions that are lower than the Pasco County noise limits, though traffic noise at Receptors 1 and 2 did have elevated noise levels that when calculated as L_{eq} exceed to the County standard when traffic is present.

3.4.2.3 Simple Cycle Noise Impact Analysis

When the baseline noise measurements were taken in 2017, the existing SHGS simple cycle units were off line. In order to predict the additional noise generated from their operation, Golder calculated their impact based on earlier field measurements. In January 2002, Golder measured far-field noise levels for each of the three simple cycle units operating individually on oil and on natural gas at a distance of 400 feet at each accessible cardinal direction (north, east, south, and west). The purpose of these measurements was to confirm that the units met the noise levels guaranteed by the combustion turbine vendor.

For purposes of the SHCCF noise study and more accurate baseline noise levels, Golder used the 2002 measurements to estimate worst-case noise impacts from the SHGS units. Using that data, Golder

estimated the cumulative noise level from all three combustion turbines operating at the same time while firing natural gas, which was 63.9 dBA at 400 ft. Golder relied on noise levels monitored while the units were firing natural gas because it is the typical fuel used during normal operations. Golder used the cumulative noise level of 63.9 dBA at 400 feet to calculate expected noise levels caused by the combustion turbines at longer distances, i.e., the two schools, the two residential areas, and the industrial area. In calculating the expected noise levels at these longer distances, Golder assumed that the combustion turbine noise from all three units combined originated at the center simple cycle unit. Golder also used the following distance attenuation calculation:

The geometric spreading loss A_s , in dBA, between two points at a distance r_1 and r_2 from a source can be expressed as:

$$A_s = 20g \log_{10}(r_2/r_1) \text{ dBA}$$

where $g = 1$ the constant given by the geometry of the source

Using this formula to estimate noise levels at further distances could be considered conservative since the loudest noise measurement was used regardless of direction from the unit, and ground and barrier attenuation were not taken into account even though the result would be lower calculated noise levels. The calculated noise levels resulting from simultaneous operation of all three SHGS simple cycle units are presented below:

Receptor Location	Distance from SHGS (feet)	Sound Level (dBA)
Reference Source	400	64
1: Residences Northeast	1,943	50
2: Residence to the West	1,678	51
3: School to the Southwest	2,509	48
4: School to the Northwest	4,573	43
5: Industrial Area to South	714	59

These calculated noise levels would be constant regardless of the time of day as long as all three units were operating. If one or two units are operating, the sound levels would be lower. The resulting sound levels are below all corresponding Pasco County noise standards during the daytime, nighttime, and on Sunday.

3.4.3 Other Environmental Features

3.4.3.1 Lighting

There is no light source within the SHCCF Certified Site at the present time. Adjacent light sources include the SHGS, and a commercial warehouse to the west and south of the SHCCF Certified Site, respectively. Nearby light sources include Pasco County's Shady Hills Wastewater Treatment Plant to the west and the Pasco County Solid Waste Resource Recovery Facility to the north.

TABLES

Table 3.2.1-2a: State Governmental Jurisdictions within 1-, 2-, 3-, 4-, and 5-Mile Radii

Name	Map ID	Governmental Jurisdiction										Managing Agency
		Historic Bridges	Historic District	Historic Structures	Historic Cemeteries	Florida Manged Lands	SWFWMD Owned Lands	State Landmark	FDEP Conservation Lands	State Trails	Scenic Byways	
Crews Lake Wilderness Park	1					X			X			Pasco County
Cross Bar Ranch Wellfield	2					X			X			Pinellas County
Jumping Gully Conservation Area	3					X						Pasco County
Lone Star Ranch Conservation Easement	4					X						Pasco County
Masaryktown Canal	5						X		X			Southwest Florida Water Management District
Morsani Conservation Easement	6								X			Pasco County
Morsani Ranch	7								X			Pasco County
Old Florida Mitigation Bank	8					X						EIP Credit Company, LLC
Starkey Wilderness Preserve & Park	9					X	X					Southwest Florida Water Management District
Upper Pithlachascotee River Historic Bridge	10	X										Pasco County
Upper Pithlachascotee River Preserve	11					X			X			Pasco County
Suncoast Recreation Trail	17									X		Florida Department of Transportation
State Road 52 Trail	18									X		Florida Department of Transportation
Suncoast Scenic Parkway	19										X	Florida Department of Transportation

Table 3.2.1-2b: County Governmental Jurisdictions within 1-, 2-, 3-, 4-, and 5-Mile Radii

Name	Map ID	Governmental Jurisdiction	Managing Agency
Crews Lake Wilderness Park	1	Park	Pasco County
Anclote/Cotee Watersheds	12	Ecological Planning Unit	Pasco County
Arthur F Engle Memorial Park	13	Park	Pasco County
Concourse Nature Center	14	Park	Pasco County
Elsie Logan Memorial Park	15	Park	Pasco County
Hernando Sandhills	16	Ecological Planning Unit	Pasco County
Suncoast Recreation Trail	17	Park	Florida Department of Transportation

Table 3.2.3-3: Employment By Occupation/Industrial Groups

Major Industry Group	Workforce Development Area 16 (Hernando and Pasco Counties)				State of Florida			
	Employment (2017)	% of total	Employment Projection (2025)	% Change	Employment (2017)	% of total	Employment Projection (2025)	% Change
All Industries	175,563	100.00%	195,897	11.58%	9,316,220	100.00%	10,366,167	11.27%
Agricultural, Forestry, Fishing and Hunting	826	0.47%	805	-2.54%	72,450	0.78%	67,858	-6.34%
Mining	128	0.07%	126	-1.56%	4,377	0.05%	4,395	0.41%
Construction	12,354	7.04%	14,453	16.99%	499,811	5.36%	578,352	15.71%
Manufacturing (Durable & Non- Durable)	5,815	3.31%	6,104	4.97%	361,197	3.88%	370,295	2.52%
Trade, Transportation, and Utilities	38,337	21.84%	41,099	7.20%	1,764,147	18.94%	1,919,556	8.81%
Information	1,509	0.86%	1,535	1.72%	137,393	1.47%	138,474	0.79%
Financial Activities	5,544	3.16%	6,076	9.60%	563,939	6.05%	617,313	9.46%
Professional and Business Services	16,722	9.52%	19,493	16.57%	1,332,376	14.30%	1,532,280	15.00%
Education and Health Services	32,184	18.33%	37,962	17.95%	1,292,873	13.88%	1,536,285	18.83%
Leisure and Hospitality	21,017	11.97%	23,879	13.62%	1,213,999	13.03%	1,362,433	12.23%
Other Services (except public administration)	6,513	3.71%	7,045	8.17%	356,591	3.83%	389,693	9.28%
Government	23,918	13.62%	25,439	6.36%	1,100,159	11.81%	1,167,334	6.11%

Source: Florida Department of Economic Opportunity 2017, Employment Projections 2017-2025 Statewide and Regional Projections.

Table 3.2.7-1: Employment By Occupation/Industrial Groups

Major Industry Group	Workforce Development Area 16 (Hernando and Pasco Counties)				State of Florida			
	Employment (2017)	% of total	Employment Projection (2025)	% Change	Employment (2017)	% of total	Employment Projection (2025)	% Change
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Government	23,918	13.62%	25,439	6.36%	1,100,159	11.81%	1,167,334	6.11%

Source: Florida Department of Economic Opportunity 2017, Employment Projections 2017-2025 Statewide and Regional Projections.

Table 3.2.7-3: Housing Characteristics

Region			Pasco County	Hernando County	Florida
No. of Households	2010	#	183,457	70,035	7,035,068
	2016	#	195,628	74,262	7,573,456
% Change		%	6.63%	6.04%	7.65%
Total Housing Units	2010	#	229,234	84,504	8,994,091
	2016	#	236,491	85,066	9,302,140
% Change in Units		%	3.17%	0.67%	3.43%
Owner Occupied Housing Units	2010	#	144,148	56,345	4,794,130
		%	78.60%	80.50%	68.10%
	2016	#	140,560	58,214	4,857,125
		%	71.90%	78.40%	64.10%
% Change in Units		%	-2.49%	3.32%	1.31%
Renter Occupied Housing Units	2010	#	39,309	13,690	2,240,938
		%	21.40%	19.50%	31.90%
	2016	#	55,068	16,048	2,716,331
		%	28.10%	21.60%	35.90%
% Change in Units		%	40.09%	17.22%	21.21%
(Homeowner) Vacancy Rate	2010	#	3.70	4.90	4.10
	2016	#	2.80	2.40	2.50
(Rental) Vacancy Rate	2010	#	13.20	8.80	12.20
	2016	#	7.50	3.50	8.30
Unit Structure (1-unit detached)	2010	%	62.00%	70.70%	54.00%
	2016	%	64.40%	75.80%	54.40%
House Value (Median)	2010	\$	\$123,900	\$125,900	\$164,200
	2016	\$	\$145,000	\$126,800	\$197,700
% Change in Units		%	17.03%	0.71%	20.40%
Gross Rent (Median)	2010	\$	\$866	\$865	\$947
	2016	\$	\$985	\$933	\$1,086
% Change in Units		%	13.74%	7.86%	14.68%
Age of Housing Stock (Built since 1980)	2010	%	65.30%	77.90%	59.60%
	2016	%	62.80%	76.20%	61.40%

US Census, DP03 and DP04 datasets for 2010 and 2016

Table 3.3.3-1: Existing or Proposed Groundwater Withdrawals within 5-Miles of the Shady Hills Expansion Project

Map ID	Permit No.	Permittee	Latitude	Longitude	Use	Distance from Site (Miles)	Permitted Average Annual Withdrawal (gpd)	DIA (in.)	Casing Depth (ft)	Total Depth (ft)
1	12052	Shady Hills Power Company, LLC	28 21 53.76	82 33 25.33	Industrial And Commercial	0.1	660	5	140	250
2	12052	Shady Hills Power Company, LLC	28 21 53.76	82 33 27.90	Industrial And Commercial	0.1	152,300	16	230	600
3	12052	Shady Hills Power Company, LLC	28 21 54.01	82 33 32.54	Industrial And Commercial	0.2				
4	9087	Pasco County Utilities c/o Covanta Pasco Inc.	28 21 56.04	82 34 29.13	Un-categorized	1.1	720,000	12	100	550
5	6821	Suncoast Golf Inc	28 20 39.90	82 32 33.10	Landscape/Recreation	1.7	13,500	4	0	195
6	6821	Suncoast Golf Inc	28 20 39.80	82 32 33.00	Landscape/Recreation	1.7	72,000	8	0	535
7	6821	Suncoast Golf Inc	28 20 39.00	82 32 32.60	Public Supply	1.8	7,000	4	0	250
8	20197	Jacquelyn Krupski	28 21 59.54	82 35 13.73	Un-categorized	1.8	21,600	12	100	350
9	11863	Pasco County Utilities Attn: Michael J. Carballa,	28 20 25.20	82 32 37.35	Un-categorized	2	180,000	12	160	400
10	12524	Vince and Kathy Conner	28 22 47.20	82 35 34.79	Agricultural	2.4	4,100	6	100	100
11	11771	Tampa Bay Water	28 19 49.16	82 33 33.61	Public Supply	2.5	500,000	24	180	750
12	11634	James & Dorothy Mitchell Investments, Ltd./Attn: Dewey Mitchell	28 22 25.87	82 30 50.82	Agricultural	2.7	340,000	10	207	550
13	11634	James & Dorothy Mitchell Investments, Ltd./Attn: Dewey Mitchell	28 22 13.03	82 30 36.27	Agricultural	2.9	5,500	4	0	0
14	11634	James & Dorothy Mitchell Investments, Ltd./Attn: Dewey Mitchell	28 22 12.72	82 30 34.33	Agricultural	2.9	5,500	4	42	80
15	6785	Celia M Williams, Trustee	28 21 11.74	82 30 41.52	Agricultural	2.9	18,500	6	84	350
16	7672	Pasco Golf Associates, Inc. / Attn: Andy Padova	28 21 03.87	82 36 06.56	Landscape/Recreation	2.9	214,500	12	204	400
17	7672	Pasco Golf Associates, Inc. / Attn: Andy Padova	28 21 03.60	82 36 07.17	Landscape/Recreation	2.9	214,500	6	137	300
18	7672	Pasco Golf Associates, Inc. / Attn: Andy Padova	28 21 04.12	82 36 07.85	Landscape/Recreation	3	214,500	12	154	400
19	6785	Celia M Williams, Trustee	28 21 02.23	82 30 31.82	Agricultural	3.1	36,900	6	81	350
21	6785	Celia M Williams, Trustee	28 21 11.36	82 30 22.48	Agricultural	3.2	10,500	8	100	350
22	8598	Be-Mac's Service, Inc./Attn: Bruce McClendon	28 20 55.06	82 30 18.63	Agricultural	3.4	17,500	8	0	300
23	8598	Be-Mac's Service, Inc./Attn: Bruce McClendon	28 20 51.72	82 30 19.09	Agricultural	3.4	17,500	8	180	300
24	11128	Tampa Bay Water/Attn: Warren Hogg	28 21 44.67	82 30 02.24	Public Supply	3.4	160,000	8	200	700
25	13351	BAS and Sons LLC	28 23 45.00	82 36 09.40	Agricultural	3.4	4,000	4	0	0
26	13351	BAS and Sons LLC	28 23 45.20	82 36 09.40	Agricultural	3.4	18,600	10	86	0
27	13351	BAS and Sons LLC	28 23 42.94	82 36 11.67	Un-categorized	3.5	20,600	10	272	548
28	11129	Tampa Bay Water/Attn: Warren Hogg	28 22 34.07	82 29 53.05	Public Supply	3.6	208,000	10	200	700
29	12751	Frank Balish & Victoria Rey	28 23 32.47	82 36 32.37	Agricultural	3.6	16,200	10	84	250
30	20137	Jacquelyn Krupski	28 23 41.00	82 36 27.50	Un-categorized	3.7	10,300	10	100	300
31	4722	District School Board of Pasco County	28 25 10.51	82 32 54.52	Public Supply	3.7	26,600	8	0	120
32	4722	District School Board of Pasco County	28 25 12.00	82 32 56.20	Public Supply	3.7	26,600	8	0	100
33	11129	Tampa Bay Water/Attn: Warren Hogg	28 22 34.85	82 29 37.92	Public Supply	3.9	208,000	10	203	700
34	11132	Tampa Bay Water	28 23 06.47	82 29 35.64	Public Supply	4.1	200,000	8	203	708
35	20048	Michael Geschke	28 21 48.10	82 37 25.70	Un-categorized	4.1	11,010	6	0	0
36	20048	Michael Geschke	28 21 47.42	82 37 26.75	Un-categorized	4.1	11,010	5	140	0



Table 3.3.3-1: Existing or Proposed Groundwater Withdrawals within 5-Miles of the Shady Hills Expansion Project

Map ID	Permit No.	Permittee	Latitude	Longitude	Use	Distance from Site (Miles)	Permitted Average Annual Withdrawal (gpd)	DIA (in.)	Casing Depth (ft)	Total Depth (ft)
37	11131	Tampa Bay Water/Attn: Warren Hogg	28 22 18.84	82 29 21.83	Public Supply	4.1	84,000	6	200	350
38	6930	Jolander Well Drilling Inc	28 25 43.38	82 33 07.66	Industrial And Commercial	4.3	1,000	8	0	200
40	11863	Pasco County Utilities Attn: Michael J. Carballa,	28 25 33.34	82 34 58.30	Public Supply	4.4	836,000	10	141	525
41	13090	Outlaw Ridge, Inc., Attn: John Dalfino	28 23 31.19	82 29 21.31	Un-categorized	4.5	114	4	80	100
42	4649	Pinellas County Utilities	28 21 06.76	82 29 06.36	Public Supply	4.5	1,000	5	203	303
43	11771	Tampa Bay Water	28 18 15.12	82 34 42.90	Public Supply	4.5		24	205	750
44	11127	Tampa Bay Water/Attn: Warren Hogg	28 22 56.56	82 29 06.02	Public Supply	4.5	498,000	10	200	700
45	12934	Angeline Corp/Attn: Jennifer Bexley	28 18 23.35	82 31 35.38	Un-categorized	4.5	150,600	6	50	200
46	4649	Pinellas County Utilities	28 20 47.13	82 29 09.01	Public Supply	4.5	149,000	8	200	400
47	20614	Seven Diamonds, LLC/Attn: Dan Aldridge	28 23 31.16	82 29 11.70	Un-categorized	4.6	2,400	4	126	180
48	20614	Seven Diamonds, LLC/Attn: Dan Aldridge	28 23 25.26	82 29 05.79	Un-categorized	4.7	30,900	6	0	0
49	12891	Enrique & Rosa Capote	28 26 04.42	82 33 26.92	Agricultural	4.7	32,500	6	80	200
50	12891	Enrique & Rosa Capote	28 26 05.94	82 33 26.79	Agricultural	4.7	200	4	80	120
51	10941	Serve & Educate, LLC / Attn: Danyelle Baughman	28 19 42.28	82 29 23.57	Agricultural	4.8	15,200	12	200	400
52	11771	Tampa Bay Water	28 22 34.34	82 28 39.46	Public Supply	4.9		24	154	485
53	4649	Pinellas County Utilities	28 21 20.41	82 28 38.83	Public Supply	4.9	650,000	12	105	619
55	10499	Jeffrey Jackson	28 19 46.60	82 37 33.50	Landscape/Recreation	4.9	86,300	4	42	60
56	11771	Tampa Bay Water	28 21 44.52	82 28 33.00	Public Supply	4.9		24	155	700

Table 3.3.3-2: Existing or Proposed Surface Withdrawals within 5-Miles of the Shady Hills Expansion Project¹

Map ID	Permit No.	Permittee	Latitude	Longitude	Use	Distance from Site (Miles)	Permitted Average Annual Withdrawl (gpd)	DIA (in.)	Casing Depth (ft)	Total Depth (ft)
54	10499	Jeffrey Jackson	28 19 46.90	82 37 33.50	Landscape/Recreation	4.9	86,300	6	0	0
20	6785	Celia M Williams, Trustee	28 21 04.52	82 30 30.11	Agricultural	3.1	36,900	3	0	0
39	13090	Outlaw Ridge, Inc., Attn: John Dalfino	28 23 33.33	82 29 28.44	Un-Categorized	4.4	68,606	0	0	0

¹ See Figure 3.3.3-2 for Surface Water Withdrawal locations



Table 3.3.6-1: Non-listed Wildlife Species Observed or Likely to Occur Within the SHCCF Site and Associated Temporary Laydown Area

Common Name	Scientific Name	Habitat Observed
Black-and-white warbler	<i>Mniotilta varia</i>	Coniferous plantation (FLUCFCS 441)
Black racer	<i>Coluber constrictor</i>	Coniferous plantation (FLUCFCS 441)
Blue-gray gnatcatcher	<i>Polioptila caerulea</i>	Coniferous plantation (FLUCFCS 441)
Blue jay	<i>Cyanocitta cristata</i>	Coniferous plantation (FLUCFCS 441)
Brown anole	<i>Anolis sagrei</i>	Coniferous plantation (FLUCFCS 441)
Carolina chickadee	<i>Poecile carolinensis</i>	Coniferous plantation (FLUCFCS 441)
Carolina wren	<i>Thryothorus ludovicianus</i>	Coniferous plantation (FLUCFCS 441)
Downy woodpecker	<i>Picoides pubescens</i>	Coniferous plantation (FLUCFCS 441)
Nine-banded armadillo		Coniferous plantation (FLUCFCS 441) and Vacant Land (FLUCFCS 190)
Northern cardinal	<i>Cardinalis cardinalis</i>	Coniferous plantation (FLUCFCS 441)
Northern mockingbird	<i>Mimus polyglottos</i>	Coniferous plantation (FLUCFCS 441)
Northern parula	<i>Setophaga americana</i>	Coniferous plantation (FLUCFCS 441)
Pine warbler	<i>Setophaga pinus</i>	Coniferous plantation (FLUCFCS 441)
Red-bellied woodpecker	<i>Melanerpes carolinus</i>	Coniferous plantation (FLUCFCS 441)
Tufted titmouse	<i>Baeolophus bicolor</i>	Coniferous plantation (FLUCFCS 441)
Yellow-throated warbler	<i>Setophaga dominica</i>	Coniferous plantation (FLUCFCS 441)

Notes: Habitat classification based on Florida Land Use, Cover, and Forms Classification System (Florida Department of Transportation, 1999).

Table 3.3.6-2: FNAI Listed Plant and Wildlife Species in Pasco County

	Common Name	Scientific Name	Federal Status	State Status	Likelihood of Occurrence within SHCCF Site and Temporary Laydown Area
Plants	Auricled Spleenwort	<i>Asplenium erosum</i>	N	E	None
	Britton's Beargrass	<i>Nolina brittoniana</i>	E	E	Low
	Celestial Lily	<i>Nemastylis floridana</i>	N	E	None
	Hand Fern	<i>Ophioglossum palmatum</i>	N	E	None
	Narrowleaf Naiad	<i>Najas filifolia</i>	N	T	None
	Plume Polypody	<i>Pecluma plumula</i>	N	E	Low
	Pondspice	<i>Litsea aestivalis</i>	N	E	None
	Pygmy Pipes	<i>Monotropis reynoldsiae</i>	N	E	Low
	Sand Butterfly Pea	<i>Centrosema arenicola</i>	N	E	Low
	Sinkhole Fern	<i>Blechnum occidentale</i>	N	E	None
	Tampa Vervain	<i>Glandularia tampensis</i>	N	E	Low
Reptiles	Eastern Indigo Snake	<i>Drymarchon corais couperi</i>	T	FT	Low
	Florida Pine Snake	<i>Pituophis melanoleucus mugitis</i>	N	ST	Low
	Gopher Tortoise	<i>Gopherus polyphemus</i>	C	ST	Present
	Green Sea Turtle	<i>Chelonia mydas</i>	T	FT	None
	Kemp's Ridley Sea Turtle	<i>Lepidochelys kempii</i>	E	FE	None
	Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	E	FE	None
	Loggerhead Sea Turtle	<i>Caretta caretta</i>	T	FT	None
	Short-tailed Snake	<i>Lampropeltis extenuata</i>	N	ST	Low
Mammals	Sherman's Fox Squirrel	<i>Sciurus niger shermani</i>	N	SSC	Low
	West Indian Manatee	<i>Trichechus manatus</i>	T	FE	None
Birds	American Oystercatcher	<i>Haematopus palliatus</i>	N	ST	None
	Black Skimmer	<i>Rynchops niger</i>	N	ST	None
	Florida Burrowing Owl	<i>Athene cunicularia floridana</i>	N	ST	Low
	Florida Sandhill Crane	<i>Antigone canadensis pratensis</i>	N	ST	Low
	Florida Scrub-Jay	<i>Aphelocoma coerulescens</i>	T	FT	None
	Least Tern	<i>Sternula antillarum</i>	N	ST	None
	Little Blue Heron	<i>Egretta caerulea</i>	N	ST	None
	Marian's Marsh Wren	<i>Cistothorus palustris marianae</i>	N	ST	None
	Piping Plover	<i>Charadrius melodus</i>	T	FT	None
	Roseate Spoonbill	<i>Platalea ajaja</i>	N	ST	None
	Scott's Seaside Sparrow	<i>Ammodramus maritimus peninsulae</i>	N	ST	None
	Southeastern American Kestrel	<i>Falco sparverius paulus</i>	N	ST	Low
	Tri-colored Heron	<i>Egretta tricolor</i>	N	ST	None
	Wood Stork	<i>Mycteria americana</i>	T	FT	None

Federal Status Codes:

C – Candidate for federal listing
 E – Endangered
 N – Not Listed on the federal level
 T – Threatened

State Status Codes:

FE – Listed as Endangered on the federal level
 FT – Listed as Threatened on the federal level
 SSC – State species of special concern
 ST – State population listed as Threatened



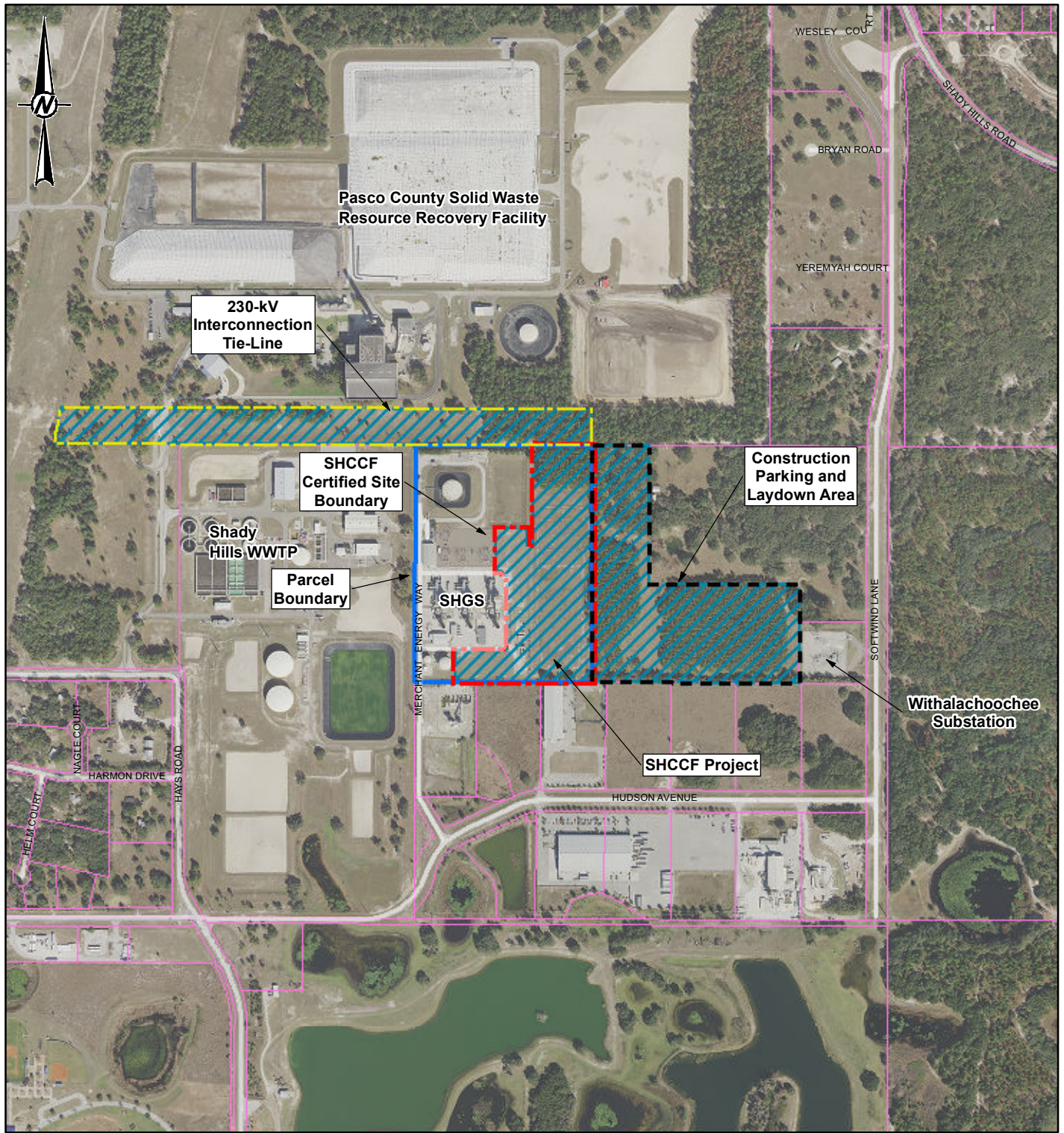
Table 3.3.7-1: Shady Hills Combined Cycle Baseline Noise Measurements - December 2017

Monitoring Location	Date	Period of day	Time	Sound Pressure Levels (dBA) ^a				Observations
				Min	Max	L ₉₀ ^b	Leq	
1: Residences Northeast	19-Dec-17	Morning	10:38	43.3	89.1	47.0	65	Local traffic noise, distant backup beepers
	18-Dec-17	Afternoon	12:38	38.1	84.9	42.3	66.1	Moderate traffic noise, nearby construction noise, sounds of nature
	18-Dec-17	Nighttime	23:10	39.4	68.5	41.1	49.3	Distant traffic, sounds of nature
2: Residence to the West	19-Dec-17	Morning	9:57	50.0	82.8	52.1	66.5	Moderate traffic noise, humming form power lines, water treatment plant noise
	18-Dec-17	Afternoon	13:28	47.4	86.9	50.7	68.5	Moderate to heavy traffic noise, humming form power lines, water treatment plant noise
	18-Dec-17	Nighttime	23:43	50.0	65.3	51.2	53.0	Distant water treatment plant, sounds of nature
3: School to the Southwest	19-Dec-17	Morning	9:37	41.6	71.6	46.7	58.2	Moderate traffic noise, backup beepers, sounds of nature
	18-Dec-17	Afternoon	13:44	36.8	76.4	41.0	56.6	Local traffic noise, sounds of nature, backup beepers
	19-Dec-17	Nighttime	0:00	34.7	63.5	36.7	46.3	Light local traffic, sounds of nature
4: School to the Northwest	19-Dec-17	Morning	10:14	41	75.6	42.9	52.6	Local traffic noise, sounds of nature, dogs barking
	18-Dec-17	Afternoon	12:09	39.1	72.5	41.5	49.6	Local traffic noise including truck noise, school noise,
	18-Dec-17	Nighttime	22:30	38.1	60.2	40.3	44.9	Distant traffic, sounds of nature
5: Industrial Receptors Southeast	19-Dec-17	Morning	11:00	43.8	63.5	46.5	51.1	Local traffic noise, sounds of nature
	18-Dec-17	Afternoon	12:59	42.7	66.1	44.5	51.6	Local traffic, backup beepers
	18-Dec-17	Nighttime	23:26	39.9	51.7	41.0	43.4	Distant traffic, sounds of nature
On-Site Monitoring	19-Dec-17	Morning	11:34	44.0	66.9	45.8	47.4	Nearby industry noise, local traffic
	18-Dec-17	Afternoon	14:44	45.1	69.9	47.0	48.7	Nearby industrial noise, sounds of nature
	19-Dec-17	Nighttime	0:27	43.5	61.6	45.7	47.5	Nearby hum from transformer, sounds of nature
Daytime Residential Sound Level Limit - Pasco County							66	
Nighttime (and all day Sunday) Residential Sound Level Limit - Pasco County							55	

Source: Golder Associates Inc, 2018.

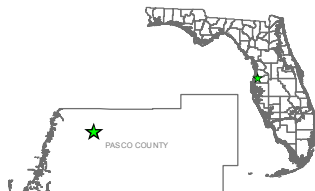
^a Sound levels do not include the operation of the SHGS simple cycle units^b The L₉₀ was used as the baseline data point as it limits the influence of transient noise sources which can change over time.

FIGURES



LEGEND

- SHCCF Project
- SHCCF Certified Site Boundary
- 230-kV Interconnection Tie-Line
- Construction Parking and Laydown Area
- Parcel Boundary
- Parcels



REFERENCE(S)

SHCCF PROJECT, CERTIFIED SITE BOUNDARY, GOLDER ASSOCIATES INC., 2017
 PARCELS, PASCO COUNTY, 12/15/2017

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE

SHCCF SITE LOCATION MAP

CONSULTANT



YYYY-MM-DD	2018-02-12
DESIGNED	NRL
PREPARED	NRL
REVIEWED	RAZ
APPROVED	MM

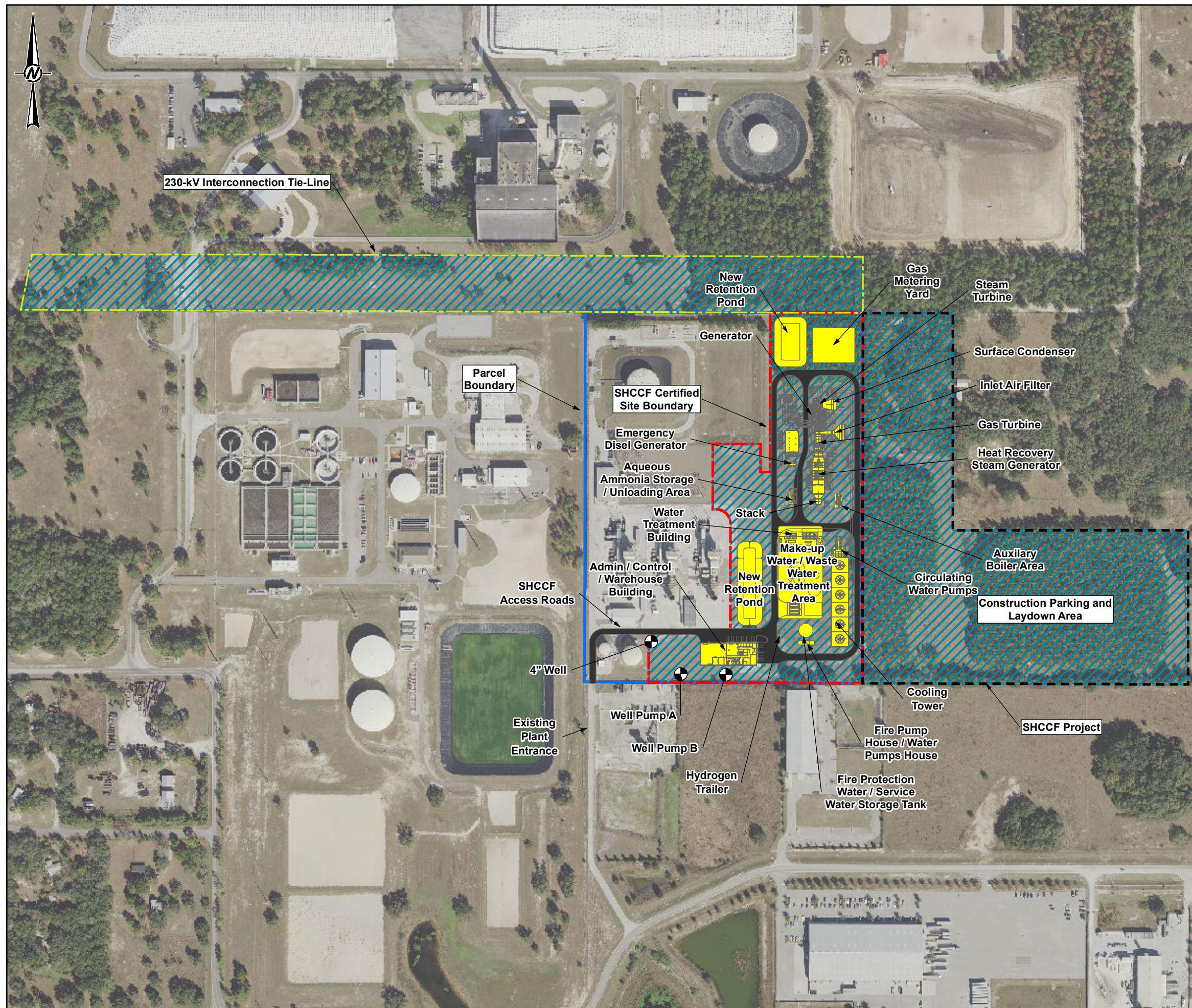
PROJECT NO.
1779520

CONTROL
H002

REV.
0

FIGURE
3.1-1

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- LEGEND**
- Well Locations (Approximate)
 - SHCCF Layout
 - SHCCF Major Components
 - SHCCF Access Roads
 - SHCCF Project
 - SHCCF Certified Site Boundary
 - Parcel Boundary
 - 230-kV Interconnection Tie-Line
 - Construction Parking and Laydown Area



REFERENCE(S)
EXISTING FACILITY FENCELINE, CERTIFIED SITE BOUNDARY, SHCCF PROJECT, GOLDER ASSOCIATES INC., 2017
PARCEL BOUNDARY, PASCO COUNTY, 2017
SHCCF MAJOR COMPONENTS, POWER ENGINEERS, 2017

CLIENT
SHADY HILLS ENERGY CENTER, LLC

PROJECT
SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

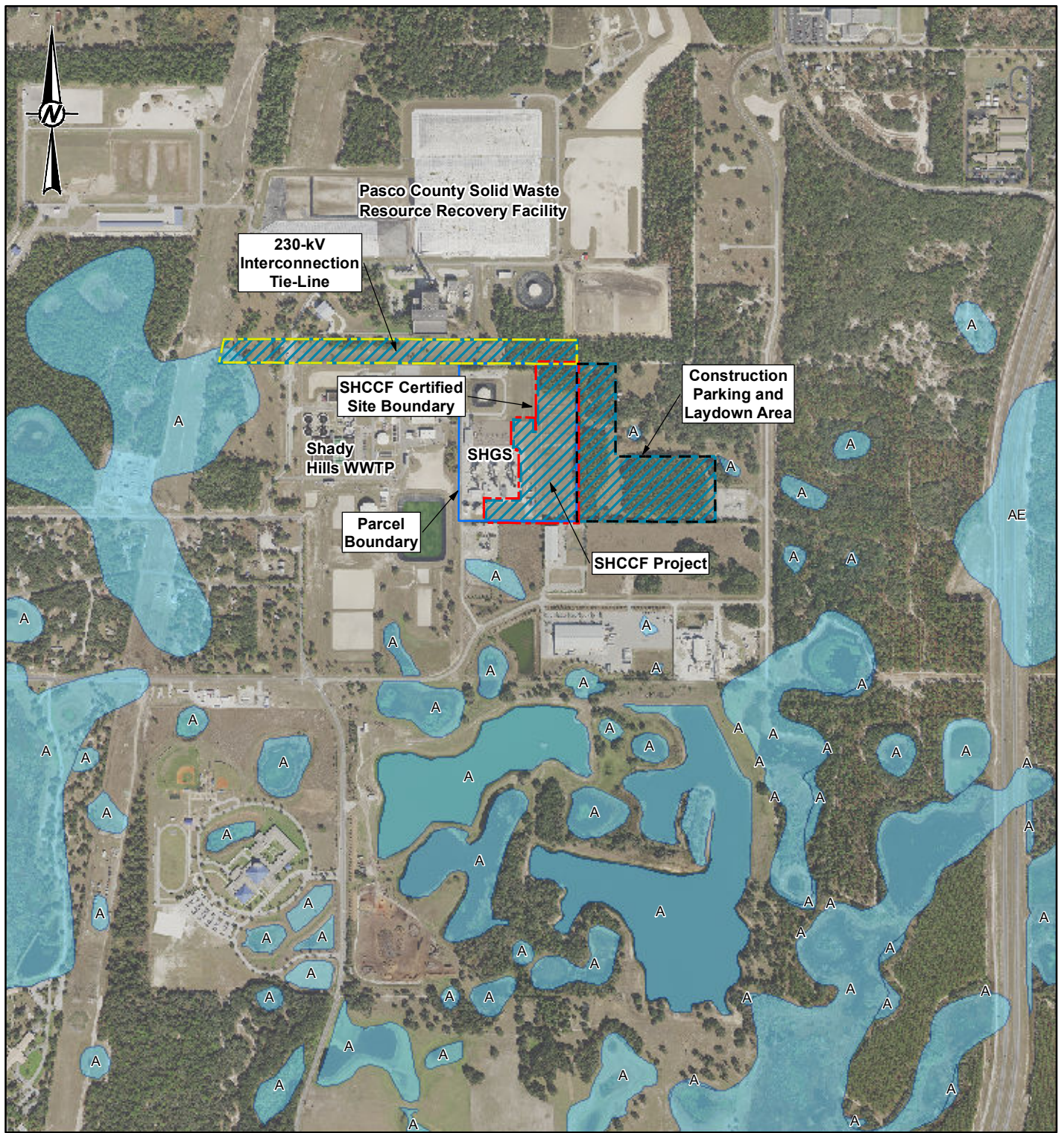
TITLE
SHCCF SITE PLAN

	CONSULTANT	YYYY-MM-DD	2018-02-15
	DESIGNED	NRL	
	PREPARED	NRL	
	REVIEWED	RAZ	
	APPROVED	MM	

PROJECT NO.	CONTROL	REV.
1779520	H003	0

FIGURE
3.1-2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



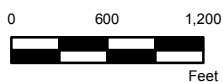
LEGEND

- SHCCF Project
- SHCCF Certified Site Boundary
- 230-kV Interconnection Tie-Line
- Construction Parking and Laydown Area
- Parcel Boundary

100-Year Flood Zone

A - Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.

AE - Areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. Base Flood Elevations (BFEs) are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.



REFERENCE(S)

SHCCF PROJECT, CERTIFIED SITE BOUNDARY, GOLDER ASSOCIATES INC., 2017
PARCEL BOUNDARY, PASCO COUNTY, 2017
FLOOD ZONES, FEMA, 2014

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE

**SHCCF
FEMA FLOOD ZONES**

CONSULTANT



YYYY-MM-DD 2018-02-12

DESIGNED NRL

PREPARED NRL

REVIEWED RAZ

APPROVED MM

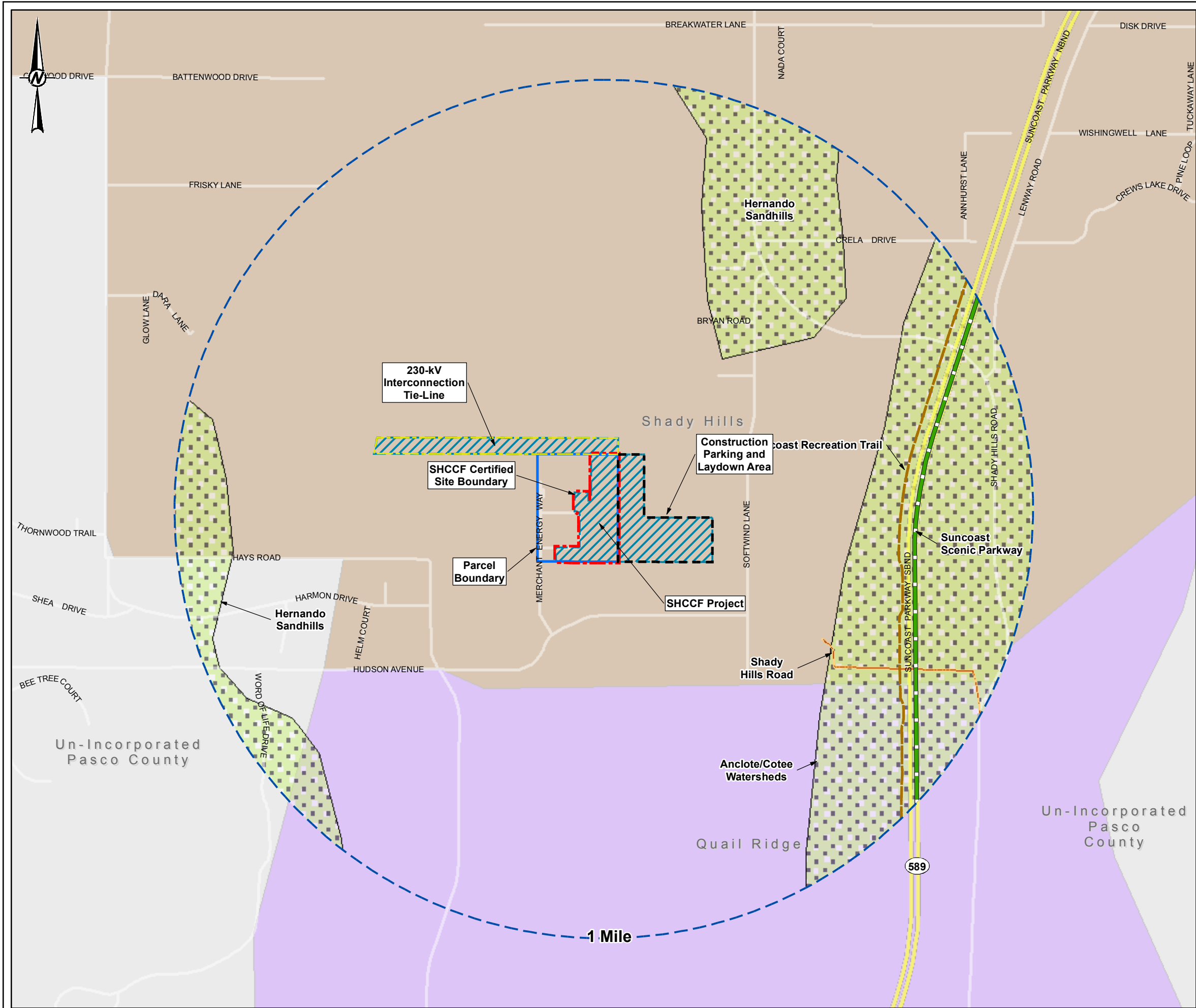
PROJECT NO.
1779520

CONTROL
H004

REV.
0

FIGURE
3.1.2-1

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LEGEND

- Trails
- Scenic Byways
- Historical Resource Groups
- Ecological Planning Units (County)
- SHCCF Project
- SHCCF Certified Site Boundary
- 230-kV Interconnection Tie-Line
- Construction Parking and Laydown Area
- Parcel Boundary

Census Designated Places

- Quail Ridge
- Shady Hills
- Un-Incorporated Pasco County

NOTE(S)

N/A

REFERENCE(S)

ECOLOGICAL PLANNING UNITS, PASCO COUNTY, 2017
SCENIC BYWAYS, FLORIDA DEPARTMENT OF TRANSPORTATION, 2017
TRAILS, FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION, 2017
HISTORICAL RESOURCE GROUPS, BUREAU OF ARCHAEOLOGICAL RESEARCH FLORIDA
MASTER SITE FILE, 2017

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE

GOVERNMENTAL JURISDICTIONS
WITHIN 1-MILE RADIUS OF SHCCF

CONSULTANT



YYYY-MM-DD 2018-02-12

DESIGNED NRL

PREPARED NRL

REVIEWED KB

APPROVED RAZ

PROJECT NO.
1779520

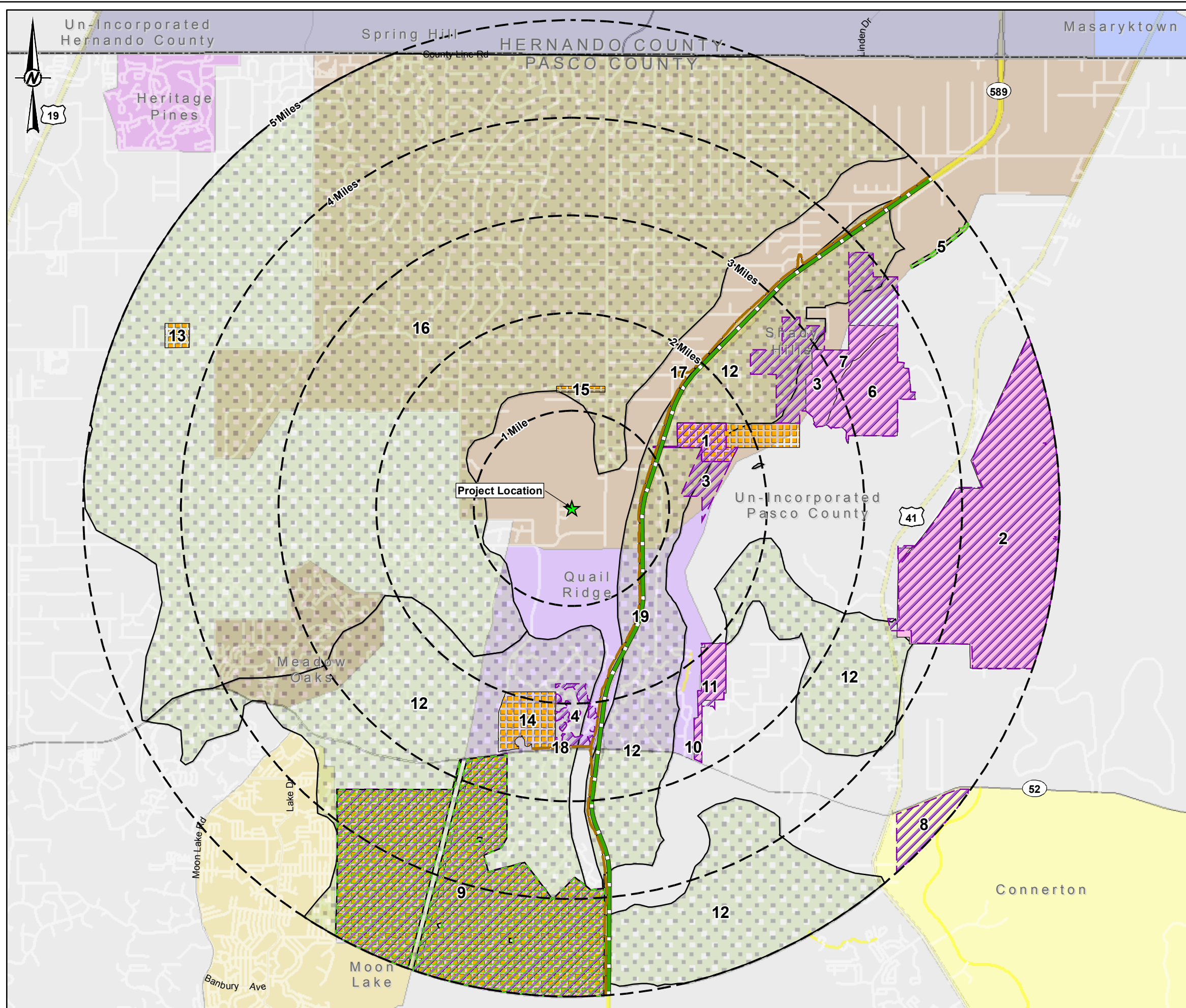
CONTROL
H007

REV.
0

FIGURE
3.2.1-1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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LEGEND

- ★ Project Location
- Historic Bridges (State)
- Trails (State)
- Scenic Byways (State)
- ▨ SWFWMD Owned Lands (WMD)
- ▨ Florida Managed Lands (State)
- ▨ Parks (County)
- ▨ Conservation Lands (State)
- ▨ Ecological Planning Units (County)

County Designated Places

- ▨ Connerton
- ▨ Heritage Pines
- ▨ Masaryktown
- ▨ Meadow Oaks
- ▨ Moon Lake
- ▨ Quail Ridge
- ▨ Shady Hills
- ▨ Spring Hill
- ▨ Un-Incorporated Hernando County
- ▨ Un-Incorporated Pasco County

NOTE(S)

SEE TABLES 3.2.1-2A AND 3.2.1-2B FOR GOVERNMENTAL JURISDICTION INFORMATION

REFERENCE(S)

SCENIC BYWAYS, FLORIDA DEPARTMENT OF TRANSPORTATION, 2017
TRAILS, CONSERVATION LANDS, FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION, 2017
HISTORIC BRIDGES, BUREAU OF ARCHAEOLOGICAL RESEARCH FLORIDA MASTER SITE FILE, 2017
FLORIDA MANAGED LANDS, FLORIDA CONSERVATION LANDS, FLORIDA NATURAL AREAS INVENTORY, 2016
ECOLOGICAL PLANNING UNITS, PASCO COUNTY, 2017

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE

**GOVERNMENTAL JURISDICTIONS WITHIN
1-, 2-, 3-, 4- AND 5-MILE RADIII OF SHCCF**

CONSULTANT	YYYY-MM-DD	2018-02-15
DESIGNED	NRL	
PREPARED	NRL	
REVIEWED	KB	
APPROVED	RAZ	

PROJECT NO.
1779520

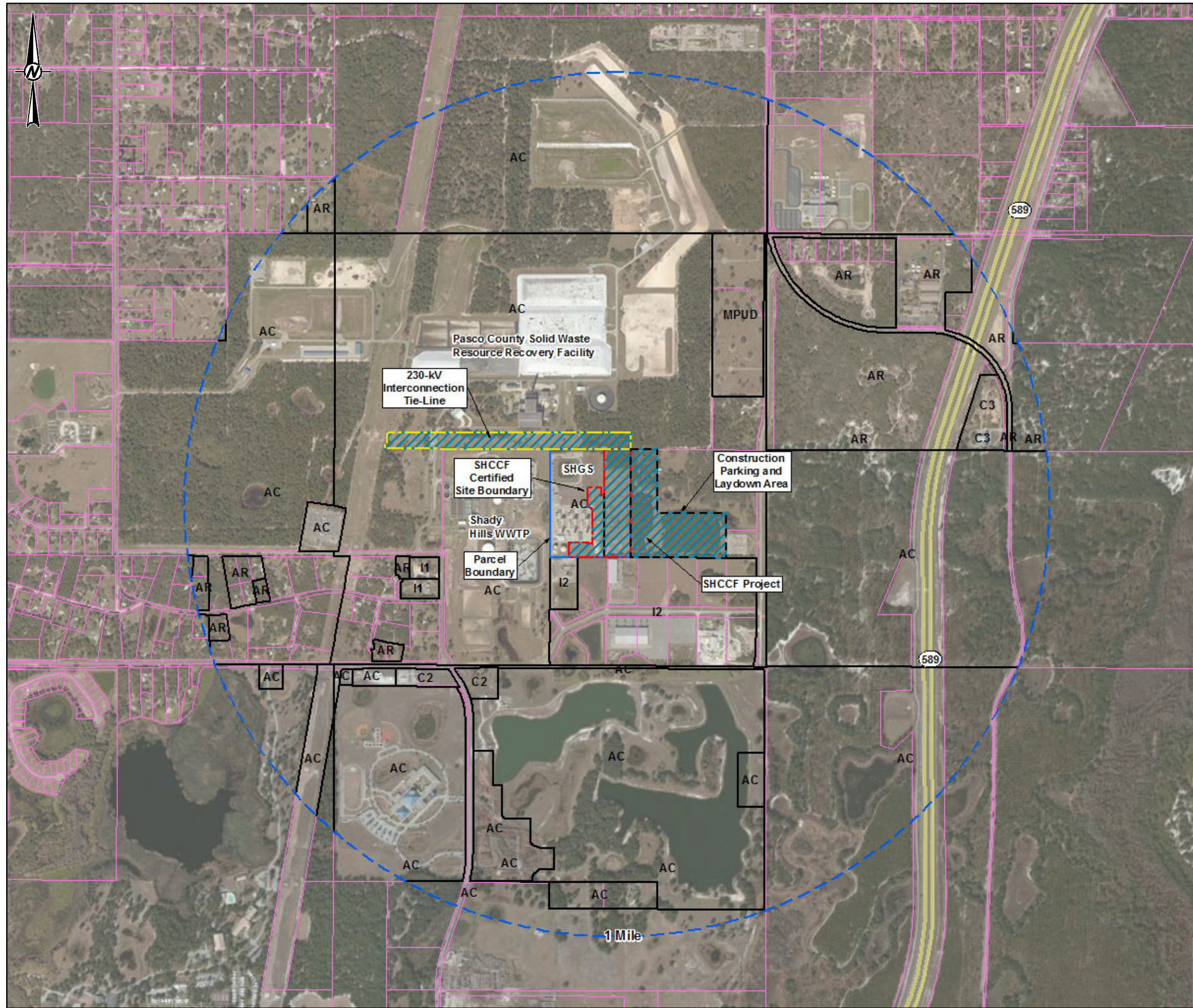
CONTROL
H008

REV.
0

FIGURE
3.2.1-2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

G:\PROJECTS\SGE_Energy_Systems\Shady_Hills\09_Parcel_Support\H1_SCA03_PRODUCTION\MXD\1779520_H015_Zoning\Map.mxd



LEGEND

- SHCCF Project
- SHCCF Certified Site Boundary
- 230-kV Interconnection Tie-Line
- Construction Parking and Laydown Area
- Parcel Boundary
- Pasco Un-Incorporated Zoning
 - AC - Agricultural District
 - AR - Agricultural-Residential District
 - C2 - General Commercial District
 - C3 - Commercial/Light Manufacturing District
 - I1 - Light Industrial Park District
 - I2 - General Industrial Park District
 - MPUD - Master Planned Unit Development District

0 600 1,200 2,400
Feet

NOTE(S)
N/A

REFERENCE(S)
ZONING, PARCELS, PASCO COUNTY, 2017

CLIENT
SHADY HILLS ENERGY CENTER, LLC

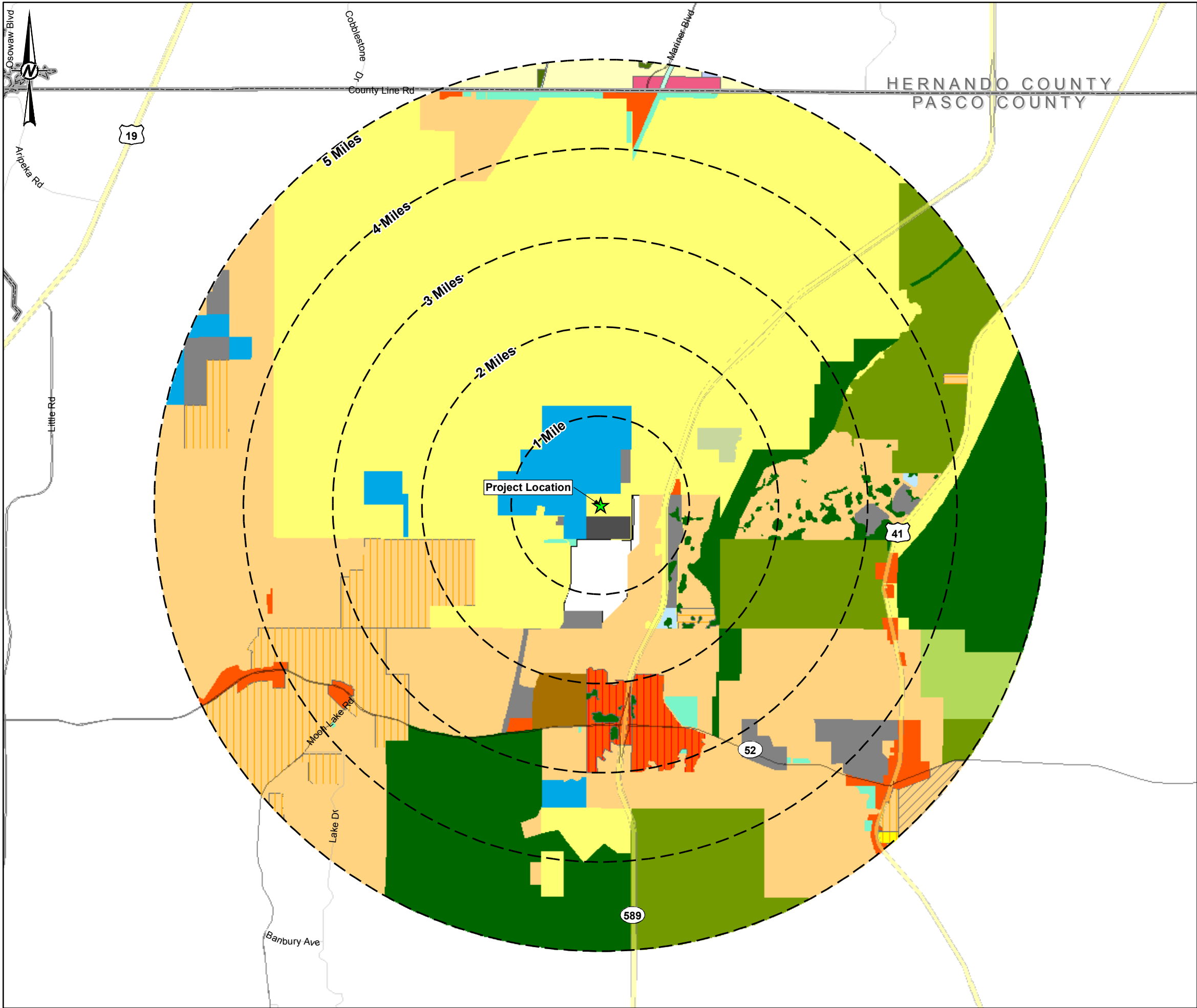
PROJECT
SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE
**PASCO COUNTY ZONING
WITHIN 1-MILE RADIUS OF SHCCF**

CONSULTANT	YYYY-MM-DD	2018-02-12
	DESIGNED	NRL
	PREPARED	NRL
	REVIEWED	KB
	APPROVED	RAZ

PROJECT NO. 1779520	CONTROL H015	REV. 0	FIGURE 3.2-2
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND

Project Location

Future Land Use - Pasco County

- AG - AGRICULTURAL-.1 du/ga*
- AG/R - AGRICULTURAL/RURAL-.2 du/ga*
- AT - MAJOR ATTRACTORS
- COM - COMMERCIAL
- CON - CONSERVATION LANDS
- EC - EMPLOYMENT CENTER
- IH - INDUSTRIAL-HEAVY
- IL - INDUSTRIAL-LIGHT
- MU - MIXED USES
- NT - NEWTOWN
- OFF - OFFICE
- P/SP - MAJOR PUBLIC/SEMI-PUBLIC
- PD - PLANNED DEVELOPMENT
- R/OS - MAJOR RECREATION/OPEN SPACE
- RES-1 - RESIDENTIAL-1 du/ga*
- RES-12 - RESIDENTIAL-12 du/ga*
- RES-3 - RESIDENTIAL-3 du/ga*
- RES-6 - RESIDENTIAL-6 du/ga*
- ROR - RETAIL/OFFICE/RESIDENTIAL

Future Land Use - Hernando County

- Commercial
- Education
- Public Facility
- Recreation
- Residential

NOTE(S)

* du / ga = DWELLING UNITS PER GROSS ACRE

REFERENCE(S)

FUTURE LAND USE, PASCO COUNTY AND HERNANDO COUNTY. 2017

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

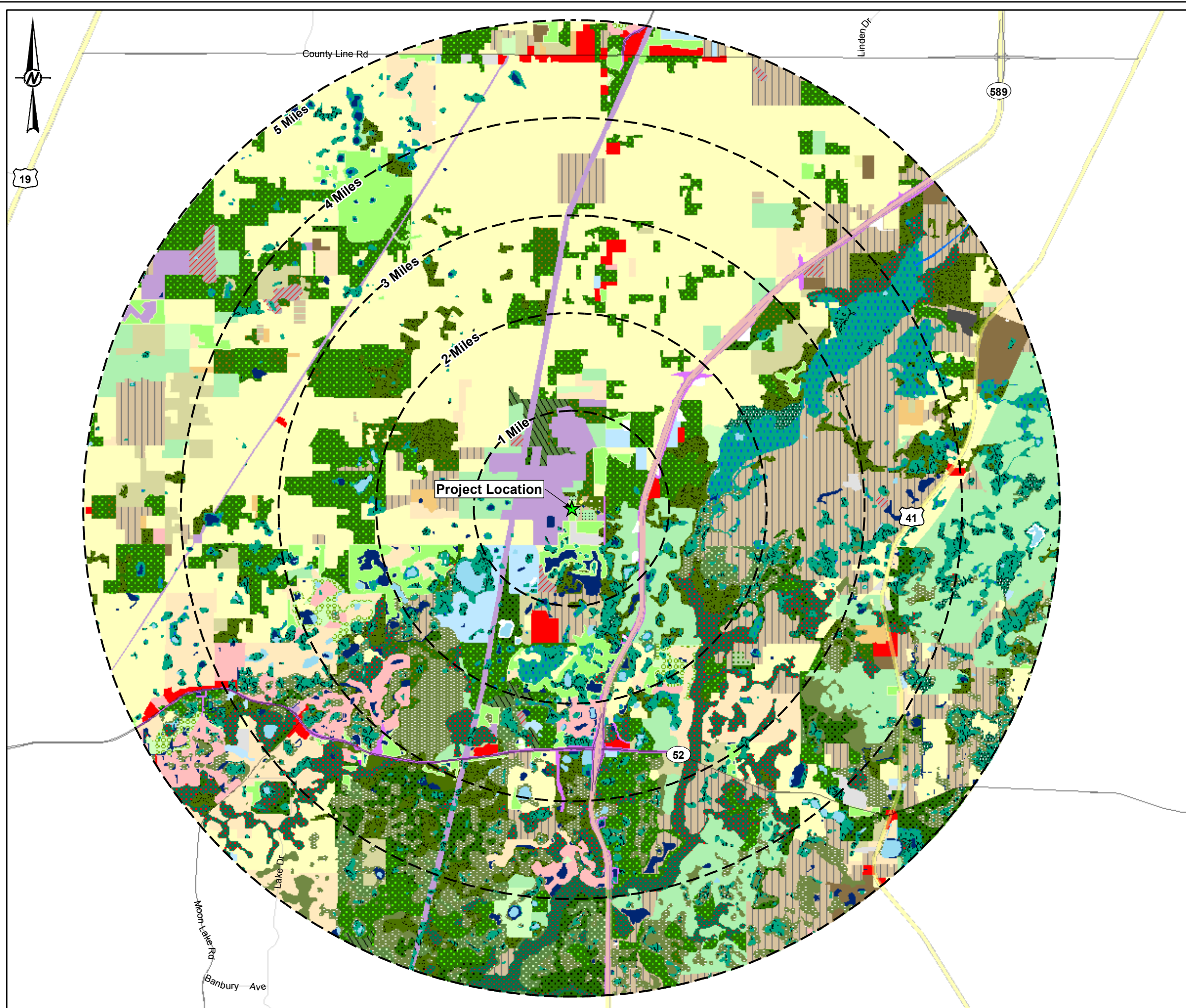
TITLE

**FUTURE LAND USE
WITHIN 5-MILES OF SHCCF**

	CONSULTANT	YYYY-MM-DD	2018-02-12
	DESIGNED	NRL	
	PREPARED	NRL	
	REVIEWED	KB	
	APPROVED	RAZ	

PROJECT NO. 1779520	CONTROL H010	REV. 0	FIGURE 3.2.2-1
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G:\PROJECTS\GE_Energy_Systems\Shady_Hills\09_PROJECT\S1779520_Perm_SuperH1_SCA02_PRODUCTION\MXD\1779520_H011_ExistingLandUse5Miles.mxd



LEGEND

Project Location

Existing Land Use (FLUCCS Level III)

Residential Low Density

Low Density Single Family

Residential Med. Density

Residential High Density

Commercial and Services

Industrial

Extractive

Institutional

Recreational

Golf Course

Open Land

Cropland and Pastureland

Improved Pasture

Row Crops

Tree Crops

Feeding Operations

Nurseries and Vineyards

Speciality Farms

Other Open Lands - Rural

Herbaceous

Upland Shrub and Brushland

Mixed Rangeland

Upland Coniferous Forest

Pine Flatwoods

Longleaf Pine - Xeric Oak

Upland Hardwood Forests; 4300

Live Oak

Hardwood - Conifer Mixed

Plantations

Coniferous Plantations

Streams and Waterways

Lakes

Reservoirs

Bay Swamps

Wetland Coniferous Forest

Cypress

Wetland Forested Mixed

Freshwater Marshes

Wet Prairies

Emergent Aquatic Vegetation

Disturbed Land

Transportation

Communication

Utilities

NOTE(S)

N/A

REFERENCE(S)

LAND USE (FLUCCS LEVEL III), SWFWMD, 2011

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

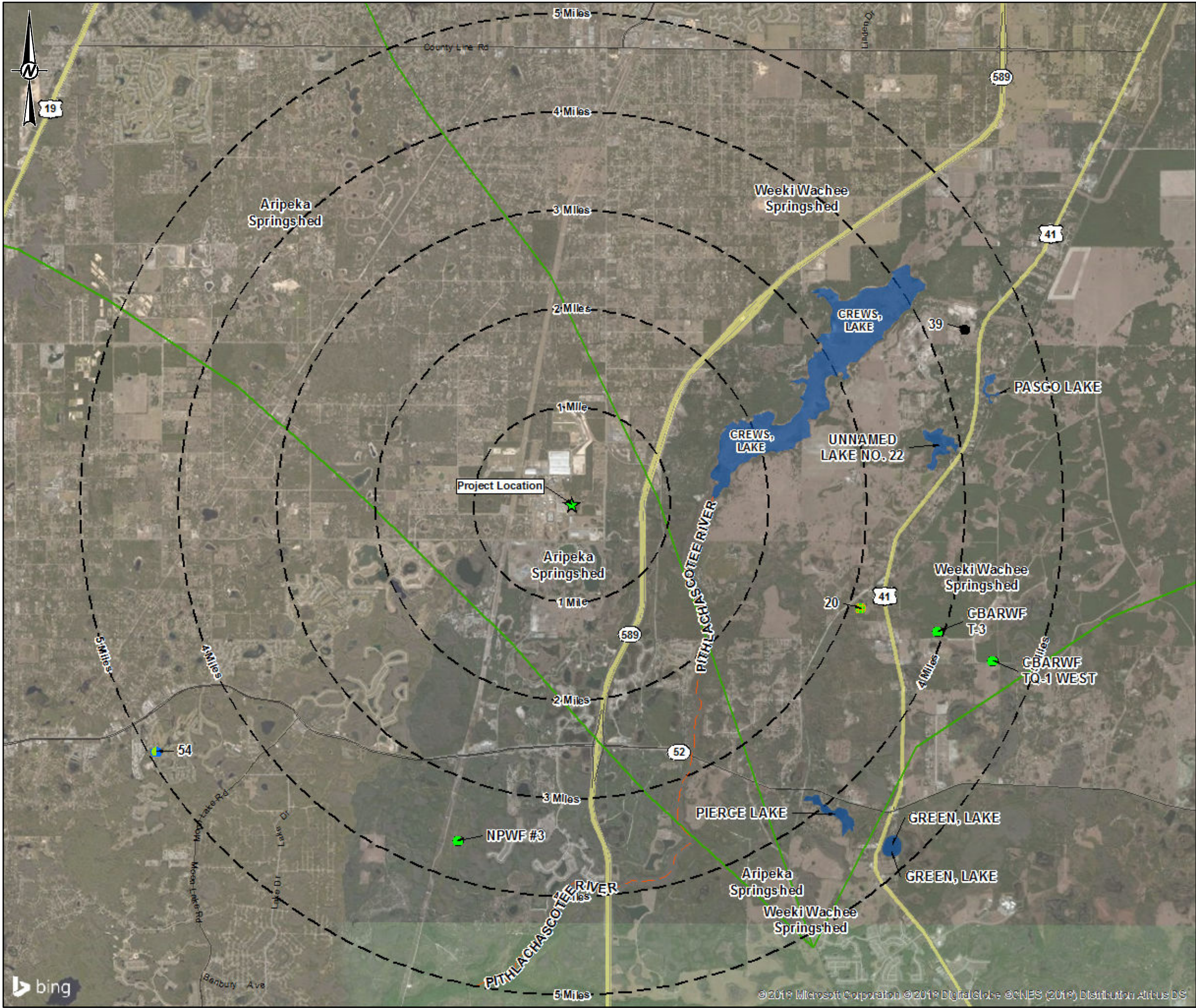
TITLE

**EXISTING LAND USE (FLUCCS LEVEL III)
WITHIN 5-MILES OF SHCCF**

	CONSULTANT	YYYY-MM-DD	2018-02-12
	DESIGNED	NRL	
	PREPARED	NRL	
	REVIEWED	KB	
	APPROVED	RAZ	

PROJECT NO. 1779520	CONTROL H011	REV. 0	FIGURE 3.2.3-1
------------------------	-----------------	-----------	--------------------------

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND

- ★ Project Location
- Adopted MFL Wetlands
- Proposed MFL Rivers
- Adopted MFL Lakes
- Springshed Boundaries (Approximate)

Water Use ¹

- Un-Categorized
- Agricultural
- Landscape/Recreation

NOTE(S)

¹SEE TABLE 3.3.3-2 FOR SURFACE WATER WITHDRAWAL LOCATION INFORMATION

REFERENCE(S)

ADOPTED MFL WETLANDS, RIVERS, LAKES, AND WELL LOCATIONS, SWFWMD, 2017
SPRINGSBED BOUNDARY, SWFWMD, 2013

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE

SURFACE WATER WITHDRAWALS AND MFL WATERBODIES WITHIN 5-MILES OF SHCCF

CONSULTANT	YYYY-MM-DD	2018-02-12
DESIGNED	NRL	
PREPARED	NRL	
REVIEWED	GP	
APPROVED	MM	

PROJECT NO.
1779520

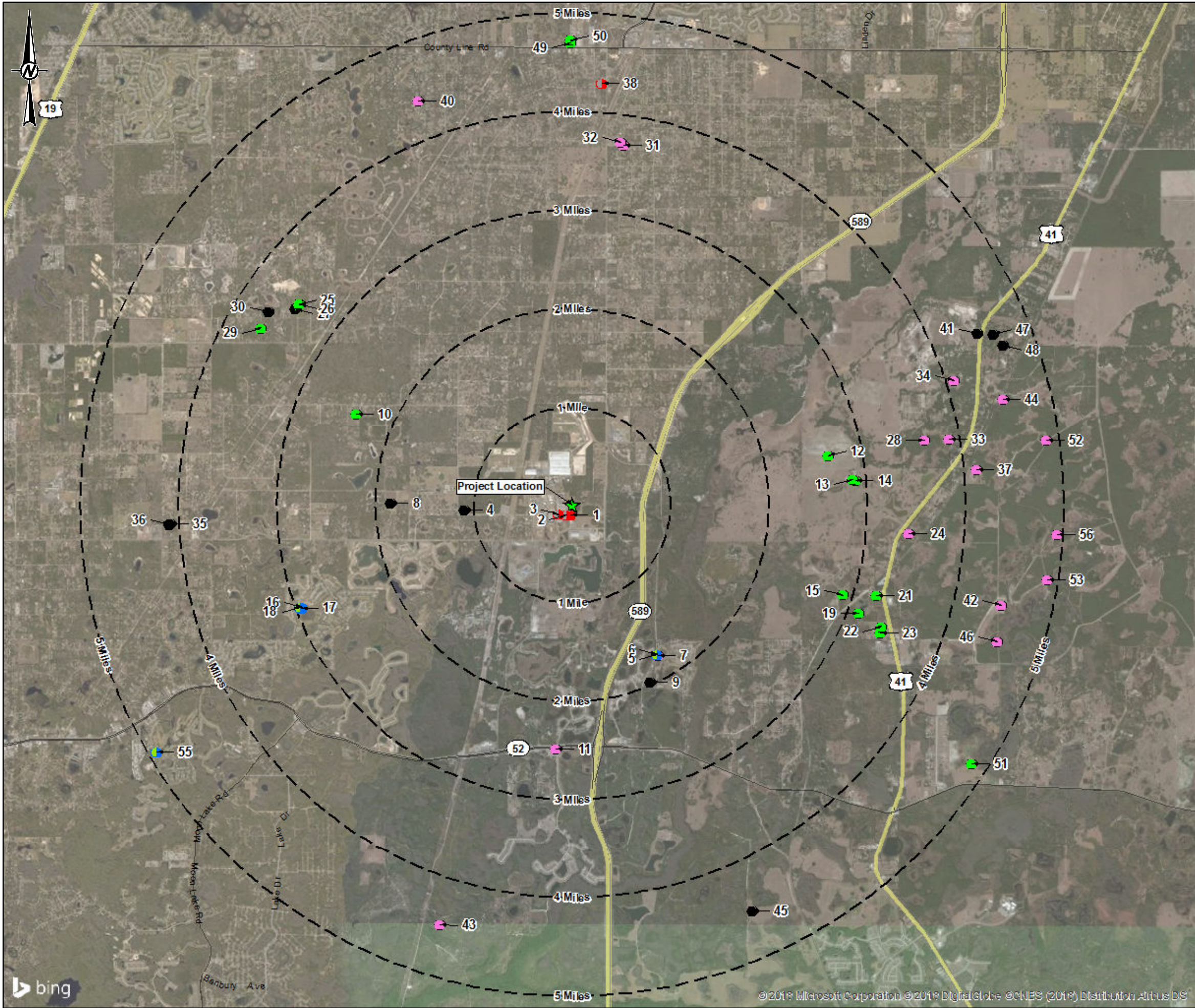
CONTROL
H006

REV.
0

FIGURE
3.3.3-1

G:\PROJECTS\GE_Energy_Systems\Shady_Hills\03_PRODUCTION\SCAD\Permit_Support\H1_SCA03_PRODUCTION\MD\1779520_H006_MFL_Waterbodies_5Miles.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND

★ Project Location

Water Use¹

- Un-categorized
- Agricultural
- Industrial And Commercial
- Landscape/Recreation
- Public Supply

NOTE(S)

¹SEE TABLE 3.3.3-1 FOR GROUNDWATER WITHDRAWAL LOCATION INFORMATION

REFERENCE(S)

WELL LOCATIONS, SWFWMD, 2017

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE

**EXISTING AND PROPOSED GROUNDWATER WITHDRAWALS
WITHIN 5-MILES OF SHCCF**

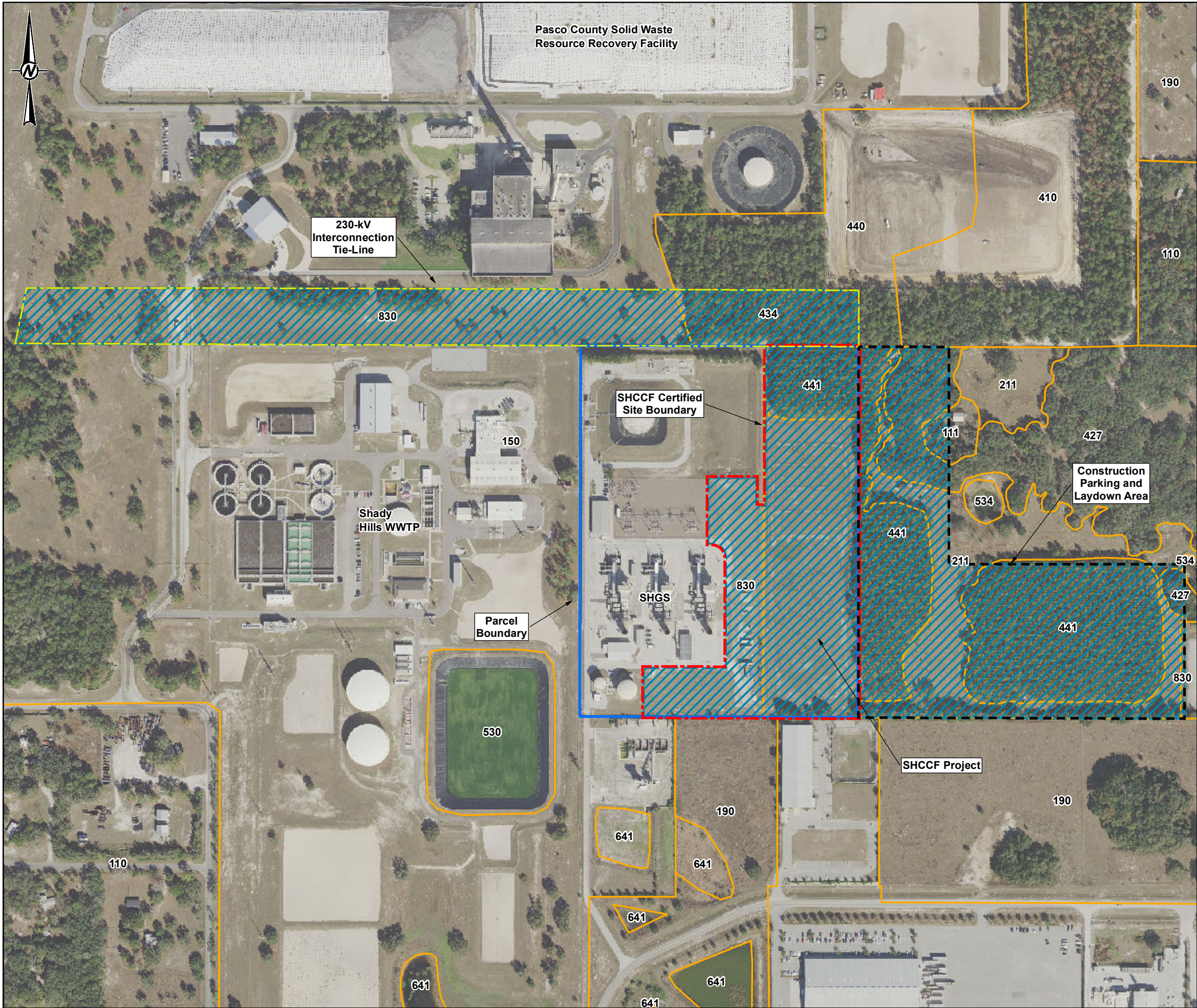
CONSULTANT	YYYY-MM-DD	2018-02-12
DESIGNED	NRL	
PREPARED	NRL	
REVIEWED	GP	
APPROVED	MM	

PROJECT NO.
1779520

CONTROL
H005

REV.
0

FIGURE
3.3.3-2



LEGEND

- SHCCF Project
- SHCCF Certified Site Boundary
- 230-kV Interconnection Tie-Line
- Construction Parking and Laydown Area
- Parcel Boundary
- Land Use
 - 110 - Residential Low Density < 2 Dwelling Units
 - 111 - Fixed Single Family Units
 - 150 - Industrial
 - 170 - Institutional
 - 190 - Open Land
 - 211 - Improved Pasture
 - 410 - Upland Coniferous Forest
 - 427 - Live Oak
 - 434 - Hardwood Conifer Mixed
 - 440 - Tree Plantations
 - 441 - Coniferous Plantations
 - 530 - Reservoirs
 - 534 - Reservoirs < 10 Acres
 - 641 - Freshwater Marshes
 - 643 - Wet Prairies
 - 653 - Intermittent Ponds
 - 830 - Utilities

NOTE(S)

N/A

REFERENCE(S)

LAND USE, SWFWMD, 2011 (WITH REVISIONS BY GOLDER BASED ON FIELD RECONNAISSANCE NOVEMBER, 2017)

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

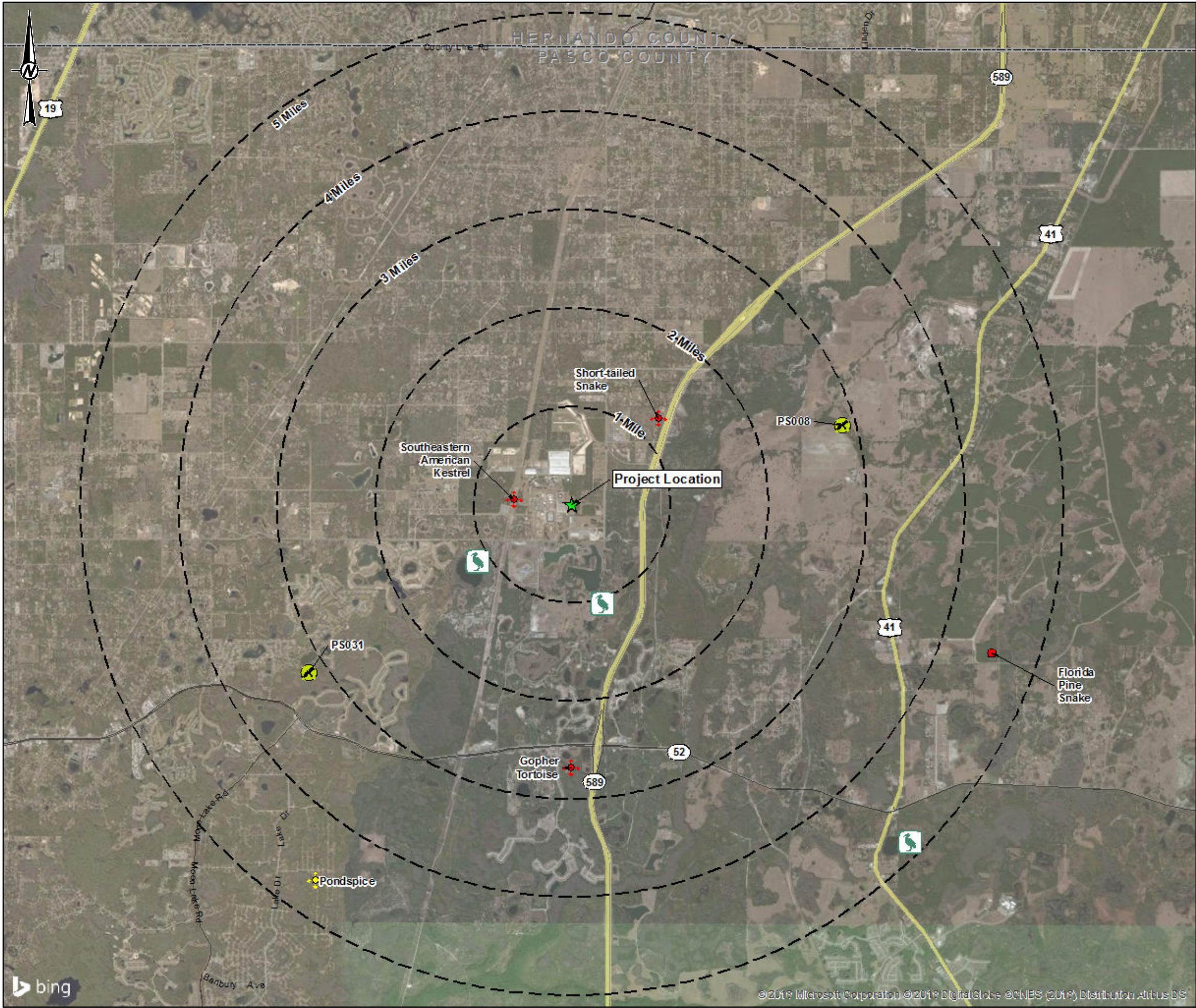
SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE

SHCCF VEGETATION / LAND USE (FLUCCS LEVEL III)

CONSULTANT	YYYY-MM-DD	2018-02-12
	DESIGNED	NRL
	PREPARED	NRL
	REVIEWED	KB
	APPROVED	RAZ

PROJECT NO. 1779520	CONTROL H012	REV. 0	FIGURE 3.3.5-1
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LEGEND

- ★ Project Location
- Wading Bird Rookeries
- Eagle Nest Locations

Element Occurrences (2014)

- Animals
- Plants
- Point Indicates General Vicinity of Element

NOTE(S)
N/A

REFERENCE(S)
ELEMENT OCCURRENCES, FNAI, 2014
WADING BIRD ROOKERIES, FWC, 1999
EAGLE NEST LOCATIONS, FWC, 2016

CLIENT
SHADY HILLS ENERGY CENTER, LLC

PROJECT
SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE
**LISTED AND OBSERVED SPECIES OCCURRENCES
WITHIN 5-MILES OF SHCCF**

CONSULTANT	YYYY-MM-DD	2018-02-12
DESIGNED	NRL	
PREPARED	NRL	
REVIEWED	KB	
APPROVED	RAZ	

PROJECT NO.
1779520

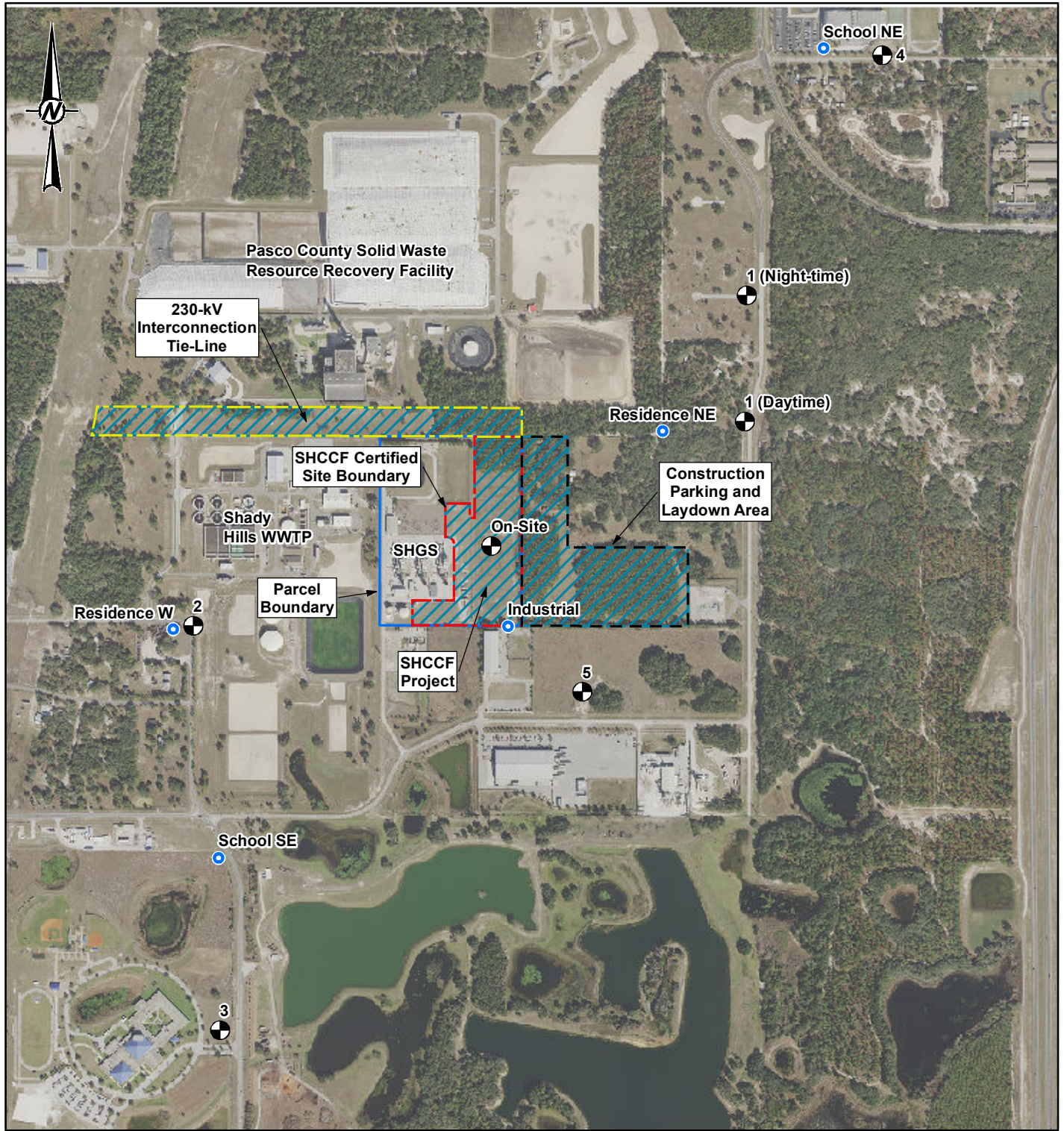
CONTROL
H013

REV.
0

FIGURE
3.3.6-1

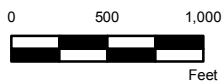
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND

- Receptors
- Noise Monitoring Locations
- SHCCF Project
- SHCCF Certified Site Boundary
- 230-kV Interconnection Tie-Line
- Construction Parking and Laydown Area
- Parcel Boundary



REFERENCE(S)
NOISE MONITORING LOCATIONS, GOLDER ASSOCIATES INC., 2017

CLIENT
SHADY HILLS ENERGY CENTER, LLC

PROJECT
SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE
SHCCF NOISE MONITORING LOCATIONS

CONSULTANT



YYYY-MM-DD 2018-02-13

DESIGNED NRL

PREPARED NRL

REVIEWED RAZ

APPROVED MM

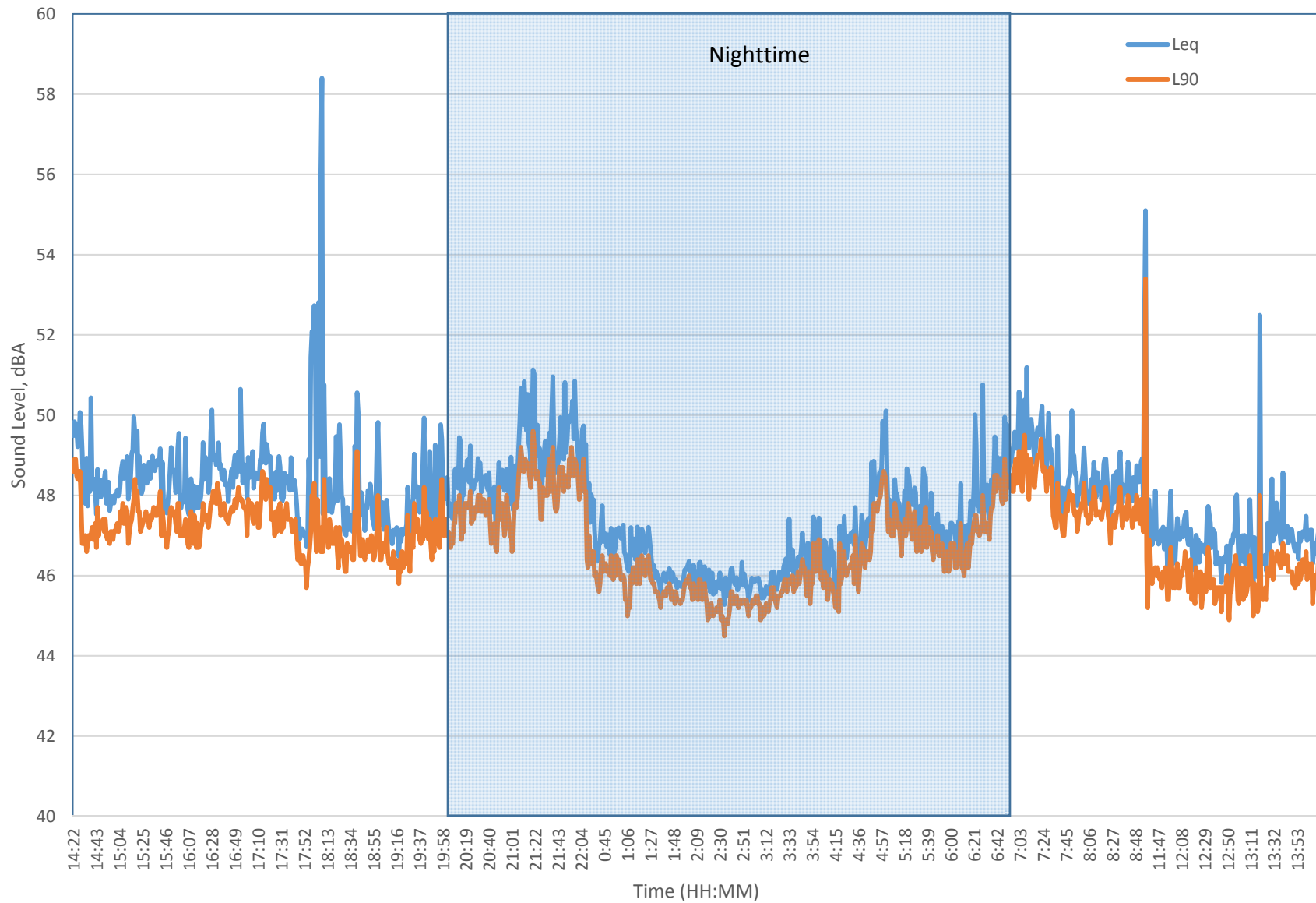
PROJECT NO.
1779520

CONTROL
H014

REV.
0

FIGURE
3.3.7-1

Figure 3.3.7-2. Shady Hills Combined Cycle
One Minute Interval Sound Levels, December 2017



4.0 THE PLANT AND DIRECTLY ASSOCIATED FACILITIES

This chapter describes the proposed SHCCF Project, site layout, and the expected character, quality and quantity of discharges or emissions from its operations. The proposed measures and systems to control or minimize the expected discharges and emissions are also described to provide reasonable assurance that Project operations will comply with the applicable regulatory requirements and standards.

SHEC is seeking to certify the SHCCF Project to meet Seminole's need for additional power supply resources. The SHCCF Project will involve the construction and operation of a new, natural gas-fired 573 MW (winter) one-on-one combined-cycle generating facility and associated facilities on approximately 14 acres adjacent to and east of the existing SHGS. SHEC has made arrangements to use approximately 20 acres of property immediately to the east of the Site for temporary construction parking and laydown purposes.

The SHCCF will be an advanced class gas turbine, one-on-one ("1x1") configuration, 573 MW (winter) combined-cycle power plant. The configuration will include one combustion turbine generator ("CTG"), one heat recovery steam generator ("HRSG"), one steam turbine generator ("STG"), and one generator step-up transformer ("GSU") (See Figure 4.1-1)

The SHCCF will be a natural gas fired, high efficiency plant that involves the generation of electricity in two stages, first by firing the CTG, and second by using the hot exhaust gas from the CTG to produce steam through the HRSG, which is then fed into the STG to generate additional electricity. The SHCCF will have moderate duct firing capability, which means 20 to 25 MWs of duct-fired output will be available as cost effective peaking capacity. This combined-cycle capability makes the most of the input fuel, by burning it and using the waste heat from that process to generate electricity. As a result, combined cycle technology is a very efficient plant design to produce electrical energy. The combined cycle generation technology is one of the more efficient power production technologies available today.

In addition to the CTG/HRSG/STG, the SHCCF will include electrical equipment enclosures, a mechanical draft cooling tower, an exhaust stack, an administration building that will include a control room and maintenance area, a warehouse, parking, a diesel-fired emergency fire water pump, a diesel-fired emergency generator, one or more aboveground diesel fuel storage tanks, an aboveground service/fire water storage tank, one or more aqueous ammonia tanks, a step-up transformer, potable water and sanitary wastewater conveyance infrastructure, reclaimed water treatment facilities, and a zero liquid discharge (ZLD) system. Two new stormwater management detention ponds will be constructed to accommodate stormwater collection, conveyance and treatment at the SHCCF.

Process water for cooling, demineralized water, and service water will be sourced as reclaimed water from the PCMRS. Potable water and firewater will be provided by Pasco County Utilities (See Figure 4.1-2). The onsite water treatment system will reduce the concentrations of calcium, magnesium, alkalinity, silica and suspended solids by adding hydrated lime, soda ash, ferric chloride and polymer to clarifiers. The onsite

water treatment system will also include ultrafiltration and reverse osmosis (RO) trains. RO reject will be treated in brine concentrators and crystalizers and processed in the ZLD system. The ZLD system will generate a non-hazardous solid waste byproduct that will be characterized and properly disposed of offsite.

The SHCCF will include an approximately 0.6-mile 230-kV interconnection tie-line from the onsite GSU to a new DEF substation to the west of the Site, to be designated Hudson North, which will connect the SHCCF to the DEF 230 kV high voltage transmission grid. Florida Gas Transmission will construct a new gas metering station approximately 150' east of the existing SHGS in the northeast corner of the SHCCF Certified Site to connect the existing FGT 12" Shady Hills Lateral to the SHCCF. The natural gas metering station and associated natural gas pipelines owned and operated by FGT will not be part of the SHCCF Certified Project.

The SHCCF CT/HRSG and auxiliary boiler will only burn natural gas. At peak operation, including duct-firing, the new unit will require approximately 89,000 MMBtu of natural gas per day.

Construction activities for the SHCCF are anticipated to begin in mid-2019, with targeted commercial operation December 1, 2021.

4.1 Site Layout

The Conceptual Site Plan for SHCCF is provided in Figure 4.2-1 and Utility Availability Layout is provided in Figure 4.1-2.

4.2 Fuel

The combined cycle combustion turbine and auxiliary boiler will be solely fueled by natural gas. The typical properties of pipeline quality natural gas are provided in Table 4.3-1. The heat content is approximately 20,611.6 British thermal units per pound (Btu/lb), low heating value (LHV), with a maximum sulfur content of less than 2 grains per 100 standard cubic feet (gr/100 scf) of natural gas. The emergency generator and fire pump will use ultra-low sulfur diesel (ULSD) fuel with a sulfur content not to exceed 0.0015%.

4.3 Air Emissions and Controls

4.3.1 Air Emissions Units

4.3.1.1 CTG and HRSG Duct Burners

Air pollutants will be emitted from the CTG and HRSG duct burner when firing natural gas. Air emissions result from either the combustion process or impurities in the fuel. Table 4.4.4-1 presents the performance and estimated emission rates of regulated air pollutants. The maximum estimated emission rates for the conditions stated were determined using the manufacturer's design information for the equipment proposed for the Project. The design parameters are provided for the range of operating conditions and ambient air temperatures. The range of operating conditions include baseload (100 percent load) operation with duct firing, baseload without duct firing, 60 percent load, and minimum emission compliance level (MECL).

MECL is the minimum CTG load where compliance with emission limits are achieved. Appendix 10.2.5, the Air Construction Permit Application, presents the basis for the emission rates and maximum annual emissions of regulated and non-regulated pollutants.

During combustion, two primary types of nitrogen oxides (NO_x) are formed: fuel NO_x and thermal NO_x. Fuel NO_x emissions are formed through the oxidation of a portion of the nitrogen contained in the fuel. Thermal NO_x emissions are generated through the oxidation of a portion of the nitrogen contained in the combustion air. NO_x formation can be limited by lowering combustion temperatures (through water or steam injection) and/or staging combustion [a reducing atmosphere followed by an oxidizing atmosphere, known as dry low-NO_x (DLN) combustors]. The proposed NO_x stack emissions rates for the CTG associated with the Project will be further controlled using selective catalytic reduction (SCR) system to reduce the NO_x emission rate to 2 parts per million by volume dry (ppmvd), corrected to 15 percent oxygen (O₂) or less. There will be over a 90 percent reduction in the NO_x emission rate over DLN combustors when using an SCR.

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

Similarly, volatile organic compound (VOC) emissions are formed by incomplete combustion of fuel. High combustion temperatures, adequate excess air, and good fuel/air mixing during combustion will minimize VOC formation. VOC formation is limited by ensuring complete, efficient combustion of the fuel in the CT. Recent improvements in CT combustor technology allow for low VOC emissions.

Particulate matter (PM), sulfur dioxide (SO₂), and sulfuric acid mist (H₂SO₄) emissions are controlled and minimized by the use of clean fuels. Natural gas is the cleanest fossil fuel with a sulfur content of no greater than 2 gr/100 scf of sulfur.

Emission rates of CO, VOC, PM, SO₂ and H₂SO₄ for the CTG/HRSG (with duct firing) are presented in detail in Appendix 10.2.5.

Greenhouse gas (GHG) emissions are minimized through the use of highly efficient combined cycle technology and the use of natural gas (the lowest GHG emitting fossil fuel).

4.3.1.2 Emergency Generator and Fire Pump Engine

The Project will be equipped with a 1,500 kW-electric (kWe) emergency generator to support the plant. The emergency generator will be used when electric power from offsite is not available. This would primarily occur during catastrophic events such as hurricanes. A 347 brake-horsepower (BHP) fire pump engine will also be installed. The emergency generator and fire pump will use ultra-low sulfur diesel (ULSD) fuel with a sulfur content not to exceed 0.0015%. SCA Appendix 10.2.5 contains emissions and manufacturer's

information for the emergency generator and fire pump engine. Normally, the emergency generator and fire pump engine would be operated only 1 to 2 hours per month for maintenance and reliability testing.

4.3.1.3 Auxiliary Boiler

An auxiliary boiler will be installed to provide steam during startup and shutdowns when heat from the HRSG is insufficient. The limited use auxiliary boiler will have a maximum heat input of 60 MMBtu/hr (HHV) and will fire only natural gas. SCA Appendix 10.2.5 contains performance and emissions information for the auxiliary boiler. During construction, this auxiliary boiler may be used for steam blows and cleaning. The air emissions for construction steam are discussed in Section 5.5.

4.3.1.4 Cooling Tower

The Project will have a mechanical draft cooling tower to provide steam cycle STG condenser and auxiliary equipment cooling. Particulate matter (PM) will be emitted in the form of drift and controlled through the use of mist eliminators will have a design drift rate of 0.001 percent of the circulating water flow.

4.3.1.5 PSD Applicability

The total annual emissions from the Project include air emissions from the CT/HRSG, emergency generator, auxiliary boiler, fire pump engine, and mechanical draft cooling system tower. Table 4.4.1-2 presents the annual potential emissions for the Project. Annual potential emissions were based on maximum emissions for baseload operation and ambient temperatures of 59°F with a maximum 4,000 hour/year of duct firing at baseload conditions plus 4,760 hours of baseload operation without duct firing.

Because the Project involves a physical change to an existing major stationary air source that will result in an increase for some regulated air pollutants, an analysis is required to determine whether the Project constitutes a Major Modification triggering PSD requirements under Rule 62-212.400, F.A.C. PSD applicability is determined on a pollutant-by-pollutant basis. As defined in Rule 62-210.200(169), Major Modification occurs where there is a “significant emission increase” and a “significant” “net emissions increase”, as defined in Rule 62-210.200(187), F.A.C. Whether an increase in a PSD pollutant is significant is based on whether it exceeds the PSD significant emission rates (SERs).

Because this Project involves the construction of new emission units, the Baseline Actual-to-Potential Applicability Test for Construction of New Units in Rule 62-212.400(2)(a)2., F.A.C. is used to determine if there is a significant emissions increase. The baseline actual emissions are presumed to be zero. The potential emissions are presumed to be an increase above zero. If the potential emissions of a PSD pollutant are above the significant emission rate (SER) for a pollutant, the increase is significant. For any PSD pollutant above the SER, the next part of the analysis is whether there is a significant “net” increase in emissions. A significant net emissions increase is determined accounting for all other increases and decreases in actual emissions that are both contemporaneous and creditable. Emission increases or decreases for a particular modification are contemporaneous if they occur between five years before the

construction of the proposed modification and the date the increase from the modification occurs. In the case of the Project, there are no contemporaneous and creditable emission decreases in actual emissions, and the only contemporaneous and creditable emission increases in actual emissions would occur from the Project itself. As a result, a significant net emission increases occurs, on a per-pollutant basis, to the extent the Project's potential emissions of a PSD pollutant exceed the PSD SER for that pollutant. As shown in Table 4.4.1-2, the potential emissions for the Project are greater than the PSD SERs for NO_x, CO, SO₂, H₂SO₄, PM (total suspended particulate), PM with an aerodynamic diameter of 10 microns (PM₁₀), and PM with an aerodynamic diameter of 2.5 microns (PM_{2.5}).

On June 3, 2010, the EPA promulgated regulations related to PSD applicability for Greenhouse Gases (GHGs) 75 Federal Register 31514-31608. In EPA's 40 CFR 52.21 definition of "subject to regulation," GHGs are defined to include an aggregate group of six classes of compounds that have been determined to have GHG properties: CO₂, methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Each of these GHGs has a specific Global Warming Potential (GWP) established under 40 CFR 98, Subpart A, Table A-1, which is calculated as "CO₂ equivalent emissions" or CO₂e that is equivalent to the GHG properties of one ton of CO₂.

In 2014, the United States Supreme Court decided *Utility Air Regulatory Group v. EPA*, 134 S. Ct. 2427 (2014), holding that GHG emissions alone could not trigger PSD review. Rather, PSD review for GHGs could only be triggered if PSD review was required for other air pollutants. The decision vacated certain provisions under the 2010 federal GHG Tailoring Rule. EPA subsequently amended its PSD rules on August 19, 2015, to remove portions of the rule that were vacated. 80 Fed. Reg. 50199. FDEP has incorporated by reference EPA's Tailoring Rule definition of "subject to regulation" in effect as of July 1, 2016, which makes the state's version consistent with the current federal version.

For the Project, the GHGs emitted are CO₂, CH₄, and N₂O, with one ton of CH₄ equivalent to 25 tons of CO₂e and one ton of N₂O equivalent to 298 tons of CO₂e. Table 4.4.1-2 includes the potential GHG emissions resulting from the Project, GHG emission increases and the PSD significant emission rate for CO₂e, which is a threshold for PSD review. Since the Project triggers PSD review for several regulated PSD air pollutants, PSD review is required for GHG emissions if they are greater than 75,000 tons per year (TPY) CO₂e. As shown in Table 4.4.1-2, the maximum potential annual CO₂e emissions of the Project will exceed the PSD threshold for GHGs.

SCA Appendix 10.2.5 contains the PSD/Air Construction Permit Application for all air pollutants triggering PSD review including GHGs.

4.3.2 Air Emission Controls

The use of clean fuel (natural gas), highly efficient combined-cycle technology, combustion controls, and air pollution control equipment will minimize air emissions such as SO₂, PM/PM_{2.5}/PM₁₀, and other fuel bound contaminants, and ensure compliance with applicable emission limiting standards. Combustion

controls and installation of an SCR system will minimize the formation of NO_x. The formation of CO and VOCs will be limited by good combustion practices. The combination of these techniques has been determined to be Best Available Control Technology (BACT) on previous combined cycle projects based on an evaluation of economic, energy, and environmental impacts. The following section presents a summary of the air pollution control technology proposed for SHCCF, which is presented in detail in the PSD/Air Construction Permit Application (Appendix 10.2.5).

4.3.3 Control Technology Description

FDEP has adopted PSD rules in FDEP Rule 62-212.400, F.A.C. BACT review is part of the evaluation of control technology under the Florida PSD rules, and is required only for those specific pollutants that trigger PSD review. A determination of BACT is required for emissions of SO₂, PM (TSP), PM₁₀, PM_{2.5}, CO, sulfuric acid mist and GHGs from the Project. BACT is an emission limitation that is based on the maximum degree of reduction for each regulated pollutant, determined after taking into account the factors listed in Rule 62-210.200(32), F.A.C. The emission limits proposed for the Project are based on recent similar projects reflective of BACT.

New Source Performance Standards (NSPS) apply to stationary CTs that commence construction, modification, or reconstruction after February 18, 2005. Subpart KKKK of the NSPS applies to units with a heat input at peak load equal or greater to 10.7 Gigajoules (Gj) (10 MMBtu). The Subpart KKKK requirements applicable to CTs greater than 875 MMBtu/hr apply to the CT/HRSG train associated with the Project. The NO_x emissions are limited by Subpart KKKK to 15 parts per million (ppm) corrected to 15 percent O₂ or 0.43 lb/MW-hr for natural gas firing.

EPA established an NSPS for GHG emissions from new, modified, and reconstructed electric utility generating units (40 CFR Part 60, Subpart TTTT; 80 Fed. Reg. 64510 (October 23, 2015)). This NSPS established CO₂ emission limits for new stationary combustion turbines that commence construction after January 8, 2014, and have a heat input rating of over 250 MMBtu/hr and serve a generator capable of selling more than 25 MW of electricity to a utility distribution system. New baseload CTs that combust more than 90 percent natural gas are required to meet a CO₂ emissions rate of 1,000 lb/MWh (gross) or 1,030 lb. CO₂/MWh (net) on a 12-month rolling average basis. EPA determined that these emission limits represent the Best System of Emission Reduction (BSER) required under Section 111(b) of the Clean Air Act. The monitoring requirements for natural gas fired units are based on 40 CFR Part 75 requirements. EPA announced on April 4, 2017 that these NSPS are being reviewed and if appropriate, will initiate proceedings to suspend, revise or rescind these NSPS (82 Fed. Reg. 16330). FDEP adopted these NSPS by reference in Rule 62-204.800, F.A.C.

NSPS are also applicable to the auxiliary boiler, fire pump engine, and emergency generator. The EPA NSPS Subpart Dc, Standards of Performance for Small Industrial Commercial-Institutional Steam Generating Units, applies to the auxiliary boiler. FDEP adopted these NSPS by reference in Rule 62-204.800(8)(b)4, F.A.C. For the emergency generator and fire pump engine, NSPS Subpart IIII, Standards

of Performance for Stationary Compression Ignition Internal Combustion Engines, is applicable. FDEP adopted these NSPS by reference in Rule 62-204.800(8)(b)82, F.A.C.

EPA has promulgated maximum achievable control technology (MACT) standards under the National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations. As presented in SCA Appendix 10.2.5, the SHGS with the three existing simple cycle combustion turbines is not a major source of hazardous air pollutant (HAP) emissions. Going forward, the SHGS (and the SHCCF) will still be classified as a “minor source” for HAPs since the major source threshold for either a single HAP or total HAPs will not be exceeded due to the addition of the SHCCF.

NESHAP Subpart ZZZZ that applies to reciprocating internal combustion engines (RICE) is applicable at both major and area sources of HAPs. Therefore, Subpart ZZZZ applies to the diesel engines associated with the Project (emergency generator and emergency fire pump). However, the method of compliance under Subpart ZZZZ for new engines would be to demonstrate compliance with 40 CFR 60, Subpart IIII. FDEP adopted Subpart ZZZZ and Subpart IIII by reference in Rule 62-204.800, F.A.C. These regulations establish emission limits for NO_x plus non-methane hydrocarbons, CO, fuel sulfur content and PM based on the engine’s intended use and size.

Appendix 10.2.5 of the SCA contains the PSD/Air Construction Permit Application for the Project. The application describes the air pollution control technology proposed for the Project and addresses air quality impacts for compliance with National Ambient Air Quality Standards (NAAQS). The remainder of this section briefly describes those control technologies that are proposed for the Project.

4.3.3.1 Nitrogen Oxides

NO_x emissions resulting from the combustion of natural gas will be controlled using dry low-NO_x (DLN) combustors. DLN combustor technology has been offered and installed by CT manufacturers to reduce NO_x emissions by inhibiting thermal NO_x formation through pre-mixing fuel and air prior to combustion and providing pre-mix combustion to reduce flame temperatures. The DLN combustors have premixed fuel zones plus a standard diffusion flame pilot burner for startup. Low NO_x levels are achieved by introducing fuel primarily to the pre-mix zones and reducing the amount of fuel being combusted from the pilot nozzle.

NO_x emissions will be further controlled by the SCR system. SCR is a post-combustion process where NO_x in the gas stream has reacted with ammonia in the presence of a catalyst to form nitrogen and water vapor. The reaction typically occurs between approximately 320 and 400 degrees Celsius (°C) (600 and 750°F). These temperatures occur within the HRSG where the SCR catalyst and ammonia injection grid is installed. Aqueous ammonia solution (at 19% or less) will be stored onsite in one or more tanks; a risk management plan for storage is not required per Section 112(r) of the Clean Air Act (as implemented by EPA regulations in 40 CFR Part 68). Flue gas NO_x emissions will be reduced to 2 ppmvd, corrected to 15 % O₂ for all operating conditions except startup, shutdown and SCR malfunction.

The NO_x control technology and emission limits proposed for the Project are consistent with emission limits established as BACT in Florida and EPA Region IV for similarly-designed projects. The use of DLN combustors and SCR for the Project will reduce NO_x emission levels to 2 ppmvd corrected to 15 % O₂. These NO_x emission levels are proposed as BACT for the Project and are consistent with recently established BACT emission limits for other combined cycle units.

The NO_x emissions from the auxiliary boiler, emergency generator, and fire pump engine will be limited using combustion techniques. The auxiliary boiler will be equipped with low NO_x burners to reduce NO_x emissions. The NO_x emission from the emergency generator and fire pump engine will meet the NSPS Subpart IIII NO_x emission requirements. The NO_x emission rates are proposed as BACT for the auxiliary boiler, emergency generator and fire pump engine and have been established as BACT in previous PSD permits (see Appendix 10.2.5, Air Construction/PSD Permit Application).

4.3.3.2 Carbon Monoxide

The CT and duct burners will utilize advanced combustion technology to reduce CO emissions. Advanced combustion technology is used to achieve low CO emission rates in CTs that have been determined to be technologies that meet BACT emission limits. The CO emission rates proposed as BACT for the CT and duct burners are based on the vendor information and presented in Appendix 10.2.5.

Combustion techniques will be used to reduce the CO emissions from the auxiliary boiler, fire pump engine, and emergency generators. The auxiliary boiler will be equipped with low NO_x burners designed to reduce CO emissions to 0.08 lb/MMBtu (HHV). The emergency generator and fire pump engine will meet the NSPS Subpart IIII CO emission requirements. The CO emission rates that are proposed as BACT for the auxiliary boiler, emergency generator and fire pump engine have also been established as BACT in previous PSD permits (see Appendix 10.2.5, Air Construction/PSD Permit Application).

4.3.3.3 Sulfur Oxides (SO₂ and H₂SO₄ Mist)

Combustion of clean fuels is the only feasible SO₂ control for the combined cycle unit, auxiliary boilers, emergency generator and fire pump engine. Natural gas is the cleanest fuel available with maximum sulfur contents of 2 gr/100 scf for natural gas proposed for the Project, and it will be used in the combined cycle unit and auxiliary boiler. Ultra-low sulfur diesel fuel (ULSD) will be used in the emergency generator and fire pump engine. H₂SO₄ emissions will also be minimized by the use of low sulfur fuel. Clean fuels have been established as BACT in previous PSD permits for SO₂ and H₂SO₄.

4.3.3.4 Particulate Matter and Other Regulated Pollutants

The use of clean fuels, characterized by low PM and trace contaminant contents, coupled with advanced combustion techniques, results in negligible PM, PM₁₀, and PM_{2.5} emissions from the combined cycle unit, auxiliary boiler, emergency generator and fire pump engine. Emission limits based on the use of clean fuel (i.e., natural gas and ULSD) have been established as BACT for PM/PM₁₀ emissions in previous PSD permits.

A small amount of PM is emitted from the mechanical draft auxiliary cooling system in the form of solution aerosols referred to as drift. Auxiliary cooling system drift is controlled by drift eliminators that separate solution aerosols from the mechanical induced air flow in the auxiliary cooling system by inertial impaction. The use of high-efficiency drift eliminators with a design drift rate of 0.001% is proposed as a BACT work practice standard for PM emissions from the Project's mechanical draft cooling tower.

4.3.3.5 Volatile Organic Compounds

Combustion techniques will be used to reduce the VOC emissions from the combined cycle unit, auxiliary boiler, emergency generator, and fire pump engine. The CTG and duct burner will utilize advanced combustion technology, and the proposed emission rates are consistent with those established as BACT for the GE 7H.02 CTG. The VOC emission rate proposed for the CTG are based on the specific vendor information and presented in Appendix 10.2.5.

The auxiliary boiler is designed with proper combustion techniques to reduce VOC emissions to 0.005 lb/MMBtu (HHV). The emergency generators will meet the NSPS Subpart IIII VOC emission requirements for non-methane hydrocarbons.

4.3.3.6 Greenhouse Gases

The Project's emissions of several non-GHG PSD pollutants are above the PSD review thresholds, triggering PSD review. Because PSD review is triggered and because the GHG emissions from the Project are above the PSD review threshold for GHGs, PSD review is required for GHG emissions. This review primarily consists of a determination of BACT since there are no air quality standards applicable to GHGs. In November 2010, EPA issued guidance on the determination of BACT for GHGs ("PSD and Title V Permitting Guidance for Greenhouse Gases", November 2010). When conducting BACT reviews, EPA believes it is important for permitting authorities to consider options that improve the overall energy efficiency of the source or modification – through technologies, processes, and practices at the emitting unit. In general, a more energy efficient technology burns less fuel than a less energy efficient technology on a per-unit of output basis. Considering the most energy efficient technologies in the BACT analysis helps reduce the products of combustion, which includes not only GHGs but also other regulated New Source Review (NSR) pollutants (e.g., NO_x, SO₂, PM/PM₁₀/PM_{2.5}, CO, etc.), EPA emphasizes that energy efficiency should be considered in BACT determinations for all regulated NSR pollutants (not just GHGs)

The efficiency of the generation technology in producing electricity and the type of fuel utilized are the most important aspects of GHG emissions from electric generation projects. Together, efficiency and fuel type dictate the amount of GHG emissions per unit of generation.

An important measure of the efficiency for an electrical generating facility is the unit's heat rate. Heat rate is a measurement of how efficiently a unit uses heat energy. It is expressed as the number of Btu's of heat required to produce a kilowatt-hour of energy (Btu/kWh). A heat rate of 3,413 Btu/kWh reflects a conversion

efficiency of 100 % from thermal energy to electrical energy, and efficiency is based on the lower heating value of the fuel.

The proposed combined cycle unit's net heat rate and energy efficiency were compared to data obtained from the U.S. Energy Information Administration (EIA). Based on data provided in the Electric Power Annual summary for 2016 (<https://www.eia.gov/electricity/annual/>), the overall average approximate heat rate for electricity for fossil fueled power plants in the U.S. in 2016 was 9,127 Btu/kWh net (HHV) (37.4 % efficiency) (EIA, 2017 Tables 3.1a and Table 8.1).

Based on US EIA's 2016 annual review of the electrical power industry, the reported average net heat rate (HHV) for natural gas firing was 7,870 Btu/kWh net (HHV) (43.4 % efficiency) including all types of generation (EIA 2017 Table 8.1). Of the generation types, the average tested heat rates when firing natural gas are (EIA 2017, Table 8.2):

- Steam turbine generator – 10,382 Btu/kWh net (HHV) (32.9 % efficiency),
- Natural gas turbine – 11,214 Btu/kWh net (HHV) (30.4 % efficiency),
- Internal combustion – 9,179 Btu/kWh net (HHV) (37.2 % efficiency), and
- Combined cycle – 7,652 Btu/kWh net (HHV) (44.6 % efficiency).

For comparison, the design (calculated) net heat rate of the Project is anticipated to range from 6,200 Btu/kWh net (HHV) (55.0 percent efficiency) at baseload condition to 7,284 Btu/kWh net (HHV) (46.9 percent efficiency) at MECL based on an ambient temperature of 77 ° F.

As part of EPA's clean energy initiatives, EPA developed the Emissions & Generation Resource Integrated Database (eGRID) as a resource tool in assessing air emissions of NO_x, SO₂, CO and GHGs. eGrid is a comprehensive source of data on the environmental characteristics of almost all electric power generated in the United States with data available based on a variety of geographic regions and locations. Data is also available for units, plants, power control areas (system), states, National Electric Reliability Council (NERC) regions and subregions, and the U.S. Information is provided on several air pollutants as well as GHGs. Emissions are provided in pound-per-megawatt-hour (lb/MWhr) basis. Based on the latest available eGrid data, the following are the emissions of CO₂ on a generation basis for generation facilities located in the same subregion as the Project (2/27/17 data: <https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid>; gross heat rate as HHV):

State of Florida – 1,099.4 lb CO₂/MWh gross (HHV) for all generation (including nuclear); 1,275.9 lb CO₂/MWh for total combustion generation.

The proposed long-term BACT emission rate covering all potential operating conditions including low load operation, degradation and variable CT operation for the Project is 875 lb CO₂/MWh (gross, HHV). See Appendix 10.2.5, Air Construction/PSD Permit Application.

4.3.4 Design Data for Control Equipment

Design data for the air pollution control equipment are presented in SCA Appendix 10.2.5 (Air Construction/PSD Permit Application).

4.3.5 Design Philosophy

SHCCF will be an advanced, natural gas-fired combined cycle unit that minimizes air pollutant emissions by using fuel-efficient and pollution-preventing technology. This concept has been incorporated with the selection of a combined cycle process utilizing an advanced CT. Advanced combined cycle units are highly efficient that reduce air emissions on a lb of CO₂e per MWh basis when compared to other generating technologies using fossil fuels. Pollution prevention is incorporated in the design by the use of clean fuels and advanced combustion technology. Moreover, advanced DLN combustion technology and the installation of an SCR system will be used to minimize NO_x emissions. CO and VOC emissions will be minimized using good combustion practices. Taken together, the design of the Project will incorporate features that will make it one of the most efficient and cleanest fossil fuel-fired units in Florida.

4.4 Plant Water Use

Primary water uses for SHCCF will include cooling, process, service (including fire protection), irrigation, and potable water. The primary water source for cooling, process and irrigation will be reclaimed water from Pasco County's Shady Hills Wastewater Treatment Facility and the interconnected Pasco County Master Reuse System (PCMRS) via up to three connections to the SHWWTF and/or the 36-inch Pasco County Master Reuse System header located adjacent to the west side of the SHGS Site. These reclaimed water supply sources include storage tanks and substantial reservoir systems providing a combined total storage capacity of 622 million gallons in addition to the daily, treated reclaimed water flow. The Shady Hills Wastewater Treatment Facility has a treatment capacity of 14 MGD and an average daily flow in 2016 of 5 MGD, and Pasco County's 2016 total wastewater treatment capacity was 46.75 MGD. The Project's annual average daily use of reclaimed water is estimated to be approx. 2.5 MGD (907.4 MGY). The maximum monthly use of reclaimed water is estimated to be approx. 3.0 MGD. The maximum monthly usage most likely will occur during the months of July, August and/or September, when the air temperatures are highest and when duct firing and the evaporative cooler is used.

SHWWTF provides secondary treatment, filtration and high-level disinfection and was designed and permitted to meet the Part III Public Access quality standards in accordance with FDEP Rule 62-610, F.A.C. Since the SHWWTF (and PCMRS) meet the requirements of Part III of Chapter 62-610.661(4) F.A.C., the SHCCF open cooling tower use of reclaimed water may be authorized under 62-610.668(2)(b), F.A.C. and setback distance requirements are not applicable to the SHCCF proposed cooling tower system.

Reclaimed water from the PCMRS that does not meet Part III Public Access quality standards will not be used at SHCCF. If reclaimed water is not available at the required quality or quantity, backup sources of water will include:

1. Water from the Pasco County Municipal Water Supply System; and/or
2. The unused allocation of groundwater from the existing wells at the adjacent SHGS, under a service agreement that will be executed between SHEC and SHPC.

Pasco County has indicated that they can supply up to 1,700 gpm (2.448 MGD) of potable water at system pressure, if needed, as an emergency backup source. This flow rate is adequate to satisfy operational requirements for ambient conditions up to the annual average temperature, but at higher ambient temperature conditions, additional water would be required to sustain full plant production.

In order to supplement available potable water in the unlikely event that reclaimed water is not available, SHCCF could, with SWFWMD approval, seek authorization to access existing allocations of groundwater which SHPC is authorized to withdraw for SHGS under its current water permit.

SHGS is authorized to pump groundwater from the UFA at an annual average rate of 0.153 MGD and peak month rate of 0.476 MGD (Southwest Florida Water Management District Water Use Permit # 12052). SHGS typically has used less than those amounts; however, the full permitted allocation is required to meet potential contractual requirements for power generation on both natural gas and fuel oil under SHGS's current power purchase agreements. If the water is not required for power production at SHGS and it is required at SHCCF, it may be available to use as a supplemental backup source for SHCCF. Subject to SHGS's first right of call to the groundwater supply and in the event that reclaimed water and potable water are not available in sufficient quantities, SHCCF would use up to the permitted allocation of groundwater from the wells as required to supplement the available quantities of reclaimed water and/or emergency potable supply from Pasco County to meet operational requirements. Authorization for this supplemental water use would be sought outside of the SCA process through a modification of the SWFWMD Water Use Permit #12052 (See Appendix 10.6).

Due to the robust nature of the PCMRs, the potential use of groundwater is expected to be very infrequent, and if supplemental potable water was needed, it would only be needed for the period of time necessary for the PCMRs to come back on-line (See Figure 4.4)

Potable water and service water, which includes fire water, will be supplied by the Pasco County municipal system. The estimated annual average daily usage of service and potable water from Pasco County will be .011 MGD (3.68 MGY).

Cooling water is required for condenser cooling, auxiliary cooling, and associated equipment. Process water is required for combustion turbine inlet air cooling and steam cycle makeup. Other water uses include service water for internal plant uses including fire protection, equipment washing and potable water for employee use. To the extent landscape irrigation will be needed, reclaimed water will be used, and the amounts are expected to be minimal. The water balance for SHCCF is shown in Figure 4.5-1.

Subsections 4.5.1 through 4.4.4 provide more detailed descriptions of SHCCF water uses.

4.4.1 Heat Dissipation System

Condenser and auxiliary cooling for SHCCF will be accomplished using a recirculating cooling system with six cooling tower cells designed to operate at approximately 3 cycles-of-concentration (See Table 4.5.1-1). The cooling tower makeup water will come from the reclaimed water supply, after filtering and treatment, and from internally recycled process wastewater streams that are part of the zero liquid discharge (ZLD) system. Waste streams to be internally recycled through the cooling towers and the ZLD include:

- Blowdown from the evaporative cooler and the Heat Recovery Steam Generator (HRSG),
- Wastewater from the process wastewater treatment system,
- Wastewater from the makeup demineralizer system, and
- Plant and equipment drains after treatment in an oil/water separator.

Under normal operating conditions (i.e., when reclaimed water is fully-available), cooling or process water will not be withdrawn from potable groundwater sources.

Blowdown from the cooling towers will be sent to the lime softening clarifiers that are part of the wastewater treatment system. Cooling tower drift will be less than 0.001% of the circulating water flow rate under all conditions. Evaporative losses depend on the operating conditions (see Figure 4.5-1 and the associated water balance tables for average and maximum month conditions).

With the ZLD, there will be no discharge of cooling or process water to surface or ground waters. Consequently, there is no need for surface water discharge structure(s), a diffuser system or a mixing zone. Solids will be concentrated and removed from the wastewater using ultra-filtration, RO systems, electro-deionization, and a brine concentrator and crystallizer. The wastewater will be internally recycled and non-hazardous solid wastes generated by the ZLD treatment system will be disposed of in a solid waste facility licensed to accept the solid waste. Water lost from the process through the solid waste stream will be approximately 3.5 to 4.5 gpm. Routine maintenance of the ZLD will be scheduled during major maintenance of the entire power block, so that no water would be delivered to the ZLD during these periods. The ZLD treatment system is described in more detail in Section 4.4.4.

No injection wells are required for wastewater disposal at SHCCF.

4.4.2 Domestic/Sanitary Wastewater

Domestic sanitary wastewater flows will average approximately 2 gpm and will be discharged to the local sewer for disposal.

4.4.3 Potable Water Systems

Potable water will be obtained from the County's potable water system. The potable water demand will average approximately 2 gpm. No additional on-site treatment will be required.

4.4.4 Process Water Systems

The Zero Liquid Discharge (ZLD) wastewater treatment system for the SHCCF is described below.

As shown on the water balance diagram (Figure 4.5-1), the wastewater treatment system will receive wastewater from the cooling tower.

As shown on the process flow diagram of the wastewater treatment system (Figure 4.5-2), wastewater received in the system will first be treated in lime softening clarifiers. Lime and soda ash will be added to precipitate hardness and remove silica. Ferric chloride and polymer will be added to coagulate suspended solids.

Wastewater treated in the clarifiers will contain suspended solids from treating cooling tower makeup, from the precipitation of hardness, and from other flows in the wastewater treatment system. Suspended solids will be separated by sedimentation and collect in the lower part of the clarifiers as sludge.

After a predetermined number of gallons are treated in a clarifier, a clarifier sludge pump will transfer sludge to the thickener. Clarified water will overflow from the thickener into the backwash and filtrate sump and be sent back to the inlet of the clarifiers. In the lower part of the thickener, the concentration of suspended solids in the sludge will increase.

A filter press feed pump will periodically transfer sludge from the lower part of the thickener to one of the filter presses where it will be dewatered. Filtrate from the filter press will be collected in the backwash and filtrate sump and be sent back to the inlet of the clarifiers. Dewatered sludge cake will be collected in a portable container under the filter press and transported to an offsite licensed landfill by truck.

Clarified and softened water will overflow from the clarifiers into the clearwell. Sulfuric acid will be added for pH adjustment. From the clearwell, clarified and softened water will be pumped to the UF permeate tank. The ultrafiltration trains will remove additional suspended solids to minimize membrane fouling in the reverse osmosis trains downstream.

The ultrafiltration trains will need to be periodically backwashed. Backwash wastewater will be collected in the backwash and filtrate sump and sent to the inlet of the clarifiers. Backwash wastewater from the ultrafiltration trains will be collected in the recycle sump and sent to the cooling tower.

From the UF permeate tank, filtered water will be pumped to the reverse osmosis trains. Sodium bisulfite will be added upstream of the reverse osmosis trains to remove chlorine. Antiscalant will also be added. The reverse osmosis trains will produce permeate and reject. Permeate will contain a small fraction of the dissolved solids or salts in the inlet filtered water, and reject will contain most of the dissolved solids. Permeate will be sent to the treated wastewater tank and reject will be collected in the RO reject tank.

Reverse osmosis reject will be pumped to the brine concentrator. The brine concentrator will be a mechanical vapor compression type evaporator. It will produce distillate and reject. Distillate will contain almost no dissolved solids, and the reject will contain most of the dissolved solids. It will therefore have a higher concentration of dissolved solids than the reject from the reverse osmosis trains.

Reject from the brine concentrator will be pumped to the crystallizer, which will also be a mechanical vapor compression type evaporator. It will produce crystallized salts from the dissolved solids that were in the brine concentrator reject, and it will also produce distillate which contains almost no dissolved solids. Crystallized salts will be dewatered in a filter press or centrifuge, collected in a portable container, and transported to an offsite licensed solid waste landfill by truck. Distillate from the brine concentrator and crystallizer will be collected and pumped to the treated wastewater tank.

Treated effluent from the wastewater treatment system will be comprised of reverse osmosis permeate and distillate from the brine concentrator and crystallizer. A portion of these flows will be used in the makeup demineralizer system to produce high purity water. The remainder of these flows will be recycled to the cooling tower. As shown on the water balance diagram, other wastewater from SHCCF, such as HRSG and evaporative cooler blowdown, will also be recycled to the cooling tower, and no process wastewater will be discharged.

The combined storage capacities of the treated wastewater and demineralized water tanks could provide demineralized water to the HRSG/steam turbine cycle for more than three (3) days in the event that the both the 100% capacity brine concentrator and the 100% capacity crystallizer are out of service. In the event that one of the two clarifiers is out of service, the plant could continue to operate at or near full capacity. Since three (3) 50% capacity granular filters, ultrafiltration trains, and reverse osmosis trains are included, the plant could continue to operate in the event that one of any of these filter/trains is out of service. Routine maintenance of the ZLD system will be scheduled during routine maintenance outages and no wastewater will be discharged during these periods.

4.5 Chemical and Biocide Waste

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

Table 4.6-1 presents a list of the waste streams associated with SHCCF, their characterization, and proposed method of disposal. The following sections provide further information on the characteristics of these waste streams (see also Section 4.7).

4.5.1 Cooling System Water Chemical Treatment

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

A scale inhibitor and shock chlorination may be fed to the auxiliary cooling system to control the formation of calcium carbonate scales and biofouling. The scales can adhere to heat transfer surfaces and impair cooling condenser performance. An anti-foam agent may be used to reduce the potential for foam generation.

4.5.2 Steam Cycle Water Treatment

The steam/condensate feed water will be chemically treated to prevent corrosion or scaling of the equipment. The steam cycle water will be treated with ammonia or an amine for pH control. Other chemicals such as oxygen scavengers will be utilized to maintain water quality. Sodium phosphate will be fed to the HRSGs for control of pH and hardness. Residual phosphate in the HRSG will react with hardness to form a non-adherent precipitate that will be removed through HRSG boiler blowdown.

4.5.3 Sanitary Wastewater Treatment

As discussed above, the sanitary wastewater system for SHCCF will be routed to the County sewer system for treatment and disposal. No pretreatment is proposed.

4.5.4 Makeup Water Demineralization

Reject from the RO that is part of the makeup demineralizer system goes to the recycle sump and then the cooling tower. Reject from the RO that is part of the wastewater treatment system goes to the RO reject tank and then to the brine concentrator.

4.5.5 Chemical Cleaning

The HRSG and feedwater piping may be chemically cleaned initially during commissioning and also periodically during the life of SHCCF. Prior to application, the chemicals will be delivered to the Site by a licensed contractor prior to or at the time of the scheduled periodic cleanings. The chemical cleaning solutions to be used for acid and alkaline cleaning of the HRSG must be consistent with the HRSG manufacturer's recommendations. Chemicals typically used in HRSG and feedwater pipe cleaning may include the following:

- Inhibited citric acid
- Ammonia
- Organic chelates, such as ethylene diamine tetra-acetic acid (EDTA)
- Disodium phosphate
- Trisodium phosphate
- Nonfoaming wetting agents
- Foam inhibitors

Wastewaters will consist of the cleaning solutions and material removed during the HRSG and feedwater piping cleaning process. Chemical cleaning is an infrequent maintenance operation; it does not contribute to the liquid wastes produced by the normal operation of SHCCF. Nonhazardous chemical cleaning wastes will be properly handled and treated through the ZLD wastewater treatment system, or by disposal through

a licensed contractor. Chemical cleaning wastes will be managed according to applicable local, state, and federal rules and regulations.

4.5.6 Miscellaneous Drains

Process wastewater can result from draining a water storage tank or from cleaning, construction activities, and maintenance operations. Wastewater from these processes will be routed through plant drains to the ZLD wastewater treatment system or otherwise managed according to applicable local, state, and federal rules and regulations. Flows from the miscellaneous drains will be intermittent and will not normally contribute to the wastewater flows. Periodic offline washes of the CT and cooling tower using water, or a detergent-water solution, will also produce wastewaters. CT offline wash wastewater will be managed by draining these wastewaters into a tank and then transferring those wastewaters by a portable pump to tank trucks. The process will be managed according to applicable local, state, and federal rules and regulations.

4.6 Solid and Hazardous Wastes

All solid (non-hazardous) and hazardous wastes associated with the SHCCF will be managed according to federal, state and local regulations. SHCCF may periodically generate hazardous waste (typically less than 100 kilograms (kg) per month), including spent solvents, boiler chemical cleaning wastes and other wastes.

4.6.1 Solid Wastes

The ZLD wastewater treatment technology proposed for the SHCCF will generate ZLD by-products that consist of a dewatered lime softening clarifier filter cake and dewatered crystalized salts. The estimated quantities of filter cake and crystalized salts are 16.6 tons per day and 24.8 tons per day, respectively. A preliminary waste determination for toxicity characteristic confirmed that the clarifier filter cake and the crystalized salts would not have toxicity characteristics and can be disposed of as a solid waste. Upon operation of the ZLD system, representative samples of the ZLD by-products will be collected for testing using the TCLP procedure to confirm that they do not have toxicity characteristics and can be disposed of as a solid waste (40 CFR 262.24). The projected quantities and composition of each of the two types of solid waste are as follows:

PRELIMINARY WASTE CHARACTERIZATION	
Dewatered Lime Softening Clarifier Sludge (estimated quantity is 16.6 tons per day)	
■	Water 60%
■	Calcium carbonate (CaCO_3) 30.45%
■	Magnesium hydroxide ($\text{Mg}(\text{OH})_2$) 6.33%
■	Calcium phosphate ($\text{Ca}_3(\text{PO}_4)_2$) 1.75%
■	Ferric hydroxide ($\text{Fe}(\text{OH})_3$) 0.76%
■	Silica (SiO_2) 0.71%
Dewatered Solids from Crystallizer (estimated quantity is 24.8 tons per day)	
■	Water 45%
■	Sodium sulfate (Na_2SO_4) 26.35%

■	Sodium chloride (NaCl) 21.20%
■	Potassium nitrate (K ₂ NO ₃) 5.38%
■	Sodium nitrate (Na ₂ NO ₃) 0.84%
■	Organics from sewage treatment plant 0.34%
■	Magnesium sulfate (MgSO ₄) 0.28%
■	Calcium carbonate (CaCO ₃) 0.25%
■	Oil and grease 0.18%
■	Aluminum (Al) 96.6 ppm
■	Arsenic (As) 1.3 ppm
■	Barium (Ba) 7.7 ppm
■	Cadmium (Cd) 0.19 ppm
■	Calcium phosphate (Ca ₃ (PO ₄) ₂) 73.7 ppm
■	Chromium (Cr) 0.42 ppm
■	Copper (Cu) 6.0 ppm
■	Fluoride (F) 247.6 ppm
■	Iron (Fe) 38.0 ppm
■	Lead (Pb) 2.6 ppm
■	Manganese (Mn) 12.9 ppm
■	Strontium (Sr) 312.0 ppm
■	Surfactants 30.4 ppm
■	Kjeldahl nitrogen 742.9 ppm
■	Zinc (Zn) 28.8 ppm

Source: POWER Engineers, 2017

Other solid wastes will be generated in small quantities and limited to municipal solid waste, and operation and maintenance wastes. An approved commercial solid waste contractor will collect and transport the solid wastes for disposal in accordance with Chapters 62-701 or 62-702, FAC. Natural gas and ULSD fuel are the only proposed fuels for the SHCCF; therefore, solid waste combustor ash management is not proposed for the SHCCF.

4.6.2 Hazardous Wastes

SHCCF will be operated to minimize the generation of hazardous waste. Any hazardous waste associated with SHCCF will be less than 100 kg per month and may include spent solvents, boiler chemical cleaning wastes, and other wastes. Potentially hazardous wastes will be collected and managed as hazardous wastes until tested to determine their hazardous waste characteristics. Hazardous wastes, if any, will be collected onsite and disposed offsite of by a licensed hazardous waste contractor.

4.7 On-Site Drainage System

The onsite drainage system for the SHCCF will be designed, constructed and operated independently from the SHGS. Two dry detention stormwater ponds are proposed (Pond 1 and Pond 2). Stormwater pond 1 is located near the northwest site boundary and Stormwater pond 2 is located near the southwestern site boundary. A combination of swales, drop inlets and underground pipes are proposed for storm water collection and routing to the dry detention pond systems. Details of the stormwater management plan are provided in Appendix 10.4.

4.7.1 Design Criteria and Applicable Regulations

The following stormwater regulations are applicable to the conceptual Surface Water Management System (SWMS) design for SHCCF:

Pasco County (County) Land Development Code (LDC), Section 902

Southwest Florida Water Management District's (SWFWMD's) Environmental Resource Permit Applicant's Handbook, Volume II, which is incorporated by reference in 40D-4.091, Florida Administrative Code.

The SHCCF Project is located within the Bear Creek watershed. The County considers this watershed to be an open basin, which affects the type of storm event used as the basis for design. As such, the SWMS design is to be based on a 100-yr, 24-hr storm event estimated to be 12 inches and modeled with Florida Modified Type II stormwater distribution.

4.7.2 Construction Site Drainage

The dry detention ponds will be built early for management of construction site drainage. Best management practices (BMPs) will be installed to prevent offsite water quality impacts. Perimeter controls including silt fencing and hay wattles will be installed around the perimeter of the SHCCF project area, the temporary Construction Parking and Laydown Area, and the 230-kV Interconnect Tie-Line area. Construction stormwater will be managed as described in Subsection 5.2.1 and Appendix 10.4. Two dry detention ponds will be built early for management of construction site drainage. Perimeter controls including silt fencing and hay wattles will be installed around the perimeter of the SHCCF Site, the Construction parking and laydown area, and the 230kV Interconnect Tie-Line corridor. Stabilized access entry and exit points will be maintained to minimize soil tracking. Best management practices (BMPs) will be installed to prevent offsite water quality impacts. No stormwater discharge to surface water is expected during construction, unless there is an extreme event (>25-year, 72-hour).

Authorization to access and use the Temporary Construction Parking and Laydown Area and 230-kV Interconnect Tie-Line is currently being negotiated with the owners of those parcels. The appropriate documentation demonstrating that SHEC has the ability to use these areas for the purposes and uses contained in the SCA will be submitted once finalized.

4.7.3 Operational Site Drainage

The storm water management system has been designed to provide approximately 8.0 acre-feet of storage from a total contributing area of approximately 14 acres. The drainage plan has been delineated into eight drainage sub-basins, and sub-basin runoff is collected within swales, drop inlets and pipe and routed to either Pond 1 or Pond 2. Runoff from the northern portion of the site is directed to Pond 1 and runoff from the southern portion of the site is directed to Pond 2. Pond 1 and Pond 2 will normally be dry as peak flows and runoff volumes resulting from the 100-year, 24-hour storm event will be attenuated via percolation.

Similar to design storm attenuation, these ponds have been designed to attenuate the required water quality treatment volumes via percolation.

4.8 Heavy Equipment and Materials

The major components of SHCCF that will be transported to and erected on the site include:

- Steam Turbine
- Gas Turbine
- HRSG
- HRSG stack
- Step Up Transformer
- Cooling Tower
- Tanks (Wastewater, Water storage, Aqueous Ammonia storage, diesel fuel, etc.)

4.8.1 Construction Materials and Equipment

Trucks, construction equipment and material will be delivered to the site by using existing roadways. Maintenance may be conducted on existing roads prior to and during its use to the extent necessary to assure public safety and safe transport of equipment. State roadways to be used include Interstate 75, Suncoast Parkway (SR589), and State Road 52.

Equipment and materials will be unloaded and handled throughout the Project Area and construction laydown area using portable cranes and trucks. Some of the heaviest items, such as the new combustion turbine, steam turbine, HRSG, and transformer, may require special transport. As necessary, additional temporary access for heavy equipment handling may require the construction of onsite support areas for lifting and material handling equipment. Figure 4.1-1 provides a depiction of the approximately 20-acre construction laydown area, located adjacent to and east of the SHCCF. Preparation for temporary facilities within the site boundary and in the temporary construction parking and laydown area for temporary roads, material and equipment laydown, parking and office trailers and sanitary facilities may require importing clean fill materials and placing crushed stone aggregate. As discussed in Section 4.8, stormwater runoff management systems will be provided to control temporary sediment erosion impacts.

Heavy components such as turbine sections, transformers, and generators may be transported by rail or ship to the nearest terminal. Delivery of heavy and/or oversized equipment will be transported to the Site by roads using specialized methods for this purpose. Appropriate FDOT and local approvals/notifications/escorts will be made prior to transporting heavy/oversized equipment.

4.9 Associated Linear Facilities

Associated linear facilities include a 230-kV interconnection tie-line, a natural gas lateral and reclaimed water, sanitary sewer and potable water infrastructure. Details associated with the interconnection tie-line are presented in Section 9. The on-site natural gas metering station will connect the existing FGT 12"

Shady Hills Lateral to the SHCCF. The metering station and lateral will be constructed, owned, and operated by Florida Gas Transmission. SHEC is currently negotiating a utility services agreement with Pasco County for the provision of reclaimed water, potable water and sanitary sewer services which will be provided by the Pasco County Utilities Division (See Figure 4.1-2). The natural gas metering station and associated natural gas pipelines owned and operated by FGT will not be part of the SHCCF Certified Project. The offsite reclaimed water, potable water, and wastewater infrastructure will not be owned or operated by SHEC and will not be part of the SHCCF Certified Project. The onsite reclaimed water, potable water, and wastewater infrastructure will be owned and operated by SHEC and will be part of the SHCCF Certified Site and SHCCF Certified Project.

4.10 Emergency Disaster Preparedness Plans

The SHCCF will develop a comprehensive emergency response plan for site emergencies and natural disasters. The emergency preparedness plan will address a range of events including chemical releases, fire, explosions, flooding and weather-related disasters (i.e., hurricanes) which will address construction and operation of the SHCCF.

TABLES

Table 4.3-1: Natural Gas Composition

Component	Molar %
Methane, CH ₄	95.912
Ethane, C ₂ H ₆	2.181
Propane, C ₃ H ₈	0.152
n-Butane, C ₄ H ₁₀	0.05
n-Pentane, C ₅ H ₁₂	0.017
n-Hexane, C ₆ H ₁₄	0.012
Carbon Dioxide, CO ₂	1.222
Nitrogen, N ₂	0.44
Hydrogen, H ₂	0.005
Oxygen, O ₂	0.009
Total Sulfur	2 grains per 100 SCF

Notes:

scf = standard cubic feet

MM = million

Low Heating Value (LHV) = 20,611.6 BTU/lb

Table 4.4.1-1: Stack, Operating, and Emission Data for CT/HRSG GE 7H.02, 1X1 Combined Cycle Combustion Turbine, HRSG with Duct Burner, Natural Gas Firing, SCR

Parameter	Units	Operating and Emission Data ^a								
		Baseload and DB Firing			Baseload			MECL		
		Ambient Temperature			Ambient Temperature			Ambient Temperature		
		30 °F	59 °F	95 °F	30 °F	59 °F	95 °F	30 °F	59 °F	95 °F
<u>CT/HRSG Stack Data</u>										
Height	ft	149	149	149	149	149	149	149	149	149
Diameter	ft	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Temperature	°F	159.7	161.1	167.3	165.7	166.1	175.0	151.3	151.9	161.6
Stack Exhaust Velocity	ft/sec	54.6	52.7	50.9	55.0	53.5	53.0	25.9	25.4	29.0
Maximum Hourly Emissions										
SO ₂	lb/hr	21.7	21.0	20.1	20.8	20.4	19.7	8.7	8.1	9.3
PM/PM ₁₀ /PM _{2.5}	lb/hr	14.6	14.4	14.8	12.9	12.8	12.7	10.6	10.4	10.7
NO _x	lb/hr	28.1	27.1	26.0	26.9	26.3	25.4	11.1	10.4	12.0
CO	lb/hr	49.8	48.3	51.9	35.2	34.7	33.1	24.2	22.4	25.9
VOC (as methane)	lb/hr	9.8	9.5	9.1	5.0	4.9	4.8	2.4	2.4	2.7
Sulfuric Acid Mist	lb/hr	4.0	3.9	3.7	3.2	3.1	3.0	1.3	1.2	1.4

^a Refer to Appendix A for detailed information on basis of pollutant emission rates and operating data.
 Sources: GE, 2018; Golder, 2018.

**Table 4.4.1-2: Summary of Maximum Potential Annual Emissions for Project
Shady Hills Combined Cycle Facility**

Pollutant	Maximum Potential Annual Emissions (TPY)							PSD Significant Emission Rate (TPY)
	1 CT/HRSG	1 Emergency Generator	1 Auxiliary Boiler	1 Fire Pump Engine	1 Cooling Tower	Fugitive Emissions SF ₆ NG Leaks	TOTAL	
SO ₂	90.6	0.00580	0.34	0.00096	--	--	90.9	40
PM	59.3	0.181	0.42	0.029	16.06	--	76.0	25
PM ₁₀	59.3	0.181	0.42	0.029	3.17	--	63.1	15
PM _{2.5}	59.3	0.181	0.42	0.029	0.010	--	59.9	10
NO _x	116.8	5.80	3.00	0.57	--	--	126.2	40
CO	179.1	3.17	4.80	0.497	--	--	187.5	100
VOC (as methane)	30.7	0.907	0.30	0.143	--	--	32.0	40
Sulfuric Acid Mist	15.2	Neg.	Neg.	Neg.	--	--	15.2	7
Greenhouse Gases (CO ₂ e)	1,877,683	606	7,019	100.8	--	62.4	1,885,409	75,000

^a An auxiliary boiler is only required to supply steam during startup.

Note: Neg.= negligible; NA= not applicable

Source: Golder, 2018.

**Table 4.5.1-1: Physical, Performance, and Emissions Data for the Mechanical Draft Cooling Tower
Shady Hills Combined Cycle Facility**

Parameter	
<u>Physical Data</u>	
Number of Cells	6
Deck Dimensions, ft	
Length	315.7
Width	61.0
Height	37.5
Stack Dimensions	
Height, ft above ground	51.2
Stack Top Effective Inner Diameter, per cell, ft	33
Effective Diameter, all cells, ft	80.8
<u>Performance Data</u>	
Discharge Velocity, ft/min	1,940
Circulating Water Flow Rate (CWFR), gal/min	94,258
Design hot water temperature, °F	115.0
Design cold water temperature, °F	83.5
Heat Rejected, million Btu/hr	1,714
Design Air Flow Rate per cell, acfm	1,659,000
Liquid/ Gas (Air Flow) (L/G) Ratio	1.32
Hours of operation	8,760
Temperature of Exit Air, °F	91.0
<u>Emission Data</u>	
Drift Rate ^a (DR), percent	0.0010
Total Dissolved Solids (TDS) Concentration ^b , maximum ppm	7,774
Solution Drift ^c (SD), lb/hr	471.7
PM Drift ^d , lb/hr	3.7
tons/year	16.1
PM ₁₀ Drift ^e	
PM ₁₀ Emissions, lb/hr	0.72
tons/year	3.17
PM _{2.5} Emissions, lb/hr	0.010
tons/year	0.044

^a Drift rate is the percent of circulating water.

^b A TDS of 35,000 results in maximum PM emissions.

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

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

^e PM₁₀ based on Calculating Realistic PM₁₀ Emissions from Cooling Towers, Joel Reisman and Gordon Frisbie.

Sources: POWER Engineers, Inc. 2018, Golder; 2018.

**Table 4.6-1: Waste Streams, Characterization and Disposal Method
Shady Hills Combined Cycle Facility**

Waste Streams (Process Water Systems)	Non Hazardous Basis for Characterization	Hazardous Basis for Characterization	Disposal Management Process
Sanitary Wastewater (operations)	Based on analytical characterization of historical data	--	Routed to SHWWTP
Water Treatment Wastewater (includes RO Reject)	Based on analytical characterization of historical data	—	Recycled to cooling tower
Heat Recovery Steam Generator Blowdown	Based on analytical characterization of historical data	—	Recycled to cooling tower
Steam Cycle Water Treatment Chemicals (Hydrazine, Ammonia, Sodium Phosphate)	Based on analytical characterization by historical data		Chemicals breakdown in steam cycle [any residual chemicals are disposed of by HRSG blowdown into the cooling tower
Cooling System Return (Biocide Addition Chlorine, Scale Inhibitor, Pretreatment Chemicals)	Based on analytical characterization by vendor supplying chemical	—	Disposed of as industrial wastewater into the cooling tower
Heat Recovery and Steam Generator as Well as Pre- boiler Piping Chemical Cleaning	Based upon analytical waste stream characterization.	Based upon analytical waste stream characterization	If non-hazardous, will be disposed of into the cooling tower. If hazardous, then disposed of by a licensed approved contractor.
Plant and Equipment Drains	Based on analytical characterization of historical data	—	Treated by oil/water separator then disposed of as industrial wastewater into the cooling tower.

**Table 4.6-1: Waste Streams, Characterization and Disposal Method
Shady Hills Combined Cycle Facility**

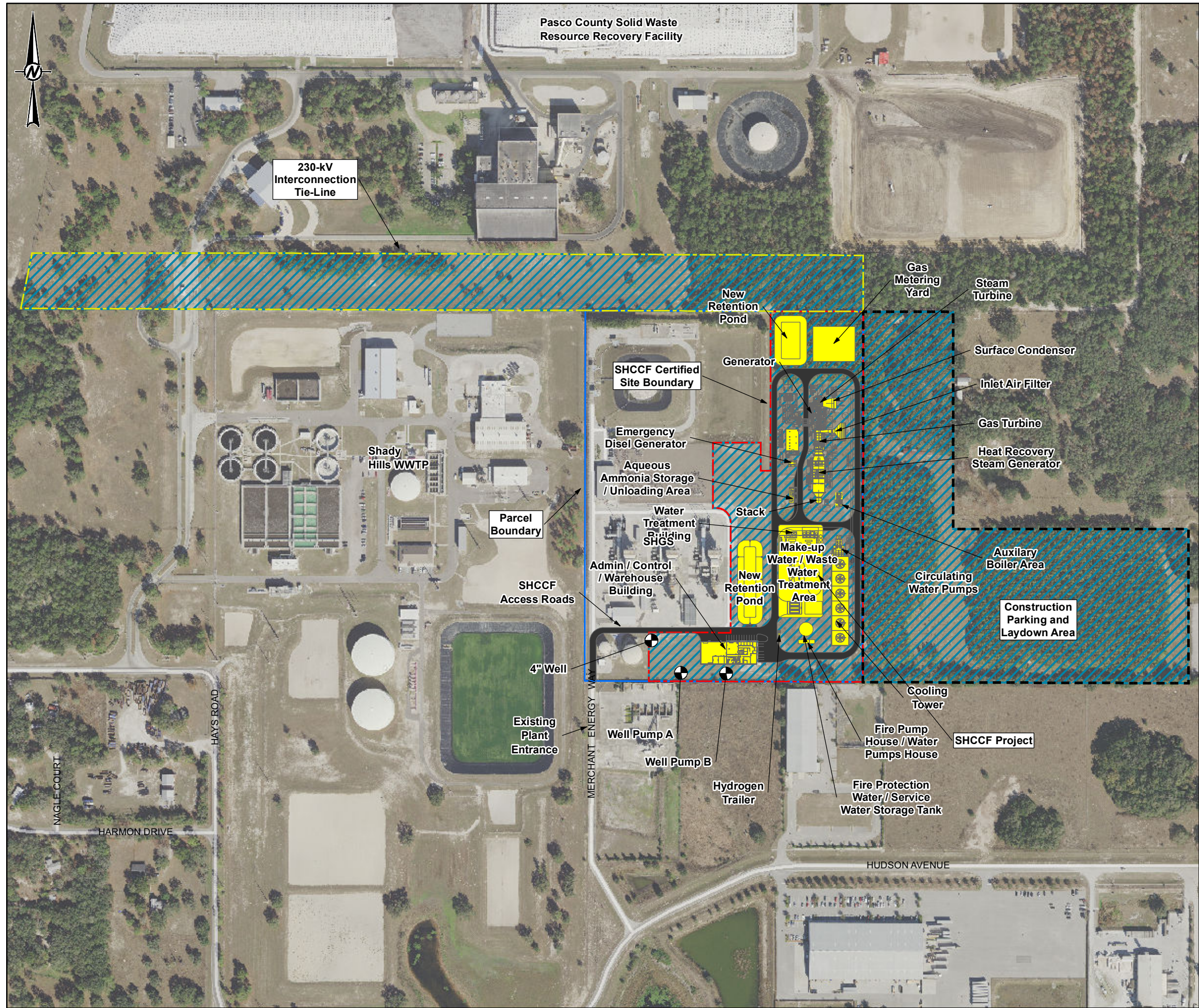
Waste Streams (Construction and Operations)	Non Hazardous Basis for characterization	Hazardous Basis for Characterization	Disposal Management Process
Sanitary Waste (construction)	Based on historical data	—	Portable chemical toilets and/or permitted holding tanks will be used. A licensed contractor will pump all sanitary sewage from the portable toilets and holding tanks as needed and transport the waste to an approved treatment/disposal facility. A temporary connection to the existing SHWWTF may be used during construction.
Construction-Related Waste Water (e.g., ammoniated process water for hydrostatic testing and backfilling, groundwater from dewatering and steam blow quench water, cleaning and flushing, etc.)	Based on historical data	—	Hydrostatic test water will be contained on site, tested, treated if necessary and either routed to the stormwater ponds for percolation/evaporation, or when necessary, the water may be disposed of at the SHWWTF, or a licensed disposal facility.
Construction-Related Solid Waste	Based on historical data	—	Materials recycled to the extent practicable or disposed of using a licensed waste contractor.
Water Pretreatment Solid Waste	Based on analytical results	—	Disposed of by an approved disposal contractor.
Oily Rags	As per EPA in 40 CFR 279	—	Recycled via laundering by FDEP-approved vendor or disposed of in landfill.
Punctured Aerosol Cans	As per EPA characterization letter	—	Disposed of by an approved scrap metal contractor.
Captured Paint Residuals from Punctured Aerosol Cans	—	Analytical data from waste characterization	As hazardous waste in accordance with 40 CFR, Part 261.
X-ray Weld Testing	—	—	Process does not generate waste chemicals onsite. Vendor is responsible for their waste generation.

**Table 4.6-1: Waste Streams, Characterization and Disposal Method
Shady Hills Combined Cycle Facility**

Waste Streams (Construction and Operations)	Non Hazardous Basis for characterization	Hazardous Basis for Characterization	Disposal Management Process
Florescent Bulbs and Batteries	—	As per 40 CFR 273 EPA determination	Recycled as universal waste.
Oily Separated Waste Water	Based on analytical results	—	Separated water is routed to onsite ponds. Oil is disposed of by an approved waste disposal contractor.
Oily Solid Wastes	As per EPA in 40 CFR 279	—	Disposed of by an approved waste disposal contractor.

FIGURES

G:\PROJECTS\SGE_Energy_Systems\Shady_Hills\09_Plan\SHCCF_Plan\SCA02_Plan_Support\H1_SCA02_Production\MD\1779520_H016_SiteMajorComponents.mxd



LEGEND

- Well Locations (Approximate)
- SHCCF Layout
- SHCCF Major Components
- SHCCF Access Roads
- SHCCF Project
- SHCCF Certified Site Boundary
- 230-kV Interconnection Tie-Line
- Construction Parking and Laydown Area
- Parcel Boundary

REFERENCE(S)

CERTIFIED SITE BOUNDARY, SHCCF PROJECT, GOLDBERG ASSOCIATES INC., 2017
PARCEL BOUNDARY, PASCO COUNTY, 2017
SHCCF MAJOR COMPONENTS, POWER ENGINEERS, 2017

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE

SHCCF SITE MAJOR COMPONENTS

CONSULTANT	YYYY-MM-DD	2018-02-15
DESIGNED	NRL	
PREPARED	NRL	
REVIEWED	RAZ	
APPROVED	MM	

PROJECT NO.
1779520

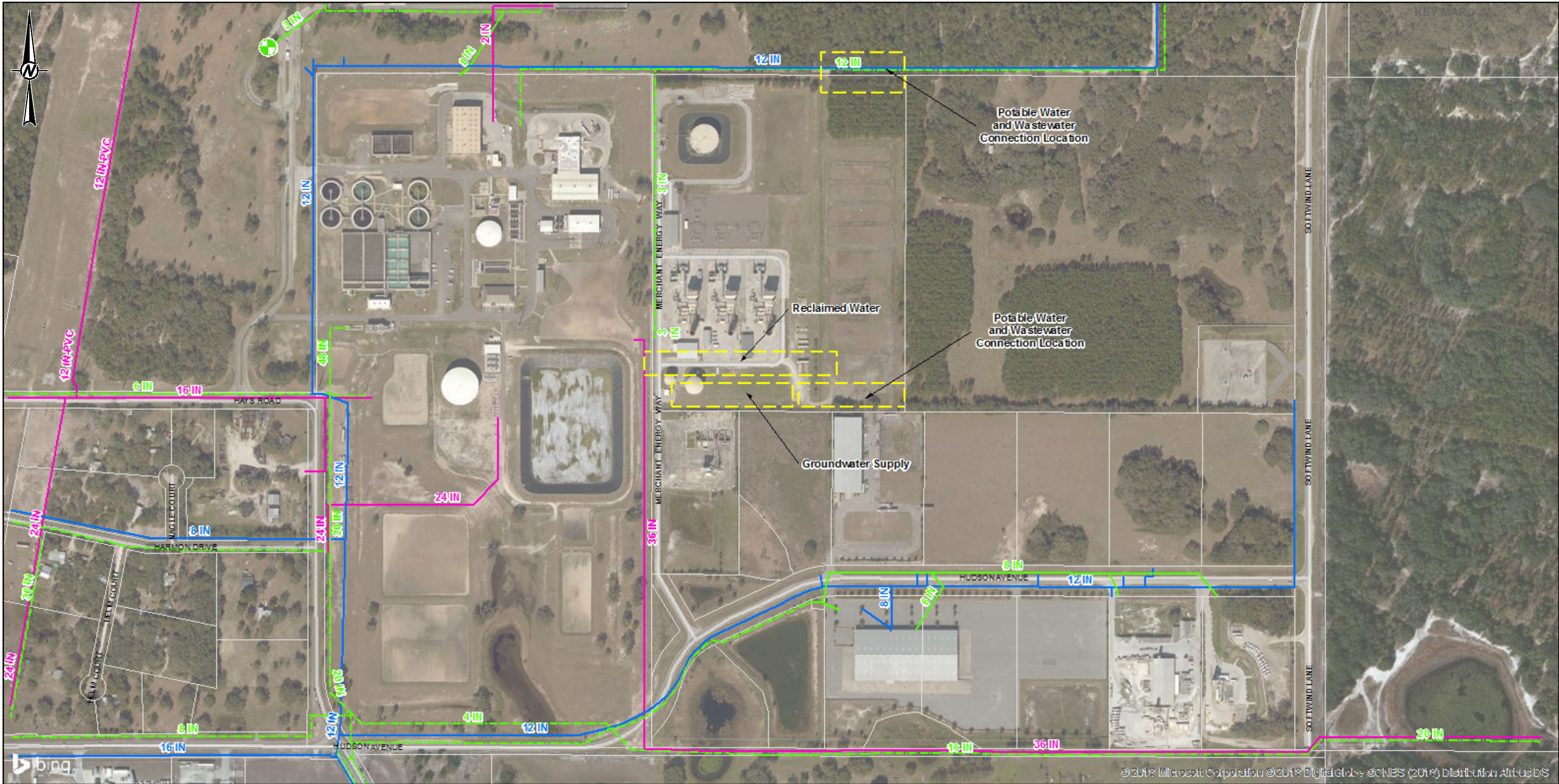
CONTROL
H016

REV.
0

FIGURE
4.1-1

Golder Associates

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



- LEGEND**
- Sewer Pump Stations
 - Reclaimed Water Main
 - Sewer Gravity Main
 - Sewer Pressurized Main
 - Water Main
 - SHCCF Utility Connection Locations (Approximate)

NOTE(S)
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CLIENT
SHADY HILLS ENERGY CENTER, LLC

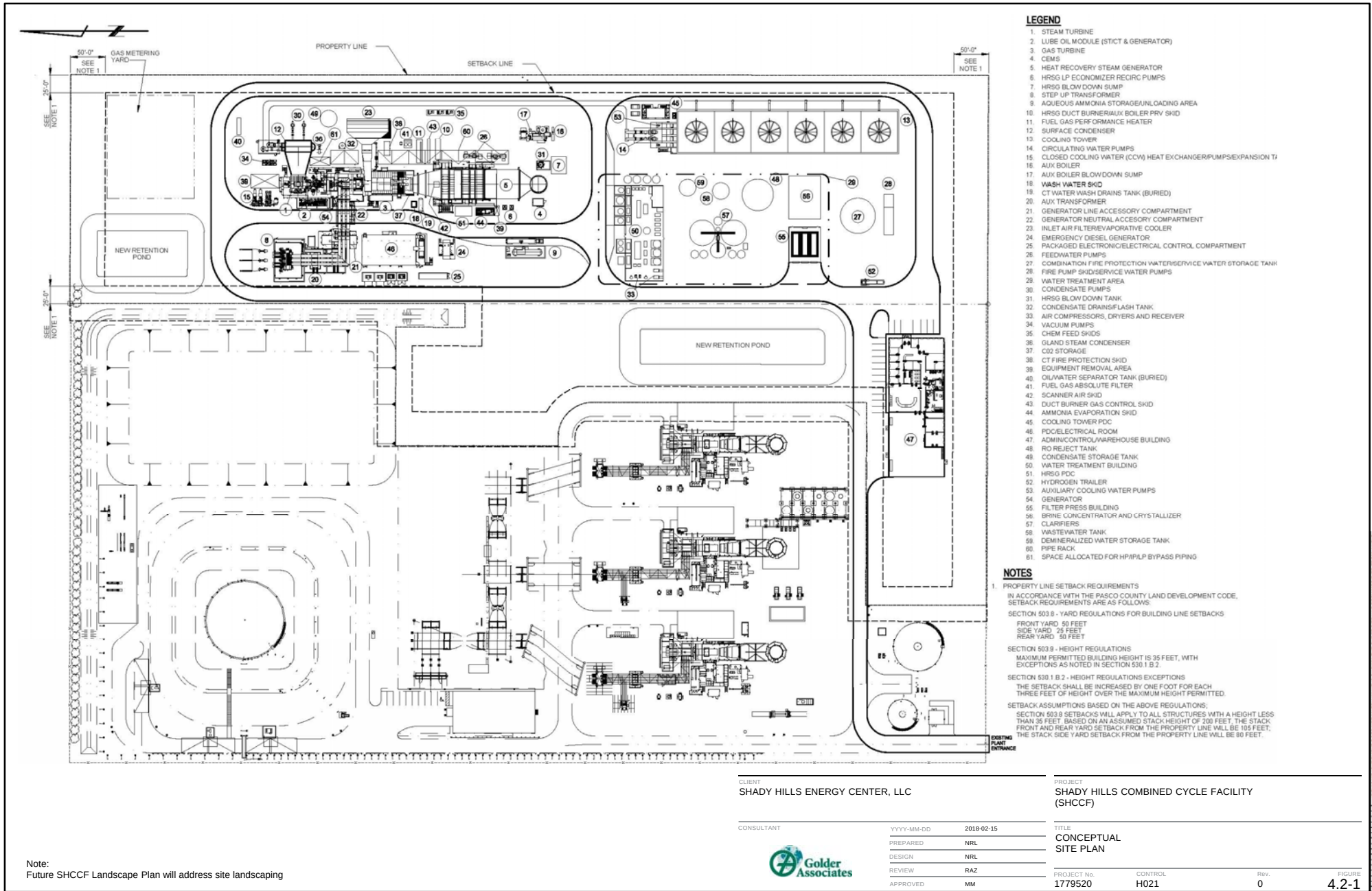
CONSULTANT	YYYY-MM-DD	2018-02-12
	DESIGNED	NRL
	PREPARED	NRL
	REVIEWED	RAZ
	APPROVED	MM



REFERENCE(S)
SEWER PUMP STATION, WATER MAINS, SEWER MAINS, PASCO COUNTY UTILITIES ADMINISTRATION OFFICE, PASCO COUNTY UTILITY AVAILABILITY MAP, DATED 11/06/2017
UTILITY CONNECTION LOCATIONS, GOLDBER ASSOCIATES INC., 2018

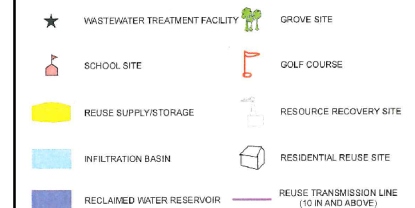
PROJECT
SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE	PROJECT NO.	CONTROL	REV.	FIGURE
UTILITY AVAILABILITY LAYOUT	1779520	H024	0	4.1-2





LEGEND



REUSE STORAGE CAPACITY			REUSE PART IV RAPID INFILTRATION BASINS		
	NAME	MG		NAME	MGD
1	DEER PARK	1.5	D	DEER PARK	0.270
2	EMBASSY HILLS	2.0	H	HUDSON	5.000
3	HUDSON	2.0	E	EMBASSY HILLS	3.730
4	NEW PORT RICHEY	7.5	N	NORTHWEST	1.900
5	SHADY HILLS	6.5	G	OAKLEY GROVES	0.075
6	LAND O' LAKES	3.8	F	FOX HOLLOW	0.663
7	WESLEY CENTER	6.0	S	SHADY HILLS	0.350
8	SOUTHEAST	1.5	O	ODESSA SPRAYFIELD	0.300
9	ODESSA	5.0			
10	HANDCART	2.0			
11	LAKE RITA	65.0			
12	LAND O' LAKES RESERVOIR	114.0			
13	BOYETTE RESERVOIR*	500.0			
			PROPOSED REUSE UTILIZATION		
				NAME	
			33	WIREGRASS RESIDENTIAL	
			34	UNION PARK RESIDENTIAL	

REUSE UTILIZATION - IRRIGATION		REUSE UTILIZATION - IRRIGATION	
	NAME		NAME
1	BEACON WOODS GOLF COURSE	17	SEVEN SPRINGS EXEC. GOLF COURSE
2	BEACON WOODS EAST GOLF COURSE	18	NORTHWOOD RESIDENTIAL
3	TIMBER OAKS GOLF COURSE	19	MEADOW POINT RESIDENTIAL
4	SEVEN SPRINGS GOLF COURSE	20	STAGECOACH RESIDENTIAL
5	TIMBER GREENS GOLF COURSE	21	HERITAGE SPRINGS GOLF COURSE
6	FOX HOLLOW ELEMENTARY SCHOOL	22	HERITAGE PINES GOLF COURSE
7	SCHRAEDER ELEMENTARY SCHOOL	23	LEXINGTON OAKS GOLF COURSE
8	COTEE RIVER ELEMENTARY SCHOOL	24	NEW RIVER RESIDENTIAL
9	HUDSON SCHOOL COMPLEX	25	OAKSTEAD RESIDENTIAL
10	SILVER OAKS GOLF COURSE	26	SEVEN OAKS RESIDENTIAL
11	LAKE BERNADETTE GOLF COURSE	27	HIDDEN CREEK GOLF COURSE
12	SADDLEBROOK GOLF COURSE	28	LONG LEAF RESIDENTIAL
13	QUAIL HOLLOW GOLF COURSE	29	THE GROVES GOLF COURSE
14	PRICE/ALTMAN GROVES	30	SANDER GROVES
15	RESOURCE RECOVERY FACILITY	31	EPCO GROVES
16	LAKE JOVITA GOLF COURSE	32	CHASCO ELEMENTARY SCHOOL

NOTE(S)

*UNDER CONSTRUCTION

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REFERENCE(S)

PASCO COUNTY REUSE SYSTEM, PASCO COUNTY, 2013

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE

PASCO COUNTY MASTER REUSE SYSTEM

CONSULTANT

YYYY-MM-DD	2018-02-13
DESIGNED	NRL
PREPARED	NRL
REVIEWED	KB
APPROVED	RAZ



PROJECT NO.	CONTROL	REV.	FIGURE
1779520	H038	0	4.4-1

HEAT BALANCE CASE	001-REV. 0	002-REV.0	003-REV.0	004-REV. 0	005-REV.1	006-REV.0	007-REV. 0	008-REV.0	009-REV.0	010-REV.1
DRY BULB TEMPERATURE, °F	30	30	30	30	30	40	40	40	40	40
RELATIVE HUMIDITY, %	60	60	60	60	60	60	60	60	60	60
GAS TURBINE LOAD	BASE	MECL	60%	80%	BASE	BASE	MECL	60%	80%	BASE
EVAPORATIVE COOLER	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
DUCT BURNER	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	ON

[illegible][illegible]

7	HRSG BLOWDOWN	39.8	21.0	29.0	33.2	43.7	39.8	20.4	28.9	33.3	43.0
8	LOSSES FROM HRSG/STEAM TURBINE CYCLE	19.9	10.5	14.5	16.6	21.9	19.9	10.2	14.4	16.6	21.5
9	DEMINERALIZED WATER PRODUCED	59.7	31.5	43.5	49.7	65.6	59.7	30.6	43.3	49.9	64.4
10	MAKEUP DEMINERALIZER REVERSE OSMOSIS REJECT	6.6	3.5	4.8	5.5	7.3	6.6	3.4	4.8	5.5	7.2
11	INFLUENT TO MAKEUP DEMINERALIZER SYSTEM	66.3	35.0	48.3	55.3	72.9	66.4	34.0	48.1	55.5	71.6
12	EVAPORATION FROM EVAPORATIVE COOLER	0	0	0	0	0	0	0	0	0	0
13	BLOWDOWN FROM EVAPORATIVE COOLER	0	0	0	0	0	0	0	0	0	0
14	MAKEUP TO EVAPORATIVE COOLER	0	0	0	0	0	0	0	0	0	0
15	COOLING TOWER EVAPORATION	1,190	642	868	992	1,286	1,291	681	939	1,080	1,375
16	COOLING TOWER BLOWDOWN	595	321	434	496	643	646	340	469	540	687
17	SLUDGE BLOWDOWN FROM CLARIFIERS	8.9	4.8	6.5	7.4	9.6	9.7	5.1	7.0	8.1	10.3
18	SLUDGE DEWATERING FILTRATE	7.8	4.2	5.7	6.5	8.4	8.5	4.5	6.2	7.1	9.0
19	WATER LOST IN DEWATERED SLUDGE	1.1	0.6	0.8	0.9	1.2	1.2	0.6	0.9	1.0	1.3
20	LIME SOFTENER EFFLUENT RECYCLED TO COOLING TOWER	339	183	247	283	367	368	194	268	308	392
21	ULTRAFILTRATION BACKFLUSH	28.3	15.3	20.6	23.6	30.6	30.7	16.2	22.3	25.7	32.7
22	WWT REVERSE OSMOSIS PERMEATE	199	107	145	166	215	216	114	157	181	230
23	WWT REVERSE OSMOSIS REJECT	27.2	14.7	19.8	22.7	29.4	29.5	15.5	21.4	24.7	31.4
24	BRINE CONCENTRATOR AND CRYSTALLIZER DISTILLATE	25.4	13.7	18.5	21.2	27.4	27.5	14.5	20.0	23.0	29.3
25	WATER LOST IN CRYSTALLIZER SOLIDS	1.8	1.0	1.3	1.5	1.9	1.9	1.0	1.4	1.6	2.1
26	TREATED WASTEWATER TO RECYCLE SUMP	158	86	115	132	170	177	94	129	148	188
27	SERVICE WATER USES	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
28	POTABLE WATER USES	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
29	DISCHARGE FROM OIL/WATER SEPARATOR	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
30	TOTAL WASTEWATER RECYCLED TO COOLING TOWER	577	314	422	482	623	628	333	458	526	668

CLIENT
SHADY HILLS ENERGY CENTER, LLC

CONSULTANT

PREPARED	NRL
----------	-----

DESIGN NRL

H019

Rev.
0

FIGURE 4.5-1



HEAT BALANCE CASE	011-REV. 0	012-REV.0	013-REV.0	014-REV. 0	015-REV.1	016-REV.1	017-REV. 0	018-REV.0	019-REV.0	020-REV.1	021-REV.0	022-REV.1
DRY BULB TEMPERATURE, °F	59	59	59	59	59	59	77	77	77	77	77	77
RELATIVE HUMIDITY, %	60	60	60	60	60	60	60	60	60	60	60	60
GAS TURBINE LOAD	BASE	MECL	80%	80%	BASE	BASE	BASE	MECL	80%	80%	BASE	BASE
EVAPORATIVE COOLER	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF	ON	ON
DUCT BURNER	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	ON

[illegible]

HEAT BALANCE CASE	023-REV.0	024-REV. 0	025-REV.1	026-REV.0	027-REV. 0	028-REV.1	029-REV.0	030-REV.0	031-REV.0	032-REV.0	033-REV.0	034-REV.0
DRY BULB TEMPERATURE, °F	90	90	90	90	90	90	95	95	95	95	95	95
RELATIVE HUMIDITY, %	60	60	60	60	60	60	60	60	60	60	60	60
GAS TURBINE LOAD	BASE	MECL	60%	80%	BASE	BASE	BASE	MECL	60%	80%	BASE	BASE
EVAPORATIVE COOLER	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF	ON	ON
DUCT BURNER	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	ON

NUMBER	DESCRIPTION	AVERAGE FLOW RATE - GALLONS PER MINUTE											
1	RECLAIMED WATER	1,788	1,033	1,302	1,519	1,862	2,017	1,808	1,070	1,317	1,536	1,882	2,049
2	POTABLE WATER	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0

3	COOLING TOWER DRIFT	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
4	TOTAL EVAPORATION LOSSES	1,789	1,035	1,303	1,520	1,862	2,017	1,808	1,072	1,319	1,536	1,882	2,049
5	WATER LOST IN SOLID WASTE	4.3	2.5	3.1	3.7	4.4	4.8	4.4	2.6	3.2	3.7	4.5	4.9
6	DISCHARGE TO SEWER	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

7	HRSG BLOWDOWN	38.9	22.1	28.1	33.0	39.9	43.9	38.7	22.5	28.0	32.8	39.7	44.0
8	LOSSES FROM HRSG/STEAM TURBINE CYCLE	19.4	11.1	14.1	16.5	20.0	22.0	19.4	11.3	14.0	16.4	19.9	22.0
9	DEMINERALIZED WATER PRODUCED	58.3	33.2	42.2	49.5	59.9	65.9	58.1	33.8	42.0	49.2	59.6	66.0
10	MAKEUP DEMINERALIZER REVERSE OSMOSIS REJECT	6.5	3.7	4.7	5.5	6.7	7.3	6.5	3.8	4.7	5.5	6.6	7.3
11	INFLUENT TO MAKEUP DEMINERALIZER SYSTEM	64.8	36.9	46.9	55.0	66.5	73.2	64.5	37.5	46.6	54.7	66.2	73.3
12	EVAPORATION FROM EVAPORATIVE COOLER	0	0	0	0	26.0	26.0	0	0	0	0	27.2	27.2
13	BLOWDOWN FROM EVAPORATIVE COOLER	0	0	0	0	2.9	2.9	0	0	0	0	3.0	3.0
14	MAKEUP TO EVAPORATIVE COOLER	0	0	0	0	28.9	28.9	0	0	0	0	30.2	30.2
15	COOLING TOWER EVAPORATION	1,769	1,024	1,289	1,503	1,816	1,969	1,788	1,061	1,305	1,520	1,835	2,000
16	COOLING TOWER BLOWDOWN	885	512	645	752	908	985	894	530	652	760	918	1000
17	SLUDGE BLOWDOWN FROM CLARIFIERS	13.3	7.7	9.7	11.3	13.6	14.8	13.4	8.0	9.8	11.4	13.8	15.0
18	SLUDGE DEWATERING FILTRATE	11.6	6.7	8.5	9.9	11.9	12.9	11.7	7.0	8.6	10.0	12.0	13.1
19	WATER LOST IN DEWATERED SLUDGE	1.7	1.0	1.2	1.4	1.7	1.8	1.7	1.0	1.2	1.4	1.7	1.9
20	LIME SOFTENER EFFLUENT RECYCLED TO COOLING TOWER	504	292	367	428	518	561	510	302	372	433	523	570
21	ULTRAFILTRATION BACKFLUSH	42.1	24.4	30.7	35.8	43.2	48.8	42.5	25.2	31.0	36.2	43.6	47.6
22	WWT REVERSE OSMOSIS PERMEATE	296	171	216	252	304	330	299	178	218	254	307	335
23	WWT REVERSE OSMOSIS REJECT	40.4	23.4	29.4	34.3	41.5	45.0	40.8	24.2	29.8	34.7	41.9	45.7
24	BRINE CONCENTRATOR AND CRYSTALLIZER DISTILLATE	37.7	21.8	27.5	32.1	38.7	42.0	38.2	22.6	27.8	32.4	39.1	42.7
25	WATER LOST IN CRYSTALLIZER SOLIDS	2.7	1.5	1.9	2.3	2.7	3.0	2.7	1.6	2.0	2.3	2.8	3.0
26	TREATED WASTEWATER TO RECYCLE SUMP	269	156	197	229	247	270	273	163	200	232	250	274
27	SERVICE WATER USES	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
28	POTABLE WATER USES	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
29	DISCHARGE FROM OIL/WATER SEPARATOR	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
30	TOTAL WASTEWATER RECYCLED TO COOLING TOWER	866	504	632	737	863	937	875	522	640	745	871	951

CLIENT
SHADY HILLS ENERGY CENTER, LLC

CONSULTANT

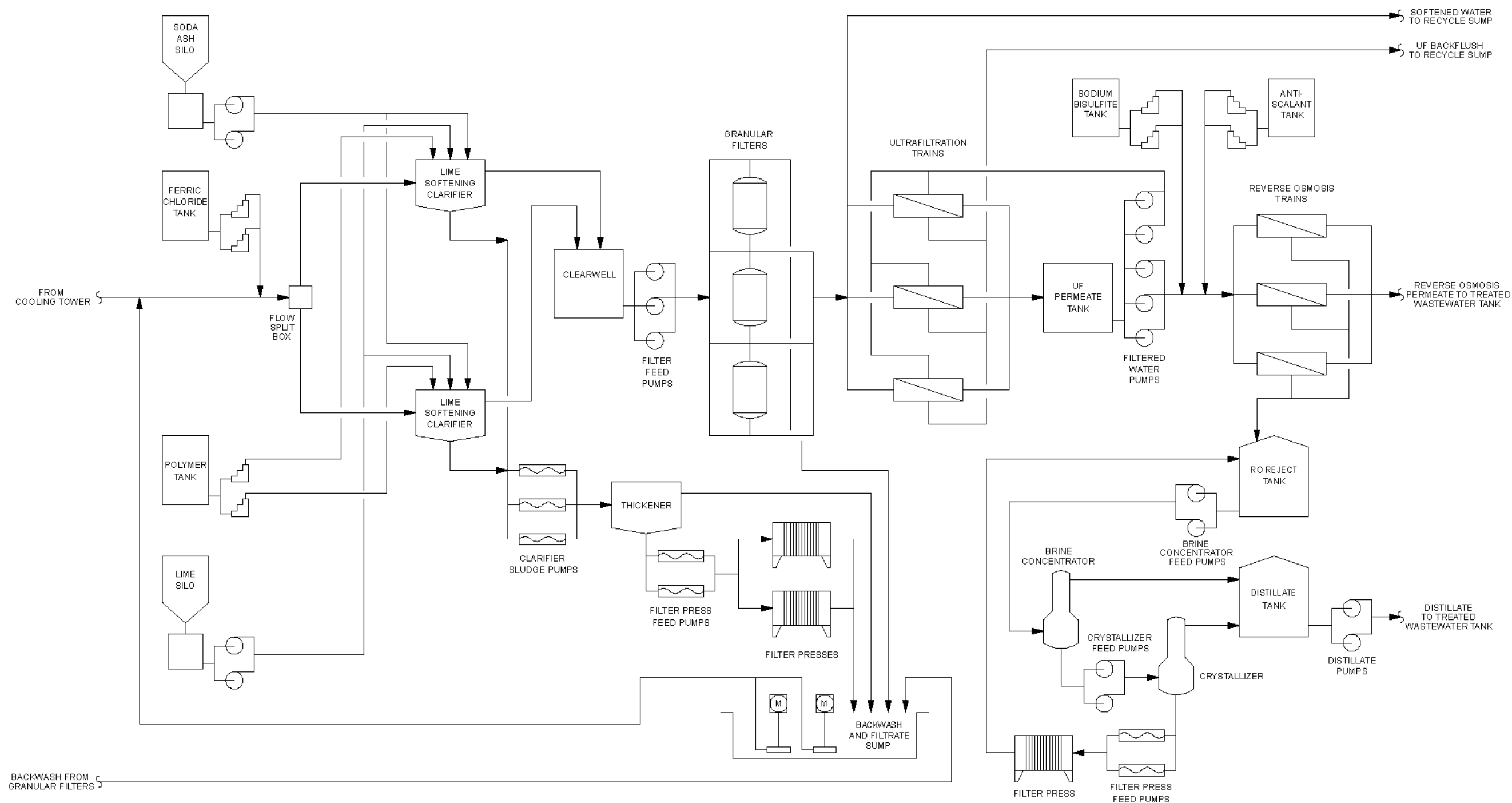


YYYY-MM-DD 2018-02-15
 PREPARED NRL
 DESIGN NRL
 REVIEW RAZ
 APPROVED MM

PROJECT
SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE
WATER BALANCE (4 of 4)

PROJECT No. 1779520 CONTROL H019 Rev. 0 FIGURE 4.5-1



CLIENT
SHADY HILLS ENERGY CENTER, LLC

PROJECT
SHADY HILLS COMBINED CYCLE FACILITY

CONSULTANT



YYYY-MM-DD 2018-01-18

PREPARED NRL

DESIGN NRL

REVIEW RAZ

APPROVED MM

TITLE

PROCESS FLOW DIAGRAM

PROJECT No.
1779520

CONTROL
H020

Rev.
0

FIGURE
4.5-2

5.0 ENVIRONMENTAL EFFECTS OF SITE PREPARATION, AND PLANT AND ASSOCIATED FACILITIES CONSTRUCTION

This section addresses the environmental effects of site preparation and construction of the SHCCF, including the temporary construction parking and laydown area. The environmental impacts discussed are specific to land, surface water, groundwater, ecology, air quality, solid waste, landmarks and sensitive areas, and impacts on archaeological and historic sites.

5.1 Land Impacts

5.1.1 General Construction Impacts

The Project will consist of the construction and operation of the SHCCF within approximately 14 acres, adjacent to and east of the SHGS. Approximately 20 acres to the east of the Site will be temporarily used for construction parking, laydown, staging, and equipment storage. Figure 4.1-1 provides a depiction of the construction laydown area. Currently, both areas consist of vacant land and coniferous plantation. The 14-acre SHCCF Certified Site was previously utilized as temporary laydown and equipment storage associated with the construction of the SHGS.

The temporary approximately 20-acre construction laydown will consist of temporary roadways, material and equipment laydown, parking and office trailers and sanitary facilities. Installation of these facilities may require the removal of unsuitable soils, with clean fill added, and the surface area will be stabilized with rock, limestone, and shell. Other areas within the construction laydown area may only be seeded or sodded with grass to prevent erosion. The necessary number of office trailers and sanitary facilities will be determined by the licensed engineering, procurement and construction (EPC) contractor.

Best management practices (BMPs) will be developed and implemented to minimize spills on-site. Maintenance and refueling activities will be performed only in designated areas. Any spills will be cleaned up and wastes will be disposed of in accordance with applicable requirements.

Land impacts within the linear facilities corridor are anticipated to be associated with land clearing and grading (See Chapter 9). The acreage associated with these temporary impacts and fill will be minimal.

5.1.2 Roads

State roadways that could be used during construction will include Interstate 75, SR589/Suncoast Parkway and SR52. County roadways that could be used during construction include: Hays Road, Hudson Avenue, and Softwind Lane.

Options under consideration for accessing the Site during construction include:

- SR52 to Hays Road (north of SR52), and Merchant Energy Way;
- Land located within the North Suncoast Industrial Park;
- The existing Seminole parcel driveway at Softwind Lane; or

- A new driveway adjacent to and north of the Withlacoochee Electric Cooperative parcel.

Fugitive dust generation from traffic and/or excavation/construction activities on-site or in the laydown area will be minimized through paving, seeding or placing of sod in areas not utilized for construction, water sprinkling, or other dust-suppressant techniques.

5.1.3 Flood Zones

The SHCCF Certified Site, the interconnection tie-line, and the temporary construction parking and laydown area are in Zone X on the Flood Insurance Rate Map (FIRM) Panel No. 12101C0206F (effective September 26, 2014) (See Figure 3.1.2-1). This Zone is designated as a minimal risk area outside the 1-percent (100-year) and .2-percent-annual-chance (500-year) floodplains. No base flood elevations (BFEs) or base flood depths are shown within these zones. Zone X is used on new and revised maps in place of Zone C.

5.1.4 Topography and Soils

The SHCCF Certified Site, the interconnection tie-line, and the temporary construction parking and laydown area are located in the Gulf Coastal Lowlands Physiographic Region. The ground elevation ranges from approximately 49 feet NGVD 29 to 54 feet NGVD 29, averaging approximately 52 feet NGVD 29. Based on the Natural Resources Conservation Service (NRCS) Soil Survey (NRCS, 2017), the surface soils are predominately Candler fine sand, with 0 to 5 percent slopes. These soils are typical eolian deposits and/or marine deposits, excessively drained, with no restrictive layer in the top 6.5 feet, and with very low runoff potential (Hydrologic Soil Group A).

5.2 IMPACT ON SURFACE WATER BODIES AND USES

No impacts to surface water bodies are anticipated as there are no surface water bodies within or proximate to the Project Area.

5.2.1 Impact Assessment

Construction stormwater will be managed following best management practice requirements of the Generic Permit for Stormwater Discharge from Large and Small Construction Activities and the Project's stormwater management plan. The SHCCF Certified Site contains no natural surface waters (i.e., lakes or streams). The soils are very permeable, and the water table is between 14 and 22 feet below ground surface. The average depth is approximately 17 feet bgs (35 feet NGVD 29). During construction, the SHCCF Certified Site will be graded to control stormwater runoff. The stormwater detention pond will be excavated early in the construction schedule and used as a stormwater detention pond during construction. The very high soil percolation rates and the deep water table will allow the stormwater basin to retain and percolate/evaporate runoff for storms exceeding the 25-year, 72-hour event (see Appendix 10.4 for details on the stormwater management system design). Silt fences, or other similar methods, will be used to prevent offsite water quality impacts. Therefore, site preparation and construction activities should have no adverse impact on

off-site surface water bodies. No dredging or filling or construction of shoreline facilities in waters of the state is proposed. Construction water use, dewatering, and stormwater management are discussed below.

5.2.1.1 Construction Water Use

Water used during Project construction will be obtained from reclaimed water and potable water from Pasco County or dewatering effluent. Construction water uses include soil improvement, hydrostatic testing, general cleaning/flushing, chemical cleaning, steam blows, fugitive dust control, potable supply, and irrigation.

Chemicals may be added to the water used for hydrostatic testing to meet manufacturer's specifications for pH control. The water from hydrostatic testing of the HRSG, piping, and tank systems will be contained onsite after such testing is completed. Hydrostatic test water will be tested, treated if necessary, and either routed to the stormwater basin for percolation/evaporation, or when necessary, the water may be disposed of at the SHWWTF or a licensed disposal facility.

Chemical cleaning of the HRSG and steam piping systems may be performed (Section 4.6). Non-hazardous wastewaters may be tested, treated if necessary, and either routed to the stormwater basin for percolation/evaporation or routed to the SHWWTF, or routed to another approved facility.

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

Potable water for consumption, emergency eyewash, and shower stations during construction will be obtained from the Pasco County potable water connection or contractor supplied potable water.

Potable water from Pasco County, reclaimed water or dewatering activities may be used as necessary to mitigate fugitive dust emissions during Project construction.

5.2.1.2 Construction Dewatering

During construction of SHCCF, dewatering activities likely will be required for only one structure – the circulating water pump basin. All other structures, pipes, and excavations are expected to be at depths above the surficial groundwater table. The circulating water pump basin will use a perimeter cutoff wall around the entire structure, set into the clay layer approximately 22 feet below ground surface. This will minimize the dewatering volumes and pumping rates required to maintain water levels in the basin. The initial dewatering rate is calculated to be less than 7,200 gpd for approximately 10 to 14 days, and the maintenance rate is calculated to be approximately 150 gpd. The dewatering effluent will be routed to the onsite stormwater basin or temporary holding basins for reuse or evaporation/percolation.

5.2.1.3 Construction Stormwater

No stormwater discharge to surface water is expected during construction, unless there is an extreme event (>25-year, 72-hour). Construction stormwater will be managed as described in Subsection 5.2.1 and Appendix 10.4. Two dry detention ponds will be built early for management of construction site drainage. Perimeter controls including silt fencing and hay wattles will be installed around the perimeter of the SHCCF Site, the Construction parking and laydown area, and the 230kV Interconnect Tie-Line corridor. Stabilized access entry and exit points will be maintained to minimize soil tracking. Best management practices (BMPs) will be installed to prevent offsite water quality impacts.

A comprehensive stormwater pollution prevention plan (SWPPP) will be prepared and implemented, as required under the FDEP Generic Permit for Stormwater Discharge from Large and Small Construction Activities, addressing the construction of SHCCF. The SWPPP will be prepared to mitigate impacts due to stormwater during construction. As a result, no adverse impacts to surface waters due to site preparation and construction are anticipated.

5.2.2 Measuring and Monitoring Programs

Construction stormwater management system will be monitored as required by both the SWPPP that will be developed and the applicable best management practices (BMPs) under the generic stormwater construction permit. Due to the use of the two stormwater ponds and the high percolation rates at the Site, no discharge to surface waters is anticipated.

5.3 GROUNDWATER IMPACTS

5.3.1 Impact Assessment

As discussed above in Section 5.2.1.2, dewatering requirements for construction of SHCCF are very limited due to the deep water table at the Site. The one structure that will require some dewatering will use dewatering techniques designed to minimize volumes and pumping rates. Consequently, no adverse impact to groundwater resources or offsite impacts are expected during construction of SHCCF from dewatering.

As discussed above in Section 5.2.1.1, construction water will be obtained from Pasco County or dewatering effluent, if available; and from vendor supplied sources, if necessary. Since groundwater will not be used during construction, no adverse impact to groundwater resources or existing legal users is anticipated.

5.3.2 Measuring and Monitoring Programs

Water use from Pasco County will be metered and construction dewatering will be monitored as discussed above in Subsection 5.2.2.

5.4 ECOLOGICAL IMPACTS

5.4.1 *Impact Assessment*

Construction of the Project will only impact terrestrial (upland) systems. No aquatic (wetland) systems exist within the Project Area. The ecological impacts associated with construction are discussed below.

5.4.1.1 Terrestrial Systems

The Project will be constructed upon previously-impacted upland areas adjacent to the existing SHGS. No significant impacts to ecological resources are anticipated.

The SHCCF Certified Site comprises approximately 14 acres, comprised chiefly of vacant land (FLUCFCS 190) and coniferous plantation (FLUCFCS 441) with additional areas of existing utilities (FLUCFCS 830). The approximately 20-acre temporary parking and construction laydown area is comprised mainly of coniferous plantation (FLUCFCS 441) and improved pasture (FLUCFCS 211), with a minor association of live oak hammock (FLUCFCS 427) which was altered for cattle grazing activities. Neither the SHCCF Certified Site nor the associated temporary parking and construction laydown area provides significant wildlife habitat, and no adverse impacts to terrestrial systems are anticipated as a result of construction.

Fugitive dust generated by construction activities on-site will be minimized through BMPs (see Subsection 4.5.2). Localized fugitive dust is not likely to adversely affect the terrestrial systems within or surrounding the Site.

Noise from construction activities is not anticipated to significantly affect wildlife surrounding the Site. Wildlife which occurs in the vicinity of the area is accustomed to noise from the existing power plant operation, SHWWTF, the Pasco County Solid Waste Resource Recovery Facility, roadways, and other surrounding industrial, utility, commercial, and residential land uses. Existing wildlife is expected to acclimate to the temporary noise associated with construction activities from the SHCCF Certified Site and temporary construction parking and laydown area.

5.4.1.2 Endangered and Threatened Species

Threatened and endangered species and their likelihood of occurrence within the SHCCF Certified Site and temporary parking and construction laydown area are discussed in Subsection 3.3.6. Construction will not have any adverse impact upon listed species of wading birds or wood storks, due to the lack of wetland impacts and location relative to known nesting colonies. Similarly, in compliance with USFWS and FWC guidelines, no construction is proposed within 660 feet of any bald eagle nests and no adverse impacts to bald eagles are anticipated. The potential for utilization of the Site by most terrestrial listed species for foraging, roosting, or breeding is limited due to the significant alteration of the upland habitats present, as well as the surrounding industrial, utility, commercial, and limited residential development (See Figure 5.4-1).

5.4.1.2.1 Gopher Tortoise

Burrows of the state-listed gopher tortoise were observed within the SHCCF Certified Site and temporary parking and construction laydown area. In accordance with the FWC gopher tortoise permitting guidelines, prior to construction activities an updated gopher tortoise burrow survey will be conducted to determine if construction will encroach within 25 feet of any burrows. Construction within 25 feet of a gopher tortoise burrow will require a permit from FWC to excavate the burrow and safely relocate any captured individuals to an FWC-approved recipient site. No long-term effects on the Florida gopher tortoise population are expected to occur as a result of the Project.

5.4.1.2.2 Eastern Indigo Snake and Pine Snake

The eastern indigo snake and Florida pine snake are commensal species that are known to potentially utilize gopher tortoise burrows. In accordance with the USFWS *Eastern Indigo Snake Programmatic Effect Determination Key*, the Project is not likely to adversely affect the eastern indigo snake. Construction of the Project will adhere to the USFWS *Standard Protection Measures for the Eastern Indigo Snake* and will impact less than 25 acres of xeric habitat and less than 25 active and inactive gopher tortoise burrows. In accordance with the FWC gopher tortoise permitting guidelines, if any Florida pine snakes or eastern indigo snakes are encountered during burrow excavation, they will be released on-site or allowed to escape unharmed. The construction of the Project is not anticipated to adversely impact either the Florida pine snake or eastern indigo snake.

5.4.1.2.3 Short-tailed Snake

A small area of potential suitable habitat for the short-tailed snake occurs in the live oak hammock (FLUCFCS 427) in the eastern portion of the temporary parking and construction laydown area and the mixed hardwood-conifer (FLUCFCS 434) habitat directly adjacent to the Site in the linear facilities corridor. However, due to the extensive hog rooting and surrounding industrial development, the probability of occurrence is low. Construction of the Project is not anticipated to adversely impact the short-tailed snake.

5.4.1.2.4 Southeastern American Kestrel

The potential for utilization of the Site or temporary parking and construction laydown area by the Southeastern American kestrel for breeding or nesting is limited due to the significant alteration of the upland habitats present, as well as the surrounding industrial, utility, commercial, and limited residential development. Furthermore, these areas lack large, dead trees with cavities suitable to support nesting by the species. Construction of the Project is not anticipated to adversely impact the kestrel.

5.4.2 Measuring and Monitoring Programs

5.4.2.1 Terrestrial Systems

No monitoring programs will be undertaken because no significant terrestrial systems will be affected by construction activities proposed within the SHCCF Certified Site.

5.5 Air Impacts

5.5.1 Air Emissions

Construction activities will result in the generation of fugitive PM emissions and vehicle exhaust emissions. Fugitive PM₁₀ emissions will result primarily from onsite vehicular travel over paved and unpaved roads. Construction traffic will include heavy equipment traffic and traffic due to construction workers entering and leaving the Site and the temporary construction parking and laydown area. Exposed land areas may also generate fugitive dust due to wind erosion. PM/PM₁₀ emissions are appropriate for determining air impacts from construction activities, since emissions of PM_{2.5} are significantly lower for the non-combustion sources such as fugitive PM sources.

Emissions of fugitive PM₁₀ from these activities are difficult to quantify because of their variable nature. They can only be estimated since emissions are dependent upon a number of factors, including specific activities conducted, level of activity, meteorological conditions, and control measures utilized.

Table 5.5.1-1 shows the estimated maximum air emissions during site preparation and construction of the Project.

During the construction period, fugitive PM₁₀ emissions will result from site preparation when removing unsuitable soils and replacing the soils with fill and grading. The total PM₁₀ emissions for these activities are estimated to be approximately 0.12 tons during the construction period.

Emissions will also result from exhaust of construction equipment such as trucks and graders. Construction equipment will produce emissions of CO, NO_x, VOC, PM₁₀, and SO₂. Estimated exhaust emissions were based on EPA emission factors for non-road diesel engines. CO, NO_x, and VOC emissions were estimated using EPA Tier 3 non-road emission standards (40 CFR 89). EPA's Tier 3 emission standards were phased in from 2006 to 2008 and apply to engines from 11 to 750 hp. On June 29, 2004, EPA established Tier 4 non-road emission standards that will be phased in from 2008 to 2015 (69 Federal Register 38958-39273). Tier 4 establishes lower emission standards for PM and NO_x and the requirement to use ULSD fuel. Some of the construction equipment brought onto the Site will likely include engines meeting EPA Tier 4 emissions standards. EPA non-road diesel engine rules required the use of ULSD fuel in non-road engines starting in 2010 (EPA, 2008). The use of ULSD fuel will minimize SO₂ and PM₁₀ emissions from any Tier 3 engines. Based on the EPA emission factors and the estimated maximum number of vehicles, the CO, NO_x, VOC, PM₁₀, and SO₂ emissions from construction equipment during site preparation are estimated to be 0.32, 0.33, 0.04, 0.02, and <0.01 tons, respectively.

Fugitive PM₁₀ emissions may occur from wind erosion from open areas. The areas subject to wind erosion will generally be small due to the nature of construction activities and control measures. Fugitive PM₁₀ emissions from wind erosion have been estimated to be a total of 0.35 tons/year during the construction period.

Fugitive PM₁₀ emissions will also result from onsite construction traffic. Based on the average construction workforce, PM₁₀ emissions from paved and unpaved roads have been estimated to be a total of 0.25 tons during the construction period. Reasonable precautions pursuant to FDEP Rule 62-296.320(4)(c)3, F.A.C., will be used to reduce the amount of fugitive emissions from onsite paved and unpaved roads (e.g., watering).

Once site preparation is complete, the construction of the combined cycle unit and associated facilities will be initiated. Emissions will also result from construction equipment operating onsite with diesel and gasoline engines including cranes, trucks, compressors, etc. The CO, NO, VOC, PM₁₀, and SO₂ emissions are estimated to be 3.62, 4.30, 0.41, 0.21, and 0.01 TPY, respectively, during the erection of the component parts of the combined cycle unit.

The auxiliary boiler may be used during construction of the project for chemical cleaning and steam blow activities. A detailed description of the auxiliary boiler is contained in Appendix 10.2.5. The maximum emissions from the boiler for this purpose are: 3.6, 2.3, 0.2, 0.3, and 0.3 TPY for CO, NO_x, VOC, PM₁₀, and SO₂, respectively.

Table 5.5.1-1 includes emission estimates for construction activities at the construction support area and parking and laydown areas. Reasonable precautions pursuant to FDEP Rule 62-296.320(4)(c)3, F.A.C., will be used to minimize fugitive particulate emissions.

5.5.2 Control Measures

A number of control measures will be implemented during the construction period to minimize air emissions and potential impacts pursuant to FDEP Rule 62-296.320(4)(c)3, F.A.C. The SHCCF Certified Site will primarily consist of compacted soils, thereby reducing fugitive emissions due to wind. After grading, the untraveled or lightly used areas may be provided with an erosion resistant covering or vegetated to minimize fugitive PM and wind erosion. Watering on an as-needed basis will control fugitive dust from highly traveled areas.

5.6 Solid Wastes

Solid wastes generated during construction will be disposed of in accordance with applicable rules and regulations. Construction wastes, such as scrap wood and metal, will be stored, separated and stockpiled for salvage and recycling. General waste material (typical of MSW) will be collected in appropriate waste collection containers for disposal at an approved offsite location.

Table 4.6.1 in Section 4.6 describes a variety of potential solid waste streams resulting from construction and operation of the SHCCF. During construction, the solid waste streams will be managed as presented in Table 4.6-1.

Individual contractors will be responsible for handling any hazardous materials used or created as part of their work. This responsibility includes the proper recordkeeping, transportation, storage, handling, and

offsite disposal of such wastes. Contractors will be required to coordinate with SHCCF and provide documentation of all activities related to hazardous material and/or solid wastes.

5.7 Impact on Human Populations

Activities associated with construction projects have the potential to alter the communities around them, resulting from infrastructure requirements, housing needs, transportation system demands, and community facilities/services. These changes are affected by additional noise generation, service requirements, construction traffic and the potential inconveniences associated with the additional activities from workers, materials, and machinery. All related activities will comply with application regulations, and policies. Provisions will be put into place to eliminate or minimize the potential disruption to the area adjacent to the Site and to the surrounding community.

Chapter 7.0 provides information on income, employment, tax revenue, and service needs associated with the construction workforce.

5.7.1 Construction Workforce

Construction on the SHCCF Project is anticipated to commence in mid-2019, with peak construction anticipated in late-2020. The construction workforce for the Project is expected to average approximately 230 workers per day during the period between 2019 and 2021. At peak construction (during 4th quarter 2020), approximately 370 workers per day are anticipated. The construction activities will require service capabilities such as: Laborers, Carpenters, Operators, Ironworkers, Millwrights, Boilermakers, Pipefitters, Insulators, Electricians, Painters, and Supervisors.

Based on 2017 estimates, the available labor force in Pasco County was 225,905, with 216,915 employed and an unemployment rate of 4.0%. In Hernando County, the available labor force was 68,987, with 65,741 employed and an unemployment rate of 4.7%, as detailed in Section 3.2.7-1 (FDEO, 2017).

The low unemployment rate and the current construction market in Florida has resulted in an increased demand in construction labor, with a 9% growth over the past 12 months. These increased demands have resulted in challenges in recruiting skilled labor. Although decisions pertaining to the construction workforce will be the responsibility of the licensed EPC contractors, SHEC will coordinate with the EPC contractor to assist in promoting recruitment for the SHCCF Project within the community, the region, and the state to alleviate the potential scheduling and budget challenges.

5.7.2 Transportation and Traffic

Roadways that could be used during construction include Interstate 75, SR589/Suncoast Parkway, and SR52. County roadways that could be used during construction include Hays Road, Hudson Avenue, and Softwind Lane. Primary construction access to the Site will be provided by Hays Road (north of SR52), Hudson Avenue, to Merchant Energy Way. From these existing roadways, construction trucks will enter the secured property and be directed to the proposed construction laydown area.

Inside the Site, the existing driveways are both paved and unpaved. In the areas that are unpaved, these areas will be reinforced with gravel and dust suppression measures that will be in place for the duration of the construction period.

The existing roadway system (SR52, Hays Road, and Hudson Avenue) is currently perform at a LOS B, with available carrying capacity that exceeds the project construction-related traffic associated with the SHCCF Project. With these roadway performing below their design standard and maintaining available carrying capacity the additional construction traffic is not anticipated to degrade the roadway conditions from the existing LOS B. The additional traffic, associated with construction-related activities, will be temporary and will not degrade or result in a long-term impact on the existing roadways.

As discussed above, the construction workforce for the Project is expected to average approximately 230 workers per day with approximately 370 workers per day during peak construction. Under worst-case conditions there will be 370 inbound vehicles during the AM peak hour and 370 peak hour exiting vehicles during the PM peak hour. In addition, during construction an estimate 13 trucks will arrive daily with supplies to the SHCCF Site, this is an increase from the existing 1-3 truck deliveries daily.

The existing roadway system (SR52, Hays Road, and Hudson Avenue) is currently perform at a LOS B, with available carrying capacity that exceeds the project construction-related traffic associated with the SHCCF Project. With these roadways performing below their design standard and maintaining available carrying capacity the additional construction traffic is not anticipated to degrade the roadway conditions from the existing LOS B. The additional traffic, associated with construction-related activities, will be temporary and will not degrade or result in a long-term impact on the existing roadways.

In addition, traffic management practices could be implemented during the peak AM and PM hours pertaining to employee trips, such as car-sharing practices or staggering construction traffic over a longer period of time, could be implemented over a longer period of time. The Project will develop a traffic management plan to include the appropriate traffic management and improvements, as necessary, to maintain acceptable level of service for the access points.

5.7.3 Housing

Impacts on housing will depend on the number of workers that could potentially relocate and the type of housing the workers could desire. Construction activities associated with the SHCCF Project will average approximately 230 employees, with a peak of approximately 370 employees. Making an assumption that 50 percent of the Project's construction and operation workers were to relocate to the immediate area, approximately 55 construction workers could migrate during the peak construction period and require either temporary or permanent housing.

In Pasco County there was a reported total of 236,491 housing units, with 17.3% of these units reported as vacant. Less than 11.5% of the total housing units consist of structures that have 3 or more units. In

Hernando County there was a reported total of 85,066 housing units, with 12.7% of these units reported as vacant. Less than 5% of the total housing units consist of structures that have 3 or more units. The majority of the housing requests are anticipated to be for temporary housing (e.g., renting), although some of these workers could select permanent housing for the duration of their stay, but jurisdictions have the capacity to meet these demands, with the gross monthly rents (median) reported at \$985 (Pasco County) and \$933 (Hernando County).

Still others could elect to reside in transient accommodations (i.e., public lodgings, transient or non-transient to include vacation rental properties, motels, and hotels, rooming houses, and bed & breakfasts establishments), mobile homes, or to bring their own housing in the form of RVs or campers. As discussed in Section 3.2.7.3, there are approximately 266 establishments providing 17,917 units based on 2015 information. In addition, Pasco County has approximately 168 apartment establishments, with approximately 14,331 apartment units in the County based on 2015 information (UF/BEBR, 2017).

In Hernando County, there are 91 established transient accommodations, providing 4,251 units based on 2015 information. In addition, the Hernando County has approximately 59 apartment establishments, with approximately 3,234 apartment units in the County based on 2015 information (UF/BEBR, 2017).

5.7.4 Education

Because of the short duration of employment (based on anticipated skill requirements and construction activities), it is anticipated that few construction workers would permanently relocate with their families. As a result, there should be little in-migration of school-aged children resulting from Project construction. Therefore, no significant adverse effects on local elementary, middle, or high school enrollment are anticipated.

5.7.5 Construction Noise

The impacts of noise on human populations are dependent upon the proximity of institutional and residential land uses to construction activities and the type and extent of noise sources. The nearest residential locations (approximately 0.2 to 0.4 miles away) that could potentially be impacted by the construction activities are northeast and west of the Site boundary. Additionally, two schools (approximately 0.5 to 0.7 miles away) were identified as sensitive receptors, one to the northeast and one to the southwest.

Construction will require installation of foundations and erection of major components of the combined cycle unit such as the CTG, HRSG, auxiliary cooling system, STG and associated facilities. The use of construction equipment such as trucks, cranes, lifts and air compressors will be required. These sources have maximum noise levels ranging from approximately 70 to 85 dBA (measured at a distance of 50 ft).

The evaluation of noise impacts from SHCCF Project construction activities was performed using results from a noise propagation computer program (Computer Aided Noise Abatement, CadnaA) to estimate noise source levels. Noise source levels were entered as octave band sound power levels. The user can specify

coordinates, either rectangular or polar. Sound propagation was calculated by accounting for hemispherical spreading and three other user identified attenuation options: atmospheric attenuation, path specific attenuation, and barrier attenuation. Atmospheric attenuation was calculated using International Organization for Standards, ISO 9613-1, Attenuation of Sound During Propagation Outdoors – Part 1: Calculation of the Absorption of Sound by the Atmosphere. Path specific attenuation can be specified to account for the effects of vegetation, foliage, and wind shadow. Directional source characteristics and reflection can be simulated using path specific attenuation. Attenuation due to barriers can be calculated using the coordinates and height of the barrier. Barrier attenuation was calculated by assuming a barrier perpendicular to the source-receptor path. No barriers were included during construction modeling outside of existing buildings. Total and A-weighted SPLs (filtered to approximate human hearing) were calculated. Background noise levels were used to calculate overall SPLs in the modeled results.

The model was performed to predict the maximum noise levels produced by a combination of likely noise sources with and without background noise levels. A conservatively high estimate of construction equipment was assumed to calculate construction noise levels. One construction scenario was modeled: daytime construction Monday through Saturday assuming worst case noise levels, with several types of heavy equipment all operating at the same time. No foliage or forested land uses were included in the modeling as they are subject to change over time.

Table 5.7.1-1 lists the pieces of equipment that will be used during the construction of SHCCF and their associated noise characteristics. Most of the heavy construction activities are expected to occur during the daytime hours. It is assumed that some nighttime or Sunday activities may occur, but no modeling was performed.

The noise levels resulting from these combinations of equipment were combined and input as one area source located where construction activities are expected. Octave bands were estimated mainly from field measurements collected by Golder and from “Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances” (EPA, 1971). Only the atmospheric attenuation and ground absorption options were enabled during the noise modeling runs.

Figure 5.7.1-1 presents the predicted noise impact contours for the SHCCF construction noise sources listed in Table 5.7.1-1. Table 5.7.1-2 presents the existing baseline, which includes (i) the calculated SHGS simple cycle contribution, (ii) the modeled construction noise levels, and (iii) the predicted overall sound levels. Overall sound levels were predicted at the five off-site receptor locations described in Section 3.3.7. Two monitoring locations (Receptors 1 and 2) were in residential areas northeast and west of the Site, two monitoring locations (Receptors 3 and 4) were at schools, and one monitoring location (Receptors 5) was located near the industrial complex to the south of the Project site. The results can be considered as conservative, as it is unlikely that all of the equipment listed in Table 5.7.1-1 would operate at the same time.

There are no Florida or federal noise regulations applicable to the Project. SHCCF will be located within Pasco County Florida, which has a noise ordinance codified in Chapter 66, Article IV, Division 2 of the Code of Ordinances – Pasco County, Florida. Construction activities are exempt from the maximum permissible sound levels for activities that occur Monday through Saturday between the hours of 7 a.m. and 6 p.m. The only regulatory requirement for construction activities during this time period is that “no power-driven construction equipment shall be operated without a muffler or other noise-reduction device,” Between 6 p.m. and 7 a.m. Monday through Saturday and all day Sunday construction noise levels are limited to 55 dBA in an adjoining residential district. If construction activities are expected to occur before 7 am, or after 6 pm, or on Sunday, SHCCF would need to ensure that its equipment is operated in a manner that complies with the Pasco County noise regulation.

The results in Table 5.7.5-2 predict noise levels ranging from a high of 65 dBA at the property boundary for an industrial area to the south of the Site to a low of 50 dBA at the school (that may be considered a residential area) to the northeast. All predicted noise levels intended to reflect SHCCF construction activities, which include current background noise levels, are expected to be short in duration and not near levels that would affect the health or wellbeing of humans at those receptors.

5.8 Impact on Landmarks and Sensitive Areas

As discussed in Section 3.2.1 (Governmental Jurisdictions) and Section 3.2.5 (Regional, Scenic, Cultural, and Natural Landmarks), there are no regional, scenic, cultural, or natural landmarks under federal jurisdiction within five miles of the Site. There are several County conservation and preserve areas and there are several state, county, and private land holdings that serve the purpose of environmental conservation, education, and protection within five miles of the Site. In addition, there are three Pasco County parks within five miles of the Site. These areas are outside of the Site and outside of the one-mile area from the Site.

Project and construction-related activities will be contained within the Project footprint and will comply with all applicable laws and regulations associated with the proposed activities. The Project will not result in adverse light, noise, or visual interruptions or obstructions upon the adjacent areas or areas that are outside of the immediate area. Therefore, the construction and operation of the Project are not anticipated to result in disruption or disturbance of existing activities or uses related to any of the above referenced parks, preserves, conservation areas or private land holdings (associated with environmental conservation, education, and protection).

5.9 Impact on Archaeological and Historic Sites

Based on a desktop cultural resource assessment and communication with DHR pertaining to the Site, it has been determined that no significant archaeological resources or historic structures within the Site were listed or potentially eligible for listing in the National Register of Historic Places. The DHR recommended that special conditions be implemented to address situations if discoveries were made during construction

and ground disturbing activities. A consistency determination letter from the DHR is provided in Appendix 10.7.1

The location of the proposed 230-kV interconnection tie-line is owned by Pasco County and has been previously evaluated for cultural resources and archaeological significance associated with the Pasco County's Shady Hills Wastewater Treatment Facility, located to the west, and the Pasco County Solid Waste Resource Recovery Facility, located to the north, of the Site. Previously, under these development projects and based on documented communication with DHR, this area has been identified to have no significant archaeological and/or historical sites recorded or considered likely to be present.

The temporary construction laydown area was identified to have the potential for significant archaeological or historical resources recorded with DHR. Coordination with DHR is being conducted to review and assess potential conditions pertaining to the proposed uses of the designated areas.

5.10 Special Features

There will be no unusual products, raw materials, solid waste, incinerator effluents, or residues produced during construction that will have influence on the environment or ecological systems of the site or adjacent areas.

5.11 Benefits from Construction

The construction phase of the SHCCF Project will contribute both short- and long-term economic benefits to the surrounding region. Construction benefits include construction employment that will average 230 workers (and peak at 370) over the construction period. Construction wages will increase the demand for goods and services in the region. Direct purchases of construction materials will have both direct and indirect economic benefits, including construction materials (e.g., concrete and steel for foundations), rental equipment (e.g., construction cranes, pumps, etc.), food services, and transportation services.

Chapter 7 provides a detailed description of the SHCCF Project benefits.

TABLES

Table 5.7.1-1. Shady Hills Combine Cycle Sound Pressure Levels for Construcion Noise sources

Equipment ID	Number of Sources	Source Height	Levels at Octave Band Center Frequencies									dBA	Source
			31.5	63	125	250	500	1000	2000	4000	8000		
Dozer 1-CatD10/D11/D7 LGPa	3	2	0.0	103.0	115.0	106.0	107.0	103.0	101.0	97.0	87.0	109.1	Vendor Supplied - Cat D10/D11/D7 LGPa
Compactor 1 - CAT 826G	2	2	0.0	111.6	118.6	116.6	114.6	109.6	104.6	98.6	92.6	115.6	Noise from Construction, EPA 1971 (Const_5)
Ford Tractor - 3930	1	2	0.0	106.6	103.6	101.6	102.6	99.6	96.6	94.6	96.6	105.3	Noise from Construction, EPA 1971 (Const_4)
JD Tractor - 5093E	1	2	0.0	106.6	103.6	101.6	102.6	99.6	96.6	94.6	96.6	105.3	Noise from Construction, EPA 1971 (Const_4)
Portable Light Gen - 1	2	1	0.0	102.6	110.6	105.6	98.6	98.6	93.6	88.6	84.6	103.6	Noise from Construction, EPA 1971 (Const_8)
Compactor - ALJON 525	1	2	130.6	131.6	126.6	114.6	119.6	121.6	122.6	116.6	110.6	127.1	Noise from Construction, EPA 1971 (Const_8)
Water Truck - CAT 6500	1	2	0.0	90.0	96.0	104.0	115.0	113.0	112.0	108.0	99.0	118.1	Vendor Supplied - Catterpillar_785 Haul Truck
Excavator - Komatsu PC 300	1	2	67.5	81.0	92.6	97.1	99.0	100.2	100.0	93.7	87.8	105.0	Field Measurement @ Wolf Creek Landfill 102/20/11_gbm
Dump Truck Volvo A25E	1	2	67.2	72.2	85.7	91.8	98.3	99.3	98.2	94.0	88.0	103.9	Field Measurement 12/20/11 @ Wolf Creek_gbm
Total Project Sound Power - all sources			130.6	131.7	128.6	121.6	123.1	122.9	123.2	117.5	111.4	128.4	

Table 5.7.1-2: Existing, Modeled, and Overall Sound Pressure Levels for the Construction of the Project at Five Receptor Locations

Receptor Location	Time	Sound Pressure Levels (dBA)			
		Existing ^a	Simple Cycle ^b	Modeled ^c	Overall ^d
1: Residences Northeast	Morning	47	50	64	64
	Afternoon	42	50	64	64
	Nighttime	41	50		51
2: Residence to the West	Morning	52	51	56	58
	Afternoon	51	51	56	58
	Nighttime	51	51		54
3: School to the Southwest	Morning	47	48	55	56
	Afternoon	41	48	55	56
	Nighttime	37	48		48
4: School to the Northeast	Morning	43	43	50	52
	Afternoon	42	43	50	51
	Nighttime	40	43		45
5: Industrial Receptors Southeast	Morning	47	59	79	79
	Afternoon	45	59	79	79
	Nighttime	41	59		59

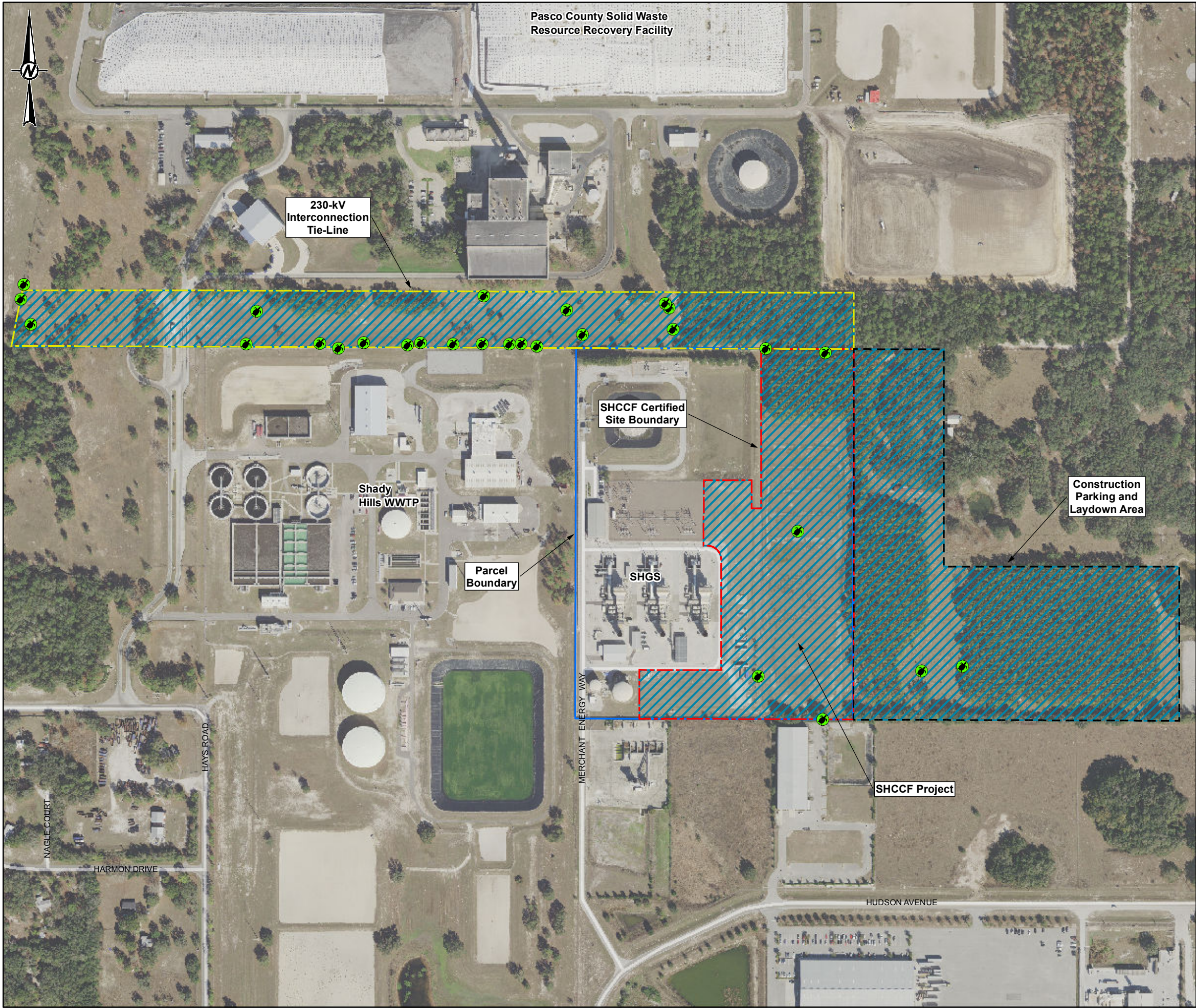
^a L₉₀ sound levels collected December 2017.

^b Calculated impacts based on gas fired noise measurements at 400ft collected by Golder, January 2002.

^c Modeled results from future Site operations only.

^d Modeled results logarithmically added to the existing baseline measurements and calculated simple cycle sound levels.

FIGURES



- LEGEND**
- Gopher Tortoise Burrow Locations
 - SHCCF Project
 - SHCCF Certified Site Boundary
 - 230-kV Interconnection Tie-Line
 - Construction Parking and Laydown Area
 - Parcel Boundary



REFERENCE(S)
EXISTING FACILITY FENCELINE, CERTIFIED SITE BOUNDARY, SHCCF PROJECT, GOLDER ASSOCIATES INC., 2017
PARCEL BOUNDARY, PASCO COUNTY, 2017
GOPHER TORTOISE BURROW LOCATIONS, GOLDER ASSOCIATES INC., 2018

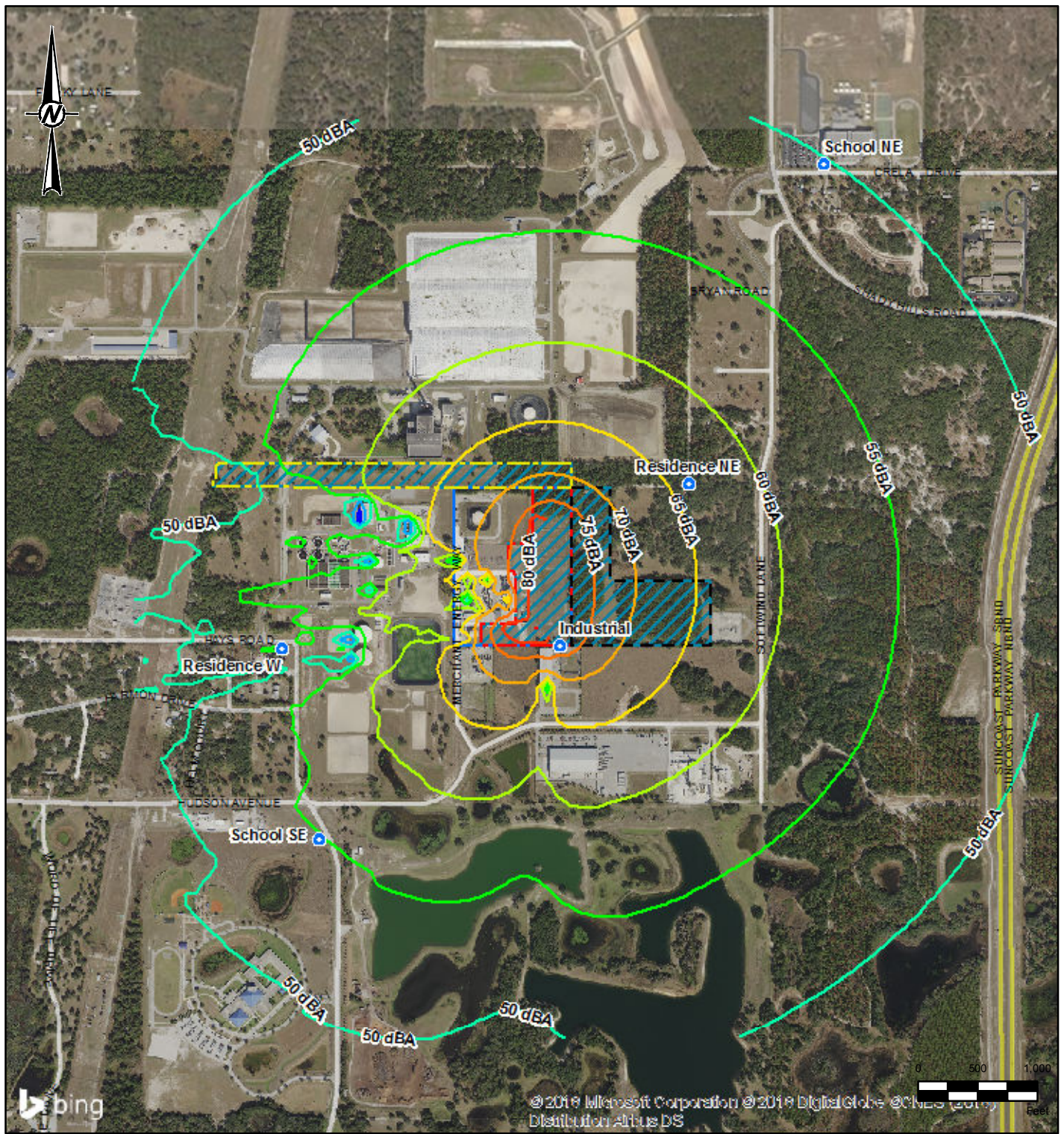
CLIENT
SHADY HILLS ENERGY CENTER, LLC

PROJECT
SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE
SHCCF OBSERVED SPECIES OCCURRENCES

	CONSULTANT	YYYY-MM-DD	2018-02-12
	DESIGNED	NRL	
	PREPARED	NRL	
	REVIEWED	RAZ	
	APPROVED	MM	

PROJECT NO. 1779520	CONTROL H025	REV. 0	FIGURE 5.4-1
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LEGEND

- Receptors
- ▨ SHCCF Project
- ▨ SHCCF Certified Site Boundary
- ▨ 230-kV Interconnection Tie-Line
- ▨ Construction Parking and Laydown Area
- ▨ Parcel Boundary
- Construction Noise Contours**
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA
- 80 dBA
- 85 dBA

REFERENCE(S)

RECEPTOR LOCATIONS, CONSTRUCTION NOISE CONTOURS, GOLDER ASSOCIATES INC., 2017

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE

**SHCCF CONSTRUCTION
NOISE IMPACT CONTOURS**

CONSULTANT



YYYY-MM-DD	2018-02-12
DESIGNED	NRL
PREPARED	NRL
REVIEWED	RAZ
APPROVED	MM

PROJECT NO.
1779520

CONTROL
H017

REV.
0

FIGURE
5.7.5-1

6.0 EFFECTS OF PLANT OPERATION

This section describes the effect of plant operations on the environment and the plans for monitoring the environmental impacts resulting from plant operations.

6.1 Effects of the Operation of the Heat Dissipation System

The heat dissipation system will use a recirculating cooling tower, with reclaimed water as the primary water source. The source of reclaimed water is the SHWWTF which is part of the PCMRS and provides secondary treatment and high-level disinfection and was designed and permitted to meet the Part III Public Access quality standards in accordance with FDEP Rule 62-610, F.A.C.

If reclaimed water is not available at the required quality or quantity, potable water from the Pasco County Municipal Water Supply System will provide a backup water supply. Additionally, in the event reclaimed water is unavailable and potable water is not available in sufficient quantities, the unused allocation of groundwater from the adjacent SHGS could be used for supplemental back-up water supply.

The SHCCF will use a ZLD wastewater treatment system to recycle all process water back to the cooling towers. Consequently, there will be no withdrawals from surface waters for any purpose, including cooling, and no discharge of industrial wastewater (cooling tower blowdown) to surface waters. This cooling system design ensures that the SHCCF will have no adverse impact from a thermal discharge, and no adverse impact on impingement or entrainment of fish or shellfish. There will be no adverse impacts on surface waters from operation of the heat dissipation system and no water quality degradation. Sections 316(b) and 316(a) of the Clean Water Act are not applicable.

6.1.1 *Temperature Effect On Receiving Body Of Water*

Since there will be no discharge to any surface water body from the heat dissipation system, there are no thermal impacts to any receiving body of water and no mixing zone is required for SHCCF.

6.1.2 *Effects On Aquatic Life*

No impacts to aquatic life are anticipated as there are no surface water bodies within or proximate to the SHCCF Certified Site.

6.1.3 *Biological Effects Of Modified Circulation*

There will be no effects on the natural circulation of any water bodies because no surface water bodies will be used as a source of cooling water. Consequently, there will be no biological effects of modified circulation on any receiving body of water.

6.1.4 *Effects Of Off-Stream Cooling*

The potential impacts of off-stream cooling using the mechanical draft cooling tower for a portion of the cooling requirements were addressed by performing plume dispersion analyses that predicted impacts with respect to:

- Plume length
- Plume height
- Plume fogging
- Plume icing
- Salt (from TDS) deposition

Two air quality dispersion models were used in these analyses to address the effects of off-stream cooling for the Project. These models are the California Puff (CALPUFF) model and the American Meteorological Society and EPA Regulatory Model (AERMOD) dispersion model.

The CALPUFF model (version 5.8.5) was used to determine the fogging and icing potential due to the mechanical draft cooling tower. The CALPUFF model can be configured to analyze the fogging and icing impacts due to emissions from sources, such as the mechanical draft cooling towers, with the use of a pre-processor program called the Cooling Tower Emissions Processor (CTEMISS) and other post-processor programs.

The AERMOD dispersion model (version 16216r) was used to determine potential mineral deposition due to the mechanical draft cooling tower.

Both air dispersion models were also used to predict ambient pollutant concentrations for the Project and are described in more detail in Subsection 6.6 and Appendix 10.2.5. These dispersion models are approved by EPA for determining ambient air pollutant concentrations and have capabilities to assess fogging impacts (CALPUFF) and solids deposition (AERMOD).

The following sections present the methods and assumptions used in these models to address the effects of off-stream cooling due to the mechanical draft cooling tower.

6.1.5 Cooling System Visibility

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

The CTEMISS program was used to create a variable emission rate file for CALPUFF for water vapor within the plume from the mechanical draft cooling tower. The CTEMISS program reads fixed inputs, such as emissions characteristics (exit velocity, exit temperature, and water emission rate) and building data. Meteorological data in the format used by the Industrial Source Complex Short-term (ISCST) model are

used. CALPUFF models the dispersion of the water contained in the plume and provides cloud information in a specialized format for further analysis. CALPUFF output is provided to the FOG.DAT file and can be run in either 'plume mode' or 'receptor mode.'

Five years of surface meteorological data for 2012 through 2016 from the Hernando County Airport (BKV) were used in the CTEMISS program. The surface and mixing height data were first processed using EPA's PCRAMMET processor to create ISCST model-compatible meteorological data, which are read by the CTEMISS program. The meteorological data for BKV are the same data approved by FDEP for determining air pollutant concentrations using these models.

The stack data and meteorological data used to determine potential fogging and icing impacts are identical to those used in the air dispersion modeling and presented in Table 4.5.1-1.

The emission rate file created by the CTEMISS program was used and the CALPUFF model was run in both plume and receptor modes. The CALPUFF model created a FOG.DAT file, which was then input to the post-processor programs, POSTPM and SUMPOST, which operate on the fog plume-mode output to characterize visible plume height and length statistics. The post-processor program POSTRM operates on the fog receptor-mode output to characterize the frequency of possible fogging and icing events at specific locations.

In the plume mode, information on the plume heights and plume lengths are generated for each hour. The program provides output that excludes hours when fog, clouds, and/or precipitation are occurring. In the receptor mode, discrete receptors are located in a receptor grid covering the Plant Site and adjacent areas.

The CALPUFF model's plume mode results are presented in Table 6.1.4-1 for all hours and Table 6.1.4-2 for daylight hours. Periods when fog, heavy cloud conditions, and/or precipitation are occurring are removed from the analysis consistent with air quality visibility assessments. In such meteorological conditions, visible vapor plumes are obscured by natural weather conditions. These tables presents the information seasonally and annually. The primary factors in the visible appearance of the plume are the height and length of the plume.

The modeling results indicate that visible vapor plumes from the mechanical draft cooling tower are predicted to be confined to an area that is very close to the auxiliary cooler throughout the year. The results for all hours and daylight-only hours indicate that, for the majority of the time (>90% of the time), plume heights will be less than 200 meters and plume lengths will be less than 300 meters (>70% of the time). For both nighttime and daytime hours, plumes heights greater than 400 meters occur less than 30 hours per year. Plume lengths greater than 200 meters occur less than 7.5 percent of the time hours when considering all hours, while plume lengths greater than 300 meters occur less than 30 percent of the time. hours per year for daylight-only hours. During daylight hours, plumes of greater than 200 meters in height

occur less than 6 percent of the time while plumes of greater than 300 meters occur about 10 percent of the time.

Neither ground-level fogging nor any other plume effect is predicted to occur at the Site property boundary or on the roadways nearest to the Site.

6.1.6 Cooling System Deposition

Deposition from the mechanical draft cooling tower will depend upon the quality of water. The water treatment design TDS values were used to estimate annual and maximum monthly deposition. The mechanical draft cooling tower provides cooling by evaporation. Using the design TDS and 5 years of meteorological data provides a conservative estimate of mechanical draft cooling tower deposition rates. Table 6.1.4-3 presents the size distribution of the drift particles as PM.

The maximum monthly deposition predicted from the mechanical draft cooling tower to locations at varying distances is presented in Table 6.1.4-3. The table shows the monthly deposition over the five-year period for which the analysis was performed. The average predicted deposition of an area within a radius of 5 km from the mechanical draft cooling tower and the average and maximum predicted salt deposition over several distances are presented in Table 6.1.4-4.

The maximum predicted monthly deposition rate of 33.83 kg/ha/month occurs about 200 meters (0.12 mile) from the mechanical draft cooling tower. The deposition rates are predicted to decrease rapidly beyond this distance. At a distance of 500 meters (0.31 miles), the maximum monthly deposition rate decreases to less than 7 kg/ha/month. At a distance of 2 km the maximum deposition decreases to 1.64 kg/ha/month. The average deposition reflects the average deposition at each location within the distance noted. As shown in the table, the average deposition with 1 kilometer is 4.25 kg/ha/month.

Several studies have been conducted to determine deposition, including the Florida Acid Deposition Study (FADS) conducted in the mid-1980s and the Florida Atmospheric Mercury Study (FAMS) conducted in the mid-1990s. FADS measured major anions and cations in dry and wet deposition, while FAMS measured the major anions and cations in wet deposition. According to data collected as part of FADS (1986), which measured deposition over many locations in Florida, background mineral deposition in the across peninsula of Florida is about 4 to 6 kg/ha/month. The maximum predicted deposition beyond 1 km of the mechanical draft cooling tower, as shown in Table 6.1.4-4, is less than the natural background deposition.

Potential impacts to vegetation and soil may result from deposition of mechanical draft cooling tower drift. A majority of available research on the impacts of deposition from cooling systems is from the use of makeup water that contains appreciable quantities of salt [i.e., sodium (Na^+) and chloride (Cl^-)]. Several plant species are considered to have very low resistance to salt. These species are flowering dogwood (*Cornus florida*), American sycamore (*Platanus occidentalis*), sassafras (*Sassafras albidum*), and arrowwood (*Viburnum dentatum*). Several studies have been conducted with dogwood because it is a

reliable bioindicator of salt damage. The leaf injury threshold of dogwood has been calculated to be 750 kg/km²/month (7.5 kg/ha-mo; Curtis *et al.*, 1976), 517 kg/km²/month (5.17 kg/ha/month; Davis, 1979), and 375 kg/km²-mo (3.75 kg/ha/month; Freudenthal and Beals, 1978). In addition to flowering dogwood, Townsend (1980) found that American sycamore was equally sensitive to sodium chloride. McCune *et al.* (1977) found that white ash was more susceptible than dogwood to saline cooling system drift. Susceptibility to foliar injury from saline aerosols also varies with the developmental stage of the leaf. McCune *et al.* (1977) found that younger leaves of deciduous woody species were more sensitive to saline aerosols than older leaves; whereas, year-old needles of conifers were more susceptible to saline aerosols. Grattan *et al.* (1981) reported that young tomato and pepper leaves (<3 cm in length) were more severely injured than older, fully developed leaves. These values are within the range of natural background deposition and are not anticipated to result in any adverse impacts to vegetation in the vicinity.

Environmental factors, other than salt drift concentration, can affect species response to cooling system drift. Temperature influences ion absorption rates, with absorption rates decreasing as temperature decreases (Smith and Robinson, 1971). Rainfall amounts also influence symptomatic response of plants to salt drift. Mulchi and Armbruster (1981) observed that above-normal amounts of rainfall delayed the onset of foliar symptoms, whereas below normal amounts of rainfall tended to promote the onset of symptoms and to enhance the magnitude of symptom expression for both corn and soybeans.

As noted above, the frequency of rainfall is an important component in the potential impacts to vegetation. The average number of days per year with precipitation greater than 0.01 inch is 105 days per year based on meteorological data from the closest National Weather Service (NWS) station. This frequency of a measurable amount of precipitation would reduce the potential impact from mechanical draft cooling tower deposition.

Vegetation can also be affected by absorbing salts that accumulate in the soil. Accumulation will occur if the annual deposition rate of salt exceeds the rate at which salt is leached from the soil by rainfall. Mechanical draft cooling tower drift deposition from SHCCF would be greatly diluted by rainfall. The maximum predicted off-Site deposition is 33.83 kg/ha-month would result in an increase in the average TDS concentration of less than 30 mg/L when dilution from rainfall is taken into account. This concentration is significantly less than the typical TDS concentration in surficial groundwater and surface waters. At locations farther from the mechanical draft cooling tower any soil accumulation would be even less since deposition rates drop significantly with distance.

When taken together, based on the water quality, low deposition rates, area of deposition impact, frequency of rainfall, and quality of the drift particles, no adverse effect to vegetation from mechanical draft cooling tower drift or accumulation in the soils is anticipated.

6.1.7 Measurement Program

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

6.2 Effects Of Chemical and Biocide Discharges

All industrial process wastewater will be treated and recycled. Industrial stormwater from equipment containment areas (contact areas) will be routed through an oil/water separator and reused in the power production process, or released to the stormwater retention basin for evaporation/percolation. Stormwater from non-contact areas will be routed directly to the stormwater retention basins for evaporation/percolation. There will be no industrial wastewater discharges from SHCCF to the environment.

6.2.1 Cooling Tower Blowdown

The cooling tower blowdown will be recycled through the ZLD wastewater treatment system. Chemicals may be added to the cooling system to control water quality, scaling and biological growth.

6.2.2 Measurement Programs

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

6.3 Impacts On Water Supplies

6.3.1 Surface Water

As discussed in Section 3, the SHCCF Certified Site is located in an area with permeable soils and a deep water table. Consequently, the Site contributes very little surface runoff (estimated to be zero to 6 inches per year) to the surface drainage system. Since the Site produces very little surface runoff, no water will be withdrawn from surface waters, no wastewater will be discharged to surface waters and the nearest water use permit withdrawing from surface waters is approximately 3 miles from SHCCF, there will be no adverse impact on surface water supplies.

6.3.2 Groundwater

Impacts on groundwater supplies from operation of the SHCCF will be very limited. Groundwater will be used only to supplement the backup water supply source (potable water), if reclaimed water is not available at the required quantity or quality.

As discussed in Section 3.3.3, the SHCCF Certified Site is located in an area that contributes significant groundwater recharge (12 to 18 inches per year) to the surficial aquifer and the Upper Florida Aquifer. When the Site is developed, stormwater runoff will be directed to the two onsite detention ponds, where

most of the stormwater will continue to recharge the surficial aquifer due to the high permeability soils. Therefore, development of the SHCCF Certified Site will not adversely impact aquifer recharge.

Furthermore, SHCCF has no waste disposal system, such as an injection well or a drain field, that discharges to a drinking water source.

6.3.3 Drinking Water

For all the reasons discussed above, operation of SHCCF will not cause adverse hydrologic changes in water quality or quantity that will impact drinking water sources in the vicinity of the Site.

6.3.4 Leachate and Runoff

The SHCCF will have no coal pile or FGD sludge storage areas. Solid waste from the ZLD system will be stored in containers and, transferred offsite for and disposal.

6.3.5 Measurement Programs

No additional monitoring or measurement programs are proposed.

6.4 Solid/Hazardous Waste Disposal Impacts

As discussed in Section 4.7, the potential solid and hazardous wastes associated with the operation of the SHCCF will be managed according to federal, state and local regulations.

6.4.1 Solid Waste

The operation of SHCCF will generate solid wastes (e.g., spent solvents, operations and maintenance wastes, municipal solid wastes, water pretreatment solids and ZLD by-products). An approved commercial solid waste contractor will collect and transport the solid wastes for disposal in accordance with Chapter 62-701 or 62-702, F.A.C.

6.4.2 Hazardous Waste

SHCCF will be operated to minimize the generation of hazardous waste. Any hazardous waste associated with SHCCF will be less than 100 kg per month and may include spent solvents, boiler chemical cleaning wastes, and other wastes. Potentially hazardous wastes will be collected and managed as hazardous wastes until tested to determine their hazardous waste characteristics. Hazardous wastes, if any, will be collected onsite and disposed offsite of by a licensed hazardous waste contractor.

6.5 Sanitary and Other Waste Discharges

Sanitary wastes from the operation of SHCCF will be discharged to the Pasco County sanitary sewer system.

6.6 Air Quality Impacts

6.6.1 6.6.1 Impact Assessment

An air quality impact analysis meeting the requirements of FDEP's PSD rules and EPA/FDEP modeling guidance was performed. EPA/FDEP requirements, modeling methodology, and results are presented in the PSD/Air Construction Permit Application in Appendix 10.2.5. The air quality impact analyses are required for NO_x, SO₂, CO, PM₁₀, and PM_{2.5} emissions from the SHCCF. The analyses for the SHCCF must demonstrate that the air quality impacts of these pollutants do not exceed the significant impact levels or, alternatively, cumulative source impact analyses are performed to demonstrate compliance with the NAAQS and PSD Increments. The air quality model used to calculate air quality impacts for the SHCCF was based on the model's ability to simulate impacts in areas surrounding the SHGS, as well as at the PSD Class I area of the Chasshowitska National Wilderness Area (CNWA), located approximately 28 km from the SHCCF. Because the CNWA is located 28 km from the SHCCF, EPA, and FDEP modeling guidelines require the use of the AERMOD dispersion model for predicting pollutant impacts. The EPA-approved and FDEP-recommended AERMOD dispersion model was used to address air quality impacts within 50 km of the Project. AERMOD was approved as part of the Guideline on Air Quality Models in 40 CFR Part 52, Appendix W, as the preferred general purpose dispersion model (70 FR 68218-68260; November 9, 2005). The AERMOD model calculates hourly concentrations based on hourly meteorological data and is valid for most applications, since it contains the latest scientific algorithms for simulating plume behavior in all types of terrain. The predicted concentrations are compared to the applicable AAQS and PSD Class II Increments.

Meteorological data used in the AERMOD model to determine air quality impacts consisted of a concurrent five-year period of hourly surface weather observations from the NWS observations located at the Hernando County Airport (BKV) airport and upper air sounding data collected at the Tampa International Airport (TPA). The five-year period of the meteorological data was from FDEP for the period 2012 through 2016. The BKH airport is located approximately 15 km (9 miles) and is considered by FDEP to have meteorological data appropriate for the air quality impact analysis of the Project. All areas between BKV and the SHCCF Certified Site are flat to gently rolling with very similar land characteristics. As such, the meteorological parameters collected at BKV are considered to be representative of those that exist at or around SHCCF.

The combustion turbine generator (CTG), with the associated heat recovery steam generator (HRSG) including a duct burner, and the mechanical draft cooling tower will operate continuously and were included in the impact assessment. The auxiliary boiler will be used intermittently during CTG startup and shutdown, while the emergency standby generators and fire pump engine will be operated only intermittently for routine testing, maintenance, and emergencies. The sources operated intermittently were not included in the air modeling analysis since their operation will not be either concurrent with the operation of the CTG or they will operate only a few hours per year. The CTG/HRSG unit (with duct firing) will only be fired with natural

gas. The maximum predicted short-term impacts (i.e., for averaging times of 24-hour hours or less) for the SHCCF are based on the highest hourly emissions rates from the CTG/HRSG (with duct firing).

All significant building structures were identified on the plot plan. The building structures were processed in the EPA Building Profile Input Program (BPIP-PRIME, Version 04274) to determine direction-specific building parameters for each 10-degree azimuth direction for each source included in the air modeling analysis.

A Cartesian receptor grid was used to predict maximum concentrations in the vicinity of the Site. The receptor grid included receptors located on and beyond the Site at the following receptor spacing: along the property boundary (50 meters); beyond the property boundary to 2 km (100 meters); and from 2 to 4 km (250 meters). The SHCCF's impacts at the PSD Class I area of the CNWA were predicted using a receptor ring with a radius of 28.2 km and with 360 receptors on the ring, spaced at 1-degree intervals.

The maximum SO₂, NO₂, CO, PM₁₀ and PM_{2.5} concentrations predicted for the SHCCF in the vicinity of the Site are presented in Table 6.6.1-1. Significant impact levels (SIL) are threshold concentrations used to determine if additional, more detailed, evaluation of pollutants requiring PSD review is necessary. The modeling results indicate that the maximum concentrations from the Project were predicted to be less than the SIL for all pollutants and averaging times. As a result, it was determined that the Project emissions would not cause or contribute to any violations of the appropriate NAAQS or PSD increments.

The maximum SO₂, PM₁₀, and PM_{2.5} concentrations predicted for SHCCF at the CNWA are presented in Table 6.6.1-2. These maximum concentrations are compared to the PSD Class I SIL. If the maximum predicted concentration is greater than the SIL, additional detailed analyses are required to determine compliance with the allowable PSD Class I increments. The modeling results demonstrate that the maximum concentrations from SHCCF are predicted to be less than the SIL.

The air modeling analysis demonstrates that the air emissions from the proposed Project will not have a significant effect on air quality and will comply with all applicable NAAQS and allowable PSD increments.

6.6.2 Monitoring Programs

Measurements of meteorology, ambient air quality, or visibility are not required for SHCCF based on FDEP PSD Rules (see Section 3.0 of Appendix 10.2.5). Proposed compliance conditions are contained in the PSD/Air Construction Permit Application (see Appendix 10.2.5). Continuous emissions monitoring or stack monitoring will be performed as required by FDEP under the air PSD/Air Construction permit and EPA regulations.

6.7 Noise Impacts

6.7.1 Methodology

The methodology for determining the potential noise impacts for the operation of SHCCF were developed using the CadnaA computer model, a computerized software program for calculation, presentation, assessment, and prediction of environmental noise (DataKustik, 2008).

CadnaA is an environmental noise propagation computer program that was developed to assist with noise propagation calculations for major noise sources and projects. Noise sources are entered as octave band sound power levels (Lw). Locations of the noise sources, structures, and receptors are input directly on the base map and can be edited throughout the modeling process. All noise sources are assumed to be a point, line, area, or vertical area source, and can be specified by the user. Sound propagation is calculated by accounting for hemispherical spreading and three other user identified attenuation options: atmospheric attenuation, path specific attenuation, and barrier attenuation. Atmospheric attenuation is calculated using “International Organization for Standardization, ISO 9613-1 Attenuation of Sound During Propagation Outdoors - Part 1: Calculation of the Absorption of Sound by the Atmosphere.” The CadnaA path specific attenuation can be specified to account for the effects of soil, vegetation, foliage, and wind shadow. Directional source characteristics and reflection can be simulated using path specific attenuation. Barrier attenuation is calculated by assuming a barrier perpendicular to the source-receptor path. Total and A-weighted SPLs are calculated.

The noise impacts of operations were evaluated using the sound power levels for the various types of sources associated with the SHCCF. The noise resulting from the operation of combined cycle unit includes noise sources associated with the CT and associated electric generator; one HRSG; one steam turbine generator; transformer; one auxiliary cooling system; and associated pumps, modules, and accessories. The sound power levels used in the analysis for the 1-on-1 combined cycle unit were based on information developed from manufacturers that has been field-verified using actual field measurements of similar units. These sound power levels conservatively represent the actual noise levels seen in field measurements. The location of each noise source was based on its location in the computerized site plan. The computerized drawing was imported into the CadnaA model for the noise analysis. The heights of the major structures were also input into CadnaA, developing a three-dimensional representation. Sources were input into CadnaA as point, line, area, and vertical area sources with appropriate dimensions.

The design of SHCCF includes components that mitigate noise from being emitted to the surrounding environment, and the orientation of the noise sources further attenuates noise. The majority of the noise sources, such as the steam turbine, gas turbine, electric generator, and compressor, are located within enclosures that mitigate sounds emitted by equipment. Existing buildings and structures in the immediate vicinity of the new unit were incorporated into the model as barriers, including the existing simple cycle units and associated structures.

The Lw noise sources used in the analysis are presented in Table 6.7.1-1. There were 30 point sources, 5 line sources, and 7 vertical area sources input to CadnaA that represented the noise sources associated with SHCCF. Noise sources such as vent fans and transformers were input as point sources. The sources listed in Table 6.7.1-1 are identified by the source name, type, number and height including horizontal and vertical areas. Sources inside structures were input as vertical area sources that represent sides of structures such as the HRSG sides from which interior noise generated by the CT exhaust can be emitted. The atmospheric attenuation for the model was set to 20°C (68°F) and 70 percent relative humidity. The ground attenuation for the area was conservatively set to represent mixed use even though the area would mostly be considered soft ground. The topography was assumed to be flat and no added vegetative or forested barriers were included in the model as they are subject to change over time. Overall the noise modeling would be considered conservative in nature given this set up.

6.7.2 Impact Analysis

Table 6.7-2 and Figure 6.7-1 presents the results of the noise modeling for SHCCF, the existing background noise level, the calculated SHGS simple cycle contribution, and overall sound pressure levels (SPLs) at each noise monitoring location. The background noise levels are presented in Subsection 3.4.2. The L_{90} background noise levels were used in the analysis because the L_{90} , where the sound level is exceeded 90 percent of the time, excludes the majority of the transient noise sources, such as motor vehicles, dogs barking, and aircraft. In contrast, the equivalent continuous sound level (L_{eq}) or the average sound pressure level, represents all the noise observed over the sampling period. As described in Section 3.4.2, there are a number of transient sources observed during the background monitoring such as motor vehicles, aircraft, and commercial and industrial activity. As a result, the L_{90} is a representative background for predicting the contribution of the SHCCF to noise levels in the vicinity of the Site and is representative of the overall noise levels from continuously operating noise sources.

There are no State of Florida noise regulations that are applicable for the operation of SHCCF which is located within Pasco County. The county noise ordinance applicable to SHCCF is summarized in section 3.3.7.2 of this application. Operational scenarios are considered to be continuous, therefore modeling results are the same for both the daytime and at night.

As presented in Table 6.7-2, the maximum modeled SPLs from the SHCCF is 59 dBA at Monitoring Receptor 5. When the background L_{90} is considered, the overall daytime SPLs at sensitive receptors range from 56 dBA at Receptor 1 to 47 dBA at Receptor 4. The overall nighttime SPLs at sensitive receptors range from 55 dBA at Receptors 1 and 2 to 46 dBA at Receptor 4. At the industrial monitoring Receptor 5 the daytime and nighttime levels were 62 dBA.

The overall predicted SPLs in the residential areas including background and SHGS are not predicted to exceed the Pasco County maximum permissible sound levels of 66 dBA during the daytime and are at the 55 dBA standard during the nighttime. The SPLs at the industrial complex to the southeast of the Site were

below the Pasco County maximum permissible sound level of 72 dBA for commercial land uses (see Figure 6.7.2-1). Impulsive noise sources are not anticipated to be generated by the new SHCCF operations.

The SHCCF is located in an industrial area. Monitoring Receptor 2 and 5 reflect this in their elevated noise levels during both the daytime and at night. While Receptor 2 is located adjacent to a residential neighborhood, the predicted SHCCF SPL increase to the overall noise level in the vicinity of this site by approximately 1 dBA above background. Given that humans do not perceive noise level changes below 3 dBA, there will be no noticeable increases to the overall noise level at the residential receptors near Receptor 2. There will be a noticeable noise increase to the sound levels at the residence represented by Receptor 1 as increased noise levels will exceed 5 dBA. While this is potentially significant, it only approaches the nighttime noise level limits set forth by the county at the closest residential boundary line that is over 500 feet away from a residential dwelling. Nighttime interferences with humans typically focus on interferences with sleep, which can impact human health.

Because of the conservative elements used in the computer modeling program to predict future noise levels from SHCCF and because of the preliminary nature of the equipment drainage information currently available, after construction of the SHCCF is complete, SHEC will verify the SHCCF's contribution to noise levels in the area. If SHCCF's operations cause noise levels above the nighttime/Sunday noise standard of 55 dBA for a nearby residential property, then additional noise control measures will be applied where necessary or operational changes implemented to ensure that the County standard is being achieved.

6.8 Changes In Non-Aquatic Species Populations

6.8.1 Impacts

As discussed in Section 3.2.1 (Governmental Jurisdictions) and Section 3.2.5 (Regional, Scenic, Cultural and Natural Landmarks), there are no regional, scenic, cultural or natural landmarks under federal jurisdiction within five miles of the Site. There are several County conservation and preserve areas and there are several state, county, and private land holdings that serve the purpose of environmental conservation, education, and protection within five miles of the Site. In addition, there are three Pasco County Parks within five miles of the Site. These areas are outside of the Site and outside of the one-mile area from the Site.

Based on the previously-disturbed nature of the SHCCF Certified Site, no adverse impacts to non-aquatic species populations are anticipated to result during operation of the SHCCF. The existing SHCCF Certified Site has been previously disturbed and is routinely managed and maintained. Vegetative communities were removed or altered significantly and topography was graded in the majority of the SHCCF Certified Site. Therefore, there will be no significant impact to the current non-native and ruderal native vegetative communities as a result of the proposed activities. Noise generated during operation of the SHCCF is not anticipated to result in significant impacts or changes in wildlife populations in the vicinity. Due to the previously-disturbed nature of the SHCCF Certified Site, and lack of impact to significant wildlife habitat, no

change in floral or faunal populations, including recreational or commercially important species, is anticipated during operation.

6.8.2 Monitoring

Because no significant impacts to plant and animal populations are anticipated, no monitoring program is proposed during operation of the SHCCF.

6.9 Other Plant Operation Effects

The operations workforce for SHCCF is anticipated to be 25, a slight increase from the current SHGS operating staff of 11 employees. Since the number of employees at SHCCF will increase slightly, the number of traffic trips is not anticipated to increase significantly and no adverse impacts to traffic are anticipated.

6.10 Archaeological Sites

No sites of historic or archaeological significance are anticipated to be directly or indirectly impacted due to the operation of SHCCF. A letter of concurrence was obtained from the DHR that confirmed that there were no indications of significant archaeological or historical resources recorded in the SHCCF project area (Appendix 10.7).

6.11 Resources Committed

SHCCF will be located on the portion of the parcel which has previously been used for electric power generation. The Project will not require the use of surface or groundwater resources and the use of advanced combined cycle technology and natural gas will result in low GHG and NOx emissions. Long-term environmental impacts are expected to be negligible.

TABLES

Table 6.4-1: Predicted Visible Cooling Tower Water Vapor Plume Height and Length - All Hours

Conditions	<u>Winter</u>		<u>Spring</u>		<u>Summer</u>		<u>Fall</u>		<u>Annual</u> ^a	
	hours/year	%	hours/year	%	hours/year	%	hours/year	%	hours/year	%
AMBIENT FOG/CALM										
HOURS REMOVED	1,969	23.8%	2,149	26.0%	2,140	25.9%	2,003	24.3%	8,261	100.0%
Plume Height (m)										
>0 200	1,648	83.7%	2,019	94.0%	2,076	97.0%	1,900	94.9%	7,643	92.5%
>200 400	304	15.4%	123	5.7%	64	3.0%	99	5.0%	590	7.1%
>400 600	14	0.7%	5	0.2%	0	0.0%	4	0.2%	23	0.3%
>600 1000	3	0.2%	1	0.0%	0	0.0%	0	0.0%	4	0.1%
>1000 3000	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Plume Length (m)										
>0 100	277	14.1%	579	26.9%	816	38.1%	481	24.0%	2,153	26.1%
>100 300	1,018	51.7%	1,042	48.5%	736	34.4%	957	47.8%	3,754	45.4%
>300 500	156	7.9%	104	4.8%	114	5.3%	97	4.9%	472	5.7%
>500 1000	105	5.3%	89	4.2%	233	10.9%	131	6.5%	558	6.8%
>1000 3000	138	7.0%	133	6.2%	161	7.5%	145	7.2%	577	7.0%
>3000 5000	79	4.0%	89	4.2%	76	3.6%	94	4.7%	338	4.1%
>5000	197	10.0%	111	5.2%	3	0.2%	98	4.9%	409	4.9%

^a Annual average of the 5-year period from 2001 to 2005.

Table 6.4-2: Predicted Visible Cooling Tower Water Vapor Plume Height and Length - Daylight Hours

Conditions		<u>Winter</u>		<u>Spring</u>		<u>Summer</u>		<u>Fall</u>		<u>Annual</u> ^a	
		hours/year	%	hours/year	%	hours/year	%	hours/year	%	hours/year	%
DAYLIGHT HOURS											
AMBIENT FOG/CALM											
HOURS REMOVED		1,111	22.4%	1,328	26.7%	1,352	27.2%	1,176	23.7%	4,966	100.0%
Plume Height (m)											
>0	200	995	89.6%	1,262	95.0%	1,292	95.6%	1,121	95.3%	4,670	94.0%
>200	400	107	9.7%	63	4.7%	59	4.4%	52	4.4%	281	5.7%
>400	600	7	0.6%	3	0.2%	0	0.0%	3	0.2%	12	0.2%
>600	1000	2	0.2%	1	0.1%	0	0.0%	0	0.0%	3	0.1%
>1000	3000	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Plume Length (m)											
>0	100	264	23.8%	568	42.8%	805	59.6%	473	40.2%	2,110	42.5%
>100	300	679	61.1%	642	48.4%	437	32.4%	592	50.3%	2,351	47.3%
>300	500	66	5.9%	38	2.8%	30	2.2%	36	3.1%	170	3.4%
>500	1000	34	3.0%	17	1.3%	29	2.2%	22	1.9%	103	2.1%
>1000	3000	24	2.1%	25	1.9%	34	2.5%	26	2.2%	109	2.2%
>3000	5000	11	1.0%	15	1.2%	15	1.1%	16	1.3%	56	1.1%
>5000		33	3.0%	22	1.6%	1	0.1%	12	1.0%	68	1.4%

^a Annual average of the 5-year period from 2001 to 2005.

**Table 6.4-3: Estimated Drift (PM) Emission Spectrum for
Mechanical Draft Auxiliary Cooling System**

Particle Size Range (micrometers)	Total in Size Range (percent)
0 - 10	0.5
10 - 15	1.3
15 - 20	3.9
20 - 25	15.6
25 - 35	28.5
35 - 65	20.7
65 - 170	11.5

Source: "Calculating Realistic PM Emissions from Cooling Towers",
Frisbie and Gordon, 2001.

**Table 6.4-4: Predicted Annual Monthly Mineral Deposition
SHCCF Auxiliary Cooling System**

Parameter	Deposition		Location	
	g/m ² /year	kg/ha/month	Distance (m)	Direction (degree)
Average within 1 km	5.11	4.25	NA	NA
Average within 2 km	0.56	0.47	NA	NA
Average within 3 km	0.32	0.27	NA	NA
Average within 4 km	0.17	0.14	NA	NA
Average within 5 km	0.12	0.10	NA	NA
Maximum within 1 km	40.59	33.83	214	202
Maximum within 2 km	1.97	1.64	1,000	233
Maximum within 3 km	0.67	0.56	2,052	223
Maximum within 4 km	0.36	0.30	3,202	219
Maximum within 5 km	0.25	0.20	4,031	240

**Table 6.6.1-1: Significant Impact Analysis for PSD Class II Areas
SHCCF Project**

Pollutant	Averaging Time	Maximum Model-Predicted Concentrations ($\mu\text{g}/\text{m}^3$)	EPA Class II Significant Impact Levels ($\mu\text{g}/\text{m}^3$)
SO ₂	Annual	0.09	1
	24-Hour	1.00	5
	3-Hour	2.78	25
	1-Hour	2.65	7.86
PM ₁₀	Annual	0.11	1
	24-Hour	1.37	5
PM _{2.5}	Annual	0.09	0.2
	24-Hour	1.00	1.2
NO ₂	Annual	0.12	1
	1-Hour	3.49	7.52
CO	8-Hour	1.7	500
	1-Hour	2.9	2,000
<u>With Cooling Tower</u>			
PM ₁₀	Annual	0.12	1
	24-Hour	1.54	5

**Table 6.6.1-2: Significant Impact Analysis for PSD Class I Area
SHCCF Project**

Pollutant	Averaging Time	Maximum Model-Predicted Concentrations^a (µg/m³)	EPA Class I Significant Impact Levels (µg/m³)
SO ₂	Annual	0.01	0.1
	24-Hour	0.09	0.2
	3-Hour	0.30	1
PM ₁₀	Annual	0.005	0.2
	24-Hour	0.07	0.3
PM _{2.5}	Annual	0.005	0.05
	24-Hour	0.05	0.27
NO ₂	Annual	0.009	0.1
<u>With Cooling Tower</u>			
PM ₁₀	Annual	0.4	0.2
	24-Hour	3.2	0.3

^a Maximum model-predicted concentrations on a receptor ring with a radius of 28.2 km.

Table 6.7-1. Sound Pressure Levels for Noise Sources Associated with SHPP Operations

Equipment ID	Noise Source Type	Number of Sources	Levels at Octave Band Center Frequencies									dBA	dB	Source
			31.5	63	125	250	500	1000	2000	4000	8000			
Air Inlet	Lw	1	121	116	107	93	82	87	95	105	101	107.6	122.4	GE Shady Hills Project 12/8/17
Air Inlet Duct	Lw	1	116	111	102	92	77	70	86	87	79	93.4	117.3	GE Shady Hills 7HA02 12/08/17
LubeOil Module	Lw	1	101	102	99	98	97	96	96	97	88	102.9	107.9	FPL DBEC, 7HA03, GE Powewr, 0717
Inlet Plenum	Lw	1	102	99	98	93	94	97	97	94	89	102.3	106.8	FPL OCEC/DBEC 0715 GE7HA02/03
Turbine Exhaust	Lw	1	106	103	101	95	96	97	100	106	94	108.6	111.4	FPL DBEC, 7HA03, GE Powewr, 0717
Exhaust Diffuser	Lw	1	107	114	98	94	88	85	87	89	76	95.3	114.9	FPL DBEC, 7HA03, GE Powewr, 0717
Load Compment	Lw	1	87	93	93	87	87	93	94	88	78	98.1	100.3	FPL OCEC/DBEC 0715 GE7HA02/03
Gas Turbine Generator	Lw	1	100	105	107	96	102	100	100	95	84	105.7	111.3	FPL DBEC, 7HA03, GE Powewr, 0717
Vent Fan	Lw	1	102	102	110	101	98	95	94	98	95	103.8	112.2	FPL Fort Myers/DBEC GE, 06 2015
Cooling Fan Module	Lw	1	97	97	94	94	100	96	89	83	76	100.2	104.8	GE Shady Hills 7HA02 12/08/17
HRSG Inlet	Lw	1	120	115	114	106	96	96	94	93	75	103.9	122.1	GE Shady Hills 7HA02 12/08/17
HRSG Wall	Lw	2	120	119	106	102	95	90	85	81	65	99.2	122.7	Generic SCC6-500F Power Island_0319, 2012
HRSG Stack Breakout	Lw	1	118	114	104	89	73	64	52	39	12	91.5	119.6	GE Shady Hills 7HA02 12/08/17
HRSG Accessories	Lw	3	106	110	109	103	94	90	78	69	62	98.6	113.9	GE Shady Hills 7HA02 12/08/17
HRSG Stack Exhaust	Lw	1	111	118	117	108	93	90	75	66	59	103.9	121.2	GE Shady Hills 7HA02 12/08/17
Condenser Pump	Lw (c)	1	68	63	73	88	83	79	75	67	61	84.9	89.9	Nitech Inc. 960 rpm15 scfm
Cooling Tower Outlet	Lw (c)	6	98	97	95	87	80	73	61	52	43	83.7	101.8	SPX marley 6-cell CoolingTower 200Hp fans12/19/17
Cooling Tower Inlet	Lw (c)	2	96	102	98	96	90	91	91	92	91	98.5	105.5	SPX marley 6-cell CoolingTower 200Hp fans12/19/17
Cooling Tower Wall	Lw (c)	2	100	103	100	97	90	91	91	92	91	98.7	107.2	SPX marley 6-cell CoolingTower 200Hp fans12/19/17
Pumps - General	Lw	5	0	74	76	78	80	78	75	72	69	82.8	85.4	Cric. Water Pumps, Torishima Pump Mfg 12/14/17
Steam Turbine	Lw	1	124	124	120	119	117	112	106	103	102	118	128.8	Black and Veatch ST
Steam Turbine Condenser	Lw	1	115	116	115	113	114	108	103	98	94	114.1	122	Table 6.7.0-1 from FPL
Transformer	Lw	1	96	102	104	103	99	93	88	83	76	100.1	108.8	Table 6.7.0-1 from FPL
Boiler Feed Pump	Lw	1	109	106	103	102	103	102	103	95	83	107.7	113.3	FPL (Tom Joseph)
Circulation Pumps	Lw	3	103	100	97	96	97	96	97	89	77	101.7	107.3	Table 6.7.0-1 from FPL
Auxiliary Boiler Fan	Lw (c)	1	8	105	103	93	91	82	79	70	57	92.3	107.4	Rentech Boiler System, BC0928Fan 0817

Lw = sound power level

Lw (c)= calculated sound power level

Table 6.7-2: Existing, Modeled, and Overall Sound Pressure Levels for the Construction of the Project at Five Receptor Locations

Receptor Location	Time	Sound Pressure Levels (dBA)			
		Existing ^a	Simple Cycle ^b	Modeled ^c	Overall ^d
1: Residences Northeast	Morning	47	50	54	56
	Afternoon	42	50	54	55
	Nighttime	41	50	54	55
2: Residence to the West	Morning	52	51	45	55
	Afternoon	51	51	45	55
	Nighttime	51	51	45	55
3: School to the Southwest	Morning	47	48	43	51
	Afternoon	41	48	43	50
	Nighttime	37	48	43	49
4: School to the Northeast	Morning	43	43	41	47
	Afternoon	42	43	41	47
	Nighttime	40	43	41	46
5: Industrial Receptors Southeast	Morning	47	59	59	62
	Afternoon	45	59	59	62
	Nighttime	41	59	59	62

^a L₉₀ sound levels collected December 2017.

^b Calculated impacts based on gas fired noise measurements at 400ft collected by Golder, January 2002.

^c Modeled results from future Site operations only.

^d Modeled results logarithmically added to the existing baseline measurements.

FIGURES

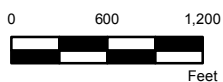


LEGEND

- Receptors
- ▨ SHCCF Project
- ▭ SHCCF Certified Site Boundary
- ▭ 230-kV Interconnection Tie-Line
- ▭ Construction Parking and Laydown Area
- ▭ Parcel Boundary

Operation Noise Contours

- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA



REFERENCE(S)
RECEPTOR LOCATIONS, OPERATION NOISE CONTOURS, GOLDER ASSOCIATES INC., 2017

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE

**SHCCF OPERATION
NOISE IMPACT CONTOURS**

CONSULTANT



YYYY-MM-DD	2018-02-13
DESIGNED	NRL
PREPARED	NRL
REVIEWED	RAZ
APPROVED	MM

PROJECT NO.
1779520

CONTROL
H018

REV.
0

FIGURE
6.7.2-1

7.0 ECONOMIC AND SOCIAL EFFECTS OF PLANT CONSTRUCTION AND OPERATION

This section identifies the direct and indirect economic costs and social effects of the Project based on temporary (construction) and long-term (operation) time periods.

7.1 Economic and Social Benefits

The SHCCF is anticipated to benefit the surrounding area by providing economic output and creating community growth, employment and opportunity. Direct and indirect economic benefits from construction include construction workforce jobs, purchase and rental of equipment and materials, housing and living expenses for construction workers, and indirect employment. Direct and indirect economic benefits from operation include capital expenditures, operation and maintenance expenditures, employment and property tax revenues.

SHEC estimates that the total cost for the SHCCF Project will be approximately \$400 million, excluding financing costs. Principal components include power plant development, equipment, and construction and related owner's costs.

7.1.1 Benefits of Construction

On-site construction activities of the Project are anticipated to begin in 2019 and conclude in late 2021. The construction workforce for the Project is expected to average approximately 230 workers per day during the period between 2019 and 2021. At peak construction (during 4th quarter 2020), approximately 370 workers per day will be at the Site. Assuming that 50 percent of the Project's construction and operation workers were to relocate to the immediate area, approximately 115 construction workers could migrate during the peak construction period and require temporary or permanent housing.

7.1.2 Benefits from Operation

The 40-year operating lifetime of the SHCCF will generate a significant amount of economic stimulus for the local economy. The SHCCF is scheduled to become operational in late 2021. The total direct employment will result in approximately 10-15 new full-time jobs, with an annual incremental operational payroll of approximately \$2.0-2.5 million in the first year. Other fixed operational costs of the Project, excluding fuel costs and property tax, are estimated to be approximately \$4 million in the first year.

The operation of the SHCCF is expected to generate over \$5 million in annual property tax revenue in 2022; with an estimated \$80 million generated with the 40-year operating lifetime. These taxes provide a large economic benefit to the county and include county funds, the school board, fire district, and water management district taxes. Over the lifetime of the Project, these economic benefits will allow for possible increases in government employment and services.

The SHCCF will also benefit the local Pasco County community through the purchase of utility services, including reclaimed water, potable water, and sanitary sewer, and possibly solid waste disposal services.

These revenues will be incremental to the county by increasing the utilization existing infrastructure which has previously been developed.

7.2 Economic and Social Costs

7.2.1 Temporary External Costs (Construction)

Temporary social costs of the Project include the generation of traffic and noise during construction. There is adequate capacity on the roadways to handle the temporary increase in traffic activity and traffic management practices will be implemented during peak construction hours to maintain an acceptable level of service for the access points. Construction noise is expected to be of short duration and will not affect the health or wellbeing of the local community.

Construction of the SHCCF is not anticipated to have a significant impact to residential, commercial or recreational uses and is not anticipated to impact existing land values or result in alteration of existing visual qualities in the vicinity of the Certified Site. Although the local community may experience some temporary disruptions during the construction period, overall socioeconomic impacts associated with the construction of the SHCCF will be favorable.

7.2.2 Long-Term External Costs (Operations)

External social cost impacts from the operation of SHCCF will be minimal and localized. The operation of SHCCF will not cause any adverse impacts to public or private facilities used for recreational purposes or impairment to recreational values. Additionally, the operation of SHCCF will not result in any deterioration of aesthetic and scenic values.

Overall, the increase in ad valorem revenue that will be paid to Pasco County, the Pasco County school district and other taxing authorities will have a positive impact to the surrounding community.

8.0 SITE AND PLANT DESIGN ALTERNATIVES

This optional chapter of the SCA is not included because there are no federal actions to consider and there is no requirement to consider alternative courses of action. The National Environmental Policy Act is not applicable and therefore, an alternatives analysis is not required.

9.0 ELECTRICAL TRANSMISSION LINES

9.1 Maps

Maps at a scale equal to or greater than 1:24,000 are provided for the corridor and the area extending one quarter mile from either side of the corridor.

9.2 Project Description

The electrical interconnection for SHCCF will consist of a single circuit 230-kV interconnection tie-line that will extend from the northeast corner of the north boundary of the SHCCF Certified Site and extend west across Pasco County-owned property to a new substation located adjacent to Duke Energy Florida's existing 230 and 500 KV transmission system. The new substation is to be owned, designed, permitted, constructed and operated by Duke Energy Florida (See Figure 9.1-1).

9.3 Corridor

The transmission corridor is about 0.6 mile in length, 200-feet wide and traverses a single property owner, Pasco County.

9.3.1 Corridor Selection

The corridor for the interconnection tie-line was established by reviewing the existing physical, biological and land use conditions between the certified site boundary and Duke Energy Florida's existing 230 and 500 KV transmission system. The objective of the corridor selection process was to establish a corridor that would provide direct access between the certified site boundary and Duke Energy Florida's existing 230 and 500 KV transmission system while minimizing impacts to the existing physical and biological resources and land uses.

9.3.2 Corridor Description

Figure 9.1-1 depicts the location of the proposed corridor at a scale of 1:24,400. The corridor is oriented east-west and abuts the north boundary of the Certified Site and extends approximately 0.6 miles to the west to abut Duke Energy Florida's existing 230 and 500 KV transmission system. The corridor is 200-feet wide and encompasses approximately 13.7 acres.

9.3.3 Alternate Corridors

Alternative corridor alignments north and south of the proposed corridor were considered for the electrical interconnection tie-line. The alternatives would have required greater land disturbance and/or relocation of existing County infrastructure associated with the Shady Hills Wastewater Treatment Plant or the Pasco County Resource Recovery Facility. As a result of the potential relocation impacts, the alternative corridors were eliminated from further consideration.

9.3.4 Access Roads

Existing access will be sufficient to access the proposed electrical interconnection tie-line corridor. Access includes both Hays Road, a County public road that provides access to Pasco County's public works facilities that surround the proposed corridor and the driveway that provides access to the Shady Hills Wastewater Treatment Plant and Pasco County Solid Waste Resource Recovery Facility. Access to structures is described in Section 9.4.1.

9.3.5 Cost Projections

The preliminary cost estimate for the interconnection tie-line is \$2,000,000, and includes right-of-way (ROW) preparation, construction access, ROW clearing, grading and fill, tower, insulator and conductor material, and installation. SHEC is currently negotiating a utility service agreement with Pasco County for various services, which will include right-of-way access.

9.3.6 Social and Political Environment of the Corridor Area

9.3.6.1 Governmental Jurisdictions

The proposed corridor and the area extending one-half mile in radius around the corridor is located within unincorporated Pasco County, Florida.

As described in Section 3.2.5, Pasco County, has identified ecological planning areas that are representative of the historic biological diversity in the County. As shown on Figure 9.3.6-1, the Hernando Sandhills is located within one-half mile of the corridor.

None of the following governmental jurisdictions are located within one-half mile of the corridor:

- National Parks
- National Forests
- National Seashores
- National Wildlife Refuges
- National Wilderness Areas
- National Memorials or Monuments
- National Marine Sanctuaries
- National Marine or Estuarine Sanctuaries
- Roadless Area Review and Evaluation Areas
- National Wild and Scenic Rivers
- Critical Habitats of Endangered Species
- State Parks
- State Forests
- State Archaeological Landmarks or Landmark Zones
- Aquatic Preserves
- Military Lands

- Save Our Rivers Lands
- State Conservation and Recreation Lands
- Native American Reservations
- County Parks or Special Management Areas established by law
- Florida Wild and Scenic Rivers
- Florida Springs
- Outstanding Florida Waters
- Areas of Critical State Concern
- Game Management Area

9.3.6.2 Zoning and Land Use Plans

The following subsections present a summary of the comprehensive plan and zoning-related topics for the transmission interconnection tie-line.

9.3.6.2.1 Comprehensive Plan

The original Pasco County Comprehensive Plan was adopted June 15, 1989 (#89-13). In accordance with state law (Chapter 73C-49, F.A.C.), at least every seven years local governments are required to review their plan to determine if revisions are necessary to reflect applicable changes. In addition, as a county's vision changes and as the county grows, so too will the plan grow through a series of amendments. The most recent amendments to the Pasco County 2025 Comprehensive Plan became effective February 15, 2014.

According to the Pasco County Future Land Use Map, the transmission corridor and directly adjacent property is located within the P/SP Major Public/Semi-Public future land use designation (Figure 9.3.6-2). The intent of the P/SP designation is to recognize major existing and programmed public/semi-public facilities, primarily those facilities associated with public or private utilities. The general range of identified uses includes major utility transmission corridors (see Appendix 10.5).

Additionally, as indicated in the Future Land Use Element of the Comprehensive Plan, public and semipublic uses, such as central utility systems, are permitted where they provide support for the general area. Specifically, Future Land Use Element, Policy FLU 3.2.2 states: "Private electric public utilities needed to support growth may be permitted in all land use designations." These needed utilities are then subject to the following..."c) All new power plants and transmission lines shall be subject to applicable State and Federal siting regulations and shall be consistent with the Goals, Objectives and Policies of this Comprehensive Plan."

The transmission corridor is located outside of sensitive lands and areas of special concern, such as rivers, lakes, wetlands, floodplains, natural vegetation communities, wells, wellfields, and 5 and 10-year protection areas, coastal high hazard areas, and evacuation routes.

The corridor is encircled by utility-type uses, with which the corridor will be compatible. Specifically, to the north is the Pasco County Solid Waste Resource Recovery Facility. To the southeast is vacant land, which is currently planned for Seminole Electric Cooperative's Power Delivery Facility and future substation. To the south is the proposed SHCCF, the existing SHGS, and the Shady Hills Wastewater Treatment Facility. DEF's existing 230 and 500 kV transmission lines and FGT's natural gas transmission line abuts the western terminus of the transmission corridor.

Importantly, FLU Policy 1.4.6 entitled "Utility Compatibility" only prohibits electric transmission corridors, natural gas pipeline easements, and similar facilities from being located "through or immediately adjacent to" existing neighborhoods. Rather, the fact that the surrounding uses are utility in nature and not existing neighborhoods conforms with the requirements of FLU Policy 1.4.6. That conformance and the fact that the corridor lacks sensitive lands and areas of special concern that are addressed in the comprehensive plan demonstrates consistency with the County's FLU policies and overall comprehensive plan.

FLU, Policy FLU 1.10.1 identifies the County's intent to review proposed uses for their compatibility and appropriate timing pertaining to the intended use and location. This review is typically conducted through the [special exception] zoning application process and considers the existing uses and the potential changes to the existing densities and intensities, the changes to development patterns in the area, the anticipated transitions between land uses, the potential changes to environmental, cultural features, and community character, and the timing of available public facilities/services associated with change in uses. Similar to the SHCCF Project, the existing surrounding uses have each been reviewed under similar processes and have demonstrated compliance with the intent of these provisions.

The Special Exception Order for the SHCCF Project was issued on January 10, 2018. As indicated in Findings of Fact: (j) the County found the request to be consistent with the LDC, Chapter 400, Permit Types and Applications: Section 402.4.E, Special Exception, Review Conditions; and the applicable provisions of the County's Comprehensive Plan. In addition, item 5 of the approval states: "The special exception requested is consistent with the adopted Pasco County Comprehensive Plan and would not have an adverse effect on the health, safety, and welfare of the public."

9.3.6.2.2 Zoning

Relevant provisions of the Code of Ordinances and Land Development Regulations for Pasco County are provided in Appendix 10.3.

The location of the transmission corridor is consistent with the Pasco County Land Development Code. The County's Zoning map identifies the transmission corridor within Agricultural (A-C) zoning district (Figure 3.2.3-1). Public and private utility facilities are allowed within this district as a special exception use if the use is in conformance with standards established by the County, State and Federal government. Specifically, Section 504.5 of the Pasco County Land Development Code permits "public and private utilities" as a special exception use in the A-C zoning district, and A-C zoning uses are permitted within the

Public/Semi-public future land use classification, providing consistency with the Comprehensive Plan's Goals, Objectives and Policies, and the A-C zoning designation.

An application for Special Exception Use for the SHCCF and transmission line was submitted to Pasco County on November 14, 2017 and was approved by the Planning Commission on January 10, 2018. A copy of the Order is contained in Appendix 10.3.

The Pasco County Order approving the Special Exception includes a determination that the proposed power plant and transmission line is consistent with the Goals, Objectives, and Policies of the adopted Comprehensive Plan elements or applicable portions thereof. The approval of the SHCCF (Special Exception Application No. 7295) was issued on January 10, 2018. The approval includes Finding of Fact 3j, which reads in part ... "[t]he proposed request is consistent with the LDC, Chapter 400, Permit Types and Applications; Section 402.4.E, Special Exception, Review Considerations; and the applicable provisions of the County's Comprehensive Plan", and Finding of Fact 5, which reads "[t]he special exception requested is consistent with the adopted Pasco County Comprehensive Plan and would not have an adverse effect on the health, safety and welfare of the public."

9.3.6.2.3 Easements, Title, and Agency Works

An easement from Pasco County will be required for the proposed electrical interconnection tie-line that will run from the northern boundary of the SHCCF to the existing Duke Energy 230 and 500 KV transmission system transmission corridor. As discussed above, SHEC is currently negotiating a utility service agreement with Pasco County for various services, which will include right-of-way access. The need for additional easements, titles or agency works is not anticipated.

9.3.7 *Biological and Physical Environment of the Corridor Area*

Characteristic vegetative communities were classified utilizing the FLUCFCS Level III (FDOT, 1999) data from the SWFWMD that were updated based on a field reconnaissance conducted in January 2018.

9.3.7.1 Species-Environmental Relationships

The following subsections include descriptions of flora and fauna within the 230-kV tie-line corridor and surrounding vicinity. This discussion includes information related to the species found and the value of the habitats present, by FLUCFCS Level III codes.

9.3.7.1.1 Mixed Hardwood-Conifer (FLUCFCS 434)

Approximately 2.9 acres within the eastern portion of the 13.7-acre transmission corridor consists of mixed hardwood-conifer habitat (Figure 3.3.5-1). The canopy is dominated by live oak, laurel oak, and slash pine, with nearly no understory or groundcover vegetation present. The sparse groundcover vegetation present consists chiefly of saplings of the canopy species present along with vine species such as grapevine and catbrier (*Smilax* sp.). Extensive hog rooting was observed in this habitat during the January 2018 field reconnaissance.

9.3.7.1.2 Utilities (FLUCFCS 830)

Approximately 10.4 acres of the 13.7 acres transmission corridor consists of utilities (Figure 3.3.5-1). This area consists chiefly of two dry detention basins with a small portion of it consisting of a vehicle weigh station and access driveway. Vegetation within the dry detention basins are dominated by herbaceous groundcover species along with a scattered canopy species. Canopy species present consist of laurel oak, live oak, slash pine, and American sycamore (*Platanus occidentalis*). Herbaceous groundcover vegetation present in this area consist of a variety of ruderal native and non-native invasive/exotic species such as bahia grass, beggar ticks, hairy indigo (*Indigofera hirsuta*), sandbur (*Cenchrus* sp.), dogfennel, cogon grass, common ragweed (*Ambrosia artemisiifolia*), bluestem (*Andropogon virginicus*), Spanish bayonet (*Yucca aloifolia*), and prickly pear cactus.

9.3.7.2 Vegetative Communities Adjacent to the Transmission Corridor

The surrounding area is dominated by existing utility and energy infrastructure uses, although parcels of xeric upland forest occur directly adjacent to the north and east of the transmission corridor. The surrounding vicinity is dominated by a variety of suburban-type environments comprised of utility and industrial uses. Residential land uses (Figure 3.3.6-1) are limited to areas west of Pasco County's Shady Hills Wastewater Treatment Plant, additional vacant County-owned property and Duke Energy Florida's 230 and 500 KV transmission system.

9.3.7.3 Terrestrial Ecology Systems - Fauna

The disturbed nature and existing use of the transmission corridor as dry detention basins provides poor quality wildlife habitat for use by avian species and herpetofauna which is common to disturbed upland fields and mixed hardwood-conifer habitat in central Florida.

Non-listed terrestrial wildlife directly observed, indirectly observed (via tracks, scat, dens, and/or burrows), or likely to occur are discussed below based on primary habitat types within the transmission corridor. Species classified as threatened, endangered, species of special concern (listed species) are discussed in Section 9.3.7.4 (See Table 9.3.7-1).

Mixed Hardwood-Conifer and Utilities (FLUCFCS 434 and 830) – Although these upland habitats have been historically altered and do not provide quality native wildlife habitat, they are occasionally used by common resident and migratory non-listed avian species such as blue jay, northern cardinal, Carolina wren, Carolina chickadee, tufted titmouse, Eastern bluebird (*Sialia sialis*), blue-gray gnatcatcher, ruby-crowned kinglet (*Regulus calendula*), palm warbler (*Setophaga palmarum*), pine warbler, black-and-white warbler, yellow-throated warbler, yellow-rumped warbler (*Setophaga coronata*), nanday parakeet (*Aratinga nenday*), red-bellied woodpecker, and downy woodpecker, as well as common mammals such as nine-banded armadillo and feral hog (*Sus scrofa*).

9.3.7.4 Aquatic Ecology Systems – Fauna

No aquatic systems exist within the transmission corridor. Therefore, no aquatic or wetland dependent fauna were observed within this area.

9.3.7.5 Threatened and Endangered Species – Flora and Fauna

Only one state-listed species was observed during the field reconnaissance, the gopher tortoise. This species is common to the area and uses other upland habitats that are found throughout the surrounding region.

9.3.7.6 Threatened and Endangered Species – Methodology

Prior to field reconnaissance, county-specific lists of threatened and endangered species were obtained from the Florida Natural Areas Inventory (FNAI, 2017). In addition, geographic information system (GIS) data were obtained from the FNAI, which maintains a database of known occurrences of listed species throughout the State of Florida.

The FNAI database was queried, and documented locations of listed species within the transmission corridor and vicinity were identified. Listed and non-listed wildlife species observed during field reconnaissance were recorded. The field effort was supplemented by evaluation of habitat conditions suitable for listed species to help identify additional species that were not observed but are likely to occur.

9.3.7.7 Plant and Animal Surveys

Multi-season surveys or an evaluation of threatened and endangered species habitat conditions was used to determine possible presence or absence of such species. For this study, a field reconnaissance was combined with the evaluation of habitat conditions to determine the presence or absence of threatened and endangered species.

The potential for utilization of the transmission corridor by most terrestrial listed species for foraging, roosting, or breeding is limited due to the alteration of the upland habitats present, as well as the surrounding utility, industrial, and limited residential development. Based on the list of threatened and endangered species known to occur in Pasco County, reported occurrences from the FNAI database review, and the available habitats within the transmission corridor and surrounding area, federally and state-listed species that were observed or may potentially occur within the area were identified and are discussed below (See Table 9.3.7-2).

Flora - The FNAI database review indicated one reported occurrences of listed plant species within 5 miles of the Project, pond spice. No listed plant species were observed within the transmission corridor during a field reconnaissance in January 2018. Furthermore, due to the lack of suitable upland and wetland habitats and significant alteration of the upland habitats present, it is not likely any listed plant species potentially occurring within Pasco County are present within the transmission corridor. Based on the Pasco County list of threatened and endangered species and the available habitats within the transmission corridor,

federally and state-listed species that were identified from the FNAI database review as occurring within 5 miles of the transmission corridor or are likely to occur within the transmission corridor were identified and are discussed below.

Pondspice (E) - Pondspice is classified at endangered in the State of Florida, but is not listed by the USFWS. It is a shrub which is found in wetland habitats such as cypress domes, freshwater ponds and shrub marshes in pine flatwoods, and along the edges of baygalls (FNAI, 2001). No individuals were observed in the transmission corridor during the field reconnaissance, and since there are no wetlands located within the transmission corridor, there is no likelihood of occurrence within the transmission corridor.

Fauna - The FNAI database review indicated reported occurrences of four listed animal species in the vicinity of the transmission corridor – Southeastern American kestrel, Florida pine snake, short-tailed snake, and gopher tortoise.

According to the FWC wading bird rookery and nest colony locator, two wading bird rookeries were identified approximately 1-mile from the Project Area, Atlas #611143 and #611144 (Figure 3.3.6-2). Atlas #611143 was documented as inactive from the last survey in the 1990's while Atlas #611144 was documented as active from the last survey in the 1990's. The transmission corridor is located within the core foraging area of six wood stork (*Mycteria americana*) colonies – Anclote River, Embassy-Shoppers Way, Greenbrooke, Heron Island, Heron Point-Land O' Lakes, and Seven Springs. However, the closest wood stork colony (Embassy – Shoppers Way) is located approximately 10 miles to the southwest of the transmission corridor.

Although no longer classified as threatened or endangered, the bald eagle (*Haliaeetus leucocephalus*) is protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. According to the FWC bald eagle nest location database, the closest documented bald eagle nests (nest ID #PS008 and PS031) are approximately 3 miles to the northeast and southwest, respectively, of the transmission corridor. Additionally, no bald eagle nests were observed within the transmission corridor during the field reconnaissance.

The only listed species observations within the transmission corridor during the field reconnaissance were burrows of the state-listed gopher tortoise. Additional species that were not observed, but have a moderate probability of occurrence within the transmission corridor based on the presence of suitable habitat include the eastern indigo snake (*Drymarchon corais couperi*), Florida pine snake, and short-tailed snake. A brief description of each species observed, identified from the FNAI database review as occurring within 5 miles of the transmission corridor, or with a moderate probability to occur within the transmission corridor is provided below.

Gopher Tortoise (T) – The gopher tortoise is classified as threatened by the FWC, but is not listed federally by the USFWS in Florida. The gopher tortoise is a large terrestrial turtle that primarily forages on herbs

and forbs. Its carapace is a dark brown or grayish brown color, while the plastron is much lighter in color, typically yellow or somewhat tan. Gopher tortoises have stumpy, elephant-like hind feet and flattened, shovel-like forelimbs that are used for digging burrows (FWC, 2017). It excavates burrows with these forelimbs for shelter from temperature extremes, predators, and refuge from fires. Burrows are excavated in well-drained, sandy soils typically associated with upland habitats such as palmetto prairies, dry pine flatwoods, turkey oak sandhills, and xeric scrub throughout peninsular Florida. It will also excavate burrows in disturbed habitats such as pastures and old fields (FNAI, 2001). It is considered a keystone species as hundreds of commensal species, such as the listed eastern indigo snake and Florida pine snake, have been documented to utilize their burrows for their own survival needs. During the field reconnaissance of the transmission corridor, several gopher tortoise burrows were observed within areas classified as Utilities (FLUCFCS 830). Potential habitat for the species exists throughout the transmission corridor, as well as directly adjacent to the southwest and east of it.

Eastern Indigo Snake (T) – The eastern indigo snake is classified as threatened by both the FWC and USFWS. The eastern indigo snake is a non-venomous, bluish-black colored snake that can reach lengths of eight feet. Its chin, cheek, and throat are mostly red or brown, but can also be white or black. Most indigo snakes have smooth scales, although adults do have keels (ridges) on the front of some of their scales (FNAI, 2001). Eastern indigo snakes inhabit pine flatwoods, hardwood forests, moist hammocks, and areas that surround cypress swamps. They can be found throughout Peninsular Florida (FWC, 2017). This species occasionally utilizes gopher tortoise burrows as refugia, especially during the winter months in the northern portion of the state where colder temperatures are more prevalent. Although no individuals or signs of their presence were observed during the field reconnaissance of the transmission corridor, potential refugia in the form of gopher tortoise burrows were observed, and adjacent areas to the north and east of the transmission corridor may provide suitable habitat.

Florida Pine Snake (T) – The Florida pine snake is classified as threatened by the FWC, but is not listed federally by the USFWS. The Florida pine snake is a large, non-venomous snake which can be found throughout most of the panhandle and peninsular Florida. It has a brown back with dark blotches, white belly, ridged scales, small head, and pointed snout (FNAI, 2001). It prefers open xeric habitats with well-drained, sandy soils such as longleaf pine-turkey oak sandhill, sand pine scrub, and scrubby flatwoods. Similar to the eastern indigo snake, they are known commensal species of gopher tortoise burrows. The FNAI database review indicated one reported occurrence of the species within 5 miles of the transmission corridor. Although no individuals or signs of their presence were observed during the field reconnaissance, potential refugia in the form of gopher tortoise burrows were observed, and adjacent areas to the east of the transmission corridor may provide suitable habitat.

Short-tailed snake (T) – The short-tailed snake is classified as threatened by the FWC, but is not listed federally by the USFWS. It is a small, non-venomous snake which is endemic to Florida. The species is cryptic and fossorial in nature. It can be found mainly from the north central to central portion of peninsular Florida. It prefers xeric habitats such as longleaf pine flatwoods, turkey oak sandhills, and scrubby oak

communities (FWC, 2017). The FNAI database review indicated one reported occurrence of the species within 1.5 miles of the transmission corridor. No individuals or signs of their presence were observed during a field reconnaissance. The mixed hardwood-conifer (FLUCFCS 434) habitat in the northeastern portion of the transmission corridor may provide suitable habitat for the species, but the likelihood of its presence is low to moderate due to the extensive hog rooting and human alteration to this community. Suitable habitat for the species may exist in adjacent areas to the east of the transmission corridor.

Southeastern American Kestrel (T) – The Southeastern American kestrel is classified as threatened by the FWC, but is not listed federally by the USFWS. The Southeastern American kestrel is a small raptor which preys upon insects, small mammals, and small birds. It prefers to nest in open fields and woodlands and pine savannah habitats with large, dead trees containing excavated cavities (FWC, 2017). The FNAI database review indicated one reported occurrence of the species within 1/4 mile of the transmission corridor (See Figure 9.3.7-3). However, since the transmission corridor lacks large dead trees with cavities suitable for nesting by the species, nesting habitat is not present at the transmission corridor. Therefore, the likelihood of it occurring at the transmission corridor is low.

9.4 Effects of Right-of-way Preparation and Transmission Line Construction

9.4.1 Construction Techniques

Construction phases will generally consist of right-of-way clearing, access road and structure pad construction (where necessary), line construction, and right-of-way restoration. The following construction phases generally will be performed sequentially along the right-of-way. All activities will conform to applicable federal, state and local regulations. In the event of inadvertent equipment or vehicle fluid release, construction crews will be equipped with spill containment and absorption materials. Right-of-way preparation and transmission line construction will be conducted in a manner so as to minimize effects on human populations and the environment to the extent practicable.

9.4.2 Right-of-Way Preparation

It is anticipated that only moderate right-of-way clearing will be required due to the location of much of the corridor along previously disturbed areas. In those areas where the ROW is not sufficiently cleared for placement of the transmission line, additional clearing will be necessary. In general, a minimal 100 ft right-of-way clearing is expected. Clearing will be in accordance with the descriptions below and will be determined by existing conditions, environmental or land use constraints, and line design requirements.

Typically, all trees and shrubs whose mature height could exceed 14 ft would be cleared. Additional minimal amounts of clearing/mowing and grading may be required for installations of the structure pads and anchors for guyed structures and the removal of conflict timber outside the right-of-way that poses a risk of falling into the transmission line conductors.

The machinery used for right-of-way clearing will depend on the size of trees to be cut. Typical equipment will include bulldozers, shearing machinery, and specialized mowing equipment, as well as chainsaws. Clearing will be limited to upland areas as no wetlands exist within the corridor.

9.4.3 Access Road and Structure Pad Construction

Access roads to structure pads may also be required. While the details of this work will be submitted for review in accordance with the conditions of certification in a post-certification submittal; an overview of typical access road and structure pad construction is provided below.

Where necessary, construction of access roads and pads will be conducted by first completing the clearing and grubbing of the road footprint and then placing, spreading, shaping, and compacting hauled clean fill or soil from both sides of the road surface to the design elevation using bulldozers.

SHEC will use erosion control best management practices (BMPs) such as silt fencing or stacked hay bales along the perimeter of the work area within the right-of-way to ensure that state water quality standards are met. Additional BMPs will be installed along the perimeter of the access road or pad construction areas prior to final clearing and grubbing of these areas. The final grade of the road and/or pad is generally set up to be at least 6 inches above the seasonal high water line elevation. Transmission line construction stormwater discharges released into waters of the state will be addressed through compliance with 62-621.300(4) F.A.C. (Generic Permit for Stormwater from Large and Small Construction Activities).

Where necessary, in conjunction with the construction of any access road, culverts may be added under the access roads to maintain surface stormwater runoff. A minimum of 2 ft of cover is planned to be installed over culverts. The culvert inverts are placed so that the invert elevation is the same as the preexisting grade. The culvert system is not intended to create a retention or detention area. During a major-intensity rainstorm (greater than a 25-year storm event), the water level may flow over the access road.

It is expected that most concrete poles will be directly embedded into the ground. If foundation construction is required, a specialized crew, and equipment will be utilized. This activity typically takes only a few hours per structure. The crew will then erect the structure on the foundation with a larger crane. This activity typically also takes only a few hours per structure.

9.4.4 Assembly and Erection of Structures

Transmission structures are generally delivered to the site using semi-trucks with open trailers and are assembled on-site as close as possible to the structure location. To install the transmission line structures a digger truck will auger a hole approximately 18 to 20 ft deep and the single-pole spun concrete structures will be embedded directly into the hole and backfilled with crushed rock. Taller poles, site specific geography or subsurface conditions may require additional setting depths. Multi-piece structures can be used should significantly taller structures be required. During the assembly process, poles are maneuvered into place using crane equipment to facilitate connections. Cribbing is used to maintain a level working surface to

prevent excess stress on components and connections. Once assembled, the structures are ready for final placement. When ready a crane is used to pick up the structure. Tag lines may be used to facilitate the proper orientation and control of the structure until placed in the hole.

Guys and anchors may be required depending on the structure type and the applied load. Anchors to be used will be either pile type or multi-helix/screw type structure type. Multi-helix anchors are installed using mechanized equipment designed to screw the anchor into the ground to a specified length or torque which meets the design requirements. Pile anchors are designed to provide high strength applications by a short pole section, a specified depth into natural earth. The anchor is then backfilled with a suitable material or concrete to obtain the desired strength. Guy wires are utilized to connect hardware on the pile anchor. Guys typically consist of high strength steel wire, typically 0.5 inch in diameter or larger. The guy wire is connected to the structure and anchor rods using preformed or adjustable guy grips. Typical equipment in transmission line construction includes but is not limited to cranes, bucket trucks, flatbed trucks, semi-trucks, front-end loaders, and support vehicles.

9.4.5 Installation of Insulators and Conductors

Insulator and conductor installation follows structure erection. Installing conductors between structures requires stringing a lead line between each structure's stringing block to form a continuous connection between end points of a conductor stringing pull. The lead line is used to pull the conductors into position. The conductor is then tensioned to design specifications, transferred to the support clamp at the structure, and then clipped into its final position. This operation is repeated for each of the conductors and overhead ground wires on the transmission line. Bucket trucks, wire-pulling equipment, wire reels, trailers, tensioners, and other support vehicles are typically used in conductor and overhead ground wire installation operations.

9.4.6 Right-of-Way Restoration

Once transmission line construction is completed, construction debris, if any, will be removed, and SHEC will employ various methods to restore the right-of-way where necessary, such as stabilizing potentially erodible areas through seeding and mulching.

9.4.7 Environmental Resource Permit (ERP)

Once the design for the transmission line is finalized, detailed design information typically provided using the environmental resource permit (ERP) application forms will be submitted for the interconnect tie-line to reviewing agencies for post-certification monitoring and compliance with the conditions of certification, as authorized by Rule 62-17.191, F.A.C. Consistent with the ERP application requirements, the detailed design information will include management of surface waters during construction, wetland mitigation and floodplain compensation will not be required.

9.4.8 Solid Wastes

Solid waste generated from transmission line right-of-way preparation and line construction typically consists of cleared vegetation and construction-related debris. Solid wastes will be collected and removed

for disposal in compliance with state and local landfill regulations. Any proposed onsite chipping or burning will be performed in compliance with state and local regulations. The quantity of solid waste generated will depend upon site-specific characteristics of the area being cleared, but is not expected to be significant due to previous disturbance and the short length of the transmission tie-line.

9.4.9 Changes to Vegetation, Wildlife, and Aquatic Life

Impacts on terrestrial and species associated with transmission line right-of-way preparation and construction depend primarily on the location of the selected right-of-way and the clearing and construction techniques. The 230-kV tie-line corridor is located on land which has already been altered for and is currently used primarily as dry detention basins; it is not anticipated that transmission line construction or maintenance will have any significant impact on native vegetation or wildlife.

9.4.10 Impact on Human Populations

No inconvenience is experienced on residents or other populations as a result of the location, construction, operation or maintenance of the interconnection tie-line. The corridor is located on property that is used for a resource recovery facility and wastewater treatment plant. No public ROW is crossed by the corridor. Noise from machinery used intermittently at various locations along the right-of-way during construction and possible minor traffic disruptions along the driveway due to use of equipment along roads and material deliveries will occur but effects of occupants of the county property will be minor. The construction and associated noise-producing activities are intermittent.

Construction activities will typically take place during daylight hours. Special circumstances could require nighttime activities. Inconvenience to human populations attributable to construction of the interconnection tie-line will be minimal and temporary.

In general, because of the temporary nature of the construction activities and the relatively short duration of the construction process at any given location, potential impacts experienced by the human populations working adjacent to the transmission line corridor are anticipated to be minor.

9.4.11 Impact on Regional Scenic, Cultural, and Natural Landmarks

There are no federally governed regional, scenic, cultural or natural landmarks within 1.5 mile radius of the transmission line corridor (See Figure 9.3.6-1).

There are no state-owned preserves or county parks within the 1.5 mile radius. No adverse impacts to these resources are anticipated as a result of the construction of the interconnection tie-line.

There are two Ecological Planning Units which extend into the 1.5 mile area, Anclote/Cotee Watersheds and the Hernando Sandhills. See Section 3.2 for additional discussions.

9.4.12 Impact on Archaeological and Historic Sites

The 230-kV interconnection tie-line corridor was assessed by the Florida Department of State, Division of Historical Resources in 1986. The location of the proposed 230-kV interconnection tie-line is owned by Pasco County and has been previously evaluated for cultural resources and archaeological significance associated with the Pasco County's Shady Hills Wastewater Treatment Facility, located to the west, and the Pasco County Solid Waste Resource Recovery Facility, located to the north, of the Site. Previously, under these development projects and based on documented communication with DHR, this area has been identified to have no significant archaeological and/or historical sites recorded or considered likely to be present. SHEC is seeking an updated confirmation of the past findings.

If any cultural resource finds are discovered during construction, construction activities will be immediately halted in the vicinity and the DHR will be notified. A determination of the significance of the find will be conducted, as appropriate, and SHEC will coordinate with DHR to evaluate mitigative measures necessary to protect the area from adverse impacts.

9.5 Effects of Maintenance

9.5.1 Maintenance Techniques

Safe and reliable operation of the new transmission lines will be maintained through regular inspection of the poles, conductors, insulators, hardware, access areas, and vegetation in proximity to the facilities. Electric transmission lines normally require minimal maintenance; however, SHEC will inspect the transmission lines on a regular basis to look for problems caused by weather, vandalism, vegetation regrowth, etc. The inspections will generally consist of ground patrols (truck).

In general, maintenance of the right-of-way will consist of mowing, pruning, and removal of conflict timber, as well as herbicide treatments. Maintenance of the right-of-way will be consistent with the right-of-way clearing described previously. Using these restrictive clearing practices will encourage the growth of low-growing woody and herbaceous vegetation that will not exceed 14 ft in height at maturity, to the greatest extent practicable. SHEC will manage vegetation within the right-of-way by a variety of methods, including trimming, mowing, and the use of approved herbicides by approved applicators in accordance with federal and state regulations, targeting species that are incompatible with the safe operation, maintenance, and access to the transmission system. The exact manner in which maintenance will be performed will depend on the location, type of terrain, and surrounding environment. Vegetation removal is minimized consistent with safe and reliable operation of the line. For example, fast-growing vegetation species and other vegetation whose mature height could exceed 14 ft in height will be cut or removed from the area between the structures lying within the transmission easement to avoid interference with the conductor clearance. Any vegetation that could restrict access will be removed. Other vegetation species are generally allowed to remain, resulting in a shrubby and herbaceous cover within the right-of-way. This allows a broad diversity of vegetation growth. Each area of the right-of-way will be addressed based on site-specific vegetation and

habitat. Endangered or threatened species, if present, are considered and accommodated in the maintenance program in accordance with state rules.

Some vegetation maintenance activities outside the right-of-way are occasionally necessary. To enhance the safe, reliable operation of the proposed transmission lines, SHEC may trim or remove conflict timber outside the right-of-way in coordination with the Pasco County. Conflict timber includes trees capable of falling or leaning into the conductors or, in areas of wildfire hazard, other vegetation that may provide excessive fuel loading in proximity to the transmission lines.

The exact manner in which maintenance will be performed will depend on the location, type of terrain, and surrounding environment. Each area of the right-of-way will be addressed based on site-specific vegetation and habitat. Listed species, if present, are considered and accommodated in the maintenance program.

Maintenance of the transmission line will be performed using various types of equipment. This equipment may consist of bucket trucks, cranes, semi-trucks and support vehicles. Typical line maintenance operations may include insulator replacements, conductor repairs, overhead ground wire repairs, grounding and other activities associated with structures, conductors and foundations. In general, authorized contractors will mobilize in line trucks capable of supporting various operations. Once on site, the crew will establish a safe working area and perform the required repair.

9.5.2 Multiple Uses

Multiple uses within a transmission line right-of-way will likely be limited to stormwater retention and continued access to the PCRRF since the County owns the property, which is used for utility uses and most of the property is restricted for public access.

9.5.3 Changes in Species Populations

The proposed location of the transmission corridor in a disturbed area for the majority of its length greatly reduces impacts to undisturbed vegetative communities and wildlife habitat. As described in Section 9.3.7.5, no significant impacts to species or changes in local or regional populations are anticipated during construction. Similarly, changes in species populations are not expected due to the operation and maintenance of the interconnection tie-line. Individuals that may be temporarily displaced from the right-of-way during construction are likely to return following construction. No animal or plant species are expected to be permanently displaced from the right-of-way or vicinity as a result of construction, operation, or maintenance.

9.5.4 Effects of Public Access

The public is not allowed on County owned utility property except through a vehicle way station when conducting business with the county's utility facilities. No public access is crossed by the corridor nor is any public access adjacent or parallel to public right-of-way. Effects on public access will be insignificant.

9.5.5 Other Post-construction Effects

9.5.5.1 Electric and Magnetic Field Effects

The interconnection tie-line complies with the Florida EMF regulations specified in Chapter 62-814, F.A.C. (The Florida EMF Rule). The strength of the magnetic field under a transmission line is primarily a function of the amount of current carried by the line and the height of the conductors above the ground. The electric field is primarily a function of the voltage impressed on the transmission line and conductor height above ground. The electric field near the transmission line is relatively constant over time, but the magnetic field fluctuates depending on customer demand for power.

The electric and magnetic fields produced by the transmission line were calculated in accordance with the requirements of Chapter 62-814.460, F.A.C. The fields associated with the new transmission line comply with the standards set forth in the Florida EMF rule, as demonstrated in Figure 9.5.5-1. The calculated fields are well within the acceptable limits required by State Regulation for the proposed configuration:

Electric

Within ROW: 3.5 kV/m // 39 ft

At Edge of ROW: 0.2 kV/m // 0 ft (Maximum Allowable – 8 kV/m)

Magnetic

At Edge of ROW: 55.2 mG // 0 ft (Maximum Allowable 150 mG)

Although the current carried by the transmission line will vary throughout the day, the value used in the calculations is the maximum quantity of electric current that can be continuously carried on the conductor, as required by Chapter 62-814, F.A.C. In the event additional configurations are required by the detailed design of the transmission line after certification, SHEC will submit the EMF compliance demonstrations to FDEP at least 90 days prior to the start of construction

9.5.5.2 Audible Noise

The audible noise associated with a transmission line is generated by either corona from the conductors or from gap-type discharges. Gap noise is typically due to faulty or failed hardware and easily corrected. Corona is a phenomenon that occurs when there is an irregularity on the surface of the conductor, such as buildup from fog, water droplets, or significant particulate matter. Corona activity at the surface of the conductors produces a low-level audible noise that is a slight humming sound. Under wet conditions, higher audible noise levels are experienced than will occur under dry conditions. However, background noise from various sources (inclement weather, traffic, agricultural activity, etc.) has the effect of masking transmission line noise.

Audible noise calculations were performed for the typical transmission line cross-section using corona field effects software produced by the Bonneville Power Administration (BPA), U.S. Department of Energy. This software provides estimated median (L50) noise levels for fair and rainy weather as a function of distance from the edge of right-of-way for the modeled transmission line configurations.

During fair weather and under normal operating conditions, the audible noise levels calculated for the DR transmission line designs will be less than the ambient outdoor noise levels. Table 9.5-2 presents the maximum audible noise levels that could be produced by the interconnection tie-line. For a small portion of time, when the conductors are wet from rainfall or heavy fog, the transmission line noise will increase. The noise level produced by the transmission line will comply with the Pasco County noise ordinance.

9.5.5.3 Radio and Television Interference

Electrical noise in the radio frequency range can be produced by corona on transmission line conductors or by gap-type discharges on transmission line hardware. Corona noise is most significant in the lower frequencies such as those used for amplitude modulation (AM) radio broadcasting. Noise from gap-type discharges, on the other hand, extends to higher frequencies (peak levels are in the 30 to 100 megahertz (MHz) range) and can be a source of interference with television broadcast reception. Since the transmission lines will be constructed with new hardware, gap-type discharges are not anticipated to occur. Should a gap-type discharge develop on a damaged, defective, or improperly installed piece of hardware and lead to interference, the hardware causing the gap-type discharge will be located and repaired or replaced.

Corona, which can occur on high-voltage transmission lines, produces electromagnetic (EM) noise. When this noise is sufficiently strong, it can cause interference with broadcast radio and television signals. Since corona is enhanced by water vapor, the magnitude of this noise is greater during wet or rainy periods than during dry or fair weather periods.

Broadcast signals in the amplitude-modulated (AM) radio band and two television bands (very-high frequency [VHF] and ultra-high frequency [UHF] bands) are susceptible to this potential interference. EM noise from corona is not expected to cause interference with frequency-modulated (FM) radio, cable or satellite television systems, cellular telephones, home cordless telephones, or wireless networking.

In general, the EM noise from transmission line corona decreases with increasing distance from the right-of-way and with increasing noise frequencies (shorter wavelengths). Thus, interference effects are greatest immediately adjacent to the right-of-way and at the lower broadcast frequencies.

Due to the rural nature of the transmission line corridor and the conservative evaluation method, the overall impact to radio or television reception is expected to be minimal with the main potential for impact being the AM radio band. Should any entity experience interference as a result of these transmission lines, SHEC will work with the entity to resolve the interference issue.

9.5.5.4 Induced or Conducted Ground Currents

Induced currents from EMF produced by the transmission lines are limited to FDEP requirements for field magnitudes on the right-of-way and at the edge of the right-of-way. Electric field limits guard against startle shocks that can occur when contacting other objects beneath the line. Furthermore, minimum clearances

for the lines are designed to meet the NESC requirements for 5 milliamperes or less of short-circuit current (induced current due to electric field) when the largest anticipated vehicle or equipment is situated directly under the line.

To minimize these induced ground currents and distribute ground fault currents, each structure will be grounded. Each will have an electrical connection between the shield wire and ground lead that will be connected to ground rods. Ground resistance tests will be made at each structure before the shield wire is electrically connected to the ground lead. Sufficient ground rods will be installed to reduce the resistance to 10 ohms or less under normal atmospheric conditions. Standards require that fences and gates either crossing or parallel to and within the transmission rights-of-way be grounded to mitigate shock hazard. SHEC will provide this grounding as part of its construction activities.

9.5.5.5 Safety

The transmission line facilities are designed to comply with all applicable codes, guidelines, and standards. The primary code used in the design of transmission lines is the NESC, 2012 edition. The NESC is an American National Standards Institute standard that covers electrical clearances and loading and strength requirements, including extreme wind. Codes and standards of other agencies and standards organizations that provide rules, guidelines, and conditions for particulars not specified by the NESC, were used to design the DR transmission line and include:

- Occupational Safety and Health Administration (OSHA) rules regarding safe minimum approach distances
- American Society of Civil Engineers (ASCE) Manual 74, Guidelines for Electrical Transmission Line Structural Loading, and Standard 48-05, Design of Steel Transmission Pole Structures
- American Concrete Institute Standards
- These codes, guidelines, and standards provide design parameters and guidelines with the goal of protecting public safety.

TABLES

Table 9.3.7-1: Non-listed Wildlife Species Observed or Likely to Occur Within the Project Area

Common Name	Scientific Name	Habitat Observed
Black-and-white warbler	<i>Mniotilta varia</i>	Utilities (FLUCFCS 830)
Blue-gray gnatcatcher	<i>Polioptila caerulea</i>	Utilities (FLUCFCS 830)
Blue jay	<i>Cyanocitta cristata</i>	Utilities (FLUCFCS 830)
Carolina chickadee	<i>Poecile carolinensis</i>	Utilities (FLUCFCS 830)
Carolina wren	<i>Thryothorus ludovicianus</i>	Utilities (FLUCFCS 830)
Downy woodpecker	<i>Picoides pubescens</i>	Utilities (FLUCFCS 830)
Eastern bluebird	<i>Sialia sialis</i>	Utilities (FLUCFCS 830)
Feral hog	<i>Sus scrofa</i>	Mixed Hardwood-Conifer (FLUCFCS 434) and Utilities (FLUCFCS 830)
Nanday parakeet	<i>Aratinga nenday</i>	Utilities (FLUCFCS 830)
Nine-banded armadillo		Utilities (FLUCFCS 830)
Northern cardinal	<i>Cardinalis cardinalis</i>	Utilities (FLUCFCS 830)
Palm warbler	<i>Setophaga palmarum</i>	Utilities (FLUCFCS 830)
Pine warbler	<i>Setophaga pinus</i>	Utilities (FLUCFCS 830)
Red-bellied woodpecker	<i>Melanerpes carolinus</i>	Utilities (FLUCFCS 830)
Ruby-crowned kinglet	<i>Regulus calendula</i>	Utilities (FLUCFCS 830)
Tufted titmouse	<i>Baeolophus bicolor</i>	Utilities (FLUCFCS 830)
Yellow-rumped warbler	<i>Setophaga coronata</i>	Utilities (FLUCFCS 830)
Yellow-throated warbler	<i>Setophaga dominica</i>	Utilities (FLUCFCS 830)

Notes: Habitat classification based on Florida Land Use, Cover, and Forms Classification System (Florida Department of Transportation, 1999).

Table 9.3.7-2: FNAI Listed Plant and Wildlife Species in Pasco County

	Common Name	Scientific Name	Federal Status	State Status	Likelihood of Occurrence within Project Area
Plants	Auricled Spleenwort	<i>Asplenium erosum</i>	N	E	None
	Britton's Beargrass	<i>Nolina brittoniana</i>	E	E	Low
	Celestial Lily	<i>Nemastylis floridana</i>	N	E	None
	Hand Fern	<i>Ophioglossum palmatum</i>	N	E	None
	Narrowleaf Naiad	<i>Najas filifolia</i>	N	T	None
	Plume Polypody	<i>Pecluma plumula</i>	N	E	Low
	Pondspice	<i>Litsea aestivalis</i>	N	E	None
	Pygmy Pipes	<i>Monotropis reynoldsiae</i>	N	E	Low
	Sand Butterfly Pea	<i>Centrosema arenicola</i>	N	E	Low
	Sinkhole Fern	<i>Blechnum occidentale</i>	N	E	None
	Tampa Vervain	<i>Glandularia tampensis</i>	N	E	Low
Reptiles	Eastern Indigo Snake	<i>Drymarchon corais couperi</i>	T	FT	Low
	Florida Pine Snake	<i>Pituophis melanoleucus mugitis</i>	N	ST	Low
	Gopher Tortoise	<i>Gopherus polyphemus</i>	C	ST	Present
	Green Sea Turtle	<i>Chelonia mydas</i>	T	FT	None
	Kemp's Ridley Sea Turtle	<i>Lepidochelys kempii</i>	E	FE	None
	Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	E	FE	None
	Loggerhead Sea Turtle	<i>Caretta caretta</i>	T	FT	None
	Short-tailed Snake	<i>Lampropeltis extenuata</i>	N	ST	Low
Mammals	Sherman's Fox Squirrel	<i>Sciurus niger shermani</i>	N	SSC	Low
	West Indian Manatee	<i>Trichechus manatus</i>	T	FE	None
Birds	American Oystercatcher	<i>Haematopus palliatus</i>	N	ST	None
	Black Skimmer	<i>Rynchops niger</i>	N	ST	None
	Florida Burrowing Owl	<i>Athene cunicularia floridana</i>	N	ST	Low
	Florida Sandhill Crane	<i>Antigone canadensis pratensis</i>	N	ST	Low
	Florida Scrub-Jay	<i>Aphelocoma coerulescens</i>	T	FT	None
	Least Tern	<i>Sternula antillarum</i>	N	ST	None
	Little Blue Heron	<i>Egretta caerulea</i>	N	ST	None
	Marian's Marsh Wren	<i>Cistothorus palustris marianae</i>	N	ST	None
	Piping Plover	<i>Charadrius melodus</i>	T	FT	None
	Roseate Spoonbill	<i>Platalea ajaja</i>	N	ST	None
	Scott's Seaside Sparrow	<i>Ammodramus maritimus peninsulae</i>	N	ST	None
	Southeastern American Kestrel	<i>Falco sparverius paulus</i>	N	ST	Low
	Tri-colored Heron	<i>Egretta tricolor</i>	N	ST	None
	Wood Stork	<i>Mycteria americana</i>	T	FT	None

Federal Status Codes:

C – Candidate for federal listing
 E – Endangered
 N – Not Listed on the federal level
 T – Threatened

State Status Codes:

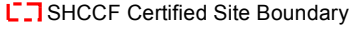
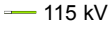
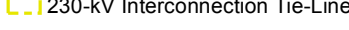
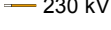
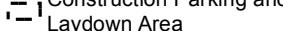
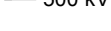
FE – Listed as Endangered on the federal level
 FT – Listed as Threatened on the federal level
 SSC – State species of special concern
 ST – State population listed as Threatened

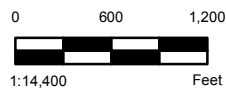


FIGURES



LEGEND

- | | |
|---|---|
|  SHCCF Project |  Existing Transmission |
|  SHCCF Certified Site Boundary |  115 kV |
|  230-kV Interconnection Tie-Line |  230 kV |
|  Construction Parking and Laydown Area |  500 kV |
|  Parcel Boundary | |



REFERENCE(S)

CERTIFIED SITE BOUNDARY, PROPOSED LAYDOWN AREA POWER ENGINEERS, 2018
PARCEL BOUNDARY, PASCO COUNTY, 2017

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE

**SHCCF 230kV INTERCONNECTION TIE-LINE
LOCATION MAP**

CONSULTANT



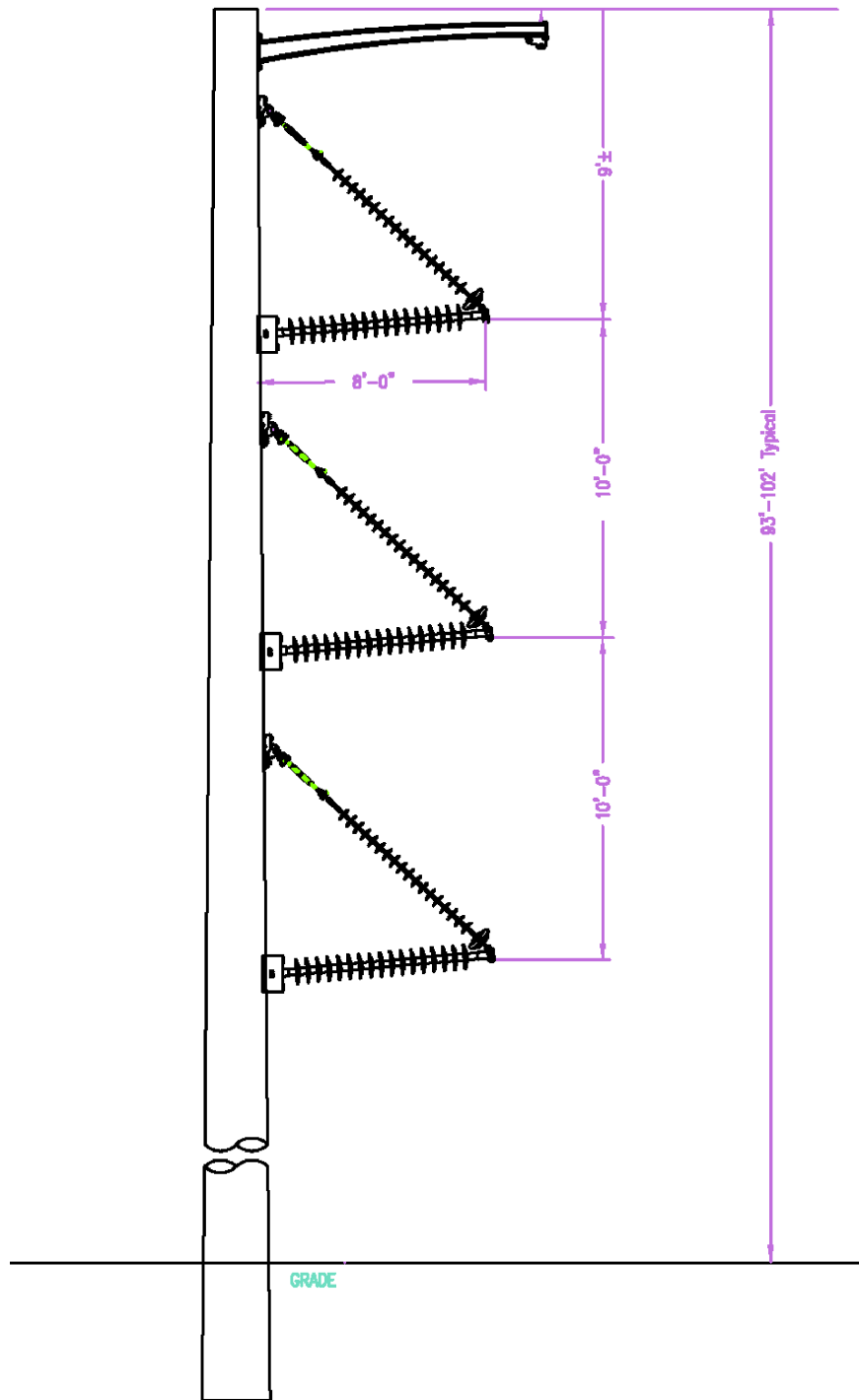
YYYY-MM-DD	2018-02-15
DESIGNED	NRL
PREPARED	NRL
REVIEWED	RAZ
APPROVED	MM

PROJECT NO.
1779520

CONTROL
H028

REV.
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FIGURE
9.1-1



NOTE(S)

THIS DRAWING WAS PREPARED BY POWER ENGINEERS, INC. FOR A SPECIFIC PROJECT, TAKING INTO CONSIDERATION THE SPECIFIC AND UNIQUE REQUIREMENTS OF THE PROJECT. REUSE OF THIS DRAWING OR ANY INFORMATION CONTAINED IN THIS DRAWING FOR ANY PURPOSE IS PROHIBITED UNLESS WRITTEN PERMISSION FROM BOTH POWER AND POWER'S CLIENT IS GRANTED.

REFERENCE(S)

230KV TANGENT STRUCTURE CONCEPTUAL DESIGN, POWER ENGINEERS, DRAWING NO. SK-1, REV 0, DATED 12/28/17

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE

TYPICAL 230KV TANGENT STRUCTURE CONCEPTUAL DESIGN

CONSULTANT



YYYY-MM-DD 2018-02-04

DESIGNED NRL

PREPARED NRL

REVIEWED RAZ

APPROVED MM

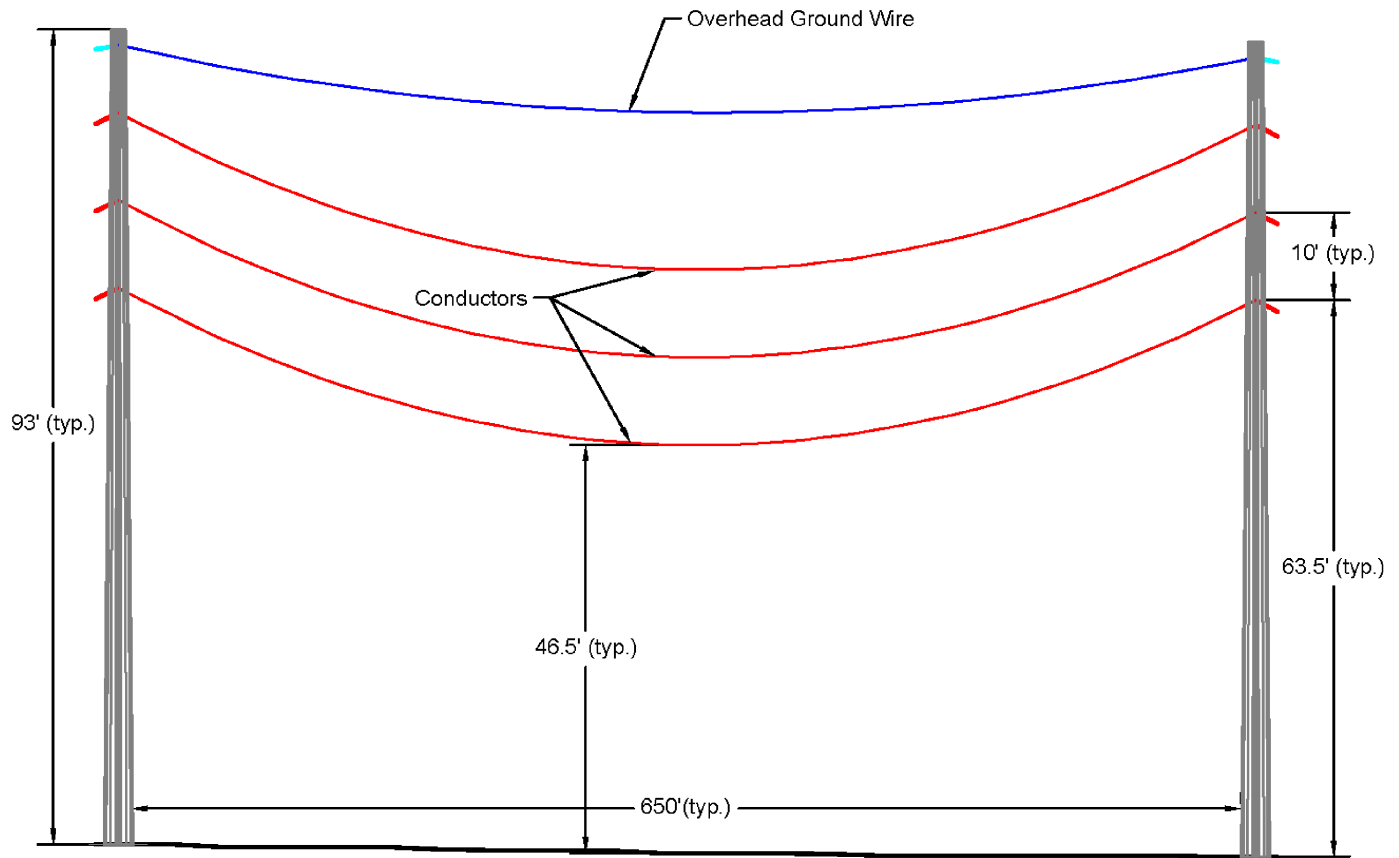
PROJECT NO.
1779520

CONTROL
H029

REV.
0

FIGURE
9.2-1

1" IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI/A



NOTE(S)

THIS DRAWING WAS PREPARED BY POWER ENGINEERS, INC. FOR A SPECIFIC PROJECT, TAKING INTO CONSIDERATION THE SPECIFIC AND UNIQUE REQUIREMENTS OF THE PROJECT. REUSE OF THIS DRAWING OR ANY INFORMATION CONTAINED IN THIS DRAWING FOR ANY PURPOSE IS PROHIBITED UNLESS WRITTEN PERMISSION FROM BOTH POWER AND POWER'S CLIENT IS GRANTED.

- 1) THIS PROFILE IS A CONCEPTUAL REPRESENTATION ONLY AND IS BASED ON A SPAN LENGTH OF 650' AND POLE HEIGHTS OF 93' ABOVE GRADE. SPAN LENGTHS AND STRUCTURE HEIGHTS MAY VARY ONCE FINAL SURVEY INFORMATION IS PROVIDED FOR DESIGN.
- 2) THE CONDUCTOR BEING USED FOR THE CONCEPTUAL DESIGN IS BUNDLED 795 KCMIL ACSR "DRAKE" CONDUCTOR. ACTUAL CONDUCTOR USED FOR THE FINAL DESIGN MAY VARY.
- 3) THE CONDUCTOR IS SHOWN AT MAXIMUM CONDUCTOR DESIGN TEMPERATURE AND THE OVERHEAD GROUND WIRE IS SHOWN AT AN EVERYDAY

REFERENCE(S)

CONDUCTOR PROFILE 650-FT SPAN AND 93-FT POLE HEIGHTS ABOVE GRADE, POWER ENGINEERS, DRAWING NO. SK-2, REV 0, DATED 12/28/17

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE

TYPICAL CONDUCTOR PROFILE

CONSULTANT



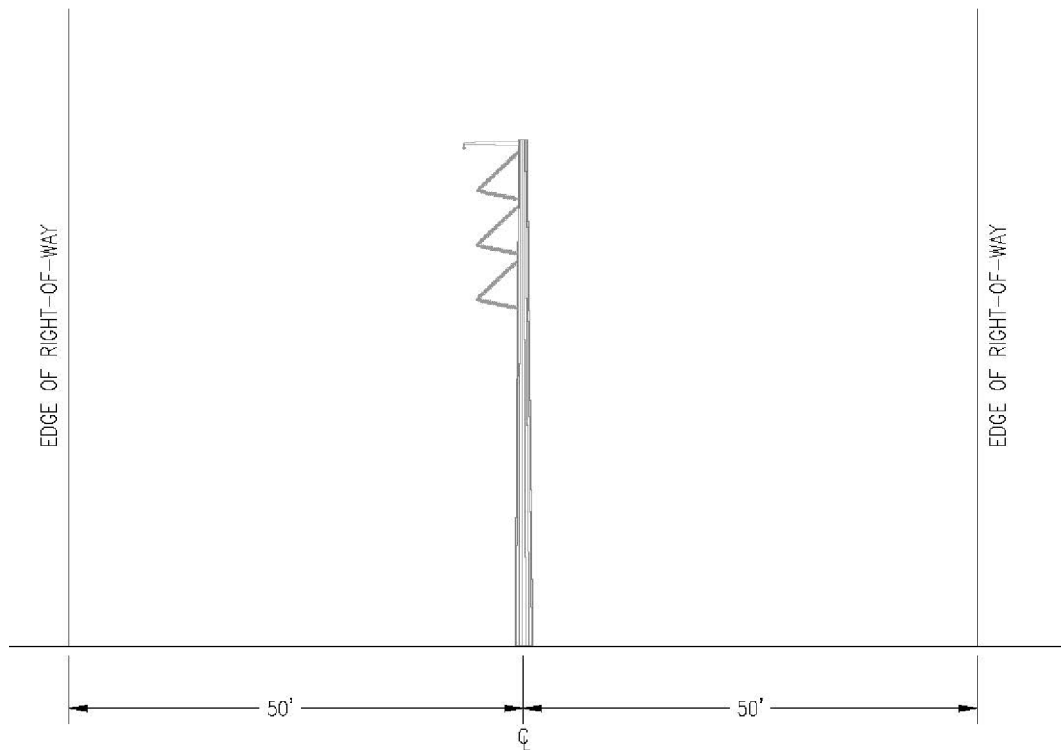
YYYY-MM-DD	2018-02-04
DESIGNED	NRL
PREPARED	NRL
REVIEWED	RAZ
APPROVED	MM

PROJECT NO.
1779520

CONTROL
H030

REV.
0

FIGURE
9.2-2



LOOKING WEST FROM SHADY HILLS POWER PLANT
PROPOSED 230KV TANGENT STRUCTURE

NOTE(S)

THIS DRAWING WAS PREPARED BY POWER ENGINEERS, INC. FOR A SPECIFIC PROJECT, TAKING INTO CONSIDERATION THE SPECIFIC AND UNIQUE REQUIREMENTS OF THE PROJECT. REUSE OF THIS DRAWING OR ANY INFORMATION CONTAINED IN THIS DRAWING FOR ANY PURPOSE IS PROHIBITED UNLESS WRITTEN PERMISSION FROM BOTH POWER AND POWER'S CLIENT IS GRANTED.

1) THIS CROSS SECTION IS A CONCEPTUAL REPRESENTATION ONLY AND IS BASED ON A 100' WIDE RIGHT-OF-WAY. ACTUAL RIGHT-OF-WAY WIDTH MAY CHANGE BASED ON THE FINAL DESIGN REQUIREMENTS.

REFERENCE(S)

TYPICAL CROSS SECTION 200-FT WIDE RIGHT-OF-WAY CONCEPTUAL DESIGN, POWER ENGINEERS, DRAWING NO. SK-3, REV 0, DATED 12/28/17

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE

**TYPICAL CROSS SECTION
 200-FT WIDE RIGHT-OF-WAY**

CONSULTANT



YYYY-MM-DD	2018-02-04
DESIGNED	NRL
PREPARED	NRL
REVIEWED	RAZ
APPROVED	MM

PROJECT NO.
1779520

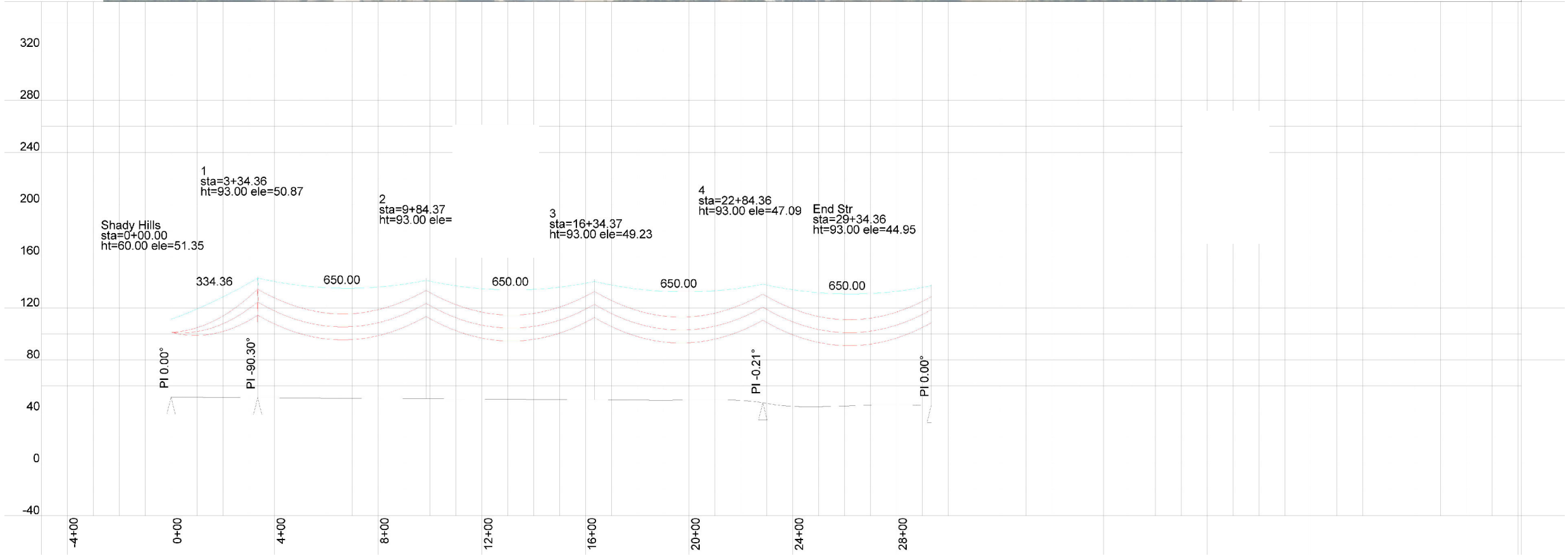
CONTROL
H031

REV.
0

FIGURE
9.2-3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A 11in

G:\PROJECTS\SGE_Energy_Systems\Shady_Hills\99_PROJECTS\1779520_Permits_Support\H1_SCA02_PRODUCTION\MXD\1779520_H041_TypDrawPlanView.mxd



LEGEND

200.0 ft. Horiz. Scale
40.0 ft. Vert. Scale

REFERENCE(S)
TYPICAL PLAN VIEW, POWER ENGINEERS, DRAWING NO. SK-4, REV 0, DATED 2/9/18

NOTE(S)
THIS DRAWING WAS PREPARED BY POWER ENGINEERS, INC. FOR A SPECIFIC PROJECT, TAKING INTO CONSIDERATION THE SPECIFIC AND UNIQUE REQUIREMENTS OF THE PROJECT. REUSE OF THIS DRAWING OR ANY INFORMATION CONTAINED IN THIS DRAWING FOR ANY PURPOSE IS PROHIBITED UNLESS WRITTEN PERMISSION FROM BOTH POWER AND POWER'S CLIENT IS GRANTED.

PROJECT
SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

CLIENT
SHADY HILLS ENERGY CENTER, LLC

CONSULTANT	YYYY-MM-DD	2018-02-15
	DESIGNED	NRL
	PREPARED	NRL
	REVIEWED	RAZ
	APPROVED	MM

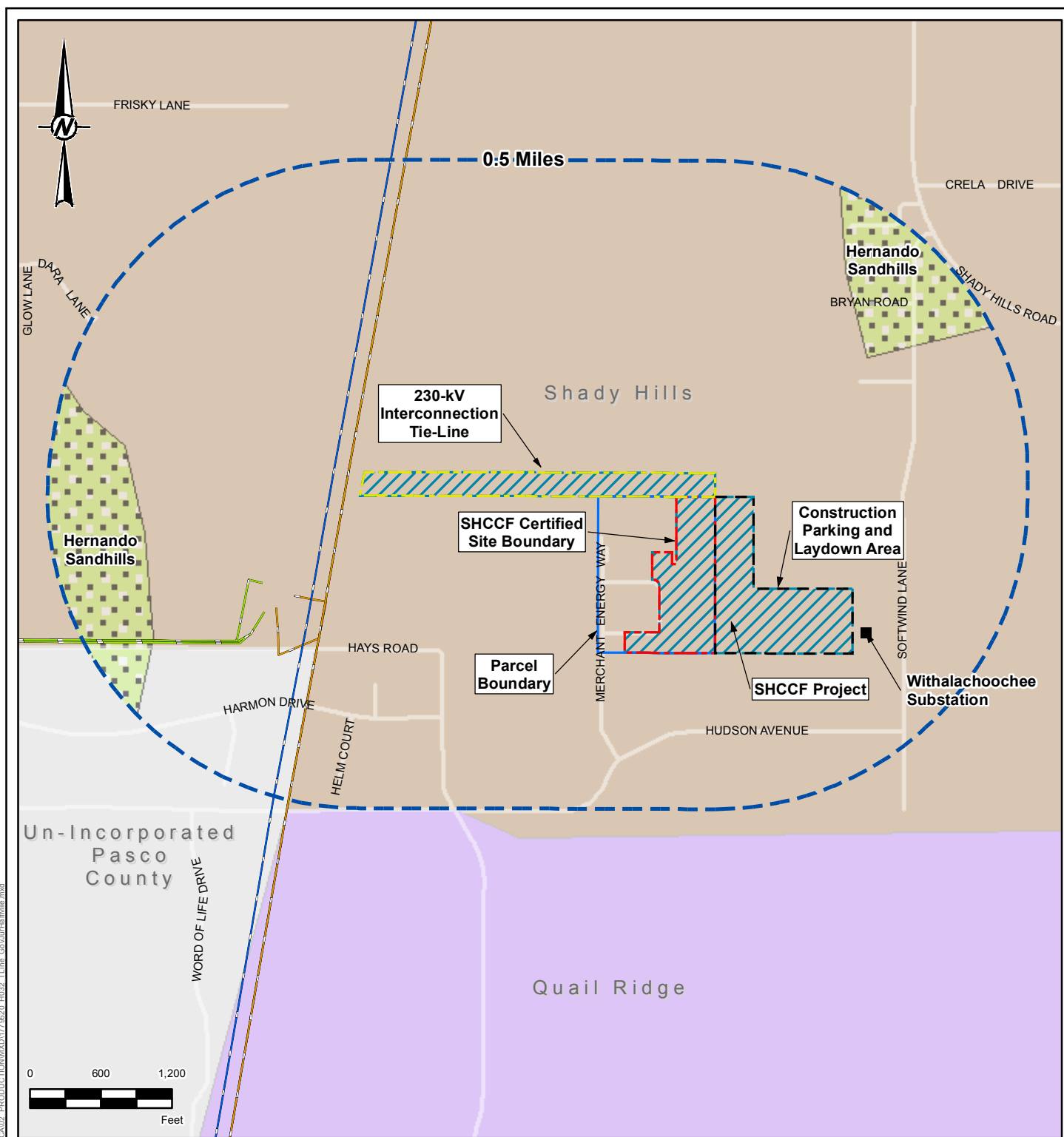


TITLE
TYPICAL PLAN VIEW

PROJECT NO. 1779520	CONTROL H041	REV. 0	FIGURE 9.2.4
------------------------	-----------------	-----------	-----------------

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

1 in



LEGEND

Ecological Planning Units (County)

Construction Parking and Laydown Area

230-kV Interconnection Tie-Line

SHCCF Certified Site Boundary

Parcel Boundary

SHCCF Project

Existing Transmission

115 kV

230 kV

500 kV

Census Designated Places

Quail Ridge

Shady Hills

Un-Incorporated Pasco County

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE

GOVERNMENTAL JURISDICTIONS WITHIN 1/2 MILE OF THE SHCCF 230kV INTERCONNECTION TIE-LINE

CONSULTANT

YYYY-MM-DD 2018-02-15

DESIGNED NRL

PREPARED NRL

REVIEWED RAZ

APPROVED MM



REFERENCE(S)

CERTIFIED SITE BOUNDARY, LAYDOWN AREA POWER ENGINEERS, 2018
PARCEL BOUNDARY, PASCO COUNTY, 2017
ENVIRONMENTAL PLANNING UNITS, PASCO COUNTY, 2017

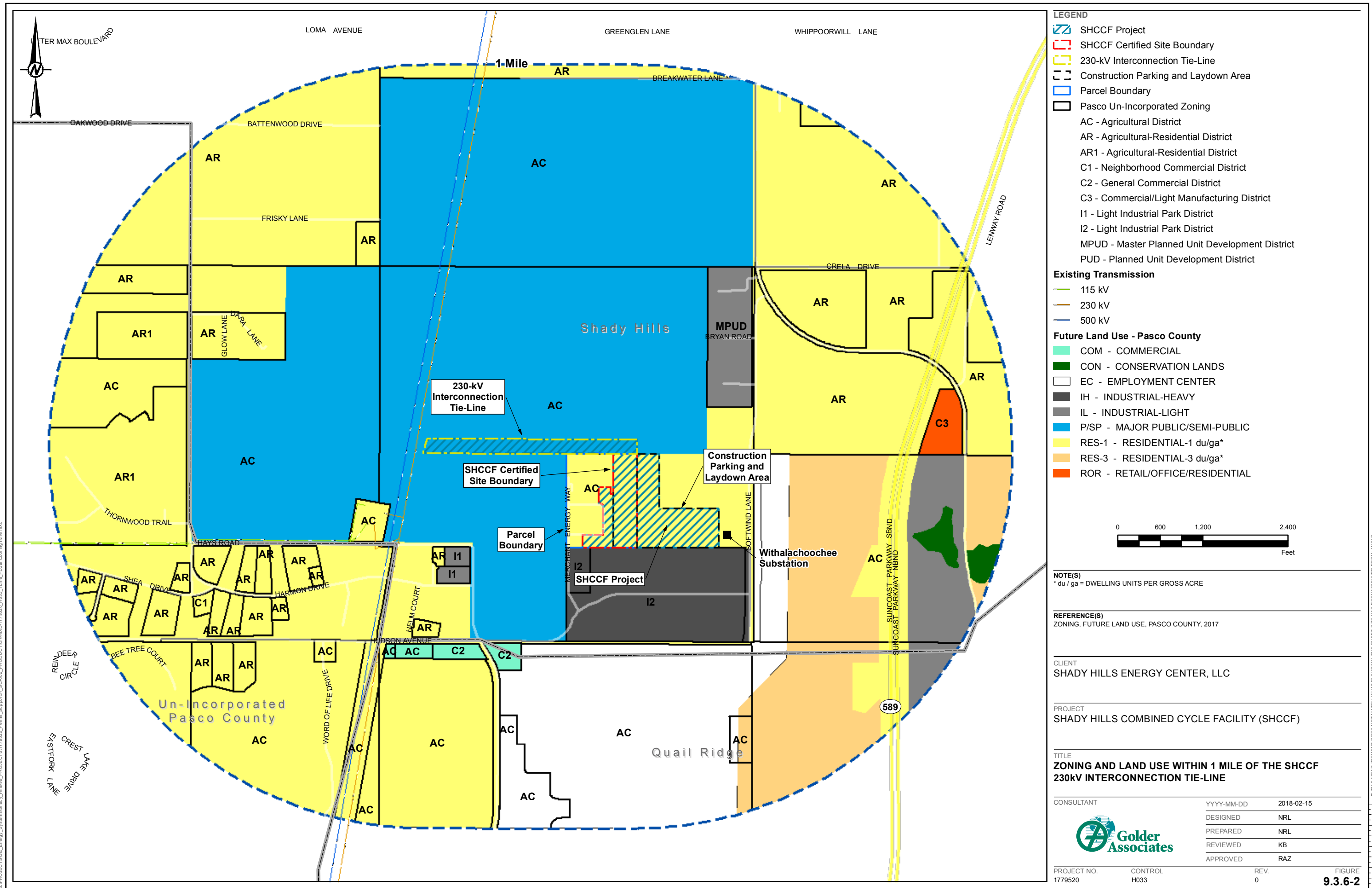
PROJECT NO.
1779520

CONTROL
H032

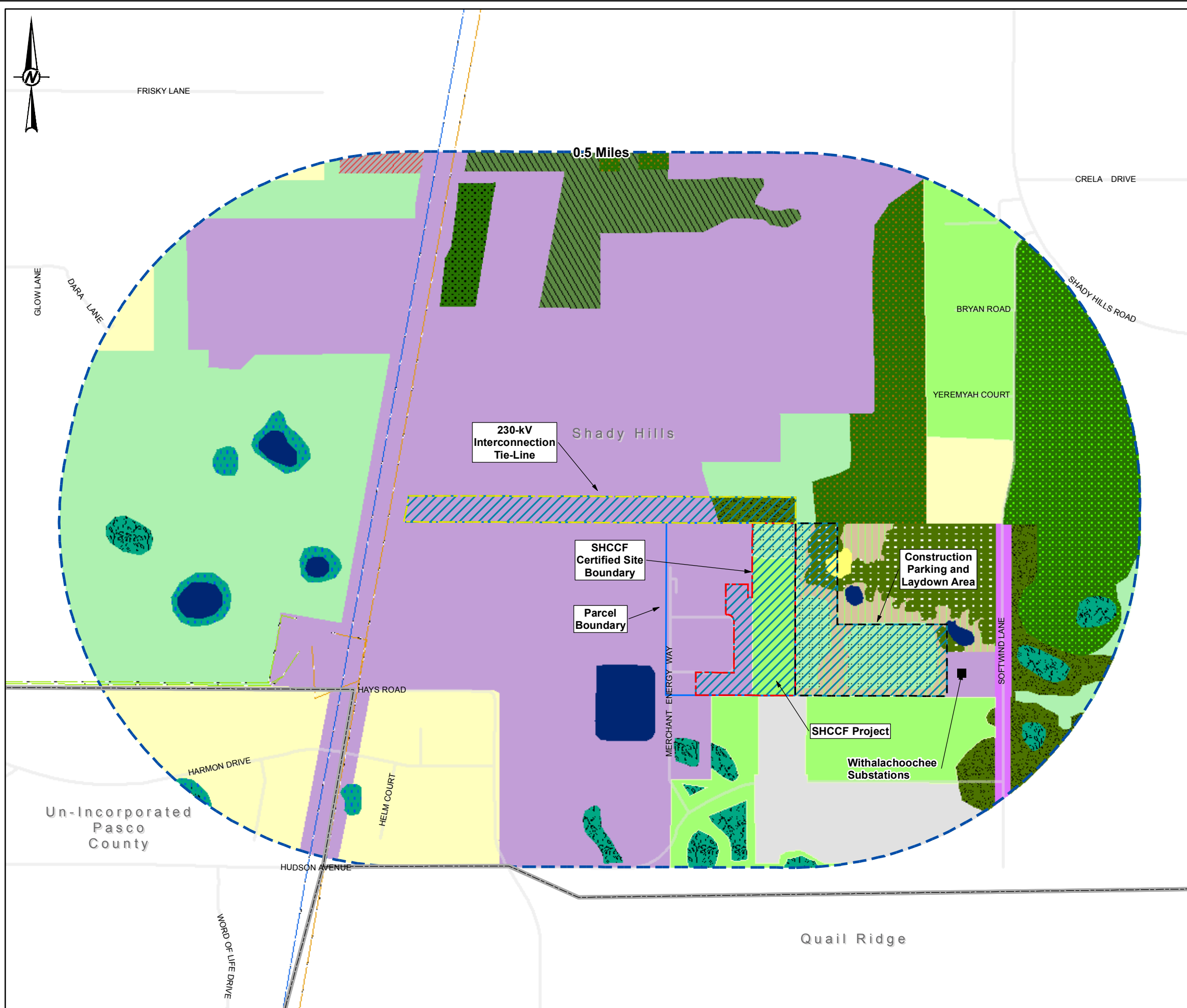
REV.
0

FIGURE
9.3.6-1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A 11in



G:\PROJECTS\GE_Energy_Systems\Shady_Hills\03_Permits\Supp\H1_SCA03_PRODUCTION\MXD\1779520_H034_T-Line_LandUse\H034.mxd



LEGEND

- SHCCF Project
- SHCCF Certified Site Boundary
- Construction Parking and Laydown Area
- 230-kV Interconnection Tie-Line
- Parcel Boundary
- Census Designated Places
- Existing Transmission**
 - 115 kV
 - 230 kV
 - 500 kV
- Existing Land Use (FLUCCS Level III)**
 - Residential Low Density
 - Low Density Single Family
 - Industrial
 - Open Land
 - Improved Pasture
 - Mixed Rangeland
 - Upland Coniferous Forest
 - Pine Flatwoods
 - Longleaf Pine - Xeric Oak
 - Live Oak
 - Hardwood - Conifer Mixed
 - Plantations
 - Coniferous Plantations
 - Reservoirs
 - Freshwater Marshes
 - Wet Prairies
 - Disturbed Land
 - Transportation
 - Utilities

NOTE(S)

N/A

REFERENCE(S)

LAND USE (FLUCCS LEVEL III), SWFWMD AND GOLDER ASSOCIATES, 2011 - 2017

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE

EXISTING LAND USE WITHIN 1/2 MILE OF THE SHCCF 230KV INTERCONNECTION TIE-LINE

CONSULTANT	YYYY-MM-DD	2018-02-15
	DESIGNED	NRL
	PREPARED	NRL
	REVIEWED	KB
	APPROVED	RAZ

PROJECT NO.	CONTROL	REV.	FIGURE
1779520	H034	0	9.3.7-1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND

- ▬ SHCCF Project
- ▬ SHCCF Certified Site Boundary
- ▬ 230-kV Interconnection Tie-Line
- ▬ Construction Parking and Laydown Area
- ▬ Parcel Boundary

Existing Transmission

- ▬ 115 kV
- ▬ 230 kV
- ▬ 500 kV

Element Occurrences (2014)

- Animals
- ⊕ Point Indicates General Vicinity of Element

REFERENCE(S)

CERTIFIED SITE BOUNDARY, PROPOSED LAYDOWN AREA POWER ENGINEERS, 2018
 PARCEL BOUNDARY, PASCO COUNTY, 2017
 ELEMENT OCCURRENCES, FNAI, 2014

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY (SHCCF)

TITLE

THREATENED AND ENDANGERED SPECIES WITHIN 1/4 MILE OF THE SHCCF 230 kV INTERCONNECTION TIE-LINE

CONSULTANT



YYYY-MM-DD	2018-02-15
DESIGNED	NRL
PREPARED	NRL
REVIEWED	RAZ
APPROVED	MM

PROJECT NO.
1779520

CONTROL
H035

REV.
0

FIGURE
9.3.7-3

Florida Department of Environmental Protection

Twin Tower Office Bldg * 2600 Blair Stone Road * Tallahassee, Florida 32399-2400

Report on Compliance with Electric and Magnetic Field (EMF) Standards

Agent/Facility Information

SHADY HILLS POWER PLANT 230KV

Name of Transmission Line/Interest Point

GENERAL ELECTRIC FINANCIAL SERVICES

Name and Address of Facility (Utility) Owner

Name and Address of Authorized Agent

January 31, 2018

Date of Proposed Construction

PEI

1060 Maitland Center Commons, Maitland, FL 32751

Name and Address of Professional Engineer

Signature of Authorized Agent

Date

Signature and Seal of Professional Engineer

Date

Field Strength Information

Transmission Lines

Cross Section	Right-of-Way (ROW) Width (ft)	Maximum Calculated Fields and Distance From ROW Left					
		Electric				Magnetic	
		Within ROW		At Edge of ROW		At Edge of ROW	
		(kV/m)	(ft)	(kV/m)	(ft)	(mG)	(ft)
PROPOSED 230 - 1 CKT	100	3.5	39	0.2	0	55.2	0

Substations

None

February 16, 2018
EzEmf (1.17)

EMF_Conceptual_Bundled795_1-Ckt-28ft.emf

Page 1

CLIENT
SHADY HILLS ENERGY CENTER, LLC

PROJECT
SHADY HILLS COMBINED CYCLE FACILITY
(SHCCF)

CONSULTANT



YYYY-MM-DD 2018-02-16

PREPARED NRL

DESIGNED NRL

REVIEWED RAZ

APPROVED MM

TITLE

REPORT ON EMF COMPLIANCE

PROJECT NO.
1779520

CONTROL
H042

REV.
0

FIGURE
9.5.5-1a

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

1 in

Florida Department of Environmental Protection

Twin Tower Office Bldg * 2600 Blair Stone Road * Tallahassee, Florida 32399-2400

Details for CrossSection: **PROPOSED 230 - 1 CKT- SHADY HILLS**

CKT 1

Circuit Name

230 kV

Rated Voltage

NEW CIRCUIT

New/Existing

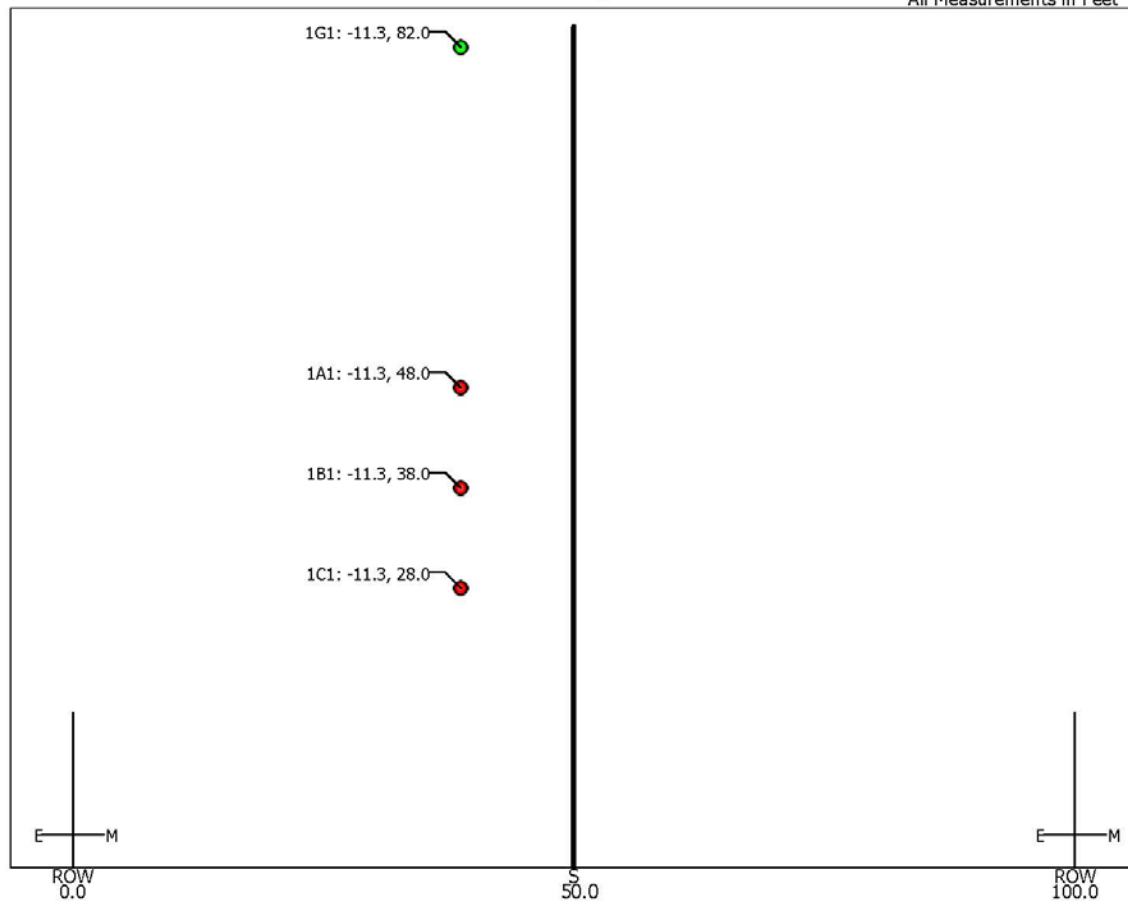
Id	Dist From Left ROW (ft)	Dist From Circuit CL (ft)	Minimum Height (ft)	SubConductors			Maximum Voltage (kV)	Angle (Degrees)	MCR (Amps)
				# of	Diameter (in)	Spacing (in)			
1A1	38.70	-11.30	48.00	2	1.11	18.00	241.0	0	1316
1B1	38.70	-11.30	38.00	2	1.11	18.00	241.0	120	1316
1C1	38.70	-11.30	28.00	2	1.11	18.00	241.0	240	1316
1G1	38.70	-11.30	82.00	1	0.36	0.00	0.0	0	0

Points of Interest

None

Phase Configuration

All Measurements in Feet



February 16, 2018
EzEmf (1.17)

EMF_Conceptual_Bundled795_1-Ckt-28ft.emf

Page 2

CLIENT

SHADY HILLS ENERGY CENTER, LLC

PROJECT

SHADY HILLS COMBINED CYCLE FACILITY
(SHCCF)

CONSULTANT



YYYY-MM-DD 2018-02-16

PREPARED NRL

DESIGNED NRL

REVIEWED RAZ

APPROVED MM

TITLE

REPORT ON EMF COMPLIANCE

PROJECT NO.

1779520

CONTROL

H042

REV.

0

FIGURE

9.5.5-1b

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

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