SITE CERTIFICATION APPLICATION
SEMINOLE GENERATING STATION UNIT 3
PALATKA, FLORIDA

VOLUME I OF III

SUBMITTED BY:

SEMINOLE ELECTRIC COOPERATIVE INC.
16313 NORTH DALE MABRY HIGHWAY
TAMPA, FLORIDA 33688

3/7/06

Scott Osbourn, P.E.
Professional Registered Engineer No. 57557

Golder Associates Inc.
5100 West Lemon Street, Suite 114
Tampa, Florida 33609

March 2006

SCOTT OSBOURN
LICENSE
NO. 57557
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

APPLICANT INFORMATION

Please supply the following information:

Applicant's Official Name **Seminole Electric Cooperative Inc**

Address **16313 North Dale Mabry Highway, Tampa, Florida 33688**

Address of Official Headquarters **16313 North Dale Mabry Highway, Tampa, Florida 33688**

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

Names, owners, etc. **Seminole Electric Cooperative Inc**

Name and Title of Chief Executive Officer **Richard Midulla**

Name, Address, and Phone Number of Official Representative responsible for obtaining certification:

James R. Frauen, 16313 North Dale Mabry Highway,

Tampa, Florida 33688, (813) 963-0994

Site Location (county) **Putnam County**

Nearest Incorporated City **Palatka**

Latitude **29° 42' 41"** **and Longitude** **81° 38' 14"**

Section, Township, Range **Sections 5, 6, 7, 8, 17, 18, Township 9S, Range 27E; Section 31, Township 8S, Range 27E; and Sections 1 and 12, Township 9S, Range 26E.**

Location of any directly associated transmission facilities (counties)

Not applicable

Existing Name Plate Generating Capacity **1,300-megawatts**

Capacity of Proposed Additions and Ultimate Site Capacity (where applicable)

Proposed 750-megawatt addition at certified SGS Site.

Remarks (additional information that will help identify the applicant):

Proposed addition of SGS Unit 3 at a previously certified site

(Site Certification No. PA 78-10)

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LIST OF ACRONYMS

bgs	below ground surface
BACT	Best Available Control Technology
Btu/hr	British thermal units per kilowatt hour
Btu/KWh	British thermal units per hour
CAA	Clean Air Act
$CaSO_3$	calcium sulfite
$CaSO_4$	calcium sulfate
CFB	circulating fluidized bed
CFR	Code of Federal Regulations
cfs	cubic feet per second
CO	carbon monoxide
CO_2	carbon dioxide
db	decibel
EA	Environmental Analysis
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESP	electrostatic precipitator
EUE	Equivalent Unserved Energy
°F	Degree Fahrenheit
FAA	Federal Aviation Authority
F.A.C.	Florida Administrative Code
FAS	Florida Aquifer System
FDACS	Florida Department of Agriculture and Consumer Affairs
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Association
FEPPSA	Florida Electric Power Plant Siting Act
FFWCC	Florida Fish and Wildlife Conservation Commission
FGD	Flue gas desulfurization
FLUCFCS	Florida Land Use, Cover and Forms Classification System
FNAI	Florida Natural Areas Inventory
fps	feet per second
F.S.	Florida Statute
ft	feet
gpd	gallons per day
gpm	gallons per minute
HAPs	Hazardous air pollutants
HRSG	Heat Recovery Steam Generator
IAS	Intermediate Aquifer System
IGCC	integrated coal gasification combined cycle
kg	kilograms
kV	kilovolt
lb/MMBtu	pounds per million British thermal unit
lb/MW-hr	pounds per megawatt hour
LFA	Lower Floridan Aquifer
LNB	low-NO_X burners

MAF	minimum absolute flow
mgd	million gallons per day
MWh	megawatt hour
msl	mean sea level
MW	megawatt
NEPA	National Environmental Policy Act
NGVD	national geodetic vertical datum
NO_X	Nitrous oxide
NPDES	National Polluant Discharge Elimination System
NSPS	New Source Performance Standards
OFA	over-fire air
PSC	Florida Public Service Commission
PSD	Prevention of significant deterioration
PUD	Planned Unit Development
RFP	Request for Proposal
RUS	Rural Utility Service
SAM	sulfuric acid mist
SAS	Surficial Aquifer System
SCA	Site Certification Application
SCR	Selective catalytic reduction
SEIS	Supplemental Environmental Impact Statement
SGS	Seminole Generating Station
SJRWMD	St. Johns River Water Management District
SO_2	sulfur dioxide
SO_3	Sulfur trioxide
TMDL	Total Maximum Daily Load
TPY	tons per year
UFA	Upper Florida Aquifer
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	Volatile organic compounds
WESP	wet electrostatic precipitator
WWTP	Wastewater Treatment Plant
ZLD	zero liquid discharge

March 7, 2006

Mr. Hamilton S. Oven
Siting Coordination Office
Florida Department of Environmental Protection
2600 Blair Stone Road, MS 48
Tallahassee, FL 32399-2400

Re: Seminole Electric Cooperative, Inc.
Power Plant Certification No. PA78-10
Seminole Generating Station, Unit 3
Putnam County, Florida

Dear Mr. Oven:

Seminole Electric Cooperative, Inc. (Seminole) is pleased to submit this Site Certification Application (SCA) for the proposed construction and operation of Unti 3 at the existing Seminole Generating Station (SGS) in Putnam County. Proposed SGS Unit 3 will use advanced supercritical pulverized coal technology, will be located proximate to Units 1 and 2 at the SGS Site, and will rely substantially on existing plant infrastructure at the SGS Site. The proposed addition of SGS Unit 3 is projected to increase the total electrical output capability from the SGS Site by almost 60 percent. Moreover, due to state of the art pollution control equipment proposed for Unit 3, combined with significant pollutant control and recycling/reuse retrofits and upgrades proposed for existing SGS Units 1 and 2, there will be several significant improvements in the SGS net environmental performance.

The original and four hard copies of the Unit 3 SCA are being submitted at this time, as well as fifteen compact disc (CD) copies. Also enclosed is a check in the amount of $200,000 for the application fee.

A petition to determine the need of SGS Unit 3 will be filed with the Public Service Commission by no later than March 10, 2006.

In addition, by copy of this letter Seminole is submitting the original and three copies of the Prevention of Significant Determination permit application to the Department of Environmental Protection's (Department's) Division of Air Resources Management. This PSD application also is included in the SCA.

Seminole looks forward to working with the Department, all affected agencies, Putnam County, and all stakeholders and parties to the certification hearing. If there are any questions or concerns concerning this project or this application, please call me at 1-800-321-6274 (x1213).

Sincerely,

James Frauen
Manager, Environmental Affairs

Seminole Electric Cooperative, Inc.

cc: Trina Vielhauer
Bureau Chief, Bureau of Air Regulation, DEP

EXECUTIVE SUMMARY OF THE APPLICATION

About Seminole

Seminole Electric Cooperative, Inc. (Seminole) is a generation and transmission cooperative that generates and transmits electric power for ten member cooperatives that provide electricity in 46 of Florida's 67 counties. Seminole was created in 1948 under the federal Rural Electrification Act of 1936 to serve Florida's electric cooperatives. Seminole and the network of electric cooperatives continue to serve Florida; currently they reliably and efficiently serve approximately 1.6 million individuals and businesses in two-thirds of the counties through the state.

The SGS Site

Seminole Generating Station (SGS) Units 1 and 2, in Putnam County, originally were approved under the Power Plant Siting Act (PPSA) by the Governor and Cabinet, sitting as the Siting Board, in 1979. Both coal-fired units were in commercial operation by the end of 1984. The air emission limitations originally applicable to Units 1 and 2 were based on a Best Available Control Technology (BACT) demonstration pursuant to the federal Clean Air Act Prevention of Significant Deterioration (PSD) program, and also Subpart Da of the federal New Source Performance Standards. Seminole has continued to undertake environmental improvements since the original certification in 1979. For example, in 2000, at Seminole's request, the SGS Conditions of Certification were modified to authorize Seminole to install an oxidation system that converts the output from the Flue Gas Desulfurization (FGD) air pollution control system to gypsum that is reused for wallboard manufacturing, thereby eliminating the disposal of hundreds of thousands of tons per year of solid waste. Since initial SGS construction and operation, Seminole has been a responsible corporate citizen and substantial contributor to the community in Putnam County.

Seminole's Recent Units 1 and 2 Pollutant Control Upgrade Application

In mid-February, 2006, Seminole filed with the Department a separate proposed modification to its existing SGS PPSA Conditions of Certification requesting approval to install several air pollution control upgrades and efficiency improvements on Units 1 and 2. The "upgrade application" was, and remains, a separate submittal that is being processed independently of this Unit 3 SCA so that Seminole can begin installation of air pollution control upgrades on Units 1 and 2 in the near future to meet upcoming requirements under new federal air regulations through emission reductions. Several features are being designed such that they can perform better than required under the new federal regulations. The new Units 1 and 2 air pollution control equipment can and will be operated in a manner that achieves air emission reductions that more that offset air emission increases of NOx, SO2, mercury and sulfuric acid mist otherwise caused by Unit 3. A short summary of selected features of the pending Units 1 and 2 "upgrade application" can be summarized as follows:

- Installation of low NOx burners and modified overfire air systems on Units 1 and 2, to meet an annual average emission limitation of 0.46 lb/mmBtu, as applicable in 2008 pursuant to Title IV of the federal Clean Air Act and corresponding state regulations.

- Installation of a state-of-the-art, urea-based selective catalytic reduction (SCR) control systems on Units 1 and 2, designed to be capable of achieving substantial nitrogen oxides (NOx) reductions (to 0.07 lb/mmBtu).

- Upgrades to the flue gas desulfurization (FGD) systems for Units 1 and 2 to achieve up to 95% post-combustion SO_2 removal efficiency.

- Substantial reductions in mercury emissions from Units 1 and 2 due to the combined effect of the new SCRs and FGD upgrades.

- An alkali injection air pollution control system for Units 1 and 2 to control for potential SO_3 formation by the new SCR systems.

- A carbon burnout (CBO) system to produce a final fly ash product that will have substantially lower carbon and ammonia levels, and therefore be suitable for beneficial reuse, while also recovering energy to improve the heat rate of Units 1 and 2.

<u>The SGS Unit 3 Project</u>

Seminole proposes in this SCA to integrate SGS Unit 3 into the existing, certified SGS Site located north of Palatka in Putnam County. SGS Unit 3 as proposed will be located near the existing SGS Units 1 and 2. Seminole anticipates beginning commercial operation of Unit 3 in 2012. The addition of SGS Unit 3 will increase the total output capability of the SGS by almost 60 percent while also, due to the pollution control features of Unit 3, in combination with significant pollution control upgrades to Units 1 and 2, result in several significant improvements in overall SGS environmental performance. The design of SGS Unit 3 will maximize the co-use of existing site facilities to the greatest extent possible.

SGS Unit 3 as proposed will feature advanced supercritical pulverized coal technology with state-of-the-art emission controls. The Unit 3 air pollution control equipment will include wet FGD for SO_2 removal, selective catalytic reduction (SCR) for control of nitrogen oxides (NOx), electrostatic precipitator (ESP) for collection and removal of fine particles, a wet ESP for control of sulfuric acid mist (SAM), and mercury removal through application of the above technologies. Fuel (coal and petroleum coke) for SGS Unit 3 will be delivered by an existing rail system. The existing SGS long-term coal storage area has adequate capacity for the addition of SGS Unit 3.

Under the Unit 3 SCA, most process wastewater streams from Units 1 and 2, as well as Unit 3, will be treated and recycled as make-up water to the FGD scrubber system. Wastewater from the existing Units and Unit 3 will be treated as necessary in a proposed zero liquid discharge (ZLD) system that will remove dissolved solids from the wastewater and maximize reuse. Upon initial operation of Unit 3, the only SGS industrial wastewater proposed to be discharged to the St. Johns River from Units 1, 2, and 3 will be cooling tower blowdown. As a result, there will be a substantial reduction in the mass loading of pollutants discharged into the lower St. Johns River. Also, due to the enhanced reuse of wastewater, Seminole is not requesting an increase in the existing PPSA limitations on SGS consumptive use of groundwater.

Net beneficial environmental impacts associated with Unit 3, in combination with the Units 1 and 2 "upgrade application" and additional retrofits, can be summarized as follows:

Air - - Substantial reductions in facility-wide SO_2, NOx, SAM, and mercury air emissions, and compliance with all applicable air quality requirements. The proposed urea-based (as opposed to ammonia) SCR system will result enhance community safety.

Water Quality - - Elimination of discharge streams will result in substantial reductions in mass loading of nutrients and several additional pollutants. A few mixing zones for cooling tower blowdown are required only on account of the concentration of river intake constituents. Several proposed mixing zones will be smaller than current mixing zones. Discharge of wastewater via groundwater percolation ponds will be eliminated.

Water Use - - The combined Units 1-3 surface water intake, as proposed, will meet consumptive use criteria, be lower than the applicability threshold of EPA's Phase II intake rules, and comply with EPA's Phase II intake rules. Enhanced on-site reuse will result in no need to increase current groundwater consumptive use limits.

Coal Combustion Product Reuse - - Reuse of FGD product, fly ash, and bottom ash will minimize solid waste disposal.

Land Use - - Seminole's proposed utilization of the existing SGS site and infrastructure is environmentally beneficial. In early January, 2006, Putnam County unanimously approved an Ordinance amending the previously approved SGS PUD designation to accommodate Unit 3.

As explained in the SCA, SGS Unit 3 also will have positive socioeconomic impacts in Putnam County and the region, through additional tax revenues and employment.

The NEPA Process

As explained in the SCA, the U.S. Department of Agriculture's (RUS) loan guarantee commitment triggers the requirement for review under the federal National Environmental Policy Act (NEPA). Because an environmental impact statement (EIS) was developed in conjunction with the original construction of Units 1 and 2, what is required at this juncture is preparation of a supplemental environmental assessment (EA) to facilitate development of a supplemental environmental impact statement (EIS). Accordingly, this SCA is submitted to RUS to satisfy the requirements of the supplemental EA process. Although there is substantial overlap in issues to be considered, some features of this submittal are included specifically in response to the respective requirements of the PPSA and NEPA.

1.0 NEED FOR POWER AND THE PROPOSED FACILITIES

1.1 Introduction

This section of the Site Certification Application (SCA) introduces the applicant, Seminole Electric Cooperative Inc. (Seminole), discusses the generating capacity needed to supply electricity to Seminole's customers beginning in 2012, and briefly describes the options identified by Seminole to meet that need.

1.2 The Applicant

Seminole is a generation and transmission cooperative that generates and transmits electricity to ten member distribution electric cooperatives (Members) in 46 of Florida's 67 counties. Seminole's Members, in turn, have individual end use customers who are members of the distribution electric cooperatives (member/customers). Seminole's ten Members serve approximately 1.6 million individuals and businesses (805,000 member/consumer meters) from the Florida panhandle to the southwest portion of the state (See Figure 1.2.0-1). Seminole currently serves its aggregate Member System electric load with a combination of Seminole-owned and purchased power resources.

The power supply resources owned by Seminole include two 650-megawatt (MW) class coal units at the Seminole Generating Station in Putnam County, Florida, and a 500-MW class dual-fueled combined cycle unit at the Payne Creek Generating Station in Hardee County, Florida, both operated by Seminole, and a 15-MW share (approximate) of the Crystal River Unit 3 Nuclear Power Plant located in Citrus County, Florida operated by Progress Energy Florida. Additionally, Seminole is constructing Payne Creek Units 4 through 8, five new aeroderivative Twin Pac combustion turbine peaking units (approximately 300 MW total) which will be located at Seminole's Payne Creek Generating Station. Seminole owns and operates 68 miles of double circuit 230 kilovolts (kV) and 134 miles of single circuit 230 (kV) transmission lines which interconnect its generation resources to the bulk electric system at several locations to electrical transmission systems owned by Florida Power & Light Company (FPL), Progress Energy Florida (Progress Energy), Ocala Electric Utilities, Tampa Electric, and JEA. Seminole also owns 140 miles of 69-kV transmission lines that interconnect its Member distribution delivery points to the transmission systems of Progress Energy and FPL.

Seminole also serves its Member System requirements through purchased power agreements. As of the end of 2005, Seminole had purchased power contracts with three renewable energy providers, three independent power producers, two investor owned electric utilities and one municipal electric utility. Seminole also had agreements to purchase excess capacity from load management generation from its Members. While some of these purchased power contracts are scheduled to expire in the future, as of the end of 2005 Seminole had over 3000 MW of capacity under contract available to meet Member System requirements.

1.3 The Project

Seminole has determined that the best alternative to meet the needs of its Member Systems and their member/consumers in 2012 and beyond is a modern, self-build, supercritical pulverized coal electrical generating unit equipped with state of the art emission control systems. The new coal unit would be constructed at Seminole's existing Seminole Generating Station (SGS) in Putnam County and would be designated as SGS Unit 3. The Unit 3 Project is identified in Seminole's Ten Year Power Plant Site Plan 2005-2014 (Seminole, 2005). The addition of SGS Unit 3 will enhance reliability, maintain a diverse generation portfolio, allow Seminole to provide adequate electricity at a reasonable cost and allow Seminole's Member Systems to offer competitive and stable prices for electric service.

Seminole will submit to the Florida Public Service Commission (PSC), on or about March 10, 2006, a Petition to Determine Need, pursuant to Section 403.519, Florida Statutes (F.S.). Section 1.5 of this document contains a summary of Seminole's capacity requirements, and its request for proposal (RFP) process and fuel diversity considerations.

1.3.1 Project Overview

Seminole intends to integrate SGS Unit 3 into the existing, certified SGS Site located north of Palatka, Putnam County, Florida (Figure 1.3.0-1). SGS Unit 3 will use advanced supercritical pulverized coal technology and will be located proximate to the existing SGS Units 1 and 2. Seminole anticipates Unit 3 will begin commercial operation in May 2012. The addition of SGS Unit 3 will increase the total output capability of the SGS by almost 60 percent and also, combined with significant upgrades to Units 1 and 2, produce several significant improvements in overall SGS environmental performance.

SGS is a 1,922-acre site that contains two existing 650 MW (net) coal electric generating units (Units 1 and 2). Both Units 1 and 2 are coal-fired and also are permitted to burn up to a 30 percent petroleum coke (petcoke) to coal blend. The SGS Site contains all facilities for the operation of the existing units, including coal unloading and storage facilities, pollution control equipment, and solid waste disposal areas. Both units are equipped with electrostatic precipitators and wet flue gas desulfurization (FGD) systems for particulate and sulfur dioxide (SO_2) removal. The output from the FGD is readily converted into wallboard grade synthetic gypsum and transported to a wallboard manufacturing facility located on a parcel of land adjacent to the SGS. The design of SGS Unit 3 will maximize the co-use of existing site facilities to the greatest extent possible. Existing plant systems proposed for utilization with SGS Unit 3 include coal unloading and storage facilities, the coal pile runoff pond system, the process wastewater treatment system, surface water intake and discharge structures, the plant switchyard, the entrance road, the groundwater well system, the limestone storage system, solid waste disposal area, and the associated transmission lines.

SGS Unit 3 will use advanced supercritical pulverized coal technology with state-of-the-art emission controls. The air pollution control equipment will consist of wet FGD for SO_2 removal, selective catalytic reduction (SCR) for control of nitrogen oxides (NO_X), electrostatic precipitator (ESP) for collection and removal of fine particles, a wet ESP for control of sulfuric acid mist (SAM), and mercury removal through application of the above technologies. Fuel (coal and petroleum coke) for SGS Unit 3 will be delivered by rail. The long- term coal storage area has adequate capacity for the addition of SGS Unit 3.

A new mechanical draft cooling tower will be added to provide cooling of the Unit 3 condenser cooling water. Most process wastewater streams from Units 1 and 2, as well as Unit 3, will be treated and recycled as make-up water to the FGD scrubber system. Wastewater from the existing Units and Unit 3 (See Figure 3.5.0-1) will be treated as necessary in a new zero liquid discharge (ZLD) system that will remove dissolved solids from the wastewater to maximize reuse. The only SGS industrial wastewater proposed to be discharged to the St. Johns River from Units 1, 2, and 3 will be cooling tower blowdown. As a result, there will be a substantial reduction in the mass load of pollutants discharged into the lower St. Johns River.

All coal combustion products produced as a result of the SGS Unit 3 Project will be sold for reuse to the extent feasible, or disposed in the certified onsite landfill or an offsite permitted landfill.

The current stormwater collection and drainage system will be expanded as necessary to collect and treat stormwater runoff onsite generated as a result of the construction and operation of the SGS Unit 3 Project.

Seminole is not planning to construct additional offsite transmission lines in conjunction with SGS Unit 3, although there are plans for upgrades to certain onsite substation equipment, primarily 230 kV circuit breakers.

1.3.2 Purpose of the Site Certification Application/Environmental Analysis

The SGS site was initially certified pursuant to the Florida Electric Power Plant Siting Act in 1979 (Certification No. 78-10) and received an Environmental Impact Statement (EIS) from the Rural Electrification Administration in 1980 for two coal-fired steam-generating units with a total nominal generating capacity of 1,300 MW. Unit 1 began commercial operation in January 1984, and Unit 2 began commercial operation in December 1984.

The existing certified SGS site was selected as the preferred location for the SGS Unit 3 Project based on several considerations, including the benefits of utilizing a site previously certified for coal-fired power generation. This additional generation will represent an incremental increase in the overall power-generating capacity of the SGS Site from approximately 1,300-MW to over 2,050-MW. The existing SGS Site has adequate area to accommodate the Unit 3 Project. Locating SGS Unit 3 at the SGS Site takes advantage of the existing infrastructure and onsite facilities and avoids potential environmental impacts that might otherwise be associated with the construction of a coal unit at an undeveloped greenfield site.

The licensing of power plants in Florida requires compliance with federal, state, regional, and local laws, regulations, and ordinances. Two of the laws applicable to this project are the Florida Electrical Power Plant Siting Act (FEPPSA, 403.501-403.517-518, F.S.) and the National Environmental Policy Act (NEPA).

The FEPPSA establishes the state's policy toward balancing the needs for increased electrical power generation with the potential effects on human health, the environment, and the ecology of the lands and waters within the state. In the site certification process, the PSC is the exclusive forum for the determination of need, and the Florida Department of Environmental Protection (FDEP) acts as the central coordinator of the certification process. Certification begins with the submittal of a Site Certification Application (SCA) to FDEP by the applicant and culminates with a final decision by the Governor and Cabinet. Implementation procedures are set forth in FEPPSA and Chapter 62-17, Florida Administrative Code (F.A.C.), Electrical Power Plant Siting.

NEPA establishes policy, sets goals, and provides means for carrying out environmental policy through a systematic interdisciplinary decision making process associated with major federal actions. The U.S. Environmental Protection Agency (EPA) has promulgated regulations [40 Code of Federal Regulations (CFR) 1500] to guide federal agencies in complying with the procedures and achieving the goals of NEPA. In meeting its responsibilities under NEPA and EPA regulations, the U.S. Department of Agriculture's Rural Utilities Service (RUS) has determined that its loan guarantee commitments to electric cooperatives for power generation "are major federal actions significantly affecting the quality of the human environment." Therefore, these commitments are subject to NEPA. RUS typically requires a borrower to prepare an environmental analysis (EA) document prior to RUS preparing its own environmental impact statement (EIS). RUS' environmental policies and procedures are presented in 7 CFR 1794. Since Seminole is seeking financing for the SGS Unit 3 Project from RUS, this Project is subject to NEPA. Because an EA and EIS previously were prepared for the SGS and since SGS Unit 3 represents an incremental increase to the overall generating capacity of the SGS site, it has been determined by RUS that requirements under NEPA will be satisfied through the preparation of a Supplemental EA and Supplemental EIS for the proposed project.

This SCA/EA is being submitted to FDEP and RUS. It describes the SGS Unit 3 Project and the environmental conditions and impacts associated with the project. This SCA/EA has been prepared to meet the requirements of both the FEPPSA and NEPA. This SCA/EA follows the scope and specificity of information described in the Seminole SGS Unit 3 Plan of Study submitted to RUS (Golder, 2005).

Agency and public comments regarding the Unit 3 Project have been obtained through meetings, discussions, and presentations.

1.4 Seminole's Resource Planning Process

Seminole's primary planning goal is to develop the most cost-effective means of meeting its Member Systems' load requirements while maintaining a reliable and diverse power supply portfolio and also meeting all applicable environmental regulations. The power supply planning process is designed to assess the adequacy of existing resources to meet the Members Systems' future requirements, identify the most favorable type of resources to meet any projected need, and evaluate the economic, reliability, and risk impacts of all available power supply alternatives.

Seminole recognizes the value of diversity in its power supply portfolio. Seminole has served its aggregate Member System load with a combination of owned and purchased power resources. Owned and/or other long-term resources contribute stability to a power supply plan, while short-term purchase arrangements provide flexibility. Seminole believes that having diversity in its power supply plan has significant strategic value (i.e., maintaining reasonable rates while leaving Seminole in a good position to respond to market and industry changes).

Seminole maintains a corporate model that is updated whenever any of the key input assumptions change significantly (e.g., load forecast, fuel price forecast, capacity additions, termination of purchased capacity commitments, etc.). Seminole's load forecast captures the impact of all conservation and demand side management programs offered by Seminole's Members. Seminole's future capacity need in terms of MW deficiency is determined from each model update. Portfolio optimization analyses are conducted using a combination of spreadsheet techniques and modeling iterations to determine the target generation mix (i.e., base, intermediate, peaking).

Upon determining the types of generation resources needed to meet Member System needs, Seminole issues competitive capacity solicitations for purchased power alternatives in advance of each type of generation need (e.g., approximately seven years in advance for base load, four years for intermediate, and three years for peaking). Proposals submitted to Seminole are evaluated against Seminole self-build options to determine which options are the best, most cost-effective alternatives available to meet the needs of Seminole's Member Systems and their member/consumers.

Based upon these analyses, recommendations are then made by Seminole's Management to Seminole's Board of Directors. Each of Seminole's Members have two voting and one non-voting representatives on the Seminole Board, and ultimately, the choice of the resources to be used to meet Member System requirements is made by Seminole's Board.

1.5 Need for the Project

1.5.1 Power Requirements

Seminole's power supply planning process begins with the load forecast, which is produced every two years in accordance with RUS requirements. The load forecast study is conducted by Seminole in cooperation with its Members and results in a projection of energy sales and monthly peak demands for each Member System, the aggregation of which is Seminole's total energy needs and monthly system demand requirements. The forecast currently in effect was developed in 2005, was approved by the Seminole Board, and has been approved by the RUS. Both the current load forecast and the preceding load forecast were used in the analyses which led to the selection of SGS Unit 3. In both load forecasts the impacts of demand side management and conservation by Seminole's Members and their member/customers are reflected.

Historical growth in Seminole's peak demand over the past ten years has averaged 3.6 percent, and future growth over the next ten years is projected at 4.1 percent. These growth rates are among the highest in Florida. They are indicative of an expectation of continued growth of Florida's population and economy and growth potential in Seminole's Members' service territories.

1.5.2 Reliability Criteria

Seminole has established reliability criteria which primarily affect the amount of generating capacity needed in future years to meet the forecast load. Seminole has two reliability criteria: (1) a minimum reserve margin of 15 percent during the peak season, and (2) a 1 percent Equivalent Unserved Energy (EUE) limitation. Both the minimum reserve margin and the EUE criteria serve to ensure that Seminole has adequate generating capacity to provide reliable service to its Members and to limit Seminole's reliance upon interconnected neighboring systems for emergency reserve purchases.

1.5.3 Assessment of Capacity Need

There are two aspects of Seminole's assessment of capacity need. Each aspect is addressed in the following text.

First, Seminole determines the amount of generating capacity necessary to cover Seminole's system peak demand and achieve Seminole's minimum reliability criteria. This is determined by examining Seminole's load forecast and assessing the amount of generating resources necessary to meet not only forecast load but also the reliability criteria. Then, the minimum amount of capacity necessary to meet both the forecasted load and the reliability criteria is compared to the generation resources owned by Seminole and committed to Seminole by contract as firm capacity. The differential is the amount of capacity necessary to maintain reliability.

Second, Seminole determines the types of incremental capacity needed to meet reliability at the lowest cost. Seminole's power supply portfolio includes base load, intermediate load, and peaking resources. Just as adequate capacity is important for reliability purposes, a suitable resource mix by capacity type is important for cost effectiveness. The most appropriate combination of resource types is a function of the economics of each resource class, fuel prices, and the load curve. Determination of the most appropriate mix of resources is handled through optimization studies using a combination of spreadsheet analysis, graphical techniques, and production costing studies based on the most recent planning assumptions and market economics.

In its analyses leading up to the selection of SGS Unit 3 as the best, most cost-effective alternative available to meet the reliability and economic needs of Seminole's Members and their member/consumers, Seminole determined that it needed in excess of 1,200 MW by the summer of 2012 to meet its reliability criteria. This anticipated shortfall resulted from not only expected load growth, but also the scheduled expiration of a number of purchased power contracts. By 2014 the expected shortfall was projected to grow to over 4,000 MW.

Seminole's early analyses showed that as much as 600 MW of base load capacity will be needed in the 2009 through 2012 time frame. During the course of the analyses of various base load options, subsequent analyses showed that as much as 750 MW of the over 1,200 MW of capacity necessary to meet reliability criteria should be base load capacity by the year 2012.

System optimization analyses showing a need for as much as 750 MW of base load capacity also showed there might be a need for the addition of coal capacity. Sustained gas price increases for several prior years plus a forecast of high sustained gas prices and a significant differential in the price of gas versus coal suggested that coal generation would be the preferred base load technology.

Seminole's need assessment showed that (1) Seminole needed by the Summer of 2012 over 1,200 MW of capacity to meet its reliability criteria, (2) that as much as 750 MW of that capacity should be base load capacity for economic reasons, and (3) coal generation was likely a less costly technology than gas combined cycle generation.

1.5.4 Alternatives Considered

Because base load generation requires the longest lead times, Seminole undertook an evaluation of alternatives that could meet its base load capacity needs in the summer of 2012. Seminole began by assessing both its self-build options and purchased power options.

Seminole considered a number of self-build technologies, including gas combined cycle, pulverized coal, circulating fluidized bed (CFB), integrated coal gasification combined cycle (IGCC) and nuclear. After an initial assessment of technologies, Seminole concluded that the two most feasible technologies for a base load addition in 2012 were gas combined cycle and pulverized coal.

In that initial technology assessment, and as explained in Section 8, Seminole dropped CFB, IGCC and nuclear technologies from consideration for its most immediate base load need. Seminole viewed IGCC as a developing but not fully mature technology. Seminole deemed the economic and reliability risks of IGCC too high as a self-build alternative in the context of Seminole's current needs. Regarding CFB technology, Seminole concluded that CFB technology would not provide benefits or significant environmental emission advantages when compared to a pulverized coal base load project. Seminole was also interested in future nuclear capacity; however, the pace of licensing activity and industry commitments to new advanced nuclear units appeared to be unclear, making nuclear generation an impractical alternative for Seminole's 2012 base load capacity need (i.e., the earliest likely commercial date for new advanced nuclear units is in the 2016 time frame).

Having made an initial determination that pulverized coal and gas combined cycle options were Seminole's most promising base load technologies for self-build options, Seminole retained an outside engineering firm to develop appropriate cost estimates and to develop detailed feasibility studies. Seminole also charged the engineering firm with separately assessing the readiness of IGCC technology in commercial scale electric generation applications. An initial feasibility study of a 600 MW class pulverized coal unit and a gas combined cycle unit was provided to Seminole in August 2004 and was updated for a larger coal unit in February 2005. In addition, Seminole was already participating in a feasibility study of a potential jointly owned pulverized coal unit in which Seminole would own or purchase approximately 150 MW.

To assess market alternatives, Seminole issued an "all source" Request for Proposals (RFP) in April 2004, seeking proposals by September 2004. The RFP solicited proposals for up to 600 MW of firm base load capacity beginning as early as summer 2009, and was structured to allow bidders flexibility in the type of capacity and the contract term. The RFP was announced directly to almost 50 business contacts and publicly through an electronically distributed news release to various industry and general news publications. Even though Seminole had concluded that IGCC technology was too risky and CFB technology more expensive for its own 2012 self-build alternative, these technologies were still alternatives Seminole's would have considered in the form of a long term purchased power contract. Seminole did not limit the technologies which could be offered. If CFB or IGCC proposals had been offered in response to the RFP, Seminole would have sought performance guarantees and economic terms to mitigate the risks (e.g., risks related to technology, cost, reliability, timely completion, etc.). Ultimately, no bidder to Seminole's RFP offered CFB or IGCC technology. In fact, as described further below, the bids received were the same technologies that Seminole had selected as viable for 2012 (i.e., gas combined cycle and pulverized coal).

Seminole received fourteen proposals from five different entities. The bidders were independent power producers and investor-owned utilities. Base load and intermediate capacity were offered in amounts ranging from 100 MW to more than 750 MW for terms from 10 to 40 years. The offers included capacity from one existing unit and capacity from proposed pulverized coal and gas combined cycle units. The following table summarizes the responses received.

Summary of Offers Received					
Bidder	Type	No. of Offers	Capacity Type(Location)	MW	Term (Years)
Invenergy	IPP	2	New Pulverized Coal/New CC Unit (Florida)	520-650	20 or 30
LS Power	IPP	1	New Pulverized Coal (Georgia)	400-600	20 or 30
Pasco Cogen	IPP	2	Existing LM 6000 CC (Florida)	104-115	20
Peabody	IPP	1	New Pulverized Coal (Kentucky)	100-750	10-40
Southern	IOU	8	New CC (Florida)	493-635	20

1.5.5 <u>Evaluation of Alternatives</u>

Seminole evaluates power supply alternatives on the basis of economics, reliability, risk, and strategic impact. Following receipt of the bids, Seminole's staff performed an initial screening of the offers for completeness and responsiveness.

The initial economic screening, which evaluated not only the proposals received but also Seminole's pulverized coal and gas combined cycle options, was done using a spreadsheet analysis tool developed to calculate bus bar costs in dollars per megawatt hour (MWh) for each option, using a standard set of operational criteria under three different scenarios for each resource type. All options were evaluated at the 70 percent, 80 percent, and 90 percent capacity factor level. The analysis calculated total fixed costs, start charges, and total variable costs including fuel expense. In order to maintain equity in the comparison of different sized offers, the bid-to-bid comparisons (and associated rankings) were done on a dollars per MWh basis, calculated as a 20 year average, and on a nominal and present worth basis. The result of the this economic evaluation revealed a significant economic advantage of coal-based alternatives over gas-based alternatives, and further, that self-build alternatives for both coal and gas were significantly favorable relative to purchase alternatives resulting from the RFP process.

Based upon the results of its economic evaluation, Seminole decided not to pursue further any of the RFP proposals and to focus instead on self-build options. An updated assessment had showed that as much as 750 MW of base load capacity could be used on Seminole's system by 2012. Seminole requested its outside engineering firm to assess the feasibility of increasing the size of Seminole's self-build pulverized coal option from 600 MW to 750 MW. That option was found to be feasible and more economical than building a 600 MW coal unit and taking a 150 MW share in a joint coal unit. Seminole also performed a risk assessment of a gas generation strategy versus a coal generation strategy. Based upon these analyses, Seminole concluded that the addition of a 750 MW pulverized coal unit at its SGS Site, SGS Unit 3, was the best, most cost-effective alternative available to meet the 2012 base load capacity needs of Seminole, its Members and their member/consumers.

A subsequent economic analysis based upon updated economic assumptions showed that SGS Unit 3 continues to be Seminole's most cost-effective alternative to maintain system reliability and provide reasonably priced electricity. SGS Unit 3 also allows Seminole to avoid an undue reliance on natural gas generation.

Seminole's planning studies have demonstrated that the addition of a 750 MW pulverized coal unit at the Seminole Generating Station (SGS Unit 3) will be the best, most cost-effective alternative to meet the needs of Seminole, its Members and their member/consumers. It is the most economical alternative to meet Seminole's base load capacity needs in 2012 and beyond.

1.6 Benefits of the Project

The SGS Unit 3 Project provides three primary benefits to Seminole and its Member cooperatives, and the public. First, the addition of SGS Unit 3 provides needed generating capacity essential to maintaining system reliability. Second, the addition provides the most cost effective means of meeting the need for base load capacity, allowing the member cooperatives to provide reasonably priced electricity to their members/consumers. Third, the addition will help avoid an increasing reliance on natural gas generation.

1.6.1 Environmental Benefits

The Unit 3 Project also provides significant environmental benefits compared to new construction at a greenfield site, since SGS Unit 3 will be integrated into the SGS Site and can be served by much of the existing plant infrastructure. This is particularly relevant in light of Seminole's recent application to undertake significant pollution control upgrades and efficiency improvements to Units 1 and 2. Environmental impacts associated with the addition of SGS Unit 3 will be minimized based on the following:

- The new unit will be located within an existing power plant site;
- No new off-site transmission line or substation facilities will be required;
- Impacts to onsite wetland communities will be minimal;
- The new unit will utilize advanced supercritical boiler technology;
- The new unit will be designed and constructed with state of the art pollution control technologies;
- The station will be equipped with a ZLD system to service the new and existing units and to eliminate discharge of process wastewater, except for cooling tower blowdown, to the St. Johns River; and
- As mentioned above, the installation of Unit 3 will coincide with significant environmental retrofits to Units 1 and 2, resulting in a net decrease in total air emissions of NO_X, SO_2, SAM, and mercury.

Where feasible, the capabilities of the existing Unit 1 and 2 common plant facilities and infrastructure will be used to also serve Unit 3, including: the administration buildings, the rail system, access roads and entrances, coal unloading and handling systems, lined coal storage area, wastewater handling systems, water supply wells, intake and discharge facilities on the St. Johns River, and coal combustion management areas.

1.6.2 Other Benefits

The Unit 3 Project also provides significant positive economic benefits including millions of dollars in property tax revenues for Putnam County over the life of the project, along with increased employment and local expenditures for equipment and services during construction and operation of the new unit. More detailed economic benefits are discussed in Section 7.0 of this SCA.

1.7 Summary of Public Outreach Program

Seminole has been involved in extensive outreach since the SGS Unit 3 project was authorized by Seminole's Board of Directors in March 2005.

Appointed and elected local, state, and federal government officials, regulatory agencies, environmental advocates, persons who live nearby, and local community business and opinion leaders have been contacted to provide factual information about Seminole's plans and the rationale for the Unit 3 Project. These individuals were asked for their input and feedback. Their input has been thoughtfully considered.

Seminole representatives met with the leaders of the local Chamber of Commerce and Economic Development Council, and they also met with or solicited meetings with representatives of local, state, and federal environmental groups. The latter includes the Putnam County Environmental Council, St. Johns Riverkeeper, Natural Resource Defense Council, and the Northeast Florida Sierra Club. Concurrent with the public announcement and a widely disseminated news release (distributed through PR Newswire), Seminole posted Unit 3 Project details on its website (at http://www.seminole-electric.com), inviting public comments, telephone calls and on-line registrations for additional information.

Presentations on the project have been made to the Putnam County Economic Development Council, the Palatka Rotary Club, the Keystone Heights Rotary Club, and the Putnam County Board of County Commissioners. Additionally, Seminole has spoken informally with local, state, and federal officials, staff members of the Florida Cabinet, the FDEP, St. Johns River Water Management District (SJRWMD), Florida Fish and Wildlife Conservation Commission (FFWCC), U.S. Army Corps of Engineers (USACE), Rural Utilities Service (RUS), and other agencies that will be parties to the PPSA Certification and NEPA process. Discussions also have been held with the Cooperative's key business partners, including fuel and fuel transportation providers and Lafarge Corporation.

In conjunction with plans for the RUS/NEPA public scoping meeting, Seminole mailed more than 2,000 invitations to residents of the local community, inviting them to attend the meeting, call, or visit the web site to submit comments on the draft Plan of Study for the preparation of the Supplemental Environmental Impact Statement (SEIS) for the proposed Unit 3 Project. The draft Plan of Study was also filed in local libraries. Similar information was disseminated through an ad in the *Federal Register*, and in legal and display ads in the area's dominant local newspaper, the *Daily News* (Palatka, Florida). The scoping meeting was held October 20, 2005, at Ravine Gardens State Park in Palatka, Florida.

Seminole will continue its efforts to provide Project information to any and all potentially interested parties, beyond the requirements for such communication, throughout the Unit 3 Project permitting and construction process. This commitment is in keeping with Seminole's positive community image and on-going community involvement efforts, which are cited as contributing factors in Seminole's 2001 Leadership Award from the Council for Sustainable Florida.

1.8 Conclusion

Seminole's planning studies have demonstrated that the addition of a 750 MW pulverized coal unit at the SGS Unit 3 will provide reliable capacity to meet a portion of Seminole's power supply needs in 2012 and beyond, and provide the best economic value to Seminole's Members and their member/consumers. SGS Unit 3 is the most cost-effective resource available to meet the needs in 2012 of Seminole's Members and their member/consumers for system reliability and adequate electricity at a reasonable cost, while maintaining and enhancing fuel diversity within Seminole's system. Also, the Unit 3 Project, coupled with the Units 1 and 2 pollution control upgrades, will provide several net environmental benefits.

1.9 References

Burns and McDonnell, Seminole Generating Station 650-MW Solid Fuel Fired Unit Feasibility Study, August 2004.

Burns and McDonnell, Seminole Generating Station 750-MW Solid Fuel Fired Unit Feasibility Study, February 2005.

ECT, Environmental Licensing Feasibility Study for New 652-MW Coal Fired Unit at Seminole Generating Station, October 2004.

ECT, Environmental Licensing Feasibility Study for New 850-MW Coal Fired Unit at Seminole Generating Station, March 2005.

Seminole Electric Cooperative, Inc., Financing Document – RUS Loan Application Package, October 2005.

Seminole Electric Cooperative, Inc., Petition for Determination of Need for an Electrical Power Plant, March 2006

Seminole Electric Cooperative, Inc, Plan of Study for the Preparation of a Supplemental Environmental Impact Statement, October 2005.

Seminole Electric Cooperative, Inc., Units 1 and 2 Site Certification Application, 1979.

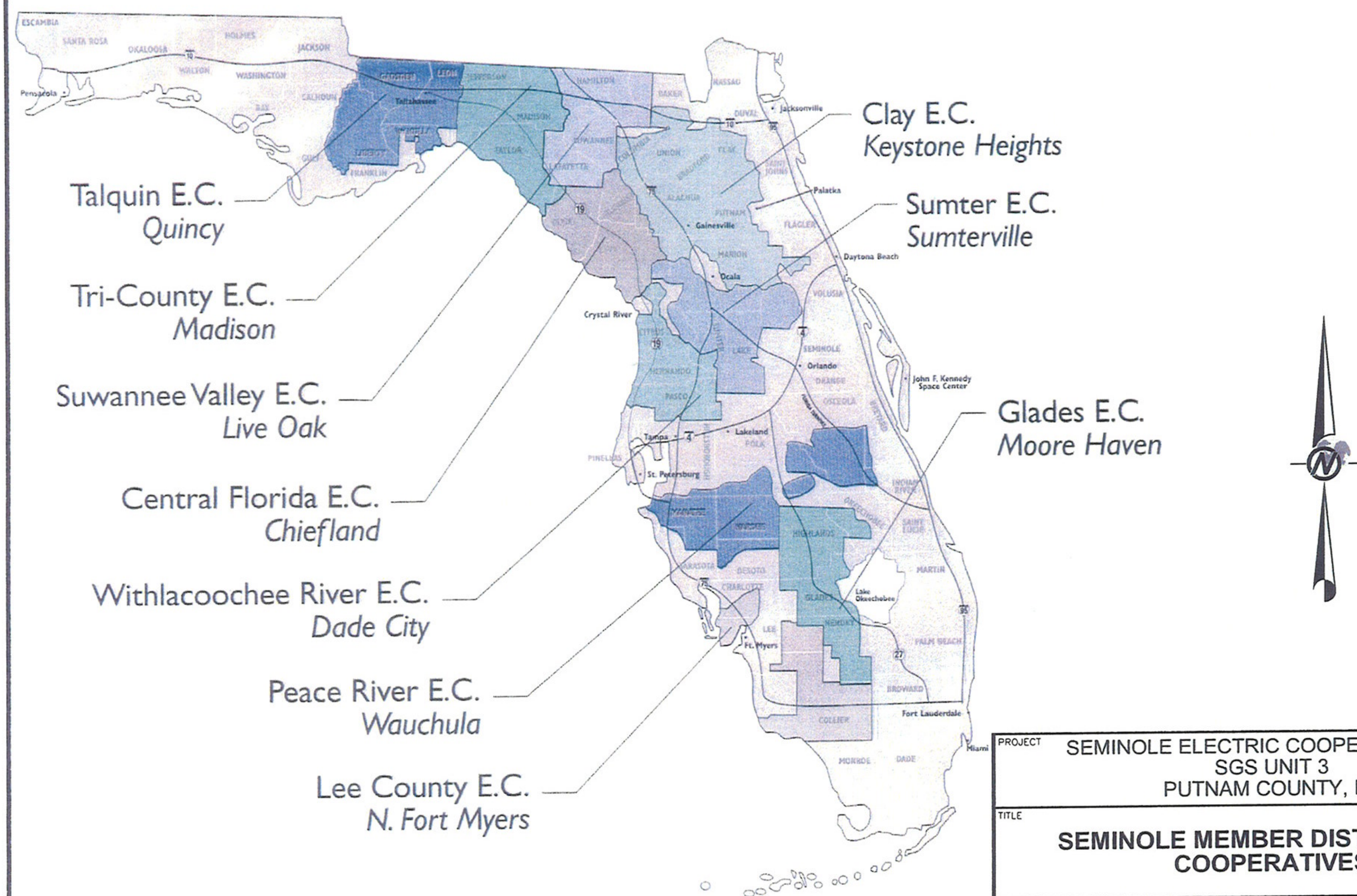
Seminole Electric Cooperative, Inc, Ten Year Site Plan 2005 – 2014, 2005

Solid-Fuel Power Plant Project, Site Selection and Feasibility Assessment, 2003

http://www.seminole-electric.com

FIGURES

Drawing file: 05. B001.dwg Mar 03, 2006 - 11:34am



PROJECT: SEMINOLE ELECTRIC COOPERATIVE INC
SGS UNIT 3
PUTNAM COUNTY, FL

TITLE: **SEMINOLE MEMBER DISTRIBUTION COOPERATIVES**

Golder Associates, Tampa, Florida

PROJECT No.		053-9540	FILE No. 0539540B001
DESIGN	MEF	09/01/05	SCALE AS SHOWN REV. 0
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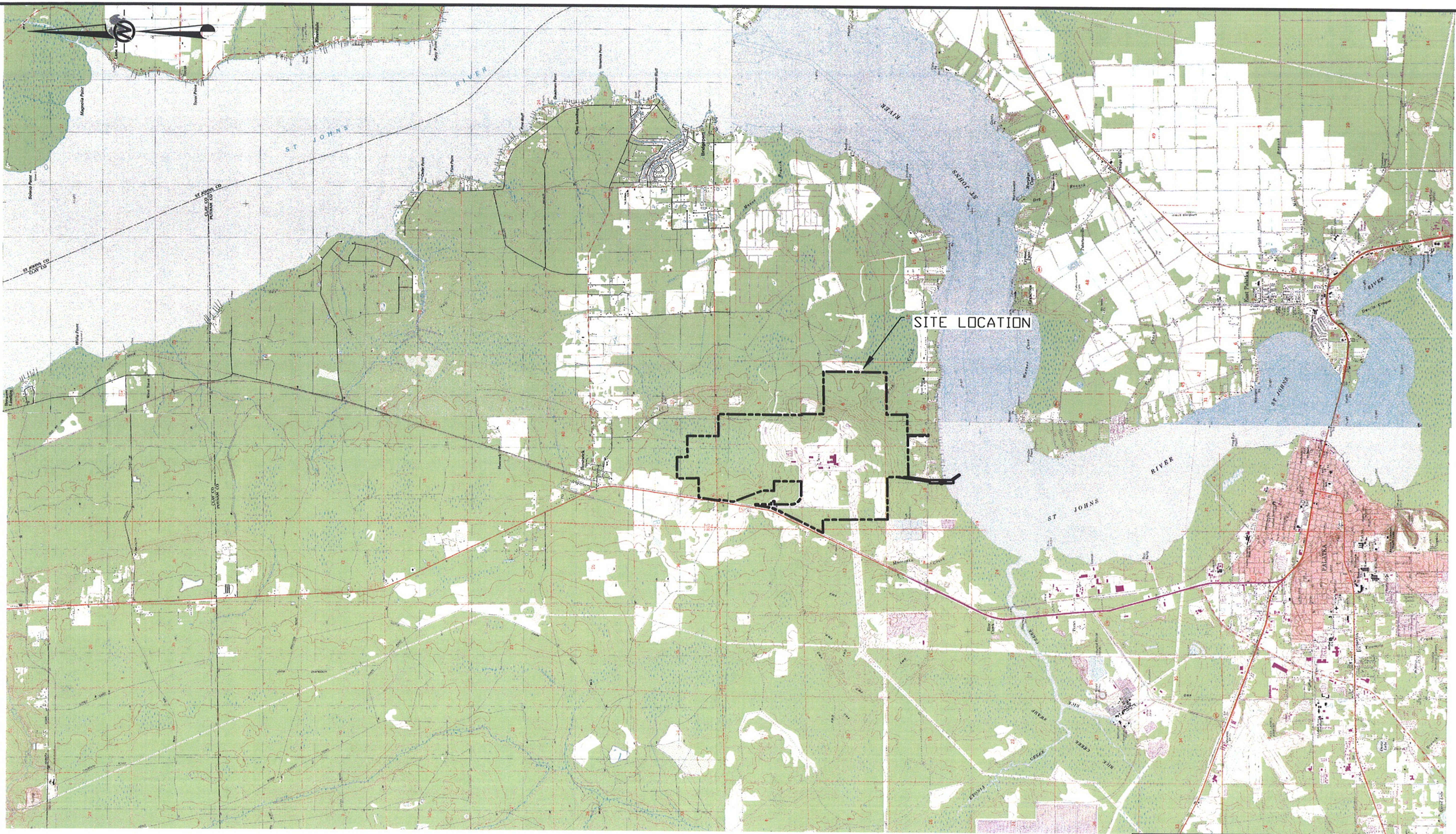
CHECK	MM	09/02/05	**FIGURE 1.2.0-1**
REVIEW	MM	10/4/05	



REFERENCES

1.) USGS 7.5 MIN DRG (FLORIDA)
PALATKA, BOSTWICK, RIVERDALE, HASTINGS

0 1,500 3,000 6,000
SCALE: 1" = 6,000'

PROJECT: SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNAM COUNTY, FL

TITLE: **SITE LOCATION**

Golder Associates
Tampa, Florida

PROJECT No.		053-9540	FILE No.	0539540B002
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REVIEW	MM	10/4/05		

Drawing file: F:\PROJECTS\2005 PROJ\053-9540\0539540B002.dwg Mar 03, 2006 - 11:37am

2.0 SITE AND VICINITY CHARACTERISTICS

2.1 Site and Associated Facilities Delineation

2.1.1 Site Location

The Seminole Generating Station (SGS) Site primarily is comprised of two parcels. Parcel 1 of the SGS Site is an approximately 1,917-acre tract of land located in all or portions of Sections 5, 6, 7, 8, 17, 18, Township 9S, Range 27E; Section 31, Township 8S, Range 27E; and Sections 1 and 12, Township 9S, Range 26E (Figure 2.1.1-1). SGS Parcel 2 is approximately 4.5 acres and includes approximately 212 ft of frontage on the St. Johns River, which serves as the northernmost boundary of a sovereign submerged land lease from the State of Florida to Seminole. SGS Parcel 2 is located south of County Road 209 within Section 18, Township 9S, Range 27E. Underground pipelines that provide plant makeup water and plant discharge water are located within an existing 100-foot wide privately granted easement that connects SGS Parcel 1 and SGS Parcel 2. SGS Unit 3 is proposed to be located within the Southeastern portion of SGS Parcel 1 in Section 8, Township 9S, Range 27E.

2.1.2 Existing Site Uses

Two existing 650 MW (nominal) coal fired electric generating units (Units 1 and 2) are located within SGS Parcel 1. Units 1 and 2 are coal fired and are also permitted to burn up to a 30 percent petroleum coke to coal blend. Units 1 and 2 burn bituminous coal primarily from mines in western Kentucky and southern Illinois, or a blend of coal and petroleum coke with up to a maximum of 30 percent petroleum coke. Units 1 and 2 currently receive approximately one unit train (10,000 tons per train) of coal and petroleum coke per day (320 trains per year). On-site coal and petroleum coke storage is provided to ensure an adequate and reliable fuel supply. The long-term coal storage area is located adjacent to the west side of the existing units and provides 45 to 60 days of fuel inventory. The coal-pile storage area has a durable liner to prevent runoff from entering groundwater. Coal and petroleum coke are unloaded from rail cars and transported to the electric generating units on a covered conveyor system.

Flue gas, fly ash, and bottom ash are produced as a result of the combustion process. Bottom ash is collected and removed from the bottom of the boilers and to the maximum extent practicable sold to concrete and concrete block manufacturers. Flue gas and fly ash exit the boiler into the post-combustion air pollution control equipment. This equipment operates in series, the first stage of which involves the Units 1 and 2 ESPs. The ESPs remove 99.7 percent of all fly ash from the flue gas. Fly ash is currently disposed of in the SGS permitted landfill which is located north of Units 1 and 2.

Units 1 and 2 are equipped with FGD systems "wet scrubbers" that remove SO_2 from the flue gas. SO_2 removal is accomplished by spraying a mixture of limestone and water into the upper part of the scrubber. The flue gas from the electrostatic precipitator enters near the bottom and comes into contact with the spray as it rises. The SO_2 in the flue gas reacts with the calcium in the limestone and is oxidized to produce calcium sulfate. The calcium sulfate slurry from the plant's FGD system then is dewatered. The dewatered solids are gypsum ready for use in the production of wallboard. Seminole produces and sells over 500,000 tons of gypsum per year to Lafarge Corporation, a wallboard production facility located off-site but adjacent to SGS Units 1 and 2.

SGS Units 1 and 2 currently use two natural draft cooling towers for condenser cooling. Each tower can cool 280,000 gallons per minute (gpm).

SGS Units 1 and 2 utilize the St. Johns River and the Floridan aquifer as water supply sources. Water withdrawn from the St. Johns River is currently used as service water for certain plant processes and cooling tower makeup. Historically, average water withdrawal from the St. Johns River has been approximately 25 million gallons per day (MGD). Groundwater is currently withdrawn from two onsite groundwater wells at an annual average rate of approximately 0.55 MGD and is utilized for boiler make-up and other plant uses.

Wastewater collected from floor drains, coal pile runoff, bottom ash collection systems, equipment cleaning, demineralization regeneration, well water pretreatment backwash, miscellaneous plant operations, and a portion of stormwater runoff from SGS Units 1 and 2 are treated at the plant's wastewater treatment facility. Wastewater is pumped to equalization basins where oily residues are skimmed off and settling occurs. Further treatment includes pH adjustment and settling of suspended solids. This wastewater is mixed with cooling tower blowdown, treated sanitary wastewater, and treated gypsum purge water prior to being discharged into the St. Johns River.

The existing stormwater management system collects and treats stormwater runoff from non-process equipment areas such as parking lots, roadways, and building roofs. The system is comprised of ditches, swales, culverts and berms which provide stormwater treatment.

An aerial photograph of the existing SGS Site (including Units 1 and 2) is provided on Figure 2.1.2-1.

2.1.3 Adjacent Properties

Land use surrounding the SGS Site is predominantly undeveloped land. The majority of the adjoining land is either in use for agricultural purposes or is forested. The land located immediately adjacent to SGS on the northwestern boundary is owned by Lafarge Corporation, which purchases SGS' gypsum to manufacture wallboard.

There is relatively low density residential housing along the northern side of the St. Johns River along County Road 209, south of SGS Parcel 1. The St. Johns River is located approximately one half mile south of the site and provides SGS with most of the facility's water consumption needs. There are three 230-kV transmission lines that run in an east-west orientation and exit from the southwest corner of the SGS Site. A rail line enters the SGS Site on its western boundary running in a north-south orientation parallel to U.S. Highway 17.

Seminole owns a 60-acre parcel of land located adjacent to the southwest portion of SGS Parcel 1; it is known as the Miller parcel and is currently in use as pine plantation. The Miller Parcel is specifically identified in the SGS boundary survey in Figure 2.1.6-1. The Miller Parcel is not part of the existing SGS certified site.

2.1.4 Uses within the Project Area

Figure 2.1.4-1 provides the site layout of the facilities that are located within the SGS Site to support the operation of SGS Units 1 and 2 and are proposed to be constructed as part of the recent Unit 1 and 2 Upgrade Modification Package submitted on February 13, 2006. Figure 2.1.4-2 provides the site layout for the facilities that will support the operation of SGS Unit 3 (identified in green). The areas within the SGS Site that will be impacted by the SGS Unit 3 Project generally consist of open areas. The existing SGS facilities for Units 1 and 2 and their approximate land areas are described below:

Existing SGS Facilities on Parcel 1 for Units 1 and 2

Facilities	Acreage
Power Blocks	19 acres
Cooling Towers	15 acres
Limestone Facilities	13 acres
Switchyard	9 acres
Wastewater Treatment	7 acres
Administration Building and Parking Lot	5 acres
FGD Effluent Processing Facilities	23 acres
Certified Landfill	115 acres
Rail Loop and Fuel Handling Facilities	196 acres
Warehouse and Other	11 acres
Total	**413 acres**

2.1.5 100-Year Flood Zone

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps 1202720185A, 1202720205A, 1202720075B, and 1202720090A, SGS Parcel 1 (the Project Site) is located in Zones A and C (See Figure 2.1.5-1). A northern section of the site (approximately 254 acres), a small portion of the southeast corner (approximately 17 acres), and a portion of the easement (approximately 4 acres within sovereign submerged land) are in Zone A. Zone A is defined as including areas of 100-year flood where base flood elevations and flood hazard factors have not been determined because site-specific data have not been collected. The remaining areas of the SGS Site, including all of the areas in which the existing and proposed facilities are located, are in Zone C. Zone C is defined as including areas of minimal flooding.

2.1.6 Property Delineation

A boundary survey map of the certified SGS Site is presented on Figure 2.1.6-1. The survey map identifies the acreage of the existing, certified SGS Site boundary, the SGS Unit 3 Project Site and SGS Parcel 2.

2.2 Socio-Political Environment

2.2.1 Governmental Jurisdictions

The SGS Site is located in unincorporated northeast Putnam County. The City of Palatka is located approximately five miles south of the SGS Site. The City of Palatka is the only local municipal governmental jurisdiction within a five-mile radius of the SGS Site (See Figure 2.2.1-1). Bostwick is the only unincorporated community located within five miles of the proposed SGS Unit 3 stack location (See Figure 2.2.1-1).

2.2.2 Zoning and Land Use Plans

2.2.2.1 Future Land Use

SGS is located in unincorporated Putnam County. The County has adopted a Comprehensive Plan which is updated on a periodic basis. The County Comprehensive Plan incorporates a Future Land Use Map that depicts the future land use designation of all property falling within the unincorporated portions of the County.

The majority of Parcel 1, and the entirety of the existing (Units 1 and 2) and proposed (Unit 3) power plant facilities, fall within the Industrial (IN) future land use category under the existing County Comprehensive Plan (See Figure 2.2.2-1). Small portions of Parcel 1, which do not encompass existing Units 1 and 2, or proposed Unit 3, fall within the Agricultural II (Ag-II) future land use category. Approximately two-thirds of Parcel 2 falls within the Agricultural II future land use category with the southerly one-third waterfront portion falling within the Rural Residential (RR) future land use category.

The existing pipeline easement, which is not a part of the PUD, runs across property zoned for agricultural uses and falling within the Agricultural II future land use category. Neither the County Comprehensive Plan nor the Putnam County Land Development Code precludes the repair, replacement, or addition of water pipes necessary to plant operations.

2.2.2.2 Zoning

The Putnam County Land Development Code (Code) has been adopted to implement the policies and objectives of the Putnam County Comprehensive Plan and regulate land development within the unincorporated portions of Putnam County. The Code incorporates a Zoning Map that depicts the zoning category of lands lying within unincorporated Putnam County. The entirety of Parcels 1 and 2 are zoned PUD (See Figure 2.2.2-2). Putnam County originally approved the PUD designation in 1978 to create a PUD specifically allowing the construction of the existing Units 1 and 2. The PUD was amended in 1980 to add an additional 40 acre out-parcel obtained by the applicant and amended again in 1999 to delete acreage purchased by Lafarge Corporation, for the construction of its existing gypsum plant lying north of Units 1 and 2.

In anticipation of seeking the certification of Unit 3, Seminole filed an application with Putnam County in 2005 requesting the amendment of the existing PUD to allow a third coal-fired generating unit to be constructed adjacent to and integrated with, the existing Units 1 and 2. On January 10, 2006, the Putnam County Board of County Commissioners unanimously approved the requested PUD amendment, and accompanying development agreement, by adopting Ordinance 2006-02. The Development Agreement, as approved, states that, "*[a]doption of an ordinance by the Board of County Commissioners, approving the proposed amendment to the Seminole Generating Station PUD, shall serve as confirmation by the County that the proposed site, for the purpose of adding Unit 3 and its accessory and associated facilities, is consistent and in compliance with existing land use plans and zoning ordinances of Putnam County.*"

The ordinance, as adopted on January 10, 2006, specifically finds that the PUD amendment to accommodate SGS Unit 3 is consistent with the County Comprehensive Plan and meets the requirement of the County Land Development Code. A compilation specifying the procedures taken to assure that SGS Unit 3, and associated facilities, is in compliance with existing land use plans and zoning ordinances as required by Section 403.508(2), FS, is attached hereto and incorporated herein as Appendix 10.3. The compilation includes the County Comprehensive Plan and incorporated Future Land Use Map, the County Land Development Code and incorporated Zoning Map, the application to amend the existing PUD zoning to accommodate SGS Unit 3, and Ordinance No.: 2006-02 which incorporates, as an attachment, the required Development Agreement between Putnam County and Seminole.

Note that the Putnam County PUD does not extend into the Miller Parcel which is not part of the SGS certified site (See Figure 2.2.2-2). Seminole is not proposing to add the Miller Parcel to the SGS certified site.

2.2.3 Demography and Ongoing Land Use

The proposed SGS Unit 3 Project Site is located in a rural unincorporated area of Putnam County. The City of Palatka is the only incorporated municipality located within five miles of the SGS Site.

According to the University of Florida's 2004 Florida Statistical Abstract, Putnam County was estimated to have 70,423 residents in 2003, a 2.2 percent increase from 2000. The medium population projections for all of Putnam County depict continued moderate growth, with an estimated population of 83,100 in 2025.

Existing land use patterns in the vicinity of the SGS Site are depicted on Figure 2.2.3-1. The predominant land use within five miles of the SGS Site is undeveloped land. This pattern of land use is anticipated to remain the same for the current planning period as evidenced by the Putnam County Future Land Use maps, which depict the area as primarily in agricultural use other than the area along the St. Johns River. Scattered residential use is located along the St. Johns River and this use is reflected on the Future Land Use map.

2.2.3.1 Race and Income Characteristics

Race and income characteristics in the vicinity of the SGS Unit 3 Project are provided in Appendix 10.6.4.

2.2.4 Easements, Title, Agency Works

The SGS intake and outfall structures are located within a submerged sovereignty land lease granted by the State of Florida for SGS. This lease will continue to be utilized for Units 1 and 2 as well as the SGS Unit 3 Project. A private recorded easement for underground pipelines which connect SGS with the intake and outfall structures has also been established and maintained.

2.2.5 Regional Scenic, Cultural and Natural Landmarks

There are no regional, scenic, cultural, and natural landmarks within five miles of the proposed Project Site.

2.2.6 Archaeological and Historic Sites

Preliminary background research conducted by Janus Research indicates that there are two previously recorded historical structures (8PU1378 and 8PU1379) and six previously recorded archaeological sites (8PU114, 8PU115, 8PU116, 8PU684, 8PU1188, and 8PU1189) located within one mile of the proposed SGS Unit 3 Project Site (Figure 2.2.6-1). The historic resources are described in Table 2.2.6-1. The previously recorded archaeological sites are discussed in Table 2.2.6-2.

Three surveys were performed within and within close proximity to the Site that disclosed the resources identified above: Cultural Resource Assessment of the Seminole Property, Putnam County (Fryman, Mildred L., et al 1978), Proposed Addition of Two Lanes to State Road 15/U.S. Highway 17, from State Road 209 North to State Road 16 [Putnam and Clay Counties] (Browning, William D. and Melissa G. Wiedenfeld 1988), A Cultural Resource Assessment Survey of Eight Proposed Retention Ponds along State Road 15, Putnam County (Johnson, Robert E. 1997).

Based on pertinent environmental variables and the presence of the above-mentioned archaeological sites, zones of archaeological site potential were designated within the SGS Site. FMSF # 8PU114 is located within a parcel of the SGS property that is not included in the SGS Site and will not be impacted by construction or facility operations. FMSF # 8PU115 and # 8PU116 are located within the SGS Unit 3 Site in an area of high archaeological site potential. FMSF # 8PU116 is located east and south of the proposed construction activities and will not be impacted by the SGS Unit 3 Project. FMSF # 8PU115 is located in the vicinity of the site laydown area. Overall, the proposed location for the SGS Unit 3 Project is not designated as a potential zone or high potential zone for archaeological resources.

2.2.7 Socioeconomics and Public Services

2.2.7.1 Labor Force

The total labor force in Putnam County for 2003 was 29,550 with employment of 27,936. Unemployment in 2003 was 1,614 or 5.5 percent. For the State of Florida, the unemployment rate was 5.1 percent and the U.S. unemployment rate was 6.0 percent (University of Florida's 2004 Florida Statistical Abstract).

Average monthly private-sector employment by major industry group in Putnam County for December 2004 is depicted below:

Major Industry Group	Employment
Agriculture, Forestry, Fishing and Hunting	647
Mining	Not Available
Utilities	418
Construction	1,257
Manufacturing	2,780
Transportation and Warehousing	200
Wholesale Trade	308
Retail Trade	2,910
Finance and Insurance	442
Information	82
Real Estate and Rental and Leasing	159
Professional Scientific and Technical Services	484
Management Companies and Enterprises	Not Available
Administration and Support	449
Educational Services	48
Health Care and Social Assistance	2,122
Arts, Entertainment & Recreation	42
Accommodation and Food Services	1,132
Other Services	687
Unclassified	Not Available

Source: State of Florida, Labor Market Statistics, "Quarterly Census of Employment and Wages" (ES-202), Annual NAICS files.

The retail trade industry and manufacturing groups provided the most employment in Putnam County with about 40 percent of the total employment between the two groups. The construction industry provided about 1,257 jobs.

Employment projections for construction and extraction trades in Florida have been estimated for the year 2011. Statewide, construction employment is estimated to increase from 482,338 in 2003 to 570,112 in 2011 (University of Florida's 2004 Florida Statistical Abstract).

2.2.7.2 General Income

Putnam County had a per capita personal income of $20,371 for 2003 compared to State of Florida and U.S. per capita personal income of $30,098 and $31,472, respectively (U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information, 2004). This income level ranked 20th out of the 67 counties in Florida.

The median household income in Putnam County was $27,191 in 2002. This income level is a 2.3 percent decrease when compared to the 2000 median household income. Florida had a median household income of $38,226 in 2002, which was a decline of 1.4 percent from 2000 (University of Florida's 2004 Florida Statistical Abstract). The average wage and salary earnings in Putnam County in 2001 were $31,131, approximately 10.5 percent lower than the statewide average.

2.2.7.3 Housing

According to the U.S. Census Bureau, the total number of housing units in Putnam County is depicted below by occupancy type:

Renter Occupied	5,574
Owner Occupied	22,265
Other	6,031
Total	33,870

The average house purchase price in Putnam County in 2003 was $130,640 (University of Florida's 2004 Florida Statistical Abstract).

A total of 36 licensed lodgings existed in 2004, representing 1,244 lodging units. This includes 1,166 apartment building units, 44 rooming house units, 23 rental condominiums, and 11 transient apartment building units (University of Florida's 2004 Florida Statistical Abstract).

2.2.8 Area Public Service and Utilities

2.2.8.1 Education

Primary public education in Florida is operated on a countywide basis. Each county's respective school district establishes educational policies and staffing requirements. According to the University of Florida's 2003 Florida Statistical Abstract, Putnam County had a total student membership of 12,429 for the 2004 school year. Putnam County schools employed approximately 1,573 staff employees in the fall of 2003.

A total of 54 elementary and secondary schools exist in the Putnam County. The closest public school, the James A. Long Elementary School, is approximately four miles east of the SGS Site. The physical address of the elementary school is 1400 Old Jacksonville Highway.

2.2.8.2 Transportation

The main entrance to the SGS Site is located on U.S. Highway 17. Plant employees also use a secondary entrance on County Road 209 West (See Figure 2.2.8-1). The U.S. Highway 17 entrance also serves as a joint entrance to allow plant employees of both SGS and Lafarge Corporation to enter the SGS Site and for access to the Lafarge Corporation facility.

Within the traffic impact study limits, U.S. Highway 17 is a four-lane divided state highway under the jurisdiction of the Florida Department of Transportation (FDOT). County Road 209 is a two-lane divided road under the jurisdiction of Putnam County. North and south of the SGS project entrance, the posted speed limit on U.S. Highway 17 is 60 miles per hour (mph). North and south of County Road 209 the speed limit is posted at 50 mph on U.S. Highway 17, while County Road 209 is posted at 45 mph.

The existing highway links have been reviewed using information from FDOT's Quality/Level of Service Manual, 2002. Generalized link maximum service volumes were used to review the existing traffic volumes assuming that the area is transitioning into an urban condition. The results of that analysis are presented in Table 2.2.8-1 for the a.m. peak hour and in Table 2.2.8-2 for the p.m. peak hour.

2.2.8.3 Medical Facilities

Putnam County has two hospitals which contain over 600 licensed beds. Emergency medical transportation is provided within Putnam County by emergency medical technicians (EMT), which are stationed at most of the county's fire stations. Licensed medical practitioners in Putnam County include 79 physicians, 46 dentists, dental hygienists, and dental radiographers, 91 health practitioners, 739 registered and practical nurses, 11 opticians, and 37 pharmacists and pharmacist interns (State of Florida, Department of Health, 2004).

Putnam Community Medical Center is the primary health care provider in the County. Putnam Community Medical Center is located approximately nine miles southwest of the SGS Project Site. Putnam Community Medical Center services include a critical care unit, nursing unit, progressive care unit, medical and surgical units, family birthplace center, and a 24-hour emergency department.

The Putnam County Department of Emergency Medical Services (EMS) is licensed to operate by the Office of Emergency Medical Services, Florida Department of Health and Rehabilitative Services and functions according to Chapter 401, F.S., and Chapter 10D-66, F.A.C. EMS operates the County rescue units with 42 full time and approximately 12 part-time emergency medical technicians and paramedics. There are seven rescue units located at six stations in Putnam County.

2.2.8.4 Firefighting Facilities

The City of Palatka operates the only full-time fire department within Putnam County, which is located approximately five miles south of the SGS Site. The other municipalities and residents of unincorporated Putnam County are served by 18 volunteer fire departments. There are approximately 500 men and women in Putnam County who are certified as firefighters and actively participate with one of the county's fire departments.

2.2.8.5 Police Protection

The Putnam County Sheriff's Office serves a population of about 70,000 people. The Putnam County Sheriff's Office provides law enforcement in the vicinity of the SGS Site. U.S. Highway 17 is patrolled by the Florida Highway Patrol which has a station located on U.S. Highway 17 southeast of Palatka.

2.2.8.6 Recreation Facilities

There are nine recreation areas and one county park within five miles of the SGS Unit 3 Project, including boat ramps, baseball fields, and recreation areas (Figure 2.2.8-2). The Palmetto Bluff Boat Ramp and the Elgin Grove Boat Ramp are both single-lane ramps with unimproved parking capable of accommodating ten vehicles.

Bostwick Community Park is the closest park to the SGS Site, which is located approximately three and a half miles north of the Site. The community park offers a small picnic area, tennis court, softball field, and a basketball court. The Tanglewydle Natural Environmental Interpretive Park is located at 229 County Road 209 in Putnam County. The park has approximately 17 acres. Portions of the park are along the St. Johns River and approximately seven acres are next to Seminole property. The Tanglewydle Natural Environmental Interpretive Park is owned by Putnam County and is at the beginning stages of development. Once the park is completed, it will consist of walking trails and an observation tower overlooking the natural resource areas.

2.2.8.7 Electricity and Gas

Electricity is provided to Putnam County businesses and residents by Florida Power & Light and Clay Electric Cooperative, a member of the cooperative system that Seminole serves. Natural gas service in the area is provided primarily by Palatka Gas Authority.

2.2.8.8 Water Supply Facilities

According to U.S. Geological Survey (USGS), total fresh water withdrawn in Putnam County was 88.43 MGD in 1995. Surface water sources comprised about 56 percent of the total volume with groundwater comprising the remaining 44 percent.

The total public-supplied water withdrawal was 3.6 MGD from groundwater sources. No surface water withdrawals were made for public supply use. The public supply served 21,118 residents. Therefore, public supply use per capita was approximately 170 gallons per day (gpd) (Source; USGS, 1995 Table 4).

2.2.8.9 Sewage Treatment Facilities

Putnam County businesses and residents are served by one of the following types of wastewater facilities: septic tanks, package plants, or regional facilities. Septic tanks provide service to individual residences or small businesses within unincorporated Putnam County.

Regional facilities are large systems that serve areas of densely populated developments. There is one regional sewage treatment facility in Putnam County. It is located in the City of Palatka and it serves City of Palatka residences.

The proposed SGS Unit 3 Project will be self-sufficient and provide for facility-specific sanitary and process wastewater collection, treatment, and disposal. The existing SGS is not connected to the regional wastewater system.

2.2.8.10 Solid Waste Disposal

The Putnam County Sanitation Department is responsible for solid waste collection, transport, and disposal in unincorporated portions of the County. Putnam County Landfill operations include the Class I Landfill (for residential and commercial garbage), the Class III Landfill (for construction debris, white goods, furniture, yard trash, etc.), long term care and maintenance for three closed landfills, a waste tire facility, and two solid waste recycling facilities. Putnam County recently combined the Class I and Class II Landfill which is located on County Landfill Road.

2.3 Bio-Physical Environment

2.3.1 Geohydrology

The information presented in this section draws upon previous information submitted in the SGS Units 1 and 2 SCA and Environmental Analysis, March 1979 and provides a brief summary of the geohydrologic baseline information.

The general geology of Putnam County was presented in "Geology and Groundwater Resources of Flagler, Putnam, and St. Johns Counties, Florida" (Bermes, et al, 1963) and "Text to Accompany the Geologic Map of Florida" (Scott, 2001). Site-specific subsurface information was obtained by a geotechnical investigation performed within the SGS Site.

2.3.1.1 Geologic Description of the Site Vicinity

The generalized geology and hydrogeology for northern Florida, in the vicinity of the site, is shown on Figure 2.3.1-1. Based upon review of the USGS map, Palatka, Florida, (dated 1968 and revised 1992); the SGS Site has a natural ground surface elevation ranging from 25 to 100 ft above mean sea level (msl) with respect to the National Geodetic Vertical Datum (NGVD) of 1929. The SGS Site (prior to development) was occupied by undifferentiated sediments. This is nearly level, poorly graded sand. Under natural conditions, the water table (i.e., absent drainage improvements) was near the ground surface. Geologic structures in the state of Florida can be seen on Figure 2.3.1-2.

The geomorphologic features in the area of the SGS Site are plains and uplands (Florida Geologic Survey, 1992) (See Figure 2.3.1-3). Seismic activity near the site is minimal. Peak ground acceleration with a two percent probability of exceedance in 50 years is 0.06 g (gravitational force) (Figure 2.3.1-4).

Rock units ranging in age from Paleocene to recent underlay the SGS Site. Formations and groups discussed in this report include (from oldest to youngest): the Cedar Keys Formation of Paleocene age; Avon Park Formation of middle Eocene Age; Ocala Limestone of late Eocene age; Hawthorn Group of Miocene age; and undifferentiated sediments of Pliocene and Holocene Age (Scott et al., 2001). Figure 2.3.1-5 depicts a stratigraphic column showing lithostratigraphic units for the state of Florida. Figure 2.3.1-6 depicts a regional geologic cross section.

The Cedar Keys Formation is subdivided by lithologic character and corresponding geophysical log characteristics into six units (Winston, 1994). In descending order they are: Unit A, characterized by a preponderance of anhedral and cryptocrystalline dolomite; euhedral dolomite is subordinate. Unit B is characterized by the presence of numerous relic grain textures in chalky to microcrystalline euhedral dolomite; Unit C is predominately anhydrite, with subordinate chalky to very fine microcrystalline euhedral dolomite; Unit D is characterized by a predominance of relic grains in a chalky to very fine microcrystalline euhedral dolomite, with few thin-bedded anhydrites; and Units E and F are similar in texture to Unit D, but contain fewer beds of relic grain texture.

The Avon Park Formation is carbonate sediments of peninsular Florida. The formation consists of cream to light-brown or tan, poorly indurated to well indurated, variably fossiliferous limestone. The limestone is interbedded with dolostones (Scott, 2001). It is comprised of alternating beds of differing permeability (Bermes et al., 1963).

The Ocala Limestone consists of nearly pure limestone with occasional dolostones. The formation can be subdivided into two facies on the basis of lithography. The lower consists of white to cream colored, fine to medium grained, poor to medium indurated, and fossiliferous limestone. The upper facies consist of a white, poor to well indurated, poorly sorted fossiliferous limestone. The permeable, highly transmissive carbonates of the Ocala Limestone form an important part of the Floridan Aquifer System (Scott, 2001)

Rocks of Miocene age in the SGS Site belong to the Hawthorn Group. The undifferentiated Hawthorne Group occurs near the surface near the southern flank of the Ocala Formation. There is little to no phosphate present in these sediments and fossils are rare. Ages have not been documented but stratigraphic location suggests that they are part of the Hawthorn Group. These sediments may be residual from the weathering and erosion of the Hawthorn Group. The sediments are light olive gray and blue gray in unweathered sections to reddish brown in the weathered sections, poorly to moderately consolidated, clayey sands, silty clays, and pure clays. These sediments are part of the intermediate confining unit and aquifer system (Scott, 2001). The Hawthorn Group is overlain at the Site by undifferentiated sediments.

The undifferentiated sediments consist of siliciclastics, organics, and freshwater carbonates. The silicates are light gray, tan, brown to black, unconsolidated to poorly consolidated, clean to clayey, silty, unfossiliferous variably organic-bearing sands to blue green to olive green, poorly to moderately consolidated, sandy, silty, clays (Scott, 2001).

2.3.1.2 Detailed Site Lithologic Description

Detailed site lithology was developed for the SGS Site based on borings installed during the geotechnical investigation conducted at the site in 1978. A generalized stratiographic column for the site can be seen on Figure 2.3.1-7.

With the exception of the northern lowland of the property, the property is underlain by poorly graded sand with little or no fines to approximately 40 feet (ft) below ground surface (bgs). The northern lowland is organic silt to a depth of 4 ft bgs. The sand is underlain by a mixture of sandy silts and clays, silts, and clays to a depth of approximately 200 ft bgs. After 200 ft bgs, limestone is encountered.

2.3.1.3 Bearing Strength

The generalized profile consists of 200 ft of unconsolidated sediments over limestone. The overburden shows a "draped" effect in the area. There are three broad geotechnical layers. The first is a clean medium dense to dense sand extending to approximately 40 ft bgs. The second is a transitional zone with increasing fines to approximately 100 ft bgs. The third is the Hawthorn Formation of a very dense impervious layer.

The SGS Site is suitable for the installation of the SGS Unit 3 Project from a geotechnical standpoint. Lightly loaded structures could be supported on shallow foundations. Since the groundwater table is relatively high and upper sand is highly permeable, major excavation may be avoided.

2.3.2 Subsurface Hydrology

2.3.2.1 Subsurface Hydrologic Data

There are three major components to the subsurface hydrogeologic framework of northeastern Florida: the unconfined surficial aquifer; the Floridan Aquifer System (FAS); and the Intermediate Aquifer System (IAS), which separates the two aquifer units.

Surficial Aquifer System

The uppermost part of the Surficial Aquifer System (SAS) is primarily composed of unconsolidated quartz sand, with localized lenses of shell and clay. Sediments forming the Surficial Aquifer System are undifferentiated sediments, Cypresshead and Nashua Formations, Caloosahatchee Formation-equivalent shell beds, and the Coosahatchee Formation of the Hawthorn Group (FGS, 1992). The surficial aquifer system in the vicinity of the SGS Project Site is about 100 ft thick.

Intermediate Aquifer System

The Intermediate Confining Unit and the IAS are present throughout the County and consists of interbedded siliciclastic and carbonate sediments of the Hawthorn Group and clay and limestone of the undifferentiated Hawthorn Group (FGS, 1992).

Floridan Aquifer

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

2.3.2.2 Karst Hydrogeology

Karst terrains develop in areas underlain by carbonate rocks such as limestone. They often have drainage systems that are reflected on the surface as sinkholes, springs, disappearing streams, or even caves (http://www.dep.state.fl.us/geology/geologictopics/sinkhole.htm).

According to Map Series No. 110, Sinkhole Type, Development, and Distribution in Florida, (William C. Sinclair and J. W. Stewart, USGS), the Site is located in Area III, where the cover is reported to be 30 to 200 ft thick. In this area, which encompasses much of Putnam County and other counties, sinkholes can be relatively numerous, varying size, and develop abruptly. The type of sinkholes are usually cover-collapse sinkholes, however, the FDEP's sinkhole database lists only 2 sinkholes in Putnam County, neither of which is near the site (See Figure 2.3.2-1).

2.3.3 Site Water Budget and Area Users

2.3.3.1 Site Water Budget

Climate and Meteorology

The SGS Site is located in northern peninsular Florida, which has a climate characterized as mild subtropical. Temperatures in the vicinity (measured at Palatka, Florida) range from an average low of about 45.2°F in January, to an average high of about 92.4°F in July, with an annual average of about 70.9°F. The highest temperature recorded was 105°F and the lowest was 7°F at Jacksonville.

As shown in Table 2.3.3-1, the mean total annual rainfall in Palatka, Florida, is 52.63 inches; with mean monthly totals ranging from 2.05 to 7.46 inches. Generally, the period of the year with the heaviest rainfall is from June to September.

Mean total yearly evaporation at Gainesville, as shown in Table 2.3.3-1, is 64.94 inches, with mean monthly totals ranging from 2.74 to 7.92 inches.

2.3.3.2 Water Supply

Several water supply alternatives have been evaluated to support the water required for SGS Unit 3 operations. The water supply alternatives analysis is summarized in Appendix 10.8 of this SCA.

2.3.3.3 Area Users

Surface water and groundwater usage in the vicinity of the SGS Site is regulated by SJRWMD. It should be noted that there is a possibility that other potable water wells are in existence in the vicinity of the SGS Site, and their presence has not been confirmed because they have not been permitted or otherwise reported to SJRWMD.

Figure 2.3.3-1 and Table 2.3.3-2 show the surface and groundwater uses within five miles of the SGS Site, most of which are for industrial purposes and agricultural irrigation. Sources of water used for these purposes include the St. Johns River, Rice Creek, the UFA, and the LFA.

2.3.4 Surficial Hydrology

2.3.4.1 Site Description

Prominent drainage features near the SGS include the St. Johns River and its tributaries.

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

2.3.4.2 Streamflow Data

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

The long-term average flow was computed for the Palatka station in 1974 (Seminole 1979). An average flow of 1.07 cfs per square mile is slightly higher than the current flow at Buffalo Bluffs station and other stations upstream of where the Palatka station was (Table 2.3.4-1). Because of the storage capacity in this area of the river and alternating tidal flows it is not possible to substantiate the data at the Palatka station. An additional gauging station in the vicinity of the SGS Site is on Rice Creek at the U.S. Highway 17 Bridge.

Water supply potential and waste assimilation capacity are based on potential flow rates. Commonly a statistical frequency analysis determines the low flows and return periods. In addition to the low flow frequency, the duration of the low flow must also be identified.

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

The waste assimilation capacity in this area of the St. Johns River is dependent on the dilution and dispersion characteristics during the design flow. For the St. Johns River at the Palatka station, the 7-day minimum absolute flow (MAF) was determined to closely approximate oscillatory movement (Seminole 1979).

The highest stage in the vicinity of the SGS Site was determined to be 5.5 ft msl in September 1964 (Seminole 1979). Since this occurred during a severe hurricane and produced the highest stage during the period of record, it is assumed to be a suitable design hurricane for determining hurricane surge elevations in the vicinity of the SGS Site. The hurricane flood level is below the 100-year flood in the vicinity of the SGS Site. Figure 2.1.5-1 shows the 100-year flood map.

2.3.4.3 Water Quality

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

Water Quality data in the vicinity of the SGS Site is available from EPA STORET Legacy and Modernized databases and from FDEP 305(b) report (See Figure 2.3.4-2).

In general, the St. Johns River has good water quality near Putnam County. Water quality data downstream and upstream from the SGS Site are listed on Table 2.3.4-2. Water Quality in the river upstream has a few elevated metals levels and has some pH exceedances. Downstream water quality improves with metal concentrations dropping and pH exceedances reducing to within water quality standards.

Thermal

Water quality standards apply to the discharges of heated water into "receiving bodies of water" (RBW). Rule 62-302.530, F.A.C. In general, the thermal standards applicable to this section of the St. Johns River are a maximum of 90° F and a maximum change of temperature of 5° F (over ambient conditions). FDEP and EPA have historically authorized a thermal mixing zone for SGS Units 1 and 2.

Based on USGS data, the average annual temperature in the St. Johns River is 76.6° F. The water temperature ranges from a low of 51.4° F in the winter to a high of 88.9° F in the summer.

2.3.5 Vegetation/Land Use

Characteristic vegetative communities/land uses within the SGS Site were classified utilizing the Florida Land Use, Cover and Forms Classification System (FLUCFCS) (FDOT, 1999). The resulting vegetation/land use map of the SGS Site is found on Figure 2.3.5-1.

A significant portion of the SGS Site has been historically cleared of vegetation and graded in association with development of the existing Seminole Units 1 and 2. Areas surrounding the plant facilities within the SGS Site include mowed and maintained grass fields classified as improved pasture (FLUCFCS Code 211), upland pine flatwoods (FLUCFCS Code 411), live oak hammock (FLUCFCS Code 427), ditches (FLUCFCS Code 511), mixed wetland hardwood forest (FLUCFCS 617), willow shrub wetlands (FLUCFCS Code 618), wetland conifer forest (FLUCFCS Code 620), cypress (FLUCFCS 621), wetland hardwood/conifer forest (FLUCFCS Code 630), and freshwater marsh (FLUCFCS Code 641).

2.3.6 Ecology

2.3.6.1 Species-Environmental Relationships

The following subsections include descriptions of potentially significant flora and fauna at the Site and areas surrounding the SGS Site. This discussion includes information related to the abundance of potentially significant species found and the value of the habitats present. Representative photographs of the vegetative communities within the SGS Site and vicinities are found in Appendix 10.6.1.

Terrestrial Ecology Systems—Flora

The following descriptions of the flora at the Site follow the FLUCFCS:

Improved Pasture (FLUCFCS 211)

The area proposed for location of the Unit 3 power block is currently cleared and maintained grass lawn (Appendix 10.6.1, Photograph 1). In these areas the native vegetative community has been cleared and replanted with predominantly bahia grass (*Paspalum notatum*), with subdominant species including crowfoot grass (*Dactyloctenium aegyptium*) and occasional weedy agricultural species.

Pine Flatwoods (FLUCFCS 411)

Pine flatwoods habitat is common within the SGS Site (Appendix 10.6.1, Photograph 2). These areas support a canopy dominated by slash and/or sand pine (*Pinus clausa*) and turkey oak (*Quercus laevigata*) with an understory of saw palmetto (*Serenoa repens*). Additional canopy species include laurel oak (*Quercus laurifolia*), black cherry (*Prunus serotina*), spruce pine (*Pinus glabra*), Chapman oak (*Quercus chapmanii*), live oak (*Quercus virginiana*), and pignut hickory (*Carya glabra*). Shrub and groundcover species include wax myrtle (*Myrica cerifera*), groundsel tree (*Baccharis halimifolia*), gallberry (*Ilex glabra*), blackberry (*Rubus* sp.), greenbrier (*Smilax* sp.), dogfennel (*Eupatorium capillifolium*), American beautyberry (*Callicarpa americana*), jointvetch (*Aeschynomene* sp.), blueberry (*Vaccinium corymbosum*), and goldenrod (*Solidago* sp.). Pine flatwoods on the property primarily consist of slash pine, saw palmetto, and turkey oak habitats, but also include drier habitats dominated by sand pine as well as more mesic areas with a predominance of slash pine and subdominant hardwood species.

Live Oak (FLUCFCS 427)

A parcel of live oak hammock occurs within the SGS Site (Appendix 10.6.1, Photograph 3), near the employee recreation pavilion. In addition to the dominant live oak canopy, other trees common within this habitat include southern magnolia (*Magnolia grandiflora*), sand pine, slash pine, laurel oak, and turkey oak. Understory species include saw palmetto, pawpaw (*Asimina* sp.), dogfennel, and muscadine grape (*Vitis rotundifolia*).

Ditches (FLUCFCS 511)

Ditches are found in several areas within the SGS Site. Many of these ditches were created by Seminole to serve as the SGS stormwater management and conveyance system. At the entrance road to the plant from U.S. Highway 17, a drainage ditch runs parallel to the roadway and adjacent to the railroad. Additional ditches are located in the northeastern portion of the SGS Site at the southern edge of the existing landfill, along the perimeter of the existing cooling towers, and within the improved pasture area (Appendix 10.6.1, Photograph 4). These ditches are of low ecological quality, are vegetated predominantly with nuisance species of vegetation, and provide little habitat for wildlife. Portions of these ditches are routinely maintained to prevent inhibition of water flow, including removal of excess vegetation and application of herbicides. Vegetation commonly observed associated with ditches within the SGS Site include cattail (*Typha latifolia*), water primrose (*Ludwigia peruviana*, *L. octovalvis*, and *L. leptocarpa*), water hyssop (*Bacopa monnieri*), spikerush (*Eleocharis* sp.), bigheaded rush (*Juncus megacephalus*), sedges (*Cyperus* sp.), marsh pennywort (*Hydrocotyle umbellata*), matchhead (*Phyla nodiflora*), dogfennel (*Eupatorium capillifolium*), and danglepod (*Sesbania herbacea*).

Mixed Wetland Hardwood Forest (FLUCFCS 617)

An area of mixed wetland hardwoods is located north-northwest of the railroad loop adjacent to the western SGS Site boundary and U.S. Highway 17. Dominant tree species within this area include blackgum (*Nyssa sylvatica*), sweetbay (*Magnolia virginiana*), dahoon holly (*Ilex cassine*), swamp bay (*Persea palustris*), and sweetgum (*Liquidambar styraciflua*), while common shrubs include wax myrtle (*Myrica cerifera*), blueberry, and fetterbush (*Lyonia lucida*). Groundcover species include

Virginia chain fern (*Woodwardia virginica*), cinnamon fern (*Osmunda cinnamomea*), maidencane (*Panicum hemitomon*), beaksedges (*Rhynchospora* sp.), and redroot (*Lachnanthes caroliniana*).

Willow Shrub Wetland (FLUCFCS 618)

Wetlands classified as willow shrub occur adjacent to the existing SGS coal yard facility as well as in the vicinity of the existing Units 1 and 2 cooling towers. These areas are dominated by coastal plain willow (Salix caroliniana), with subdominant canopy species including wax myrtle, red maple (*Acerrubrum*), and groundsel tree. Herbaceous species include soft rush (*Juncus effusus*), marsh pennywort, southern shield fern (*Thelypteris kunthii*), Virginia chain fern, peppervine (*Ampelopsis arborea*), sedges, climbing hempvine (*Mikania scandens*), and Japanese climbing fern (*Lygodium japonica*).

Wetland Conifer Forest (FLUCFCS 620)

An area classified as wetland coniferous forest is located to the west of the rail loop. This habitat contains a canopy of cypress (*Taxodium ascendens*) and slash pine, with occasional blackgum, dahoon holly, and swamp bay. Common shrub and groundcover species include wax myrtle, gallberry, blueberry, blackberry, Virginia chain fern, marsh fleabane (*Pluchea rosea*), and redroot.

Cypress (FLUCFCS 621)

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

Wetland Hardwood/Conifer Forest (FLUCFCS 630)

These areas are similar to pine flatwoods habitat but experience hydric soils and support a mixture of slash pine, pond pine (*Pinus serotina*), and facultative hardwood species of trees, such as loblolly bay (*Gordonia lasianthus*), red maple, and blackgum. Areas classified as wetland hardwood/conifer forest are found on the eastern, southern, and northeastern edges of the Unit 3 Project. Additional canopy species include laurel oak, water oak (*Quercus nigra*), swamp bay, and sweetbay. Shrub species include dahoon holly, fetterbush, saw palmetto, wax myrtle, gallberry, and blueberry, while common herbaceous species include Virginia chain fern, netted chain fern (*Woodwardia aereolata*), sphagnum moss, whitehead bogbutton (*Lachnocaulon anceps*), swamp doghobble (*Leucothoe racemosa*), catbrier (*Smilax sp.*), beakrushes, sedges, spikerush, and peppervine.

Freshwater Marsh (FLUCFCS 641)

Two small areas classified as freshwater marsh exist within the existing transmission line right-of-way and rail loop to the south of the coal yard. These areas are routinely mowed, and are vegetated with a mixture of shrubs, small trees, and herbaceous species, including coastal plain willow, sweetgum, saw palmetto, gallberry, fetterbush, persimmon (*Diospyros virginiana*), red chokeberry (*Photinia pyrifolia*), cinnamon fern, Virginia chain fern, nutrush (*Scleria* sp.), redroot, goldenrod (*Solidago fistulosa*), maidencane (*Panicum hemitomon*), and shortspike bluestem (*Andropogon brachystachys*).

Vegetative Communities Adjacent to the Site

The land uses adjacent to the Site include industrial areas, roadways, undeveloped upland forested parcels, planted pines, agricultural fields, low-density residential areas, freshwater marsh wetlands, forested wetlands, the St. Johns River, and its associated floodplain.

Terrestrial Ecology Systems—Fauna

The SGS Site is an active industrial site, which is unsuitable habitat for most species due to the amount and frequency of human activity; however, forested parcels, wetlands, and ditches within the SGS Site do provide suitable wildlife habitat for species common to north Florida. A summary of wildlife surveys conducted in conjunction with the original SCA for Units 1 and 2 are summarized below, as well as any additional species observed during field reconnaissance conducted in 2005.

Common mammalian species observed on the Site include feral hog (*Sus scrofa*), whitetail deer (*Odocoileus virginianus*), bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), armadillo (*Dasypus novemcinctus*), cottontail rabbit (*Sylvilagus floridanus*), eastern gray squirrel (*Scirurus carolinensis*), cotton mouse (*Peromyscus gossypinus*), and eastern mole (*Scalopus aquaticus*).

Avian species include the mockingbird (*Mimus polyglottis*), American crow (*Corvus brachyrhynchos*), blue jay (*Cyanocitta cristata*), turkey vulture (*Cathartes aura*), red-tailed hawk (*Buteo jamaicense*), screech owl (*Otus asio*), barred owl (*Strix varia*), bobwhite (*Colinus virginianus*), wild turkey (*Meleagris gallopavo*), pine warbler (*Dendroica pinus*), mourning dove (*Zenadia macrocoura*), ground dove (*Columbina passerine*), eastern kingbird (*Tyrannus tyrannus*), white-throated sparrow (*Zonotrichia albiocollis*), savannah sparrow (*Passerculus sandwichensis*), field sparrow (*Spizella pusilla*) and loggerhead shrike (*Lanius ludovicianus*).

Amphibians and reptiles observed on the Site include the American toad (*Bufo americanus*), southern toad (*Bufo terrestris*), southern fence lizard (*Sceloporus undulatus*), ground skink (*Scincella lateralis*), green anole (*Anolis carolinensis*), gopher tortoise (*Gopherus polyphemus*), and southern black racer (*Coluber constrictor*).

Aquatic Ecology Systems–Fauna

Avian species associated with forested wetland habitats on the SGS Site include yellow-rumped warbler (*Dendroica coronata*), black-and-white warbler (*Mniotilta varia*), brown thrasher (*Toxostoma rufum*), cardinal (*Cardinalis cardinalis*), white-eyed vireo (*Vireo griseus*), rufous-sided towhee (*Pipilo erythrophthalmus*), chuck-will's widow (*Caprimulgus carolinensis*), and pileated woodpecker (*Dryocopus pileatus*). None of the forested wetland areas on the SGS Site include standing water of sufficient hydroperiod to support utilization by wading birds, although the ditches on the Site may occasionally be utilized by common species such as white ibis (*Eudocimus albus*), little blue heron (*Egretta caerulea*), great blue heron (*Ardea herodias*), and great egret (*Casmerodius albus*).

Amphibian and reptile species associated with wetland habitats on the site include the southern leopard frog (*Rana utricularia*), squirrel treefrog (*Hyla squirella*), little grass frog (*Lemnaoedus ocularis*), slimy salamander (*Plethodon glutinosus*), and dwarf salamander (*Eurycea quadridigitata*).

Threatened and Endangered Species—Flora and Fauna

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

There are a number of federally and/or state listed animals that are associated or potentially associated with the SGS Site. A number of wetland dependent animal species (e.g., wading birds) have the potential to use the drainage canals and borrow ponds for foraging, including the little blue heron, tricolor heron, white ibis, snowy egret, and wood stork. These species are common to the area and use other similar habitats that are found throughout the surrounding region.

Threatened and Endangered Species—Methodology

Prior to the field surveys, literature and agency surveys were undertaken to determine the species that could potentially be present in the habitats found on the SGS Site. Primary sources of information are the Florida Natural Areas Inventory (FNAI) database; Florida Committee on Rare and Endangered Plants and Animals (FCREPA) reports; Preservation of Native Flora of Florida Law, Rule Chapter 5B-40, F.A.C., the Regulated Plant Index (5B-40.0055); and Notes on Florida's Endangered and Threatened Plants, FDACS, Division of Plant Industry, Bureau of Entomology, Nematology and Plant Pathology - Botany Section, Contribution No. 38, Addition 2, Gainesville. The USFWS and FFWCC were consulted to solicit input regarding the Unit 3's potential impact to listed species and recommendations to avoid and/or minimize adverse impacts. In addition, a Site-specific element occurrence report from FNAI was requested, which identifies the results of a database search of documented occurrences of listed species within a one-mile radius of the SGS Site.

Plant and Animal Surveys

Because of the rareness and seasonality of threatened and endangered species, either multi-season surveys or an evaluation of threatened and endangered species habitat conditions are necessary to determine their presence or absence on the SGS Site. For the SGS Site, a limited threatened and endangered species survey was combined with the evaluation of habitat conditions to determine the presence or absence of threatened and endangered species. Based on lists of threatened, endangered, or species of special concern known to occur in Putnam County and literature review, federally and state listed species whose ranges include the Site were identified.

Flora

Threatened, endangered, and/or plant species of special concern that occur within Putnam County are listed in Table 2.3.6-1. A substantial portion of the SGS Site has been cleared of vegetation and graded in association with the existing electric generation facilities. Due to the developed nature of these areas and lack of native vegetation, no threatened or endangered species of plants were observed on the active portion of the SGS Site. Surrounding undisturbed areas of upland and wetland forest may provide habitat for threatened, endangered, and/or species of special concern, although none were observed during field reconnaissance conducted in September 2005.

The FNAI element occurrence report (Appendix 10.6.2) did not include any listed plants within the Unit 3 Project boundary. Correspondence from the USFWS (Appendix 10.6.3) indicated that the proposed Project is not likely to adversely affect any plant resources protected by the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.).

Fauna

Threatened, endangered, and/or animal species of special concern that occur within Putnam County are listed in Table 2.3.6-1. During the field reconnaissance conducted in September 2005, as well as during studies conducted in association with the original SCA for Units 1 and 2, the only listed species observed was the gopher tortoise (*Gopherus polyphemus*), which is not listed federally by the USFWS but is classified as a species of special concern by the FFWCC. Gopher tortoise habitat is located within the dry pine flatwoods located to the north/northeast of the existing cooling towers. Gopher tortoises are listed as a species of special concern in the State of Florida due to loss of preferred habitat, which includes xeric upland areas that are prime parcels for development, as well as due to historical capture for food. Several species utilize the burrows of gopher tortoises as refugia. These "commensal" species include the federally and state-threatened Eastern indigo snake (*Drymarchon couperi*) as well as the gopher frog (*Rana capito*), which is classified by the FFWCC as a species of special concern but is not listed federally by the USFWS. Neither of these species has been observed at the Project Site.

The FFWCC's bald eagle nest locator database (http://wld.fwc.state.fl.us/eagle/eaglenests/Default.asp#criterialocator) was queried and resulted in no known bald eagle nests on or adjacent to the Project Site. According to the FFWCC database, the closest known active nests are each located approximately four miles from the Site. Seminole personnel have identified an additional eagle nest located approximately one-half mile to the north of the existing landfill; a distance greater than the recommended primary and secondary protection zones for eagle nests. The FFWCC nest identification numbers and location information are given below:

Nest ID	Longitude	Latitude	S-T-R
PU003	81° 38.38"	29° 37.42"	18-10S-27E
SJ004	81° 31.08"	29° 47.54"	19-08S-28E
SJ005	81° 34.47"	29° 52.18"	27-07S-27E
SJ012	81° 31.16"	29° 44.49"	06-09S-28E
SJ014	81° 33.01"	29° 49.25"	38-08S-27E
CL005	81° 37.74"	29° 54.54"	08-07S-27E
CL012	81° 37.48"	29° 52.89"	20-07S-27E

The FNAI element occurrence report (Appendix 10.6.2) indicated no documented occurrences of listed species of animals within the SGS Site. Correspondence from the USFWS (Appendix 10.6.3) indicated that the proposed Project is not likely to adversely affect any resources protected by the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.), provided the standard protection measures for eastern indigo snakes are incorporated in the project design.

2.3.6.2 Pre-Existing Stresses

Terrestrial Systems

The greatest pre-existing stress to terrestrial systems in the SGS Site and surrounding area is the result of the existing electric utility facilities. The natural topography, soils, and hydrology of the SGS Site have been altered to accommodate the existing units.

Aquatic Systems

Aquatic systems within the Site are limited to artificial drainage ditches, shrub wetlands, and forested wetlands. No streams or surface waters occur within the SGS Site. Pre-existing stresses to aquatic systems on the SGS Site include occasional mowing and maintenance of ditches and wetlands under the existing transmission line, while forested wetland systems on the Site are relatively undisturbed.

2.3.6.3 Measurement Programs

Terrestrial Ecology

Terrestrial ecological resources were evaluated through SGS Site reconnaissance, agency review, previous studies, and literature searches. Vegetative communities, wildlife utilization, and potential for threatened and endangered wildlife occurrence were addressed during the SGS Site reconnaissance conducted in September 2005.

Wetlands

Wetland resources within the Unit 3 Project boundary were delineated by scientists from Environmental Consulting & Technology, Inc. (ECT). The resulting delineation and description of wetland habitats was assessed by Golder biologists in September 2005.

Aquatic Ecology

Submerged aquatic vegetation (SAV) is a vital component of Florida's ecology and economy. Submerged aquatic vegetation provides nutrition and shelter to animals important to marine fisheries, provides critical habitat for other species (e.g. wading birds, manatees, and sea turtles), and improves water quality.

From 1998 through 2003, Sagan (2003) found *Vallisneria americana* Michx. to be the dominant SAV species throughout the Lower St. Johns River basin. *V. americana* was found on 84 percent of transects with SAV and accounted for 66.7 percent of total cover. Other dominant species included *Najas guadalupensis* (spreng), Magnus and *Ruppia maritima* L., accounting for 16.4 percent and 8.3 percent, respectively, of total cover.

2.3.6.4 Fish and Ichthyoplankton

The FFWCC's Fisheries Independent Monitoring (FIM) program has conducted sampling of the fish and selected invertebrates in the Northeast Florida region since 2001 (FMRI, 2004). The sampling area includes the lower St. Marys River Basin (Zone A), the lower Nassau River Basin (Zone B), and the lower St. Johns River Basin (Zones C & D) (See Figure 2.3.6-1).

A total of 238,293 animals representing 167 taxa were collected from 972 samples during 2004 (Table 2.3.6-2). Bay anchovy (*Anchoa mitchilli*, n=66,042) and Spot (*Leiostomus xanthurus*, n=55,145) were the most abundant taxa collected, comprising 27.7 percent and 23.1 percent of the 2004 total catch, respectively. Dominant species included small forage fishes such as Menhaden (*Brevoortia* spp., n=28,346), Atlantic silverside (*Menidia menidia*, n=12,380), Striped anchovy (*Anchoa hepsetus*, n=5,994), Rainwater killifish (*Lucania parva*, n=3,415), and Silversides, *Menidia* spp. (n=3,396). The dominant commercial and recreational species collected included Atlantic croaker (*Micropogonias undulates*, n=11,076), White shrimp (*Litopenaeus* setiferus, n=9,126), and Striped Mullet (*Mugil cephalus*, n=5,959). Other important species collected included Blue crab (*Callinectes sapidus*), Largemouth bass (*Micropterus salmoides*), Sheepshead (*Archosargus* *probatocephalus*), Spotted seatrout (*Cynoscion nebulosus*), Weakfish (*Cynoscion regalis*), Redear sunfish (*Lepomis microlophus*), Bluegill (*Lepomis macrochirus*), Threadfin shad (*Dorosoma petenense*), Pink shrimp (*Farfantepenaeus duorarum*), and Southern flounder (*Paralichthys lethostigma*).

2.3.6.5 Threatened and Endangered Species

Shortnose Sturgeon

Shortnose sturgeon (*Acipenser brevirostrum*), listed as endangered since 1967, is historically found in major rivers along the Atlantic seaboard from the St. Johns River, Canada, south to the St. Johns River, Florida. From 1949 through 1999, only eleven shortnose sturgeons were positively identified from the St. Johns River. In August 2000, a shortnose sturgeon was caught near Racy Point just north of Palatka, the area where most previous captures had been made. The fish had been tagged by the Georgia Department of Natural Resources near St. Simon Island, Georgia in March 1996.

In the spring of 2001, researchers working in cooperation with the USFWS began a study to determine current population levels of shortnose sturgeon in the St. Johns River. Gill-net sampling was conducted in the St. Johns River from January 2002 through June 2003. Only one shortnose sturgeon was collected during the entire period. Due to only one shortnose sturgeon being caught despite extensive sampling, it is unlikely that a sizable population of shortnose sturgeon currently exists in the St. Johns River.

Florida Manatee

The Florida manatee (*Trichechus manatus latirostris*) is currently listed as endangered by the State of Florida and the USFWS (USFWS, 2001). In August of 2001, the FFWCC was petitioned to re-evaluate the status of the Florida manatee (FMRI, 2002). The FFWCC developed a population viability analysis that incorporated survival rates, age of maturity, age of first reproduction, and potential of catastrophic events such as red tide. The model indicated a probable 50 percent decrease of the population. The analysis did not predict extinction of the population within 100 years. These criteria fit the category of "threatened" for the State of Florida; however, the status of the Florida manatee has not been changed.

Synoptic aerial manatee surveys conducted in January 2005 reported preliminary data of 3,142 manatees living in Florida waters. Dr. Gerry Pinto, a research scientist from Jacksonville University, is conducting aerial surveys of manatees in conjunction with the Clay County Parks and Recreation Department. He estimated 260 manatees reside in the Lower St. Johns River (personal communication). The FFWCC reports a total of 154 manatees observed near the headwaters of the Upper St. Johns River at Blue Spring during the synoptic survey in January 2005. The St. Johns River in the vicinity of the SGS intake/discharge is not a significant congregation area for the manatee.

In the winter, the Florida manatee spends most of its time in and around areas of warm water such as natural springs and the cooling water discharge of power plants. It has been reported that the warm water refuge of power plants is becoming more important for the Florida manatee, as the percentage of animals using these areas has increased by 4-6 percent per year since 1994 (Craig and Reynolds, 2004).

2.3.6.6 Pre-Existing Stresses

The principal pre-existing stresses to the lower St. Johns River basin primarily are associated with various anthropogenic impacts. These impacts are linked to point and non-point pollution, water usage, levels and flow.

The St. Johns River is a slow flowing river, having a total drop of approximately 30 ft from its source to its mouth. This averages to about a one inch drop in elevation per mile of run. This lack of significant drop causes the river to have relatively slow flow, which in turn, limits the capacity of the river current to flush pollutants (SJRWMD, 2005). Historical sources of pollution in the St. Johns River come from various point source and non-point source outlets, but in general are concentrated around urban areas.

Point source pollution comes from specific, fixed locations such as discharges from industrial and wastewater treatment plants. Non-point source pollution is from urban, agricultural, and other types of stormwater runoff.

One of the potential consequences of certain types of point and non-point source pollution is eutrophication and associated algal blooms. Eutrophication is the excessive nutrient load caused by the presence of high amounts of nitrogen or phosphorus in the water. While naturally occurring organisms such as algae and other aquatic vegetation use the nutrients to grow, high amounts of nitrogen and phosphorus can cause excessive algae blooms and aquatic weed growth. These algae blooms can have a domino effect on the water quality by lowering the dissolved oxygen, affecting the pH, and decreasing the light penetration into the water (Cadenhead, 2005). Algae blooms are more likely to occur in areas of low flow such as lakes. The wider, low flow area of the river is more susceptible to algal blooms than the deeper cut areas near the mouth of the river (SJRWMD, 2005).

Bacterial pollution has been an issue in the St. Johns River since the 1950s (Proceedings of the St. Johns River Summit, 2005). Fecal coliform bacteria are microorganisms that are found in human and animal waste and are used as an indicator of bacterial pollution. Fecal coliform can enter the waterway through many avenues; however, the typical sources are failing septic tanks, illegal septic bypasses, aging sewer lines, and runoff from farm and livestock areas. While today the main stem of the river usually has fecal coliform levels below the state criteria, high levels remain a problem upstream in the many tributaries and streams that feed the river. Rainstorms can wash the bacteria from the tributaries into the main stem, causing high coliform levels far from the source (Proceedings of the St. Johns River Summit, 2005).

2.3.6.7 Measurement Programs

Aquatic habitat loss and degradation can often be directly linked to development and population growth. Point and non-point source discharges increase with increased development. As natural areas are replaced with the impervious surfaces such as roads, parking lots, etc. associated with urban growth, and larger agricultural and industrial developments are needed to support the associated growing populations; the river is stressed with higher runoff and pollution levels. Tools such as Best Management Practices (BMP) for new developments and Basin Management Action Plans (BMAPs) under the Total Maximum Daily Load (TMDL) program are expected to result in improved water quality.

The St. Johns River is a major source of water for central and northeastern Florida. Water is withdrawn from the river for many uses ranging from irrigation for agriculture to direct aquifer recharging to drinking water for some counties within the watershed. In order to regulate current water usage and plan for future demands, the SJRWMD established minimum water levels and flows for certain sections of the St. Johns River (as well as other lakes, rivers, wetlands, and streams in the district). The intent of the Minimum Flows and Levels (MFLs) program is to maintain water levels and/or flows to prevent significant harm to water resources or ecology of an area resulting from permitted water withdrawals (SJRWMD, MFLs, 2005). Water uses cannot be permitted that cause any MFL to be violated (SJRWMD, MFLs, 2005).

2.3.7 Meteorology and Ambient Air Quality

2.3.7.1 Meteorology

Meteorological data collected at existing monitoring stations were used to describe the local and regional climatology in the vicinity of the SGS Site. The closest existing meteorological station to the SGS Site with complete data is the National Weather Service (NWS) station located at the Jacksonville International Airport (JAX), situated approximately 53 miles north of the SGS Site. The NWS has recorded weather observations for more than 50 years at this station. These data are the most complete and are representative of the region surrounding the Site. FDEP has approved the use of these meteorological data for previous air permit applications in this region and is appropriate for use in air dispersion modeling. Portions of the JAX meteorological data related to precipitation were used to characterize precipitation at the SGS Site (refer to Subsection 2.3.3).

The climate in the region is subtropical with a marine influence from the Atlantic Ocean. The monthly and annual average temperatures for this area are presented in Table 2.3.7-1. The annual average temperature is approximately 68°F with daily average temperatures varying from a maximum of 91°F to a minimum of 43°F. Record extreme temperatures range from a low of 7°F to a record high of 105°F. During the summertime, temperatures rarely exceed 100°F due to the high relative humidity with subsequent cloud cover formation and the abundant convective-type (e.g., thunderstorms) precipitation.

The monthly and annual average precipitation data are presented in Table 2.3.7-2. Approximately 64 percent of the annual precipitation falls during the six warmest months, May through October. The average annual precipitation is approximately 52 inches, but this has varied from as little as 31 inches to more than 69 inches in the past 30 years. The majority of rain is in the form of short-lived convection showers (e.g., thunderstorms) during the summer months when a measurable amount can be expected every other day. Large amounts of rain are also produced very infrequently during the summer or fall when tropical storms or hurricanes pass near the region.

Monthly and annual average relative humidities, which indicate the amount of moisture in the air at a given temperature, are presented in Table 2.3.7-2 for the morning hours of 1:00 a.m. and 7:00 a.m. and early afternoon and evening hours of 1:00 p.m. and 7:00 p.m. The highest humidities are coincident with the coolest ambient temperatures, which generally occur at 7:00 a.m., or near dawn. The lowest humidities coincide with the highest ambient temperatures.

Annual and seasonal windroses for the five-year period from 1987 through 1991 are given in Figures 2.3.7-1 through 2.3.7-5. A summary of the seasonal and annual average wind direction and wind speed, including calm conditions, is presented in Table 2.3.7-3. The predominant winds during the year are from the southwest clockwise through northwest, with predominant winds also from the northeast and southeast. Also, because of the location of the Atlantic Ocean, the easterly winds are reinforced due to the moderate to strong late afternoon sea breezes that occur on days with strong land heating and produce localized onshore winds. The data for this period (1986 through 1990) were also used in the air quality impact analyses and are approved by FDEP for dispersion analyses.

Except during the passage of tropical storms or hurricanes, high wind speeds generally do not occur. During the winter and spring, there are usually only a few days when wind speeds are greater than 20 to 30 miles per hour (mph).

Atmospheric stability is a measure of the atmosphere's capability to disperse pollutants and potentially reduce ground-level concentrations. During the daytime with strong solar heating, the atmosphere can disperse pollutants very quickly over a relatively short period of time. This condition is considered as very unstable and generally occurs infrequently during the year. During the nighttime under clear skies and light wind speeds, the atmosphere is considered stable with minimal potential to disperse pollutants. During the day or night when wind speeds are moderate to high, pollutants are dispersed at moderate rates (i.e., dispersion rates that are lesser than those during unstable conditions but greater than those during stable conditions). This condition is considered neutral and occurs frequently throughout the year. The seasonal and annual average occurrences of atmospheric stability classes for this area for 1986 to 1990 are shown in Table 2.3.7-4. During the summer months, unstable conditions occur about 32 percent of the time due to strong solar heating, whereas unstable stability conditions occur only 12 percent of the time in the winter months. Neutral stability occurs most frequently during the winter months due to the higher wind speeds that occur in this season. The occurrence of stable stability conditions are nearly uniform throughout the year and typically occur at night and early morning.

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

The seasonal and annual average morning and afternoon mixing heights for this area for 1986 to 1990 determined using the Holzworth method are listed in Table 2.3.7-5. The highest seasonal afternoon mixing heights occur in the spring and the lowest seasonal morning mixing heights occur in winter.

Thunderstorms are the most frequent of severe storms that occur an average of 68 days per year as reported by the NWS at JAX. These storms occur throughout the year, but about 80 percent occur from May through September.

Hurricanes and tornadoes are other types of severe weather that can occur. In the 92.6-km (50-nautical mile) coastal strip from Flagler to Jacksonville Beach, there is about a seven percent chance that a tropical storm will pass over the area during any given year (Gale Research Co., 1980). For storms of hurricane strength (i.e., wind speeds exceeding 73 mph), the chance decreases to about one percent with nearly zero percent chance that the winds will be greater than 124 mph (i.e., wind speeds of a great hurricane).

Statistics compiled by the severe local storms branch of the national severe storms forecast center (Paulz, 1969) show that 16 tornadoes were spotted within the 1-degree-latitude by 1-degree-longitude square centered near the Project Site from 1955 to 1967. This averages about slightly more than one tornado per year.

The tornado recurrence interval for any specific point location within the 1-degree square was estimated by the methodology of Thom (1963). The recurrence interval, r, is equal to 1/p where p is the probability of a tornado striking within the 1-square-area and is estimated as follows:

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

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

a area of 1°square mile (mi2).

In this analysis, *t* was assumed to be 0.8 based on data collected from 1953 to 1962 and was estimated to be 4,100 mi^2. Therefore, the mean recurrence interval for a tornado striking a point within this square is more than 1,800 years. The month during which tornadoes occur most frequently is June.

2.3.7.2 Ambient Air Quality

Ambient Standards

The National and Florida Ambient Air Quality Standards (AAQS) are presented in Table 2.3.7-6. Primary National AAQS were promulgated to protect the public health, and secondary National AAQS were promulgated to protect the public welfare from any known or anticipated adverse effects associated with the presence of pollutants in the ambient air. This is clearly stated by the EPA [(EPA), 2005 (http://www.epa.gov/ttn/naaqs)]:

> *"The Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards (NAAQS) for wide-spread pollutants from numerous and diverse sources considered harmful to public health and the environment. The Clean Air Act established two types of national air quality standards. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against visibility impairment, damage to animals, crops, vegetation, and buildings. The Clean Air Act requires periodic review of the science upon which the standards are based and the standards themselves."*

Florida has adopted both the Primary and Secondary NAAQS. For SO_2, the Florida AAQS are more stringent than the federal standards.

Areas of the country in compliance with AAQS are designated as attainment areas. Pollutants for which AAQS have been established are referred to as criteria pollutants. These pollutants include particulate matter (PM) with an aerodynamic particle size of 10 micrometers (µm) or less (PM_{10}), PM with an aerodynamic particle size of 2.5 µm or less ($PM_{2.5}$), SO_2, carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and lead (Pb).

Putnam County is designated as an attainment area for all criteria pollutants with the exception of PM_{10} and Pb (Rule 62-204.340, F.A.C.). For PM_{10} and Pb, the entire State of Florida is designated as unclassifiable. These designations indicate that Putnam County is in compliance with the AAQS. Adjacent counties, such as Clay, St. Johns, Flagler, Marion, and Alachua Counties, have the same designations for all criteria pollutants.

On July 18, 1997 the EPA promulgated revisions to the National AAQS for O_3 and PM [62 Federal Register (FR) No. 138]. The O_3 standard was modified from 0.12 parts per million (ppm) for the 1-hour average concentration to be 0.08 ppm for an eight-hour average concentration. The new standard is achieved when the 3-year average concentration of the fourth highest value is 0.08 ppm or less. The 1-hour average AAQS will no longer apply to an area 1 year after the effective date of the designation of that area for the 8-hour ozone AAQS. The effective date for most areas is June 15, 2004 [Federal Register, April 30, 2004 (69 FR 23996)].

The revised PM AAQS included two new $PM_{2.5}$ standards: a short-term 24-hour average standard and an annual average standard. The $PM_{2.5}$ standards are based on a three-year average of the 98th percentile of 24-hour average concentrations that must not exceed 65 micrograms per cubic meter ($\mu g/m^3$) (from population-orientated monitors) and a three-year average of annual average concentrations that must not exceed 15 $\mu g/m^3$ (from a single- or community-orientated monitor). A change to the form of compliance with the annual PM_{10} standard was proposed but the change has since been rescinded. The form of compliance for the annual standard remains in the form of an expected exceedance that must not be exceeded more than once per year averaged over three years.

The FDEP has not yet adopted the revised O_3 or $PM_{2.5}$ AAQS. Based on evaluations performed by FDEP and EPA, Putnam County and the rest of Florida has been designated an attainment area for the revised O_3 AAQS [Federal Register, April 30, 2004 (69 FR 23996)] as well as an attainment area for the new $PM_{2.5}$ AAQS [Federal Register, January 5, 2005 (70 FR 944)]. These standards must be implemented in the 2007 to 2008 timeframe with a revision to the State Implementation Plan.

In promulgating the 1977 Clean Air Act (CAA) Amendments, Congress specified that certain increases above an air quality *baseline concentration* level of SO_2 and PM concentrations would constitute *significant deterioration* for sources located in attainment areas. The magnitudes of the allowable increases, referred to as prevention of significant deterioration (PSD) increments, depend on the classification of the area in which a new source (or modification) will be located or have an impact. Three PSD increment classifications were designated based on criteria established in the 1977 CAA Amendments. Initially, Congress designated areas as either Class I (national parks, national wilderness areas, and memorial parks larger than 5,000 acres, and national parks larger than 6,000 acres) or as Class II (all areas not designated as Class I). Class III areas, which would allow greater deterioration than Class II areas, were not designated. EPA then promulgated as regulations the requirements for classifications and area designations.

On October 17, 1988, EPA promulgated regulations to prevent significant deterioration due to NO_X emissions and established PSD increments for NO_2 concentrations. The EPA class designations and allowable PSD increments are presented in Table 2.3.7-6. Florida has adopted the EPA allowable increments for PM_{10}, SO_2, and NO_2. The entire State of Florida is classified as PSD Class II with the exception of four PSD Class I Areas designated by Congress: Everglades National Park (ENP), the Chassahowitzka, St. Marks, and Bradwell Bay National Wilderness Areas. There are no PSD Class III Areas designated in Florida.

Putnam County is classified as a Class II area (Rule 62-204.340, F.A.C.) since it is an attainment area for all pollutants. The nearest Class I area to the SGS Site is the Okefenokee NWA located about 105 km (63 miles) to the north. Other PSD Class I areas with 200 km of the SGS Site include the Chassahowitza NWA (144 km) and Wolf Island NWA (179 km).

Existing Air Pollutant Sources

The Project Site is located in a rural area of Putnam County, which has a minimal number of air pollution sources. Existing major sources with SO_2, PM, or NO_x emissions greater than 100 tons per year (TPY) and within 25 km (16 miles) of the Project Site include the Georgia Pacific Palatka Mill and FPL Putnam Plant. In general, other major air pollution sources are located more than 30 km (19 miles) from the SGS Site.

Ambient Air Quality Data

Air monitoring data have been collected in Putnam County for more than 20 years. Air monitoring data currently are collected for SO_2 and PM_{10}. This station is located within 6 km (3.6 miles) of the Project Site. The nearest monitors that measure NO_2, $PM_{2.5}$, ozone and CO concentrations are located in Duval and Alachua County and are anywhere from 45 km (27 miles) to 69 km (41 miles) from the plant site. These data are generally representative of air quality for areas with more industrial development than that around the SGS Site. Thus, the measured air quality data from these air monitoring stations provide a conservative indication of air quality in the vicinity of the SGS Site. Monitoring data from these stations demonstrates compliance with applicable air quality standards.

A summary of the maximum pollutant concentrations measured in Putnam County from 2002 through 2004 is presented in Table 2.3.7-7. These data indicate that the maximum air quality concentrations measured in the region are well below applicable standards.

2.3.7.3 Measurement Programs

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

Meteorological data were obtained from the NWS surface and upper-air station at the Jacksonville International Airport. These data were obtained for a five-year period from 1986 through 1990 from which the joint frequency of wind direction, wind speed, and atmospheric stability and a five-year average of mixing heights were developed. Since 1996, the wind sensors at the airport have been located 31 ft above grade. Regular surface observations are taken just before each hour, seven days per week. Upper-air soundings are conducted twice per day at 7:00 a.m. and 7:00 p.m., Eastern Standard Time (EST).

Available monitoring data recently collected from regional monitoring sites were used to support the impact evaluation and are included in the Air Permit/PSD Application (Appendix 10.1.5). The need for a PSD preconstruction ambient air monitoring analysis was evaluated as part of the impact evaluation. Since the estimated increase in potential emissions associated with Unit 3 exceeds the PSD review thresholds for regulated pollutants, including PM_{10}, CO, and volatile organic compounds (VOCs), an ambient air monitoring analysis is required for these pollutants (O_3 in the case of VOC emissions). For these pollutants, an exemption from preconstruction monitoring analysis is provided for impacts less than the *de minimis* impact levels [Rule 62-212.400(3)(e), F.A.C.]. The facility's impacts for all applicable pollutants are predicted to be below the *de minimis* impact levels for all pollutants except ozone (i.e., VOCs), so preconstruction monitoring for the Project is not required.

2.3.8 <u>Noise</u>

2.3.8.1 Background

Sound propagation involves three principal components: a noise source, a person, or a group of people, and the transmission path. While two of these components, the noise source and the transmission path, are easily quantified (i.e., direct measurements or though predictive calculations), the effects of noise to humans is the most difficult to determine due to the varying responses of humans to the same or similar noise patterns. The perception of sound (noise) by humans is very subjective, and similar to considerations of odors and taste, is very difficult to predict a precise response from one individual to another. To address the direct physical effects such as potential hearing loss and the less direct effects of interference with activities such as sleep and conversation, noise standards and criteria have been developed.

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

$$SPL = 20 \log10 (Pe/Po)$$

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

Po = reference effective pressure of 20 Pa.

To account for the effect of how the human ear perceives sound pressure, at moderate to low levels, sound pressure levels are adjusted for frequency (or pitch). One of the most commonly used frequency filters is the A-weighting (dBA), which adjusts measurements for the approximated response of the human ear to low-frequency SPLs [i.e., below 1,000 hertz (Hz)] and high-frequency SPLs (i.e., above 1,000 Hz).

In the early 1970s, the EPA established numerical noise standards, which are summarized in their 1974 report *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare, with an Adequate Margin of Safety* (EPA, 1974). In developing these standards, reported as both equivalent sound pressure level (L_{eq}) and day-night sound pressure level (L_{dn}), the EPA drew on a large body of survey data describing the degree of activity interference and resulting annoyance for a variety of noise levels. However, these standards were promulgated in the Noise Control Act of 1972 without regard to economic or technical feasibility. Additionally, these guidelines, often misconstrued, were not meant to be pragmatic or realistic goals for short-term noise control (Harris, 1991). The EPA closed its Office of Noise and Radiation in the early 1980s rendering the Noise Control Act of 1972 ineffective and mainly forgotten.

In 2002, Putnam County amended the existing countywide noise control ordinance. Ordinance 2000-05 and its enforcement provide numerical noise standards that are not to be exceeded, which are based on receiving land use categories. The Section 6 of the County Noise Ordinance is summarized as follows:

> *No person shall operate or cause to be operated any source of sound in such a manner as to create a sound level that exceeds the sound level limits set forth for the appropriate use category in Table 1 below. The measurement shall be taken at the outside wall of the complainant's primary dwelling, or in the case of a commercial or industrial structure, at the outside wall of such structure in the direction of the sound.*

Maximum Sound Levels		
Zoning Category of Receiving Use	Time	Sound Level Limit (dBA)
Residential zoned property	Sun-down to Sun-up	65
Residential zoned property	Sun-up to Sun-down	70
Commercial or business zoned property	Sun-down to Sun-up	70
Commercial or business zoned property	Sun-up to Sun-down	80
Manufacturing and industrial zoned property	Sun-down to Sun-up	70
Manufacturing and industrial zoned property	Sun-up to Sun-down	80
Agricultural zoned property	Sun-down to Sun-up	65
Agricultural zoned property	5:31 a.m. to 8:59 p.m.	75
Public space	All times	70

The ordinance also explains that the sound level limits set forth in the above table shall be exceeded when any of the following occur:

- The sound at any one point in time exceeds any of the established zone limits in the above table by a measures sound level of fifteen (15) dBA; or
- The sound exceeds any of the established zone limits by a measures sound level of ten (10) dBA for a cumulative total of on minute of more out of and 10- minute period; or
- The sound exceeds, except in the Industrial District, any of the established zone limits by a measurable sound level of five minutes out of any 10-minute period.

2.3.8.2 Noise Measurement Procedures

A comprehensive ambient noise monitoring program was performed at six locations on or near the Project Site to assess the existing ambient noise levels in November 2005. The equipment used to monitor the baseline noise levels operated in the slow response mode to obtain accurate, integrated, A-weighted sound pressure levels. A windscreen was used because all measurements were taken outdoors. The microphone was positioned so that a random incidence response, as specified by the American National Standard Institute (ANSI), was achieved. The sound level meter and octave band analyzer were calibrated immediately prior to and just after the sampling period to provide a quality control check of the sound level meter's operation during monitoring. The higher the decibel value, the louder the sound.

The SPLs and octave band data were collected at the monitoring locations, for a minimum of 15 continuous minutes, using measurement techniques set forth by ANSI S12.9-1993/Part 3 (ANSI, 1993). Integrated SPL data consisting of the following noise parameters were collected at each location:

Leq — The sound pressure level averaged over the measurement period; this parameter is the continuous steady sound pressure level that would have the same total acoustic energy as the real fluctuating noise over the same time period;

Max — The maximum sound pressure level for the sampling period;

Min — The minimum sound pressure level for the sampling period; and

Ln — The sound pressure levels, which were exceeded n% of the time during sampling period. For example, L50 is the sound level exceeded 50 percent of the time during the monitoring period.

The noise monitoring equipment used during the study included:

- Larson Davis Model 824 Precision Integrating Sound Level Meter with Real Time Frequency Analyzer
- Larson Davis Model PRM902 Microphone Preamplifier
- Larson Davis Model 2560 Prepolarized 1/2" Condenser Microphone
- Windscreen, tripod, and various cables
- Larson Davis Model CAL200 Sound Level Calibrator, 94/114 dB at 1,000 Hz.

The Larson Davis sound level meter complies with Type I--Precision requirements set forth for sound level meters and for one-third octave filters. The SPL averages were calculated using the following formula:

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

where: N =number of observations.

SPL_i =individual sound pressure level in data set.

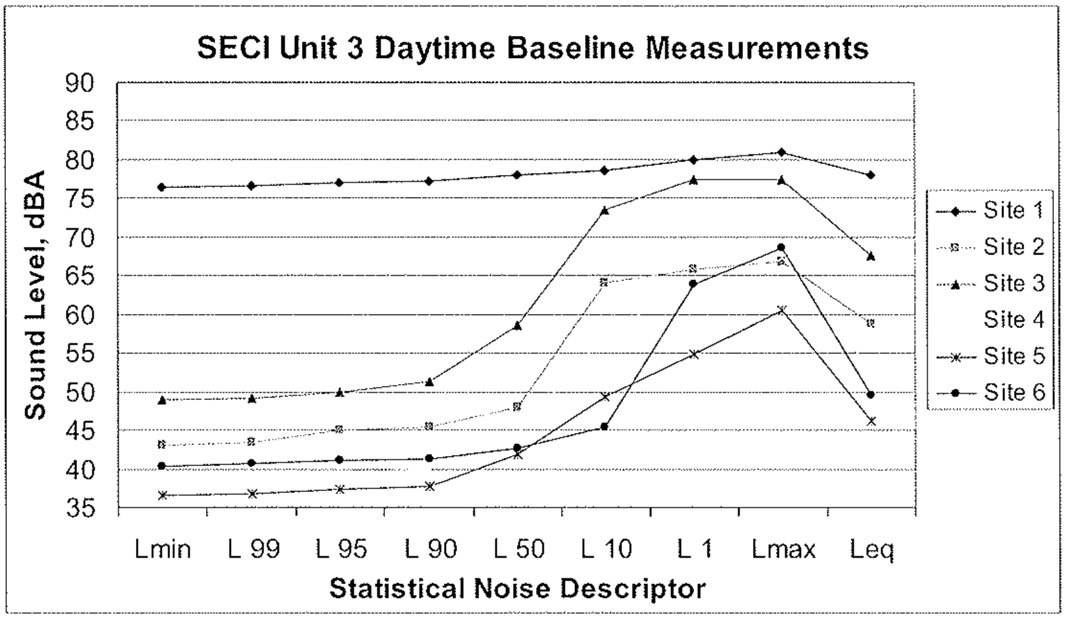
Monitoring was conducted using the sound level meter mounted on a tripod at a height of 1.2 m (4 ft) above grade. Local meteorological conditions (wind speed, wind direction, temperature, and relative humidity) were measured during the monitoring periods. The operator recorded detailed field notes during monitoring, including identification of major noise sources in the area. The calibration certificates for the monitoring equipment are provided in Appendix 10.5.1.

Site 1 is located east of the existing power block at the most recent proposed location of Unit 3. Monitroing sites 2 through 6 were selected to determine the baseline noise levels at or near the property lines of various receiving land use categories (i.e., residential, agricultural, and commercial). Site 1 is located east of the existing power block at the most recent proposed location of Unit 3. Site 2 was located on the boundary line directly west of the facility on the transmission line access road. Site 3 was located north of the plant entrance off of U.S. Highway 17 (and adjacent to the rail line) across from the nearest residence to the west. Since residential land use is typically the most restrictive relative to noise levels, this fact was taken into account when locating the monitoring Site 4 in the town of Bostwick. Bostwick is north of the existing facility and Site 4 was at the intersection of Mulberry St. and Tillman St. Site 5 was located directly east of the facility at residences near the intersection of Millican Road and SW 5th Ave. Site 6 was located on the southern boundary line off of the plant access road. The locations of the monitoring sites are presented in Figure 2.3.8-1.

2.3.8.3 Existing Ambient Sound Pressure Level Conditions

The daytime and nighttime ambient noise levels measured in July 2005 are presented in the following tables and graphs. The table includes the minimum, maximum, percentiles, and L_{eq} SPLs for each monitoring location. Meteorological conditions and operator observations during sampling are also included in the table.

The daytime and nighttime L_{90} values at each site were compared to the sound level limits set forth by the Putnam County Noise Ordinance. Since the facility emits a constant sound, the L_{90} descriptor values filter out all extraneous noises from car or plant traffic, bird, or wind noise. The highest L_{90} boundary noise levels measured during the study was 53.5 dBA at Site 3 during the daytime and 56.3 dBA at Site 4 during the nighttime. The elevated daytime noise levels at Site 3 were due to the persistent vehicular traffic on U.S. Highway 17 as well as train traffic, with warning horn, during the measurement period and are not reflected in the graphic below. The elevated nighttime noise levels at Site 4 were due to the persistent insect noises in the monitoring area.



2.4 REFERENCES

Bermes, B.J., Leve, G.W., and Tarver, G.R., 1963. Geology and Groundwater Resources in Flagler, Putnam, and St. Johns Counties, Florida. Florida Geological Survey Report of Investigations No 31.

Brooks, H. K., and Merrit, J. M. 1981, Guide to the Physiographic Divisions of Florida: Florida Cooperative Extension Service Institute of Food and Agricultural Sciences, University of Florida, Gainesville. 1 map 150x105 cm and text 16 p.

Browning, William D. and Melissa G. Wiedenfeld 1988,

Cadenhead, Mark. Eutrophication: Causes and Effects St. Johns River Summit, 2003, Health of the River Report; (2005, September 7) http://www.dep.state.fl.us/northeast/stjohns/river.pdf

Environmental Protection Agency (EPA). STORET Legacy Data Station Number 20030220 Rice Creek at U.S. Highway 17 Bridge.

Environmental Protection Agency (EPA). STORET Modernized Data Station Number 20030220 Rice Creek at U.S. Highway 17 Bridge

Environmental Protection Agency (EPA). STORET Legacy Data Station Number 20030229 St Johns River at confluence of Rice Creek

EPODUNK http://www.epodunk.com

Florida Department of Environmental Protection, 2001. 2000 Florida Water Quality Assessment 305(b) Report.

Florida Department of Environmental Protection, 2004. Division of Water Resource Management 2003 Reuse Inventory, July, 2004.

Florida Administrative Code Chapter 40C-2 Applicant's Handbook Consumptive Uses of Water.

Florida Administrative Code Chapter 40C-8 Minimum Flows and Levels.

Florida Administrative Code Chapter 62-302 Surface Water Quality Standards.

Florida Administrative Code Chapter 62-520 Groundwater Classes, Standards and Exemptions.

Florida Aviation Database http://www.florida-aviation-database.com.

Florida Department of Education Bureau of Education Information & Accountability Services Statistical Brief, Membership in Florida's Public Schools Fall 2004

Florida Department of Environmental Protection http://www.dep.state.fl.us./gwt/guide/regions/crossflorida/trails.

Florida Fish and Wildlife Conservation Commission http://myfwc.com/.

Florida Geological Survey (FGS), 1992. Special Publication No. 34.

Florida Geological Survey (FGS), 1991. Special Publication No. 32.

Florida Marine Research Institute. 2002. Population viability analysis of the Florida manatee (Trichechus manatus latirostris). St. Petersburg, FL.

Florida Public Service Commission Currently Regulated Natural Gas and Electric Companies.

Florida State Parks http://www.floridastateparks.org/.

National Weather Service, 2005. Monthly Precipitation, Maximum Air Temperature and Minimum Air Temperature for Palatka Station number 08 6753.

National Weather Service, 2005. Maximum and Minimum Daily Temperature for Jacksonville, FL.

Northeast Florida Regional Planning Council (NFRPC), 1997. Strategic Directions Natural Resources of Regional Significance.

Putnam County School District, http://www.putnamschools.org/

Putnam County Comprehensive Plan, July, 2002.

Putnam County Future Land Use Map, 2005.

Putnam County Land Development Regulations, April 2005.

Putnam County Planning and Zoning Department, http://www1.putnam-fl.com.

Putnam County Zoning Map, 2005.

Regional Economic Information System Bureau of Economic Analysis Table CA1-3 April 2005.

Reynolds, Smith and Hills, 1974. Surface Water Resources of the St. Johns River, Florida. Jacksonville, Florida

Sagan, J.J., 2003. Distribution of submerged aquatic vegetation within the Lower St. Johns River: 1998 – 2003. Interim Report III to the St. Johns River Water Management District, Palatka, Florida.

Scott, Thomas M., 2001. Text to Accompany the Geologic Map of Florida. Florida Geologic Survey Open-File Report 80.

Seminole Electric Cooperative, Inc., Units 1 and 2 Site Certification Application, 1979.

Sinclair, William C. and Stewart, J.W. U.S.G.S. Map Series 110 Sinkhole Type, Development, and Distribution in Florida. USGS.

St. Johns River Water Management District, 2005. GIS Regulatory Permit Search Tool. Consumptive Use Permits. http://www.sjrwmd.com/programs/data.html.

St. Johns River Water Management District, 2004. Special Publication SJ2004-SP28. 2004 Interim Update to Special Publication SJ2000-SP1 District Water Supply Plan.

St. Johns River Water Management District, 2003. Water Resource Atlas, Putnam County.

St. Johns River Water Management District, 2000. Special Publication SJ2000-SP1. District Water Supply Plan.

St. Johns Water Management District Wildlife Management Areas.

United States. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information, 2004

United States Geological Survey (USGS). Streamflow Statistics for the Nation Retrieved on 6-6-05

United States National Park Service Florida,

University of Florida, Bureau of Economic Business Research, Florida Statistical Abstract, 2004

USGS Water-Resources Investigation Report Florida 1999, 99-4002, Tables 2 and 4.

USGS Palatka Quadrangle, Florida-Putnam Co. 7.5 Minute Series (Topographic) Map Edited 1992.

William C. Sinclair and J. W. Stewart, USGS.

TABLE 2.2.6-1

HISTORIC RESOURCES IDENTIFIED WITHIN THE PROJECT AREA

FMSF #	Name	Distance from SGS Site	Const. Date	*NRHP* Status
8PU1378	299 West River Road, Cottage 1	Approximately 800 meters south of SGS Site	1940	Not evaluated
8PU1379	299 West River Road, Cottage 1	Approximately 800 meters south of SGS Site	1940	Not evaluated

TABLE 2.2.6-2

IDENTIFIED ARCHAEOLOGICAL RESOURCES

FMSF #	Name	Distance from SGS Site	T/R/S	Site Type	Cultural Affiliation	*NRHP* Status
8PU114	Hart Homestead	Within SGS Site	9S/27E/7	Historic home site	Unspecified	Not evaluated
8PU115	Hampton Homestead	Within SGS Site	9S/27E/7	Historic home site	Unspecified	Not evaluated
8PU116	Crews Homestead	Within SGS Site	9S/27E/8	Historic home site	Unspecified	Not evaluated
8PU684	No name	Approximately 800 meters west of SGS Site	9S/26E/13	Unspecified	Unspecified	Not evaluated
8PU1188	FAS 1	Approximately 800 meters west of SGS Site	9S/26E/12	campsite	Late Archaic – St. Johns period	Ineligible
8PU1189	FAS 2	Adjacent to SGS Site	9S/26E/6	campsite	Orange – St. Johns I period	Ineligible

TABLE 2.2.8-1

EXISTING LINK OPERATION FOR THE A.M. PEAK HOUR

Road	Limits	Direction	Accept LOS	Max SV	Exist Vol	LOS
U.S. Highway 17	North of Project Entrance	NB	B	1,470	608	B
		SB	B	1,470	819	B
	Project Entrance to County Road 209	NB	B	1,470	639	B
		SB	B	1,470	844	B
	South of County Road 209	NB	B	1,470	701	B
		SB	B	1,470	1,029	B
County Road 209	West of U.S. Highway 17	EB	D	720	54	C
		WB	D	720	122	C
	East of U.S. Highway 17	EB	D	720	108	C
		WB	D	720	300	C

Source: Florida Design Consultants, 2006

TABLE 2.2.8-2

EXISTING LINK OPERATION FOR THE P.M. PEAK HOUR

Road	Limits	Direction	Accept LOS	Max SV	Exist Vol	LOS
U.S. Highway 17	North of Project Entrance	NB	B	1,470	811	B
		SB	B	1,470	926	B
	Project Entrance to County Road 209	NB	B	1,470	764	B
		SB	B	1,470	973	B
	South of County Road 209	NB	B	1,470	1,068	B
		SB	B	1,470	1,386	B
County Road 209	West of U.S. Highway 17	EB	D	720	112	B
		WB	D	720	143	B
	East of U.S. Highway 17	EB	D	720	207	B
		WB	D	720	236	B

Source: Florida Design Consultants, 2006

TABLE 2.3.3-1

MEAN MONTHLY TEMPERATURE, PRECIPITATION, AND EVAPORATION

Month	Temperature[1] (1948-2004)	Precipitation[1] (1948-2004)	Evaporation[2] (1953-1990)
January	57.1	2.83	2.93
February	59.7	3.30	3.64
March	65.1	3.93	5.52
April	70.7	2.68	6.94
May	76.5	3.28	7.92
June	81.1	6.12	7.51
July	82.5	7.05	7.10
August	82.4	7.29	6.57
September	79.7	7.46	5.66
October	72.8	4.05	4.92
November	64.6	2.05	3.49
December	58.8	2.59	2.74
Annual	70.9	52.63	64.94

Notes:

[1] Data from NOAA Hydrologic Data Systems Group for Station 08 6753 Palatka, FL.

[2] Data from NOAA Climatic Data Center "Climatological Data: Florida for Gainesville, FL.

TABLE 2.3.3-2
CONSUMPTIVE USE PERMITS IN VICINITY OF THE PROJECT SITE

Permit ID	Project Name	Applicant Name	Mailing Address	City	State	Zip	Receive Date	Issue Date	Expire Date	Permit Status	Project Acreage	Total Number of Wells	Total Number of Pumps	Current Year Water Allocation (MGY)	Allocation Source
7938	Edgewater Farms														
7975	W. C. JONES & SONS TRUST	Wilson Farm	7849 CR 214	Saint Augustine	FL	32092	4/1/1987			Undetermined Permit Status	325	8	0	129.3	Ground
8042	Battaglia Farms	Mr James Singleton	411 Putnam Co Blvd	East Palatka	FL	32131	8/6/1999	8/26/1999	8/26/2019	Active	62	2	0	34.8	Ground
8084	Fire House Pump CUP														
8127	Palm Port	Aqua Utilities Florida	6960 Professional Parkway East, Suite 400	Sarasota	FL	34240	7/2/2004	7/2/2004	5/2/2021	Active	75	1	0	7.7	Ground
50221	GP Palatka Operations	Mr Ted Kennedy	CR 216	Palatka	FL	32177	11/12/1997	3/12/2002	3/12/2012	Active	5414	29	13	876	Ground
50221	GP Palatka Operations	Mr Ted Kennedy	CR 216	Palatka	FL	32177	11/12/1997	3/12/2002	3/12/2012	Active	5414	29	13	9825	Surface
60663	Lafarge Gypsum	Bill Brundage Plant Mgr.	886 N. Highway 17	Palatka	FL	32177	9/9/2003	12/2/2003	12/2/2023	Active	88	4	0	163.52	Ground
90227	SJHWA Water Distribution System	St Johns Harbor Water Association	152 Basin Dr	Palatka	FL	32177	8/13/2003			Undetermined Permit Status	8	3	0		
7922	Jasper Ballard	Mr Jasper Ballard	2209 Land Harbor	Newland	NC	28657	4/27/1998	6/11/1998	6/11/2018	Active	108	4	0	60.7	Ground
8122	Alford Farm	Mr Joe McGee	2925 Huntleigh Dr Suite 204	Raleigh	NC	27604	6/4/1999	9/30/1999	9/30/2019	Active	82	2	0	46	Ground
7998	Arledge Farm	Joseph McGee	2925 Huntleigh Dr Suite 204	Mordecai	NC	27604	11/10/1999	1/18/2000	1/18/2020	Active	140	3	0	89.4	Ground
7911	Stewart Farms	Mr George E Stewart Sr	RR 1 Box 64	East Palatka	FL	32131	4/10/1998	6/6/1998	6/6/2018	Active	155	8	0	163.3	Ground
7931	Mr Robert L Revels	Mr Robert L Revels	PO Box 909	East Palatka	FL	32131	2/25/1998	5/12/1998	5/12/2018	Active	760	17	0	545.8	Ground
8047	Barstow Farm	Fred Tibbetts	4309 Blue Heron Dr	Ponte Vedra Beach	FL	32082	10/31/2000	2/16/2000	2/16/2020	Active	170	4	0	274.6	Ground
7997	W W Tilton	Mr W W Tilton Jr	120 Turner Rd	East Palatka	FL	32131	7/20/1999	9/7/1999	9/7/2019	Active	490	10	0	340.8	Ground
7923	MICHAEL BALLARD	Mr Michael Ballard	PO Box 520	Hollister	FL	32147	5/8/1998	6/6/1998	6/6/2018	Active	79	2	0	44.4	Ground
3698	Hunt Farms	Mr JOHN R HUNT	137 Knowles Rd	East Palatka	FL	32131-4109	9/7/1999	10/29/1999	10/29/2019	Active	55	3	0	30.9	Ground
8123	Cantrell Farm	Mr Joe McGee	2925 Huntleigh Dr Suite 204	Raleigh	NC	27604	6/4/1999	9/3/1999	9/3/2019	Active	166	6	0	137.8	Ground
7942	Shamrock Farms	L and M Farms	2925 Huntleigh Dr Suite 204	Raleigh	NC	27604	7/10/2000	8/28/2000	8/28/2020	Active	60	4	0	100.3	Ground
7969	Alton J. Roberts	Donald Sweat Farms	RR 2 Box 185	East Palatka	FL	32131	6/18/1998			Under Review - Information subject to change	170	10	0		
7963	Anguilla Fish Farm	Anguilla Fish Farm	PO Box 817	Hastings	FL	32145-0817	3/9/1992	3/10/1993	3/10/2000	Active	32	10	0	1708.2	Ground
7964	Daniel L. Byrnes	Daniel L Byrnes	PO Box 8	Hastings	FL	32145	6/17/1998	9/2/1998	9/2/2018	Active	210	11	0	118.03	Ground
320	Mays Landing	Byrnes Farm Inc	PO Box 8	Hastings	FL	32145	7/18/2003	10/10/2003	10/10/2023	Active	55	2	0	30.9	Ground
50246	R M Miles	Mr Robley Miles	7312 A1A South	Saint Augustine	FL	32086	12/3/1997	6/6/1998	6/6/2018	Active	42	1	0	23.6	Ground
3606	Jack Lee Farm	Bulls-Hit Ranch & Farm Inc	9165 Hastings Palatka	Hastings	FL	32145	9/13/2001	10/26/2001	10/26/2021	Active	120	3	0	108.5	Ground
1622	Shirley Adams	Daniel Byrnes	PO Box 8	Hastings	FL	32145	6/17/1998	9/2/1998	9/2/2018	Active	160	3	0	217.66	Ground
8058	Federal Point	Mr Frank C Johns Jr	6245 CR 13 S	Hastings	FL	32145	5/8/1995	7/11/1995	7/11/1999	Active	88	3	0	140.06	Ground
8059	McCallum Field	Mr Frank C Johns Jr	6245 CR 13 S	Hastings	FL	32145	5/5/1999	6/7/1999	6/7/2019	Active	65	5	0	110.4	Ground
7916	Don P Hunt Farms	Don P Hunt Farms	PO Box 415	Hastings	FL	32145	4/7/1998	6/6/1998	6/6/2018	Active	90	3	0	50.6	Ground
149	BULLS-HIT RANCH & FARM	Thomas R Lee	9165 Hastings-Palatka Rd	Hastings	FL	32145	2/7/2000	7/11/2000	7/11/2020	Active	455	15	0	326.01	Ground
8114	R. C. Willis WTP	City of Palatka	320 N Moody Rd	Palatka	FL	32177	10/1/1996	8/12/1997	8/12/2004	Active	183	8	0	1106	Ground
7991	St Johns River Community College	St Johns River Community College	5001 St Johns Ave	Palatka	FL	32177	10/9/2001	11/30/2001	11/30/2021	Active	15	1	0	6	Ground
7962	Palatka High	Putnam County District School Board	124 W Lewis Broer Rd	East Palatka	FL	32131	11/15/2001	12/17/2001	12/17/2021	Active	20	1	0	19.1	Ground
92165	East Putnam County Water System	Putnam County Board of Co Commissioners	514 St. Johns Ave	Palatka	FL	32177	1/23/2004			Under Review - Information subject to change	16000	4	0		
3673	Floraking Farm	L and M	Po Box 369	East Palatka	FL	32131	5/2/2003	7/2/2003	7/2/2023	Active	40	10	0	33.7	Ground
1012	Barnes Farms LTD	Mr Mark Barnes	PO Box 1026	Hastings	FL	32145	7/8/1998	1/12/1999	1/12/2019	Active	1001	32	0	1906.7	Ground
2827	Baucom's of Florida	Baucom's of Florida	3050 Britt Road	Mount Dora	FL	32757	3/6/2002	5/11/2004	5/11/2024	Active	86	14	4	8.97	Surficial
50226	Simpson Fruit Co.	Simpson Fruit Co	445 Limit Ave	Mount Dora	FL	32757	11/14/1997	2/17/1998	2/17/2008	Active	316	3	1	32.75	Surface
50226	Simpson Fruit Co.	Simpson Fruit Co	445 Limit Ave	Mount Dora	FL	32757	11/14/1997	2/17/1998	2/17/2008	Active	316	3	1	157.44	Ground
8124	Hiawatha Management	Hiawatha Management Inc.	116 Hiawatha Court	East Palatka	FL	32131	10/12/2000	6/28/2002	6/28/2022	Active	7	2	0	8	Ground
3671	Circle S Farms	Wayne Stewart	221 East McCormick	East Palatka	FL	32131	6/8/1998	8/17/1998	8/17/2018	Active	173	4	0	173.34	Ground
7957	Putnam Correctional Institution	Bill Thurber	2601 Blairstone Road	Tallahassee	FL	32399	9/18/2000	8/27/2002	8/27/2022	Active	70	3	0	40.7	Ground
3672	Ryan Farm	Byrnes Farms Inc	PO Box 8	Hastings	FL	32145	11/26/2001	6/25/1998	6/25/2018	Active	100	4	0	140.7	Surface
7990	RYAN FARM	Mr James D Carter Jr	12905 Phillips Hwy	Jacksonville	FL	32256	12/29/1998	3/19/1999	3/19/2019	Active	90	3	0	69.9	Ground
8197	Triangle														Ground
8200	Cabbage														Ground
8198	Allen 1&2														Ground
8199	Bray														Ground
7965	WB Farm														Ground
8202	Bray Back														Ground
8196	Canal														Ground
8194	Smith 40														Ground
8130	School Board Maintance Dept.			East Palatka											Ground
8193	Pole														Ground

TABLE 2.3.4-1
MEAN ANNUAL STREAMFLOW FOR ST. JOHNS RIVER

Station ID	Station Name	Drainage Area (sq. miles)	Annual Mean Streamflow (cfs)*	Discharge per Square Mile	Period of Record
02232000	Melbourne	968	681	0.70	1940-2002
02232400	Cocoa	1,331	1,012	0.76	1954-2002
02232500	Christmas	1,539	1,294	0.84	1934-2002
02234000	Lake Harney	2,043	1,757	0.86	1982-2002
02234500	Sanford	2,582	2,287	0.89	1988-2002
02236000	Deland	3,070	3,052	0.99	1934-2002
02236125	Astor	3,330	3,381	1.02	1995-2002
02244040	Buffalo Bluff	6,582	4,992	0.76	1995-2002
	Palatka	7,117	7,613	1.07	1968-1976
02246500	Jacksonville	8,850	3,799	0.43	1973-2000

Source: USGS Streamflow Statistics for the Nation Retrived on 6-6-05

TABLE 2.3.4-2
ST. JOHNS RIVER SURFACE WATER QUALITY NEAR SGS OUTFALL

Parameter		Average		Maximum	95th Precentile	Number of Samples		Class III Water Quality Standard[1]
Temperature (°F)*		77.10		92.28	57.26	947		92 or +5
Turbidity (NTU)		5.44		117.00	9.03	750		
pH		7.71		9.01	8.56	918		6.0 to 8.5
Oil and Greese (mg/L)		1.42		6.40	3.08	253		5
Ammonia, as NH4 (mg/L)		0.027		0.531	0.089	734		
Unionized Ammonia, as NH4 (mg/L)		0.00099		0.0284	0.0039	644		0.02
TKN, as N (mg/L)		1.30		2.40	1.78	717		
Nitrate+Nitrite, as N (mg/L)		0.052		0.410	0.190	344		
Nitraogen, total (mg/L)		1.304		2.237	1.831	317		
Phosphorus, total (mg/L)		0.074		0.682	0.119	708		
Ortho-phasphate (mg/L)		0.022		0.073	0.052	205		
Total Hardness, as CaCO3 (mg/L)		176		480	255	419		
Specific Conductivity (μmhos/cm)		940.3		1,516	1,327	978		1,991
Beryllium, annual average (μg/L)		0.022		0.050	0.038	22		0.13
Arsenic (μg/L)		2.23		8.85	8.85	214		50
Cadmium (μg/L)		0.57		2.20	1.00	415		1.77
Chromium (μg/L)		2.05		22.80	9.63	397		
Copper (μg/L)		1.76		17.00	5.00	424		15.1
Cyanide (μg/L)		1.70		4.00	2.60	33		5.2
Iron (mg/L)		0.20		1.52	0.43	433		1.0
Lead (μg/L)		1.77		10.00	3.26	375		6.5
Mercury (μg/L)		0.004		0.017	0.010	61		0.012
Nickel (μg/L)		3.56		53.00	9.45	376		84
Selenium (μg/L)		1.16		4.90	2.50	75		5
Silver (μg/L)		0.134		16.0	0.370	301		0.07
Zinc (μg/L)		9.00		196.0	25.0	443		193

Source: ECT, 2005.

* 95% Temperature is 5% low temperature

[1]Florida Administrative Code Chapter 62-302 Surface Water Quality Standards.

TABLE 2.3.6-1

THREATENED, ENDANGERED, AND SPECIES OF SPECIAL CONCERN KNOWN TO OCCUR IN PUTNAM COUNTY, FLORIDA (SOURCE: FLORIDA NATURAL AREAS INVENTORY, 2005)

Scientific Name	Common Name	Federal Status	State Status	Occurrence Status
	FISH			
Acipenser brevirostrum	shortnose sturgeon	LE	LE	C
Acipenser oxyrinchus oxyrinchus	Atlantic sturgeon	N	LS	C
Etheostoma olmstedi	tessellated darter	N	LS	C
Pteronotropis welaka	bluenose shiner	N	LS	C
	REPTILES AND AMPHIBIANS			
Rana capito	gopher frog	N	LS	C
Alligator mississippiensis	American alligator	T(S/A)	LS	C
Drymarchon corais couperi	eastern indigo snake	LT	LT	C
Gopherus polyphemus	gopher tortoise	N	LS	C
Pituophis melanoleucus mugitus	Florida pine snake	N	LS	C
Stilosoma extenuatum	*short-tailed snake*	*N*	*LT*	*C*
	BIRDS			
Aphelocoma coerulescens	Florida scrub-jay	LT	LT	C
Aramus guarauna	limpkin	N	LS	C
Egretta caerulea	little blue heron	N	LS	C
Egretta thula	snowy egret	N	LS	C
Egretta tricolor	tricolored heron	N	LS	P
Eudocimus albus	white ibis	N	LS	P
Falco peregrinus	peregrine falcon	LE	LE	P
Falco sparverius paulus	southeastern American kestrel	N	LT	C
Grus canadensis pratensis	Florida sandhill crane	N	LT	C
Haliaeetus leucocephalus	bald eagle	LT	LT	C
Mycteria americana	wood stork	LE	LE	C
Picoides borealis	red-cockaded woodpecker	LE	LT	C
	MAMMALS			
Podomys floridanus	Florida mouse	N	LS	C
Sciurus niger shermani	Sherman's fox squirrel	N	LS	C
Trichechus manatus	manatee	LE	LE	C
Ursus americanus floridanus	Florida black bear	C	LT	C
	INVERTEBRATES			
Procambarus pictus	Black Creek crayfish	N	LS	C

TABLE 2.3.6-1

THREATENED, ENDANGERED, AND SPECIES OF SPECIAL CONCERN KNOWN TO OCCUR IN PUTNAM COUNTY, FLORIDA (SOURCE: FLORIDA NATURAL AREAS INVENTORY, 2005)

Scientific Name	Common Name	Federal Status	State Status	Occurrence Status
	PLANTS			
Andropogon arctatus	pine-woods bluestem	N	LT	C
Arnoglossum diversifolium	variable-leaved Indian-plantain	N	LT	C
Balduina atropurpurea	purple honeycomb-head	N	LE	C
Calydorea coelestina	Bartram's ixia	N	LE	C
Carex chapmanii	Chapman's sedge	N	LE	C
Conradina etonia	etonia rosemary	LE	LE	C
Ctenium floridanum	Florida toothache grass	N	LE	C
Drosera intermedia	spoon-leaved sundew	N	LT	C
Hartwrightia floridana	hartwrightia	N	LT	C
Helianthus carnosus	lake-side sunflower	N	LE	R
Litsea aestivalis	pondspice	N	LE	C
Matelea floridana	Florida spiny-pod	N	LE	C
Parnassia grandifolia	large-flowered grass-of-parnassus	N	LE	C
Salix floridana	Florida willow	N	LE	C
Schwalbea americana	chaffseed	LE	LE	C
Sideroxylon lycioides	buckthorn	N	LE	C
Stylisma abdita	scrub stylisma	N	LE	C

Federal/State Status:
LT = Listed as Threatened
LE = Listed as Endangered
LS = Listed as Species of Special Concern
N = Not listed
T (S/A) = Listed as Threatened due to similarity of appearance

County Occurrence Status
Animals:
C = (Confirmed) Occurrence status derived from a documented record in the FNAI data base.
P = (Potential) Occurrence status derived from a reported occurrence for the county or the occurrence lies within the published range of the taxon.
N = (Nesting) For sea turtles only; occurrence status derived from documented nesting occurrences.

Plants:
C = (Confirmed) Occurrence status derived from a documented record in the FNAI data base or from a herbarium specimen.
R = (Reported) Occurrence status derived from published reports.

TABLE 2.3.6-2

SUMMARY BY GEAR, STRATUM, AND ZONE OF SPECIES COLLECTED DURING NORTHEAST FLORIDA STRATIFIED-RANDOM SAMPLING, 2004

Species	Gear and Strata			Zone				Totals
	21.3-m river seine	183-m haul seine	6.1-m otter trawl	A	B	C	D	
	E=384	E=192	E=396	E=204	E=204	E=276	E=288	E=972
Abudefduf saxatilis	1	.	.	.	1	.	.	1
Achirus lineatus	11	20	88	23	25	63	8	119
Aetobatis narinari	.	3	.	1	1	1	.	3
Albula vulpes	.	.	1	.	1	.	.	1
Alosa mediocris	2	1	.	1	.	.	2	3
Ameiurus catus	17	209	221	33	22	15	377	447
Ameiurus nebulosus	.	1	1	.	.	.	2	2
Amia calva	.	2	.	.	.	.	2	2
Anchoa hepsetus	5,255	.	739	2,736	2,488	711	59	5,994
Anchoa lyolepis	5	.	1	5	1	.	.	6
Anchoa mitchilli	59,091	.	6,951	33,247	20,310	8,395	4,090	66,042
Ancylopsetta quadrocellata	.	35	52	41	33	13	.	87
Anguilla rostrata	1	2	1	1	.	.	3	4
Archosargus probatocephalus	23	216	18	58	44	136	19	257
Arius felis	.	31	12	.	24	16	3	43
Astroscopus y-graecum	2	3	19	14	8	1	1	24
Bagre marinus	4	1	4	.	4	1	4	9
Bairdiella chrysoura	764	1,478	309	417	1,416	425	293	2,551
Bathygobius soporator	26	.	3	2	5	20	2	29
Bothidae spp.	1	.	.	.	1	.	.	1
Brevoortia spp.	6,783	21,538	25	561	1,027	4,797	21,961	28,346
Callinectes bocourti	.	.	1	.	1	.	.	1
Callinectes ornatus	.	.	1	.	1	.	.	1
Callinectes sapidus	505	289	1,200	362	388	519	725	1,994
Callinectes similis	143	22	167	130	176	24	2	332
Caranx hippos	7	56	.	8	30	22	3	63
Centropristis philadelphica	.	6	28	12	2	20	.	34
Centropristis striata	.	.	5	.	4	1	.	5
Chaetodipterus faber	.	2	19	5	12	4	.	21
Charybdis hellerii	.	1	3	3	1	.	.	4
Chasmodes bosquianus	4	.	.	.	2	2	.	4
Chilomycterus schoepfi	9	39	10	23	10	25	.	58
Chloroscombrus chrysurus	32	13	19	11	38	10	5	64
Citharichthys macrops	.	1	.	1	.	.	.	1
Citharichthys spilopterus	85	56	170	75	97	99	40	311
Cynoscion nebulosus	102	112	8	69	54	79	20	222
Cynoscion nothus	.	.	23	9	14	.	.	23

Species	Gear and Strata			Zone				Totals
	21.3-m river seine	183-m haul seine	6.1-m otter trawl	A	B	C	D	
	E=384	E=192	E=396	E=204	E=204	E=276	E=288	E=972
Cynoscion regalis	35	9	1,500	288	821	277	158	1,544
Dasyatis sabina	17	891	75	253	294	287	149	983
Dasyatis say	.	33	5	16	9	12	1	38
Diapterus auratus	26	101	7	21	39	24	50	134
Dormitator maculatus	.	3	2	.	.	.	5	5
Dorosoma cepedianum	1	30	3	.	1	5	28	34
Dorosoma petenense	95	25	12	19	2	96	15	132
Elassoma evergladei	1	.	.	1	.	.	.	1
Eleotris pisonis	.	.	1	.	.	1	.	1
Elops saurus	8	207	17	16	60	92	64	232
Esox americanus	.	1	.	.	.	.	1	1
Esox niger	.	3	.	.	.	.	3	3
Etropus crossotus	22	79	207	166	90	45	7	308
Eucinostomus gula	117	61	15	41	42	99	11	193
Eucinostomus harengulus	348	75	59	69	32	232	149	482
Eucinostomus spp.	301	.	174	27	54	338	56	475
Evorthodus lyricus	1	.	.	1	.	.	.	1
Farfantepenaeus aztecus	77	.	725	79	636	36	51	802
Farfantepenaeus duorarum	46	6	230	120	44	37	81	282
Farfantepenaeus spp.	546	.	594	198	240	382	320	1,140
Fundulus confluentus	4	.	.	.	.	1	3	4
Fundulus heteroclitus	3,088	.	.	1,542	1,361	168	17	3,088
Fundulus majalis	206	.	.	14	38	154	.	206
Fundulus seminolis	98	34	.	.	.	.	132	132
Gambusia holbrooki	225	.	.	51	8	9	157	225
Gobiesox strumosus	2	.	.	1	1	.	.	2
Gobioides broussoneti	.	.	7	.	.	.	7	7
Gobionellus boleosoma	209	.	8	61	29	77	50	217
Gobionellus oceanicus	8	.	21	3	2	19	5	29
Gobionellus shufeldti	127	.	252	22	9	19	329	379
Gobionellus smaragdus	7	.	.	1	2	4	.	7
Gobiosoma bosc	66	.	9	4	15	29	27	75
Gobiosoma robustum	1	.	1	1	.	1	.	2
Gobiosoma spp.	99	.	1	1	1	10	88	100
Gymnura micrura	.	13	11	8	16	.	.	24
Harengula jaguana	3,041	30	.	292	1,522	1,255	2	3,071
Heterandria formosa	5	.	.	.	.	.	5	5
Hippocampus erectus	.	.	4	3	.	1	.	4
Hypsoblennius hentzi	.	.	4	.	3	1	.	4
Hypsoblennius ionthas	1	.	.	.	1	.	.	1
Ictalurus punctatus	3	25	23	.	.	1	50	51
Jordanella floridae	2	.	.	.	.	.	2	2
Labidesthes sicculus	99	.	.	.	.	.	99	99

Species	Gear and Strata			Zone				Totals
	21.3-m river seine	183-m haul seine	6.1-m otter trawl	A	B	C	D	
	E=384	E=192	E=396	E=204	E=204	E=276	E=288	E=972
Lagodon rhomboides	551	1,756	76	199	167	706	1,311	2,383
Larimus fasciatus	.	.	14	8	5	1	.	14
Leiostomus xanthurus	39,792	1,547	13,806	16,767	15,925	15,622	6,831	55,145
Lepisosteus osseus	.	58	.	15	11	3	29	58
Lepisosteus platyrhincus	4	50	.	.	.	.	54	54
Lepomis auritus	140	53	4	.	.	.	197	197
Lepomis gulosus	2	1	1	.	.	.	4	4
Lepomis macrochirus	381	414	10	6	.	4	795	805
Lepomis marginatus	2	1	.	.	.	.	3	3
Lepomis microlophus	76	180	9	.	.	.	265	265
Lepomis punctatus	2	1	.	.	.	.	3	3
Lepomis spp.	24	.	.	.	.	1	23	24
Lepophidium brevibarbe	.	.	20	2	.	.	18	20
Limulus polyphemus	.	3	12	9	5	1	.	15
Litopenaeus setiferus	5,358	509	3,259	1,420	3,755	2,976	975	9,126
Lobotes surinamensis	6	.	.	.	5	1	.	6
Lucania goodei	6	.	.	.	.	.	6	6
Lucania parva	3,414	.	1	.	1	1	3,413	3,415
Lutjanidae spp.	1	.	.	1	.	.	.	1
Lutjanus analis	1	.	.	.	1	.	.	1
Lutjanus griseus	11	2	.	2	4	3	4	13
Lutjanus synagris	3	.	.	1	2	.	.	3
Membras martinica	47	.	.	3	35	8	1	47
Menidia menidia	12,373	.	7	6,650	3,774	1,780	176	12,380
Menidia spp.	3,396	.	.	28	43	665	2,660	3,396
Menippe spp.	2	.	.	.	1	1	.	2
Menticirrhus americanus	128	29	350	120	289	90	8	507
Menticirrhus littoralis	19	4	.	7	7	9	.	23
Menticirrhus saxatilis	34	.	4	3	29	6	.	38
Microgobius gulosus	32	.	68	1	2	32	65	100
Microgobius thalassinus	1	.	2	.	.	3	.	3
Micropogonias undulatus	2,402	338	8,336	1,268	3,512	1,072	5,224	11,076
Micropterus salmoides	80	121	.	.	.	1	200	201
Monacanthus hispidus	50	.	20	14	50	6	.	70
Morone saxatilis	1	.	.	1	.	.	.	1
Mugil cephalus	3,087	2,871	1	977	1,728	2,269	985	5,959
Mugil curema	499	710	.	99	278	660	172	1,209
Mugil spp.	1	.	.	.	1	.	.	1
Myrophis punctatus	.	.	3	.	1	1	1	3
Notemigonus crysoleucas	10	31	.	.	.	.	41	41
Notropis maculatus	54	.	.	.	.	.	54	54
Ogcocephalus radiatus	.	.	3	2	1	.	.	3
Oligoplites saurus	53	4	.	10	30	14	3	57

Species	Gear and Strata			Zone				Totals
	21.3-m river seine	183-m haul seine	6.1-m otter trawl	A	B	C	D	
	E=384	E=192	E=396	E=204	E=204	E=276	E=288	E=972
Ophichthidae spp.	1	1	.	.	2	.	.	2
Ophichthus gomesi	.	.	1	.	.	1	.	1
Ophidion holbrooki	.	.	8	8	.	.	.	8
Ophidion spp.	.	.	10	.	9	.	1	10
Ophidion welshi	.	.	2	1	1	.	.	2
Opisthonema oglinum	1,400	127	167	873	340	457	24	1,694
Opsanus tau	3	3	13	6	8	5	.	19
Orthopristis chrysoptera	134	5	124	83	93	76	11	263
Paralichthys albigutta	41	32	29	37	13	50	2	102
Paralichthys dentatus	4	6	11	10	5	5	1	21
Paralichthys lethostigma	45	65	102	29	35	86	62	212
Paralichthys squamilentus	9	.	.	3	5	1	.	9
Peprilus alepidotus	.	1	10	4	5	2	.	11
Peprilus burti	.	.	7	6	1	.	.	7
Peprilus spp.	.	.	3	3	.	.	.	3
Peprilus triacanthus	.	.	1	.	.	1	.	1
Poecilia latipinna	31	.	.	.	.	2	29	31
Pogonias cromis	3	52	2	23	6	26	2	57
Pomatomus saltatrix	33	56	.	12	36	37	4	89
Pomoxis nigromaculatus	2	7	22	.	.	.	31	31
Prionotus evolans	.	.	6	.	6	.	.	6
Prionotus scitulus	3	3	66	26	31	15	.	72
Prionotus tribulus	11	12	115	39	41	45	13	138
Rachycentron canadum	.	1	.	.	1	.	.	1
Sardinella aurita	2	.	.	.	1	1	.	2
Sciaenops ocellatus	96	270	39	4	71	188	142	405
Scomberomorus cavalla	.	2	.	2	.	.	.	2
Scomberomorus maculatus	.	32	.	3	16	13	.	32
Scophthalmus aquosus	.	.	1	.	.	1	.	1
Scorpaena brasiliensis	.	.	1	.	.	1	.	1
Selene setapinnis	.	.	4	4	.	.	.	4
Selene vomer	18	177	23	24	96	84	14	218
Sphoeroides nephelus	26	28	66	44	20	45	11	120
Sphoeroides spengleri	.	.	1	1	.	.	.	1
Sphyraena borealis	3	.	.	1	1	1	.	3
Sphyrna tiburo	.	13	1	6	8	.	.	14
Stellifer lanceolatus	2	.	3,099	1,439	1,209	433	20	3,101
Stomolophus meleagris	.	67	35	1	.	100	1	102
Strongylura marina	10	33	.	11	8	17	7	43
Strongylura spp.	15	.	.	3	2	3	7	15
Symphurus plagiusa	152	3	248	197	133	61	12	403
Syngnathus floridae	1	.	1	1	.	.	1	2
Syngnathus fuscus	3	.	3	2	2	1	1	6

Species	Gear and Strata			Zone				Totals
	21.3-m river seine	183-m haul seine	6.1-m otter trawl	A	B	C	D	
	E=384	E=192	E=396	E=204	E=204	E=276	E=288	E=972
Syngnathus louisianae	32	.	17	17	15	12	5	49
Syngnathus scovelli	55	.	16	2	5	7	57	71
Synodus foetens	91	4	57	30	72	40	10	152
Tilapia spp.	.	1	.	.	.	.	1	1
Trachinotus carolinus	806	11	.	108	503	206	.	817
Trachinotus falcatus	70	33	.	31	38	33	1	103
Trichiurus lepturus	1	.	16	6	4	5	2	17
Trinectes maculatus	35	15	1,313	761	139	110	353	1,363
Tylosurus acus	1	.	.	.	1	.	.	1
Urophycis floridana	.	.	36	20	13	3	.	36
Urophycis regia	.	.	52	42	3	2	5	52
Totals	**156,987**	**35,506**	**45,800**	**72,703**	**64,273**	**47,223**	**54,094**	**238,293**

Note: Effort, or the total number of hauls, is labeled 'E'. Taxa are arranged alphabetically

Source: Florida Marine Research Institute, 2004. Fisheries-Independent Monitoring program Annual Report. St. Petersburg, FL.

TABLE 2.3.7-1

MONTHLY AND ANNUAL AVERAGE TEMPERATURES MEASURED AT JACKSONVILLE INTERNATIONAL AIRPORT

	Daily Temperatures (°F)[a]			Extremes (°F)[b]	
Month	Average	Maximum	Minimum	Maximum	Minimum
January	53.8	64.2	41.9	85	7
February	56.6	67.3	44.3	88	19
March	62.1	73.4	49.8	91	23
April	68.1	78.6	54.6	95	34
May	74.7	84.3	62.5	100	45
June	80.1	88.7	69.4	103	47
July	82.5	90.8	72.4	105	61
August	81.8	89.4	72.2	102	59
September	78.6	86.1	69.4	100	48
October	70.4	79.1	59.7	96	36
November	62.0	72.5	50.8	88	21
December	55.5	65.8	44.1	84	11
Annual	68.8	78.3	57.6	105	7

[a] 30-year period of record, climatological normal, 1971 to 2000.
[b] 63-year period of record, 1942 to 2004.

Source: National Oceanic and Atmospheric Administration (NOAA), 2004.

TABLE 2.3.7-2

MONTHLY AND ANNUAL AVERAGE PRECIPITATION AND RELATIVE HUMIDITY MEASURED AT JACKSONVILLE INTERNATIONAL AIRPORT

Month	Precipitation (inches)			Humidity (%) hour (LT) [a]			
	Average[a]	Maximum[b]	Minimum[b]	1 a.m.	7 a.m.	1 p.m.	7 p.m.
January	3.69	10.20	0.06	86	88	59	76
February	3.15	11.12	0.52	85	88	55	71
March	3.93	10.71	0.18	86	89	52	68
April	3.14	11.61	0.14	86	89	49	65
May	3.48	10.43	0.18	88	90	53	68
June	5.37	17.15	1.59	90	90	59	75
July	5.97	16.21	1.97	90	91	60	76
August	6.87	16.24	1.83	92	93	62	80
September	7.90	19.36	1.02	93	94	65	83
October	3.86	13.44	0.16	92	93	61	84
November	2.34	7.85	0.00	90	92	59	84
December	2.64	9.77	0.04	88	90	61	82
Annual	52.34			89	91	58	76

Note: LT = local time.

[a] 30-year period of record, climatological normal, 1971 to 2000.
[b] 63-year period of record, 1942 to 2004.

Source: NOAA, 2004.

TABLE 2.3.7-3

SEASONAL AND ANNUAL AVERAGE WIND DIRECTION AND WIND SPEED MEASURED AT JACKSONVILLE INTERNATIONAL AIRPORT

Season	Average Wind Speed [mph (m/s)]	Calm (%)	Prevailing Wind	
			Direction	Average Wind Speed [mph (m/s)]
Winter	7.2 (3.2)	20.1	Northwest	9.8 (4.4)
Spring	7.3 (3.3)	21.4	Southeast	9.8 (4.4)
Summer	6.0 (2.7)	22.4	Southwest	7.2 (3.2)
Fall	6.4 (2.9)	22.8	Northeast	10.5 (4.7)
Annual	6.7 (3.0)	21.7	Northeast	10.5 (4.7)

[a] 5-year period of record, 1986 to 1990. The data for this period were also used in the air quality impact analyses for the Project.

Source: NOAA, 1986-1990.

TABLE 2.3.7-4

SEASONAL AND ANNUAL AVERAGE ATMOSPHERIC STABILITY CLASSES DETERMINED AT JACKSONVILLE INTERNATIONAL AIRPORT [A]

Season	Occurrence (%) of Stability Class					
	Very Unstable	Moderately Unstable	Slightly Unstable	Neutral	Slightly Stable	Moderately Stable
Winter	0.1	3.7	8.5	47.5	10.5	29.7
Spring	1.8	8.1	14.0	34.9	10.0	31.2
Summer	3.5	12.7	17.1	23.7	11.0	32.0
Fall	0.8	6.6	11.7	35.1	11.0	34.8
Annual	1.6	7.8	12.9	35.2	10.6	31.9

[a] 5-year period of record, 1986 to 1990. The data for this period were also used in the air quality impact analyses for the Project.

Source: NOAA, 1986-1990.

TABLE 2.3.7-5

SEASONAL AND ANNUAL AVERAGE MORNING AND AFTERNOON MIXING HEIGHTS DETERMINED AT JACKSONVILLE INTERNATIONAL AIRPORT [A]

	Mixing Height (m)	
Season	Morning	Afternoon
Winter	406	977
Spring	378	1,700
Summer	384	1,743
Fall	503	1,258
Annual	417	1,424

[a] 5-year period of record, 1986 to 1990. The data for this period were also used in the air quality impact analyses for the Project. Mixing heights based on surface temperatures and upper-air data from the NWS stations at Jacksonville International Airport and Waycross, Georgia, respectively.

Source: NOAA, 1986-1990.

TABLE 2.3.7-6

NATIONAL AND STATE AAQS, ALLOWABLE PSD INCREMENTS, AND SIGNIFICANT IMPACT LEVELS

Pollutant	Averaging Time	National AAQS ($\mu g/m^3$) Primary Standard	National AAQS ($\mu g/m^3$) Secondary Standard	Florida AAQS [a] ($\mu g/m^3$)	PSD Increments ($\mu g/m^3$) [a] Class I	PSD Increments ($\mu g/m^3$) [a] Class II	Significant Impact Levels[b] ($\mu g/m^3$) Class I	Significant Impact Levels[b] ($\mu g/m^3$) Class II
Particulate Matter [c] (PM_{10})	Annual Arithmetic Mean	50	50	50	4	17	0.2	1
	24-Hour Maximum	150	150	150	8	30	0.3	5
Sulfur Dioxide	Annual Arithmetic Mean	80	NA	60	2	20	0.1	1
	24-Hour Maximum	365	NA	260	5	91	0.2	5
	3-Hour Maximum	NA	1,300	1,300	25	512	1.0	25
Carbon Monoxide	8-Hour Maximum	10,000	10,000	10,000	NA	NA	NA	500
	1-Hour Maximum	40,000	40,000	40,000	NA	NA	NA	2,000
Nitrogen Dioxide	Annual Arithmetic Mean	100	100	100	2.5	25	0.1	1
Ozone [c]	1-Hour Maximum [d]	235	235	235	NA	NA	NA	NA
Lead	Calendar Quarter Arithmetic Mean	1.5	1.5	1.5	NA	NA	NA	NA

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

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

[b] Maximum concentrations, if exceeded, can require additional air quality impact analyses.

[c] On July 18, 1997, EPA promulgated revised AAQS for particulate matter and ozone. For particulate matter, $PM_{2.5}$ standards were introduced with a 24-hour average standard of 65 $\mu g/m^3$ (based on the 3-year averages of the 98th percentile values) and an annual standard of 15 $\mu g/m^3$ (3-year averages at community monitors). The O_3 standard was modified to be 0.08 ppm (160 $\mu g/m^3$) for the 8-hour average; achieved when the 3-year average of 99th percentile values is 0.08 ppm or less. These standards must be implemented in the 2007-2008 timeframe. The FDEP has not yet adopted the revised standards.

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

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

TABLE 2.3.7-7

Summary of Maximum Measured SO_2, PM_{10}, $PM_{2.5}$, NO_2, O_3, and CO Concentrations Observed from the Nearest Monitoring Stations Used to Represent Air Quality for the SECI SGS Unit 3 Project, 2002 through 2004

			Measurement Period		Concentration									
					1-Hour		3-Hour		8-Hour			24-Hour		Annual
AIRS No.	County	Location	Year	Months	Highest	2nd Highest	Highest	2nd Highest	Highest	2nd Highest	3-year Average 4th Highest	Highest	2nd Highest	Average
Sulfur dioxide		**Florida AAQS**			**NA**	**NA**	**NA**	**0.5 ppm**	**NA**	**NA**	**NA**	**NA**	**0.1 ppm**	**0.02 ppm**
12-107-1008	Putnam	Palatka, Comfort and Port Rd	2004	Jan-Dec	NA	NA	0.038	0.036	NA	NA	NA	0.013	0.010	0.0018
			2003	Jan-Dec	NA	NA	0.066	0.042	NA	NA	NA	0.016	0.014	0.0018
			2002	Jan-Dec	NA	NA	0.038	0.033	NA	NA	NA	0.018	0.009	0.0018
PM_{10} [a]		**Florida AAQS**			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**150 µg/m³**	**50 µg/m³**
12-107-1008	Putnam	Palatka, Comfort and Port Rd	2004	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	102	97	24.7
			2003	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	54	52	23.2
			2002	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	49	49	21.0
$PM_{2.5}$ [a]		**Florida AAQS**			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**65 µg/m³**	**15 µg/m³**	**NA**
12-031-0098	Duval	Jacksonville, 14932 Mandarin Rd.	2004	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	26.3 [b]	11.4	NA
			2003	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	20.5 [b]	9.4	NA
			2002	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	22.3 [b]	9.3	NA
Nitrogen dioxide		**Florida AAQS**			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**0.053 ppm**
12-031-0032	Duval	Jacksonville, Bennett/Kooker Park 2900 Bennett St.	2004	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0137
			2003	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0143
			2002	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0146
Ozone [a]		**Florida AAQS**			**NA**	**0.12 ppm**	**NA**	**NA**	**NA**	**NA**	**0.08 ppm**	**NA**	**NA**	**NA**
12-031-0100	Duval	Jacksonville, 13600 Wm Davis Pkwy	2004	Jan-Dec	0.110	0.099	NA	NA	NA	NA	0.0074	NA	NA	NA
			2003	Jan-Dec	0.102	0.094	NA	NA	NA	NA	0.0071	NA	NA	NA
			2002	Jan-Dec	0.087	0.081	NA	NA	NA	NA	NA	NA	NA	NA
12-001-3011	Alachua	Gainesville, 100 Savannah Rd	2004	Jan-Dec	0.093	0.082	NA	NA	NA	NA	0.0072	NA	NA	NA
			2003	Jan-Dec	0.089	0.087	NA	NA	NA	NA	0.0072	NA	NA	NA
			2002	Jan-Dec	0.090	0.085	NA	NA	NA	NA	0.0075	NA	NA	NA
Carbon Monoxide		**Florida AAQS**			**NA**	**35 ppm**	**NA**	**NA**	**NA**	**9 ppm**	**NA**	**NA**	**NA**	**NA**
12-031-0080	Duval	Jacksonville, 1605 Minerva St Lasalle St	2004	Jan-Dec	2.9	2.7	NA	NA	2.0	1.6	NA	NA	NA	NA
			2003	Jan-Dec	2.7	2.3	NA	NA	2.0	1.9	NA	NA	NA	NA
			2002	Jan-Dec	2.8	2.6	NA	NA	2.2	2.0	NA	NA	NA	NA

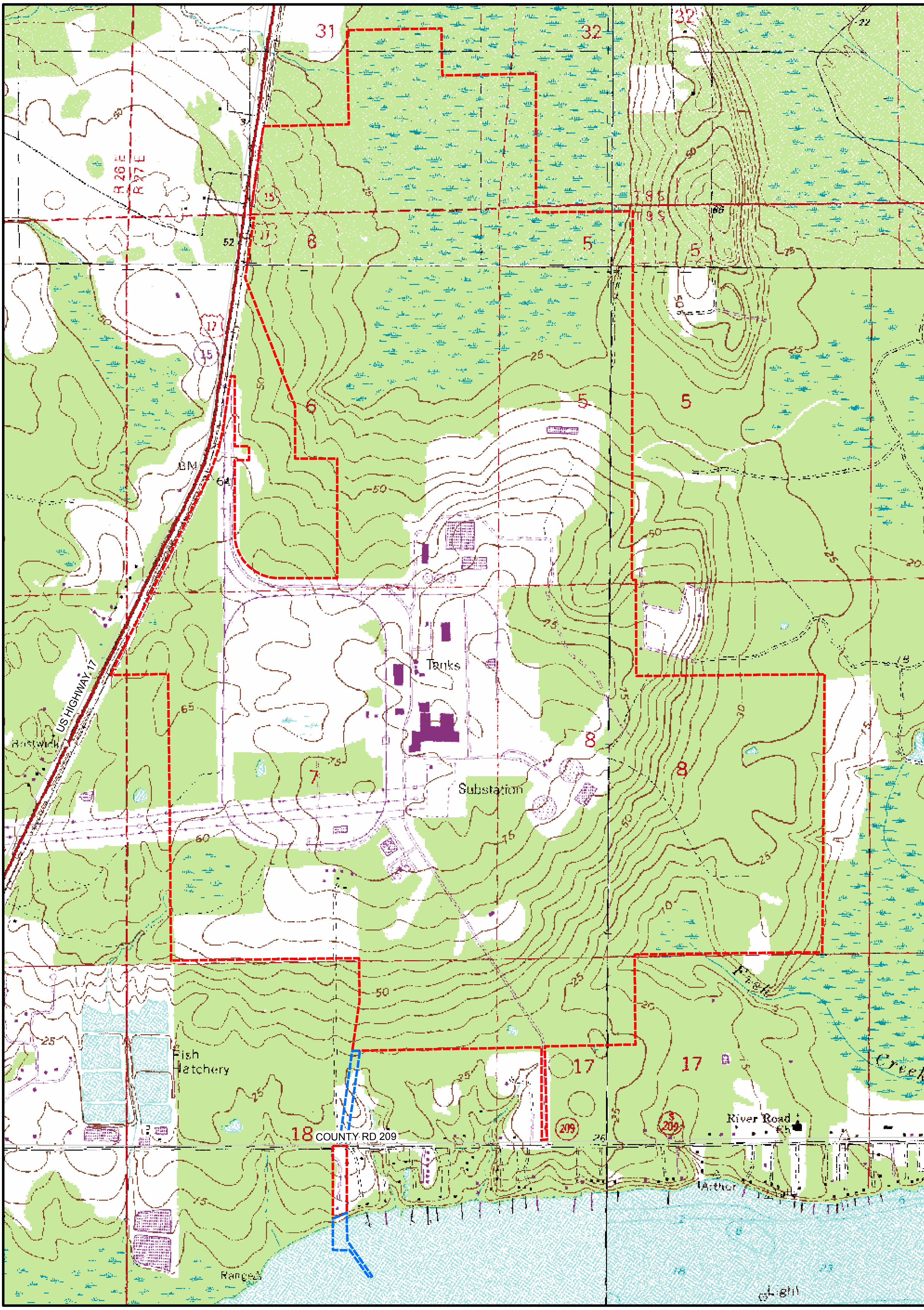
Note: NA = not applicable
AAQS = ambient air quality standard

[a] On July 18, 1997, EPA promulgated revised AAQS for particulate matter and ozone. For particulate matter, $PM_{2.5}$ standards were introduced with a 24-hour average standard of 65 µg/m³ (based on the 3-year averages of the 98th percentile values) and an annual standard of 15 µg/m³ (3-year averages at community monitors). The O_3 standard was modified to be 0.08 ppm for the 8-hour average, achieved when the 3-year average of 99th percentile values is 0.08 ppm or less.

[b] 98th percentile for the year

Source: EPA Aerometric Information Retrieval System, Air Quality Subsystem, Quick Look Reports, Florida: 2002, 2003, 2004.

FIGURES



0 0.25 0.5 Miles

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LEGEND

Easement

Property Boundary

REFERENCE

1.) Property parcel, Putnam County parcel data set and property legal description

2.) USGS Digital Raster Graphic (DRG) Florida Topographic Quadrangles (Bostwick, Hastings, Palatka, Riverdale), LABINS

PROJECT

SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNUM COUNTY, FL

TITLE

SITE LOCATION

Golder Associates
Tampa, Florida

PROJECT No. 053-9540			SCALE AS SHOWN	REV. 0
DESIGN	JWT	11/28/2005	2.1.1-1	
GIS	JWT	3/8/2006		
CHECK	MM	2/20/2006		
REVIEW	RAZ	2/20/2006		

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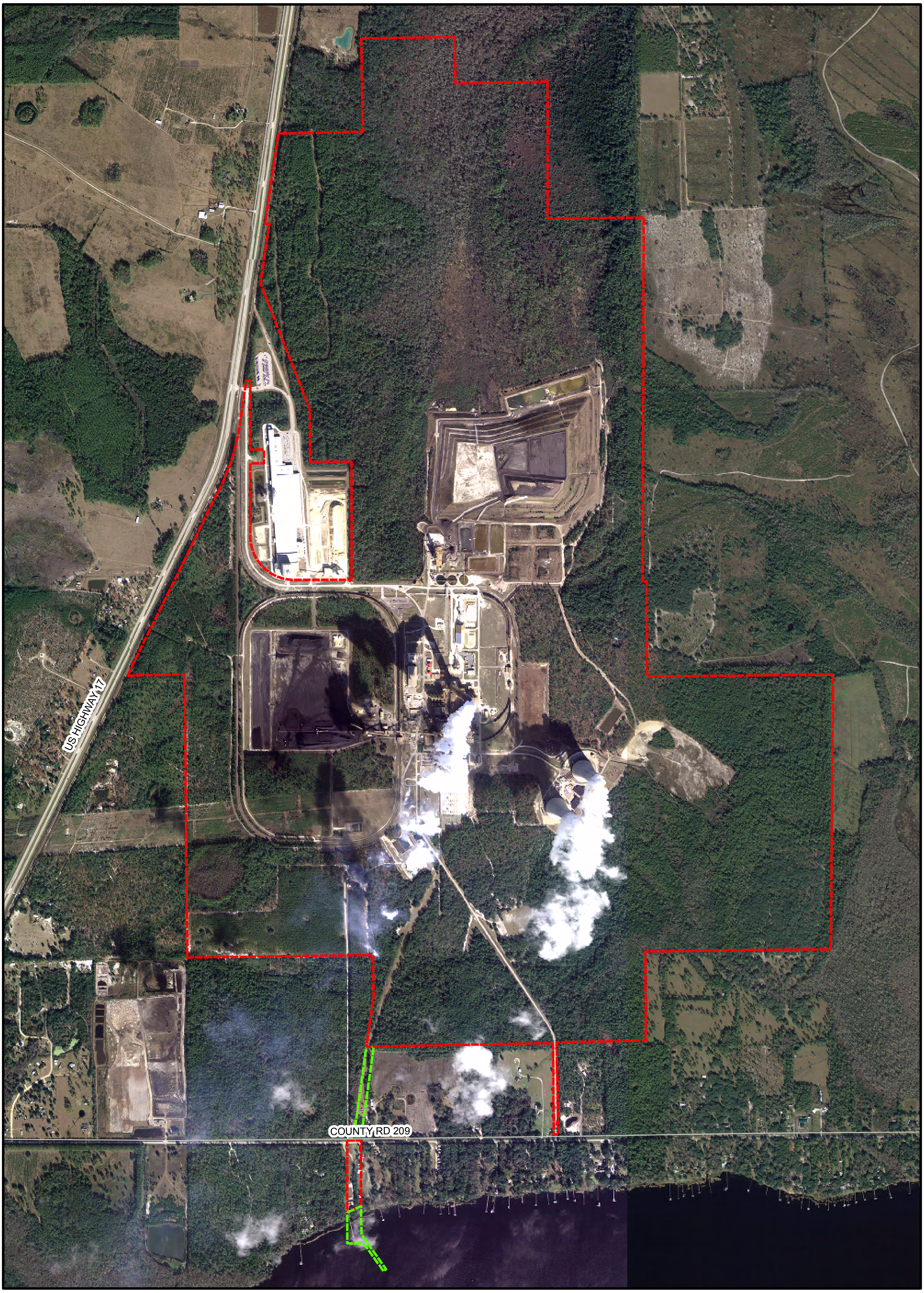

LEGEND

- Easement
- Property Boundary

REFERENCE

1.) Property parcel, Putnam County parcel data set and property legal description
2.) 2004 aerial photography, USGS Digital Ortho Quarter Quadrangles (DOQQ)

PROJECT
SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNUM COUNTY, FL

TITLE

AERIAL PHOTOGRAPH

Golder Associates
Tampa, Florida

PROJECT No. 053-9540			SCALE AS SHOWN	REV. 0
DESIGN	JWT	11/28/2005	2.1.2-1	
GIS	JWT	3/8/2006		
CHECK	MM	2/20/2006		
REVIEW	RAZ	2/20/2006		

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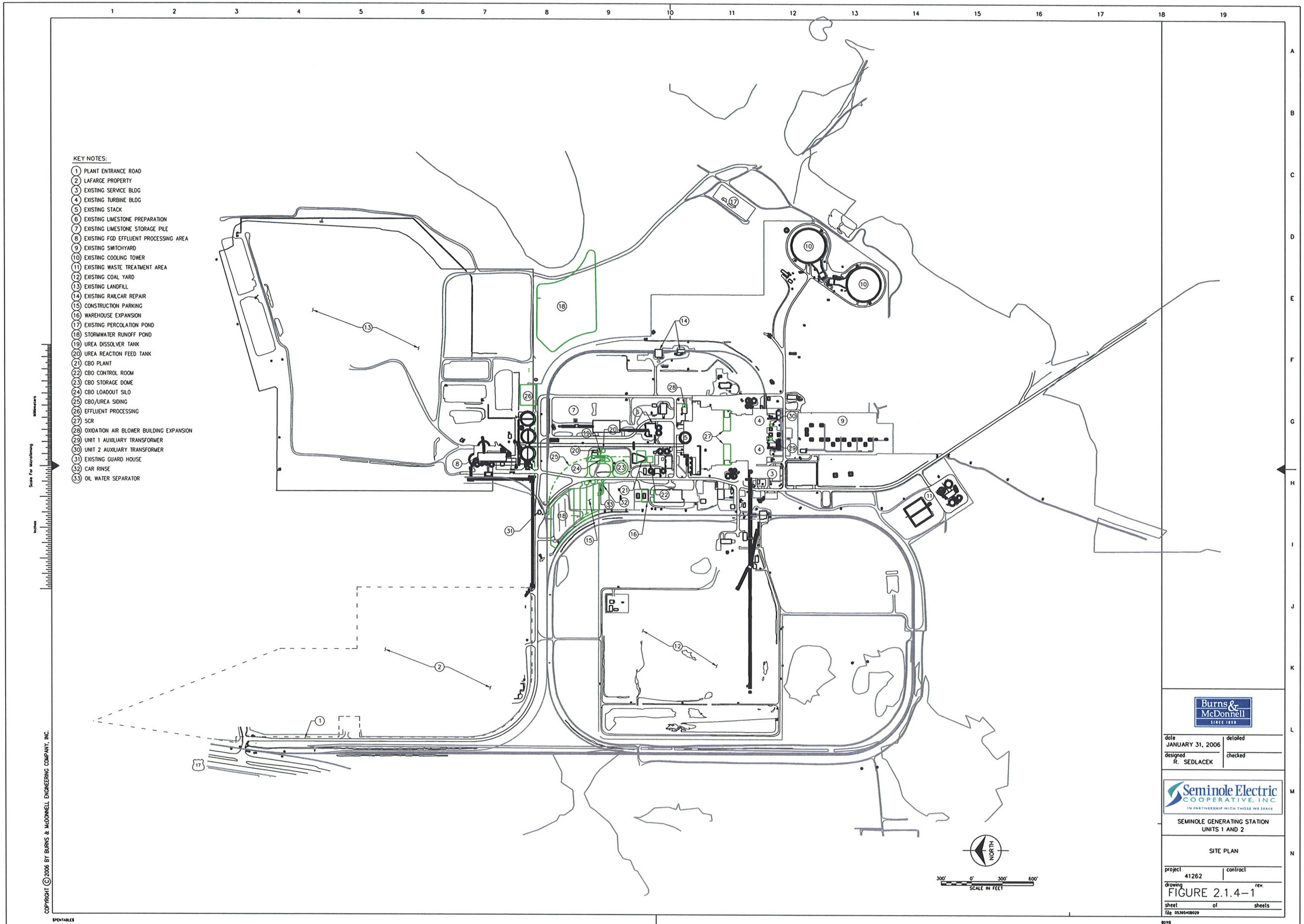


KEY NOTES:
1 PLANT ENTRANCE ROAD
2 LAFARGE PROPERTY
3 EXISTING SERVICE BLDG
4 EXISTING TURBINE BLDG
5 EXISTING STACK
6 EXISTING LIMESTONE PREPARATION
7 EXISTING LIMESTONE STORAGE PILE
8 EXISTING FGD EFFLUENT PROCESSING AREA
9 EXISTING SWITCHYARD
10 EXISTING COOLING TOWER
11 EXISTING WASTE TREATMENT AREA
12 EXISTING COAL YARD
13 EXISTING LANDFILL
14 EXISTING RAILCAR REPAIR
15 CONSTRUCTION PARKING
16 WAREHOUSE EXPANSION
17 EXISTING PERCOLATION POND
18 STORMWATER RUNOFF POND
19 UREA DISSOLVER TANK
20 UREA REACTION FEED TANK
21 CBO PLANT
22 CBO CONTROL ROOM
23 CBO STORAGE DOME
24 CBO LOADOUT SILO
25 CBO/UREA SIDING
26 EFFLUENT PROCESSING
27 SCR
28 OXIDATION AIR BLOWER BUILDING EXPANSION
29 UNIT 1 AUXILIARY TRANSFORMER
30 UNIT 2 AUXILIARY TRANSFORMER
31 EXISTING GUARD HOUSE
32 CAR RINSE
33 OIL WATER SEPARATOR
NORTH
300' 0' 300' 600'
SCALE IN FEET
Burns & McDonnell
SINCE 1898
date JANUARY 31, 2006
detailed
designed R. SEDLACEK
checked
Seminole Electric COOPERATIVE, INC.
IN PARTNERSHIP WITH THOSE WE SERVE
SEMINOLE GENERATING STATION UNITS 1 AND 2
SITE PLAN
project 41262
contract
drawing FIGURE 2.1.4–1
rev.
sheet of sheets

KEY NOTES:

1. PLANT ENTRANCE ROAD
2. LAFARGE PROPERTY
3. EXISTING SERVICE BLDG
4. EXISTING TURBINE BLDG
5. EXISTING STACK
6. EXISTING LIMESTONE PREPARATION
7. EXISTING LIMESTONE STORAGE PILE
8. EXISTING FGD EFFLUENT PROCESSING AREA
9. EXISTING SWITCHYARD
10. EXISTING COOLING TOWER
11. EXISTING WASTE TREATMENT AREA
12. EXISTING COAL YARD
13. EXISTING LANDFILL
14. EXISTING RAILCAR REPAIR
15. CONSTRUCTION PARKING
16. CONSTRUCTION OFFICE TRAILER AREA
17. UNIT 3 TURBINE BLDG.
18. UNIT 3 BOILER
19. UNIT 3 PRECIPITATOR
20. UNIT 3 WET FGD
21. UNIT 3 STACK
22. UNIT 3 EFFLUENT PROCESSING
23. UNIT 3 HOUSE SPUR
24. UNIT 3 COOLING TOWER
25. UNIT 3 LIMESTONE PILE EXPANSION
26. UNIT 3 CONSTRUCTION LAYDOWN
27. EXISTING GUARD HOUSE
28. UNIT 3 COAL PILE LINER LIMIT
29. UNIT 3 LIMESTONE PREPARATION
30. UNIT 3 FUEL OIL STORAGE TANK
31. WASTE WATER SURGE POND
32. EXISTING PERCOLATION POND
33. TEMPORARY CONSTRUCTION WAREHOUSE
34. COAL CONVEYOR
35. UNIT 3 WET ESP
36. ZERO LIQUID DISCHARGE SYSTEM
37. STORMWATER RUNOFF POND
38. UNIT 3 CRUSHER HOUSE
39. FLY ASH SILO
40. CONDENSATE STORAGE TANK
41. LIMESTONE SLURRY TANK
42. LIMESTONE SLURRY EMERGENCY STORAGE TANK
43. COAL TRANSFER TOWER
44. EMERGENCY DIESEL GENERATOR
45. EXISTING TRANSFER SAMPLE TOWER DUST COLLECTOR
46. STACKER RECLAIMER W/SPRAY DUST SUPPRESSION - COAL PILE A
47. STACKER RECLAIMER W/SPRAY DUST SUPPRESSION - COAL PILE B
48. TRANSFER TOWER DUST COLLECTOR
49. CRUSHER TOWER DUST COLLECTOR
50. UNIT FEED SYSTEM DUST COLLECTOR
51. LIMESTONE TRANSFER TO BALL MILL DUST COLLECTOR
52. FLY ASH SILO BIN VENT
53. COAL PILE A
54. COAL PILE B
55. COAL PILE RUNOFF POND
56. SWITCHYARD EXPANSION
57. SEWAGE TREATMENT PLANT
58. EXISTING PERMITTED LANDFILL LIMIT
59. UREA DISSOLVER TANK
60. UREA REACTION FEED TANK
61. CBO PLANT
62. CBO CONTROL ROOM
63. CBO STORAGE DOME
64. CBO LOADOUT SILO
65. WAREHOUSE EXPANSION
66. SCR
67. OXIDATION AIR BLOWER BUILDING EXPANSION
68. UNIT 1 AUXILIARY TRANSFORMER
69. UNIT 2 AUXILIARY TRANSFORMER
70. UNIT 1 AND 2 CONSTRUCTION PARKING
71. CAR RINSE
72. AS-RECEIVED TRANSFER TOWER ADDITION
73. UNIT 3 STEP-UP TRANSFORMER
74. UNIT 3 START-UP TRANSFORMER
75. EXISTING BORROW PIT AREA
76. AS-RECEIVED SAMPLING SYSTEM
77. UNIT 3 RECLAIM HOPPERS
78. OIL WATER SEPARATOR
79. BORROW PIT AREA EXPANSION
80. UNIT 3 PLANT MAKE-UP WATER LINE
81. GYPSUM CONVEYOR

Burns & McDonnell

date AUGUST 29, 2005 | detailed
designed R. SEDLACEK | checked

Seminole Electric Cooperative, Inc.

SEMINOLE GENERATING STATION UNIT 3

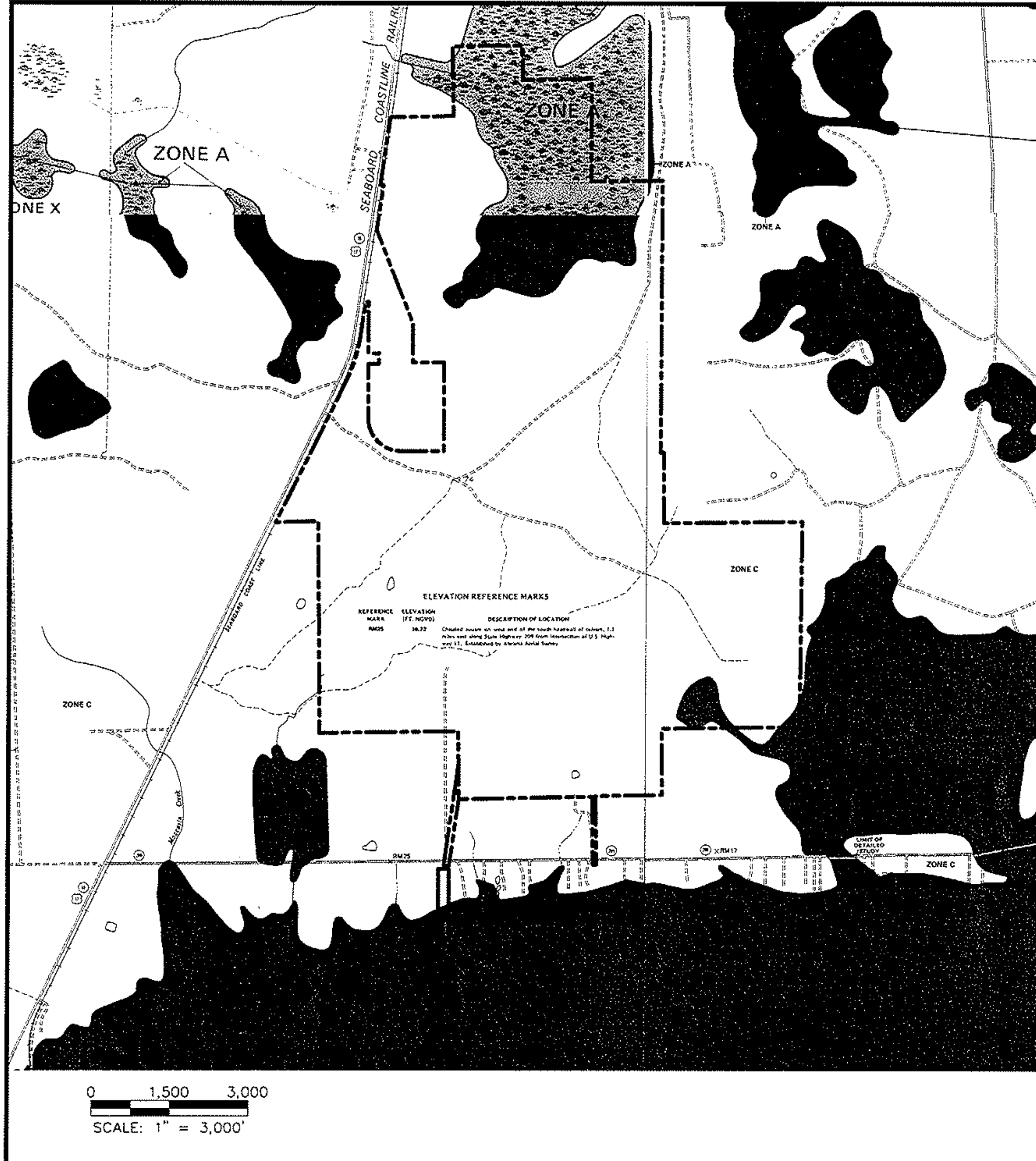
SITE PLAN

project | contract

drawing FIGURE 2.1.4-2 rev.

sheet of sheets

file 05305408027



KEY TO MAP

500-Year Flood Boundary — ZONE B

100-Year Flood Boundary

Zone Designations* With Date of Identification e.g., 12/2/74 — ZONE A DATE / ZONE A DATE

100-Year Flood Boundary

500-Year Flood Boundary — ZONE B

Base Flood Elevation Line With Elevation In Feet** — 513

Base Flood Elevation in Feet Where Uniform Within Zone** — (EL 987)

Elevation Reference Mark — RM7×

River Mile — •M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

INITIAL IDENTIFICATION:
JANUARY 10, 1975

FLOOD HAZARD BOUNDARY MAP REVISIONS:

FLOOD INSURANCE RATE MAP EFFECTIVE:
SEPTEMBER 16, 1981

FLOOD INSURANCE RATE MAP REVISIONS:

PROJECT

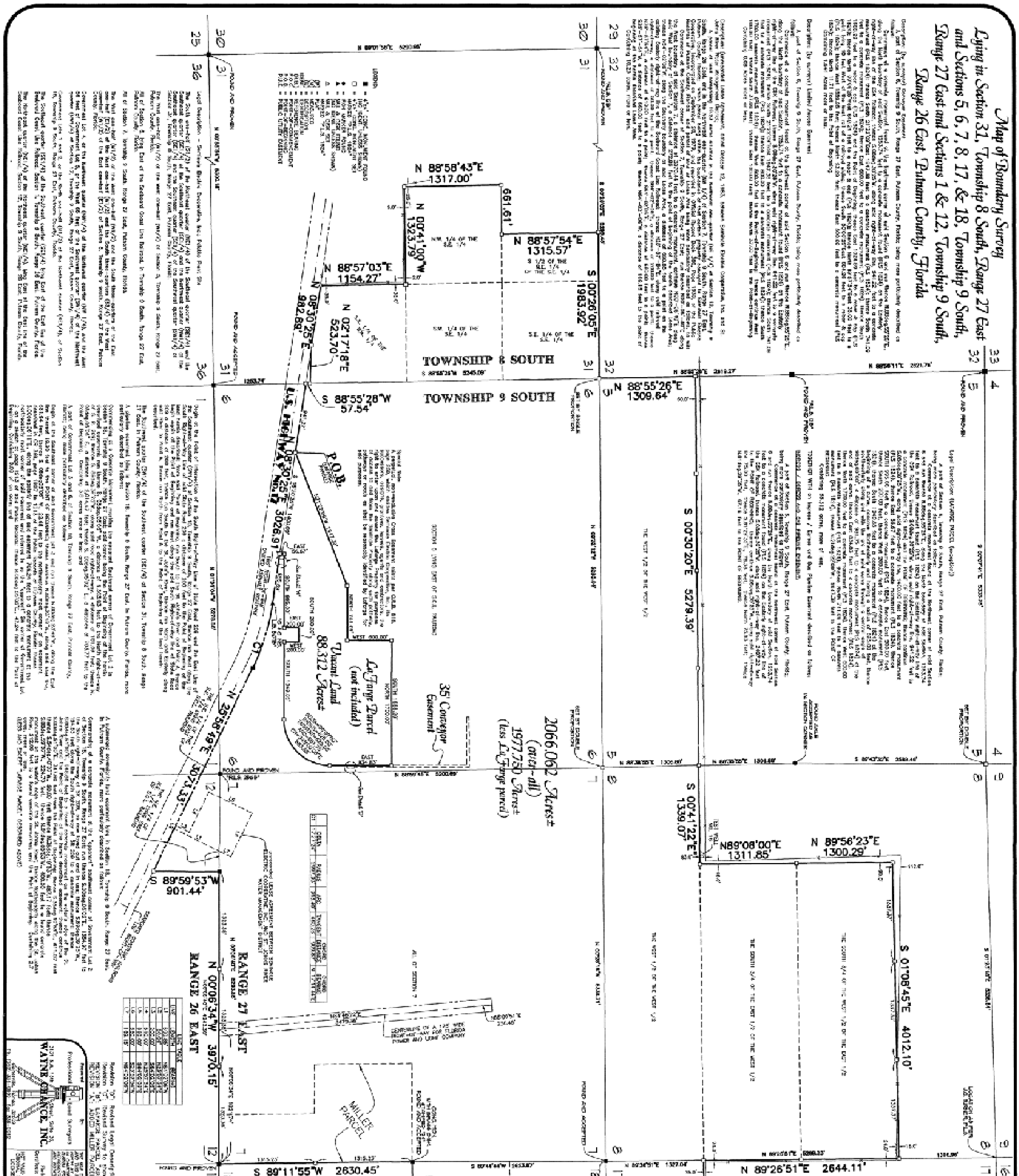
SEMINOLE ELECTRIC
PALATKA UNIT 3
PUTNAM COUNTY, FLORIDA

TITLE

FIRM MAP

Golder Associates
Tampa, Florida

PROJECT No.		053-9540	FILE No.
DESIGN	MEF	06/20/05	SCALE AS SHOWN REV. 0
CADD	MEF	06/20/05	
CHECK	MM	01/23/06	FIGURE 2.1.5-1
REVIEW			



N

REFERENCE

1.) Boundary Survey, Wayne Chance Inc. 1999

PROJECT SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNUM COUNTY, FL

TITLE

BOUNDARY SURVEY

PAGE 1 OF 2

PROJECT No. 053-9540			SCALE AS SHOWN	REV. 0
DESIGN	JWT	11/28/2005	**2.1.6-1**	
GIS	JWT	11/28/2005		
CHECK				
REVIEW				

Golder Associates
Tampa, Florida

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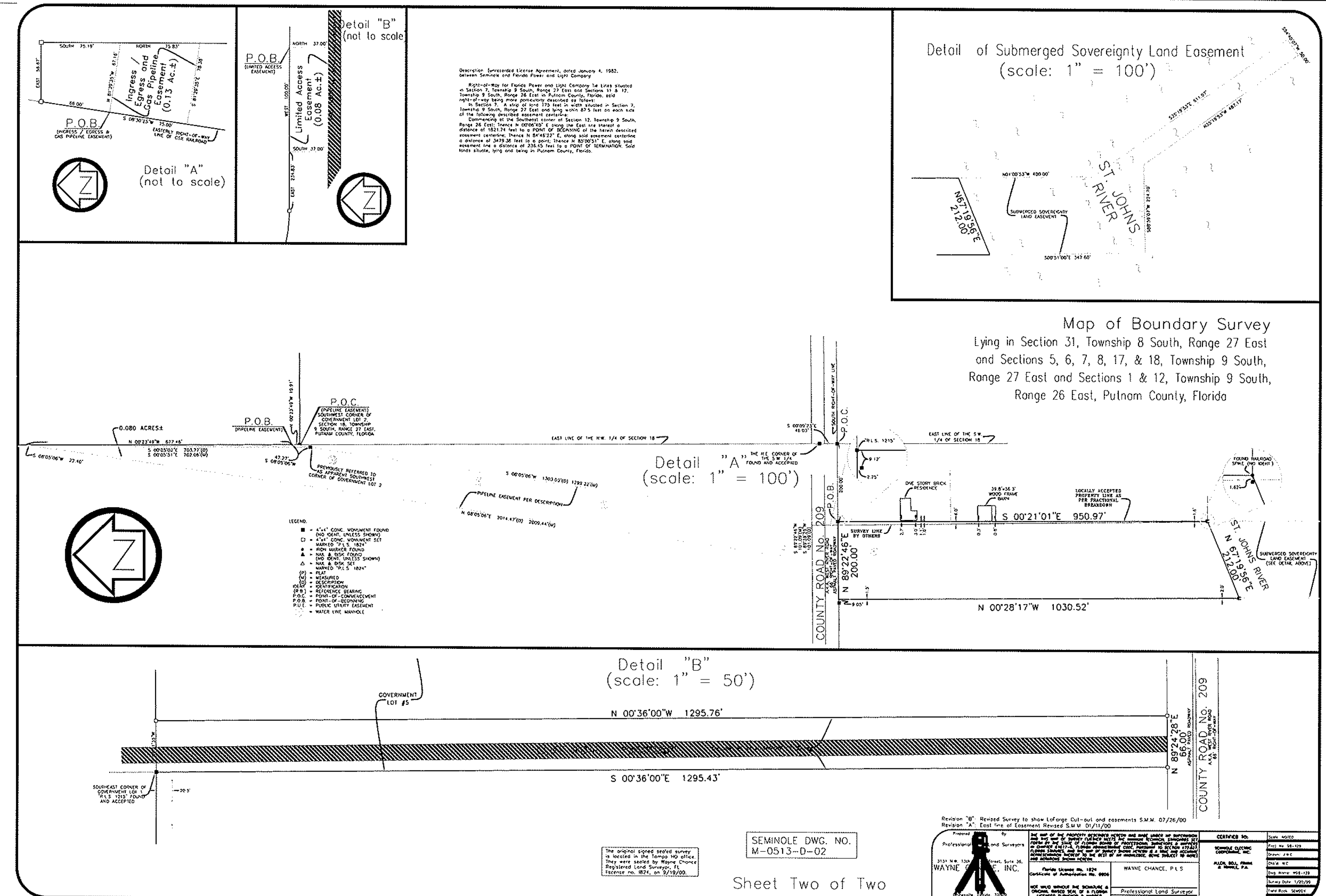
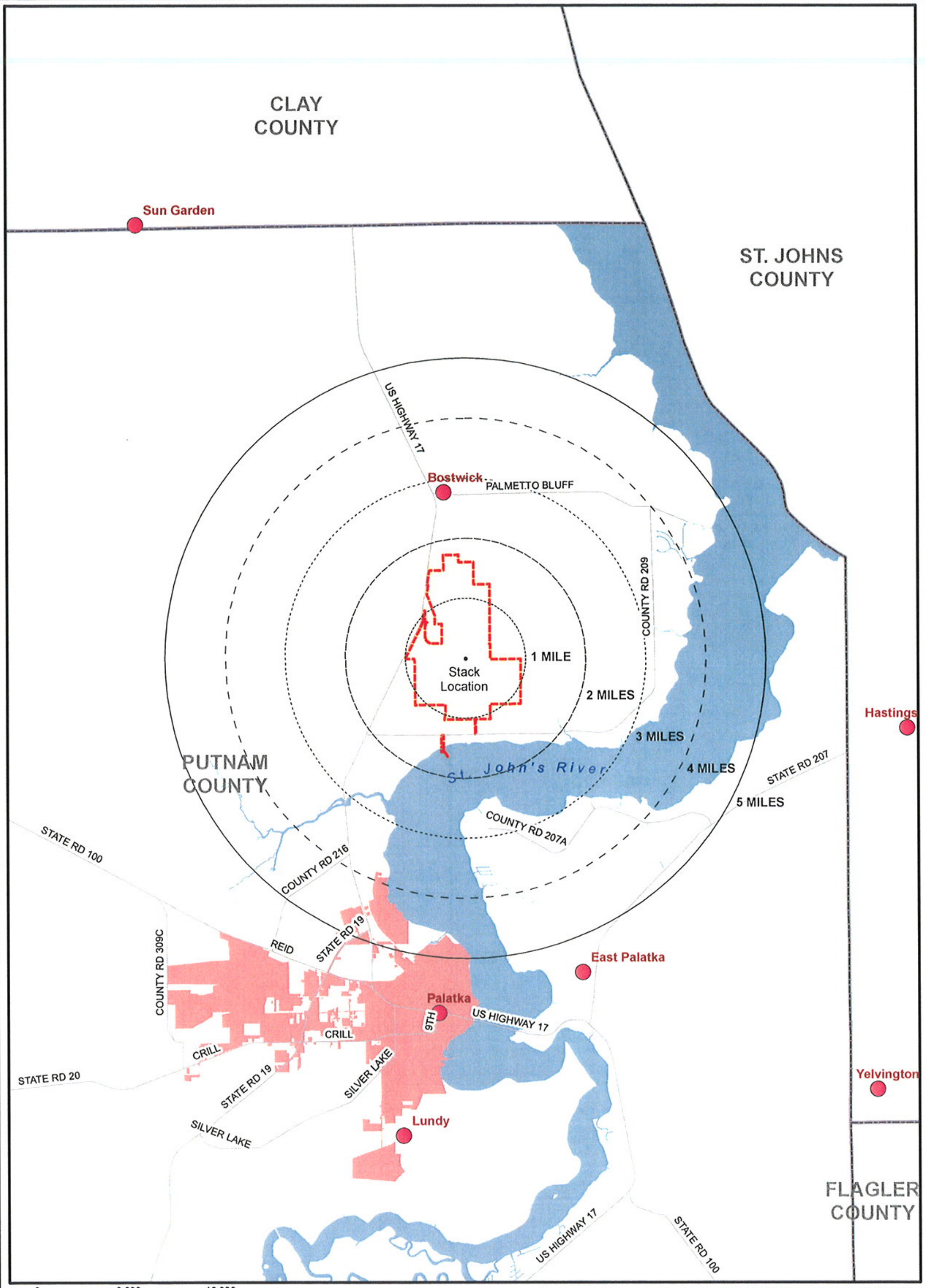


PROJECT	SEMINOLE ELECTRIC COOPERATIVE, INC. SGS UNIT 3 PUTNAM COUNTY, FLORIDA
TITLE	**BOUNDARY SURVEY PAGE 2 OF 2**

Golder Associates
Tampa, Florida

PROJECT No.		053-9540	FILE No.	05395408040.dwg
DESIGN	MEF	03/08/06	SCALE AS SHOWN	REV. 0
CADD	MEF	03/08/06	**FIGURE 2.1.6-1**	
CHECK	MM	03/08/06		
REVIEW	MM	03/08/06		

Drawing file: F:\PROJECTS\2005 PROJ\053-9540\05395408040.dwg Mar 08, 2006 - 2:53pm



0 8,000 16,000
Feet

N

LEGEND

- Cities, Towns, and Communities
- Municipalities
- County Boundary
- Easment
- Property Boundary
- Major Water

REFERENCE

1.) Property parcel, Putnam County parcel data set and property legal description
2.) Roads, major water, and municipality boundaries, Putnam County 2005

PROJECT	SEMINOLE ELECTRIC COOPERATIVE INC. SGS UNIT 3 PUTNUM COUNTY, FL
TITLE	**GOVERNMENTAL JURISDICTIONS WITHIN 1,2,3,4, AND 5 MILE RADII OF PROPOSED STACK**

Golder Associates
Tampa, Florida

PROJECT No. 053-9540			SCALE AS SHOWN	REV. 0
DESIGN	JWT	11/28/2005	**2.2.1-1**	
GIS	JWT	3/6/2006		
CHECK	MM	2/20/2006		
REVIEW	RAZ	2/20/2006		

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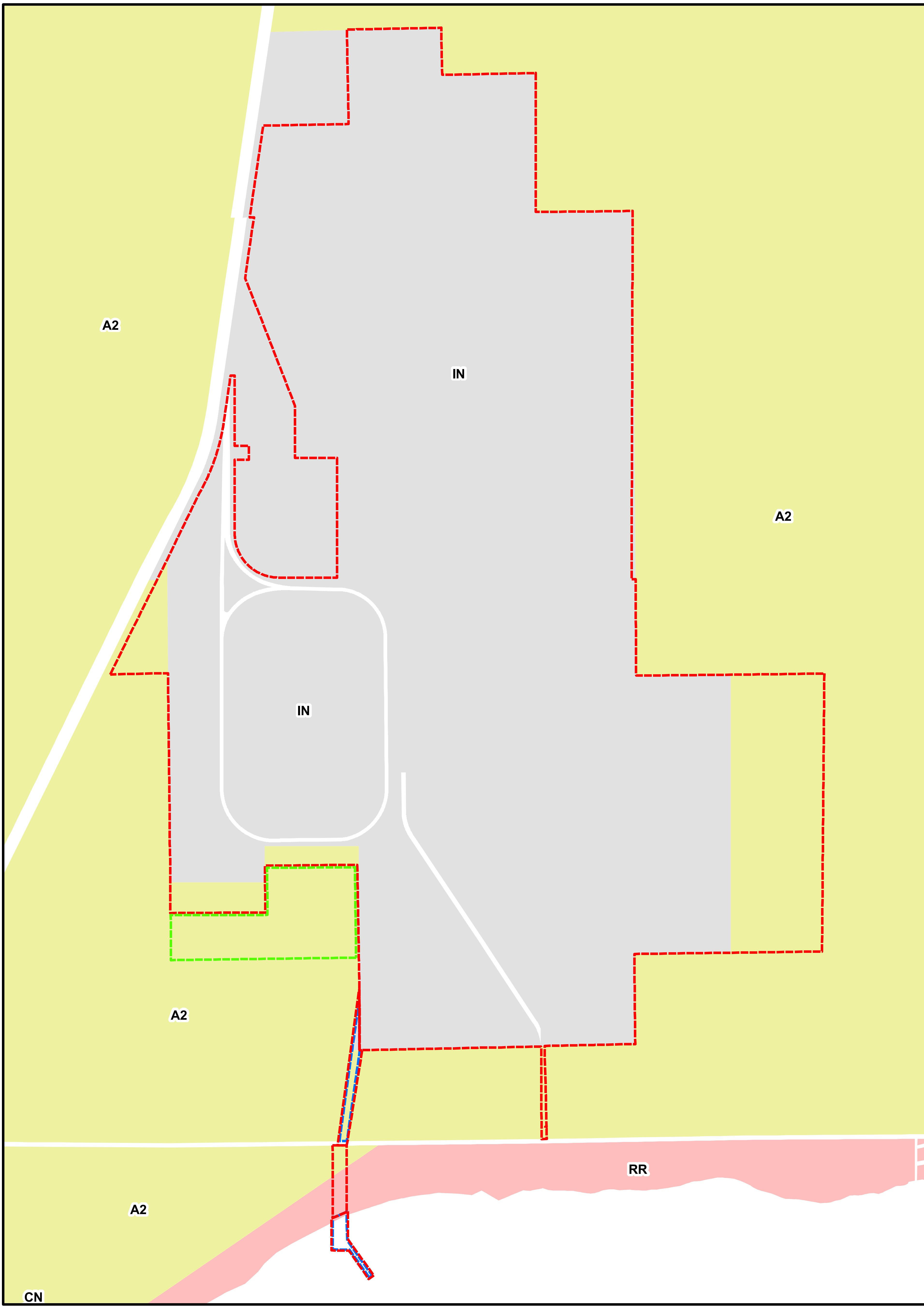

LEGEND

- Certified site boundary
- Easement
- Portion of SECI site, not part of certified site
- A2 - Agricultural II
- IN - Industrial
- RR - Rural Residential

REFERENCE

1.) Property parcel, Putnam County parcel data set and property legal description
2.) Future Land Use, Putnum County 2005

PROJECT SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNUM COUNTY, FL

TITLE

FUTURE LAND USE

Golder Associates
Tampa, Florida

PROJECT No. 053-9540			SCALE AS SHOWN	REV. 0
DESIGN	JWT	11/28/2005	**2.2.2-1**	
GIS	JWT	3/8/2006		
CHECK	MM	2/20/2006		
REVIEW	RAZ	2/20/2006		

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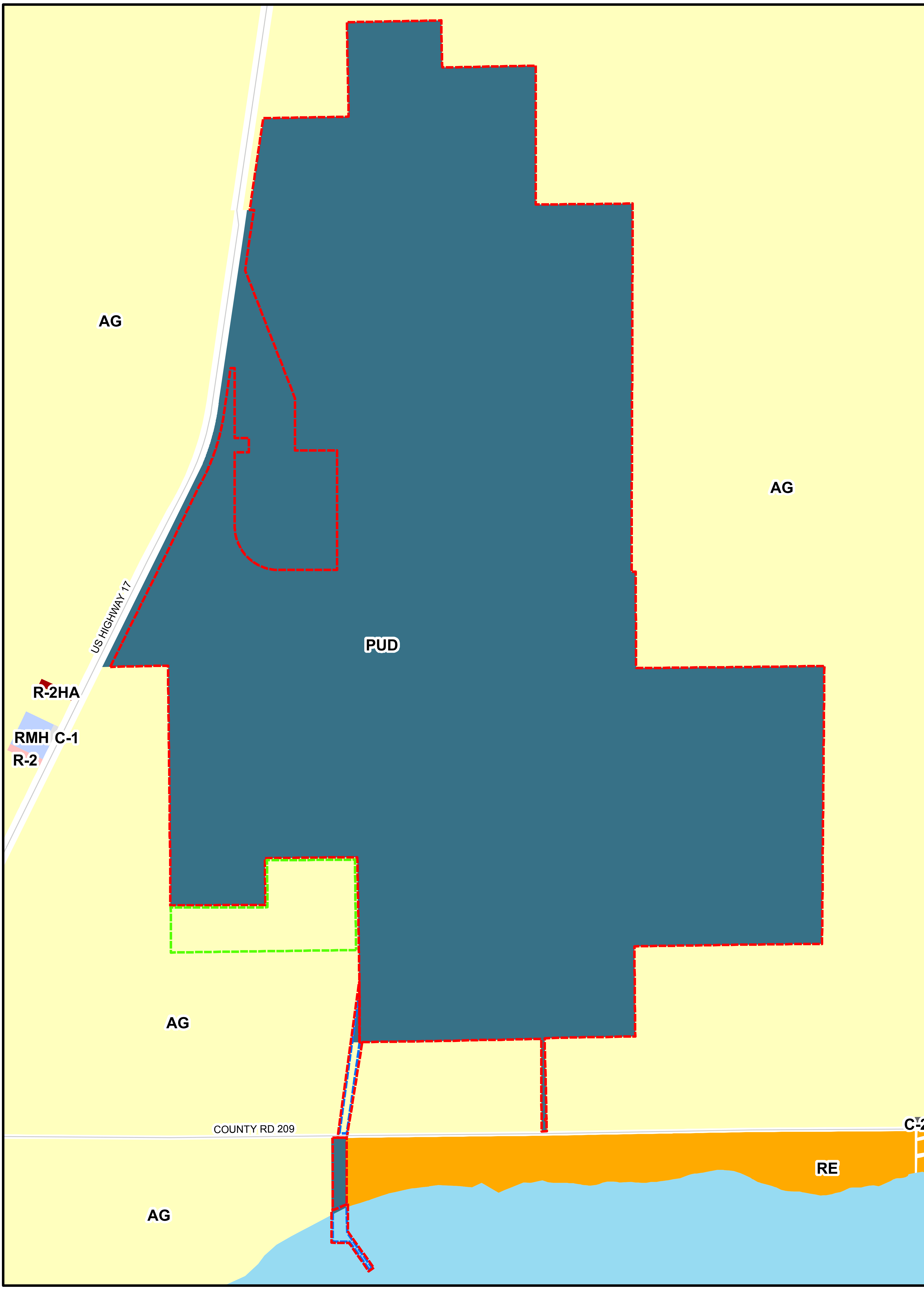

LEGEND

- Certified site boundary
- Easement
- Portion of SECI site, not part of certified site
- Water
- AG - Agriculture
- C-1 - Commercial
- C-2 - Commercial
- PUD - Planned Unit Developments
- R-2 - Residential, Mixed
- R-2HA - Residential, Mixed
- RE - Residential, Single Family Estate
- RMH - Residential, Mobile Home

N

0 0.25 0.5 Miles

REFERENCE

1.) Property parcel, Putnam County parcel data set and property legal description
2.) Zoning, Putnum County 2005

PROJECT
SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNUM COUNTY, FL

TITLE

ZONING

Golder Associates
Tampa, Florida

PROJECT No. 053-9540			SCALE AS SHOWN	REV. 0
DESIGN	JWT	11/28/2005	**2.2.2-2**	
GIS	JWT	3/8/2006		
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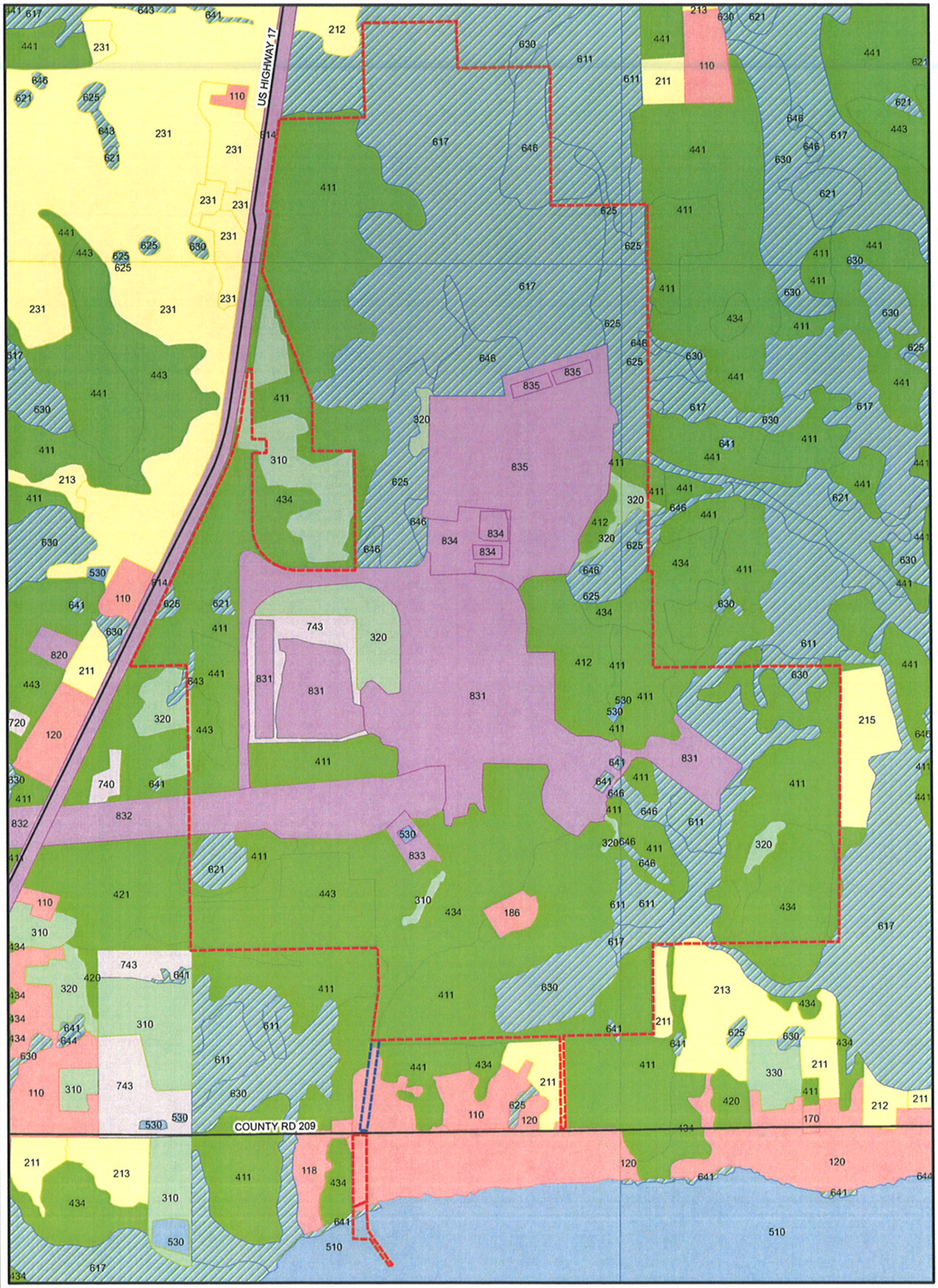


LEGEND

- Easment
- Property Boundary
- 100 - Urban and Built-up
- 200 - Agricultureal
- 300 - Upland Non-Forested
- 400 - Upland Forested
- 500 - Water
- 600 - Wetlands
- 700 - Barren Land
- 800 - Transportation Communication & Utilities

REFERENCE

1.) Property parcel, Putnam County parcel data set and property legal description
2.) Existing Land Use, St. Johns River Water Management District

0 0.25 0.5 Miles

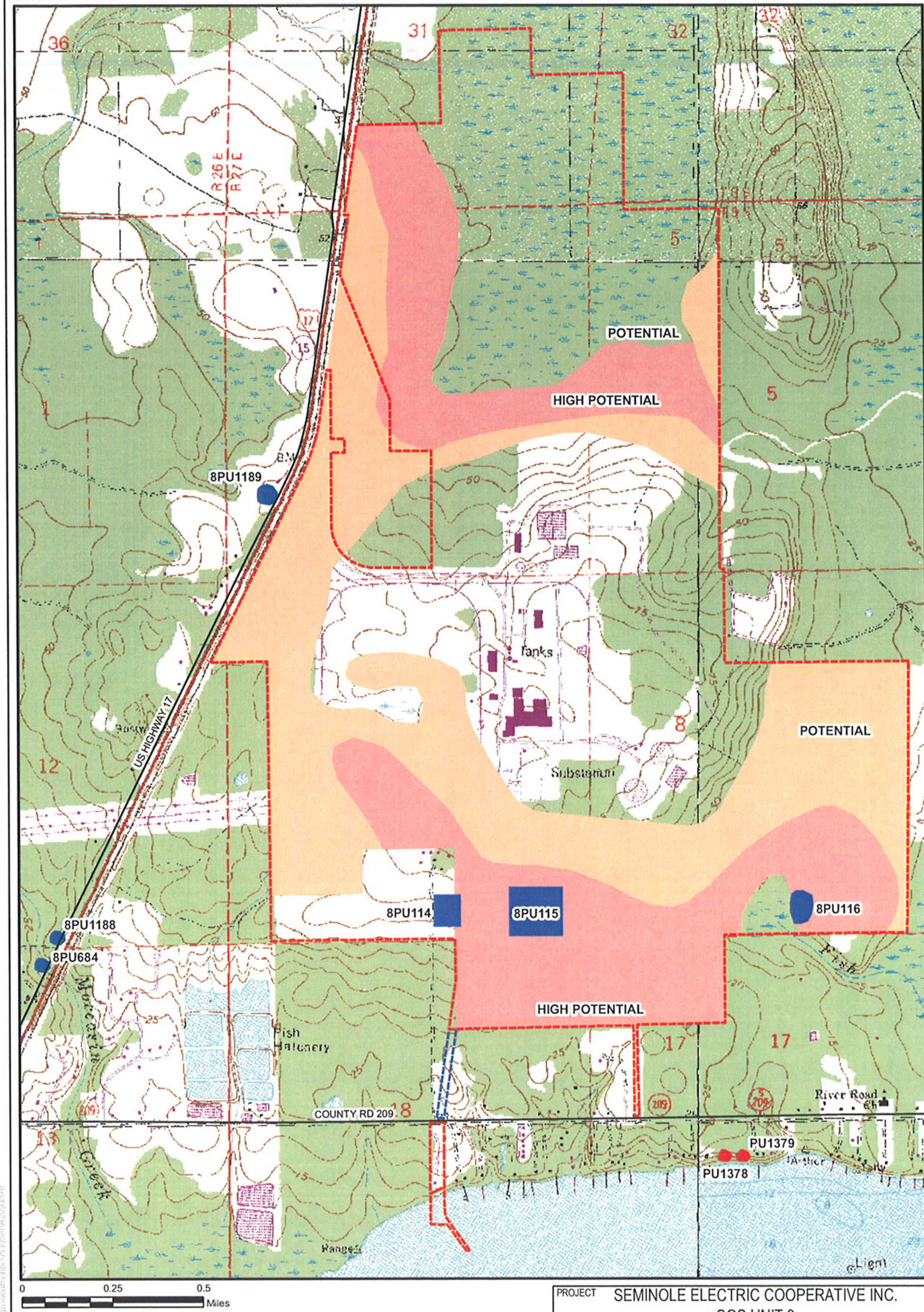
N

PROJECT
SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNUM COUNTY, FL

TITLE
EXISTING LAND USE

Golder Associates
Tampa, Florida

PROJECT No. 053-9540			SCALE AS SHOWN	REV. 0
DESIGN	JWT	11/28/2005	2.2.3-1	
GIS	JWT	2/21/2006		
CHECK	MM	2/20/2006		
REVIEW	RAZ	2/20/2006		



LEGEND

Easment	HISTORIC STRUCTURE
Property Boundary	ZONE OF ARCEALOGICAL SITE POTENTIAL
ARCHEALOGICAL SITE	ZONE OF HIGH ARCEALOGICAL SITE POTENTIAL

REFERENCE

1.) Property parcel, Putnam County parcel data set and property legal description
2.) Archaelogical data, Janus Research 2005

PROJECT SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNAM COUNTY, FL

TITLE

ARCHAEOLOGICAL AND HISTORICAL MAP

Golder Associates
Tampa, Florida

PROJECT No. 053-9540			SCALE AS SHOWN	REV. 0
DESIGN	JWT	11/28/2005	2.2.6-1	
GIS	JWT	2/21/2006		
CHECK	MM	2/20/2006		
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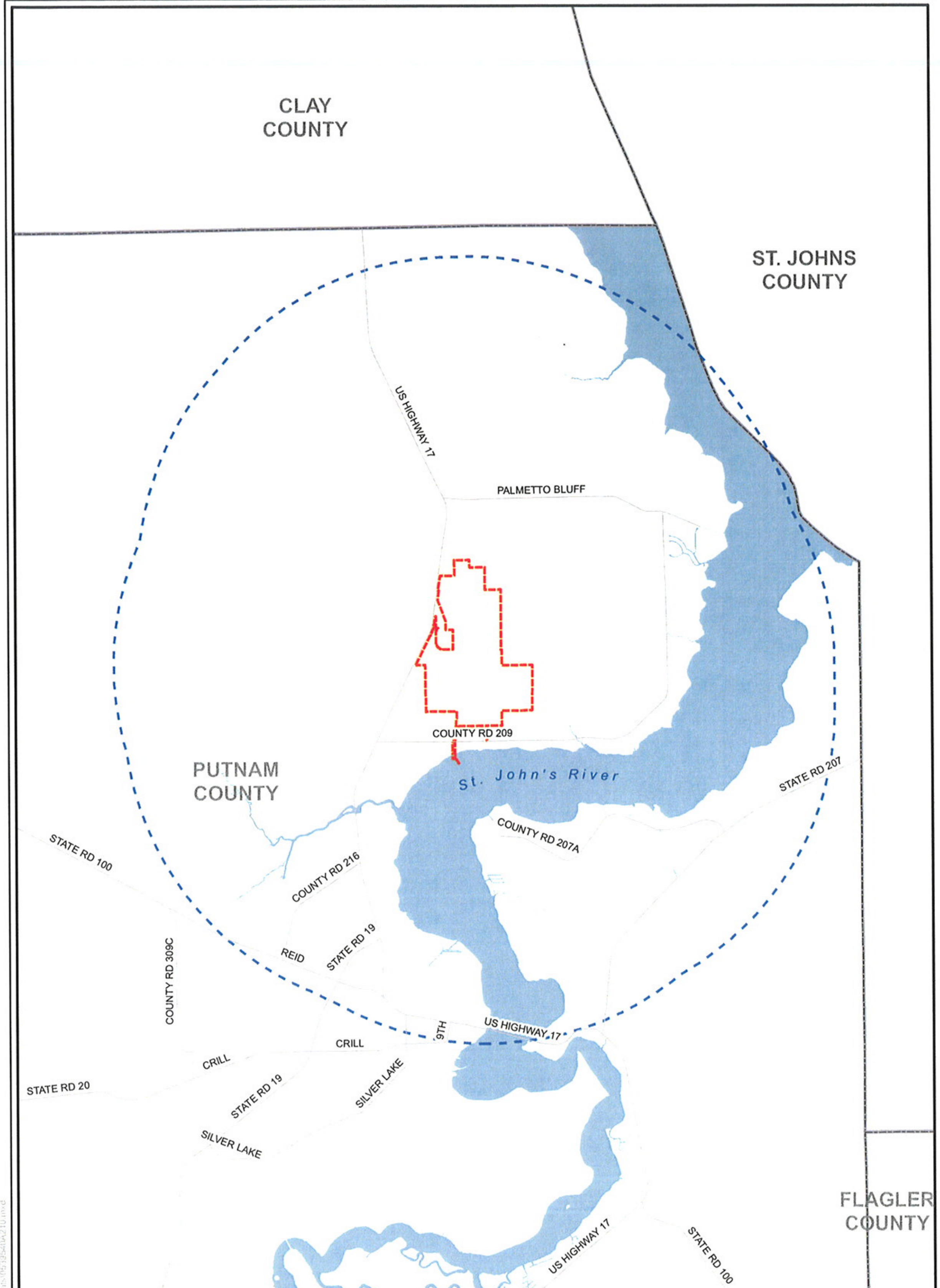

0 8,000 16,000 Feet

N

LEGEND

- County Boundary
- Property Boundary
- 5 Mile Buffer of Site
- Major Water
- Major Roads

REFERENCE

1.) Property parcel, Putnam County parcel data set and property legal description

2.) Roads and major water, Putnam County 2005

PROJECT SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNUM COUNTY, FL

TITLE

MAJOR ROADS

Golder Associates
Tampa, Florida

PROJECT No. 053-9540			SCALE AS SHOWN	REV. 0
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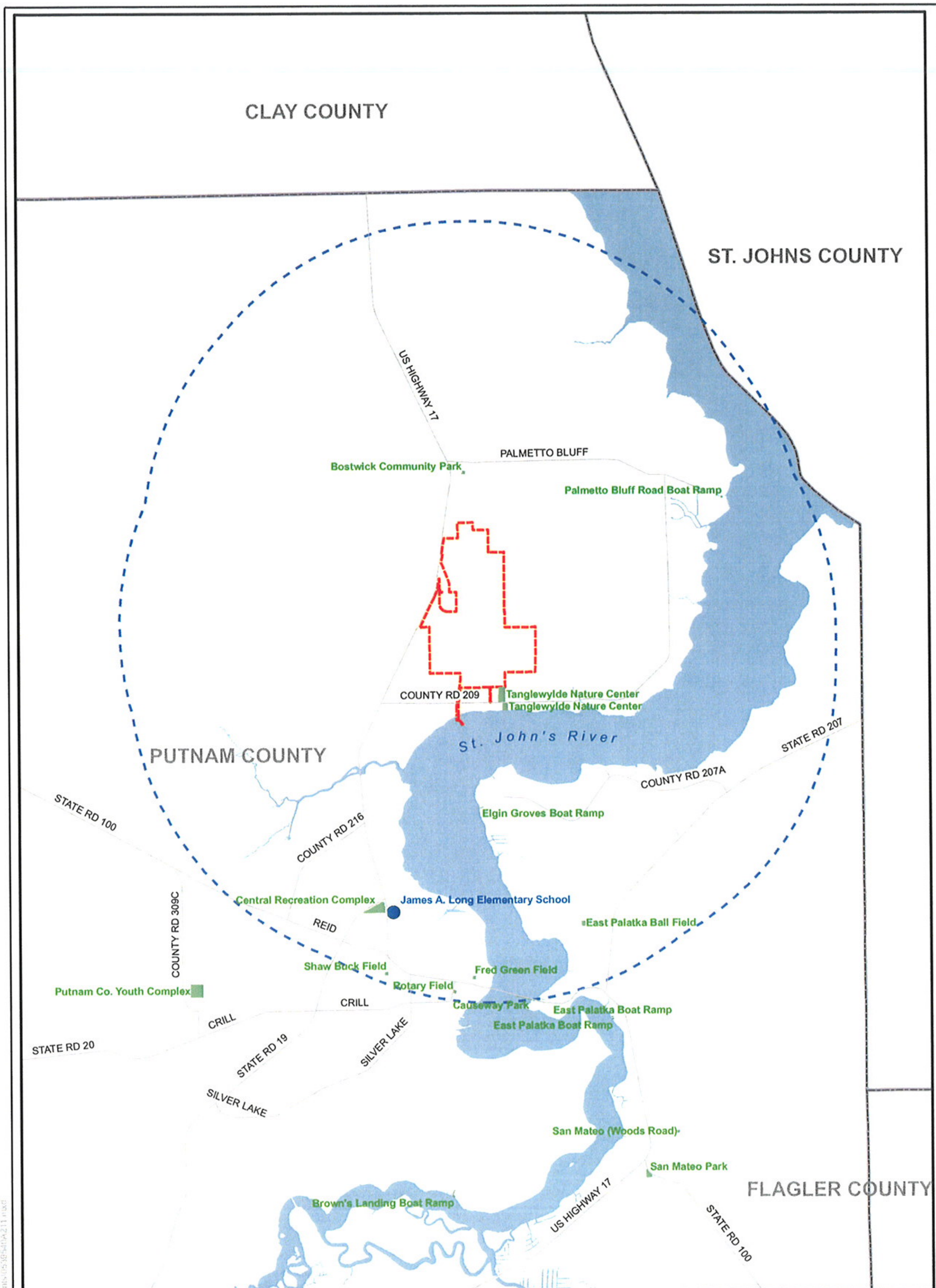
REVIEW	RAZ	2/20/2005		



0 8,000 16,000 Feet

LEGEND

- Property Boundary
- County Boundary
- 5 Mile Buffer of Site
- Major Water
- Parks and Recreation
- Schools

N

REFERENCE

1.) Property parcel, Putnam County parcel data set and property legal description
2.) Roads, major water, parks & recreation; Putnam County 2005

PROJECT SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNUM COUNTY, FL

TITLE
SCHOOL AND RECREATION LOCATION MAP

Golder Associates
Tampa, Florida

PROJECT No. 053-9540			SCALE AS SHOWN	REV. 0
DESIGN	JWT	11/28/2005	2.2.8-2	
GIS	JWT	2/21/2006		
CHECK	MM	2/20/2006		
REVIEW	RAZ	2/20/2006		

Quaternary

Holocene

- Qh — Holocene sediments

Pleistocene/Holocene

- Qal — Alluvium
- Qbd — Beach ridge and dune
- Qu — Undifferentiated sediments

Pleistocene

- Qa — Anastasia Formation
- Qk — Key Largo Limestone
- Qm — Miami Limestone
- Qtr — Trail Ridge sands

Tertiary/Quaternary

Pliocene/Pleistocene

- TQsu — Shelly sediments of Plio-Pleistocene age
- TQu — Undifferentiated sediments
- TQd — Dunes
- TQuc — Reworked Cypresshead sediments

Tertiary

Pliocene

- Tc — Cypresshead Formation
- Tci — Citronelle Formation
- Tmc — Miccosukee Formation
- Tic — Intracoastal Formation
- Tt — Tamiami Formation
- Tjb — Jackson Bluff Formation

Miocene/Pliocene

- Thcc — Hawthorn Group, Coosawhatchie Formation, Charlton Member
- Thp — Hawthorn Group, Peace River Formation
- Thpb — Hawthorn Group, Peace River Formation, Bone Valley Member

Miocene

- Trm — Residuum on Miocene sediments
- Tab — Alum Bluff Group
- Th — Hawthorn Group
- Thc — Hawthorn Group, Coosawhatchie Formation
- Ths — Hawthorn Group, Statenville Formation
- Tht — Hawthorn Group, Torreya Formation
- Tch — Chatahoochee Formation
- Tsmk — St. Marks Formation

Oligocene/Miocene

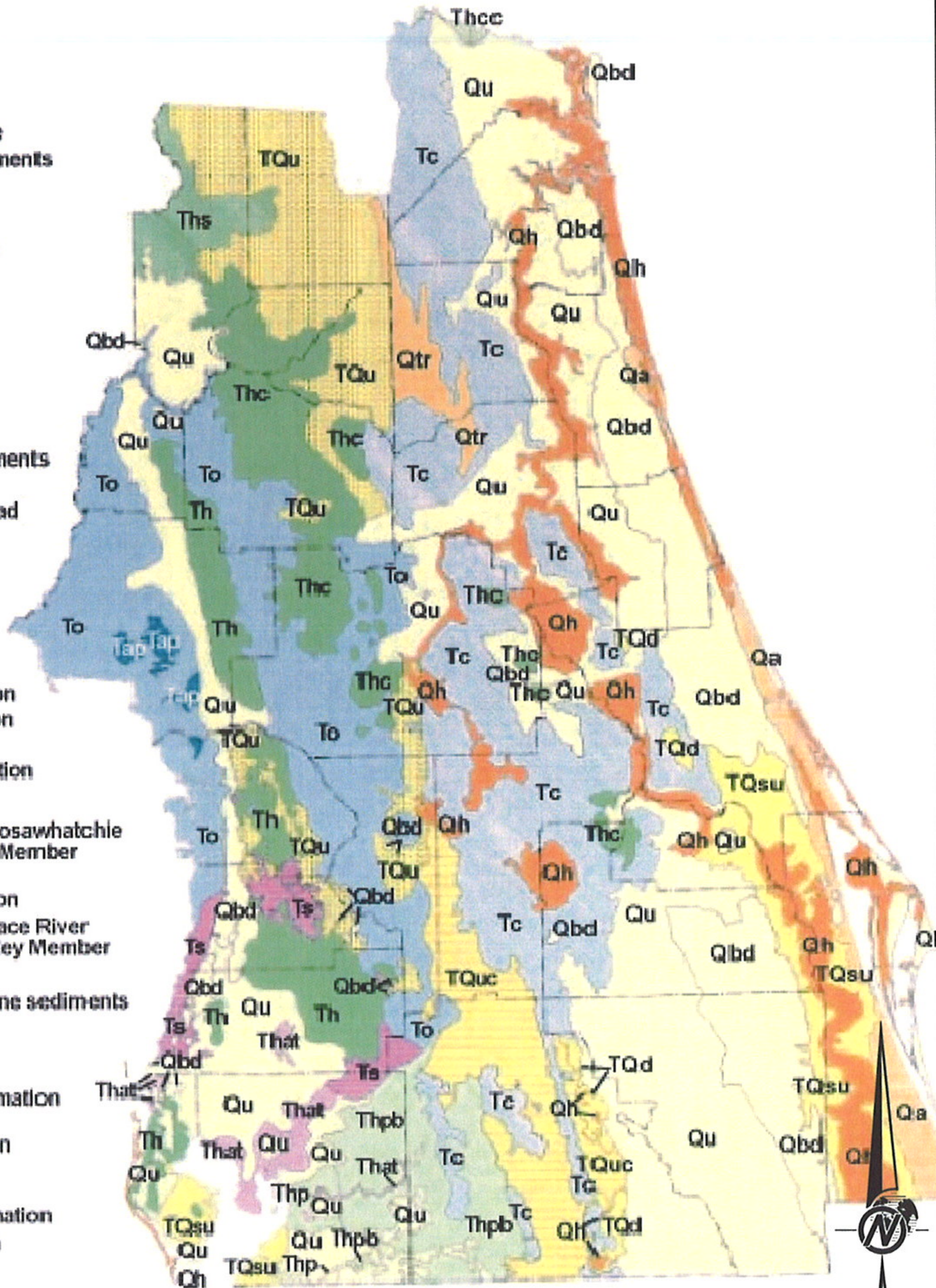
- Tha — Hawthorn Group, Arcadia Formation
- That — Hawthorn Group, Arcadia Formation, Tampa Member

Oligocene

- Tro — Residuum on Oligocene sediments
- Ts — Suwannee Limestone
- Tsm — Suwannee Limestone - Marianna Limestone undifferentiated

Eocene

- Tre — Residuum on Eocene sediments
- To — Ocala Limestone
- Tap — Avon Park Formation



30 0 30
1" TO 1 MILE MILES

REFERENCES

1.) FLORIDA GEOLOGICAL SURVEY OPEN FILE REPORT 80, 2001

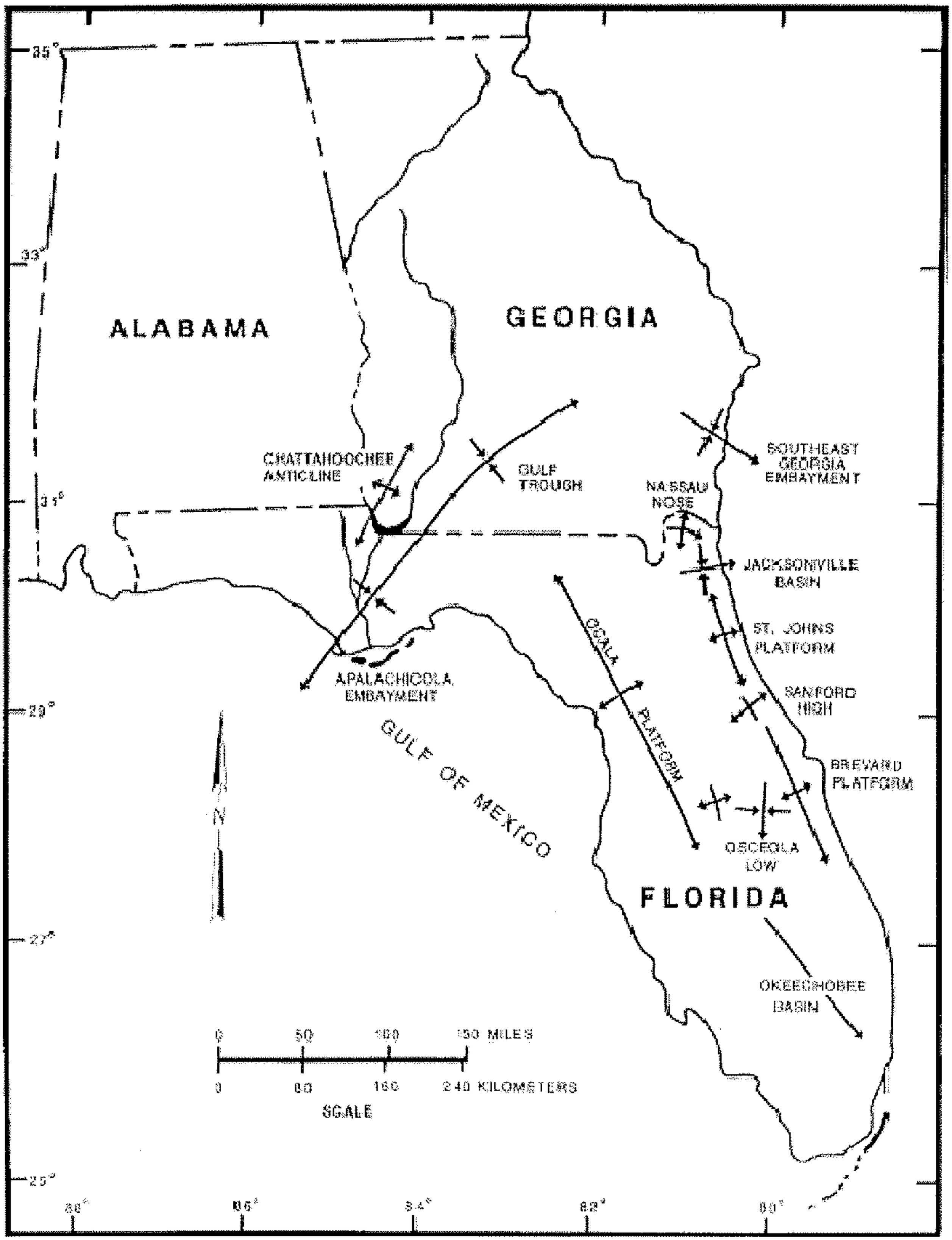
PROJECT
SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNAM COUNTY, FLORIDA

TITLE
NORTHERN PENINSULA GEOLOGIC MAP

Golder Associates
Tampa, Florida

PROJECT No.		053-9540	FILE No.	0539540B004
DESIGN	MEF	06/20/05	SCALE AS SHOWN	REV. 0
CADD	MEF	06/20/05		
CHECK	MM	11/29/05	FIGURE 2.3.1-1	
REVIEW				

Drawing file: 0539540B004.dwg Mar 03, 2006 - 10:05am



PROJECT SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNAM COUNTY, FLORIDA

TITLE

FLORIDA GEOLOGIC STRUCTURES

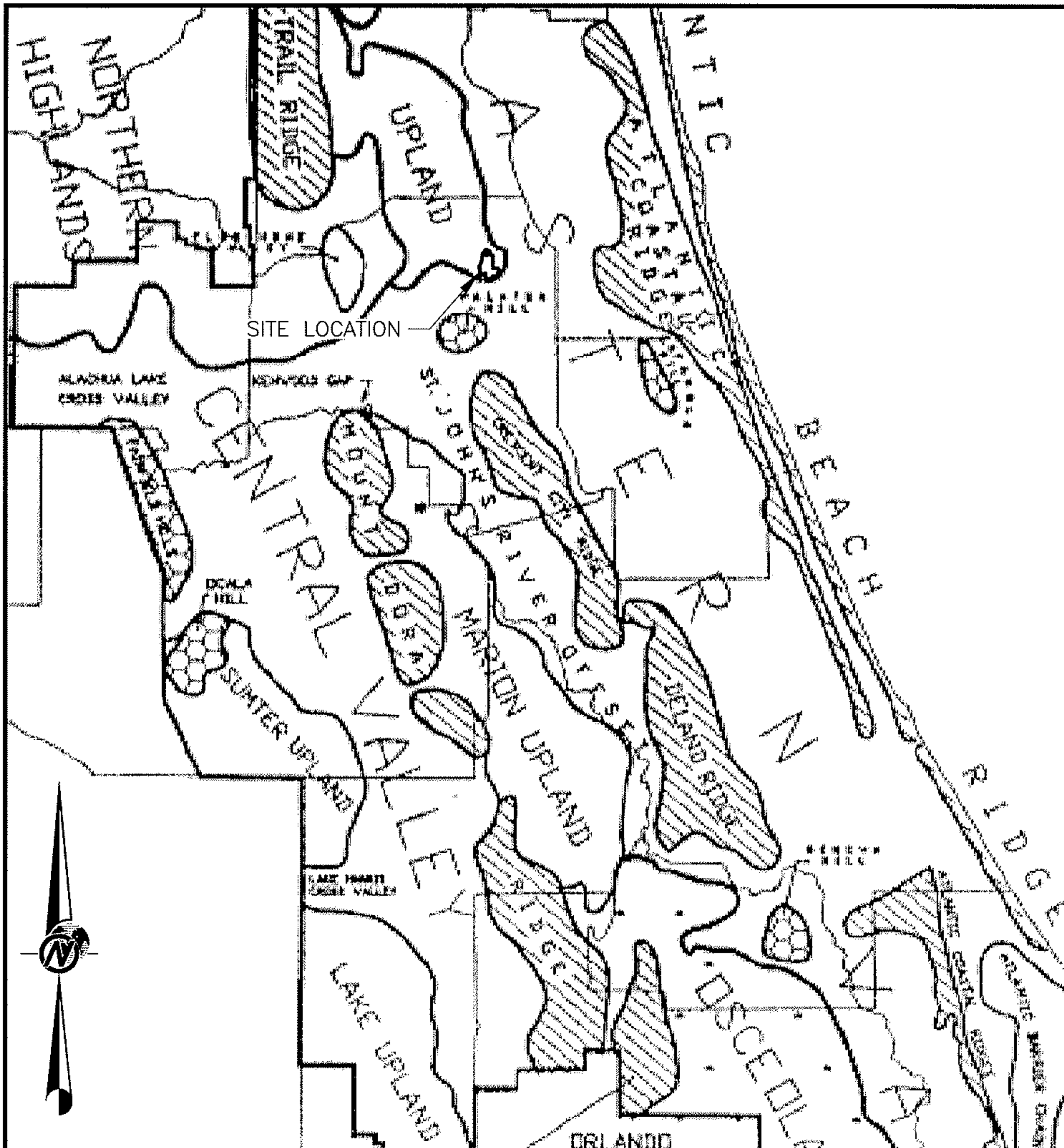
PROJECT No.		053-9540	FILE No.	0539540B005
DESIGN	MEF	06/20/05	SCALE AS SHOWN	REV. 0
CADD	MEF	06/20/05		
CHECK	MM	11/29/05	FIGURE 2.3.1-2	
REVIEW				

Golder Associates
Tampa, Florida

REFERENCES

1.) FLORIDA GEOLOGICAL SURVEY OPEN FILE REPORT 80, 2001

Drawing file: 0539540B005.dwg Mar 03, 2006 - 10:07am



PROJECT	SEMINOLE ELECTRIC COOPERATIVE INC. SGS UNIT 3 PUTNAM COUNTY, FLORIDA	
TITLE	**GEOMORPHOLOGIC FEATURES OF ST. JOHNS RIVER WATER MANAGEMENT DISTRICT**	

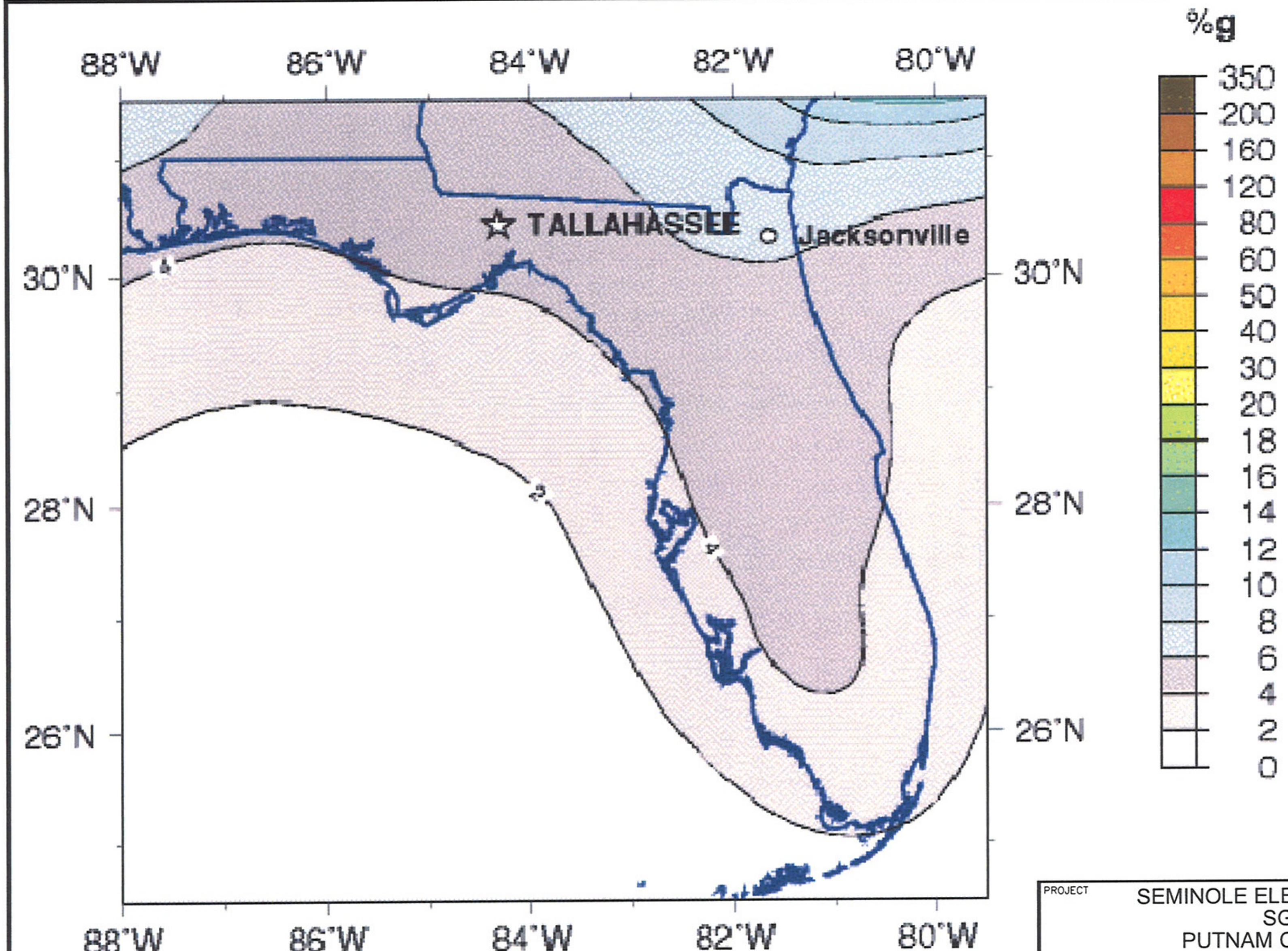
Golder Associates, Tampa, Florida				
PROJECT No.		053-9540	FILE No.	05395408006
DESIGN	MEF	06/20/05	SCALE AS SHOWN	REV. 0
CADD	MEF	06/20/05		
CHECK	MM	11/29/05	**FIGURE 2.3.1-3**	
REVIEW				

REFERENCES

1.) FLORIDA GEOLOGICAL SURVEY GEOLOGICAL OVERVIEW OF FLORIDA SCOTT, 1992.

Drawing file: 0539540B006.dwg Mar 03, 2006 -- 10:07am

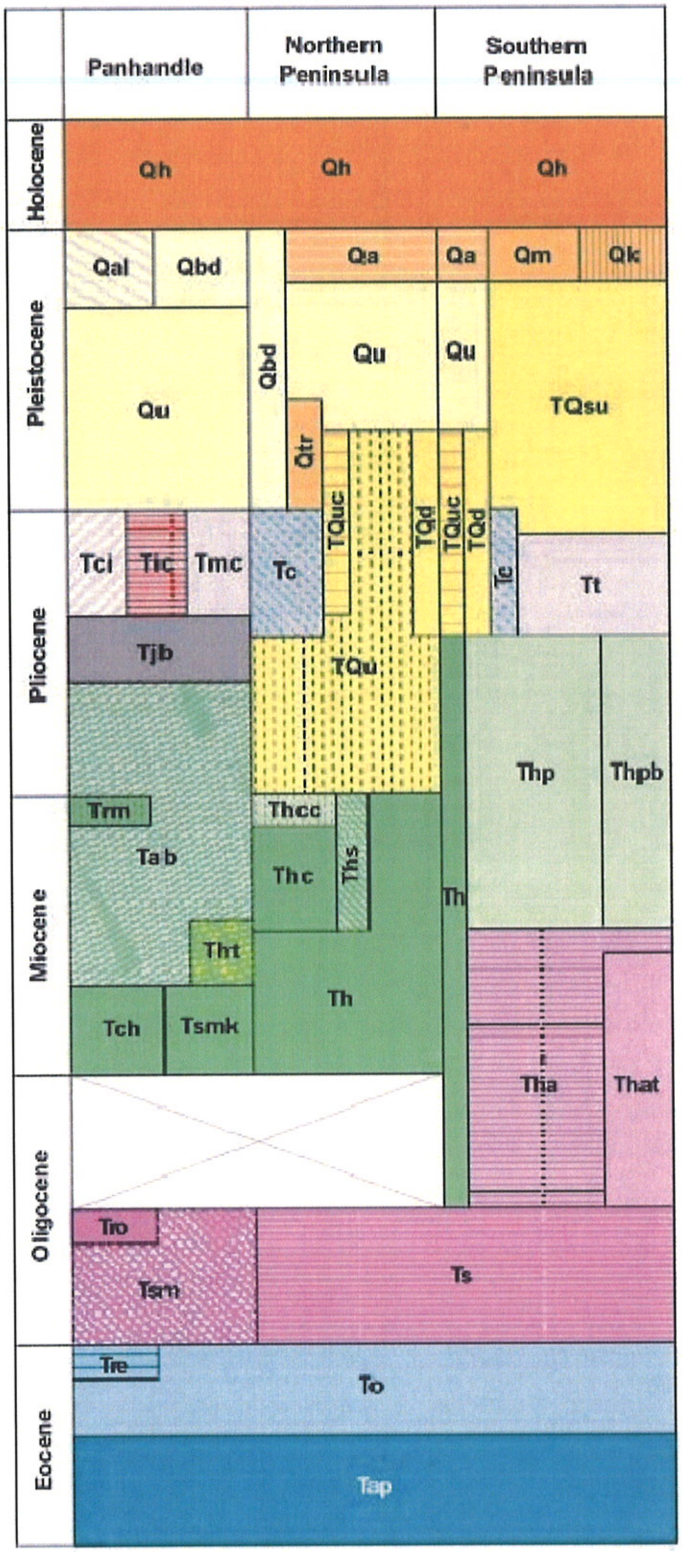
Drawing file: 0539540B007.dwg   Mar 03, 2006 - 10:08am



REFERENCES

1.) NATIONAL SEISMIC HAZARD MAPPING PROJECT SITE:NEHRP B-C BOUNDARY

PROJECT	SEMINOLE ELECTRIC COOPERATIVE SGS UNITS 3 PUTNAM COUNTY, FLORIDA			
TITLE	PEAK ACCELERATION WITH 2% PROBABILITY OF EXCEEDANCE IN 50 YEARS			
Golder Associates Tampa, Florida	PROJECT No.		053-9540	FILE No. 0539540B007
	DESIGN	MEF	07/11/05	SCALE AS SHOWN REV. 0
	CADD	MEF	07/11/05	FIGURE 2.3.1-4
	CHECK	MM	11/29/05	
	REVIEW			



Quaternary

Holocene

- Qh — Holocene sediments

Pleistocene/Holocene

- Qal — Alluvium
- Qbd — Beach ridge and dune
- Qu — Undifferentiated sediments

Pleistocene

- Qa — Anastasia Formation
- Qk — Key Largo Limestone
- Qm — Miami Limestone
- Qtr — Trail Ridge sands

Tertiary/Quaternary

Pliocene/Pleistocene

- TQsu — Shelly sediments of Plio-Pleistocene age
- TQu — Undifferentiated sediments
- TQd — Dunes
- TQuc — Reworked Cypresshead sediments

Tertiary

Pliocene

- Tc — Cypresshead Formation
- Tci — Citronelle Formation
- Tmc — Miccosukee Formation
- Tic — Intracoastal Formation
- Tt — Tamiami Formation
- Tjb — Jackson Bluff Formation

Miocene/Pliocene

- Thcc — Hawthorn Group, Coosawhatchie Formation, Charlton Member
- Thp — Hawthorn Group, Peace River Formation
- Thpb — Hawthorn Group, Peace River Formation, Bone Valley Member

Miocene

- Trm — Residuum on Miocene sediments
- Tab — Alum Bluff Group
- Th — Hawthorn Group
- Thc — Hawthorn Group, Coosawhatchie Formation
- Ths — Hawthorn Group, Statenville Formation
- Tht — Hawthorn Group, Torreya Formation
- Tch — Chatahoochee Formation
- Tsmk — St. Marks Formation

Oligocene/Miocene

- Tha — Hawthorn Group, Arcadia Formation
- That — Hawthorn Group, Arcadia Formation, Tampa Member

Oligocene

- Tro — Residuum on Oligocene sediments
- Ts — Suwannee Limestone
- Tsm — Suwannee Limestone - Marianna Limestone undifferentiated

Eocene

- Tre — Residuum on Eocene sediments
- To — Ocala Limestone
- Tap — Avon Park Formation

Mar 03, 2006 - 10:08am

Drawing file: 0539540B008.dwg

REFERENCES

1.) FLORIDA GEOLOGICAL SURVEY OPEN FILE REPORT 80, 2001

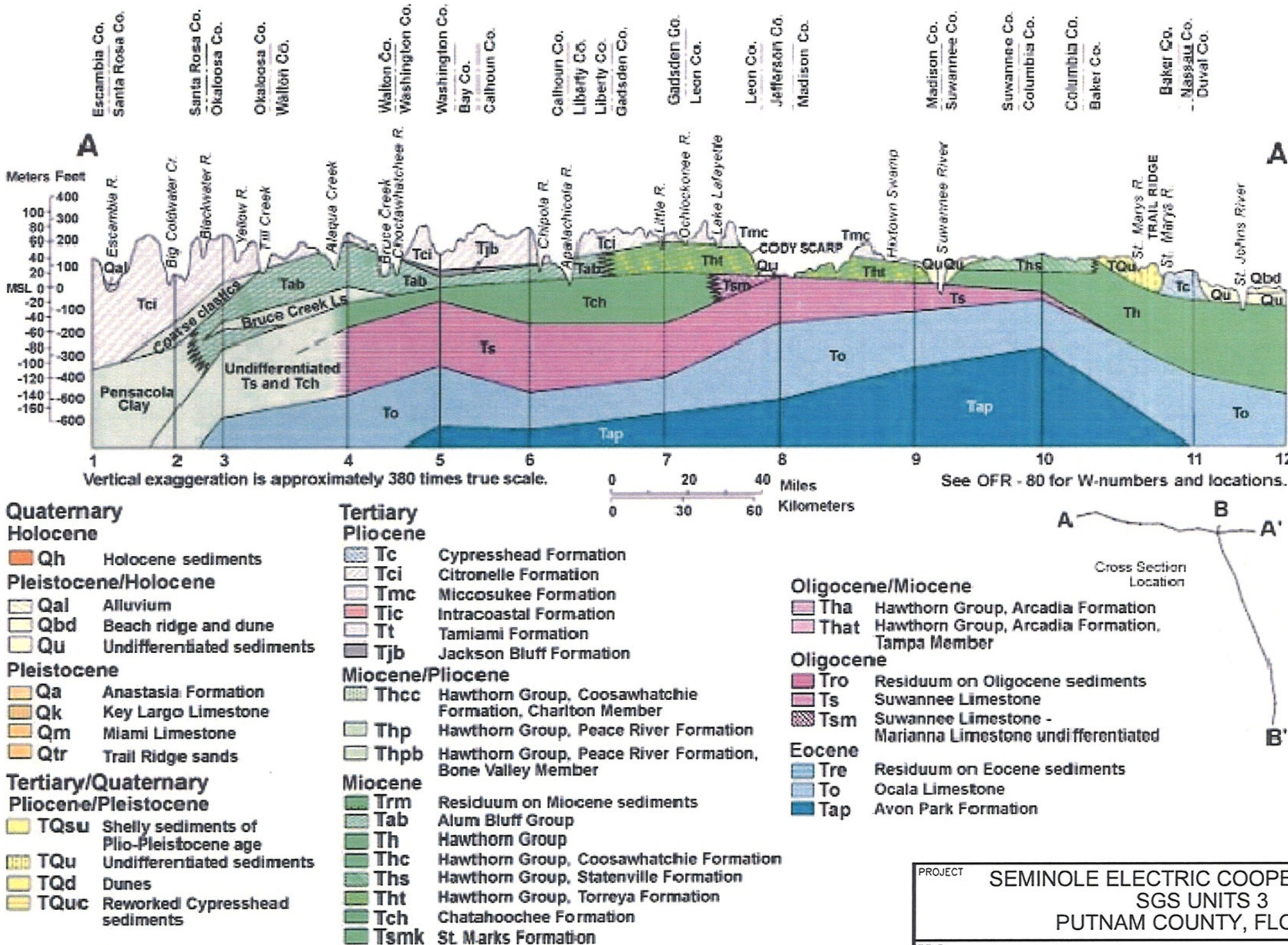
PROJECT
SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNAM COUNTY, FLORIDA

TITLE
STRATIGRAPHIC COLUMN SHOWING LITHOSTRATIGRAPHIC UNITS

Golder Associates
Tampa, Florida

PROJECT No.		053-9540	FILE No.	0539540B008
DESIGN	MEF	06/20/05	SCALE AS SHOWN	REV. 0
CADD	MEF	06/20/05		
CHECK	MM	11/29/05	FIGURE 2.3.1-5	
REVIEW				

Drawing file: 0539540B009.dwg Mar 03, 2006 - 10:09am



REFERENCES

1.) FLORIDA GEOLOGICAL SURVEY OPEN FILE REPORT 80, 2001

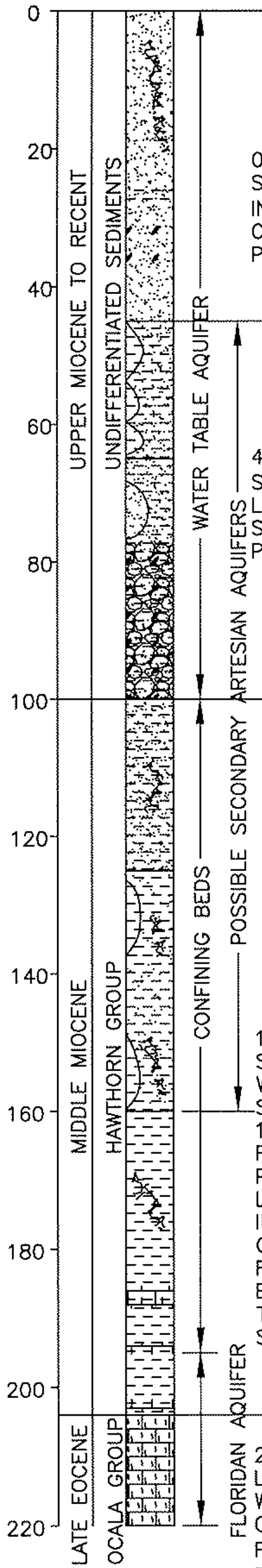
PROJECT
SEMINOLE ELECTRIC COOPERATIVE INC
SGS UNITS 3
PUTNAM COUNTY, FLORIDA

TITLE

GEOLOGIC CROSS-SECTION A

Golder Associates
Tampa, Florida

PROJECT No.		053-9540	FILE No.	0539540B009	
DESIGN	MEF	06/20/05	SCALE	AS SHOWN	REV. 0
CADD	MEF	06/20/05			
CHECK	MM	11/29/05	FIGURE 2.3.1-6		
REVIEW					



0 TO 45 FT. FINE TO MEDIUM SAND, SCATTERED OCCURANCES OF INTERBEDDED SILTY AND/OR CLAYEY SAND, TRACES OF PHOSPHATE AND SHELL FRAGMENTS

45 TO 100 FT. FINE TO MEDIUM SILTY AND/OR CLAYEY SAND WITH LENSES OF CLAY AND SAND, SOME SHELL FRAGMENTS AND PHOSPHATE PEBBLES

100 TO 196 FT. CLAYS AND/OR SILT, SANDY, SOME SAND LAYERS, WITH SILT OR CLAY, ACT AS SECONDARY AQUIFERS AT ABOUT 125 TO 140 FT. AND 145 TO 160 FT.; SCATTERED PHOSPHATE PEBBLES, CLAY LENSES OCCUR LOCALLY; LIMESTONE LAYERS ARE INTERBEDDED WITH SILTY CALCAREOUS CLAY AT 186 TO 204 FT. WITH THE LOWER 5 TO 10 FT BEING HYDROLICALLY CONNECTED TO THE UNDERLYING STRATOGRAPHIC UNIT

204 FT TO TOTAL DEPTH LIMESTONE, SANDY TO CHALKY, WHITE, MODERATELY WELL CEMENTED, VUGULAR, POROUS, FOSSILFEROUS (AQUIFER NOT FULLY PENETRATED).

LEGEND

- SAND
- CLAY AND/OR SILT
- SHELL FRAGMENTS
- SCATTERED PHOSPHATE PEBBLES
- LIMESTONE
- FOSSILIFEROUS LIMESTONE

REFERENCES

1.) SEMINOLE ELECTRIC. SITE CERTIFICATION AND APPLICATION AND ENVIROMENTAL ANALYSIS, 1979.

0 00 00 00

SCALE: 1" = 00'

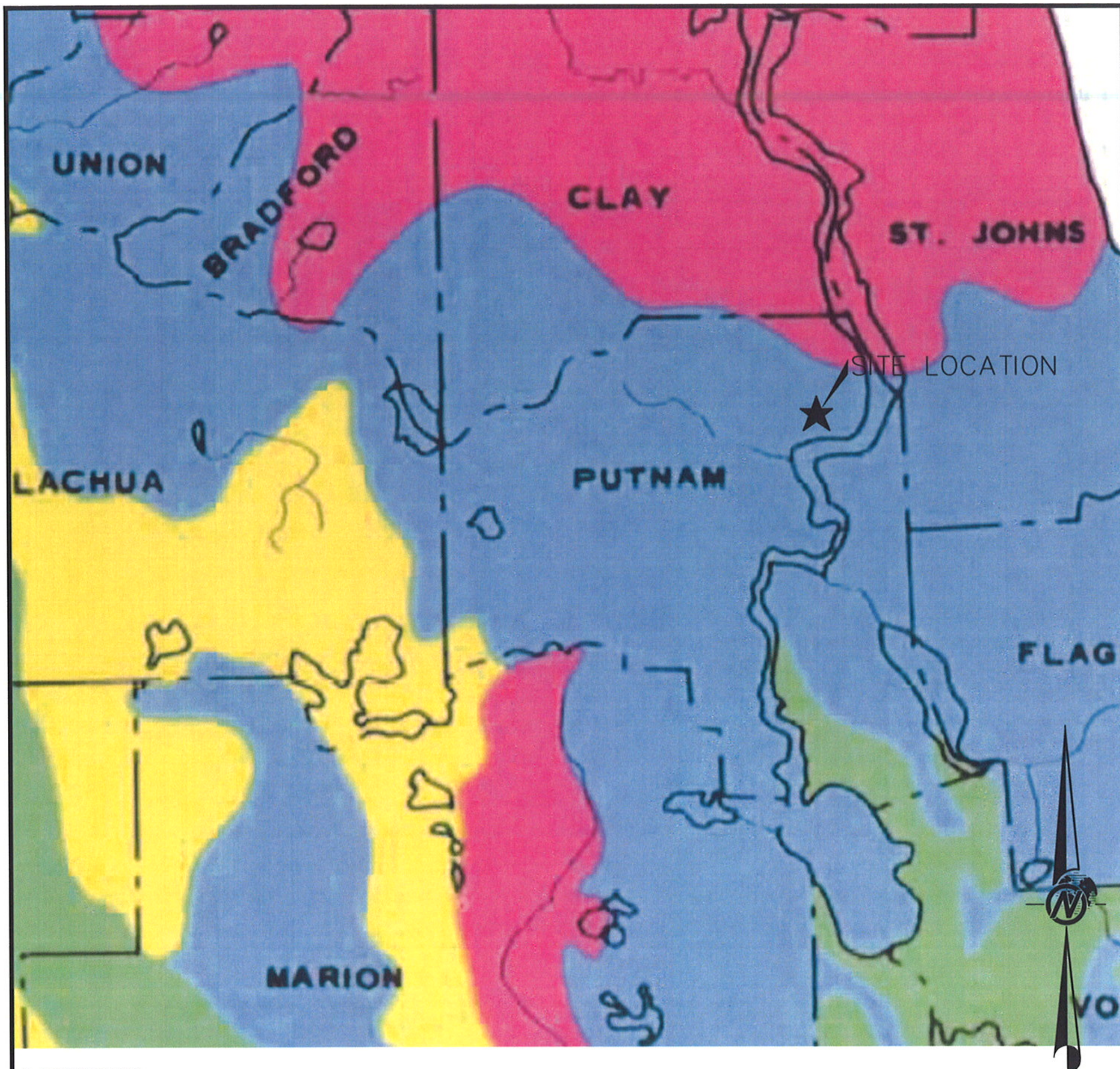
PROJECT
SEIMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNAM COUNTY, FLORIDA

TITLE
GENERALIZED STRATIGRAPHIC COLUMN AND WATER BEARING CHARACTERISTICS

Golder Associates
Tampa, Florida

PROJECT No.		053-9540	FILE No. 05395408010
DESIGN	MEF	07/07/05	SCALE AS SHOWN REV. 0
CADD	MEF	07/07/05	
CHECK	MM	11/29/05	**FIGURE 2.3.1-7**
REVIEW			

Drawing file: 0539540b010.dwg Mar 03, 2006 - 10:09am



LEGEND

- **AREA I. BARE OR THINLY COVERED LIMESTONE** — Sinkholes are few, generally shallow and broad, and develop gradually. Solution sinkholes dominate
- **AREA II. COVER IS 30 TO 200 FEET THICK** — Consists mainly of incohesive and permeable sand. Sinkholes are few, shallow, of small diameter, and develop gradually. Cover-subsidence sinkholes dominate
- **AREA III. COVER IS 30 TO 200 FEET THICK** — Consists mainly of cohesive clayey sediments of low permeability. Sinkholes are most numerous, of varying size, and develop abruptly. Cover-collapse sinkholes dominate
- **AREA IV. COVER IS MORE THAN 200 FEET THICK** — Consists of cohesive sediments interlayered with discontinuous carbonate beds. Sinkholes are very few, but several large diameter, deep sinkholes occur. Cover-collapse sinkholes dominate.

10 0 10

1" = 10 MILES MILES

REFERENCES

1.) FLORIDA DEPARTEMENT OF ENVIRONMENTAL PROTECTION MAP SERIES 110

PROJECT
SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNAM COUNTY, FLORIDA

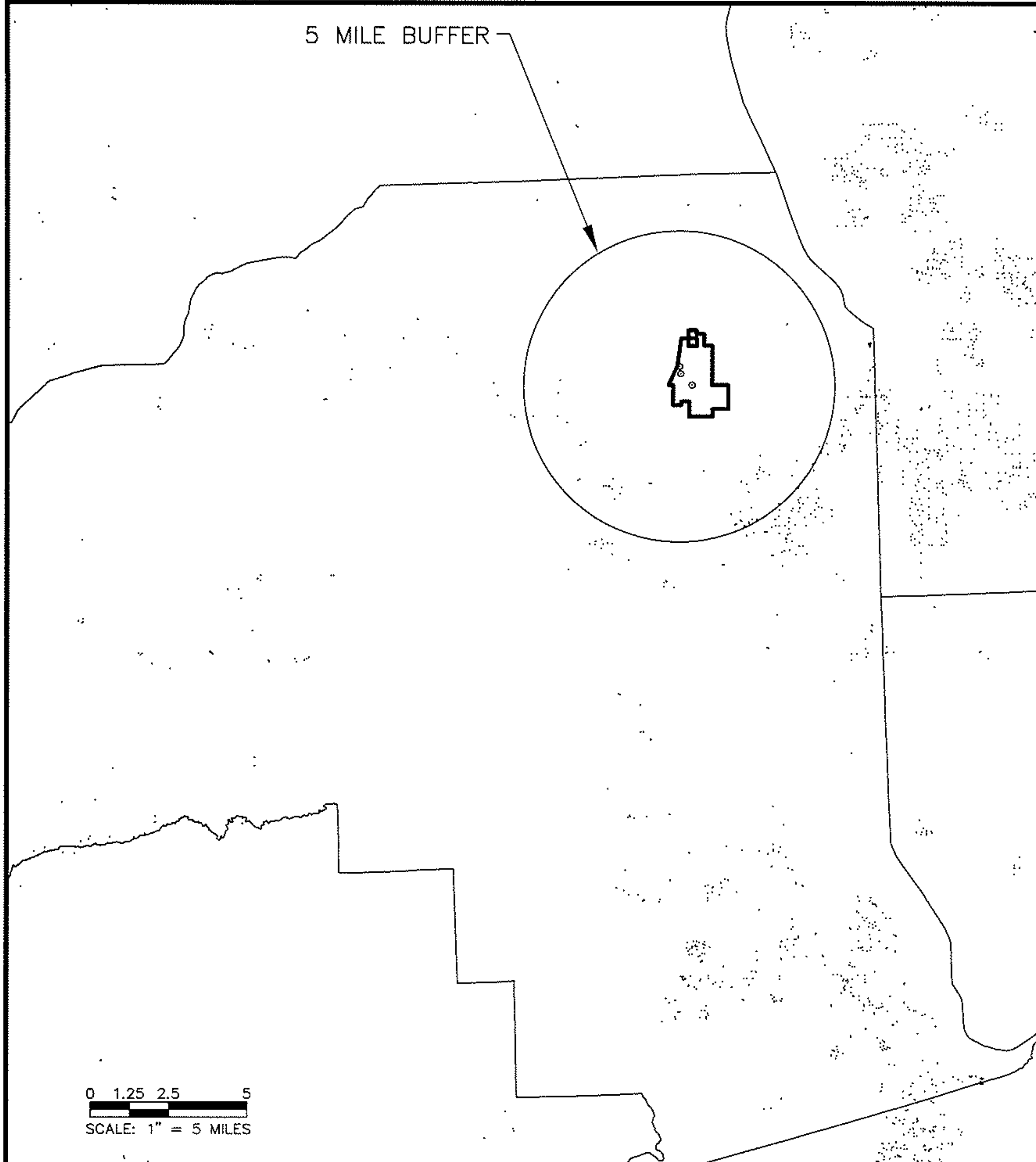
TITLE
SINKHOLE TYPE, DEVELOPMENT AND DISTRIBUTION IN FLORIDA MAP

Golder Associates
Tampa, Florida

PROJECT No.		053-9540	FILE No.	0539540B017
DESIGN	MEF	06/20/05	SCALE AS SHOWN	REV. 0
CADD	MEF	06/20/05		
CHECK	MM	11/29/05	FIGURE 2.3.2-1	
REVIEW				

Drawing file: 0539540B017.dwg Mar 03, 2006 - 10:13am

Drawing file: 0539540b031.dwg Mar 03, 2006 - 11:04am



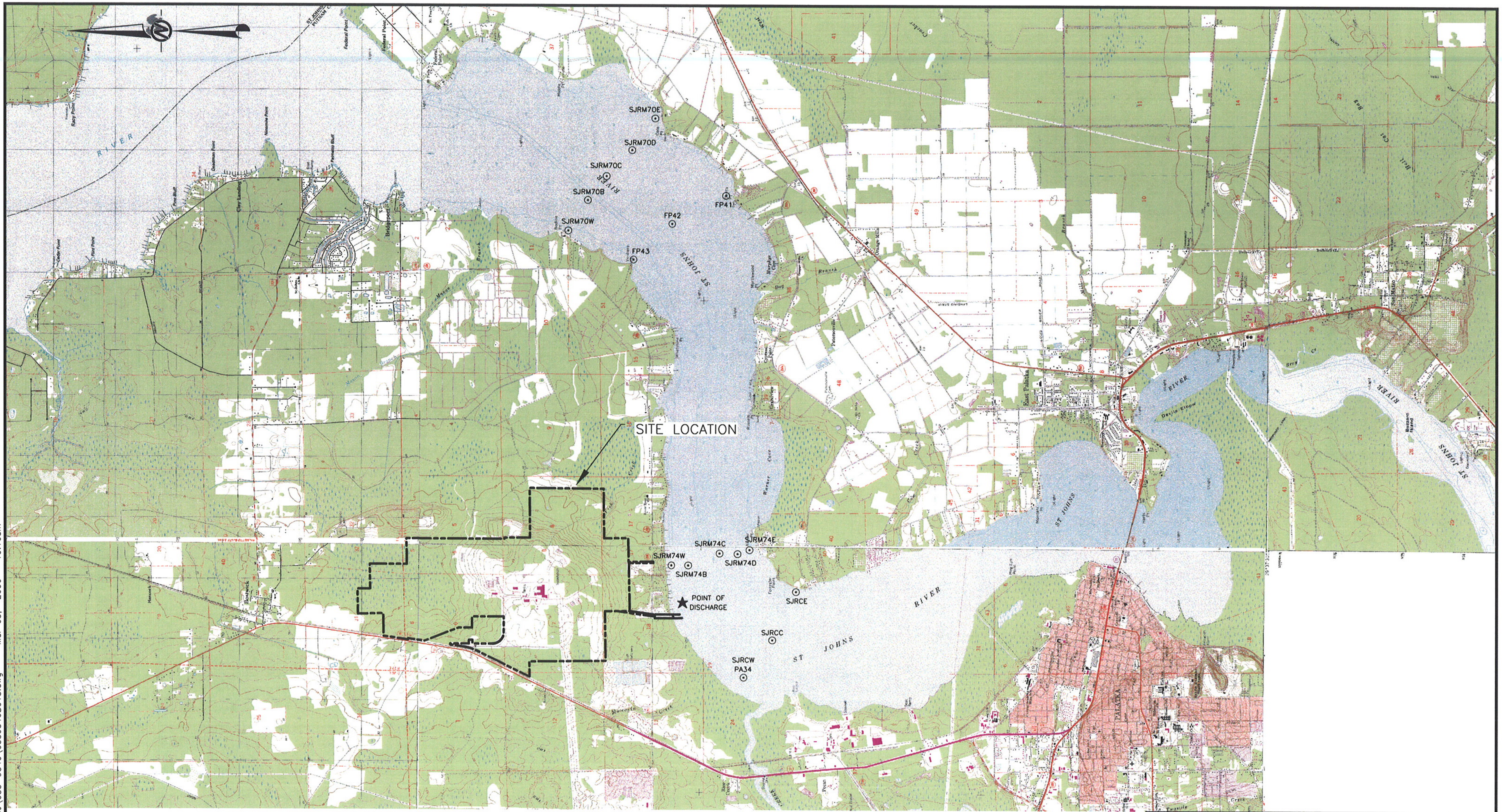
PROJECT
SEMINOLE ELECTRIC COOPERATIVE
SGS UNIT 3
PUTNAM COUNTY, FLORIDA

TITLE

CONSUMPTIVE USE PERMITS

Golder Associates
Tampa, Florida

PROJECT No.		053-9540	FILE No.	
DESIGN	MEF	06/20/05	SCALE AS SHOWN	REV. 0
CADD	MEF	06/20/05	FIGURE 2.3.3-1	
CHECK	MM	06/25/05		
REVIEW	MM	06/25/05		



REFERENCES

1.) USGS 7.5 MIN DRG (FLORIDA)
PALATKA, BOSTWICK, RIVERDALE, HASTINGS, SAN MATEO

2.) ECT INC., 2004, GOLDER, 2006.

LEGEND

⊙ ST JOHNS RIVER WATER QUALITY STATION

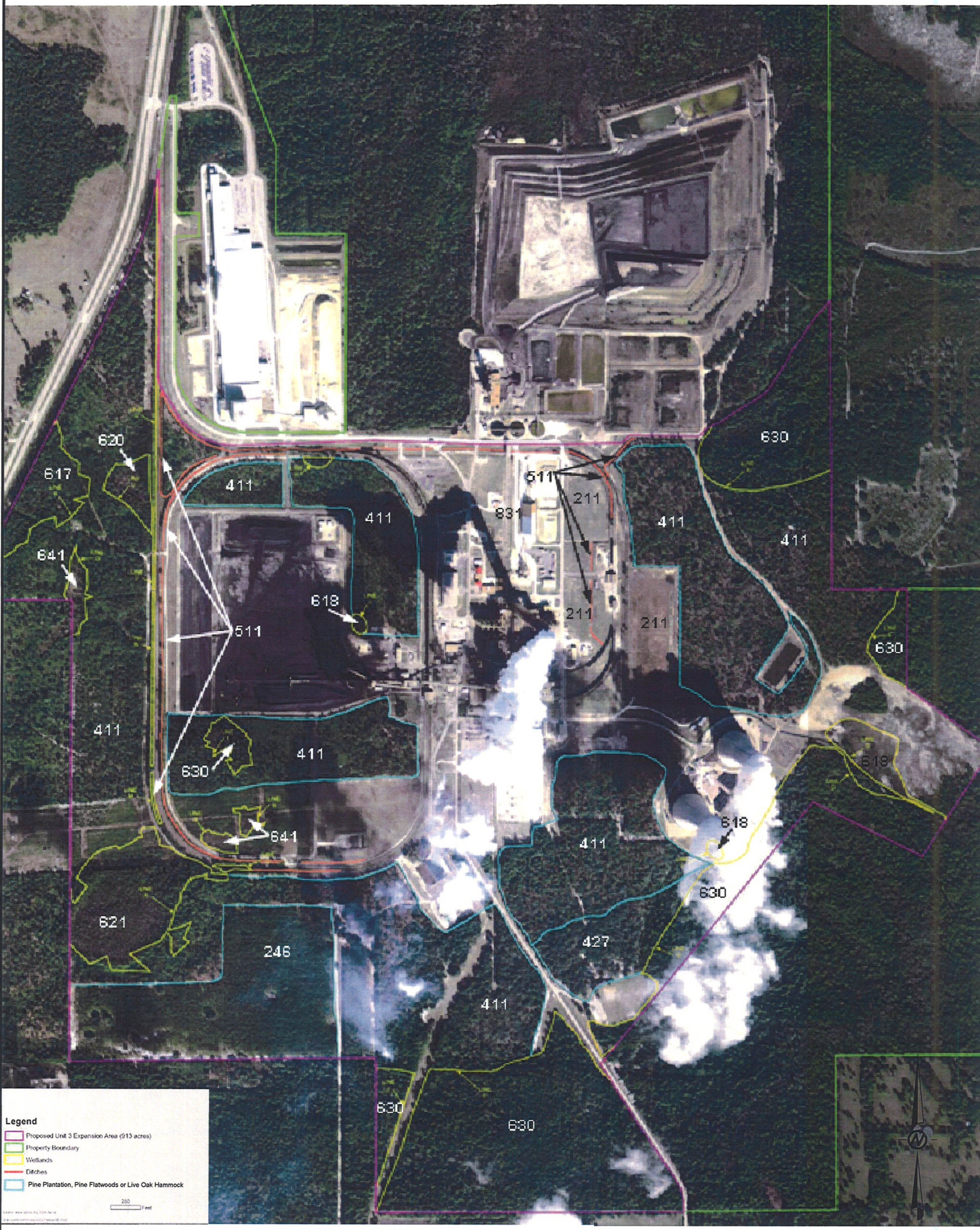
0 2,500 5,000
SCALE: 1" = 5,000'

PROJECT	SEMINOLE ELECTRIC COOPERATIVE INC. SGS UNIT 3 PUTNAM COUNTY, FL
TITLE	**WATER QUALITY STATIONS**

Golder Associates
Tampa, Florida

PROJECT No.	053-9540		FILE No.	0539540B018
DESIGN	MEF	11/30/05	SCALE AS SHOWN	REV. 3
CADD	MEF	11/30/05		
CHECK	MM		**FIGURE 2.3.4-2**	
REVIEW				

Drawing file: F:\PROJECTS\2005 PROJ\053-9540\0539540B018.dwg Mar 03, 2006 - 10:16am



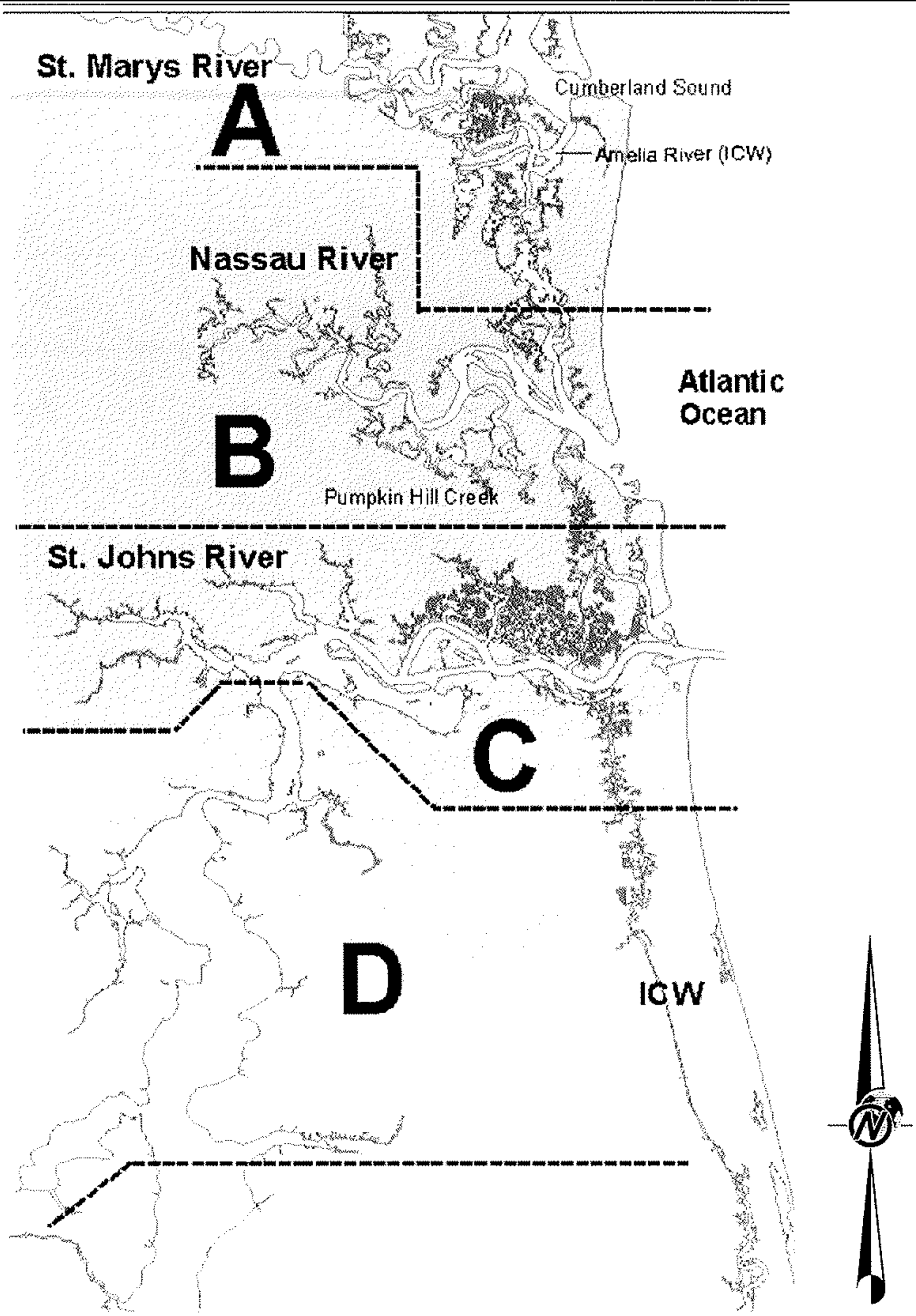
211 - Grassed Lawn
246 - Pine Plantation
411 - Pine Flatwoods
427 - Live Oak Hammock
511 - Ditches
617 - Mixed Wetland Hardwood Forest
618 - Shrub Marsh
620 - Wetland Coniferous Forest
621 - Cypress
630 - Wetland Hardwood/Conifer Forest
641 - Freshwater Marsh
831 - Electric Utilities

PROJECT	SEMINOLE ELECTRIC COOPERATIVE INC. SGS UNIT 3 PUTNAM COUNTY, FLORIDA
TITLE	**VEGETATION/LAND USE MAP USING FLORIDA LAND USE COVER AND FORMS CLASSIFICATION SYSTEM (FLUCFCS)**

Golder Associates
Tampa, Florida

PROJECT No.	053-9540		FILE No. 0539540b019	
DESIGN	KB	11/29/05	SCALE AS SHOWN	REV. 0
CADD	MEF	11/30/05		
CHECK			**FIGURE 2.3.5-1**	
REVIEW				

Drawing file: F:\PROJECTS\2005 PROJ\053-9540\0539540b019.dwg Mar 03, 2006 - 10:17am



6 0 6
1" TO 6 MILE MILES

PROJECT
SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNAM COUNTY, FLORIDA

TITLE
NORTHEAST FLORIDA SAMPLING MAP

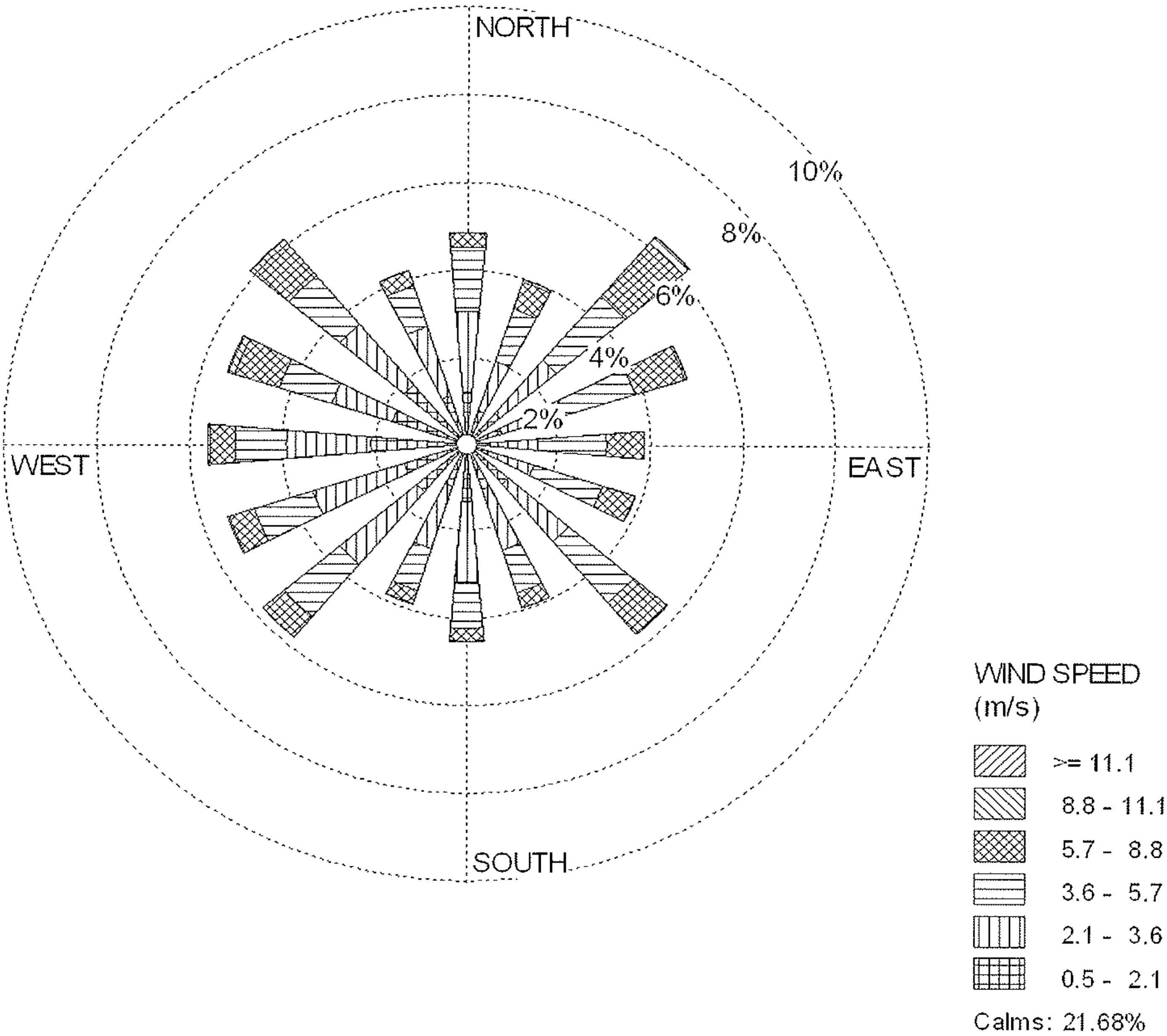
REFERENCES

1.) FLORIDA MARINE RESEARCH INSTITUTE, 2004. FISHERIES-INDEPENDENT MONITORING PROGRAM ANNUAL REPORT, ST. PETERSBURG, FL.

Golder Associates
Tampa, Florida

PROJECT No.		053-9540	FILE No. 05395408020
DESIGN	AP	12/01/05	SCALE AS SHOWN REV. 0
CADD	MEF	12/02/05	
CHECK	MM	12/05/05	FIGURE 2.3.6-1
REVIEW			

Drawing file: 05395408020.dwg Mar 03, 2006 - 10:17am



AVERAGE WIND SPEED 3.0 m/s

REFERENCES

1.) NATIONAL CLIMATIC DATA CENTER, 1986–1990, GOLDER, 2005

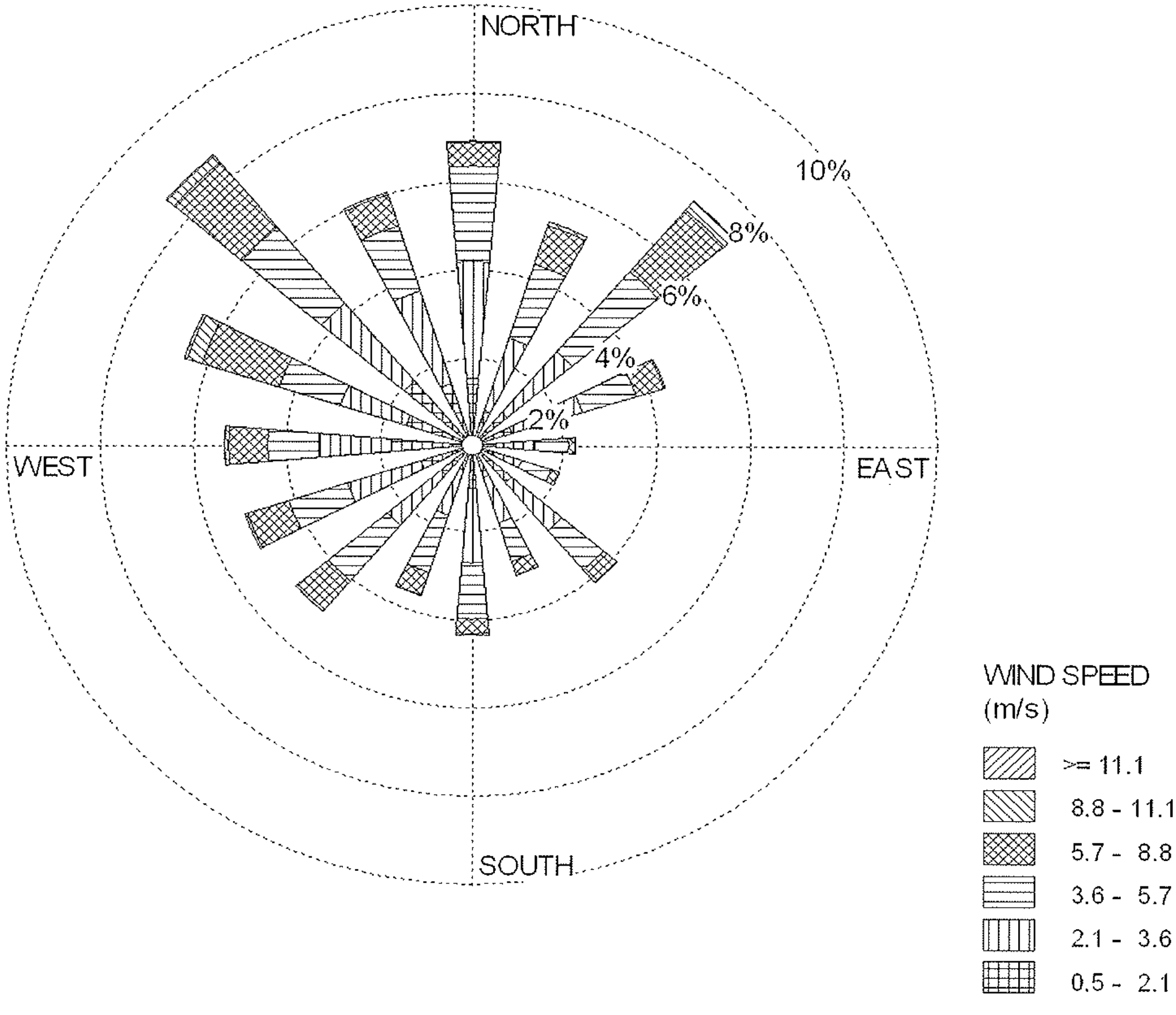
PROJECT SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNAM COUNTY, FLORIDA

TITLE **ANNUAL WIND ROSE FOR 1986 TO 1990 JACKSONVILLE INTERNATION AIRPORT STATION NO. 13889**

Golder Associates
Tampa, Florida

PROJECT No.		053-9540	FILE No. 05395408012
DESIGN	BM	11/21/05	SCALE AS SHOWN REV. 0
CADD	MEF	11/29/05	
CHECK			**FIGURE 2.3.7-1**
REVIEW			

Drawing file: 05395408012.dwg Mar 03, 2006 – 10:11am



AVERAGE WIND SPEED 3.2 m/s

PROJECT
SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNAM COUNTY, FLORIDA

TITLE
WINTER WIND ROSE FROM DECEMBER TO FEBRUARY FOR 1986 TO 1990 JACKSONVILLE INTERNATION AIRPORT STATION NO. 13889

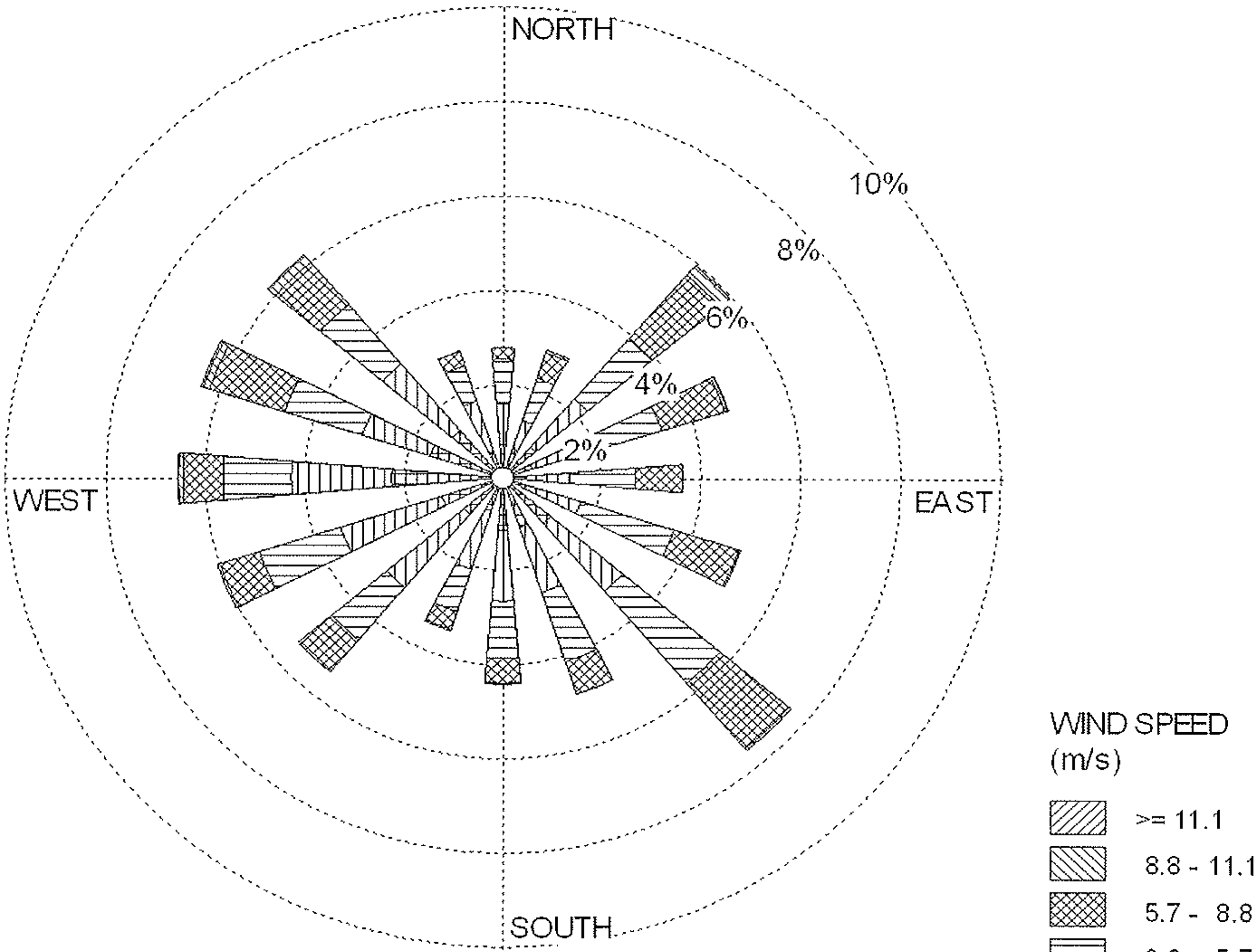
REFERENCES

1.) NATIONAL CLIMATIC DATA CENTER, 1986–1990, GOLDER, 2005

Golder Associates
Tampa, Florida

PROJECT No.		053–9540	FILE No.	0539540B013
DESIGN	BM	11/21/05	SCALE AS SHOWN	REV. 0
CADD	MEF	11/29/05		
CHECK			**FIGURE 2.3.7-2**	
REVIEW				

Drawing file: 0539540B013.dwg Mar 03, 2006 – 10:11am



AVERAGE WIND SPEED 3.3 m/s

REFERENCES

1.) NATIONAL CLIMATIC DATA CENTER, 1986–1990, GOLDER, 2005

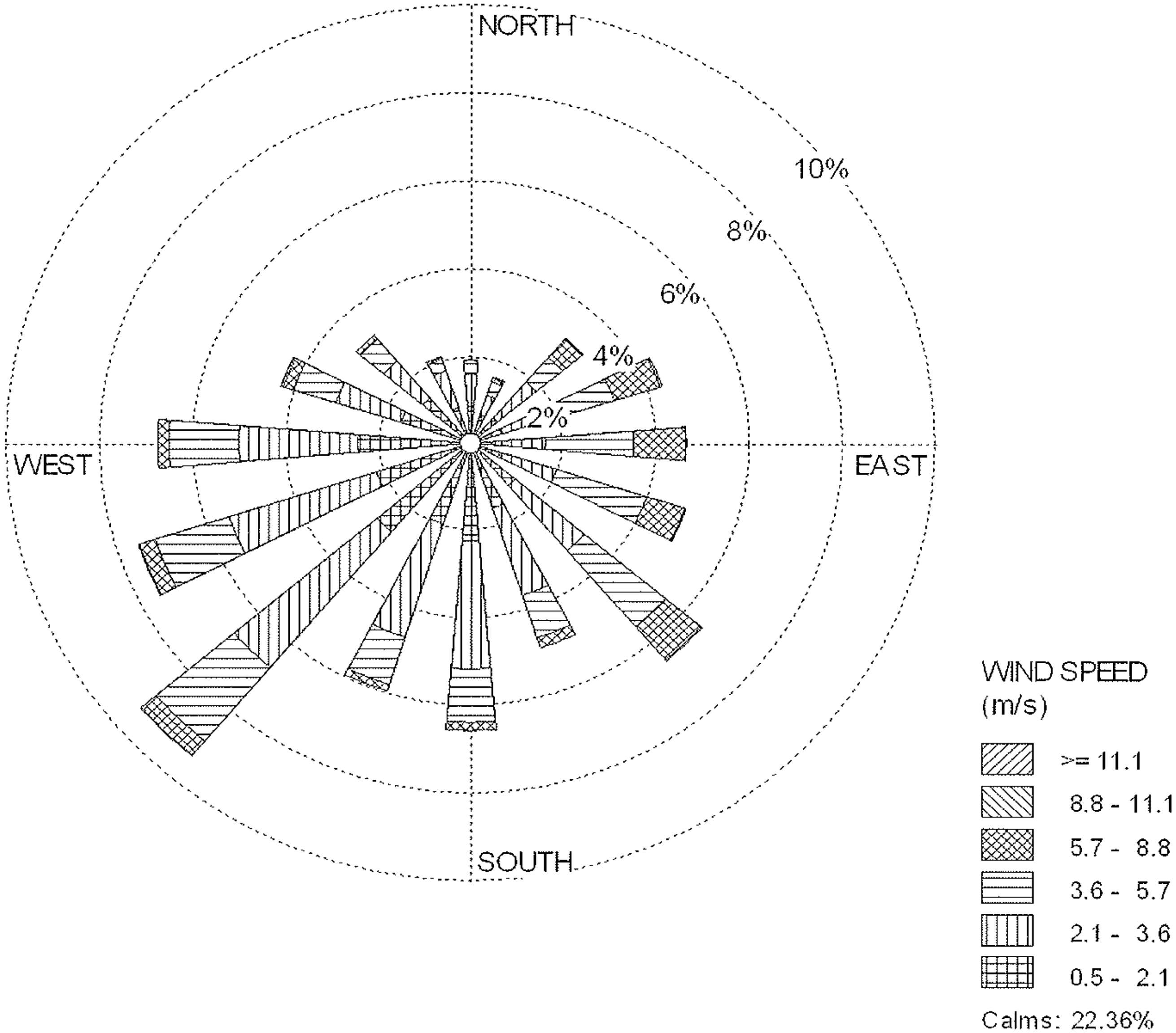
PROJECT SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNAM COUNTY, FLORIDA

TITLE **SPRING WIND ROSE FROM MARCH TO MAY FOR 1986 TO 1990 JACKSONVILLE INTERNATION AIRPORT STATION NO. 13889**

Golder Associates
Tampa, Florida

PROJECT No.		053-9540	FILE No.	0539540B014
DESIGN	BM	11/21/05	SCALE AS SHOWN	REV. 0
CADD	MEF	11/29/05		
CHECK			**FIGURE 2.3.7-3**	
REVIEW				

Drawing file: 0539540B014.dwg Mar 03, 2006 – 10:11am



AVERAGE WIND SPEED 2.7 m/s

PROJECT
SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNAM COUNTY, FLORIDA

TITLE
SUMMER WIND ROSE FROM JUNE TO AUGUST FOR 1986 TO 1990
JACKSONVILLE INTERNATION AIRPORT
STATION NO. 13889

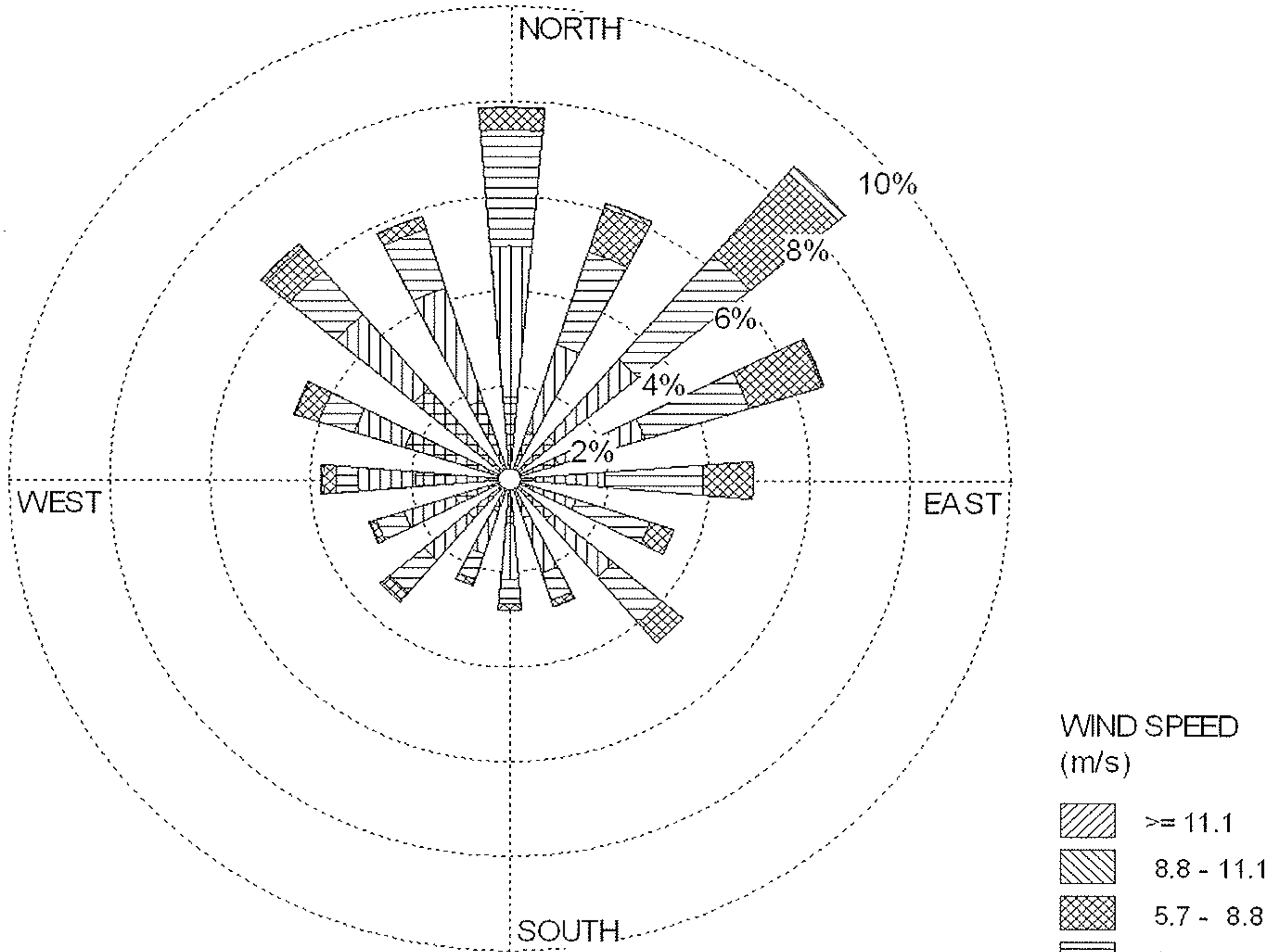
Golder Associates
Tampa, Florida

PROJECT No.		053-9540	FILE No.	0539540B015
DESIGN	BM	11/21/05	SCALE AS SHOWN	REV. 0
CADD	MEF	11/29/05		
CHECK			**FIGURE 2.3.7-4**	
REVIEW				

REFERENCES

1.) NATIONAL CLIMATIC DATA CENTER, 1986–1990, GOLDER, 2005

Drawing file: 0539540b015.dwg Mar 03, 2006 - 10:12am



AVERAGE WIND SPEED 2.9 m/s

PROJECT
SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNAM COUNTY, FLORIDA

TITLE
FALL WIND ROSE FROM SEPTMEBER TO NOVEMBER FOR 1986 TO 1990 JACKSONVILLE INTERNATION AIRPORT STATION NO. 13889

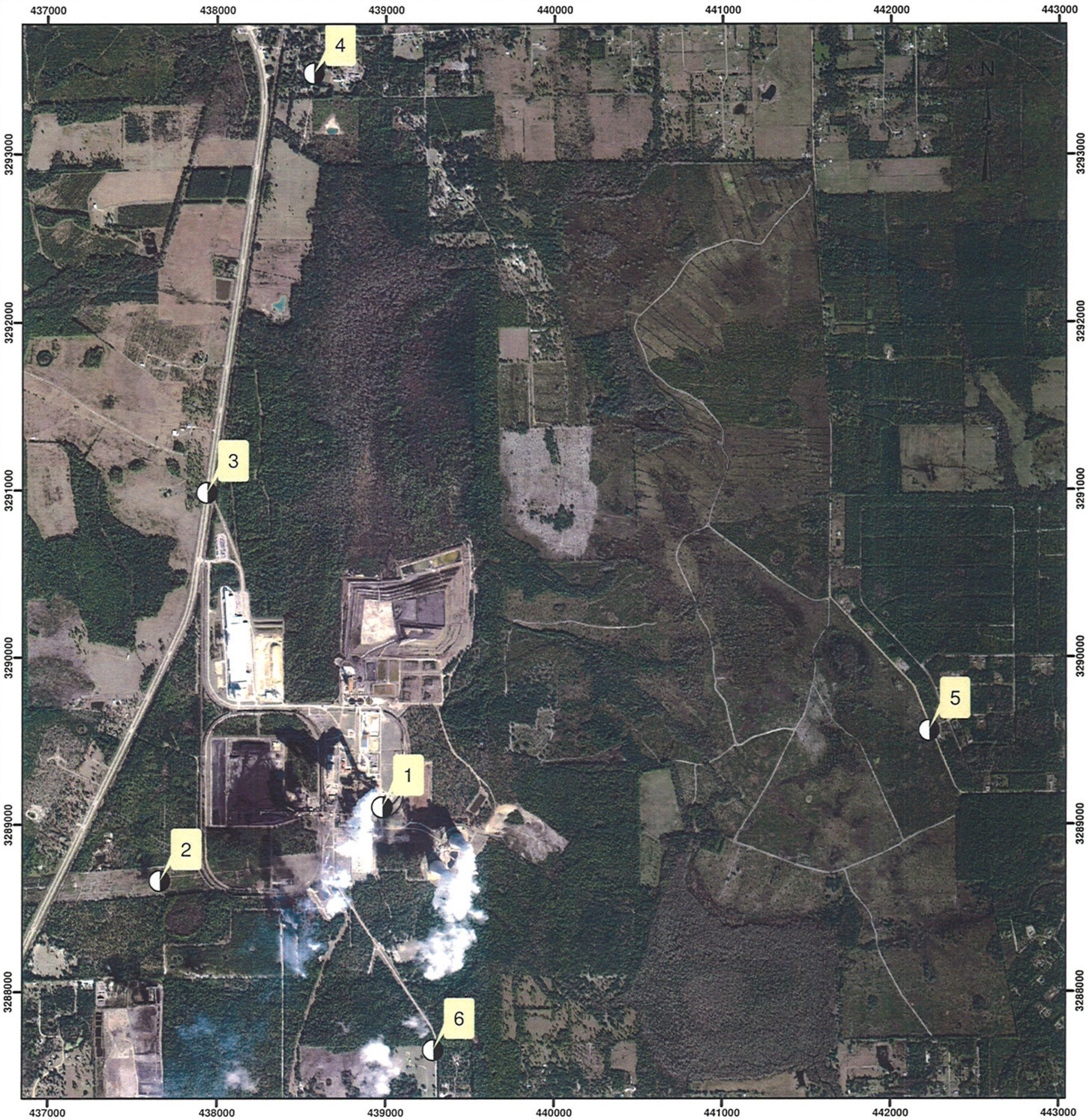
Golder Associates
Tampa, Florida

PROJECT No.		053-9540	FILE No.	0539540B016
DESIGN	BM	11/21/05	SCALE AS SHOWN	REV. 0
CADD	MEF	11/29/05	**FIGURE 2.3.7-5**	
CHECK				
REVIEW				

REFERENCES

1.) NATIONAL CLIMATIC DATA CENTER, 1986–1990, GOLDER, 2005

Drawing file: 0539540B016.dwg Mar 03, 2006 – 10:12am



LEGEND

◐ Noise Monitoring Locations

REFERENCE

Projection: Transverse Mercator Datum: NAD 27 Coordinate System: UTM Zone 17

700 0 700 Meters

PROJECT
SEMINOLE ELECTRIC COOPERATIVE
SGS UNIT 3

TITLE
Noise Monitoring Locations

Golder Associates
Gainesville, Florida

PROJECT No. 053-9540			SCALE AS SHOWN	REV. 0
GIS	AB	23 Jan. 2006	**FIGURE 2.3.8-1**	

Project: P:\2005\0539540\Figure 2.3.8-1.mxd

3.0 THE PLANT AND DIRECTLY ASSOCIATED FACILITIES

This section describes the SGS (Units 1 and 2) and directly associated facilities. The character and magnitude of the proposed SGS Unit 3 plant operations and plant-related systems, overall SGS Site layout, key components of the facility, and proposed controls for air emission and water treatment and discharge are described in detail. Estimates of the expected character, quality, and quantity of discharges and emissions are provided.

3.1 Project Overview

The Project for which SGS Site Certification is sought consists of the addition of SGS Unit 3 and related appurtenances onto the existing SGS Site. The location of SGS Unit 3 at the existing coal-fired generating SGS Site and selection of supercritical technology will maximize the beneficial use of the SGS Site while minimizing environmental, land use and other potential impacts, otherwise associated with development of a greenfield coal-fired electric generating station. The SGS Site contains facilities required for the operation of the existing and proposed units, including rail facilities, coal unloading and storage facilities, river intake and discharge structures, waste handling facilities, potable water systems and pollution control equipment on the existing units to provide offsets for the new facilities.

SGS is a 1,922-acre SGS Site that contains two existing 650 MW coal electric generating units (Units 1 and 2). Both Units 1 and 2 are coal-fired and also are permitted to burn up to a 30 percent petroleum coke (petcoke) to coal blend. The SGS Site contains all facilities for the operation of the existing units, including coal unloading and storage facilities, pollution control equipment, and solid waste disposal areas. Both units are equipped with electrostatic precipitators and wet FGD systems for particulate and SO_2 removal. The output from the FGD is readily converted into wallboard grade synthetic gypsum and transported to a wallboard manufacturing facility located on a parcel of land adjacent to the SGS. The design of SGS Unit 3 will maximize the co-use of existing SGS Site facilities to the greatest extent possible. Existing plant systems proposed for utilization with SGS Unit 3 include coal unloading and storage facilities, the coal pile runoff pond system, the process wastewater treatment system, surface water intake and discharge structures, the plant switchyard, the entrance road, the groundwater well system, the limestone storage system, solid waste disposal area, and the associated transmission lines.

The SGS Unit 3 Project will utilize advanced supercritical pulverized coal technology with state-of-the-art emission controls. The term "supercritical" refers to higher steam operating pressures than conventional (sub-critical) boiler designs to achieve greater efficiency. SGS Unit 3 will be located adjacent to SGS Units 1 and 2 and will be rated at a nominal 750 MW net. The following air emission control equipment is proposed for SGS Unit 3:

- State-of-the-art burner technology to minimize the quantity of NO_X generated in the boiler and improve combustion efficiency;
- An SCR system to remove approximately 90 percent of NO_X generated by the unit;
- An ESP for collection and removal of fine particles;
- A wet FGD system for approximately 98 percent removal of SO_2; the wet FGD system will be used to produce commercial-grade gypsum that will be sold for use in the manufacture of wallboard;
- A wet ESP for control of sulfuric acid mist and trace elements; and
- Approximately 90 percent removal of mercury through application of each of the above technologies.

Fuel (coal and petroleum coke) will continue to be delivered by rail from the existing railroad line, CSX Transportation Inc. (CSX). The addition of SGS Unit 3 will increase coal deliveries to approximately 1.6 unit trains per day (from approximately 320 to 550 trains per year). The existing coal storage area has adequate capacity for SGS Unit 3 and can accommodate up to 60 days of full load operation by all three units. The existing As-Received Transfer Sampling Tower will be modified by adding a new diverter gate and belt feeder. The belt feeder will transfer coal to a new yard belt which will stack out or reclaim coal via a new trencher type stacker/reclaimer. Three days of reclaimable storage for Unit 3 will be provided in a lined area adjacent to the stacker/relaimer. Coal from the yard belt will be directed through a new enclosed crusher tower and to a new tower adjacent to Unit 3. The Unit 3 tower will be provided with a surge bin and variable speed belt feeders which will provide coal to the Unit 3 traveling tripper conveyors. Coal combustion products produced as a result of the addition of Unit 3 will be sold for reuse or disposed in the permitted on-SGS Site landfill or an off SGS Site permitted landfill.

A new 200,000-gallon No. 2 fuel oil storage tank will be added to supply fuel for start-up, flame stabilization, emergency reserve capacity and limited supplemental load. The new tank will be added adjacent to the existing fuel oil tanks that serve Units 1 and 2. The existing fuel oil unloading system will be used to fill the new No. 2 fuel oil tank.

Limestone will continue to be delivered by truck and will be transferred from the existing truck unloading system to the existing storage facility utilizing the existing limestone handling system. A new ball mill will be installed to increase the limestone preparation capacity required for Unit 3.

The primary water uses for the SGS Unit 3 Project will be for cooling tower makeup, wet FGD makeup, steam cycle makeup, and process service water. Cooling water will be withdrawn from the St. Johns River. Condenser cooling for Unit 3 will be provided by a new mechanical draft cooling tower. The existing intake structure will continue to be used; two intake screen ports which are currently not operational may be opened during the operation of Unit 3. An additional intake pipe will be added in the river between the intake structure and the river water pump house. New pumps and piping will be added as necessary in the river pump house, additionally, a new pipe will be added within the existing easement between the river pump house and Unit 3 to ensure that adequate flow is available for cooling water.

Most process wastewater streams from Units 1 and 2, as well as Unit 3, will be treated and recycled as make-up water to the FGD scrubber system. Wastewater from the FGD system will be treated in a new ZLD system which will remove dissolved solids from the wastewater. A new waste water surge pond will be installed to accommodate the storage of wastewater during times when the ZLD is not in service. Condensate from the ZLD system will be recovered as make-up to the steam cycles from Units 1, 2 and 3. The waste concentrate will be evaporated in a spray dryer and disposed in the onsite landfill or offsite in permitted landfills.

Process wastewater discharge to the St. Johns River from Units 1 and 2 will be eliminated. The only industrial wastewater proposed to be discharged to the St. Johns River from Units 1, 2, and 3 will be cooling tower blowdown (See Figure 3.5.0-1). The existing 12-inch diameter nozzle will be removed from the discharge pipe in order to eliminate the potential of increased turbulence at the point of discharge. The resulting discharge pipe exit diameter will be 16-inches.

A new sanitary treatment system will be installed to handle the sanitary waste from all three units and will be located adjacent to the existing sewage treatment plant. Treated sanitary wastewater will be recycled as makeup to the FGD system.

A borrow pit will be constructed to provide fill material required for the modification of the plant entrance road, development of the construction laydown areas, backfill for structures and to establish grade elevation for the SGS Unit 3 Project and for base and cover for future landfill activities. The borrow pit will be designed to meet the local and state requirements and will be incorporated into the SGS Site stormwater management system as necessary.

Stormwater runoff from several sub-basins within the affected project area will be routed to on-SGS Site detention ponds. The detention ponds are designed to meet federal, state, regional and local requirements (See Section 3.8). A new coal pile runoff pond will be installed inside the existing rail loop to handle the storm water from the new coal yard facilities.

Seminole has no plans for offsite SGS Site transmission line construction associated with the SGS Unit 3 Project. Onsite substation equipment upgrades are proposed to support the connection of Unit 3 to the existing 230 kV lines. The existing 230 kV circuit breakers and disconnect switches will be replaced and upgraded and two new voltage transformers will be required. The existing onsite interface with the Rice and Silver Springs North transmission lines will be reconfigured to enhance reliability. A new line terminal with 2 circuit breakers and associated terminal equipment will be added onsite to connect the new generator to the existing switchyard. To accommodate the above work, the existing substation fence line will be relocated eastward up to 100 ft on the north end and up to 250 ft on the south end. Work inside this area will include foundations, trenching, ground grid installation, steel erection, and aluminum bus installation.

An emergency diesel generator will be installed to increase reliability and provide emergency power supply for critical operating systems in the event of a loss of power to the switchyard.

The plant entrance road will be modified from two lanes to four lanes to accommodate the additional traffic requirements for construction and operation of the SGS Unit 3 Project.

By separate application submitted on February 13, 2006, Seminole submitted a Request for Modification of SGS Site Certification to add several environmentally-beneficial upgrades to Units 1 and 2. Specifically, Seminole proposed the following inter-related pollution control upgrades:

- Installation of low NO_X burners and modified overfire air systems on Units 1 and 2, in order to comply with the annual average emission limitation of 0.46 lb/mmBtu that will become applicable in 2008 pursuant to Title IV of the federal Clean Air Act and corresponding state regulations.

- Installation of a state-of-the-art, urea-based selective catalytic reduction (SCR) control system on both units. This included a new urea unloading systems, a urea storage area, and facilities to convert the urea to ammonia for injection into the SCRs. The proposed SCR systems are being designed to be capable of achieving substantial NO_X reductions (to 0.07 lb/mmBtu at 90 percent removal) so that Seminole will have the option of meeting its projected NO_X allocations under Phases I and II of the federal Clean Air Interstate Rule through actual emission reductions instead of purchasing allowances. (For example, the SCR technology would make it possible for Seminole to reduce current NO_X emissions from Units 1 and 2 by approximately 13,000 tons per year to meet its anticipated Phase I allocations.) Reductions associated with the SCR systems on Units 1 and 2 also will make it possible to offset potential NO_X air emission increases that would be associated with a new proposed Unit 3 and will provide a co-benefit in the reduction of mercury emissions from Units 1 and 2.

- Upgrades to the FGD systems for Units 1 and 2 to provide the capacity to achieve up to 95 percent post-combustion SO_2 removal efficiency. Related appurtenances will include expansion of the air compressor building, the addition of an air compressor, additional FGD dewatering appurtenances, and additional gypsum conveyance capability. With the improvements to the FGD system, Seminole would have the option of meeting its projected Phase I (in 2010) and Phase II (in 2015) Clean Air Interstate Rule SO_2 allocations through emission reductions instead of purchasing allowances. (For example, with the FGD upgrades Seminole could achieve SO_2 reductions of approximately 10,000 tons per year to meet Phase I requirements.) This new air pollution control technology will be relied on to offset potential SO_2 air emission increases associated with Unit 3 and will further assist the already substantial reduction of mercury emissions from Units 1 and 2.

- The addition of an alkali injection air pollution control system for each unit to control for potential SO_3 formation by the SCR systems. The alkali injection technology will be designed to ensure that the installation and operation of the SCR systems do not result in an increase in SAM emissions and will be relied on to offset potential SAM emission increases associated with Unit 3.

- The installation of a carbon burnout (CBO) system to produce a final fly ash product that will have substantially lower carbon and ammonia levels and therefore will be suitable for beneficial reuse. The CBO system also will recover energy from the high-carbon fly ash from Units 1 and 2 (this will improve the heat rate of Units 1 and 2). The CBO system also will offset the adverse effects that the new NO_X control systems otherwise would have on fly ash reuse. The CBO system will minimize the need to landfill solid waste. The CBO system will include a bulk storage facility, silos, loading and conveyance systems, and a small truck rinse station.

- The steam turbines associated with Units 1 and 2 are proposed to undergo blade efficiency improvements that will be designed to obtain greater electric generating output per unit of fuel burned and also accommodate the CBO unit. The current nominal gross MW rating would increase from 714.6 MW to 735.9 MW per unit. These changes will compensate for the energy penalties associated with the pollution control upgrades.

- This project also includes a proposed warehouse expansion, the addition of two new auxiliary transformers and related appurtenances, a parking lot, employee car rinse area and the installation of a wet detention stormwater management and control systems to comply with the requirements of Chapter 40C-42, F.A.C. and the St. Johns River Applicant's Handbook with respect to stormwater management and control. The stormwater system will be designed such that it will have the capacity to accommodate stormwater associated with the appurtenances proposed in the submittal, and the projected stormwater impacts associated with Unit 3.

Importantly, the upgrades discussed above will allow Seminole to add the proposed SGS Unit 3, which is the subject of this PPSA SGS Site certification modification application, with no net increase in total emissions of NO_X, SO_2, SAM and mercury.

3.1.1 Unit 3 Supercritical Technology

SGS Unit 3 will utilize supercritical pulverized coal technology with the steam cycle described as follows. Condensate pumps will take condensate from the condenser and pump the water through four low-pressure feedwater heaters to the deaerator. The boiler feed pumps take suction from the deaerator and pump the water through three high-pressure feedwater heaters to the boiler. The boiler feedwater enters the boiler through the economizer to recover heat from the combustion gases exiting the boiler. Downstream of the economizer, the heated feedwater is directed to the water wall circuits enclosing the furnace. After passing through the lower and then the upper radiant wall, the fluid passes through the convection enclosure circuits to become steam and is superheated in the superheater section of the boiler. The steam then exits the boiler to the high-pressure (HP) section of the steam turbine at an inlet temperature of 1,050°F.

As the steam energy is converted to shaft power in the HP section of the steam turbine, its temperature and pressure are reduced. The cooled and lower pressure steam exits the HP section of the turbine and returns to the boiler and passes through the reheater section of the boiler where the steam temperature is raised back up to the expected intermediate-pressure (IP) turbine inlet temperature of 1,050°F. This step is called reheat and it is used to increase the efficiency of the cycle. The steam then is directed to the IP section of the steam turbine where again steam energy is converted to shaft power as its temperature and pressure drops. From the IP section, the steam is directed to the low-pressure (LP) section of the steam turbine where the steam further expands to convert additional energy to turbine shaft power that drives the electric generator. Steam exhausts from the LP section of the steam turbine to the condenser where the steam is condensed. Cooling water for the condenser is cooled in a mechanical draft cooling tower.

The Unit 3 boiler will be a pulverized coal, balanced draft type unit employing supercritical steam pressure and temperature. Supercritical boilers are similar to subcritical boilers, but the major difference is the supercritical boiler operates in the supercritical pressure-temperature region where water converts directly to steam without two phase fluid existing. As a result the supercritical boiler uses a once-through system which does not require a steam drum. The primary advantages of supercritical steam cycles over subcritical steam cycles are improved plant efficiency due to higher operating pressures and temperatures, lower air emissions and lower fuel consumption. An additional advantage of the planned sliding pressure supercritical boiler is that it simplifies cycling the unit to accommodate load flow fluctuations required by the electrical system demand.

3.2 SGS Site Layout

The SGS Unit 3 will be located within the SGS Site (within Parcel 1 of the SGS Site) which encompasses 1,917-acres. See Section 2.1.1 for a detailed description of the existing SGS Site. The Unit 3 power block will be located adjacent to Unit 2. The Unit 3 mechanical draft cooling tower will be located to the north of the existing Unit 1 and 2 cooling towers. Figure 3.2.0-1 presents the boundary of the SGS Site. Figure 3.2.0-2 presents a photo rendering and Figure 3.2.0-3 presents the overall SGS Site layout of the SGS Unit 3 Project.

The SGS Unit 3 power block will contain fuel bunkers, a boiler, steam turbine generator, step-down transformers, pollution control equipment, water treatment equipment, ash handling equipment, and other facilities. The existing fuel storage and handling area will be expanded from approximately 60 acres to approximately 84 acres to support the new SGS Unit 3 facility. Warehouse, administrative and maintenance buildings will be supported by existing facilities. The primary SGS Unit 3 facilities and their approximate land areas are described below:

SGS Unit 3 Facilities

Power Block	18 acres
Cooling Tower	5 acres
Construction Laydown, Parking and Trailers	132 acres
Stormwater Ponds	21 acres
Wastewater Equalization Basin	6 acres
Coal Pile Runoff Pond	3 acres
Coal Handling Facilities	24 acres
Entrance Road	3 acres
Zero Liquid Discharge System	1 acre
Substation Expansion Area	2 acres
Borrow Pit	13 acres
SGS Unit 3 TOTAL	**228 acres**

3.3 Fuel

SGS Unit 3 will use the same primary fuels as Units 1 and 2: bituminous coals and petroleum coke, delivered to the SGS Site by CSX rail. The SGS Unit 3 will co-fire up to 30 percent by weight petroleum coke with coal. Typical ultimate and proximate analyses of coals and petroleum coke representative of the types of fuels proposed for the SGS Unit 3 project, as well as the proposed blend, are shown in Table 3.3.1-1. The petroleum coke-coal blend for typical averages is also provided. No. 2 fuel oil will be used for startup and flame stabilization, emergency reserve capacity and limited supplemental load. A new 200,000-gallon fuel oil storage tank will be provided to supply fuel for the new SGS Unit 3. Typical properties of the No. 2 fuel oil are shown in Table 3.3.1-2.

It is the intention of Seminole to utilize the same fuel blends in all three units. Burning the same fuel in Unit 3 as is burned in Units 1 and 2 maximizes the co-use of existing coal handling areas and equipment (for example, rail lines, unloading facilities, storage areas, conveyor systems, etc.), avoiding the need to construct separate facilities dedicated solely to Unit 3, and avoids the substantially increased costs associated with purchasing and transporting lower sulfur coals from other mines.

The existing Units 1 and 2 are burning coal with a sulfur content that typically ranges up to 3.8 percent, although individual shipments can exceed this value. The Unit 3 Project is demonstrating a net decrease in facility SO_2 emissions, and there is no regulatory restriction on fuel sulfur content. Nonetheless, Seminole is committed to achieving the proposed 0.165 lb/MMBtu SO_2 limit regardless of the fuel sulfur content. The existing units are currently utilizing 0.5 percent sulfur oil and, to maximize the co-use of existing equipment, Seminole proposes the same choice for the Unit 3 Project.

3.4 Air Emissions Controls

3.4.1 Air Emissions Types and Sources

The types and sources of air emissions associated with the SGS Unit 3 Project consist of the one supercritical boiler, a mechanical draft cooling tower, ZLD spray dryers, an emergency diesel generator, and material handing facilities. Figure 3.2.0-3 presents the location of the air emission sources.

Table 3.4.1-1 presents the estimated emission rates of regulated pollutants for the SGS Unit 3 boiler. The design parameters are provided in Table 3.4.1-1 for operating loads of 100, 75, and 50 percent. The maximum estimated emission rates were determined using the air pollution control equipment proposed for the Project. The Air Construction and PSD Application as set forth in Appendix 10.1.5 presents the basis for the emission rates and maximum annual emissions of regulated and non-regulated pollutants, including air pollutants defined as hazardous air pollutants (HAPs), as well as unit performance.

During combustion, two primary types of NO_X are formed: fuel NO_X and thermal NO_X. Fuel NO_X emissions are formed through the oxidation of a portion of the nitrogen contained in the fuel. Thermal NO_X emissions are generated through the oxidation of a portion of the nitrogen contained in the combustion air. NO_X formation can be limited by controlling combustion temperatures and/or staging combustion. NO_X formed in the boiler will be minimized through combustion controls that will include low-NO_X burners (LNB) and over-fire air (OFA). SCR will be installed after the economizer to limit NO_X emissions to 0.07 lb/MMBtu on Unit 3. In addition, NO_X emissions from the installation of SCRs on Units 1 and 2 will result in a facility-wide decrease in NO_X emissions from SGS, even after Unit 3 comes online.

CO and VOCs are formed by incomplete combustion of fuel. The level of NO_X control in the boiler also influences the formation of CO and VOCs since it is desired to minimize flame temperatures to reduce the formation of NO_X. Proper combustion temperatures, adequate excess air, and good combustion control during operation will minimize CO and VOC emissions from Unit 3 to 0.150 and 0.004 lb/MMBtu, respectively.

PM emissions are primarily the result of the ash in the fuels. A portion of the ash, about 20 percent, remains in the boiler and is removed as bottom ash. The remaining ash is collected in the PM control device, which will be an ESP. The filterable PM emissions from Unit 3 will be limited to 0.015 lb/MMBtu.

Emissions of SO_X, which are a result of the oxidation of sulfur in the fuels, will be limited by two types of air pollution control devices. First, SO_2 emissions, the majority of the SO_X emissions, will be controlled using a wet limestone FGD system achieving approximately 98 percent removal. Unit 3's maximum SO_2 emission rate will be limited to 0.165 lb/MMBtu. Also, the decrease in SO_2 emissions from the FGD upgrades to SGS Units 1 and 2 will result in an overall decrease in SO_2 emissions from SGS, even after Unit 3 comes online. Second, following the wet FGD system, a wet ESP will be installed to minimize emissions of SAM. SAM is the result of a small portion of the oxidized sulfur (about 2 percent) being formed as gaseous SO_3. The lower temperature and moist conditions of the wet FGD system forms SAM from the SO_3. The wet ESP is designed to minimize the SAM from Unit 3 to no more than 0.005 lb/MMBtu. The alkali system requested for Units 1 and 2 will result in a facility-wide decrease in SAM emissions from SGS, even after Unit 3 comes online.

PM emissions are emitted from the cooling tower in the form of drift. Drift is water aerosols emitted from the cooling tower containing dissolved minerals from the water circulating in the cooling tower. The dissolved minerals become PM, including PM_{10}, when the water in the drift is evaporated. Cooling tower drift will be controlled through the use of drift eliminators that will be designed to limit drift to 0.0005 percent of the circulating water rate of the cooling tower.

PM emissions will be generated by material handling operations that include fuel, limestone, and product handling and storage. The latter includes bottom and fly ash and FGD product. A description of material handling operations is presented in Section 3.9. The Air Construction and PSD Application presents the basis for the emission rates and maximum annual emissions of PM and PM_{10}.

Table 3.4.1-2 presents the annual potential emissions of SO_2, PM, PM_{10}, NO_X, CO, VOCs, SAM, fluoride, lead, and mercury for the Project. As summarized in this table, the project also includes a cooling tower, material handling operations an emergency diesel generator and spray dryers, associated with the ZLD system. Emissions from each of these units are presented individually in the Tables 2-7 through 2-10 of the PSD Application in Appendix 10.1.5 of this SCA. Fluoride, lead, and mercury are classified as PSD pollutants and are trace elements in fuels. These pollutants are minimized by the use of an SCR, ESP, wet FGD, and wet ESP, and are emitted in small concentrations. Annual emissions were based on emissions expected for 100-percent load and 8,760 hours per year (100-percent-capacity factor). Unit 3 will normally operate at less than 90-percent capacity on an annual basis.

Table 3.4.1-3 compares the Unit 3 Project emissions to the PSD significant emission rates, which are thresholds for PSD review for new major sources. PSD review is required for emissions of a pollutant greater than the listed PSD significant emission rate. This review would include a determination of Best Available Control Technology (BACT).

Based on the overall emissions from the facility for each regulated pollutant, PSD review is required for each of the following pollutants:

- Particulate matter (PM) as total suspended particulate matter (TSP) [PM(TSP)],
- Particulate matter with aerodynamic diameter of 10 microns or less (PM_{10}),
- Carbon monoxide (CO),
- Volatile organic compounds (VOCs), and
- Fluorides.

Due to the conservative nature of formally projecting future emissions, Seminole is confident that there will actually be at least a ten percent reduction in SO_2, NO_X, SAM and mercury emissions even after Unit 3 comes online. Specifically, the projected future actual emissions from Units 1, 2 and 3 were calculated using the emission rates specified in Table 3.4.1-1 (and Table 3-4 of the PSD Application in Appendix 10.1.5), and assuming that all three units will run continuously for 8,760 hours per year (i.e., one-hundred percent capacity factor). Historical capacity factors for Units 1 and 2 have never exceeded 90 percent, and this is expected for Unit 3 as well. In addition, emission rates will not continually be exactly at the maximum allowable level. Accordingly, the actual emissions of SO_2, NO_X, SAM and mercury from SGS after Unit 3 comes online should be at least ten percent less than baseline emissions.

3.4.2 Air Emission Controls

State-of-the-art air pollution control equipment will be installed on Unit 3 and associated systems to minimize air emissions. Within the boiler, combustion controls and design will minimize the formation of NO_X, CO and VOCs. Additional NO_X reduction will be achieved by using an SCR. PM emissions will be controlled using an ESP. SO_X will be controlled using a wet limestone FGD system followed by a wet ESP. The cooling tower will use drift eliminators to minimize PM emissions. Material handling PM emissions will be minimized through the use of best management practices, including covered conveying systems, baghouses at transfer points and water sprays for dust suppression. The ZLD spray dryer and emergency diesel generator will use clean fuels and good combustion practices.

The following subsection presents a summary of these technologies and BACT analysis, which is presented in detail in the Air Construction and the PSD Application in Appendix 10.1.5.

3.4.3 Control Technology Description/Best Available Control Technology

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

The FDEP and EPA have established a policy for BACT review in which the most stringent control alternatives are evaluated first. The alternatives are either rejected based on technological, environmental, energy or economic reasons or are proposed as BACT. This procedure is referred to as the "top-down" approach. For the Project, BACT is applicable for emissions of PM and PM_{10}, CO, VOCs, and fluorides. As described in the PSD Application in Appendix 10.1.5, emission reduction credits for SO_2, NOx, and SAM due to control equipment upgrades to Units 1 and 2, will allow the new Unit 3 to net out of PSD review for these pollutants. Nonetheless, the control levels proposed for SO_2, NO_X and SAM are BACT-type limits and allow the overall project to demonstrate no net increase in these pollutants. The mercury emissions from SGS Unit 3 are well below the PSD "significance" threshold (0.1 tons per year), therefore BACT review is not required, and moreover, the control equipment upgrades to Units 1 and 2 will result in a facility-wide decrease in mercury emissions even after Unit 3 comes online. Units 1, 2 and 3 will be in compliance with the new CAMR requirements when they become effective in 2010.

Appendix 10.1.5 of the SCA contains a complete Air Construction and PSD Application. This Application includes the BACT evaluation for the Project and addresses those pollutants for which BACT is applicable. A discussion of the environmental, economic, and energy aspects of alternative control techniques and methods are included. The remainder of this section briefly describes the control technologies that are proposed for the Project (as BACT or otherwise).

3.4.3.1 Nitrogen Oxides

Emissions of NO_X are produced by the high-temperature reactions of molecular nitrogen and oxygen in the combustion air and by fuel-bound nitrogen with oxygen. The former is referred to as thermal NO_X, while the latter is referred to as fuel-bound NO_X. The relative amount of each depends on the combustion conditions and the amount of nitrogen in the fuel. Formation of thermal NO_X depends on the combustion temperature and becomes rapid above 2,550 °F. The equations developed by Zeldovich are recognized as the reactions that form thermal NO_X:

$$N_2 + O \longrightarrow NO + N$$
$$N + O_2 \longrightarrow NO + O$$
$$N + OH \longrightarrow NO + H$$

The important parameters in thermal NO_X formation are combustion temperatures, gas residence time, and local stoichiometric ratio of fuel and air.

Fuel-bound NO_X, which with most fossil fuels is usually small compared to thermal NO_X, is more readily formed by the nitrogen in the fuel that reacts with combustion air. Another mechanism for NO_X formation is the reaction of molecular nitrogen with free hydrogen (H) radicals. This mechanism is known as "prompt NO_X" and occurs within the combustion zone with the following major reactions:

$$N_2 + CH \longrightarrow HCN + N$$
$$N + O_2 \longrightarrow NO + H$$

The contribution of prompt NO_X to overall NO_X levels is relatively small (less than 5 percent).

The primary way to reduce NO_X emissions is through either combustion process control or through catalytic or noncatalytic reactions. Combustion controls are the necessary engineering choice in reducing NO_X concentrations within the boiler. Combustion controls include LNBs and OFA. Such controls are considered "pollution preventing", since the formation of NO_X is limited by the combustion process. NO_X emissions will be further controlled by SCR systems. SCR is a post-combustion process where NO_X in the gas stream is reacted with ammonia in the presence of a catalyst to form nitrogen and water. The reaction occurs typically between about 600 and 750°F. These temperatures occur after the economizer, followed by the ammonia injection and the SCR catalyst. Ammonia will be produced onsite using urea as a raw material.

The permitting trend for coal-fired units is the use of combustion controls and SCR. Based on the ability to control NO_X using combustion controls and SCR, an emission level of 0.07 lb/MMBtu is proposed for the Unit 3 Project and is equal to or lower than BACT determinations made for similarly designed projects. Due to the installation of SCRs on Units 1 and 2, the facility-wide NO_X emissions after Unit 3 comes online will actually be less than current levels.

3.4.3.2 Particulate Matter

Combustion of coal in a pulverized coal-fired boiler creates ash, which is the non-combustible portion of the fuel. The ash is solid and therefore is classified as PM. A portion of this PM, approximately 20 percent, falls to the bottom of the boiler as bottom ash and is removed by the bottom ash system. The majority of the PM, approximately 80 percent, is fly ash and is entrained by the flue gases leaving the boiler. The majority of this fly ash is then collected by the flue gas PM removal system.

ESPs and fabric filters are the most effective PM control devices being successfully applied to coal-fired power plants. PM removal efficiencies of these devices can be greater than 99.8 percent. Either device is highly effective in controlling PM_{10} emissions.

In an ESP, a high-voltage electric field is produced that imparts an electric charge to the solid particles in the flue gas stream. This is accomplished using a pulsating direct-current voltage in the range of 20,000 to 100,000 volts, which ionizes the gas stream and is commonly known as corona. The ions, usually produced using a negative corona, are attracted to the particles traveling in the ionized gas stream. These particles are then removed from the gas stream by migrating toward oppositely charged collectors. Rapping mechanisms are operated intermittently to dislodge the collected particles, which subsequently fall into hoppers.

ESP performance is highly dependent on the electrical characteristics or resistivity of the particle to be collected. The resistivity of the particle and the corresponding ESP performance are functions of the particle composition, flue gas characteristics, particle size distribution, and particle loading. These parameters can vary during normal operation, can influence ESP performance, and are accommodated in the ESP design.

ESP performance is dependent on a number of factors, which influence the resistivity of the particle. These factors include the particle composition, flue gas characteristics, particle size distribution, and particle loading. These parameters can vary during normal operation and can influence ESP performance when gas streams come directly from the boiler.

In a fabric filter, PM is removed from the flue gas as it passes through a fabric filter media such as woven cloths or felts; hence the term "fabric filter." The filters are normally arranged as a number of cylinders or tubes (commonly referred to a "bags") through which the flue gas is directed. The filters are contained in a housing which has gas inlets and outlets. The flue gas enters the cylindrical filter from the bottom and flows upward, from either the inside of the cylinder to the outside or the opposite depending upon the design. Particulate collection occurs through several mechanisms, including gravitational settling, direct impaction, inertial impaction, diffusion, and electrostatic attraction. When the pressure drop reaches a predefined level, a section of the filters is taken offline for cleaning. Various methods are used to clean the bags in the fabric filter. The two general types of cleaning are shaker cleaning, pulse-jet cleaning, and reverse-gas cleaning. Both types of cleaning methods ensures the fabric filter achieves the same low emission rates.

The use of fabric filters for fuels in the range of sulfur concentrations proposed for Unit 3, has limited operating experience and has not proven capable of achieving low emissions and long term reliability and therefore an ESP is the technology proposed as BACT in achieving an emission rate of 0.015 lb/MMBtu for the SGS Unit 3 Project. Other technologies, such as mechanical collectors and wet scrubbers, have not demonstrated equivalent levels of control.

PM emissions will be emitted from the mechanical draft cooling towers in the form of drift. Cooling tower drift for Unit 3 will be controlled through the use of mist eliminators that will be designed to limit drift to 0.0005 percent of the circulating water flow rate of the cooling tower.

For the cooling tower, the installation of drift eliminators is the only feasible technology for controlling PM emissions. Drift eliminators use inertial separation caused by airflow direction changes to remove water droplets from the air stream exhausting from the cooling tower. These water droplets generally contain the same concentration of dissolved solids and chemical impurities as the water circulating through the tower. Drift eliminator configurations include cellular (or honeycomb), wave-form, and herringbone (blade-type) designs. Drift eliminators may also be constructed of various materials, such as ceramic; fiberglass; metal; plastic; and wood installed or formed into slats, sheets, honeycomb assemblies, or tiles. Particulate emissions from the proposed cooling tower will be controlled utilizing high-efficiency drift eliminators achieving a drift loss rate of 0.0005 percent of the cooling tower recirculating water flow.

The ZLD system will utilize three spray dryers to remove the final moisture from the wastewater treatment effluent, thereby creating PM emissions. This process involves the atomization of concentrated wastewater into a spray of droplets and contacting the droplets with hot air in a drying chamber. The sprays can be produced by either rotary (wheel) or nozzle atomizers. Evaporation of moisture from the droplets and formation of dry particles proceed under controlled temperature and airflow conditions. The particles are discharged continuously from the drying chamber and collected in a particulate removal device. The particulate control device with the greatest degree of emission reduction is a fabric filter, commonly referred to as a baghouse. For the ZLD system, a baghouse will be used to limit PM emissions to 0.3 lb/hr/dryer. The fabric filter will have an efficiency of greater than 99.5 percent. Fabric filter technology is demonstrated and cost effective for the proposed project. There are no other particulate control devices that would provide greater control. Typical design features for a wastewater fabric filter are a maximum air to cloth ratio of 4 to 1, fiberglass bags (although Nomex and Teflon can be used) and pulsed jet cleaning.

3.4.3.3 Sulfur Oxides (SO_2 and SAM)

Sulfur in fuels is oxidized at the high combustion temperatures in a boiler and across the SCR to form SO_2 and SO_3, with about 2 percent being SO_3. The control of SO_2 from coal-fired power plants has developed at a rapid rate since the early 1970s. Since that time, numerous control processes have been developed, tested, and offered by control equipment companies. The primary technology that has been developed and installed to remove SO_2 at high efficiencies (90 percent or greater) from coal-fired power plants has been wet limestone scrubbing or wet flue gas desulfurization (FGD). Wet scrubbing is a gaseous- and liquid-phase reaction process in which the SO_2 gas is absorbed by the scrubbing liquid under saturated conditions. The most widely used system for large-scale SO_2 removal is the calcium-based wet limestone FGD system. Worldwide, there are about 200,000 MW of installed wet limestone FGD systems, which represent about 80 percent of FGD systems. The SO_2 reacts with the carbonates to form calcium sulfite (i.e., $CaSO_3 \cdot \frac{1}{2} H_2O$) initially, then sulfate (i.e., $CaSO_4 \cdot 2H_2O$) with further oxidation. The latter, known as wet limestone forced-oxidation FGD, involves blowing air into the FGD slurry to force almost 100 percent oxidation of calcium sulfite to calcium sulfate. This produces a marketable product (i.e., gypsum suitable for wallboard manufacture). Wet limestone FGD systems have been demonstrated to achieve high SO_2 removal efficiencies of 95 percent or more. For SGS Unit 3, the proposed wet limestone FGD system will remove 98 percent of the SO_2, resulting in a proposed emission rate of 0.165 lb/MMBtu. Due to the FGD upgrades on Units 1 and 2, the SO_2 emissions after Unit 3 comes online will actually be less than current levels. The wet scrubbing process will result in a liquid wastewater stream, which will be treated in a ZLD system and gypsum which will be sold as a product in the manufacture of wallboard.

Wet ESPs use a similar control mechanism as dry ESPs in collecting particles, except that they are well suited for acid mists. They are operated at temperatures less than 190°F. Instead of rapping mechanisms, wet ESPs typically use water to wash particles from the collectors. The water wash can be either intermittent or continuous. Unlike dry ESPs, resistivity of the particle is not a major factor in performance since the gas stream has high humidity that reduces the resistivity of most particles. Due to this effect, wet ESPs can collect smaller particles than dry ESPs since resistivity is lowered for all particle sizes and there is less re-entrainment. Removal efficiencies of 90 percent can be expected for SAM emissions in new designs and an emission rate of 0.005 lb/MMBtu is proposed. This SAM emission level has been approved as BACT on similar recent projects. Due to the installation of an alkali system on Units 1 and 2, the facility-wide SAM emissions after Unit 3 comes online will actually be less than current levels.

3.4.3.4 Carbon Monoxide and Volatile Organic Compounds

CO emissions result from incomplete combustion of the fuel and are controlled by boiler design features and combustion air feed rates. The boiler will be designed and operated for high-combustion efficiency, which will inherently minimize the production of CO. Combustion control is the primary method used to control CO emissions.

VOC emissions result from incomplete combustion of the fuel. This incomplete combustion can result from poor air/fuel mixing or insufficient oxygen for combustion. Such emissions are reduced by modifying design features of the boiler and control of the combustion air feed rates. Design of a boiler and combustion air system to efficiently burn the coal represents the control technology with the greatest degree of emissions reduction. The predominant control method is combustion control. The proposed BACT emission rate for VOCs would be achieved through good combustion practices, which have been accepted as the control technology to establish BACT on pulverized coal fired power plant units. No other control technology is available to further reduce emissions. This emission rate proposed for the Unit 3 Project is within the range of emission rates established for similar sources.

Design of a boiler and combustion air system to efficiently burn the coal represents BACT for control of CO and VOC emissions. There are no other control devices demonstrated that are available or feasible for the Unit 3 Project. The CO and VOC emission rates for the Unit 3 boiler of 0.15 lb/MMBtu and 0.004 lb/MMBtu, respectively, are within the range of emission rates recently established as BACT.

The ZLD spray dryer will use distillate oil for heating the air necessary to dry the concentrated wastewater. Small amounts of CO and VOC will be emitted in the combustion process. Good combustion practices are proposed for the three spray dryers associated with the Unit 3 Project. There are no other available or feasible control technologies that would further reduce CO and VOC emissions other than good combustion practices. Add-on control technologies, such as an oxidation catalyst, are not feasible due to the generation of particulate matter in the spray dryer system.

3.4.3.5 Mercury

The combination of controls proposed for Unit 3 is especially important for mercury, one of the trace elements in coal. Mercury removal is enhanced by the SCR where elemental mercury is oxidized into a form that can be readily collected by the wet FGD system. The combination of SCR, ESP, wet FGD and wet ESP is expected to achieve a removal efficiency of approximately 90 percent. A mercury emission rate of 7.05×10^{-6} pounds per megawatt hour (lb/MW-hr) is proposed for Unit 3. This emission level is significantly less than EPA's recently issued mercury emissions limit of 21 x

10^{-6} lb/MW-hr for new sources using bituminous coal (40 CFR 60.45a; 70 FR 28653; May 18, 2005). Due to the installation of SCRs and FGD upgrades on Units 1 and 2, the facility-wide mercury emissions after Unit 3 comes online will actually be less than current levels. In fact, Seminole is proposing a facility-wide mercury limit of 119 lb/yr after Unit 3 comes online (based on 90 percent removal), which is 11 lb/yr less than historic baseline levels.

3.4.3.6 Hazardous Air Pollutants and Other Regulated Pollutants

Emissions of pollutants classified as HAPs will result from metals found in trace amounts in coal and petroleum coke. Certain trace metals can also be volatilized in the combustion process. These trace metals either remain in the gas phase or condense to form PM. The fraction that condenses is dependent upon the specific trace metal and the flue gas temperature. Some trace metals condense onto other PM in the gas stream and may be collected in the particulate control system. The amount of condensation depends upon the volatilization properties of the trace metals and the temperature prior to the particulate control device. The combination of controls, including an ESP, wet limestone FGD, and wet ESP, will effectively limit the emissions of these pollutants (i.e., achieve between 95-99 percent removal).

Organic HAP emissions are controlled by boiler design features and combustion air feed rates. The boilers will be designed and operated for high-combustion efficiency, which will inherently minimize the production of organic HAP emissions.

Emissions of HAPs using EPA emissions factors are presented in detail in the PSD Application in Appendix 10.1.5 of the Air Construction and PSD Application.

3.4.3.7 Fugitive PM

Fugitive particulate emissions from fuel, ash, limestone, and FGD product handling, conveying, and storage will be minimized by using SGS' existing equipment design and operating procedures.

Fuel delivery to the plant will be by rail, with rail cars unloaded in an enclosed rotary dump building. Fuel will be unloaded into an enclosed underground hopper that is protected from wind. Dust from fuel unloading operations will be controlled using dust collection and/or suppression systems.

Conveyors used for transfer of the fuel to the active storage piles will be enclosed to minimize wind-borne fugitive dust. Unloading onto the active and inactive storage piles will use a yard conveyor and a trencher type stacker/reclaimer (similar to the existing system). The fuel will be reclaimed and conveyed to an enclosed crusher tower. After crushing, the fuel is then conveyed through an enclosed tripper house to the storage silos adjacent to the boilers. All fuel storage silos are connected to a dust collection system. Outdoor conveyors will be enclosed (i.e., conveyor hoods) to minimize dust emissions. All conveyor transfer points will have a dust collection system. The inactive storage pile will be compacted when built and sprayed with a crusting agent and/or chemical stabilizer to prevent wind erosion.

Bottom ash will be collected in a drag chain conveyor and will have sufficient moisture content to minimize fugitive dust for transport to the product storage area or transported offsite for use as an aggregate. Fly ash from the ESP will be pneumatically conveyed to a storage silo that will be equipped with a fabric filter to minimize PM emissions. Fly ash, used for cement or other purposes, will be transported offsite in enclosed tanker trucks or rail cars. While filling these trucks or rail cars, displaced air will be vented to the dust collection system. Fly ash that is not sold and is ultimately disposed in the onsite landfill will be mixed with water (e.g., pug mill), loaded into trucks, and transported to the onsite landfill.

Fugitive particulate emissions from the limestone handling and storage systems will be minimized by equipment design and operating procedures. Limestone will be delivered by truck and either unloaded in an existing truck unloading system or placed in a limestone storage area. From the unloading system, limestone will be transferred to an active roof-covered storage area. Conveyors will be covered to minimize dust emissions. Dust collection or suppression techniques will be utilized to minimize dust emissions.

Fugitive emissions from the FGD processing area will be minimized by the higher moisture content of the product. Marketable gypsum will be transported via conveyor to the adjacent wallboard processing facility. Onsite disposal of gypsum, if required, will occur by transporting the gypsum by truck from the storage area to the onsite landfill.

Watering, using a water-spray truck or sweeping using a vacuum truck will also be performed as necessary to minimize fugitive emissions from active areas (i.e., unpaved roads and working areas of the limestone, FGD and landfill areas).

3.4.4 Design Data for control equipment

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

3.4.5 Design Philosophy

The Unit 3 Project minimizes air pollutant emissions by using efficient boiler design and state-of-the-art air pollution control equipment. Supercritical steam generating units can be expected to achieve higher efficiencies than the more conventional steam-generating plants. Thus, by maximizing the megawatt output per unit of fuel consumed, the air pollutant emissions per megawatt output are minimized. The Project will utilize combustion and post-combustion controls (SCR, ESP, wet limestone FGD, and wet ESP) to reduce emissions levels. Collectively, the design of the Project will incorporate features that will make the Unit 3 Project one of the most efficient and lowest emitting solid fuel-fired steam-generating power plants in the State of Florida and in the U.S.

3.5 Plant Water Use

SGS Unit 3 will utilize water from the St. Johns River and the Floridan aquifer as water supply sources for plant operations. Surface water from the St. Johns River will be obtained using the existing river water intake structure system with minor upgrades, and will be used to provide makeup for the SGS Unit 3 heat dissipation system, to replace water lost to evaporation, drift, and blowdown. SGS Unit 3 will utilize a mechanical draft cooling tower for dissipation of the condenser cooling water and auxiliary cooling system thermal load. St Johns River water will be used for other processes as described later in Section 3.5.4. Ground water will be used for air heater washes, fire water supply, miscellaneous plant uses, potable water and an alternate source of makeup to the demineralizers, however, the Unit 3 project will not require additional groundwater usage that is greater than the existing consumptive use limitations in the current SGS Conditions of Certification.

Process wastewater streams will be collected, treated as necessary, and recycled as make-up water to the FGD system. Wastewater from the FGD system will be treated in a new ZLD system and reused onsite within the scrubbers for all three units, and as influent to the Units 1, 2 and 3 demineralizers to produce boiler makeup.

The SGS facility is currently authorized to operate under NPDES Permit No. FL0036498. As discussed in Section 3.1, SECI requested modification of the NPDES permit to include a new wastestream from the proposed CBO unit to support the Unit 1 and 2 construction upgrade on February 13, 2006. It is anticipated that the modified NPDES permit will be issued during the second quarter of 2006. This SCA and NPDES permit modification application is specific to the SGS Unit 3 project.

The quantitative water-use diagram/water budget for SGS Unit 3 is presented in Figure 3.5.0-1. This figure also shows water uses for Units 1 and 2. The water quality of the St. Johns River is presented in Table 3.5.0-1. The following subsections (3.5.1 through 3.5.4) provide more detailed descriptions of the proposed plant water systems. The Unit 3 NPDES permit application forms and supporting documentation are provided in Appendix 10.1.2 of this SCA.

3.5.1 Circulating Water Heat Rejection System

An induced draft, counterflow, rectangular in-line design mechanical draft cooling tower will be used to reject the heat load of about 3.4 Billion Btu/hr for SGS Unit 3. It is estimated that the cooling tower will consist of 26 cells, each with a 200 HP fan. The circulating water (C.W.) flow rate to the cooling tower is estimated to be 360,000 gpm, with a drift rate estimated at 0.0005 percent of the C.W. flow rate (about 1.8 gpm) (See Table 3.5.1-1). Cooling tower blowdown from Unit 3 will be combined with cooling tower blowdown from Units 1 and 2, and discharged to the St. Johns River. Table 3.5.1-2 provides an estimate of the monthly evaporation and blowdown rates of the Unit 3 cooling tower and Table 3.5.1-3 provides the associated estimated blowdown temperatures. The cooling tower is designed to typically operate at 3.5 cycles of concentration to maintain proper water quality.

3.5.2 Domestic/Sanitary Wastewater

The existing onsite domestic wastewater treatment system is adequate in size to support Unit 3 in addition to Units 1 and 2. In order to ensure continued reliability, the existing system will be replaced with a like-kind replacement that will continue to meet the existing effluent limitations. The system is being sized to handle effluent from a total of 330 people. The design flow rate is estimated at 50 gallons per person per day, for a total of about 16,500 gpd (11 gpm). Treated sanitary wastewater will be recycled as makeup to the FGD system. Residuals will be handled in accordance with Rule 62-640, FAC.

3.5.3 Potable Water Systems

The existing SGS potable water system is adequate to provide water for the additional 50 people expected to be added with Unit 3. The addition of the new ZLD system will result in less ground water makeup to the SGS demineralizers. The capacity in the existing ground-water treatment system will be used to supply the estimated additional 50 gpd per additional person, or 2,600 gpd (1.8 gpm). The potable water system will be expanded in accordance with the requirements of Chapter 64E-6, F.A.C.

3.5.4 Process Wastewater Systems

The wastewater collected from the Unit 1, 2 and 3 floor drains, coal pile runoff, bottom ash collection systems, equipment cleaning, demineralization regeneration, well water pretreatment backwash, miscellaneous plant operations, FGD wash water, and a portion of stormwater runoff from the plant area will continue to be treated in the plant's wastewater treatment facility. However, these waste streams will not be discharged to surface waters. The wastewater will be pumped to an equalization basin where oily residues are skimmed off and settling occurs. A ZLD system will be added with Unit 3 which will be capable of assimilating all process wastewaters (non-heat dissipation system wastewater) from Unit 3 as well as the existing Units 1 and 2. This ZLD system, along with river water from the St. Johns River and ground water, will supply water for plant processes. Water requirements for various plant systems are discussed in the following sections (See Figure 3.5.0-1).

3.5.4.1 Demineralized Water

The original Unit 1 and 2 SCA estimated that the two-unit usage of groundwater as influent to the demineralizers to produce boiler makeup water would average about 510 gpm. With the installation of Unit 3, it is estimated that the groundwater flow rate into the Unit 1 and 2 demineralizers will be reduced to an average of about 237 gpm, of which only 19 gpm will be from groundwater. The source for the remainder will be product water from the ZLD system. The influent to the Unit 3 demineralizer is estimated to average about 178 gpm, of which only 33 gpm is estimated to be from groundwater, and the remaining 144 gpm will be product water from the ZLD system. In fact, Seminole estimates that groundwater will only be used for demineralizer makeup when the ZLD system is undergoing maintenance or repair.

Demineralized water will be used in the Unit 3 boiler to replace boiler water losses. The wastewater (regenerants) from the demineralizers will be collected and reused as makeup to Units 1, 2, and 3 wet FGD systems, instead of being discharged to the river.

3.5.4.2 Air Heater Wash/Fireside Wash

Units 1, 2, and 3 are expected to consume an average of about 7 gpm of groundwater for air heater washing. This water will be recycled to be used as makeup to the Units 1, 2, and 3 wet FGD systems. Currently, the Units 1 and 2 wash waters are disposed to a percolation pond which will no longer be used during the operation of SGS Unit 3.

3.5.4.3 Bottom Ash Handling

Intake water from the St. Johns River may be used as makeup to the bottom ash drag chain conveyor system, which has lower water requirements than the existing ash sluicing systems. These wastewaters will be treated and recycled as makeup to the Units 1, 2 and 3 wet FGD system.

3.5.4.4 FGD/Gypsum Dewatering

Unit 3 will be integrated into the existing FGD/Gypsum dewatering system. The FGD systems for Units 1, 2, and 3, and the integrated associated gypsum dewatering and washing system, will receive water from the St. Johns River and recycled water as makeup. Recycled water sources may include:

- Units 1 and 2 boiler blowdown and quench water;
- Treated demineralizer regeneration wastewaters from Units 1,2 and 3;
- Treated sewage treatment plant effluent from Units 1, 2 and 3;
- Treated service water used for washdowns from Units 1, 2 and 3;
- Treated coal pile runoff;
- Ash truck rinse waters;
- Open portions of the FGD landfill runoff and leachate;
- Treated air heater wash and fireside wash from Units 1, 2 and 3; and
- Product water from the ZLD system.

Scrubber blowdown will be reused. A small amount of gypsum wash water will be used to condition the fly ash to minimize fugitive dust emissions during its handling.

3.5.4.5 Service Water

Service water will be supplied by river water from the St. Johns River. Sodium hypochlorite and sodium bromide are added for biocide treatment. General service water uses (including pump bearing cooling water, pump seal water, equipment maintenance cleaning and flushing, and area and floor washing) will be provided by the service water system. Service water collected in floor drains will be routed to oil/water separators prior to reuse as scrubber makeup water.

3.5.5 Water Supply Alternatives

As previously discussed, SGS Unit 3 will utilize water from the St. Johns River and the Floridan aquifer as water supply sources for plant operations. An evaluation of water supply alternatives considered for SGS Unit 3 is provided in Appendix 10.8 of this SCA. Several alternative water supply sources were evaluated including: 1) groundwater resources, 2) surface water resources, 3) reclaimed water supply, 4) industrial reuse and 5) municipal water supply. The alternatives analyses concluded that surface water from the St. Johns River (annual average of 33.2 MGD and an instantaneous maximum of 48.7 MGD) and groundwater from the Upper Floridan Aquifer (annual average withdrawal of 0.55 MGD and a peak daily withdrawal of 3.6 MGD) continue to be most feasible source of water supply based on water quality requirements and water supply needs.

3.6 Chemical and Biocide Waste

The principal uses of chemicals and biocides will be for steam cycle water quality control, chemical cleaning of the boiler and associated piping systems and conditioning of cooling tower makeup water. The ZLD system will enable the SGS to recycle or reuse all plant wastewaters, from all three units, except for cooling tower blowdown. The ZLD system will include a brine concentrator system, followed by a spray dryer. Solids will be collected from the spray dryer(s) and will be sent to a landfill. The only wastewater that will be discharged from the SGS Site will be cooling tower blowdown.

Seminole anticipates that the Unit 3 cooling system water will be treated in the same manner as the existing Units 1 and 2 cooling systems. Cooling tower makeup will be treated for biofouling control as it enters the cooling tower. Cooling tower blowdown will be dehalogenated prior to discharge.

3.6.1 Cooling System Water Chemical Treatment

Chemicals which potentially will be used include biocides, inhibitors, dispersants, and sulfuric acid. Biocides include strong oxidizing halogenated compounds such as sodium hypochlorite and sodium bromide. In addition, non-oxidizing biocides may be introduced occassionally to shock the system and help prevent biological activity. Sodium hypochlorite and sodium bromide will be stored in a large bulk storage tanks within a containment area adjacent to the cooling towers. Free residual halogen concentration in the cooling tower blowdown will be removed by the addition of sodium bisulfite prior to discharge to the St. Johns River.

Inhibitors and dispersants may be added to the circulating water (cooling water system) for scale and corrosion control. Inhibitors and dispersants will likely be delivered in small portable containers and stored in a separated containment area adjacent to the cooling towers.

Sulfuric acid will be added to the circulating water (cooling water system) for control of alkalinity and pH. Sulfuric acid will be stored in a large bulk storage tank within a containment area adjacent to the cooling towers.

3.6.2 Steam Cycle Water Treatment

The steam-condensate-feedwater cycle will be chemically treated utilizing Oxygenated Treatment (OT) to prevent corrosion and scaling of the condensate and feedwater piping. Oxygen is deliberately injected into the condensate and feedwater to produce low dissolved oxygen concentrations of about 30 to 50 ppb. The low dissolved oxygen concentration in the system creates a dense, highly insoluble, protective layer on the piping surfaces that is primarily composed of ferric oxide hydrate. Oxygenated Treatment has been shown to significantly reduce steel corrosion rates and subsequent iron carryover into the boiler. A small amount of ammonia is also added to the condensate system to maintain the system pH between 8.0 and 8.5. Condensate polishers will be installed to maintain the high-purity feedwater quality necessary for Oxygenated Treatment in supercritical steam cycle operation. Regeneration of the condensate polishers will be performed onsite in an elementary neutralization unit (ENU).

3.7 Coal Combustion Product Reuse and Solid Waste Management

3.7.1 Coal Combustion Products

Coal combustion products will be reused to the maximum extent feasible. The following types of coal combustion products are expected to be generated during the operation of SGS Unit 3:

Type of Product	Estimated Rate
Bottom Ash	20,200 lb/hr
Fly Ash	47,200 lb/hr
FGD Product (Gypsum)	180,400 lb/hr

Bottom ash will continue to be sold to concrete and concrete block manufacturers. Fly ash will be sold for reuse to the maximum extent feasible. Gypsum will be sold to the adjacent wallboard manufacturing facility.

3.7.2 Solid Waste

The addition of the ZLD system will result in a dry solid reject which will be disposed of in the on-SGS Site landfill or in an offsite permitted landfill. Approximately 4,500 lb/hr of ZLD solid waste is anticipated to be generated upon commencement of operation of Unit 3. Any coal combustion products that are not reused or miscellaneous plant wastes (e.g., sludges from plant treatment and conveyance systems) will be managed onsite within the existing landfill area or disposed of in an offsite permitted landfill. Prospective utilization of the existing onsite landfill area will be in conjunction with the installation of a composite or double liner and leachate collection and removal system.

3.7.2.1 Hazardous Waste

Hazardous waste may be generated periodically including spent solvents, spent cleaning materials, and other wastes. Any wastes, if potentially hazardous, will be collected and managed in the permitted hazardous waste storage facility as authorized by FLD000772194. All hazardous wastes will be managed appropriately in accordance with applicable regulations (See Appendix 10.4.2)

3.8 On-Site Drainage System

3.8.1 Design Criteria and Applicable Regulations

The storm water management system for the SGS Unit 3 project will be designed to meet all applicable local, regional, state, and federal requirements. The storm water management system is designed to treat stormwater from the proposed SGS Unit 3 facilities as well as the facilities associated with the Unit 1 and 2 upgrades (discussed in Section 3.1) and existing plant facilities within the affected sub-basins.

3.8.2 Construction SGS Site Drainage

The conceptual stormwater design is based on eight drainage basins which include five storm water ponds, and six swales as shown on Figure 3.8.2-1. Two of these areas, the area within the coal pile railroad loop (shown in light yellow) and the area of the landfill/FGD effluent processing area (shown in dark green) are not included within the Unit 3 stormwater management system because runoff from various portions of these basins will be reused within the FGD scrubber system. A description of the system, conceptual design details, characteristics of the drainage areas and supporting calculations are provided in Appendix 10.9.

Drainage Basin 1 (shown in light orange) includes the Unit 1 plant area and new 200,000 gallon fuel oil storage tank. Drainage Basin 1 is served by Storm Water Pond 1, shown in blue at the northeast corner of the drainage basin. Storm Water Pond 1 is a wet detention pond that is currently being added as part of the Unit 1 and 2 upgrades.

Drainage Basin 2 (shown in violet) will include all of the new Unit 3 plant facilities, including the power block, mechanical draft cooling towers, construction parking area and trailers. Drainage Basin 2 is served by Storm Water Pond 2, shown in blue at the north central edge of the drainage basin. Storm Water Pond 2 is a wet detention pond that is currently being added as part of the Unit 1 and 2 upgrades.

Drainage Basin 3 (shown in dark gray) includes the west construction laydown area. It is served by Storm Water Pond 3, shown in blue at the southern edge of the drainage basin. Storm Water Pond 3 is a wet detention facility being added specifically for Unit 3.

Drainage Basin 4 (shown in light green) includes the east construction laydown area. It is served by Storm Water Pond 4, shown in blue at the southeast edge of the drainage basin. Storm Water Pond 4 is a wet detention facility being added specifically for Unit 3.

Drainage Basin 5 (shown in purple) is a borrow area. During construction of Unit 3, soil may be excavated from this area as necessary to provide fill material as needed. Basin 5 is served by Storm Water Pond 5, shown in blue at the southeast edge of the basin. Storm Water Pond 5 is a retention facility being added specifically for Unit 3.

The Swale System drainage area (shown in red) includes the portion of the plant entrance road which will be modified from two lanes to four lanes to accommodate the additional traffic requirements for construction and operation of the SGS Unit 3 Project. This area is served by a linear set of swales (shown in blue within the drainage area) designed to percolate 80% of the runoff from the 3-year, 1-hour storm (2.6 inches/hour intensity). However, the swale system has been designed as a dry detention facility by routing the individual swale discharges through 12-inch diameter culverts to the existing west ditch.

The colorized drainage areas have been superimposed onto the USGS quad sheet for the plant vicinity in order to show the storm water management system release points relative to nearby surface water features (See Figure 3.8.2-2). The releases from Pond 1 and the Swale System appear to drain into an isolated "wooded marsh or swamp" to the north of the landfill area. Similarly, releases from Pond 2 appear to drain into an isolated "wooded marsh or swamp" to the northeast of Drainage Basin 2. Pond 3 releases appear to drain eventually to the St. Johns River. Pond 4 releases appear to drain to an isolated "wooded marsh or swamp" to the south-southeast of Drainage Basin 4.

At least 2 days prior to commencement of construction, Seminole will submit a Notice of Intent to Use Generic Permit for Stormwater Discharge from Large and Small Construction Activities (Rule 62-621.300(4), and the associated fee to the FDEP. Prior to submittal of the NOI, Seminole Electric will prepare a Storm Water Pollution Prevention Plan for construction activities, and will maintain the SWPPP onsite for the duration of the construction.

3.8.3 Operational SGS Site Drainage

Currently SGS stormwater associated with "industrial activity" is discharged under the NPDES Multi-Sector General Stormwater Discharge Permit No. FLR05B869 as incorporated by reference at Rule

62-621.300(5), F.A.C. Stormwater is currently managed through a network of conveyance ditches and vegetated swales and ditches that treat and percolate stormwater onsite. The power block is located on a ridge in the middle of the property which causes stormwater runoff to flow away from the plant in six general directions. The receiving waters for each basin consist primarily of unnamed wetlands and ditches. Following the completion of construction, Seminole will maintain the stormwater management system previously prescribed for the construction phase, and will update the SWPPP to address SGS Unit 1, 2 and 3 operations in accordance with the Multi-Sector General Permit.

3.9 Materials Handling

3.9.1 Construction Materials and Equipment

Construction materials and equipment will be delivered to the SGS Site by rail and existing roadways. The existing roadway that will be used during construction and operation is U.S. Highway 17.

Surface materials associated with the SGS Unit 3 project will be obtained from local sources and transported to the SGS Site by truck. These materials will include lime rock and aggregate for construction laydown areas and internal roads. Onsite materials, from excavation of the stormwater and water storage ponds and the borrow pit will be used where needed for fill material.

Equipment and component parts of the units will be unloaded and moved around the SGS Site using portable cranes and trucks. The heaviest items such as the steam turbine, generator, boiler components, air pollution control equipment components, fans, pulverizers, and transformers may be transported to the SGS Site by rail. Components not shipped by rail may require special transport depending upon their weight and size. Pollution control measures for the laydown areas will include runoff collection as is described in Section 3.8. Main roads in the laydown areas will be surfaced with aggregate and will be treated as necessary with dust suppression methods to reduce dust. Alternatively, water sprays may be used, as required, to control dust due to traffic.

3.9.2 Roads

Construction traffic will use U.S. Highway 17 to access the SGS Site. To accommodate peak construction traffic and maintain an adequate level of service during morning and afternoon peak hours, SGS Site related improvements include the installation of a traffic signal on U.S. Highway 17 at the project entrance prior to maximum construction employment and widening of the SGS Site access road to provide two entrance and exit lanes (See Figure 3.9.2-1). During normal plant operations, traffic volumes will decrease resulting in better operating conditions on area roadways. During normal plant operations, all road segments are projected to operate at acceptable levels of service.

3.9.3 Rail

Rail will be used for construction activities and SGS Site operation. During operation, rail will be used for delivery of fuel, consumable products and transport of coal combustion products.

3.9.4 Fuel Handling

Fuel (coal and petroleum coke) will be transported to the SGS Site by rail. The existing SGS coal handling system for the SGS Unit 3 project is designed to handle bituminous coal with a density of 50 pounds per cubic foot and petroleum coke with a density of 45 pounds per cubic foot. The existing Units 1 and 2 rotary dumper and stackout system has adequate capacity (approximately 3,000 tons per hour) to handle SGS Unit 3 fuel. The addition of SGS Unit 3 will increase coal deliveries to approximately 1.6 unit trains per day (from 320 trains to 550 trains per year). The existing coal storage has a total area of approximately 60 acres (1,225,000 tons) and provides adequate capacity for all three units.

The existing As-Received Transfer Sampling Tower will be modified by adding a new diverter gate and belt feeder. The belt feeder will transfer coal to a new yard belt which will stack out or reclaim coal via a new trencher type stacker/reclaimer. Three days of reclaimable storage for Unit 3 will be provided. Coal from the yard belt will be directed through a new enclosed crusher tower and to a new tower adjacent to Unit 3. The Unit 3 tower will be provided with a surge bin and variable speed belt feeders which will provide coal to the Unit 3 traveling tripper conveyors.

Dust control for the new coal handling system appurtenances described in the preceding paragraph will be provided by a dry baghouse type collection system to limit particulate emissions in accordance with local, state, and federal regulations. Figure 3.9.4-1 presents a flow diagram of the coal handling system.

3.9.5 Limestone Handling

Limestone used in the wet FGD system will be transported to the SGS Site by truck. The limestone will be transferred from the existing truck unloading system to a storage facility utilizing the existing limestone handling system. Figure 3.9.5-1 presents a flow diagram of the limestone handling system

3.9.6 Coal Combustion Product Handling

A new drag chain conveyor system will be used to collect and transport the Unit 3 bottom ash to a new truck loading area. Bottom ash will be sold to concrete and concrete block manufacturers. A fly ash silo with a storage capacity of three days will be installed. Fly ash will be blended for use in the CBO unit if necessary or trucked or hauled by rail from the storage silo for offsite sales to the maximum extent feasible. Product from the plant's Unit 3 FGD system will be pumped to the existing Units 1 and 2 effluent processing system where it will be dewatered to produce gypsum for use in the production of wallboard. Figure 3.9.6-1 and 3.9.6-2 presents flow diagrams of the fly ash and bottom ash handling systems, respectively.

TABLES

TABLE 3.3.1-1
ULTIMATE AND PROXIMATE ANALYSIS OF REPRESENTATIVE FUELS AND DESIGN FUEL BLEND FOR SEMINOLE ELECTRIC COOPERATIVE, SEMINOLE GENERATING STATION UNIT 3

	Units	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum	
		Illinois-Western Kentucty Bituminous			Central Appalachian Bituminous			Petroleum Coke			Design Blend[a]
Ultimate Analysis											
Carbon	%	59.0	61.0	65.0	60.0	68.0	75.0	78.0	80.0	85.0	64.70
Sulfur*	%	2.0	2.8	3.8	0.1	1.0	2.0	3.5	5.5	6.8	4.70
Oxygen	%	6.5	7.0	8.0	5.0	6.0	6.5	0.1	0.8	2.0	4.58
Hydrogen	%	3.8	4.0	4.5	3.8	4.5	5.0	2.5	2.8	3.5	3.41
Nitrogen	%	0.8	1.2	1.4	0.8	1.2	1.8	1.0	1.3	1.8	0.86
Ash	%	5.0	8.5	12.0	5.0	8.5	12.0	0.1	0.3	0.5	8.55
Moisture	%	7.0	10.0	14.0	2.0	6.0	10.0	5.0	7.0	12.0	13.40
Proximate Analysis											
Moisture	%	7.0	10.0	14.0	2.0	6.0	10.0	5.0	7.0	12.0	13.40
Volatile matter	%	29.0	33.0	38.0	29.0	32.0	40.0	9.0	10.0	12.0	23.00
Fixed Carbon	%	38.0	43.0	48.0	38.0	46.0	50.0	78.0	80.0	85.0	50.00
Ash	%	5.0	8.5	12.0	5.0	8.5	12.0	0.1	0.3	0.5	8.55
Gross (Higher) Heating Value	Btu/lb	11,300	11,700	12,800	12,000	12,400	13,000	12,900	14,000	14,500	11,780
		Southern Illinois-Indiana Bituminous			Northern Appalachian Bituminous			Petroleum Coke			Design Blend[a]
Ultimate Analysis											
Carbon	%	59.0	61.0	65.0	60.0	71.0	75.0	78.0	80.0	85.0	64.70
Sulfer*	%	2.0	2.8	3.8	2.0	2.8	3.8	3.5	5.5	6.8	4.70
Oxygen	%	6.5	7.0	8.0	4.0	5.0	6.0	0.1	0.8	2.0	4.58
Hydrogen	%	3.8	4.0	4.5	3.8	4.5	5.0	2.5	2.8	3.5	3.41
Nitrogen	%	0.8	1.2	1.4	0.8	1.2	1.4	1.0	1.3	1.8	0.86
Ash	%	5.0	10.0	12.0	5.0	8.5	12.0	0.1	0.3	0.5	8.55
Moisture	%	7.0	12.0	14.0	2.0	6.0	10.0	5.0	7.0	12.0	13.40
Proximate Analysis											
Moisture	%	7.0	12.0	14.0	2.0	6.0	10.0	5.0	7.0	12.0	13.40
Volatile matter	%	29.0	33.0	38.0	29.0	36.0	40.0	9.0	10.0	12.0	23.00
Fixed Carbon	%	38.0	43.0	48.0	38.0	46.0	50.0	78.0	80.0	85.0	50.00
Ash	%	5.0	8.5	12.0	5.0	8.5	12.0	0.1	0.3	0.5	8.55
Gross (Higher) Heating Value	Btu/lb	10,500	11,000	12,000	12,000	13,000		12,900	14,000	14,500	11,220

[a] Design Blend is 70% Coal and 30% Petroleum Coke

Note: Data for the the Ultimate and Proximate Analysis is based on the range and average of each fuel. These data do not total 100%, since they represent a statistic of the fuel data.

* Representative maximum 70/30 Blend = 4.7% S, based on 3.8% S for coal and 6.8% S for pet coke. Individual shipments of coal can exceed 3.8% and pet coke is limited to 7%.

Note: Petroleum Coke will be co-fired with coal at a maximum amount of 30 percent on a weight basis.
Blends of coals shown are approximately based on equal weight.

TABLE 3.3.1-2

SEMINOLE GENERATING STATION
NO. 2 FUEL OIL DESCRIPTION

No. 2 fuel oil will have the following approximate composition:

Parameter	Units	Value
Carbon	Weight %	87.0
Hydrogen	Weight %	12.4
Sulfur	Weight %	0.5
Nitrogen	Weight %	0.1
Heat Content	Btu/lb	19,400

Source: SECI Title V Application

TABLE 3.4.1-1
AIR POLLUTANT EMISSIONS FOR CRITERIA POLLUTANTS FROM SECI SGS UNIT 3

Parameter	Units	Data for Each Nominal 750 MW net Unit [a]		
		100% Load	75% Load	50% Load
Performance				
Gross Power Output	kW	820,000	615,000	410,000
Net Heat Rate	Btu/kWhr	9,260	9,570	10,250
Heat Input (HHV)	MMBtu/hr	7,500	5,250	3,000
Capacity Factor		100%	75%	50%
Stack Data				
Height	feet	675	675	675
Diameter	feet	26.00	26.00	26.00
Temperature	^{o}F	126	126	126
Velocity	ft/sec	61.80	46340.00	30.90
Flow	acfm	1,970,000	1,477,000	985,000
Emissions				
SO_2 *	lb/MMBtu	0.165	0.165	0.165
	lb/hr	1,238	866	495
	lb/MW-hr	1.51	1.41	1.21
	tons/year	5,420	2,846	1,084
PM/PM_{10}	lb/MMBtu	0.015	0.015	0.015
	lb/hr	113	79	45
	lb/MW-hr	0.14	0.13	0.11
	tons/year	493	259	99
NO_x	lb/MMBtu	0.07	0.07	0.07
	lb/hr	525	368	210
	lb/MW-hr	0.64	0.60	0.51
	tons/year	2,300	1,207	460
CO	lb/MMBtu	0.15	0.15	0.15
	lb/hr	1,125	788	450
	lb/MW-hr	1.37	1.28	1.10
	tons/year	4,928	2,587	986
VOC	lb/MMBtu	0.004	0.004	0.004
	lb/hr	30.00	21.00	12.00
	lb/MW-hr	0.037	0.034	0.029
	tons/year	131.4	69.0	26.3
Sulfuric Acid Mist	lb/MMBtu	0.005	0.005	0.005
	lb/hr	37.50	26.25	15.00
	lb/MW-hr	0.046	0.043	0.037
	tons/year	164	86	33

[a] Based on Eastern Bituminous (IL-WKY) Coal and Petroleum Coke Blend. See Table 2-1.
* A minimum of 95% control must be achieved per the revised NSPS, Subpart Da

Sources: Burns & McDonnell, 2005; Golder, 2005.

TABLE 3.4.1-2
SUMMARY OF POTENTIAL AIR EMISSIONS FOR SECI SGS BASED ON 100-PERCENT CAPACITY FACTOR

Pollutant	750 MW (net) Unit	Cooling Tower	Material Handling	Emergency Diesel Generator	ZLD Spray Dryer	Total Emissions
SO_2	5,420			0.10	16.2	5,437
PM	493	9.5	12.7	0.04	3.9	519
PM_{10}	493	5.5	8.9	0.04	3.9	511
NO_x	2,300			4.01	32.4	2,336
CO	4,928			0.15	8.1	4,936
VOC (as methane)	131			0.06	0.6	132
Sulfuric Acid Mist	164					164
Fluoride	7.522					7.522
Lead	0.247					0.247
Mercury	0.023					0.023

TABLE 3.4.1-3
PSD NETTING ANALYSIS

Pollutant	Units 1 and 2 Baseline Actual Emissions (tpy)	Projected Actual Emissions from Units 1-2 Project (tpy)	Net Emissions Increase from Units 1-2 Project (tpy)	Unit 3 Project	Net Emissions Decrease from Units 1 and 2 with Unit 3 Project (tpy)	Net Emissions Increase with Unit 3 Project (tpy)	Significant Emission Rates (tpy)	PSD Review Required for Unit 3 Project?
SO_2	29,074	29,074	0.0	5,437	(5,437)	0	40	No
NOx	23,289	23,289	0.0	2,336	(2,336)	0	40	No
PM	822	846	24.4	519	NA	519	25	Yes
PM_{10}	822	836	14.4	511	NA	511	15	Yes
H_2SO_4	2,129	2,129	0.0	164	(164)	0	7	No
VOC	108	147	39.0	132	NA	132	40	Yes
CO	4,976	5,099	122.6	4,936	NA	4,936	100	Yes
Pb	NA	NA	NA	0.247	NA	0.247	1	No
HF	NA	NA	NA	7.5	NA	7.5	3	Yes
Hg	0.066	0.066	0	0.023	(0.023)	0.000	<0.1	No

* Units 1 and 2 baseline actual emissions are based on Tables B-4E through B-4S, supplied with Units 1 and 2 application.

TABLE 3.5.0-1

ST. JOHNS RIVER SURFACE WATER QUALITY NEAR SGS OUTFALL

Parameter	Average	Maximum	95^{th} Precentile	Number of Samples	Class III Water Quality Standard[1]
Temperature (°F)*	77.10	92.28	57.26	947	92 or +5
Turbidity (NTU)	5.44	117.00	9.03	750	
pH	7.71	9.01	8.56	918	6.0 to 8.5
Oil and Greese (mg/L)	1.42	6.40	3.08	253	5
Ammonia, as NH4 (mg/L)	0.027	0.531	0.089	734	
Unionized Ammonia, as NH4 (mg/L)	0.00099	0.0284	0.0039	644	0.02
TKN, as N (mg/L)	1.30	2.40	1.78	717	
Nitrate+Nitrite, as N (mg/L)	0.052	0.410	0.190	344	
Nitraogen, total (mg/L)	1.304	2.237	1.831	317	
Phosphorus, total (mg/L)	0.074	0.682	0.119	708	
Ortho-phasphate (mg/L)	0.022	0.073	0.052	205	
Total Hardness, as CaCO3 (mg/L)	176	480	255	419	
Specific Conductivity (µmhos/cm)	940.3	1,516	1,327	978	1,991
Beryllium, annual average (µg/L)	0.022	0.050	0.038	22	0.13
Arsenic (µg/L)	2.23	8.85	8.85	214	50
Cadmium (µg/L)	0.57	2.20	1.00	415	1.77
Chromium (µg/L)	2.05	22.80	9.63	397	
Copper (µg/L)	1.76	17.00	5.00	424	15.1
Cyanide (µg/L)	1.70	4.00	2.60	33	5.2
Iron (mg/L)	0.20	1.52	0.43	433	1.0
Lead (µg/L)	1.77	10.00	3.26	375	6.5
Mercury (µg/L)	0.004	0.017	0.010	61	0.012
Nickel (µg/L)	3.56	53.00	9.45	376	84
Selenium (µg/L)	1.16	4.90	2.50	75	5
Silver (µg/L)	0.134	16.0	0.370	301	0.07
Zinc (µg/L)	9.00	196.0	25.0	443	193

Source: ECT, 2005.

* 95% Temperature is 5% low temperature

[1]Florida Administrative Code Chapter 62-302 Surface Water Quality Standards.

TABLE 3.5.1-1

SEMINOLE GENERATING STATION UNIT 3
SUMMARY OF HEAT DISSIPATION SYSTEM
750 MW SCPC BOILER

Supplier	GEA
Physical Data	
Tower Type	Counterflow
Number of Cells	In-line
Cell Dimensions	
Length, ft	54
Width, ft	54
Height, ft	37
Deck Dimensions	
Length, ft	1,404
Width, ft	54
Height, ft	37
Fan Stack Dimensions	
Height, ft	10
Fan Diameter, ft	32.8
Performance Data	
Circulating Water Flow Rate, gpm	360,352
Design Hot Water Temperature °F	106.3
Design Cold Water Temperature °F	87.9
Design Air Flow Rate per Cell, acfm	1,259,541
Exhaust Temperature °F	99.6
Exhaust Velocity, ft/min	1,390
Emission Data	0.0005
Drift Rate, % of circulating water flow rate	2,400

Source: Burns and McDonnell, 2006

TABLE 3.5.1-2
Estimated SGS Unit 3 Cooling Tower Monthly Evaporation and Blowdown Rates in GPM

Month	Peak Evaporation	Peak Blowdown	Average Evaporation	Average Blowdown
January	5,202	2,079	4,501	1,799
February	5,350	2,139	4,579	1,830
March	5,350	2,139	4,723	1,888
April	5,507	2,201	4,898	1,958
May	5,673	2,268	5,079	2,030
June	5,601	2,239	5,157	2,061
July	5,601	2,239	5,195	2,076
August	5,576	2,229	5,175	2,068
September	5,601	2,239	5,120	2,046
October	5,437	2,173	4,911	1,963
November	5,350	2,139	4,710	1,882
December	5,068	2,026	4,534	1,812

Source: Golder, 2005

TABLE 3.5.1-3

Estimated SGS Unit 3 Cooling Tower Monthly Blowdown Temperatures in ° F.

Month	Peak Blowdown Temperature	Average Blowdown Temperature
January	85.7	76.4
February	87.2	77.0
March	87.2	78.7
April	88.1	80.0
May	89.2	81.4
June	90.8	83.9
July	90.8	84.4
August	91.3	84.8
September	90.8	83.4
October	89.7	81.6
November	87.2	78.5
December	88.5	77.2

Source: Golder, 2005

Table 3.8.2-1
SGS UNIT 3 STORM WATER MANAGEMENT SYSTEM

	Basin 1	Basin 2	Basin 3	Basin 4	Basin 5	Swale System
description	Unit 1 drainage area	Unit 2 and 3 drainage area	East laydown area	West laydown area	Borrow Area	Entrance Road
25-year design storm 24-hour precipitation (inches)	8	8	8	8	10	8
25-year pre-construction peak discharge (cfs)	403.55	725.61	88.57	139.46		18.55
pre-construction % impervious	0.85	0.65	0.15	0.15		15%
pre-construction runoff volume (acre-feet)	28.51	49.8	22.39	34.08		3.53
treatment volume (cubic feet)	255,534	457,095	464,022	517,923	45,657	20851
permanent pool volume			628,946	702,004	343339	
25-year post-construction peak discharge (cfs)	379.0	327.1	85.6	129.9	257048.0	18.15
post-construction % impervious	0.85	0.77	0.9	0.9	11	0.55
post-construction runoff volume (acre-feet)	23.08	35.61	25.26	28.98	5.9	4.00
pervious area (sq mi)	0.0106	0.0471	0.0089	0.010	0.017	0.00328
impervious area (sq mi)	0.0598	0.0874	0.0799	0.089	0.002	0.00408
total area (sq miles)	0.0704	0.1345	0.0888	0.099	0.020	0.00736
pervious area (acres)	6.8	30.1	5.68	6.34	11.17	2.10
impervious area (acres)	38.3	55.9	51.13	57.07	1.41	2.61
total area (acres)	45.1	86.1	56.81	63.41	12.58	4.71
SCS curve number post-construction	82	80	85	85	80	68

FIGURES

REFERENCES

1.) DIGITAL ORTHOPHOTOS FLOWN 2004 FOR USGS 7.5 MIN DRG PALATKA, BOSTWICK, RIVERDALE, AND HASTINGS

0 1,500 3,000 6,000
SCALE: 1" = 6,000'

PROJECT
SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3
PUTNAM COUNTY, FL

TITLE

PROPERTY BOUNDARY

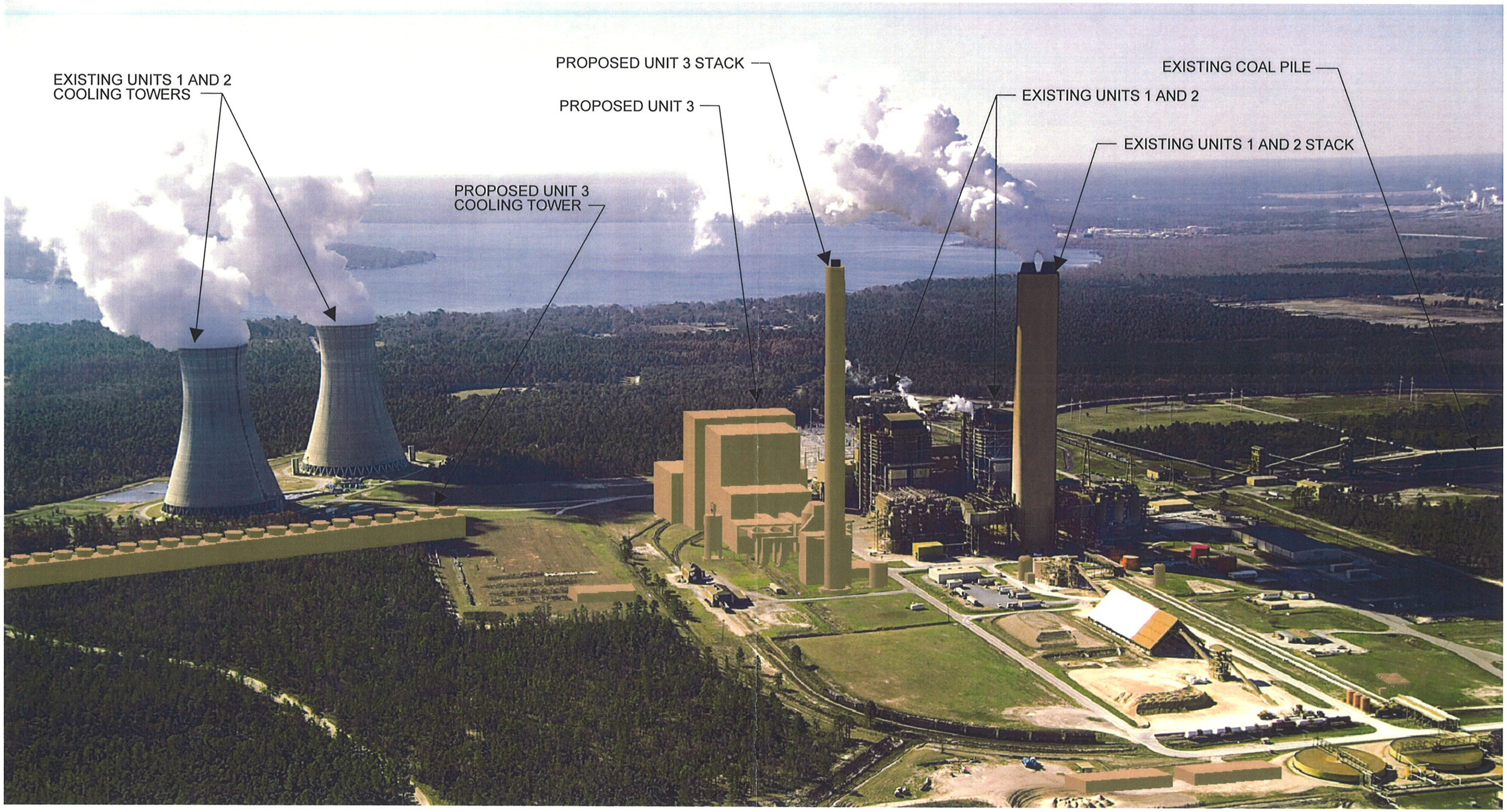
Golder Associates
Tampa, Florida

PROJECT No.		053-9540
DESIGN	MEF	09/01/05
CADD	MEF	09/01/05
CHECK	MM	09/02/05
REVIEW	MM	10/4/05

FILE No. 0539540B003.dwg
SCALE AS SHOWN REV. 0

FIGURE 3.2.0-1

Drawing file: F:\PROJECTS\2005 PROJ\053-9540\0539540B003.dwg Nov 17, 2005 - 7:52am



SOURCE: BURNS AND McDONNELL, SEPTEMBER 2005; GOLDER, 2006.

PROJECT
SEMINOLE ELECTRIC COOPERATIVE, INC.
SGS UNIT 3
PUTNAM COUNTY, FLORIDA

TITLE
SGS UNIT 3 PHOTO RENDERING

Golder Associates
Tampa, Florida

PROJECT No.	053-9540	FILE No. 0539540B024.dwg	
DESIGN		SCALE AS SHOWN	REV. 0
CADD	- 2/27/06	**FIGURE 3.2.0-2**	
CHECK			
REVIEW			

Drawing file: \\Tam1-s-fs1\cad\PROJECTS\2005 PROJ\053-9540\0539540B024.dwg Feb 27, 2006 - 2:17pm

KEY NOTES:

1. PLANT ENTRANCE ROAD
2. LAFARGE PROPERTY
3. EXISTING SERVICE BLDG
4. EXISTING TURBINE BLDG
5. EXISTING STACK
6. EXISTING LIMESTONE PREPARATION
7. EXISTING LIMESTONE STORAGE PILE
8. EXISTING FGD EFFLUENT PROCESSING AREA
9. EXISTING SWITCHYARD
10. EXISTING COOLING TOWER
11. EXISTING WASTE TREATMENT AREA
12. EXISTING COAL YARD
13. EXISTING LANDFILL
14. EXISTING RAILCAR REPAIR
15. CONSTRUCTION PARKING
16. CONSTRUCTION OFFICE TRAILER AREA
17. UNIT 3 TURBINE BLDG.
18. UNIT 3 BOILER
19. UNIT 3 PRECIPITATOR
20. UNIT 3 WET FGD
21. UNIT 3 STACK
22. UNIT 3 EFFLUENT PROCESSING
23. UNIT 3 HOUSE SPUR
24. UNIT 3 COOLING TOWER
25. UNIT 3 LIMESTONE PILE EXPANSION
26. UNIT 3 CONSTRUCTION LAYDOWN
27. EXISTING GUARD HOUSE
28. UNIT 3 COAL PILE LINER LIMIT
29. UNIT 3 LIMESTONE PREPARATION
30. UNIT 3 FUEL OIL STORAGE TANK
31. WASTE WATER SURGE POND
32. EXISTING PERCOLATION POND
33. TEMPORARY CONSTRUCTION WAREHOUSE
34. COAL CONVEYOR
35. UNIT 3 WET ESP
36. ZERO LIQUID DISCHARGE SYSTEM
37. STORMWATER RUNOFF POND
38. UNIT 3 CRUSHER HOUSE
39. FLY ASH SILO
40. CONDENSATE STORAGE TANK
41. LIMESTONE SLURRY TANK
42. LIMESTONE SLURRY EMERGENCY STORAGE TANK
43. COAL TRANSFER TOWER
44. EMERGENCY DIESEL GENERATOR
45. EXISTING TRANSFER SAMPLE TOWER DUST COLLECTOR
46. STACKER RECLAIMER W/SPRAY DUST SUPPRESSION - COAL PILE A
47. STACKER RECLAIMER W/SPRAY DUST SUPPRESSION - COAL PILE B
48. TRANSFER TOWER DUST COLLECTOR
49. CRUSHER TOWER DUST COLLECTOR
50. UNIT FEED SYSTEM DUST COLLECTOR
51. LIMESTONE TRANSFER TO BALL MILL DUST COLLECTOR
52. FLY ASH SILO BIN VENT
53. COAL PILE A
54. COAL PILE B
55. COAL PILE RUNOFF POND
56. SWITCHYARD EXPANSION
57. SEWAGE TREATMENT PLANT
58. EXISTING PERMITTED LANDFILL LIMIT
59. UREA DISSOLVER TANK
60. UREA REACTION FEED TANK
61. CBO PLANT
62. CBO CONTROL ROOM
63. CBO STORAGE DOME
64. CBO LOADOUT SILO
65. WAREHOUSE EXPANSION
66. SCR
67. OXIDATION AIR BLOWER BUILDING EXPANSION
68. UNIT 1 AUXILIARY TRANSFORMER
69. UNIT 2 AUXILIARY TRANSFORMER
70. UNIT 1 AND 2 CONSTRUCTION PARKING
71. CAR RINSE
72. AS-RECEIVED TRANSFER TOWER ADDITION
73. UNIT 3 STEP-UP TRANSFORMER
74. UNIT 3 START-UP TRANSFORMER
75. EXISTING BORROW PIT AREA
76. AS-RECEIVED SAMPLING SYSTEM
77. UNIT 3 RECLAIM HOPPERS
78. OIL WATER SEPARATOR
79. BORROW PIT AREA EXPANSION
80. UNIT 3 PLANT MAKE-UP WATER LINE
81. GYPSUM CONVEYOR

Burns & McDonnell SINCE 1898

date AUGUST 29, 2005 | detailed
designed R. SEDLACEK | checked

Seminole Electric COOPERATIVE, INC. IN PARTNERSHIP WITH THOSE WE SERVE

SEMINOLE GENERATING STATION
UNIT 3

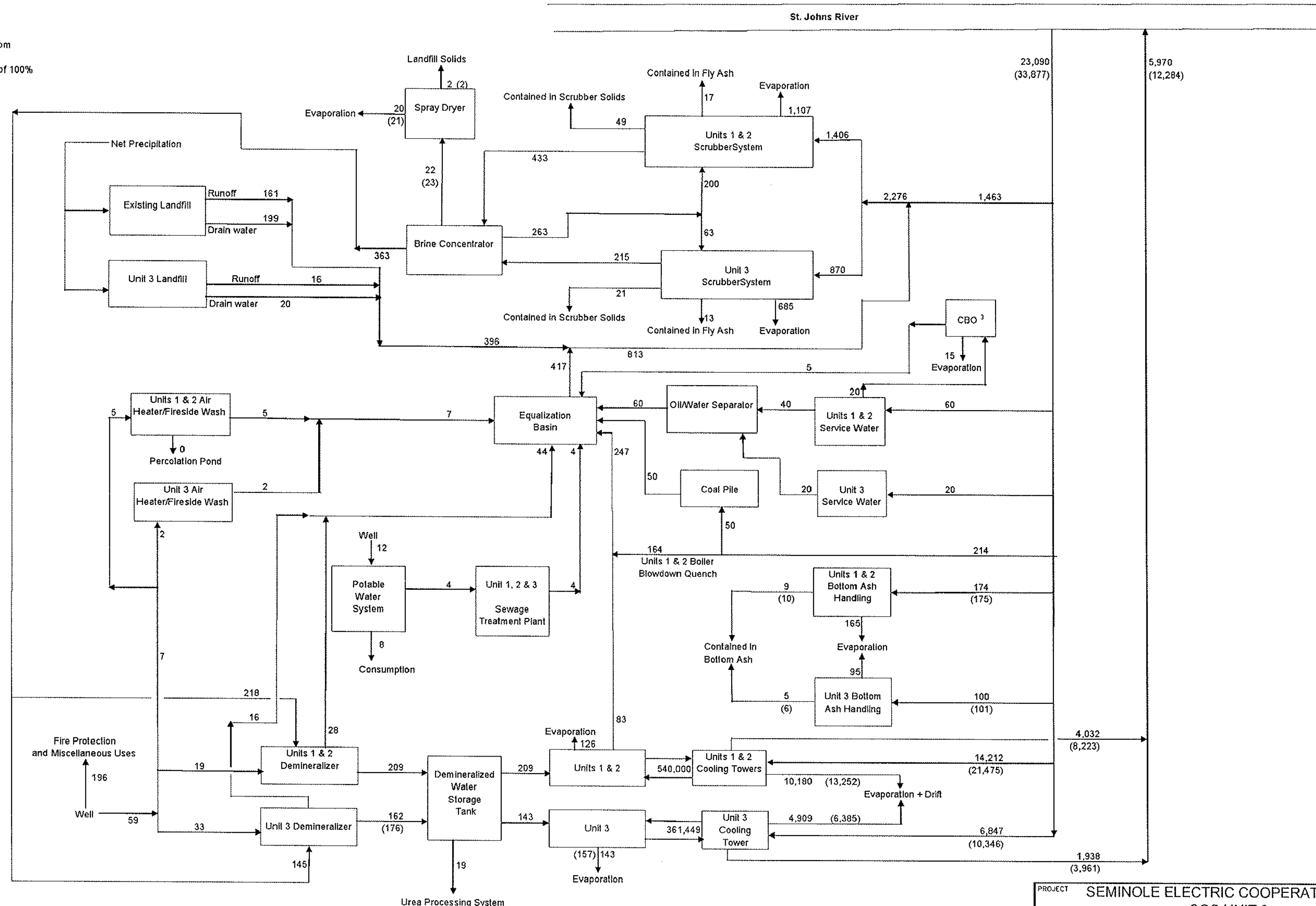
SITE PLAN

project | contract

drawing FIGURE 3.2.0-3 rev.

sheet of sheets

1 Average flows in gpm
2 Peak flows in parentheses in gpm
3 Carbon Burn Out System
4 Assumed plant capacity factor of 100%



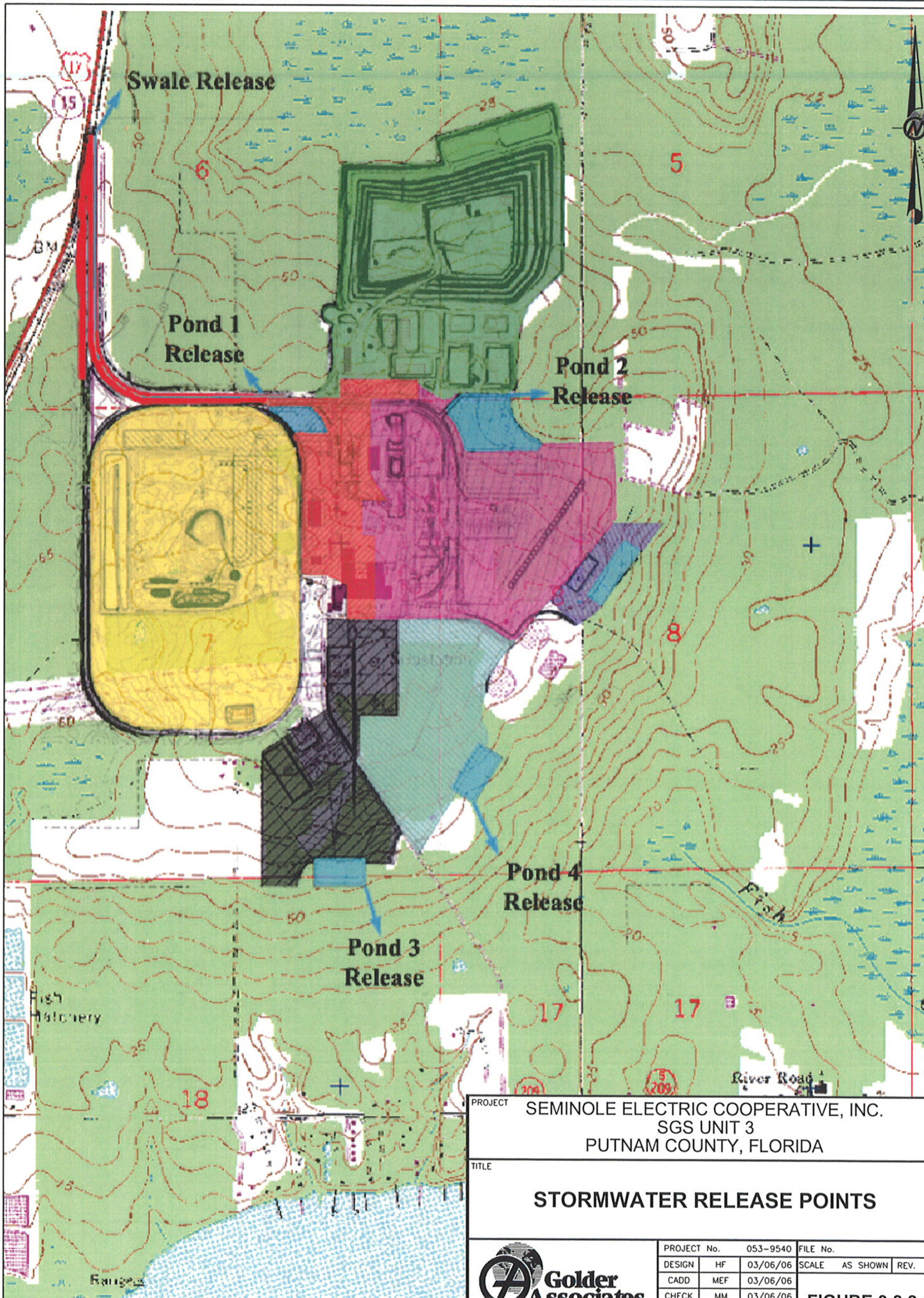
PROJECT SEMINOLE ELECTRIC COOPERATIVE INC
SGS UNIT 3
PUTNAM COUNTY, FLORIDA

TITLE

SGS UNIT 3 WATER-USE DIAGRAM

Golder Associates
Tampa, Florida

PROJECT No.		053-9540	FILE No.	053954OB032.dwg	
DESIGN	MEF	03/07/06	SCALE	AS SHOWN	REV. 0
CADD	MEF	03/07/06	FIGURE 3.5.0-1		
CHECK	HF	03/07/06			
REVIEW	MM	03/07/06			



PROJECT
SEMINOLE ELECTRIC COOPERATIVE, INC.
SGS UNIT 3
PUTNAM COUNTY, FLORIDA

TITLE

STORMWATER RELEASE POINTS

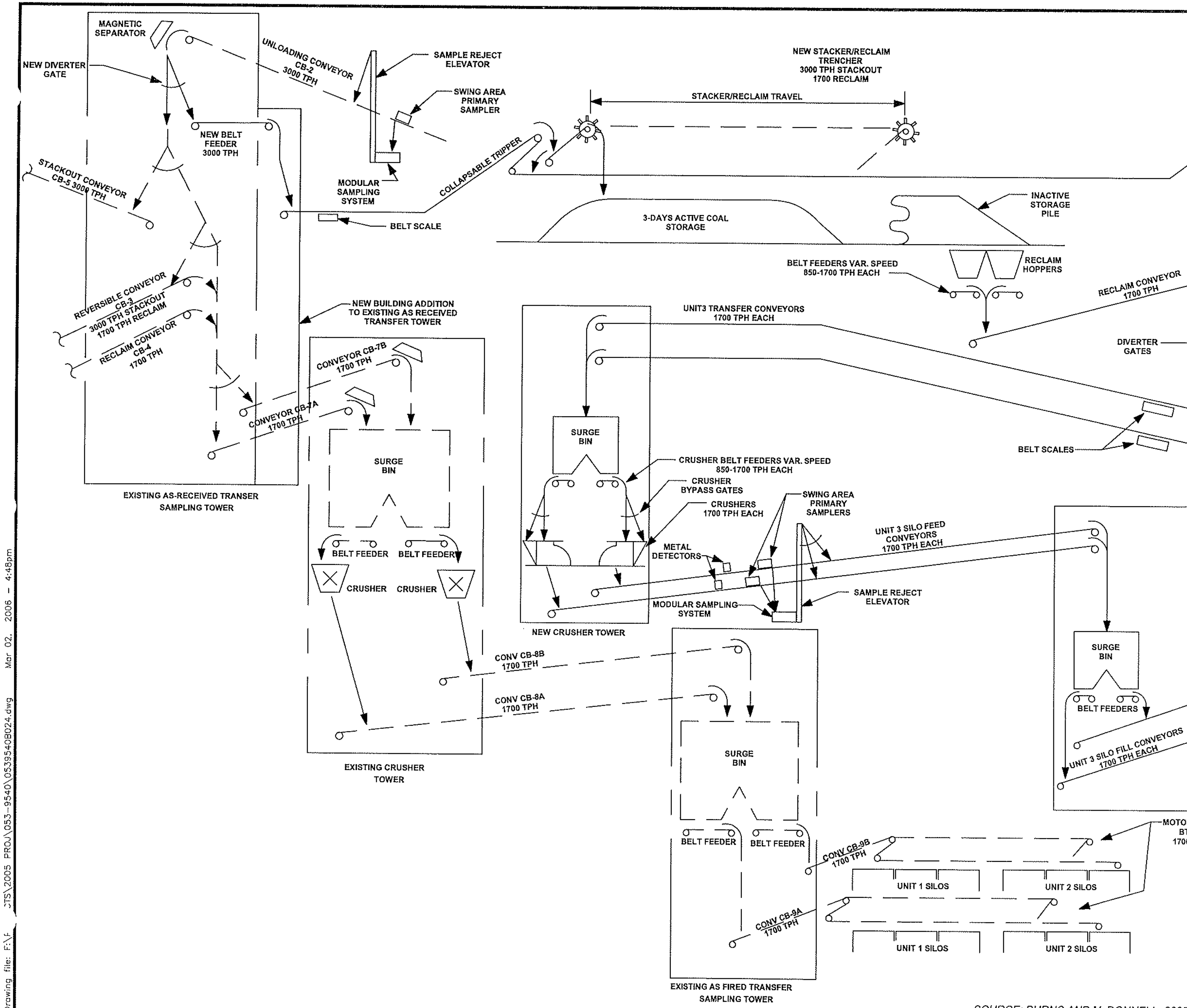
Golder Associates

PROJECT No.		053-9540	FILE No.	
DESIGN	HF	03/06/06	SCALE AS SHOWN	REV. 0
CADD	MEF	03/06/06		
CHECK	MM	03/06/06	FIGURE 3.8.2-1	
REVIEW				

Drawing file: F:\PROJECTS\2005 PROJ\053-9540\0539540B034.dwg Mar 06, 2006 - 1:28pm

FLORIDA DESIGN CONSULTANTS, INC.
ENGINEERS, ENVIRONMENTALISTS, SURVEYORS & PLANNERS
3030 Starkey Blvd. New Port Richey FL. 34655
Tel: (727) 849-7588 - Fax: (727) 848-3648
E.B. No. 7421

DESCRIPTION:	PROJ No.	DATE:	FIGURE:
SEMINOLE ELECTRIC COOPERATIVE, Inc. PROJECT ENTRANCE UPGRADES	2005-54	9/23/05	3.9.2-1
	EPN: 2005-0054	DRAWN BY: E.P.P.	
	SCALE: 1"=200'		



Drawing file: F:\PROJECTS\2005 PROJ\053-9540\0539540B024.dwg Mar 02, 2006 - 4:48pm

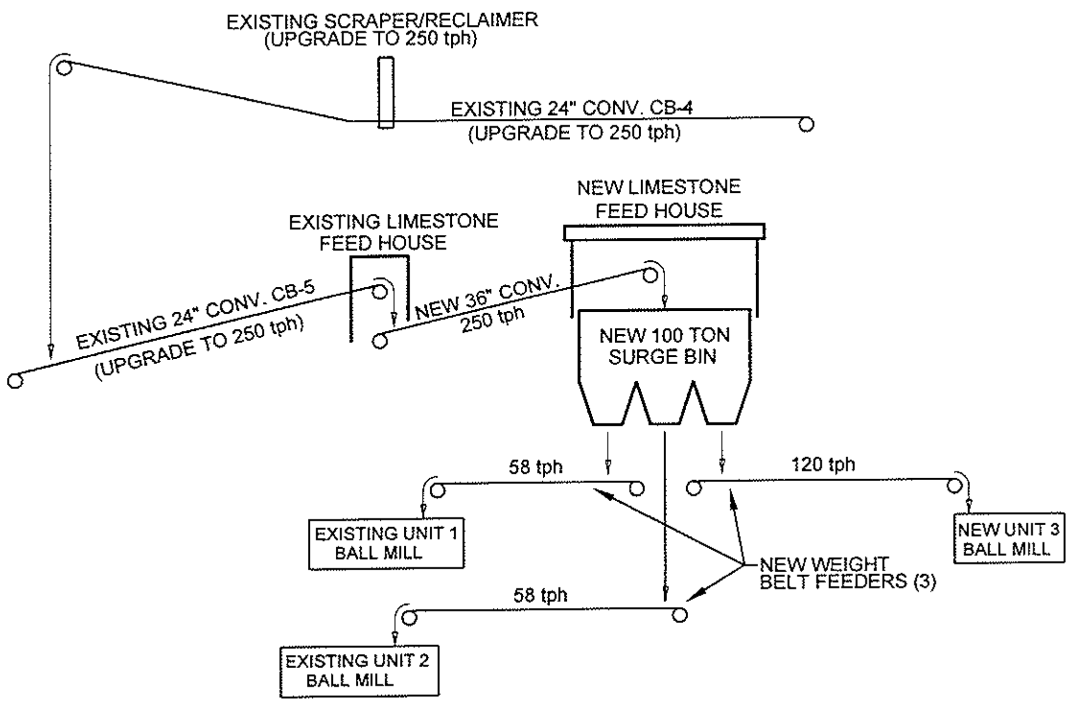
SOURCE: BURNS AND McDONNELL, 2005

PROJECT	SEMINOLE ELECTRIC COOPERATIVE, INC. SGS UNIT 3 PUTNAM COUNTY, FLORIDA
TITLE	COAL HANDLING FLOW DIAGRAM

Golder Associates
Tampa, Florida

PROJECT No.	053-9540		FILE No. 0539540B024.dwg	
DESIGN			SCALE AS SHOWN	REV. 0
CADD	-	2/27/06	FIGURE 3.9.4-1	
CHECK				
REVIEW				

Drawing file: F:\PRO... .S\2005 PROJ\053-9540\0539540B024.dwg Mar 02, 2006 - 4:45pm



NOTE: NO CHANGES REQUIRED TO THE LIMESTONE UNLOADING & STOCKOUT SYSTEM.

SOURCE: BURNS AND McDONNELL, 2005

PROJECT
SEMINOLE ELECTRIC COOPERATIVE, INC.
SGS UNIT 3
PUTNAM COUNTY, FLORIDA

TITLE
LIMESTONE HANDLING FLOW DIAGRAM

Golder Associates
TAMPA, FLORIDA

PROJECT No.		053-9540
DESIGN	-	-
CADD	KT	2/27/06
CHECK	MM	2/27/06
REVIEW		

FILE No. 0539540B024.dwg
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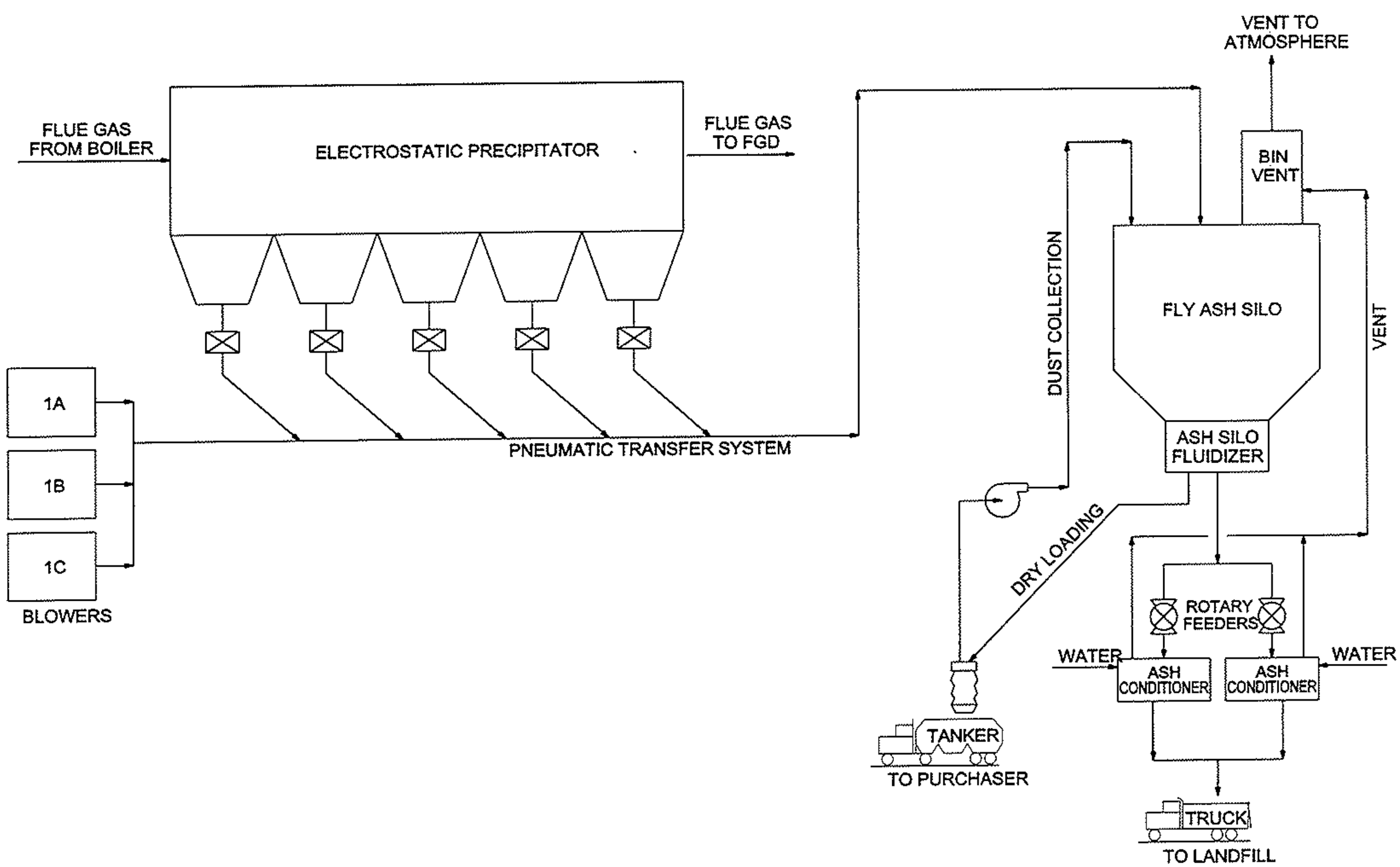
FIGURE 3.9.5-1

Drawing file: F:\PRO... ...S\2005 PROJ\053-9540\0539540B024.dwg Mar 02, 2006 - 4:46pm



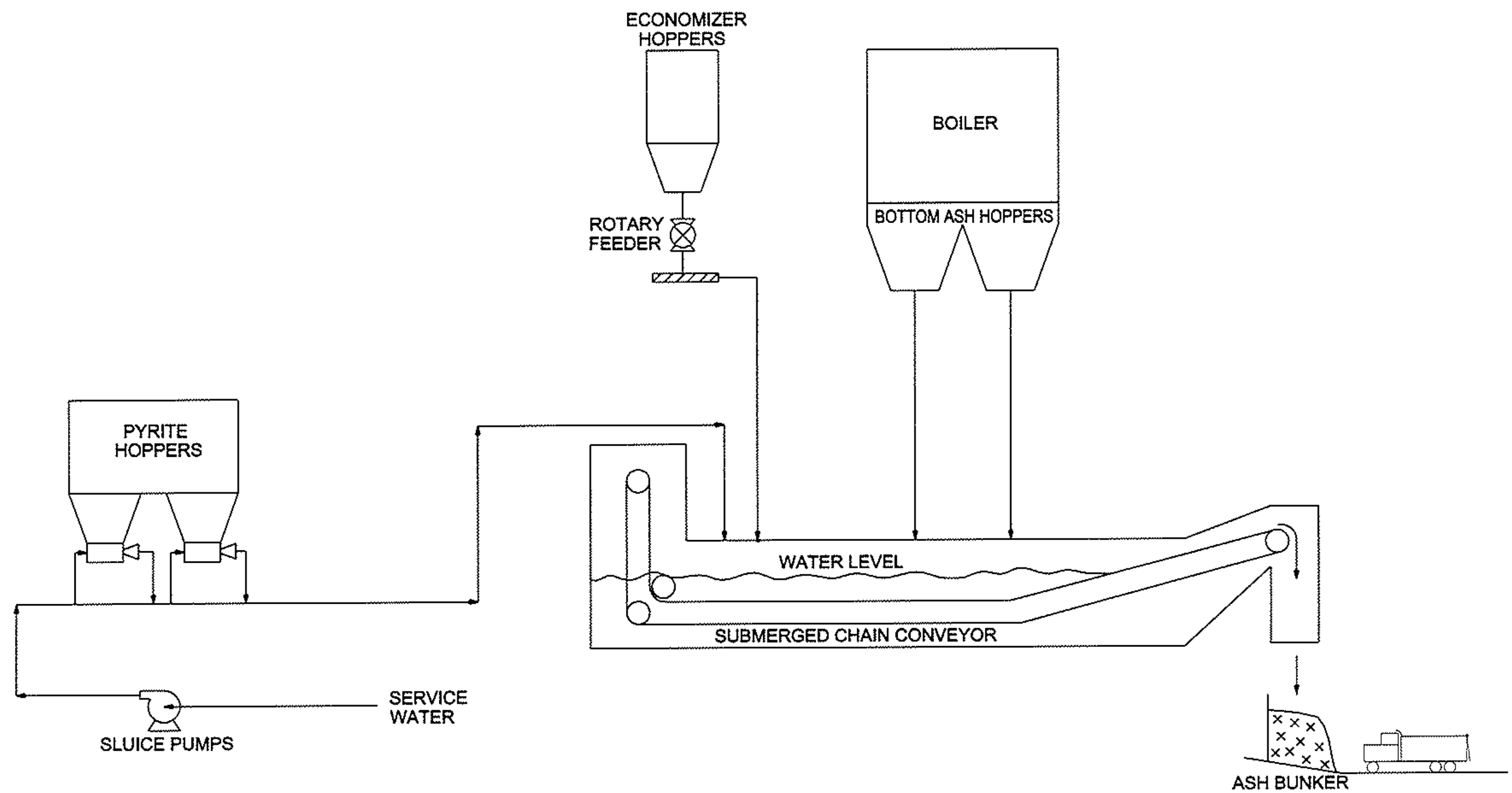
SOURCE: BURNS AND McDONNELL, 2005

PROJECT	SEMINOLE ELECTRIC COOPERATIVE, INC. SGS UNIT 3 PUTNAM COUNTY, FLORIDA		
TITLE	FLY ASH FLOW DIAGRAM		
Golder Associates, TAMPA, FLORIDA	PROJECT No. 053-9540		FILE No. 0539540B024.dwg
	DESIGN	-	-
	CADD	KT	2/27/06
	CHECK	MM	2/27/06
	REVIEW		

SCALE AS SHOWN | REV. 0

FIGURE 3.9.6-1

Drawing file: F:\PROJECTS\2005 PROJ\053-9540\0539540B024.dwg Mar 06, 2006 - 2:10pm



SOURCE: BURNS AND McDONNELL, 2005.

PROJECT
SEMINOLE ELECTRIC COOPERATIVE, INC.
SGS UNIT 3
PUTNAM COUNTY, FLORIDA

TITLE
BOTTOM ASH FLOW DIAGRAM

Golder Associates
TAMPA, FLORIDA

PROJECT No.		053-9540	FILE No. 0539540B024.dwg
DESIGN	-	-	SCALE AS SHOWN REV. 0
CADD	KT	2/27/06	FIGURE 3.9.6-2
CHECK	MM	2/27/06	
REVIEW			

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

4.1 Land Impacts

4.1.1 General Construction Impacts

The portions of the SGS Site that will be affected by the construction of the SGS Unit 3 Project are shown on Figures 3.2.0-2 and 3.2.0-3. As described in Section 3.2, a total of about 228 acres within the 1,916.8-acre Site will be utilized during construction of the Project. Areas of the Site will require clearing and burning of vegetation, primarily upland pine flatwoods (FLUCFCS 411) and live oak hammock (FLUCFCS 427), as described in Section 2.3.5 and identified on Figure 2.3.5-1. Grading and filling will be required for the Project. Construction laydown and parking areas, which may be heavily traveled, may be stabilized with limerock. Other more lightly traveled areas will be seeded with grass to prevent erosion.

The area that will be occupied by the SGS Unit 3 power block includes space for the boiler, steam turbine generator, air pollution control equipment, mechanical draft cooling tower, and support facilities (see Figure 3.2.0-3). The fuel handling facilities provide space for the unloading and reclaim systems, active and inactive storage areas. Other facilities include stormwater ponds and roads and associated facilities as described in Section 3.8.

Primary access to the SGS Site is provided by a public road, U.S. Highway 17, which is located west of the Site. The plant entrance road will be modified from two lanes to four lanes, at the very beginning of the construction process to minimize traffic impacts onsite and U.S. Highway 17.

Fugitive dust generation from the SGS Site associated with Unit 3 traffic and/or clearing and excavation activities will be minimized through paving and stabilization with limerock, seeding and grassing of areas not immediately utilized for construction, the use of water sprinkling, or other dust-suppressant techniques. No explosives for blasting will be used during construction of Unit 3.

The existing grade of the SGS Site is approximately 78 ft-msl. The finished grade of the SGS Site that includes the power block and the equipment will remain at an elevation of approximately

78 ft-msl. Construction laydown and parking areas will also be constructed at existing site elevation (i.e., 78 ft) which generally occurs within several feet of the predominant site elevation of 78 ft-msl.

Foundations required to support heavy loads (i.e., such as boiler, air pollution control equipment and steam turbine generator) are anticipated to be mat foundations but may be supported by pilings.

Temporary dewatering activities may be required during the construction of SGS Unit 3. Dewatering will be accomplished using standard construction dewatering techniques. Well points will be installed around the areas to be excavated and/or excavations will be dewatered by pumping. Dewatering will be required for all excavations below 72 ft-msl. Discharge from dewatering operations will be routed to the onsite stormwater detention ponds. Lowering the water table allows for safe and efficient excavation, construction and backfilling of foundations and other below grade facilities. The total duration of dewatering conducted at the site will be approximately 16 months. There will be numerous dewatering activities conducted at various locations throughout the site. Limited impacts to groundwater will occur and no offsite impacts to groundwater are anticipated (see Section 4.3). Dewatering will be undertaken in compliance with the substantive requirements of Rule 62-621.300(2), F.A.C. A dewatering plan, if required, will be prepared when the detailed design of Unit 3 is completed.

Water associated with hydrostatic testing will be obtained from the plant service water system for use in non-steam types of piping systems. Well water will be used in pipe and tank systems that require high quality water. Service water will be used for systems not requiring high quality water such as hydrostatic testing of the river intake piping and tank systems after they are installed. To the extent possible, hydrostatic test water will be recycled in the existing wet FGD system.

Solid waste materials generated during construction will be disposed of in accordance with applicable rules and regulations. Construction and demolition wastes, such as scrap wood and metal, will be transferred to a specified storage area on the SGS Site where they will be separated for salvage and recycling. General waste materials (i.e., typical of municipal solid wastes) will be collected in appropriate waste collection containers for disposal at an approved offsite location. All hazardous materials generated during construction activities will be properly stored, transported and disposed of in accordance with applicable regulations and the site hazardous waste management plan (See Appendix 10.4.2).

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

Potable water for consumption during construction will be obtained from bottled potable water. Potable water for emergency eyewash and shower stations will be supplied from temporary systems initially and subsequently connected to the permanent SGS Site potable water system.

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

It is anticipated that onsite construction activities for the Unit 3 Project will begin by no later than the third quarter of 2008 and will be completed by no later than the third quarter of 2012. Peak employment is expected to occur in 2010 with approximately 1,500 construction workers and plant staff.

4.1.2 Roads

Construction traffic will use U.S. 17 Highway to access the SGS Site. Construction traffic will be directed to the appropriate construction parking area and material and equipment deliveries will be directed to laydown areas. The plant entrance road will be modified from two lanes to four lanes to minimize traffic impacts onsite and U.S. Highway 17.

4.1.3 Flood Zones

The entire SGS Unit 3 construction project is located above the 100-year flood. Construction of the SGS Unit 3 Project will not adversely impact site flood elevations for adjacent areas and will not cause any adverse flooding or related impacts to offsite property (See Section 2.1.5).

4.1.4 Topography and Soils

The existing grade is about 78 ft-msl and varies about +/- 1 ft. During Unit 3 Site preparation, areas will be graded as necessary.

It is anticipated the low soil stability or bearing strength of soils at the SGS Site will require the use of mat foundations but in limited circumstances, piling may be required. It is expected that overall settling of the land area will be negligible.

Construction facilities will require grading and filling, but remain within +/- 3 ft of the existing elevation. Site topography will not be affected by construction-related activities and there will be no effect on existing aesthetics or view shed due to changes in the topography of the plant. Elevations of the land surface after construction will be similar to the existing elevations; no significant changes in topography will be observable from offsite locations except for construction of the stormwater ponds.

Construction activities will alter runoff in several parts of the Unit 3 Project; however, no adverse effects are anticipated from this alteration. Surface water runoff from the power block, construction parking, and laydown areas and access road expansion will be directed to properly sized and designed stormwater swales and ponds that will meet all applicable requirements (See Sections 3.8 and Appendix 10.9).

Offsite groundwater levels will not be significantly affected by modifications to soil percolation from construction activities at the SGS Site. Slight changes in percolation rates will have negligible impacts on water levels, because the surface infiltration affects only localized areas within the SGS Site.

4.2 Impact on Surface Water Bodies and Uses

4.2.1 Impact Assessment

Due to the existing nature of the SGS Site and proposed stormwater controls, impacts to the surrounding surface waters will not be adversely affected by SGS Unit 3 Site preparation and construction activities. Figure 4.1.1-1 generally identifies the various drainage basins of the SGS

Site. The focus of this impact evaluation is on potential discharges from the project area to wetlands and/or nearby surface waters.

4.2.1.1 Surficial Hydrology—Physical and Chemical Impacts

Construction of the Unit 3 Project will result in the temporary impact of 0.03 acres to the bank and approximately 0.01 acres of permanent impact to the river bottom for the addition of a new 325-foot long, 36-inch diameter high density polyethylene intake pipe adjacent to the existing intake pipeline extending from the existing river water pump house on Parcel 2 into the St. Johns River to the existing intake structure. The pipeline will be installed on the bottom of the river adjacent to the existing intake pipeline within the existing submerged land easement currently authorized by the Board of Trustees of the Internal Improvement Trust Fund (See Appendix 10.4-6). A barge-mounted overhead crane, anchored at a required spacing, and connected to the existing intake structure will be used to install the new 36-inch intake pipe. From the shoreline, the new pipe will be connected underground to the pump house via an open trench. To minimize turbidity, sheet piling will be installed around the trench excavation area at the shoreline. The area will be approximately 10 ft wide by 30 ft long. The trench will be dewatered for connection of the new pipeline with the pump house. The trench will subsequently be backfilled and the shoreline restored. No adverse physical or chemical impacts to the St. Johns River are anticipated as a result of installation of the new intake pipe.

Erosion will be controlled by grading, construction of ditches and embankments, maintenance of relatively flat grades, and other appropriate erosion control techniques. Sedimentation will be controlled during construction by use of additional sediment control basins and traps, filter berms, silt fence, and other applicable devices as appropriate.

Stormwater (sediment control) ponds will be installed to serve runoff from construction activities (See Appendix 10.9). Runoff collected in the sediment control ponds will be released to wetlands and surface waters through outlet structures equipped with oil skimmers and sedimentation weirs, designed in accordance with SJRWMD requirements. Offsite impacts will be controlled and minimized through proper design and construction of runoff control features in accordance with federal, state, regional, and local regulations described in Section 3.8. Based on the limited discharge quantity and treated nature of runoff to wetlands and surface water bodies associated with construction activities, adverse impacts to surface waters are expected to be negligible.

Dewatering will be required for construction of foundations and piping and associated facilities during construction activities. The water quality of the dewatering effluent will essentially be identical to the onsite groundwater. Any onsite dewatering water will be routed to the stormwater ponds or reused in the FGD system.

Impacts from the use of chemicals and/or oil and grease will be mitigated through proper handling and disposal practices. Construction contractors will be required to implement environmental control practices (e.g., designating specific areas for chemical use and storage and areas for fueling and maintenance) to minimize spills. These areas will be located so that any spills, if they do occur, will not be adjacent to surface waters or other sensitive areas. If spills occur, immediate cleanup will be performed with ultimate disposal to an approved facility. When appropriate, such materials will be handled to conform to Spill Prevention Control and Countermeasure (SPCC) plans and hazardous waste management plans implemented at the SGS. Construction-specific procedures will be developed and implemented by individual contractors in accordance with the Seminole construction management procedures.

Seminole will prepare a Notice of Intent and a revised Stormwater Pollution Prevention Plan prior to the commencement of construction in accordance with Florida's generic NPDES permit for construction activities.

4.2.1.2 Aquatic Systems- Physical and Chemical Impacts

The Unit 3 Project has been designed to avoid and/or minimize impacts to wetlands or surface waters. The power block and associated facilities will be located to avoid wetland habitats on the SGS Site, with the exception of a 0.46-acre isolated willow shrub marsh of relatively low ecological quality located adjacent to the existing coal yard. An upland-cut stormwater conveyance ditch within the previously-cleared grass field adjacent to Units 1 and 2 will also be impacted during the construction of Unit 3. Dredge/fill impacts associated with the installation of the intake pipeline between the intake structure and intake pump house will be avoided and/or minimized. The new 36-inch diameter intake pipe will be laid upon the river bottom directly adjacent to the existing intake pipe. The new pipe will not be trenched into the sediment; therefore no dredging within the river will be required. The shoreline at the location of the new intake pipe has been previously cleared of vegetation and stabilized with concrete; which will be removed and subsequently replaced in order to connect the new pipe to the pump house on shore. From the shoreline, the new pipe will be connected underground to the pump house via open trench. Turbidity impacts will be avoided through installation of sheet piling around the area for trench excavation at the shoreline. The sheet pile area will be approximately 10 ft wide by 30 ft long. The trench will be dewatered for pipeline installation to the pump structure then subsequently backfilled and the shoreline restored. The acreage of impact associated with the installation of the new intake pipe between the intake structure and the pump house is 0.04 acres. Between the pump house and Unit 3, the pipe will be installed within the existing pipeline easement along with a new duct bank, which will impact a total of 0.47 acres; 0.13 acres of disturbed wet prairie, 0.26 acres of wet pine flatwoods, 0.05 acres of mixed wetland hardwoods, and an additional 0.03 acres of mixed wetland hardwoods within an unnamed creek floodplain near CR 209. The construction will comply with the requirements of the USACE, FDEP, and Putnam County. No significant adverse impacts to aquatic systems are anticipated as a result.

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

Stormwater associated with construction activities will be managed in accordance with Florida's generic permit for construction activities. Silt fences will be installed around the perimeter of wetland and surface waters and maintained during construction.

4.2.1.3 Site Preparation – Physical and Chemical Impacts

Activities associated with Site preparation and construction is not expected to produce any significant changes to groundwater quality, quantity, or levels in the vicinity of the SGS Project Site. Dewatering, if required during construction, will be confined to localized areas, consequently, the zone of influence for the dewatering activities will be confined to areas associated with the construction of foundations and piping, the intake and associated facilities. No overall impacts to groundwater resources or offsite wells are expected to will occur from dewatering activities.

Construction contractors will be required to implement practices to minimize spills, as discussed in Section 4.2.11. Maintenance and refueling will be performed only in designated areas. Any spills will be cleaned up and wastes disposed of in accordance with the applicable requirements.

4.2.2 Measuring and Monitoring Program

During construction dewatering, Seminole will comply with the substantive requirements of Rule 62-621.30(2), F.A.C.

4.3 Ecological Impacts

4.3.1 Impact Assessment

4.3.1.1 Terrestrial Systems

The SGS Site comprises approximately 1,917 acres, of which approximately 228 acres will be affected by the construction and operation of SGS Unit 3. Terrestrial systems on the Site are dominated by the existing power plant facility (FLUCFCS 831), associated cleared and open grass lawns (FLUCFCS 211), upland pine flatwoods (FLUCFCS 411), and oak hammock (FLUCFCS 427), as described in Section 2.3.5 and illustrated in Figure 2.3.5-1.

The construction of the SGS Unit 3 power block and pollution control systems will be located upon cleared grasslands, and is not expected to result in any adverse ecological impacts. The SGS Unit 3 fuel storage and conveyance system will be located immediately east of the existing coal yard, requiring clearing of approximately 24 acres of an isolated parcel of pine flatwoods. In addition, a total of 137 acres of pine flatwoods and oak hammock will be cleared for the SGS Unit 3 cooling tower, construction laydown, trailers, and parking. Although extensive incidental mortalities are not anticipated, the loss of this habitat will displace wildlife. Large areas of similar habitat occur on the plant site and the surrounding area; therefore, most species of wildlife are expected to relocate to suitable habitat in the vicinity during land clearing activities.

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

Noise (including human disturbance from construction activities) will not result in significant adverse affect upon wildlife in the vicinity of the Site. Presently, the area experiences noise associated with operation of the existing SGS Units 1 and 2, and wildlife that occurs in the vicinity of the Site, such as birds, are acclimated to such activities. No noise-sensitive wildlife is known to occur on the Site or its vicinity since wildlife in the area would have been acclimated to noise associated with the existing activities of Units 1 and 2.

4.3.1.2 Aquatic Systems/Wetlands

Permanent impacts to aquatic systems or wetlands within the SGS Site are limited to an isolated willow shrub marsh and upland stormwater conveyance ditches. Approximately 0.46 acres of isolated willow shrub marsh proposed to be filled for the construction of the Unit 3 fuel storage and conveyance system is of low ecological quality, does not provide critical wildlife habitat, and is surrounded by existing coal storage facilities and access roads. The upland stormwater conveyance ditch system currently provides drainage within the open grassed field adjacent to the existing Units 1 and 2. The ditch system is part of a constricted and actively maintained stormwater system that does not provide quality aquatic habitat. The new 36-inch intake pipeline will be placed on the river bottom without excavation and will cover 0.01 acres.

Temporary impacts are limited to installation of a pipeline that will route through a disturbed wet prairie, wet pine flatwoods, and mixed wetland hardwoods will be 0.50 acres. This includes excavation using open trench methods through areas which include the disturbed wetland prairie, mixed wetland hardwoods, an unnamed creek and the bank of the St. Johns River bank. The impacts to aquatic and wetland systems associated with installation of the new intake pipeline will be negligible.

The new intake pipeline will be constructed using open trench methods. The connection between the shoreline and the pump house on shore will be underground. The area of the shoreline will be isolated from the river, backfilled and reinforced, and restored to grade. Installation of a new intake pipeline will involve temporary impacts to a 0.03-acre area which include the shoreline which is currently devoid of riparian vegetation and stabilized with cement. Between the river pump house and Unit 3, the intake pipe and a new duct bank will be installed, which will include temporary impacts to 0.13 acres of disturbed wet prairie, 0.03 acres of an unnamed creek, 0.26 acres of wet pine flatwoods, and 0.05 acres of mixed wetland hardwoods within the existing pipeline easement. The wet prairie and wet pine flatwoods areas are adjacent to the existing pipeline easement upon marginally hydric soils and experience significant encroachment of upland vegetation. The western edge of an area of mixed wetland hardwoods will be impacted within the pipeline easement, requiring clearing of a small amount (0.05 acres) of water oaks and wax myrtle in order to install the pipeline and duct bank. An unnamed creek just north of County Road 209 will be temporarily impacted and an approximately 30 foot wide easement through the narrow floodplain cleared. No significant ecological impacts are anticipated associated with the construction of the new intake pipeline.

4.3.1.3 Endangered and Threatened Species

The areas to be impacted do not support any threatened or endangered flora; therefore, no adverse impacts to federally or state-listed plant species will occur as a result of construction of SGS Unit 3. No federally listed animal species occur in the areas impacted by Unit 3; however, the state-listed gopher tortoise does occur within the upland pine flatwoods area proposed for location of construction laydown, trailers, and parking. The gopher tortoise is not threatened or endangered, but classified as a species of special concern by the FFWCC. A gopher tortoise burrow survey will be conducted to calculate the population size within the laydown area. Impacts to the gopher tortoise populations will be avoided and/or minimized through burrow avoidance, tortoise relocation, or mitigation through purchase of suitable gopher tortoise habitat offsite, in consultation with and in accordance with FFWCC regulations and guidelines.

According to the USFWS, "the proposed action is not likely to adversely affect resources protected by the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.), provided the standard protection measures for eastern indigo snakes are incorporated into the project design". Eastern indigo snakes are known to frequent gopher tortoise burrows, and although none have been observed on the areas to be impacted by Unit 3, their presence or absence will be verified during pre-clearing surveys of the area and the standard protection measures will be incorporated during construction, as listed below:

Standard Protection Measures for the Eastern Indigo Snake ***(rev July 12, 1999)***

1. An eastern indigo snake protection/education plan shall be developed by the applicant or requestor for all construction personnel to follow. The plan shall be provided to the Service for review and approval at least 30 days prior to any clearing activities. The educational materials for the plan may consist of a combination of posters, videos, pamphlets, and lectures (e.g., an observer trained to identify eastern indigo snakes could use the protection/education plan to instruct construction personnel before any clearing activities occur). Informational signs should be posted throughout the construction site and contain the following information:

- *Description of the eastern indigo snake, its habits, and protection under Federal Law;*
- *Instructions to injure, harm, harass or kill this species;*
- *Directions to cease clearing activities and allow the eastern indigo snake sufficient time to move away from the site on its own before resuming clearing; and*
- *Telephone numbers of pertinent agencies to be contacted if a dead eastern indigo snake is encountered. The dead specimen should be thoroughly soaked in water, then frozen.*

2. Only an individual who has been either authorized by a section 10(a)(1)(A) permit issued by the Service, or designated as an agent of the State of Florida by the Florida Fish and Wildlife Conservation Commission for such activities, is permitted to come in contact with or relocate an eastern indigo snake.

3. If necessary, eastern indigo snakes shall be held in captivity only long enough to transport them to a release site; at no time shall two snakes be kept in the same container during transportation.

4. An eastern indigo snake monitoring report must be submitted to the appropriate Florida Field Office within 60 days of the conclusion of clearing phases. The report should be submitted whether or not eastern indigo snakes are observed. The report should contain the following information:

- *Any sightings of eastern indigo snakes;*
- *Summaries of any relocated snakes if relocation was approved for the project (e.g., locations of where and when they were found and relocated); and*
- *Other obligations required by the Florida Fish and Wildlife Conservation Commission, as stipulated in the permit.*

4.3.2 Measuring and Monitoring Programs

4.3.2.1 Terrestrial Systems

Monitoring programs for the Eastern indigo snake will be undertaken in accordance with the USFWS guidelines.

4.3.2.2 Aquatic Systems/Wetlands

No monitoring programs will be undertaken because no important aquatic/wetland systems will be affected by construction activities proposed for the Unit 3 Project. Standard measures to prevent turbidity impacts to the St. Johns River or the unnamed creek north of County 209 will be adhered to.

4.4 Air Impacts

4.4.1 Air Emissions

Construction activities will result in the generation of fugitive particulate matter (PM) emissions and vehicle exhaust emissions. Fugitive PM emissions will result primarily from ground excavation, grading, cut-and-fill operations, and vehicular travel over paved and unpaved roads from the existing Site. Vehicular traffic will include heavy-equipment traffic and traffic due to construction workers entering and leaving the SGS Site. Construction personnel and equipment will enter the SGS Site exclusively via the U.S. Highway 17 and the existing entrance roadway. Exposed land areas may also generate fugitive dust due to wind erosion. Table 4.5.1-1 presents the estimated air emissions during construction.

As needed, material from the SGS Site will be cleared and burned on-site. Open burning associated with land clearing activities will be conducted according to Chapter 62-256, F.A.C. for open burning of land clearing debris. Open burning will be conducted after notification of the Florida Division of Forestry and conducted under the requirements of Rule 62-256.300(3) F.A.C. This includes limiting open burning activities from 9 a.m. to one hour before sunset.

Emissions of fugitive PM 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.

Both EPA and FDEP have promulgated AAQS for PM_{10}. During the construction period, PM_{10} emissions will result from site preparation by replacing soil with fill and grading the site areas. The estimated emissions for this activity are estimated to be about 0.1 tons for soil removal, 0.003 tons for limestone or aggregate placement, and 2.9 tons for movement of material and grading. These activities will generally not occur simultaneously.

Fugitive PM_{10} emissions may occur from wind erosion from open areas around the site. The areas subject to wind erosion will generally be small due to the nature of construction activities and control measures taken, such as seeding. Construction related PM_{10} emissions have been estimated to be 1.3 tons/year.

PM_{10} emissions will also result from vehicle entering and leaving the SGS Site. Based on the average construction workforce PM_{10} emissions from paved roads have been estimated to be 1.6 tons.

For PM_{10}, the PSD significant emission rate is 15 TPY. The estimated PM_{10} emissions are not cumulative since the construction activities are preformed in series. The estimated fugitive emissions are not expected to significantly affect air quality outside the SGS boundary given their small magnitude compared to the PSD significant emission rate.

Emissions will also result from onsite construction equipment including cranes, trucks, compressors, etc., operating with diesel and gasoline engines. This equipment will produce emissions of PM_{10}, NO_X, SO_2, CO, and VOC. Exhaust emissions were based on EPA emission factors for non-road diesel engines. Based on the EPA emission factors and the estimated maximum number of vehicles, the PM_{10}, NO_X, SO_2, CO, and VOC and emissions are estimated to be 0.3, 5.1, 0.3, 4.9, and 0.6 tons, respectively, over the four-year construction period. These levels of emissions will not cause significant impacts to air quality in the vicinity of the SGS Site.

4.4.2 Control Measures

A number of control measures will be implemented during the construction period in order to minimize air emissions and potential impacts. After grading, the lightly traveled areas will be either paved or vegetated to minimize fugitive PM and wind erosion. Heavily traveled unpaved construction laydown areas and unpaved roads may be stabilized with rock. Watering on an as-needed basis will control fugitive dust from highly traveled areas. The entrance roads are paved, which minimizes dust emissions from vehicles entering the SGS Site.

4.5 Impact on Human Populations

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

4.5.1 Construction Workforce

The construction workforce for the Unit 3 Project is expected to average approximately 600 employees over the four-year construction period. Construction is anticipated to commence in 2008 and conclude in the 2012. Peak construction is estimated at approximately 1,500 workers in mid-2010 and will result in the following workforce skills:

	Percent		Percent
Laborers	11	Pipefitters	18
Carpenters	5	Insulators	1
Operators	6	Electricians	19
Ironworkers	5	Painters	3
Millwrights	7	Supervision	5
Boilermakers	17	Teamsters	3

The majority of construction workers are expected to commute to the SGS Site from within a commuting distance of up to 60 miles, primarily from locations within Putnam, Flagler, and Duval Counties. Contractors will be responsible for hiring the construction workforce. A more detailed discussion of the workforce, payrolls, and economic impacts of the workforce is found in Section 7.0.

4.5.2 Transportation

Traffic during construction will affect area roadways on a temporary basis for the duration of the construction period. Construction activity is scheduled to begin in 2008 and continue for four years to 2012. Average construction employment in 2008 is expected to be approximately 600 workers with peak construction employment in 2010 reaching 1,500. Construction activities will take place between the hours of 7:00 a.m. and 5:00 p.m. The worst-case impact for construction traffic will occur when the maximum employment is reached at the site in the year 2010. The construction employees are expected to arrive by automobile or light truck at an average automobile occupancy of 1.2 persons per vehicle. This will result in 1,250 inbound automobiles in the a.m. peak hour and 1,250 outbound automobiles in the p.m. peak hour. Truck deliveries are expected to be approximately 40 trucks per day from 7:00 a.m. to 3:00 p.m. This will result in an average of five inbound trucks in the a.m. peak hour. No project related trucks are anticipated in the p.m. peak hour.

Rail access to the SGS Site is provided by CSX Railroad via tracks located parallel to and just east of U.S. Highway 17. All train traffic to the SGS Site comes from the north and all return trips from the Site return to the north. Train traffic will increase during construction to bring materials to the Site and will also increase during the operating period following construction to provide coal for the additional unit. The existing rail traffic is 11 to 14 trains per day, which includes four Amtrak passenger trains.

Project trip distribution for construction has been estimated based on the location of the Unit 3 Project in Putnam County and the distribution exhibited by the existing traffic counts. A traffic impact analysis was conducted to determine impacts during the construction period timeframe when the peak construction workforce will be present onsite (2010). The calculations of the future turning movements at the intersections in the study area are documented in the Total Traffic Determination Sheets contained in the Appendix 10.7 of this SCA. Figure 4.5.2-1 identifies the projected turning traffic in the a.m. and p.m. peak hours for peak construction traffic in the year 2010.

The intersections in the study area were analyzed to determine future year operating conditions during construction. First the intersections were analyzed during the peak construction activity in 2010 using the Highway Capacity Software (HCS), with the results provided in Table 4.5.2-1. The un-signalized intersection of U.S. Highway 17 at the Unit 3 Project entrance would not operate at an acceptable level of service (LOS) with the projected total traffic. In order to achieve acceptable operating level of service, this intersection needs to be signalized and widened to provide two approach lanes. Copies of the HCS computer runs are provided in Appendix 10.7 of this SCA.

Highway link operation has been reviewed using generalized peak hour volumes from the FDOT 2002 Quality/Level of Service Handbook. Table 4-8 from that document (See Appendix 10.7), identifies directional peak hour maximum volumes for various types of roadways transitioning into urban areas like those adjacent to the SGS site. Tables 4.5.2-2 and 4.5.2-3 summarize the link operating conditions for the peak construction activity in 2010 for the a.m. and p.m. peak hours respectively. The southbound direction of U.S. Highway 17 from the Unit 3 Project entrance to south of County Road 209 is not projected to operate at an acceptable LOS in the a.m. and p.m. peak hours, while all other road segments in the morning and afternoon peak periods are projected to operate acceptably. This analysis is based on worst-case traffic impacts during the construction of SGS Unit 3 and assumes that all exiting Project workers would leave the facility in the same hour, although their exit may be staggered over several hours.

As indicated earlier, it is expected that trains will be used to deliver some of the project equipment during the construction phase and will deliver fuel to the power plant during normal plant operations. It is not expected that the train operation to the SGS Site will result in a significant delay to area motorists.

The proposed development of the SGS Unit 3 Project can occur and allow the roadway network to operate at reasonable Levels of Service. During the construction period, segments of U.S. Highway 17 are projected to operate at unacceptable levels of service during the a.m. and p.m. peak hour, while the remaining road segments would operate at acceptable levels in the a.m. and p.m. peak hours. Site related improvements include the installation of a traffic signal on U.S. Highway 17 at the SGS site entrance prior to maximum construction employment. Additionally, the SGS site entrance drive will be widened to provide two exit lanes, one for right turns and the other for left turns (See Figure 4.5.2-2).

4.5.3 Housing

An average of 600 employees will be required during Unit 3 construction and employment will peak at 1,500 employees. Many of these employees will be employed for only a portion of the construction period due to the changing skill requirements of the construction project. There is a significant labor pool of construction workers in Putnam, Flagler and Duval Counties, as a result, it is expected that few construction workers will be relocating to the area for the construction term. Most workers that do relocate will use the available lodging accommodations (over 1,244 licensed lodging units) in Putnam County.

4.5.4 Education

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

4.5.5 Construction Noise Impacts

The impacts of noise on human populations are dependent upon the proximity of institutional and residential land uses to construction activities and the type and extent of noise sources. The nearest locations that could potentially be impacted by noise (i.e., critical receptors) from the proposed facility construction area are the five off-site baseline monitoring sites identified in Section 2.3.8.

Construction of the Unit 3 Project will require site preparation, installation of foundations and erection of major components of the unit such as the boilers, air pollution control equipment, steam turbine, and cooling system.

The evaluation of noise impacts from construction activities was performed using previous results from noise propagation computer programs to estimate noise levels (CADNA A). Noise source levels are entered as octave band sound power levels. The user can specify coordinates, either rectangular or polar. To determine noise impacts from the Unit 3 Project's construction activities, the receptor grid used for the modeling was 10 x 10 meters out to a distance of 4 kilometers. All noise sources are assumed to be point sources; line sources can be simulated by several point sources. Sound propagation is calculated by accounting for hemispherical spreading and three other user-identified attenuation options: atmospheric attenuation, path-specific attenuation, and barrier attenuation. Atmospheric attenuation is calculated using the data specified by the American National Standard Institute Method for the Calculation of the Absorption of Sound by the Atmosphere (ANSI, 1999). Path specific attenuation can be specified to account for the effects of vegetation, foliage, and wind shadow. Direction source characteristics and reflection can be simulated using path-specific attenuation. Giving the coordinates and height of the barrier can specify attenuation due to barriers. Barrier attenuation is calculated by assuming an infinitely long barrier perpendicular to the source-receptor path. Total and A-weighted SPLs (filtered to approximate human hearing) are calculated. Background noise levels can be incorporated into the program and are used to calculate overall SPLs.

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

Table 4.6.5-1 lists the major types of equipment expected to be used during the construction of the Unit 3 Project and their associated noise characteristics. For the purpose of the construction noise impact analyses, all of the equipment was conservatively assumed to be operating simultaneously at peak power. These heavy construction activities are expected to occur during the daytime hours. Most of the heavy construction activities will occur during the first six to eight months of construction. Mechanical and electrical installation activities may occur at night; however, these activities have minimal noise levels and are much less than the existing plant.

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

The construction noise impacts at the five off-plant property-monitoring locations are presented in Table 4.6.5-2 and Figure 4.6.5-1. The L_{90} and L_{eq} are from the background noise monitoring discussed in Section 2.3.8, and the background with construction impacts are presented in the table. The estimated L_{eq} noise levels during the construction of the Unit 3 Project are estimated to be less than 5 dBA above measured background as shown in Table 4.6.5-2. The predicted noise levels are not expected to adversely impact the sensitive receptors identified in the vicinity of the SGS Site. The noise estimates are conservative and include only atmospheric attenuation. The actual or measured noise levels due to construction are expected to be lower than predicted.

During the initial startup of the Unit 3 Project, steam blows are conducted to clean piping. Steam blows result in elevated noise levels for short durations. Notification will be made to those locations that may be able to notice elevated noise levels.

4.6 Impacts on Landmarks and Sensitive Areas

Construction-related impacts to landmarks and sensitive areas will be minor and will not result in any changes to accessibility or use. There are no regional, scenic, or natural landmarks and sensitive areas within a five mile radius of the Unit 3 Project (refer to Section 2.2.5).

Occasional construction noise may be heard near the SGS Site during the construction term. The noise is anticipated to be infrequent and of short duration and primarily occur during the daytime. Visual impacts will be minor since most of the construction activity and new structures will not be near public viewpoints. Views of the construction activity will be limited at public recreational areas.

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

4.7 Impact on Archaeological and Historic Sites

Results of a search of the Florida Master Site File conducted for the SGS Site lists two previously recorded historical structures and six previously recorded archeological sites located within a mile of the proposed SGS Unit 3 Project Site (See Tables 2.2.6.1 and 2.2.6-2). Surveys performed within and within close proximity to the SGS Site indicate that most of the high site potential occurs on uplands in close proximity to wetlands and around depressional wetlands. Construction activities associated with the SGS Site are not within a potential zone or high potential zone for archaeological resources (See Figure 2.2.6-1).

4.8 Special Features

There will be no unusual products, raw materials, solid waste disposal, incinerator effluents, or residues produced during construction of the Unit 3 Project that will have influence on the environment or ecological systems of the SGS Site, or adjacent areas.

The Unit 3 Project will be connected to existing transmission facilities through 230-kV transmission lines. No new offsite transmission lines are proposed to be constructed.

4.9 Benefits of Construction

The construction phase of the Unit 3 Project will contribute both short- and long-term economic benefits to the surrounding region. Construction benefits will include construction employment that will average several hundred over the four year construction period. Construction wages will increase the demand for goods and services in the region. Direct purchases of construction materials will have both direct and indirect economic benefits. Construction activities will increase tax revenues to the county and state governments due to sales and income taxes from the purchase of equipment and material to support construction activities. This includes construction materials (e.g., concrete and steel for foundations), rental equipment (e.g., construction cranes, pumps), food services, and transportation services. These benefits are presented in detail in Section 7.0.

4.10 Variances

No variances from applicable regulatory standards due to the construction of the Unit 3 Project are being sought as part of this SCA.

TABLES

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TABLES

TABLE 4.5.1-1

ESTIMATED AIR EMISSIONS DURING CONSTRUCITON OF SGS UNIT 3

Construction Activity	Type Operation	Amount	Units	Pollutant	Emissions	Units	Controls
Site Preparation							
Soil Moving	Batch Drop	738,720	tons	PM_{10}	0.1	tons	High moisture material
Limestone and Aggregate	Batch Drop	20,777	tons	PM_{10}	0.003	tons	High moisture material
Grading	Unpaved Roads	8,256	VMT	PM_{10}	2.9	tons/yr	Watering
Equipment	IC Engines	198,900	gallons/yr	PM_{10}	0.6	tons/yr	EPA Non-Road Tier 3
				NO_x	11.2	tons/yr	EPA Non-Road Tier 3
				SO_2	0.7	tons/yr	EPA Non-Road Tier 3
				CO	10.8	tons/yr	EPA Non-Road Tier 3
				VOC	1.2	tons/yr	EPA Non-Road Tier 3
Open Areas	Wind Erosion	12	acres	PM_{10}	1.3	tons/yr	Watering
Vehicle Traffic	Paved Roads	312,857	VMT	PM_{10}	1.6	tons/yr	Watering as necessary
Installation	IC Engines	90,645	gallons/yr	PM_{10}	0.3	tons/yr	EPA Non-Road Tier 3
				NO_x	5.1	tons/yr	EPA Non-Road Tier 3
				SO_2	0.3	tons/yr	EPA Non-Road Tier 3
				CO	4.9	tons/yr	EPA Non-Road Tier 3
				VOC	0.6	tons/yr	EPA Non-Road Tier 3

Note: VMT = vehicle miles traveled; acres based on open areas at any one time.

Sources: USEPA, 1992 Fugitive Dust Background and Technical Information Document for Best Available Control Measures; Section 2.3.1.3.3, Wind Emissions from Continuously Active Piles.
USEPA, 1995; AP-42, Section 13.2.4 for Aggregate Handling and Storage Piles.
USEPA, 2003; AP-42, Section 13.2.2 Unpaved Roads.
USEPA, 2004; Exhaust and Crankcase Emissions Factors for Nonroad Engine Modeling-Compression Ignition.

TABLE 4.5.2-1
INTERSECTION OPERATION DURING PEAK CONSTRUCTION (2010)

Intersection	Peak Hour LOS AM/PM	LOS after Improve AM/PM	Improvement
U.S. Highway 17 at Project Entrance	F/F	A/B	Signalize when warranted by MUTCD, provide WB left and right turn lanes
U.S. Highway 17 at County Road 209	D/C	NA	

TABLE 4.5.2-2
A.M. LINK OPERATION DURING PEAK CONSTRUCTION (2010)

Road	Limits	Dir	Accept LOS	Max SV	2010 Vol	LOS
U.S. Highway 17	North of Project Entrance	NB	B	1,470	711	B
		SB	B	1,470	1396	C
	Project Entrance to County Road 209	NB	B	1,470	1555	B
		SB	B	1,470	984	C
	South of County Road 209	NB	B	1,470	1608	B
		SB	B	1,470	1208	B
County Road 209	West of U.S. Highway 17	EB	D	720	63	C
		WB	D	720	141	C
	East of U.S. Highway 17	EB	D	720	124	C
		WB	D	720	352	C

TABLE 4.5.2-3
P.M. LINK OPERATION DURING PEAK CONSTRUCTION (2010)

Road	Limits	Dir	Accept LOS	Max SV	2010 Vol	LOS
U.S. Highway 17	North of Project Entrance	NB	B	1,470	1383	B
		SB	B	1,470	1087	B
	Project Entrance to County Road 209	NB	B	1,470	939	B
		SB	B	1,470	1947	E
	South of County Road 209	NB	B	1,470	1211	B
		SB	B	1,470	2441	E
County Road 209	West of U.S. Highway 17	EB	D	720	132	C
		WB	D	720	165	C
	East of U.S. Highway 17	EB	D	720	237	C
		WB	D	720	280	C

Source: Florida Design Consultants, Seminole Generating Station Unit #3 Traffic Study, February 2006.

TABLE 4.6.5-1
SUMMARY OF NOISE SOURCE DATA USED IN THE CONSTRUCTION IMPACT ANALYSIS FOR SGS UNIT 3

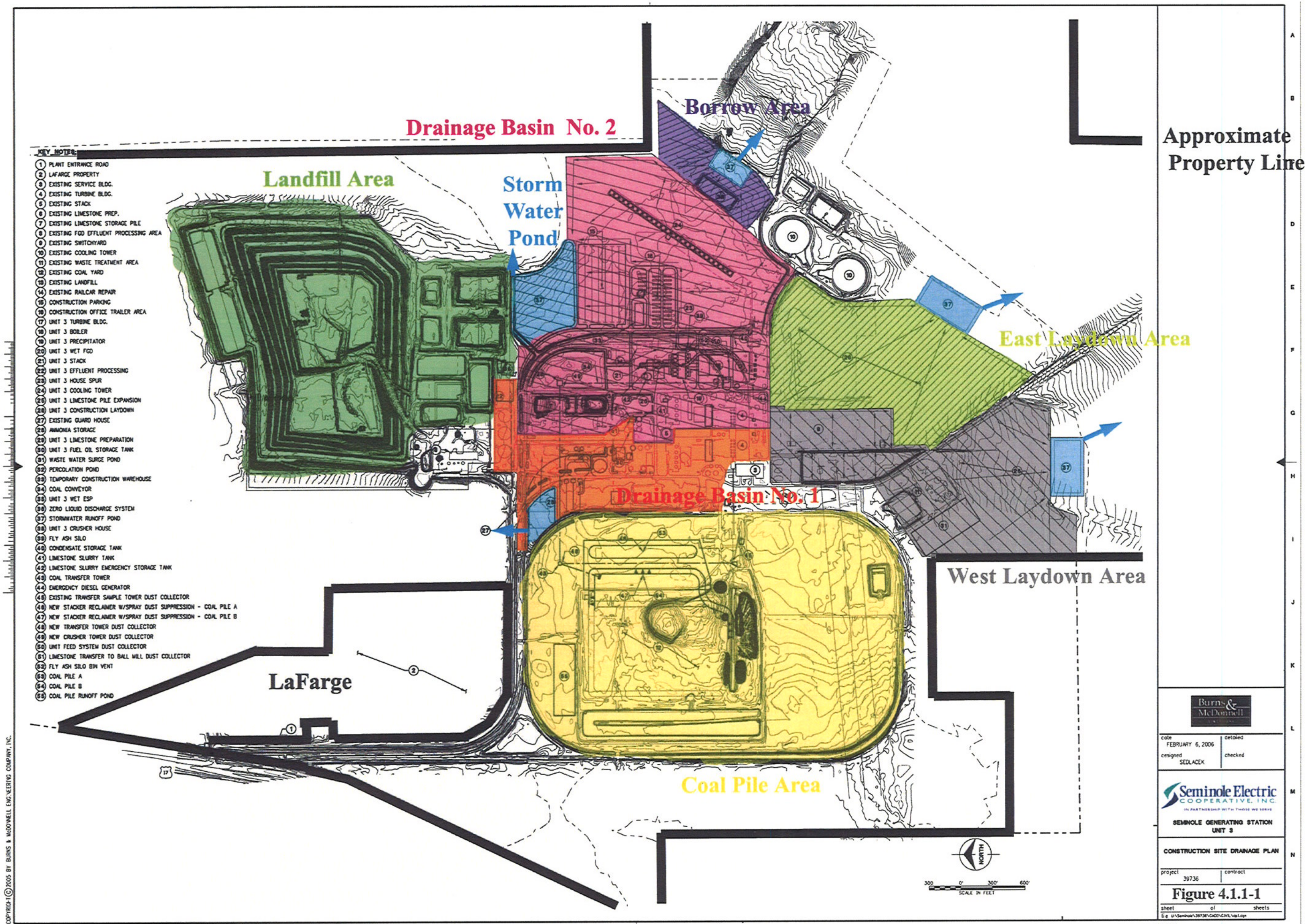
Sources	Source Location		Source Height	Sound Power Level (dB) for Octave Band Center Frequency (Hz)									Overall Sound Power Level
	X (m)	Y (m)	(m)	31.5	63	125	250	500	1000	2000	4000	8000	(dBA)
Crane 1	439294.2	3289146.2	3	0	111.6	118.6	116.6	114.6	109.6	104.6	98.6	92.6	115.6
Crane 2	439092.0	3289058.8	3	0	111.6	118.6	116.6	114.6	109.6	104.6	98.6	92.6	115.6
Crane 3	439084.9	3289240.7	3	0	111.6	118.6	116.6	114.6	109.6	104.6	98.6	92.6	115.6
Pile Driver	439036.9	3289108.1	15	130.6	131.6	126.6	115.6	118.6	121.6	123.6	116.6	109.6	127.5
Truck 1	439574.7	3289319.7	2	0	0	118.6	116.1	113.1	109.6	106.1	102.1	0	115.3
Truck 2	439049.7	3289020.2	2	0	0	118.6	116.1	113.1	109.6	106.1	102.1	0	115.3
Truck 3	439016.6	3289130.7	2	0	0	118.6	116.1	113.1	109.6	106.1	102.1	0	115.3
Truck 4	439043.2	3289237.9	2	0	0	118.6	116.1	113.1	109.6	106.1	102.1	0	115.3
Truck 5	439069.0	3289296.0	2	0	0	118.6	116.1	113.1	109.6	106.1	102.1	0	115.3
Welder 1	439012.4	3289056.0	2	0	102.6	110.6	105.6	98.6	98.6	93.6	88.6	84.6	103.6
Welder 2	439065.2	3289137.2	2	0	102.6	110.6	105.6	98.6	98.6	93.6	88.6	84.6	103.6
Welder 3	439013.4	3289211.4	2	0	102.6	110.6	105.6	98.6	98.6	93.6	88.6	84.6	103.6
Bulldozer 1	439078.3	3289122.0	2	0	106.6	103.6	101.6	102.6	99.6	96.6	94.6	96.6	105.3
Bulldozer 2	439049.2	3289189.7	2	0	106.6	103.6	101.6	102.6	99.6	96.6	94.6	96.6	105.3

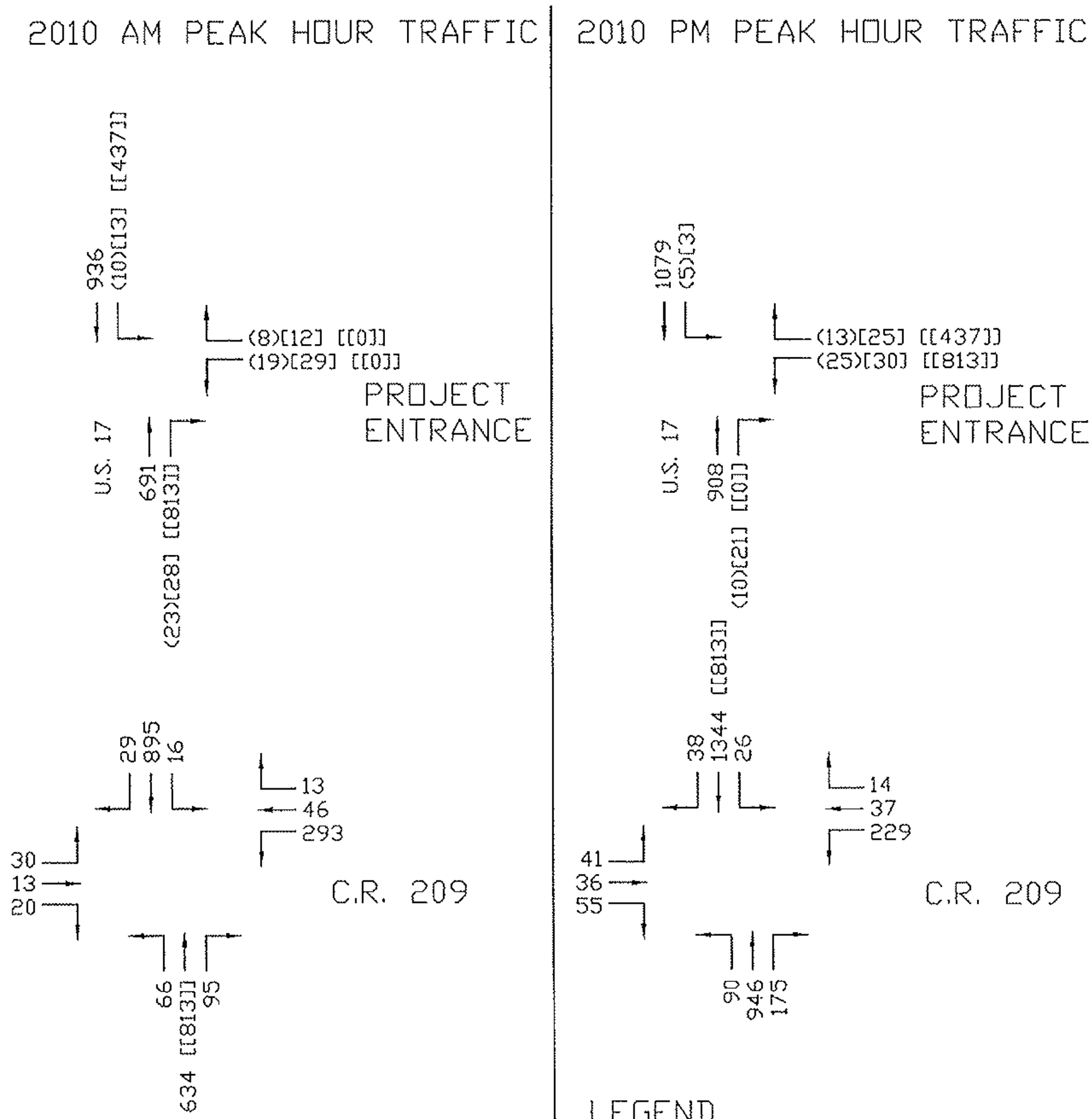
TABLE 4.6.5-2
BASELINE AND CONSTRUCTION IMPACTS OF SGS UNIT 3

Baseline Site	Time	Baseline Sound Levels (dBA)				Sound Levels with New Unit (dBA)				Increase (dBA)	
		Min	Max	L_{90}	Leq	Min	Max	L_{90}	Leq	L_{90}	Leq
1	Day	76.4	81.0	77.3	78.1	81.9	83.8	82.2	82.5	4.9	4.4
	Night	77.0	79.9	77.6	78.5	82.1	83.2	82.3	82.6	4.7	4.1
2	Day	43.0	66.8	45.5	58.7	44.7	66.8	46.5	58.8	1.0	0.1
	Night	45.7	63.5	47.1	51.5	46.7	63.5	47.8	51.8	0.7	0.3
3	Day	47.6	109.1	53.5	84.1	48.5	109.1	53.8	84.1	0.3	0.0
	Night	49.3	86.0	50.5	69.2	49.9	86.0	51.0	69.2	0.5	0.0
4	Day	39.2	67.4	39.9	52.8	39.5	67.4	40.2	52.8	0.3	0.0
	Night	55.8	76.2	56.3	61.0	55.8	76.2	56.3	61.0	0.0	0.0
5	Day	36.5	60.5	37.8	46.1	39.2	60.5	40.0	46.5	2.2	0.4
	Night	70.4	49.1	49.8	53.6	70.4	49.3	50.0	53.7	0.2	0.1
6	Day	40.4	68.6	41.3	49.5	47.2	68.6	47.4	51.2	6.1	1.7
	Night	47.8	60.0	48.5	55.0	50.1	60.2	50.5	55.5	2.0	0.5

Source: Golder, 2005

FIGURES


Drainage Basin No. 2
Borrow Area
Approximate Property Line
Landfill Area
Storm Water Pond
East Laydown Area
Drainage Basin No. 1
West Laydown Area
Coal Pile Area
LaFarge
KEY NOTES:
1 PLANT ENTRANCE ROAD
2 LAFARGE PROPERTY
3 EXISTING SERVICE BLDG.
4 EXISTING TURBINE BLDG.
5 EXISTING STACK
6 EXISTING LIMESTONE PREP.
7 EXISTING LIMESTONE STORAGE PILE
8 EXISTING FGD EFFLUENT PROCESSING AREA
9 EXISTING SWITCHYARD
10 EXISTING COOLING TOWER
11 EXISTING WASTE TREATMENT AREA
12 EXISTING COAL YARD
13 EXISTING LANDFILL
14 EXISTING RAILCAR REPAIR
15 CONSTRUCTION PARKING
16 CONSTRUCTION OFFICE TRAILER AREA
17 UNIT 3 TURBINE BLDG.
18 UNIT 3 BOILER
19 UNIT 3 PRECIPITATOR
20 UNIT 3 WET FGD
21 UNIT 3 STACK
22 UNIT 3 EFFLUENT PROCESSING
23 UNIT 3 HOUSE SPUR
24 UNIT 3 COOLING TOWER
25 UNIT 3 LIMESTONE PILE EXPANSION
26 UNIT 3 CONSTRUCTION LAYDOWN
27 EXISTING GUARD HOUSE
28 AMMONIA STORAGE
29 UNIT 3 LIMESTONE PREPARATION
30 UNIT 3 FUEL OIL STORAGE TANK
31 WASTE WATER SURGE POND
32 PERCOLATION POND
33 TEMPORARY CONSTRUCTION WAREHOUSE
34 COAL CONVEYOR
35 UNIT 3 WET ESP
36 ZERO LIQUID DISCHARGE SYSTEM
37 STORMWATER RUNOFF POND
38 UNIT 3 CRUSHER HOUSE
39 FLY ASH SILO
40 CONDENSATE STORAGE TANK
41 LIMESTONE SLURRY TANK
42 LIMESTONE SLURRY EMERGENCY STORAGE TANK
43 COAL TRANSFER TOWER
44 EMERGENCY DIESEL GENERATOR
45 EXISTING TRANSFER SAMPLE TOWER DUST COLLECTOR
46 NEW STACKER RECLAIMER W/SPRAY DUST SUPPRESSION - COAL PILE A
47 NEW STACKER RECLAIMER W/SPRAY DUST SUPPRESSION - COAL PILE B
48 NEW TRANSFER TOWER DUST COLLECTOR
49 NEW CRUSHER TOWER DUST COLLECTOR
50 UNIT FEED SYSTEM DUST COLLECTOR
51 LIMESTONE TRANSFER TO BALL MILL DUST COLLECTOR
52 FLY ASH SILO BIN VENT
53 COAL PILE A
54 COAL PILE B
55 COAL PILE RUNOFF POND
NORTH
300 0' 300' 600'
SCALE IN FEET
Burns & McDonnell
date FEBRUARY 6, 2006
designed SEDLACEK
detailed
checked
Seminole Electric COOPERATIVE, INC.
IN PARTNERSHIP WITH THOSE WE SERVE
SEMINOLE GENERATING STATION UNIT 3
CONSTRUCTION SITE DRAINAGE PLAN
project 39736
contract
Figure 4.1.1-1
sheet of sheets
COPYRIGHT © 2005 BY BURNS & McDONNELL ENGINEERING COMPANY, INC.



NOTE:
EXISTING PROJECT TRAFFIC IS ONLY SHOWN AT THE PROJECT ENTRANCE

LEGEND
XX - BACKGROUND TRAFFIC
(XX) - LEFARGE TRAFFIC
[XX] - EXISTING PROJECT TRAFFIC
[[XX]] - CONSTRUCTION PROJECT TRAFFIC

SOURCE: FLORIDA DESIGN CONSULTANTS, INC. FEBRUARY 2006; GOLDER, 2006.

PROJECT
SEMINOLE ELECTRIC COOPERATIVE, INC.
SGS UNIT 3
PUTNAM COUNTY, FLORIDA

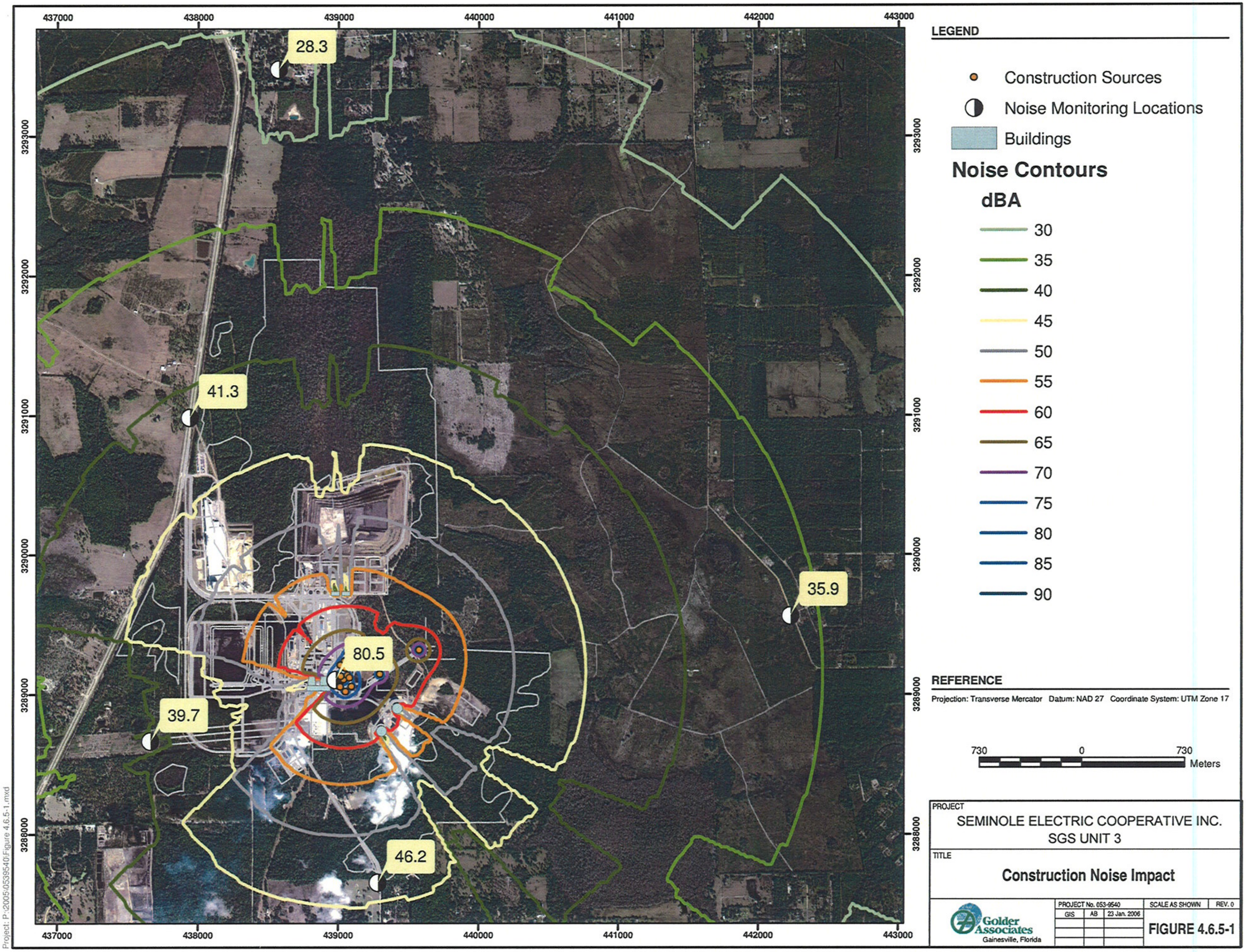
TITLE
2010 PEAK CONSTRUCTION TRAFFIC

Golder Associates
Tampa, Florida

PROJECT No.	053-9540	FILE No. 05395408025.dwg	
DESIGN		SCALE AS SHOWN	REV. 0
CADD		**FIGURE 4.5.2-1**	
CHECK			
REVIEW			

FLORIDA DESIGN CONSULTANTS, INC.
ENGINEERS, ENVIRONMENTALISTS, SURVEYORS & PLANNERS
3030 Starkey Blvd. New Port Richey FL. 34655
Tel: (727) 849-7588 · Fax: (727) 848-3648
E.B. No. 7421

DESCRIPTION:	PROJ No.	DATE:	FIGURE:
SEMINOLE ELECTRIC COOPERATIVE, Inc. PROJECT ENTRANCE UPGRADES	2005-54	9/23/05	4.5.2-2
	EPN: 2005-0054	DRAWN BY: E.P.P.	
	SCALE: 1"=200'		



PROJECT
SEMINOLE ELECTRIC COOPERATIVE INC.
SGS UNIT 3

TITLE
Construction Noise Impact

Golder Associates
Gainesville, Florida

PROJECT No. 053-9540			SCALE AS SHOWN	REV. 0
GIS	AB	23 Jan. 2006	**FIGURE 4.6.5-1**	

5.0 EFFECTS OF PLANT OPERATION

This section describes the effects of the operation of the SGS Unit 3 Project on the environment, the plans and programs to comply with all applicable regulatory standards, and to minimize impacts through available and reasonable methods and/or mitigation where applicable.

5.1 Effects of the Operation of the Heat Dissipation System

Blowdown from the Unit 3 mechanical draft cooling tower will be combined with that of the Units 1 and 2 natural draft cooling towers and discharged to the St. Johns River via the existing outfall structure. The assessment of the thermal component of the discharge was conducted using the predicted average and extreme temperatures of the blowdown discharges, and the maximum and average ambient river temperatures, on a monthly basis (See Table 5.1.1-1). The predicted summertime (June-September) discharge temperatures from the blowdown from Units 1, 2 and 3 are less than the existing Units 1 and 2 discharge temperatures and therefore, the addition of Unit 3 will not result in any increase in the temperature of the effluent during the summer months.

The FDEP-approved CORMIX discharge model has been used to estimate the size of the mixing zone required to achieve the number of dilutions required to lower the discharge temperature rise. A complete description of the CORMIX model and the modeling performed for the Unit 3 Project is presented in Appendix 10.1.2. The worst case discharge temperatures and temperature rises, as well as the average, maximum, and 95^{th} percentile values for the river, and the associated Class III water quality standards are provided in Table 5.1.1-2. The number of dilutions (5.39) of ambient river water required to lower the discharge temperature rise to meet the water quality standards are also shown on Table 5.1.1-2. The proposed mixing zone as well as the present thermal mixing zone size for Units 1 and 2, is shown in Table 5.2.1-1. The table shows that the size of the mixing zone for temperature will increase from 39 square meters (m^2) to approximately 120 m^2. A mixing zone of this size remains a relatively small portion of the St. Johns River in the vicinity of the site and therefore, no adverse impacts due to temperature are expected from the addition of Unit 3.

5.1.1 Temperature Effect on Receiving Body of Water

Blowdown from the mechanical draft cooling tower will be discharged to the St. Johns River. The thermal component of the discharge is anticipated to be consistent with the discharge from Units 1 and 2. The predicted summertime discharge from the combined blowdown from Units 1, 2 and 3 is anticipated to be less than the existing thermal discharge from Units 1 and 2. As discussed in Section 5.1, a mixing zone of 120 m^2 is required to lower or dilute the discharge temperature rise to meet the water quality standard at the point of discharge. Due to the small area of the river influenced by the thermal discharge, no adverse impacts are expected from the thermal discharge from Units 1, 2 and 3.

5.1.2 Effects on Aquatic Life

Fish survey data collected in the area are limited, however, the lower St. Johns River Basin supports common native and commercial and recreational species in the vicinity of the Site (See Section 2.3.6.5). The unusual pattern of salinity in the St. Johns River supports both marine and freshwater species.

The shortnose sturgeon, listed as endangered since 1967, is historically found in the St. Johns River. Research conducted by the USFWS from January 2002 through June 2003, revealed the identification of one shortnose sturgeon, therefore it is unlikely that a sizable population of shortnose sturgeon currently exists in the St. Johns River.

The West Indian manatee, listed as threatened by the State and endangered by the U.S. Fish and Wildlife Service is abundant in areas of the Atlantic coasts from the Florida Keys to the St. Marys River. Within the St. Johns River they are more abundant from Lake Monroe north to the mouth at Jacksonville. The U.S. Fish and Wildlife previously determined that the construction and operation of SGS Units 1 and 2 will "neither jeopardize the existence of the manatee nor adversely affect its habitat" (Seminole Plant Units 1 and 2, Final Environmental Impact Statement, 1979). The changes associated with SGS Unit 3 are so minimal it is reasonable to conclude that there will continue to be no adverse impacts.

5.1.2.1 Thermal/Chemical Discharge

Because of the small proportion of the river affected by the withdrawal and/or thermal plume, no significant adverse effects upon aquatic life are anticipated as a result of the operation of the SGS Unit 3.

5.1.2.2 Impingement and Entrainment

Similar to Units 1 and 2, Unit 3 will employ closed-cycle cooling and therefore, intake withdrawal rates are minimized relative to a once-through cooling system. When intake volumes are low, as in with closed-cycle cooling, the potential for impact is also low. The instantaneous maximum withdrawal for Units 1, 2 and 3 is anticipated to be 48.7 MGD. The intake withdrawal represents a small percentage of the river flow (<1.5 percent), therefore, only a small percentage of organisms that are potentially present could be impacted by the withdrawal for Units 1, 2 and 3. Additionally, the cooling water intake structure has been designed to minimize through-screen velocity. The through- screen velocity will be less than 0.5 feet per second (fps) for all three units. Low intake velocities will also reduce any potential for adverse impact to fish, shellfish and macroinvertebrate populations. Finally, the intake structure screen design is sited offshore within the river rather than flush with the shoreline, in an additional effort to minimize impacts to aquatic organisms.

As discussed above, the location, design and capacity of the intake structure results in minimal impact to aquatic organisms. Additionally, prior ecological studies based on the abundance and distribution of fish and macroinvertebrates in the vicinity of the intake structure and operating characteristics of the SGS cooling water intake structure demonstrated that the design and location of the SGS cooling water intake structure meet the Section 316(b) criteria for "best technology available for minimizing environmental impact" (Seminole Units 1 and 2 – 316(b) Study Report, 1979, Dames and Moore). As discussed in Appendix 10.1.1, the SGS facility is not subject to EPA's new Phase II 316(b) regulations, and would meet those regulations if they did apply, therefore, additional impingement and entrainment studies are not required.

5.1.3 <u>Biological Effects of Modified Circulation</u>

Due to the implementation of design parameters which meet the criteria for "best technology available", no significant biological effects of modified circulation are anticipated. The use of the low-intake velocity and wedgewire screen systems will minimize impingement and/or entrainment of aquatic organisms.

5.1.4 Effects of Offstream Cooling

The potential impacts of the Unit 3 mechanical draft cooling tower were addressed by performing plume dispersion analyses that predicted impacts with respect to:

- Plume length;
- Plume height;
- Plume shadowing;
- Plume fogging;
- Plume icing; and
- Salt [from total dissolved solids (TDS)] deposition.

Assessments of maximum seasonal and annual Unit 3 cooling tower impacts of potential plume-induced visibility effects, fogging and icing, and deposition of drift were predicted with the technically recognized cooling tower impact model (SACTI), which was developed through the Electric Power Research Institute (EPRI, 1984). Standard hourly meteorological data of surface weather observations and coincident twice-daily mixing height data are used in the analysis and processed with cooling tower data (e.g., tower size, height, and latitude/longitude) by a preprocessor program. The output meteorological record is utilized by the SACTI model to predict the increase in annual frequencies of meteorological events due to a particular cooling tower's design and configuration. Icing and fogging frequencies at a particular location are based on the prediction of the cooling tower's visible plume length under various ambient meteorological conditions. The impacts of the visible plumes are evaluated in the model through the use of physical plume dispersion in conjunction with an algorithm to take into account the thermodynamic interactions of the cooling tower plume as well as any potential wake effects. The SACTI model can also determine the potential drift and particle deposition frequencies by wind direction and distance category from a cooling tower.

The general parameters used in the SACTI modeling are presented in Table 3.4.1-2. A distribution of the predicted drift droplet sizes for the cooling tower design is presented in Table 5.1.4-1. The drift emissions from the cooling towers were based on the maximum concentration of TDS in the circulating water. The maximum TDS in the cooling towers was conservatively assumed to be 2400 ppm, based on 3.5 cycles of concentration for the modeling.

5.1.4.1 Cooling Tower Visibility

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

The frequencies of visible plume length, height, shadowing, and hours of fogging which can result from the mechanical draft cooling tower without plume abatement are summarized in Table 5.1.4-2 for each season and annually. The predicted results for plume length, shadowing, fogging, rime icing and deposition are presented starting at about 100 m from the cooling towers. The table presents results for various increasing distances from the tower. The nearest Site boundary to any part of the cooling towers is toward the northeast at about 150 m; the nearest Site boundaries to the south, west, and north are greater than 1 km.

Plume shadowing is the best indicator of a highly visible plume since it is the indicator of a distinct shadow.

The total hours per year of induced fogging surrounding the cooling tower is estimated to be about 30 hours at a distance of 200 m from the cooling towers, but no fogging occurrences are predicted with the wind blowing from the tower towards the northeast and the nearest property boundary. In other directions, fogging resulting from the cooling towers is not predicted to occur beyond 1 km from the towers. As a result, induced fogging from the cooling towers is not predicted to occur outside the SGS Site boundary. Because of the high height of release from the existing cooling towers, the water vapor from these towers produce fogging for a minimal number of hours, if any.

The nearest public roads to the SGS Site are U.S. Highway 17 and County Road 209, located about 1.3 miles (2.09 km) west of the cooling tower and County Road 209 located about 1.3 mile (2.09 km) south of the cooling tower. Ground-level fogging or any other plume effect is not expected to occur on these roadways from either the proposed or existing towers.

Rime icing is not predicted to occur from the proposed cooling towers nor expected from the existing cooling towers.

5.1.4.2 Cooling Tower Deposition

The maximum and minimum average TDS deposition predicted from the Unit 3 cooling tower to locations off the SGS Site are presented seasonally and annually in Table 5.1.4-2. The maximum impacts are based on the TDS in the circulating water of 2400 ppm.

The maximum seasonal average TDS deposition from the Unit 3 cooling tower is predicted to be 648 kilograms per square kilometer per month (kg/km^2-month) during the winter at a distance of 100 m (328) ft) from the towers. The maximum annual average deposition for all sectors is 440 kg/km^2-month, 100 m from the cooling towers. At a distance of 500 m (1640 ft), the maximum seasonal average deposition is 9 kg/km^2-month.

A majority of available research on the impacts of deposition from cooling towers is from the use of makeup water that contains appreciable quantities of salt [i.e., sodium (Na^+) and chloride (Cl^-)], unlike the case with use of freshwater from the St. Johns River. Analysis of cooling tower blowdown from the SGS facility indicates approximately 980 mg Cl/L, 0.5 mg Na/L, 200 mg Ca/L, and 76 mg Mg/L. Approximately 41% of the TDS value consists of Cl and Na, therefore the maximum annual average deposition of Na and Cl during the winter at a distance of 100 m from the towers is approximately 266 kg/km^2-month. This concentration is a conservative estimate of salt deposition, as the low amount of Na compared to Cl limits the formation of NaCl. Nevertheless, this value (266 kg/km^2-month) is well below the threshold of sensitive species of vegetation, such as dogwood (*Cornus florida*), which is a reliable bioindicator of potential salt damage. The leaf injury threshold for dogwood exposed to salt drift ranges between 375 to 750 kg/km^2-month (Curtis *et al.*, 1976; Davis, 1979; Freudenthal and Beals, 1978), therefore the maximum concentration resulting from the Project is not likely to cause any significant adverse effects upon vegetation in the vicinity.

As presented in Table 5.1.4-2, the maximum predicted deposition rates for the Unit 3 tower are close to the proposed cooling tower with minimal deposition offsite to the northeast where the property line comes within 150 m to the towers. The majority of deposition will occur near the cooling tower and over other areas within the site boundary. Over the course of an annual period, the chemical constituent of the drift is similar to the source water.

With regards to the possibility of cumulative impacts, the maximum deposition from the cooling towers for Units 1and 2 are expected to occur approximately 1 km away from the plant site at very low values when compared to those for the proposed cooling tower due to the much higher heights for the existing cooling towers. As a result, the cumulative impacts from the proposed and existing cooling towers are not expected exceed levels of concern.

Taking together the low deposition rates, area of deposition impact, and quality of the drift particles, no effect to offsite vegetation from cooling tower drift is anticipated from the combined effects of the proposed and existing cooling towers.

Vegetation may 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. However, it is difficult to predict which plant species would be most affected by soil salinity, as tolerance to salt spray does not necessarily parallel known plant tolerances to soil salinity, but is governed by the rate of foliar absorption (Grattan *et al.*, 1981). Given the low deposition rates and the type of compounds in the drift particles, adverse impacts from the combined effects of the proposed and existing cooling towers are not anticipated by accumulation in the soils.

5.1.5 Measurement Program

Since no significant impact to surface water quality is expected from the Unit 3 Project, no additional monitoring of surface water is proposed. Because there are no significant adverse ecological impacts due to the proposed Unit 3 Project's heat dissipation system, no biological monitoring is proposed.

Surface water withdrawals will be measured and reported to the SJRWMD as required by consumptive use permitting rules and regulations.

5.2 Effects of Chemical and Biocide Discharges

Most process wastewater streams from Units 1 and 2, as well as Unit 3, will be treated and recycled as make-up water to the FGD scrubber system.

5.2.1 Industrial Wastewater Discharges

Wastewater from the FGD system will be treated in a new zero liquid discharge (ZLD) system which will remove dissolved solids from the wastewater. Condensate from the ZLD system will be recovered as make-up to the steam cycles from Units 1, 2 and 3. The waste concentrate will be evaporated in a spray dryer and disposed in the onsite landfill or offsite in permitted landfills. With the ZLD, the discharge of low volume wastewater, ash handling water and other traditional pollutant wastestreams will be eliminated. The only SGS industrial wastewater proposed to be discharged to the St. Johns River from Units 1, 2, and 3 will be cooling tower blowdown (See Figure 3.5.0-1). The existing Units 1 and 2 net surface water discharges of nutrients (nitrogen), estimated to be 20 lbs/day will be eliminated (See Table 5.2.1-1) In fact, there will be potential reductions in the mass loadings of several additional water pollutants.

Contact stormwater subject to contact with oils, greases and lubricants will be collected and treated in an oil/water separator and then routed to the equalization basin and recycled in the FGD system.

5.2.2 Cooling Tower Blowdown and Industrial Wastewaters

Use of the ZLD will result in the recycling of all industrial waste waters within the project, except for cooling tower blowdown, which will be discharged to surface waters. Additionally, the cooling tower blowdown will be dehalogenated to remove biocides prior to discharge.

Table 5.2.1-2 identifies all constituents of the assumed cooling tower blowdown assuming that the river water is cycled through the cooling tower 3.5 times. The majority of these non-thermal constituents are not added in the process; they are present in cooling tower blowdown only because they are present in the makeup water from the river and are essentially "pass-through" pollutants from the intake river water. The CORMIX model was used to estimate the size of the mixing zone required to provide the necessary dilution to meet the water quality standard for each of the constituents (See Appendix 10.1.2). The proposed mixing zone sizes are presented in Table 5.2.1-2, along with the associated existing mixing zones for Units 1 and 2. The mixing zone size required after the addition of Unit 3 is smaller for copper, cyanide, iron, mercury and specific conductivity than for the existing discharge from Units 1 and 2. With the addition of Unit 3 and the ZLD system, a mixing zone for zinc is no longer required. The remaining constituents, oil and grease, selenium, cadmium and lead will require a larger mixing zone than that presently required.

These 4 mixing zones will not cause any significant adverse effects to the St. Johns River for the following reasons:

- The proposed mixing zones are exceedingly small relative to the size of the river (none larger than 42 m^2);
- The proposed mixing zones are only required because of the presence of the constituents in the river;
- The constituents which require mixing zones are concentrated in the cooling towers; and
- No chemicals containing these constituents will be added by SGS.

As previously discussed, the existing discharge includes process wastewaters other than cooling tower blowdown. The proposed discharge will only consist of cooling tower blowdown from Units 1, 2 and 3. The pollutants in the discharge are "pass-through" pollutants from the intake river water, therefore, no adverse impacts from the operation of Unit 3 are anticipated.

5.2.3 Monitoring Programs

Seminole will continue to implement the monitoring program required by the facility's NPDES permit.

5.3 Impacts on Water Supplies

SGS Unit 3 will utilize surface water from the St. Johns River and groundwater from the Floridan aquifer as water supply sources for plant operations.

5.3.1 Surface Water

The SGS Unit 3 Project has the following primary water needs that will be met by surface water supply:

1. Makeup water to replace cooling tower evaporation and blowdown;
2. Water for air pollution control equipment; and
3. Process water for miscellaneous plant operations.

The St. Johns River has the capacity to provide sufficient water to meet the surface water needs of the Unit 3 project. Surface water of sufficient quality is available and is currently authorized for Units 1 and 2 in the Conditions of Certification. The instantaneous maximum withdrawal for Units 1, 2 and 3 is anticipated to be 48.7 MGD.

The SJRWMD has established performance standards for determining whether a surface water withdrawal meets consumptive use requirements. Any single or combined withdrawal must not cause flow rates to deviate from their normal rate and range of fluctuation such that there are adverse impacts. Generally, the withdrawal should not reduce the rate of daily flow in the stream or river by more than 10 percent at any point in the drainage system.

As discussed in the Water Supply Alternatives Analysis in Appendix 10.8, the annual average recorded streamflow in the area of the SGS is 3,200 MGD. An estimated withdrawal of 10 percent of the total flow would produce approximately 320 MGD on an annual average basis, in excess of the requested withdrawal. The proposed withdrawal represents a small percentage of the river flow (<1.5%), and will therefore not have an adverse impact on minimum flows and levels.

In accordance with Section 373.223, F.S., the proposed surface water use meets the three-prong criteria for surface water withdrawals:

1) The use is reasonable and beneficial.

The use is reasonable and beneficial and the SGS Unit 3 provides a net benefit to the environment due to the elimination of the discharge of most process wastewaters, except for cooling tower blowdown, to the St. Johns River. Numerous environmental benefits are described in Section 1.6 of the SCA.

2) The use is in the public interest.

The SGS Unit 3 Project will serve to meet the electric power needs of Seminole's Member Cooperatives, and is in the public interest. The addition of SGS Unit 3 will provide needed generating capacity essential to maintain system reliability. Additionally, the project will provide the most cost effective means of meeting the need for base load capacity, and allow the Member Cooperatives to provide reasonably priced electricity to the members/consumers.

3) The use will not interfere with any existing and legal use of water.

Only one other surface water withdrawal (27 MGD) has been authorized in the area. This existing and legal withdrawal combined with the requested instantaneous maximum withdrawal for SGS Units 1, 2 and 3 (48.7 MGD) and is approximately two percent of the river flow, significantly less than the recommended ten percent limitation.

The Unit 3 Project meets the criteria for authorization, will not have an adverse impact on surface water supplies, and will provide a benefit to the environment due to the elimination of most process wastewaters, except for cooling tower blowdown, from the discharge to the St. Johns River. Additional analyses, including water supply alternatives, are addressed in Appendix 10.8 of this SCA.

5.3.2 Groundwater

Groundwater resources in the vicinity of the Site are described in Section 2.3 of the SCA, and the potable water supply wells are discussed in Section 3.5.

Plant potable and process water was supplied to SGS Units 1 and 2 by groundwater using two production wells which withdraw from the Floridan Aquifer. The annual average daily withdrawal rate is currently authorized as 0.55 MGD. During the original licensing of Units 1 and 2, the projected drawdowns and impact to off-site potentiometric levels was determined to be minor and not cause an adverse impact to offsite users (Seminole Units 1 and 2 – Final Environmental Impact Statement, 1979).

SGS Unit 3 will continue to utilize water from the Floridan aquifer as water supply sources for plant operations. Ground water will be used for air heater washes, fire water supply, miscellaneous plant uses, potable water and an alternate source of makeup to the demineralizers, however, the SGS Unit 3 project will not require additional groundwater usage that is greater than the existing consumptive use limitations in the current SGS Conditions of Certification, therefore, impacts to offsite users are not anticipated.

5.3.3 Drinking Water

The existing SGS potable water system is adequate to provide water for the additional 50 people expected to be added with Unit 3. The addition of the new ZLD system will result in less ground water makeup to the SGS demineralizers. The capacity in the existing ground-water treatment system will be used to supply the estimated additional 50 gpd per additional person, or 2,600 gpd (1.8 gpm). The potable water system will be expanded in accordance with the requirements of Chapter 64E-6, F.A.C.

No impacts to drinking water sources are expected from the Unit 3 Project.

5.3.4 Runoff and Leachate

Coal combustion products (i.e., dry fly ash, bottom ash and gypsum) and miscellaneous plant wastes will continue to be produced as a result of the addition of Unit 3. Bottom ash will continue to be sold to concrete and concrete block manufacturers. Fly ash will be sold for reuse to the maximum extent feasible or trucked to the permitted on-site landfill for disposal. Gypsum will continue to be sold to an adjacent wallboard manufacturing facility. The addition of the ZLD system will result in a dry solid waste which will be disposed of in the on-site landfill or in an offsite permitted landfill. A groundwater monitoring well system is currently in place to monitor groundwater quality adjacent and down gradient of the landfill area.

The existing permitted landfill area will be utilized to accommodate SGS Unit 3. Prospective utilization of the existing onsite landfill area will be in conjunction with the installation of a composite or double liner with a leachate treatment collection and removal system, thereby avoiding adverse impacts to surface water and groundwater. Final design of future landfill increments will require FDEP approval in accordance with the Conditions of Certification.

5.3.5 Measurement Programs

Seminole will continue to monitor surface water and groundwater as required in the NPDES permit and Conditions of Certification.

5.4 Impacts from Disposal of Solid and Hazardous Wastes

5.4.1 Solid Waste

Coal combustion products will be reused to the maximum extent feasible. Any coal combustion products that are not reused or miscellaneous plant wastes will be managed onsite within the existing landfill area or disposed of in an offsite permitted landfill.

Impacts to the air, soil, and groundwater resulting from the handling and storage onsite of coal combustion products are expected to be minimal due to the design of the facility. The combination of the liner and leachate collection system will reduce the potential for impacts to the underlying soil and groundwater and nearby surface water. Impacts to air will be minimized by keeping the wastes moist when they are placed, covering the portions of the cells that have achieved final grade, and maintaining the cover during the post-closure care period.

5.4.2 Hazardous Waste

Hazardous waste may be generated periodically including spent solvents, spent cleaning materials, and other wastes. Any wastes, if potentially hazardous, will be collected and managed in the permitted hazardous waste storage facility as authorized by FLD000772194. All hazardous wastes will be managed appropriately in accordance with applicable regulations. Therefore, no impacts are anticipated from hazardous wastes generated from the operation of the Unit 3.

5.5 Sanitary and Other Waste Discharges

Sanitary wastes will be routed to Unit 1, 2, and 3 domestic wastewater treatment system. The wastewater will be treated and recyled in the onsite FGD system.

5.6 Air Quality Impacts

This section presents a summary of the air quality requirements, air modeling methodology, and results of air quality impact analyses for the Unit 3 Project. Detailed information is contained in Appendix 10.1.5, Air Construction and PSD Application.

5.6.1 Impact Assessment

5.6.1.1 Regulatory Applicability

Annual potential emissions for the Unit 3 Project, as well as the requested decreases from Units 1 and 2 are presented in Table 3.4.1-3 and are compared to the PSD significant net emission increase thresholds. Based on the proposed emissions for the Unit 3 Project, and the proposed lower emissions from Units 1 and 2, PSD review is required for the Unit 3 Project for each of the following regulated pollutants:

- Particulate matter (PM) as total suspended particulate matter (TSP);
- Particulate matter with aerodynamic diameter of 10 microns or less (PM_{10});
- Carbon monoxide (CO);
- Volatile organic compounds (VOCs); and
- Flourides.

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

- Control technology review;
- Source impact analysis;

- Air quality analysis (monitoring);
- Source information; and
- Additional impact analyses.

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

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

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

Source information must be provided to adequately describe the Unit 3 Project. The general type of information required for the Unit 3 Project is presented in Section 3.4.

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

The following sections describe the methods and assumptions used to determine the air quality impacts of the addition of the SGS Unit 3 Project.

5.6.1.2 Analysis Approach and Assumptions

General Modeling Approach

The air quality modeling approach for the Unit 3 Project must follow EPA and FDEP modeling guidelines for determining compliance with AAQS and PSD increments. In general, when model predictions are used to determine compliance with AAQS and PSD increments, current policies stipulate that the highest annual average and highest, second-highest (HSH) short-term (i.e., 24 hours or less) concentrations are to be compared to the applicable standard when a five year period of meteorological data is used. The HSH concentration is calculated for a receptor field by:

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

This approach is consistent with the air quality standards, which generally allow a short-term average concentration to be exceeded once per year at each receptor. Determining compliance with the 24-hour AAQS for PM_{10}, the highest of the sixth-highest concentration predicted in five years (i.e., H6H), instead of the HSH concentration predicted for each year, is used to compare to the applicable 24-hour AAQS.

To predict the maximum annual and short-term concentrations for the Unit 3 Project, the modeling approach involves screening and refined phases. Concentrations are predicted for the screening phase using a coarse receptor grid and a five year meteorological data record. If the highest concentration is predicted at a receptor that lies in an area where the receptor spacing is more than 100 m, then a refined analysis is performed in that area using a receptor grid of greater resolution. Modeling refinements are performed using a receptor spacing of 100 m or less with a receptor grid centered on the screening receptor at which the maximum concentration must be predicted. The air dispersion model is then executed with the refined grid for the entire year of meteorology during which the screening concentration occurred.

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

Air Quality Models

The selection of an air quality model to predict air quality impacts for the proposed project was based on the ability of the model to simulate impacts in areas surrounding the projects as well as at the PSD Class I areas. Two air quality dispersion models were selected and used in these analyses to address air quality impacts for the project. These models were:

- The American Meteorological Society and EPA Regulatory Model (AERMOD) dispersion model; and
- The California Puff model (CALPUFF).

The AERMOD dispersion model (Version 04300) is available on the EPA's Internet web site, Support Center for Regulatory Air Models (SCRAM), within the Technical Transfer Network (TTN).

On November 9, 2005, the EPA implemented AERMOD into its *Guideline of Air Quality Models (Appendix W to 40 CFR Part 51)* as the recommended model for regulatory modeling applications.

The FDEP is allowing the use of AERMOD for air permitting projects as a replacement for the Industrial Source Complex Short-Term Model (ISCST3), which will no longer be in effect as of December 2006.

The EPA and FDEP recommend that the AERMOD model be used to predict pollutant concentrations at receptors located within 50 km from a source. The AERMOD model calculates hourly concentrations based on hourly meteorological data. The AERMOD model is applicable for most applications since it is recognized as containing the latest scientific algorithms for simulating plume behavior in all types of terrain. For evaluating plume behavior within the building wake of structures, the AERMOD model incorporates the Plume Rise Model Enhancement (PRIME) downwash algorithm developed by the Electric Power Research Institute (EPRI). AERMOD can predict pollutant concentrations for averaging times of annual and 24, 8, 3, and 1 hour.

The AERMOD model was used to predict the maximum pollutant concentrations due to the SGS Unit 3 Project in nearby areas surrounding the SGS. The AERMOD model was also used to predict the maximum pollutant concentrations due to the Project's emissions together with appropriate background sources. The predicted concentrations were then compared to the applicable AAQS and PSD Class II increments.

For this analysis, the EPA regulatory default options were used to predict all maximum impacts.

These options include:

- Final plume rise at all receptor locations;
- Stack-tip downwash;
- Buoyancy-induced dispersion;
- Default wind speed profile coefficients;
- Default vertical potential temperature gradients; and
- Calm wind processing.

At distances beyond 50 km from a source, the CALPUFF model, Version 5.711a (EPA, 2004), is recommended for use by the EPA and the Federal Land Manager (FLM). The CALPUFF model is a long-range transport model applicable for estimating the air quality impacts in areas that are more than 50 km from a source. The CALPUFF model is maintained by the EPA on the SCRAM internet website. The methods and assumptions used in the CALPUFF model are based on the latest recommendations for modeling analysis as presented in the following reports:

- The Interagency Workgroup on Air Quality Models (IWAQM), *Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts* (EPA, 1998); and
- The *Federal Land Manager's Air Quality Relative Values Workgroup (FLAG) Phase I Report* (December, 2000).

In addition, updates to the modeling methods and assumptions were followed based on discussion with the FLM.

The CALPUFF model was used to assess the Unit 3 Project's impact on regional haze at each evaluated Class I Area.

As discussed in Section 5.6.1.3, the Unit 3 Project's PM_{10} and CO impacts were predicted to be less than the PSD Class II significant impact levels for the applicable averaging periods. As a result, cumulative source impact analyses are not required to demonstrate compliance with the PM_{10} AAQS and PSD Class II increments and CO AAQS. In addition, the Unit 3 Project's PM_{10} impacts were also predicted to be less than the PSD Class I significant impact levels for PM_{10}. As a result, cumulative source impact analyses are not required to demonstrate compliance with the 24-hour and annual average PM_{10} PSD Class I increments. As discussed previously, PSD Class II increment consumption analyses were conducted for SO_2 at the Okefenokee NWA since there have been modeled exceedances of the SO_2 PSD Class I increment in recent years.

<u>Meteorological Data</u>

Meteorological data used in the AERMOD model to determine air quality impacts consisted of a concurrent 5-year period of hourly surface weather observations and twice-daily upper air soundings from the National Weather Service (NWS) offices located at the Jacksonville International Airport and in Waycross, Georgia, respectively. Concentrations were predicted using five years of hourly meteorological data from 1986 through 1990. The NWS office at Jacksonville is located approximately 92 km (55 miles) northeast of the site. The FDEP consider this station to have surface meteorological data representative of the project site.

The data for these stations were processed into a format that can be input to the AERMOD model using the meteorological preprocessor program AERMET. The data were processed using the Lakes Environmental graphical interface using the latest version of AERMET (04300). The hourly surface data were obtained from the Solar and Meteorological Observation Network (SAMSON) CD. Upper air sounding data were obtained in the required NCDC TD-6201 format from the Lakes website (www.webmet.com).

A unique feature of AERMOD is its incorporation of land use parameters for the processing of boundary layer parameters used for the dispersion. Based on the most recent regulatory guidance, the land use parameters should be representative of the data measurement site (i.e., NWS at Jacksonville). Land use data, representing the average surface roughness, albedo, and Bowen ratio that exist within a 3-km radius of the NWS station at Jacksonville were extracted from 1-degree land use files from the U.S. Geographical Survey (USGS) using the AERSURFACE program. AERSURFACE currently extracts land use data in 12 wind direction sectors covering 360 degrees. The land use values for each wind direction sector were input into Stage 3 of the AERMET preprocessor program to create the surface and profile meteorological files that AERMOD requires.

CALMET, the meteorological preprocessor to CALPUFF, was used to develop a three dimensional wind field necessary to perform the air modeling analysis to evaluate pollutant impacts at each PSD Class I area. The modeling domain consisted of a rectangular 3-dimensional grid that extended from approximately 79.0 to 83.5 degrees longitude and from 23.75 to 28.0 degrees latitude. The modeling domain includes the following meteorological and land use parameters:

- Surface weather data;
- Upper air data;
- A 1-degree land use data;
- A 1-degree Digital Elevation Model (DEM) terrain data;
- Mesoscale Model - Generations 4 and 5 (MM4 and MM5) data (for initializing the wind field); and

- Hourly precipitation data.

These data were obtained and processed for 1990, 1992, and 1996, the years for which MM4 and MM5 data are available. It should be noted that MM4 data are available for 1990 while MM5 data are available for 1992 and 1996. The CALMET wind field and the CALPUFF model options used were consistent with the suggestions of the FLMs. Meteorological data used with the CALPUFF model consist of a CALMET-developed wind field covering North-Central Florida.

Emission Inventory

Project Sources—Emission rates for regulated pollutants and stack and operating parameters used in the air modeling analysis for the Unit 3 Project included the SGS Unit 3 boiler, cooling tower and ZLD spray dryer. PM emission sources from the material handling operations and fugitive sources that are part of the Unit 3 Project were also included. Reduced emission rates for SO2, NOx and SAM from Units 1 and 2, sufficient to offset these emissions from Unit 3 and that are achievable due to the requested upgrades to Units 1 and 2, were also used. In an effort to obtain the maximum air quality impacts for a range of possible operating conditions, the air modeling for the SGS Unit 3 Project considered operating loads at 100, 75, and 50 percent. The stack, operating, and emission data used in the air dispersion modeling are those presented in Appendix 10.1.5.

The AERMOD model was used to predict maximum concentrations for the annual and 24-, 8-, 3-, and 1-hour averaging times in the near-field areas of the Unit 3 Project. To estimate impacts due to emissions from the boiler stack, a total emission rate of 7.94 lb/hr or 1.0 grams per second (g/s) was initially used. These modeling results produced relative concentrations as a function of the modeled emission rate (i.e., $\mu g/m^3$ per 1.0 g/s). These impacts are referred to as generic pollutant impacts. Maximum air quality impacts for specific pollutants were then determined by multiplying the maximum pollutant-specific emission rate in lb/hr (g/s) by the maximum predicted generic impact divided by the modeled emission rate [e.g., 7.94 lb/hr (1.0 g/s)].

To address PM_{10} impacts from the Unit 3 Project, the PM_{10} sources were modeled explicitly using the maximum PM_{10} emission rates. These sources included the SGS Unit 3 boiler; cooling tower, material handling operations for coal, petcoke, limestone, flyash, and gypsum; and ZLD system . To address CO impacts from the Unit 3 Project, the CO sources were modeled and included the SGS Unit 3 and ZLD system.

For the PSD Class I areas, regional haze analyses were performed for the Unit 3 Project with the CALPUFF model based on the maximum hourly emissions for the SGS Unit 3 boiler which is for 100-percent load conditions, and the reduced emission rates requested for Units 1 and 2. Emissions from other smaller sources were not included, as they would have insignificant impacts on long-range transport.

All significant building structures in the Unit 3 Project area were identified by the site plot plan. The building structures were processed in the EPA Building Profile Input Program [(BPIP), Version 95086] to determine direction-specific building heights and widths for each 10-degree azimuth direction for each source that was included in the modeling analysis. Based on this evaluation, the GEP stack height for the SGS Unit 3 was determined to be 675 ft. Therefore, building downwash effects for that emission unit were not included in the air modeling analyses. For other emission units with stack releases, building downwash effects were included.

AAQS and PSD Class II Analyses- The maximum pollutant impacts for the Unit 3 Project are predicted to be less than the significant impact levels for the applicable pollutants of PM_{10} and CO. As a result, no additional modeling analyses are required to address compliance with the AAQS and PSD Class II increments.

PSD Class I Analysis- The maximum Unit 3 Project impacts at the PSD Class I areas are predicted to be less than the PSD Class I significant impact levels for PM_{10}. As a result, cumulative source impact analyses are not required to demonstrate compliance with the PM_{10} PSD Class I increments.

For SO_2, although there will be no increase in SO_2 emissions even after Unit 3 comes online, PSD Class I increment consumption analyses were performed since there has been modeled exceedances of the SO_2 PSD Class I increment at the Okefenokee NWA in recent years. The maximum emission rate for Unit 3, as well as the requested lower rates for Units 1 and 2 (sufficient to offset the Unit 3 Project), that were used are presented in Appendix 10.1.5. PSD sources located within 200 km of the Class I areas were included in the PSD Class I modeling analysis. Detailed SO_2 background source data that were used for the PSD Class I analyses are presented in Appendix 10.1.5.

Receptor Locations

To determine the maximum impact for all pollutants and averaging times in the vicinity of the Unit 3 Project, concentrations were predicted at receptors located in a detailed receptor grid centered on the stack for SGS Unit 3, the modeling origin, and extended from the plant property out to 20 km. More than 6,000 receptors were used in the analysis to determine the maximum impacts for the Unit 3 Project. Along the plant boundary, a Cartesian receptor grid was used to predict concentrations for the Unit 3 Project at 352 receptors spaced at 50-m intervals.

For determining the Unit 3 Project's impacts at the PSD Class I areas, pollutant concentrations were predicted in an array of 268 discrete receptors located at the PSD Class I areas of the Okefenokee, Wolf Island, and Chassahowitzka NWA. These receptors are a subset of the more than 900 receptors provided by the National Park Service (NPS). The 268 receptors include all of the NPS boundary receptors and an array of interior receptors with less resolution than for the NPS set.

5.6.1.3 Model Results

Project Impacts

A summary of the maximum PM_{10} and CO concentrations predicted for the Unit 3 Project for comparison to the PSD Class II significant impact analysis is presented in Table 5.6.1-1. The PM_{10} impacts are predicted for the SGS Unit No. 3, cooling tower, material handling operations (including fugitive sources), and ZLD system. The CO impacts are predicted for the SGS Unit No. 3 and ZLD system. Based on these modeling results, the maximum concentrations due to the Unit 3 Project are predicted to be less than the PSD Class II significant impact levels for PM_{10} and CO. As a result, the Unit 3 Project's impacts are predicted to comply with the AAQS and PSD Class II increments.

The maximum PM_{10} concentrations predicted for the Unit 3 Project at the PSD Class I areas are also shown in Table 5.6.1-2. As shown, the maximum Unit 3 Project impacts at the PSD Class I areas are predicted to be less than the PSD Class I significant impact levels. As a result, the Unit 3 Project's impacts are predicted to comply with the PSD Class I increments for PM_{10}.

Cumulative Impacts for SO_2 PSD Class I Increment Analyses

As discussed previously, although there will not be an increase in SO_2 emissions even after Unit 3 comes online, PSD Class I increment consumption analyses were performed since there has been modeled exceedances of the SO_2 PSD Class I increment at the Okefenokee NWA in recent years. A summary of the results of the cumulative PSD Class I increment analyses (i.e., impacts due to PSD increment consuming sources) for the SO_2 concentrations are presented in Table 5.6.1-3. These results show that the maximum PSD increment consumption impacts for all sources are predicted to be below the allowable SO_2 PSD Class I increments. The contribution from the SGS Units 1, 2 and 3 to the overall maximum predicted SO_2 increment consumption is 30 percent or less.

5.6.1.4 Additional Impact Analysis

Impacts Due To Direct Growth

The Unit 3 Project is needed to meet the growth in load demand expected in 2012 and beyond.

Construction of the Unit 3 Project will occur over a four-year period, requiring an average of approximately 600 workers during that time. It is anticipated that many of these construction personnel will be drawn from surrounding metropolitan areas and will commute to the job site.

The Unit 3 Project will employ a total of about 50 operational workers. The workforce needed to operate the Unit 3 Project represents a small fraction of the population already present in the region. Therefore, while there would be a very slight increase in vehicular traffic in the area, the effect on air quality levels would be minimal.

There are also expected to be no air quality impacts due to associated industrial/commercial growth given the Unit 3 Project's location. The existing infrastructure should be more than adequate to provide any support services that the Unit 3 Project might require.

Impacts on Soils, Vegetation, Wildlife, and Visibility

The potential effects of the SGS Unit 3 Project on soils, vegetation, wildlife, and visibility in the local vicinity of the Site and in the PSD Class I areas within 200 km of the Unit 3 Project site (i.e., Okefenokee, Wolf Island, and Chassahowitzka NWA) were analyzed and are also not expected to be significant. Certain air pollutants in acute concentrations or chronic exposures can impact soils, vegetation, and wildlife. Based on available literature, soils impacts can result from SO_2 and NO_2 deposition creating an acidic reaction or lowering of soil pH. Vegetation is sometimes affected by acute exposures to high concentrations of pollutants often resulting in foliar damage. Lower dose exposure over longer periods of time or chronic exposure can often affect physiological processes within plants causing internal and external damage. Because of the reductions in SO_2 and NO_x emissions from historic operations even after Unit 3 comes online, there is expected to be a reduction in deposition of these pollutants in the local Site vicinity and PSD Class I areas.

The major air quality risk to wildlife in the United States is from continuous exposure to pollutants above the National AAQS. This occurs in non-attainment areas, of which there are none in Florida. Risks to wildlife also may occur for wildlife living in the vicinity of an emission source that experiences frequent upsets or episodic conditions resulting from malfunctioning equipment, unique meteorological conditions, or startup operations. Under these conditions, chronic effects (e.g., particulate contamination) and acute effects (e.g., injury to health) have been observed. For impacts on wildlife, the lowest threshold values of particulates that are reported to cause physiological changes are up to orders of magnitude higher in concentration than maximum concentrations expected from operation of the Unit 3 Project. Again, there will be a reduction in SO_2 and NO_X emissions even after Unit 3 comes online. As a result, no adverse effects on wildlife due to SO_2, NO_2, and particulate impacts from the Unit 3 Project are expected.

No adverse visibility impairment is expected from the Unit 3 Project in the immediate vicinity of the SGS Site due to the type and quantities of emissions from the Unit 3 Project sources. Opacity levels from the stack associated with the Unit 3 Project will be low. Emissions of PM_{10} and SO_X (includes SO_2 and SAM) will also be controlled to low levels. The primary visible plume from the stack will be water vapor that results from the wet FGD process. As a result, the Unit 3 Project will not adversely affect visual qualities in the area.

The PM, SO_2, NO_X, and SAM emissions from the Unit 3 Project, along with the requested lower SO_2, NO_X and SAM rates from Units 1 and 2, will potentially impact regional haze at the three PSD Class I areas within 200 km of the Unit 3 Project Site. The modeling results, however show that the maximum visibility impact due to the Unit 3 Project and the Units 1 and 2 Upgrades Project at any of the Class I areas is predicted to be substantially less than the 5-percent criteria. As a result, SGS and the Unit 3 Project are not expected to have an adverse impact on regional haze at any of the PSD Class I areas within 200 km of the site.

Impacts from Mercury and Metals

There are trace amounts of mercury and metals in coal. The maximum concentrations of trace metals including mercury predicted for the Project are presented in Table 5.6.1-4. As shown, these maximum concentrations of the trace elements are predicted to be extremely low in the ambient air. With the exception of lead, there are no FDEP or EPA AAQS for the trace metals shown in Table 5.6.1-4. For lead, the maximum impact of the Project is predicted to be more than 1,000 times less than the AAQS set to protect public health from lead emissions. While there are no air quality standards for the other trace elements, the EPA has reference air concentrations and occupational guidelines that are available from the American Conference of Governmental and Industrial Hygienists (ACGIH) to which these concentrations can be compared. These comparisons, as shown in Table 5.6.1-4, are made to the EPA Reference Concentrations for Chronic Inhalation Exposure (RfC) and the occupational Threshold Limit Values (TLV), Time Weighted Average (TWA).

The EPA RfC is based on a lifetime of exposure and the comparison is made for the highest annual average concentration predicted for the Project over a 5-year period. This is a conservative estimate since the highest concentrations for other years will be lower. In addition, the predicted concentrations at other locations will be much less than where the overall maximum concentrations are predicted (i.e., near the plant).

The TLV-TWA represents levels of 8-hour average occupational exposure that are considered levels that workers can be exposed day after day without adverse health effects. The maximum 8-hour average concentrations that occur over a 5-year period are compared to the TLV-TWA in Table 5.6.1-4. Again, this comparison is conservative since the maximum 8-hour average concentration predicted for the Project will be much less than the highest 8-hour average exposure for other years and the levels at other locations will be less than the location of overall maximum impact.

As shown in Table 5.6.1-4, the maximum predicted annual concentrations are from 600 to over 6,000 times lower than the EPA RfC. When comparing the maximum predicted impacts to the TLV-TWA, the maximum impacts are over 8,000 to over 50,000 times lower than the TLV-TWA. In both cases, comparisons of the maximum predicted impacts for the Project to the EPA RfC and TLV-TWA are extremely conservative given the use of the worst-case period and maximum location.

Seminole is committed to reducing mercury emissions from SGS even after Unit 3 comes online, to a level below the historical baseline as described in Chapter 3 and Appendix 10.1.5.

5.6.2 Monitoring Programs

5.6.2.1 Ambient Air Quality Monitoring

Pre- and post-construction ambient air quality monitoring is not required for this Unit 3 Project since the air quality impacts are less than the *de minimis* monitoring thresholds. Air quality concentrations at and in the region of the Site comply and are anticipated to continue to comply with all applicable ambient standards.

5.6.2.2 Air Emissions Monitoring

The Unit 3 Project will be subject to the applicable NSPS for the steam electric generating facilities (40 CFR Part 60, Subpart Da) and acid rain program (40 CFR 75). Continuous monitoring will be required for the Unit 3 Project pursuant to applicable NSPS for opacity, SO_2, NO_X, and mercury. Initial performance testing of each unit will be required for PM, SO_2, NO_X, and mercury, and will be conducted as required by Subpart Da.

Continuous emission monitoring (CEM) for SO_2 and NO_X is required for solid fuel-fired affected units in accordance with the provisions of 40 CFR 75. CO_2 emissions must also be determined through CEM (e.g., as a diluent for NO_X monitoring). Alternate procedures, test methods, and quality assurance/quality control (QA/QC) procedures for CEM are specified (Part 75 Appendices A through I). The CEM requirements, including QA/QC procedures are, in general, more stringent than those specified in the NSPS for Subpart Da. New units are required to meet these requirements not later than 90 days after the unit commences commercial operation.

Initial and periodic compliance testing of pollutants emitted by the Unit 3 Project will be conducted pursuant to the FDEP requirements as specified in the FDEP Air Construction PSD Permit in accordance with Chapter 62-297.401, F.A.C.

5.7 Noise Impacts

5.7.1 Impacts to Adjacent Properties

5.7.1.1 Existing and Proposed Noise Sources

The proposed noise sources and their octave band and overall sound power levels are listed in Table 5.7.1-1. Noise levels of the existing SGS sources were measured using the procedures described in Section 2.3.8.2 during the baseline noise measurement portion of the impact evaluation.

The existing Units 1 and 2 will continue to operate and emit noise after the Unit 3 Project is complete. Additionally, new equipment will be added in association with the Unit 3 Project, which will also emit noise. These new noise sources include the inlet air filters of the steam boiler, the FD and ID fans, the air pollution control devices, the exhaust stack, and the power transformers, as well as the cooling tower.

5.7.1.2 Noise Impact Methodology

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

The impact evaluation of the proposed Unit 3 Project was performed using CADNA A, an environmental noise propagation computer program that was developed to assist with noise propagation calculations for major noise sources and projects. Noise sources are entered as octave band sound power levels, L_w. Locations of the noise sources, buildings, and receptors are input directly on the base map and can be edited throughout the modeling process. All noise sources are assumed to be a point, line, area or vertical area source, and can be specified by the user. Sound propagation is calculated by accounting for hemispherical spreading and three other user-identified attenuation options: atmospheric attenuation, path-specific attenuation, and barrier attenuation.

Atmospheric attenuation is calculated using the data specified by the Calculation of the Absorption of Sound by the Atmosphere (ANSI, 1999). Path-specific attenuation can be specified to account for the effects of vegetation, foliage, and wind shadow. Directional source characteristics and reflection can be simulated using path-specific attenuation. Barrier attenuation is calculated by assuming an infinitely long barrier perpendicular to the source-receptor path. Total and A-weighted SPLs are calculated. The sound power levels and octave band data for the various major noise sources of the Unit 3 Project are provided in Table 5.7.1-1.

The noise impact modeling was performed to predict the maximum noise levels produced by the proposed and existing noise sources with background noise levels. Atmospheric and ground attenuation were assumed for all sites. The source data used in the analysis are contained in Tables 5.7.1-2. Background L_{90} and L_{eq} levels measured during the baseline noise study were included in the predicted maximum SPLs calculated for each critical receptor (i.e., residential, agricultural, commercial, etc.).

The critical receptors selected for the analysis consisted of five off-plant noise monitoring locations plus one onsite (industrial) monitoring location where ambient noise measurements were taken (refer to Section 2.3.8). Since there are no federal or state noise standards applicable to the Unit 3 Project, the applicable maximum noise level for this area is promulgated by Putnam County Ordinance 2002. Putnam County ordinance limit sound levels to 70 and 65 A-weighted decibels (dBA), sun-up to sundown and sun-down to sun-up, respectively, for residential land uses. The ordinance defines sun-up as 30 minutes before the official sunrise time and sunset as 30 minutes after sunset, as defined in the Framer's Almanac.

5.7.1.3 Results

Comparison to Putnam County Noise Standards

The noise impact modeling was performed to predict the maximum noise levels produced by the proposed and existing noise sources without the background noise levels. Background noise levels measured at each receptor were combined with the modeling results. Atmospheric attenuation was assumed for all sites.

Table 5.7.1-2 present the observed and predicted noise levels at the five off-plant noise monitoring locations plus the on-site location at the proposed Unit. The observed background noise levels include the operation of existing Units 1and 2 and include the minimum, the maximum, the L_{90}, and the L_{eq} noise levels.

The nearest residential receptors are the residences to the north of the project (refer to Section 2.3.8). The predicted noise level impacts at these receptors, due to the project only, are less than 61 dBA for Unit 3 (Table 5.7.1-2). Indeed, the estimated L_{eq} noise levels during the operations of the Unit 3 Project are estimated to be less than 10 dBA above measured background as shown in Table 5.7.1-2. The noise modeling results indicate that the operation of SGS Unit 3 would not result in sound levels in excess of the Putnam County Noise Control Ordinance.

Figure 5.7.1-1 illustrates the sound level isopleths developed from the results of the noise model.

Intermittent Noise Sources

Intermittent noise sources during routine startup, testing, and maintenance, and emergency conditions will include steam venting. During the initial startup of the Unit 3 Project, steam blows are conducted to clean piping. Steam blows may result in elevated noise levels for short durations. The noise impacts of these conditions would not be expected to cause a nuisance. Additionally, the Putnam County Noise Control Ordinance provides an exemption for noise resulting from emergency pressure relief valves (Section 8 (1) of the Putnam County Noise Ordinance).

5.8 Changes to Non-Aquatic Species Population

5.8.1 Impacts

No adverse impacts to non-aquatic species are anticipated during operation of the Project, as the Unit 3 facilities will be located primarily upon previously-impacted areas directly adjacent to the SGS Units 1 and 2, which does not provide suitable natural areas for wildlife. The SGS Site has been significantly disturbed during the construction of the existing SGS facilities, including removal of vegetative communities, topographic grading, and hydrologic alteration. The SGS facility does not provide critical habitat for wildlife; therefore the operation of the Unit 3 Project is not anticipated to result in the reduction of any populations of non-aquatic species.

No adverse impacts to federal- or state-listed terrestrial plants or animals are expected during operation of SGS Unit 3, due to the existing developed nature of the habitat within the Site. No long term change in the populations of any threatened or endangered species is anticipated as a result of operation of Unit 3.

No changes in wildlife populations at the adjacent undeveloped areas are anticipated, including listed species. Noise and lighting impacts are minimal, and not anticipated to deter the continued use of the undeveloped forested areas within the vicinity by listed species of wildlife based upon evidence from existing power facilities in Florida. Natural areas adjacent to power facilities continue to provide suitable habitat for threatened and endangered species, which in many cases utilize habitats directly adjacent to plant facilities. The evidence indicates that construction and operation of power generation facilities does not render adjacent areas unsuitable for wildlife, which become acclimated to the low level of noise and lighting impacts. No impacts to listed species of plants or wildlife will occur as a result of the Project's emissions, which will be below the Ambient Air Quality Standards designed to prevent adverse impacts to human health, wildlife, and vegetation.

5.8.2 Monitoring

Because no significant impacts to non-aquatic species populations are anticipated, no monitoring program is proposed.

5.9 Other Plant Operation Effects

5.9.1 Operations Traffic

A traffic study was prepared to review the expected impact on the roadway transportation network during normal plant operation (See Appendix 10.7).

5.9.2 Project Traffic and Distribution

For the purposes of the Traffic Study, it is anticipated that normal full employment operation will occur in 2013. Seminole Electric is expected to increase its employment by 50 persons over existing levels and the Lafarge Plant is expected to retain its current employment. To estimate future full employment in 2013, the existing peak season volumes at the project entrance were increased to account for the 50 additional employees. These employees are expected to be split into 25 additional day shift, 13 additional afternoon shift and 12 additional evening shift personnel.

Project trip distribution for operation has been estimated based on the location of the project in Putnam County and the distribution exhibited by the existing traffic counts. The calculations of the future turning movements at the intersections in the study area are documented in the Total Traffic Determination Sheets contained in the Appendix. Figure 5.9.2-1 identifies the projected project and background traffic in during normal operation in 2013 with full operation of the new unit at Seminole Generating Station.

5.9.3 Future Background Traffic

The increase in background traffic was estimated using information from the FDOT Traffic Information CD. The 2004 AADT Forecast sheet for U.S. Highway 17, 1,000 feet north of County Road 209 was used for the growth rates on County Road 209 and for U.S. Highway 17 north of County Road 209. Information from the Forecast sheet for U.S. Highway 17, 3.3 miles north of State Road 100 was used for U.S. Highway 17 south of County Road 209. Copies of these sheets are provided in Appendix 10.6. The AADT Forecast sheets identify the expected daily traffic on the segments of U.S. Highway 17 each year from 2005 to 2014. This information was used to determine growth rates for the background traffic. For U.S. Highway 17 south of County Road 209, a growth rate of 2.7 percent per year was calculated from 2005 to 2010 and a rate of 2.8 percent per year was calculated from 2005 to 2013. For the remainder of the study area, a growth rate of 3.5 percent per year was calculated for both 2010 and 2013. These growth rates were applied to background traffic to determine the number of background trips to be included in the future year analysis, see the Total Traffic Determination Sheets in Appendix 10.6 for documentation on each turning movement increase and Figure 5.9.2-1 for the turning movements at the intersections in the study area.

5.9.4 Total Traffic

Total traffic is a combination of existing volumes projected to 2013, the first full year of normal plant operation and assignment of project traffic during the a.m. and p.m. peak hours. The calculation of total traffic for these conditions is indicated in the Total Traffic Determination Sheets contained in the Appendix 10.7.

5.9.5 Future Year Traffic Analysis

The intersections in the study area were analyzed to determine future year operating conditions. First the intersections were analyzed during the first full year of operation in 2013 using the HCS software, (See Appendix 10.7). The unsignalized intersection of U.S. Highway 17 at the project entrance would not operate at an acceptable level of service with the projected total traffic. In order to achieve acceptable operation this intersection needs to be signalized and the project drive needs to be widened to provide two approach lanes and two departure lanes. With improvements, the LOS of the intersection of U.S. Highway 17 at the project entrance would be A in the a.m. and B in the p.m. The U.S. Highway 17 at County Road 209 intersection is projected to operate at LOS B in the a.m. and LOS D in the p.m. peak hour during facility operation. Copies of the HCS computer runs are provided in the Appendix 10.6

Highway link operation has been reviewed using generalized peak hour volumes from the FDOT 2002 Quality/Level of Service Handbook. Table 4-8 from that document (See the Appendix for a copy), identifies directional peak hour maximum volumes for various types of roadways transitioning into urban areas. Tables 5.9.5-2 and 5.9.5-3 summarize the link operating conditions for the normal plant operations in 2013 for the a.m. and p.m. peak hours. Listed in these two tables are the roadway links reviewed, the acceptable level of service, and maximum service volume (SV) for the acceptable level of service indicated in the FDOT Table 4-8. Also indicated in these tables are the total traffic on each link by direction and the projected level of service. U.S. Highway 17 south of County Road 209 is not projected to operate at an acceptable level of service in the southbound direction in the p.m. peak hour. This is due primarily to the growth in background traffic. All other highway segments are projected to operate at acceptable levels of service.

5.9.6 Effect of Train Operations

As indicated in Section 5.9.1, it is expected that trains will continue to be used to deliver fuel to the power plant during normal plant operations. It is not expected that train operation to support the SGS Unit 3 Project will result in a significant delay to area motorists.

5.10 Archaeological Sites

No sites of historic or archaeological significance will be impacted due to the operation of the Unit 3 Project. No sites listed, or eligible for listing in the *National Register of Historic Places*, are located in close proximity to the Site. No direct or indirect impacts are anticipated from any operation aspect of the Unit 3 Project.

5.11 Resources Committed

There are no major irreversible and irretrievable commitments of national, State, and local resources due to the Unit 3 Project.

The consumption of water by the proposed Unit 3 Project will be for condenser cooling, pollution control equipment, other process water requirements, and potable water.

Based on the modeling results discussed in the PSD Application in Appendix 10.1.5 of this SCA, the maximum concentrations due to the Project are predicted to be less than the PSD significant impact levels. As a result, the Project's impacts are predicted to comply with the AAQS and PSD Class II increments as well as the PM_{10} Class I increments.

Coal and petroleum coke will be consumed during the operation of the Unit 3 Project as described in Section 3.3. Petroleum coke is a byproduct of petroleum refining that has useful energy. The use of coal is an irreversible and irretrievable commitment of a national energy resource for the production of electricity for the people of Florida. However, coal is the most abundant energy required in the U.S. and the use of supercritical steam generating technology maximizes the energy efficiency. The use of petroleum coke provides a resourceful application of a byproduct.

Limestone is used in the wet FGD system to remove SO_2. This is an irreversible and irretrievable use of a natural resource. However, limestone is abundant in Florida and the byproduct of the wet FGD system, gypsum, will be used in the construction industry as wallboard since it will be recycled.

Ammonia will be required for the operation of the Unit 3 Project's SCR systems with the amount depending upon the operation. While ammonia will be consumed, emissions of NO_X will be substantially reduced as a result.

The Unit 3 Project will effectively utilize national, State, and local resources, given the production of efficient electric power, low environmental impacts, and the use of a previously impacted Site.

5.12 Variances

No variances from any applicable standards of any State, regional or local government agency are being requested as part of this application.

TABLES

TABLE 5.1.1-1
COOLING TOWER BLOWDOWN AND AMBIENT ST. JOHNS RIVER TEMPERATURES

	January	February	March	April	May	June	July	August	September	October	November	December
Maximum Ambient River	65.4	73.0	76.6	81.9	86.7	88.4	88.9	92.3	88.0	85.9	77.3	72.1
Average Ambient River	57.2	63.2	67.9	74.7	80.5	84.1	85.4	85.7	83.0	76.6	68.7	61.8
Minimum Ambient River	51.3	56.1	54.1	69.3	72.7	75.2	82.2	81.1	77.7	69.5	61.9	52.8
Maximum Unit 3 Blowdown	85.7	87.2	87.2	88.1	89.2	90.8	90.8	91.3	90.8	89.7	87.2	88.5
Average Unit 3 Blowdown	76.4	77.0	78.7	80.0	81.4	83.9	84.4	84.8	83.4	81.6	78.5	77.2
Maximun Unit 3 Delta T	34.4	31.1	33.1	18.8	16.5	15.6	8.6	10.2	13.1	20.2	25.3	35.7
Average Unit 3 Delta T	19.2	13.8	10.8	5.3	0.9	-0.2	-1.0	-0.9	0.4	5.0	9.8	15.4
Maximum Units 1 & 2 Blowdown	82.0	83.0	84.0	84.0	88.0	91.0	92.0	93.0	92.0	89.0	86.0	86.0
Average Units 1 & 2 Blowdown	72.0	74.0	76.0	79.0	84.0	88.0	89.0	90.0	88.0	82.0	76.0	73.0
Combined Blowdown Maximum Temperature*	83.2	84.4	85.0	85.3	88.4	90.9	91.6	92.4	91.6	89.2	86.4	86.8
Combined Blowdown Average Temperature*	73.4	75.0	76.9	79.3	83.2	86.7	87.5	88.3	86.5	81.9	76.8	74.4
Combined Blowdown Maximum Temperature Rise*	31.9	28.2	30.9	16.1	15.7	15.7	9.4	11.3	13.9	19.8	24.5	34.0
Combined Blowdown Average Temperature Rise*	16.2	11.8	8.9	4.6	2.6	2.5	2.1	2.6	3.5	5.3	8.1	12.5

* Based on Units 1 & 2 at 4,033 gpm and Unit 3 at 1,938 gpm

TABLE 5.1.1-2
SEMINOLE GENERATING STATION COOLING TOWER BLOWDOWN CHARACTERISTICS

Parameter	Average	Maximum	95th Percentile	Class III Water Quality Standard	Number of Samples	Assumed Blowdown Quality	Exceeds Standard	Dilutions (D) Required
Temperature (°F)*	77.10	92.28	57.26	92.0000	947	89.2000	no	
Temperature Rise (°F)*	0.00	0.00	0.00	5.0000		31.9406	yes	5.39
Oil and Greese (mg/L)	1.42	6.40	3.08	5.0000	253	10.7800	yes	3.01
Specific Conductivity (µmhos/cm)	940.3	1,516	1,327	1,990.7250	978	4,645.0250	yes	4.00
Cadmium (ug/L)	0.57	2.20	1.00	1.7650	415	3.5000	yes	2.27
Copper (ug/L)	1.76	17.00	5.00	15.0944	424	17.5000	yes	0.24
Cyanide (ug/L)	1.70	4.00	2.60	5.2000	33	9.1000	yes	1.50
Iron (ug/L)	0.20	1.52	0.43	1.0000	433	1.4969	yes	0.87
Lead (ug/L)	1.77	10.00	3.26	6.5160	375	11.4030	yes	1.50
Mercury (ug/L)	0.004	0.017	0.01	0.0120	61	0.0354	yes	12.29
Selenium (ug/L)	1.16	4.90	2.50	5.0000	75	8.7500	yes	1.50
Silver (ug/L)***	0.01	0.05	0.02	0.0700	49	0.0700	no	1.00

Source of Sampling Data: ECT, 2004.
* 95% Temperature is 5% low temperature
**pH controlled between 7.0 and 7.5 by addition of sulfuric acid
*** Data based on Method E200.8
Blowdown temperature is highest value for months October thru May (October Value Combined 3 units)

Discharge Flow = 5970 gpm = 13.3 cfs

TABLE 5.1.4-1

ESTIMATED DRIFT EMISSION SPECTRUM FOR THE SGS UNIT 3 PROJECT COOLING TOWER

Particle Size Range (micrometers)	Total in Size Range (percent)
0 - 50	50.00
51 - 100	25.00
101 - 150	12.00
151 - 250	9.10
251 - 400	3.15
401 - 500	0.48
>500	0.27

Source: Golder, 2006.

TABLE 5.1.4-2
PREDICTED PLUME CHARACTERISTICS AND DRIFT DEPOSITION FROM THE MECHANICAL DRAFT COOLING TOWER

	Distance from Tower (meters)	Winter		Spring		Summer		Fall		Annual	
		For Sector	For All Sectors	For Sector	For All Sectors	For Sector	For All Sectors	For Sector	For All Sectors	For Sector	For All Sectors
		Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum
Plume Length	100	8.3	71	12.2	89.4	12.3	95.4	8.7	84	8.8	85.0
(Units = Percent)	200	2.8	7.3	1.6	5.4	1	3.1	2	5.1	1.8	5.2
	300	1.9	4.6	1	3.1	0.8	2.1	1.4	3.1	1.2	3.2
		Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum
Plume Height	10	8.3	71	12.2	89.4	12.3	95.4	8.7	84	8.8	85.0
(Units = Percent)	30	5.4	35.1	5.8	37.7	6.9	42.2	4.1	38.4	4.5	38.3
	50	2.3	6.8	2.5	7.8	2	4.7	2.7	7.9	2.3	6.8
		Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average
Plume Shadowing	200	927	570	101	744	1,012	654	667	564	3,156	2,532
(Units = Hours)	400	295	192	355	249	379	237	234	192	1,079	869
	600	185	114	222	147	227	141	152	115	655	517
		Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum
Plume Fogging	100	3.4	14.4	0.8	2.1	0.8	1.0	0.8	1.6	3.4	19.1
(Units = Hours)	200	4.6	22.2	3	4	0.5	1.8	0.5	1.8	8.6	29.9
	300	4.5	20	3	4	0.5	0.8	0.5	0.8	8.5	25.6
		Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum
Rime Icing	100	0	0	0	0	0	0	0	0	0	0
(Units = Hours)	200	0	0	0	0	0	0	0	0	0	0
	300	0	0	0	0	0	0	0	0	0	0
		Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
TDS Deposition[a]	100	648	3	774	2	446	1	287	4	440	3
(Units = $kg/km^2/month$)	200	558	3	692	2	404	1	260	3	383	3
	300	22	1	38	1	36	1	39	2	32	1
	500	4	1	9	1	9	1	6	1	7	1

[a] Salts (Na and Cl) comprise approximately 41 percent of the TDS concentration

TABLE 5.2.1-1
Summary of Mass Loading to the St Johns River

Constituent++	Units	Existing Average D-001*	Ambient River Average Concentration**	Existing Net Mass Loading in lbs per day +	Proposed cooling tower blowdown concentration +++	Proposed Net Mass Loading in lbs per day #	Decrease in Net Mass Loading with Proposed Unit 3
Oil & Grease	mg/L	0.9	0.77	-114.4	2.695	-20.20	-94.24
Nitrogen, Total	mg/L	6.96	1.5	20.4	5.25	-39.36	59.73
Phosphorus, Total	mg/L	0.24	0.076	-4.2	0.266	-1.99	-2.24
Beryllium, annual average	ug/L	0	0.05	-10.2	0.175	-1.31	-8.85
Cadmium	ug/L	0.85	0.6	-82.2	2.1	-15.74	-66.49
Copper	ug/L	33.37	1.106	1,334.6	3.871	-29.02	1,363.65
Cyanide	ug/L	13.02	2.3	141.0	8.05	-60.35	201.31
Iron	mg/L	0.63	0.226	-16.5	0.791	-5.93	-10.56
Mercury***	ug/L	0.0212	0.0038	0.2	0.0133	-0.10	0.32
Nickel	ug/L	13.12	1.192	370.8	4.172	-31.28	402.12
Selenium	ug/L	4.47	1.134	-21.6	3.969	-29.76	8.16
Zinc	ug/L	10.4	2.805	-84.1	9.8175	-73.60	-10.51

* from 2004 Mixing Zone Assessment Report Table 3-1
** from 2004 Mixing Zone Asessment Report Table 3-3 or 4-1 (preferentially 4-1)
*** from Nov 2005 ECT Report

+ Existing station intake flow = 24.4 MGD per Table 1 of Nov 2005 ECT Report
and Existing Station D-001 discharge flow = 5.61 MGD per Table 9 of Nov 2005 ECT Report
'++: Constituents never detected assumed absent

+++ based on 3.5 cycles of concentration

Based on average intake flow rate of 33.25 MGD and average discharge flow rate of 8.60 MGD from Figure 3.5-1 of Unit 3 SCA

TABLE 5.2.1-2
EXISTING AND PROPOSED MIXING ZONES

Constituent	Existing Units 1 and 2 Mixing Zone (square meters)	Proposed Units 1-3 Mixing Zones (square meters)	Parallel to Shore (meters)	Perpendicular to Shore (meters)
Copper	253.00	1.30	1.38	1.87
Mercury	67,323.00	1,022.84	51.04	40.08
Cyanide	108.00	12.80	4.18	6.12
Iron	15.00	5.90	2.86	4.12
Oil and Grease	23.00	42.00	7.44	11.29
Selemium	7.00	12.80	4.18	6.12
Specific Conductivity	170.00	73.00	9.84	14.83
Temperature	39.00	120.20	13.10	18.35
Zinc	29.00	NR	NR	NR
Cadmium	NR	27.00	5.90	9.04
Lead	NR	12.79	4.18	6.12

NR - Not Required

TABLE 5.6.1-1
SUMMARY OF MAXIMUM POLLUTANT CONCENTRATIONS PREDICTED FOR THE PROJECT COMPARED TO THE EPA CLASS II SIGNIFICANT IMPACT LEVELS AND INCREMENTS

Averaging Time and Rank	Maximum Concentration (µg/m³)	PSD Class II Significant Impact Levels (µg/m³)	PSD Class II Increment (µg/m³)
PM10 IMPACTS			
Annual			
Highest	0.65	1	17
24-Hour			
Highest	3.98	5	30
CO IMPACTS			
8-Hour			
Highest	18.8	500	NA
1-Hour			
Highest	39.2	2,000	NA

TABLE 5.6.1-2
SUMMARY OF MAXIMUM PM10 CONCENTRATIONS PREDICTED FOR THE PROJECT
COMPARED TO THE EPA CLASS I SIGNIFICANT IMPACT LEVELS AND INCREMENTS

PSD Class I Area	Averaging Period	Maximum Concentrations (μg/m³) [a] 1990	1992	1996	PSD Class I Significant Impact Levels (μg/m³)	PSD Class I Increment (μg/m³)
PM10 IMPACTS						
Okefenokee NWA	Annual	0.0055	0.0045	0.0049	0.2	4
	24-Hour	0.087	0.113	0.099	0.3	8
Wolf Island NWA	Annual	0.0036	0.0035	0.0029	0.2	4
	24-Hour	0.089	0.135	0.087	0.3	8
Chassahowitzka NWA	Annual	0.0036	0.0033	0.0037	0.2	4
	24-Hour	0.068	0.089	0.115	0.3	8

[a] Concentrations are highest predicted using CALPUFF model and CALMET wind fields for north central Florida, 1990, 1992, and 1996.

TABLE 5.6.1-3
MAXIMUM SO_2 IMPACTS PREDICTED FOR COMPARISON TO THE
SO_2 PSD CLASS I INCREMENTS AT THE OKEFENOKEE NWA

Pollutant / Averaging Time	Maximum Concentration [a] (μg/m³)	Receptor Location UTM Coordinates (km) East	North	Time Period (YYMMDDHH)	PSD Class I Increment (μg/m³)
Okefenokee NWA					
Annual					
Highest	0.00 [b]	NA	NA	NA	2
	0.00	NA	NA	NA	
	0.00	NA	NA	NA	
24-Hour					
Highest, second-highest	3.07	390.317	3,401.812	90010724	5
	2.07	390.336	3,403.659	92112424	
	4.13	390.147	3,385.188	96010624	
3-Hour					
Highest, second-highest	24.1	390.355	3,405.506	90010712	25
	13.9	390.242	3,394.424	92101512	
	22.1	388.530	3,383.358	96011703	

Note: YYMMDDHH = Year, Month, Day, Hour Ending
UTM = Universal Transverse Mercator: Zone 16.

[a] Based on the CALPUFF model using 3 years of CALMET meteorological data for 1990, 1992, and 1996 for North Central Florida.

[b] A "0.00" impact means that the predicted concentration was zero or less. The CALPUFF model does not printout a negative concentration

TABLE 5.6.1-4
COMPARISON OF MAXIMUM IMPACTS OF TRACE METALS WITH EPA REFERENCE CONCENTRATIONS AND OCCUPATIONAL THRESHOLD LIMIT VALUES

Trace Metal	Maximum Concentration (ug/m3)	Averaging Time	EPA RfC (ug/m3)	Occupational TLV-TWA (ug/m3)
Antimony	0.0000024	Annual	No RfC	
	0.000041	8-hour		500
Arsenic	0.000065	Annual	No RfC	
	0.00112	8-hour		10
Beryllium	0.0000031	Annual	0.02	
	0.000054	8-hour		2
Cadmium	0.0000069	Annual	No RfC	
	0.00012	8-hour		2
Chromium[a]	0.000043	Annual	0.1	
	0.00074	8-hour		10
Cobalt	0.000012	Annual	No RfC	
	0.00021	8-hour		20
Lead	0.000054	Annual	No RfC[b]	
	0.00094	8-hour		50
Manganese	0.000075	Annual	0.05	
	0.00129	8-hour		200
Mercury	0.0000052	Annual	0.3	
	0.000090	8-hour		25
Nickel[c]	0.00013	Annual	No RfC	
	0.00233	8-hour		100
Selenium	0.00012	Annual	No RfC	
	0.00217	8-hour		200
Vanadium[d]	0.00032	Annual	No RfC	
	0.00562	8-hour		50

RfC = Reference Concentration for Chronic Inhalation Exposure
The RfC is an estimate of the continuous inhalation exposure to the human population (including sensitive subgroups) that is
TLV = Threshold Limit Values, TWA = Time Weighted Average
[a] provided as worst case Chromium (IV) particles
[b] Lead has an ambient air standard of 1.5 ug/m on an averaging time of a calendar quarter
[c] provided as worst case Nickel soluble compounds
[d] provided as worst case Vanadium Pentoxide

TABLE 5.7.1-1
SUMMARY OF NOISE SOURCE DATA USED IN THE IMPACT ANALYSIS FOR SGS UNIT 3

Sources	Source Location		Source Height	Sound Power Level (dB) for Octave Band Center Frequency (Hz)									Overall Sound Power Level
	X (m)	Y (m)	(m)	31.5	63	125	250	500	1000	2000	4000	8000	(dBA)
Boiler	439047.9	3289134	15.24	102.6	101.7	98.4	93	96.4	96	94	87	86	100.3
STG Sources	439044.3	3289047	9.14	100.1	103.2	101.9	98.7	98.3	94.4	95.2	91.8	85.2	101.5
Main Auxiliary Transformer 1	439007.3	3289019	2	96.2	102.2	104.2	99.2	99.2	93.2	88.2	83.2	76.2	99.6
Main Auxiliary Transformer 2	439007.3	3289011	2	96.2	102.2	104.2	99.2	99.2	93.2	88.2	83.2	76.2	99.6
Generator Step-up Transformer 1	439019	3289008	2	114.2	120.2	122.2	117.2	117.2	111.2	106.2	101.2	94.2	117.6
Generator Step-up Transformer 2	439033.7	3289008	2	114.2	120.2	122.2	117.2	117.2	111.2	106.2	101.2	94.2	117.6
Generator Step-up Transformer 3	439048.4	3289008	2	114.2	120.2	122.2	117.2	117.2	111.2	106.2	101.2	94.2	117.6
Cooling Tower Fand	439224.6	3289083	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439238.2	3289092	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439252.2	3289102	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439265.5	3289111	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439279.5	3289119	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439293.4	3289129	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439307.1	3289138	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439320.7	3289147	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439334.4	3289156	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439347.6	3289165	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439362	3289175	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439375.3	3289184	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439389.3	3289193	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439405	3289204	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439418.6	3289213	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439432.5	3289222	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439445.5	3289231	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439459.8	3289240	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439473.5	3289249	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439487.1	3289258	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439501.4	3289267	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439514.7	3289276	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439528.4	3289286	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439542.3	3289295	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439555.6	3289304	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Cooling Tower Fand	439569.6	3289314	12.2	128.2	131.2	131.2	128.2	125.2	121.2	118.2	115.2	107.2	127.4
Forced Draft Fan	439020.7	3289123	4.57	132.2	134.2	136.2	135.2	134.2	134.2	130.2	126.2	119.2	138.1
Forced Draft Fan	439075.4	3289123	4.57	132.2	134.2	136.2	135.2	134.2	134.2	130.2	126.2	119.2	138.1
ID Fan	439022.6	3289245	12.2	132.2	134.2	136.2	135.2	134.2	134.2	130.2	126.2	119.2	138.1
ID Fan	439033.9	3289245	12.2	132.2	134.2	136.2	135.2	134.2	134.2	130.2	126.2	119.2	138.1

TABLE 5.7.1-1
SUMMARY OF NOISE SOURCE DATA USED IN THE IMPACT ANALYSIS FOR SGS UNIT 3

Sources	Source Location		Source Height	Sound Power Level (dB) for Octave Band Center Frequency (Hz)									Overall Sound Power Level
	X (m)	Y (m)	(m)	31.5	63	125	250	500	1000	2000	4000	8000	(dBA)
ID Fan	439061.9	3289245	12.2	132.2	134.2	136.2	135.2	134.2	134.2	130.2	126.2	119.2	138.1
ID Fan	439075.8	3289245	12.2	132.2	134.2	136.2	135.2	134.2	134.2	130.2	126.2	119.2	138.1
Ventilating Fans Turbine Bldg.	439006.7	3289061	34	77.2	79.2	81.2	80.2	79.2	79.2	75.2	71.2	64.2	83.1
Ventilating Fans Turbine Bldg.	439018.8	3289062	34	77.2	79.2	81.2	80.2	79.2	79.2	75.2	71.2	64.2	83.1
Ventilating Fans Turbine Bldg.	439030.7	3289062	34	77.2	79.2	81.2	80.2	79.2	79.2	75.2	71.2	64.2	83.1
Ventilating Fans Turbine Bldg.	439042.1	3289061	34	77.2	79.2	81.2	80.2	79.2	79.2	75.2	71.2	64.2	83.1
Ventilating Fans Turbine Bldg.	439054.5	3289062	34	77.2	79.2	81.2	80.2	79.2	79.2	75.2	71.2	64.2	83.1
Ventilating Fans Turbine Bldg.	439065.9	3289062	34	77.2	79.2	81.2	80.2	79.2	79.2	75.2	71.2	64.2	83.1
Ventilating Fans Turbine Bldg.	439079.3	3289062	34	77.2	79.2	81.2	80.2	79.2	79.2	75.2	71.2	64.2	83.1
Ventilating Fans Turbine Bldg.	439006.6	3289034	34	77.2	79.2	81.2	80.2	79.2	79.2	75.2	71.2	64.2	83.1
Ventilating Fans Turbine Bldg.	439018.6	3289034	34	77.2	79.2	81.2	80.2	79.2	79.2	75.2	71.2	64.2	83.1
Ventilating Fans Turbine Bldg.	439031.4	3289034	34	77.2	79.2	81.2	80.2	79.2	79.2	75.2	71.2	64.2	83.1
Ventilating Fans Turbine Bldg.	439042.4	3289034	34	77.2	79.2	81.2	80.2	79.2	79.2	75.2	71.2	64.2	83.1
Ventilating Fans Turbine Bldg.	439054.7	3289034	34	77.2	79.2	81.2	80.2	79.2	79.2	75.2	71.2	64.2	83.1
Ventilating Fans Turbine Bldg.	439066.7	3289034	34	77.2	79.2	81.2	80.2	79.2	79.2	75.2	71.2	64.2	83.1
Ventilating Fans Turbine Bldg.	439079.5	3289033	34	77.2	79.2	81.2	80.2	79.2	79.2	75.2	71.2	64.2	83.1
Coal Pulverizers	439020.4	3289085	13	128.2	128.2	128.2	124.2	122.2	119.2	117.2	113.2	104.2	124.9
Coal Pulverizers	439073.2	3289084	13	128.2	128.2	128.2	124.2	122.2	119.2	117.2	113.2	104.2	124.9
Coal Pulverizers	439031	3289084	13	128.2	128.2	128.2	124.2	122.2	119.2	117.2	113.2	104.2	124.9
Coal Pulverizers	439062.5	3289084	13	128.2	128.2	128.2	124.2	122.2	119.2	117.2	113.2	104.2	124.9
Coal Pulverizers	439040.3	3289085	13	128.2	128.2	128.2	124.2	122.2	119.2	117.2	113.2	104.2	124.9
Coal Pulverizers	439051.4	3289084	13	128.2	128.2	128.2	124.2	122.2	119.2	117.2	113.2	104.2	124.9
Bulldozer	438504.8	3289200	4	0	106.6	103.6	101.6	102.6	99.6	96.6	94.6	96.6	105.3
Bulldozer	438508.9	3289464	4	0	106.6	103.6	101.6	102.6	99.6	96.6	94.6	96.6	105.3
Coal Crusher	438550.2	3289069	5	128.2	128.2	128.2	124.2	122.2	119.2	117.2	113.2	104.2	125
Coal Crusher	438575	3289069	5	128.2	128.2	128.2	124.2	122.2	119.2	117.2	113.2	104.2	125
Rotary Dump	438616.7	3289074	2	94.5	91.9	86.6	84.8	83.9	79.9	77	72.8	66.9	85.6

TABLE 5.7.1-2
BASELINE AND OPERATION IMPACTS OF SGS UNIT 3

Baseline Site	Time	Baseline Sound Levels (dBA)				Sound Levels with New Unit (dBA)				Increase (dBA)	
		Min	Max	L_{90}	Leq	Min	Max	L_{90}	Leq	L_{90}	Leq
1	Day	76.4	81.0	77.3	78.1	92.8	93.0	92.8	92.8	15.5	14.7
	Night	77.0	79.9	77.6	78.5	92.8	92.9	92.8	92.9	15.2	14.4
2	Day	43.0	66.8	45.5	58.7	60.9	67.8	60.9	62.9	15.4	4.2
	Night	45.7	63.5	47.1	51.5	60.9	65.4	61.0	61.3	13.9	9.8
3	Day	47.6	109.1	53.5	84.1	58.0	109.1	59.0	84.1	5.5	0.0
	Night	49.3	86.0	50.5	69.2	58.2	86.0	58.4	69.5	7.9	0.3
4	Day	39.2	67.4	39.9	52.8	47.2	67.4	47.3	53.7	7.4	0.9
	Night	55.8	76.2	56.3	61.0	56.3	76.2	56.7	61.1	0.4	0.1
5	Day	36.5	60.5	37.8	46.1	51.3	61.0	51.4	52.4	13.6	6.3
	Night	70.4	49.1	49.8	53.6	70.5	53.3	53.6	55.6	3.8	2.0
6	Day	40.4	68.6	41.3	49.5	55.6	68.8	55.7	56.5	14.4	7.0
	Night	47.8	60.0	48.5	55.0	56.2	61.3	56.3	58.3	7.8	3.3

Source: Golder, 2005

TABLE 5.9.5-1
INTERSECTION OPERATION DURING NORMAL OPERATION (2013)

Intersection	Peak Hour LOS AM/PM	LOS after Improve AM/PM	Improvement
U.S. Highway 17 at Project Entrance	A/C	NA	
U.S. Highway 17 at County Road 209	B/D	NA	

TABLE 5.9.5-2
A.M. LINK OPERATION DURING NORMAL OPERATION (2013)

Road	Limits	Dir	Accept LOS	Max SV	2013 Vol	LOS
U.S. Highway 17	North of Project Entrance	NB	B	1,470	774	B
		SB	B	1,470	1045	B
	Project Entrance to County Road 209	NB	B	1,470	805	B
		SB	B	1,470	1070	B
	South of County Road 209	NB	B	1,470	875	B
		SB	B	1,470	1328	D
County Road 209	West of U.S. Highway 17	EB	D	720	69	C
		WB	D	720	153	C
	East of U.S. Highway 17	EB	D	720	158	C
		WB	D	720	396	D

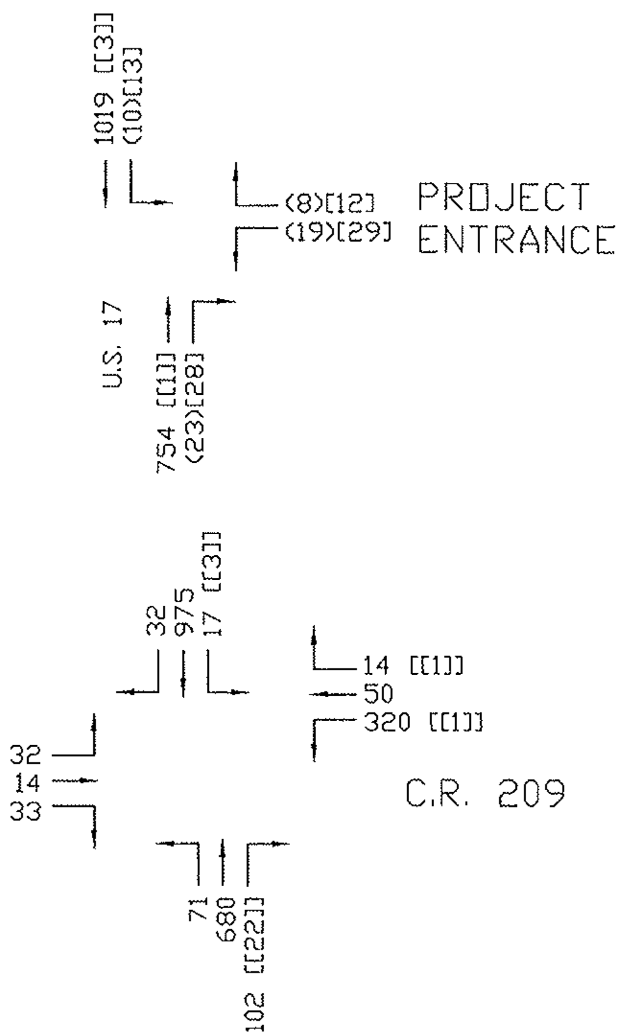
TABLE 5.9.5-3
P.M. LINK OPERATION DURING NORMAL OPERATION (2013)

Road	Limits	Dir	Accept LOS	Max SV	2013 Vol	LOS
U.S. Highway 17	North of Project Entrance	NB	B	1,470	1030	B
		SB	B	1,470	1185	B
	Project Entrance to County Road 209	NB	B	1,470	1023	B
		SB	B	1,470	1232	B
	South of County Road 209	NB	B	1,470	1310	B
		SB	B	1,470	1795	D
County Road 209	West of U.S. Highway 17	EB	D	720	143	C
		WB	D	720	179	C
	East of U.S. Highway 17	EB	D	720	269	C
		WB	D	720	330	C

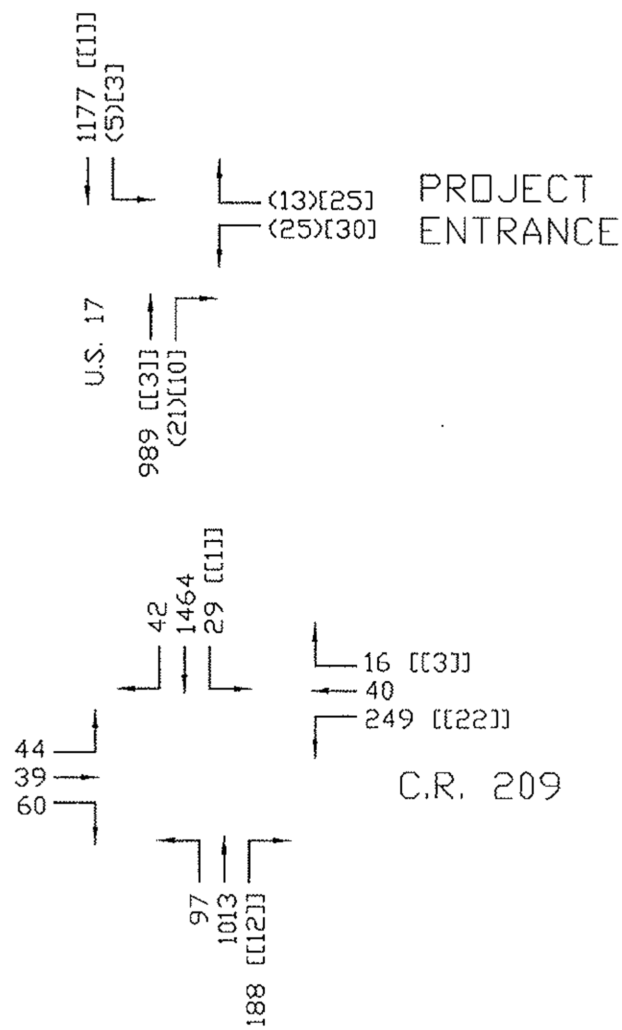
Source: Florida Design Consultants, Seminole Generating Station Unit 3 Traffic Study, February 2006.

FIGURES

2013 AM PEAK HOUR TRAFFIC



2013 PM PEAK HOUR TRAFFIC



NOTE:
EXISTING PROJECT TRAFFIC IS ONLY SHOWN AT THE PROJECT ENTRANCE

LEGEND
XX - BACKGROUND TRAFFIC
(XX) - LEFARGE TRAFFIC
[XX] - EXISTING PROJECT TRAFFIC
[[XX]] - NEW EMPLOYEE TRAFFIC

SOURCE: FLORIDA DESIGN CONSULTANTS, INC. FEBRUARY 2006; GOLDER, 2006.

PROJECT
SEMINOLE ELECTRIC COOPERATIVE, INC.
SGS UNIT 3
PUTNAM COUNTY, FLORIDA

TITLE
2013 NORMAL OPERATIONS

Golder Associates
Tampa, Florida

PROJECT No.	053-9540	FILE No. 0539540B025.dwg	
DESIGN		SCALE AS SHOWN	REV. 0
CADD		**FIGURE 5.9.2-1**	
CHECK			
REVIEW			

Drawing file: F:\CTS\2005 PROJ\053-9540\0539540B025.dwg Mar 07, 2006 - 8:52am

6.0 TRANSMISSION LINES AND OTHER LINEAR FACILITIES

This section is not required since additional offsite transmission lines or associated facilities are not required to support the SGS Unit 3 Project.

7.0 ECONOMIC AND SOCIAL EFFECTS OF PLANT CONSTRUCTION AND OPERATION

The purpose of this section is to identify the economic and social effects of construction and operation of the SGS Unit 3 Project and quantify the project's benefits and costs in the area surrounding the SGS Site as well as to the Putnam County economy and to the State of Florida.

Socio-economic effects can be classified as either direct or indirect effects. Direct effects are those that are the direct result of the construction or operation of the Unit 3 Project. Indirect effects are costs and benefits that affect people and business interests in the vicinity of the Project who, because of their relative proximity to the SGS Site, may experience changes in their local socio-economic environment, such as increased spending due to Project construction and operation. Some of these effects are estimated through the use of economic models that rely on generally-accepted assumptions to assess the relative values of expected costs and benefits.

This section is divided into two parts. Section 7.1 addresses the socio-economic benefits of the project and consists of an analysis of the plant construction and operational expenditures. Section 7.2 addresses the temporary and long-term indirect costs involving the construction and operation of the SGS Unit 3 project as well as the construction and operational use of private and public services in the vicinity of the Site and in Putnam and surrounding counties. All cost and benefit values are based on present (2005) dollar values.

7.1 Socio-Economic Benefits

7.1.1 Direct Socio-Economic Benefits

The Project is expected to have a net significant benefit on Putnam County government, the local economy, local communities, and the surrounding areas. Increased local public revenues will be derived primarily from property taxes paid on the SGS property and the onsite facilities. These increased revenues will be significantly higher than the costs associated with the use of public facilities and services by the Project.

Direct economic benefits from the Project include employment opportunities created by the construction and operation of the Project. Employment opportunities will result from construction job opportunities as well as jobs indirectly generated through the purchase of goods and services in the area. With the addition of 50 full-time equivalent operational jobs, expenditures associated with the operation of the Project, local jobs, wages, and output are anticipated to increase for the Unit 3 Project. The additional labor demands associated with the operation of the Project will not create labor shortages. Due to the proximity of the SGS Unit 3 Project to the Jacksonville metropolitan area labor market including Putnam County, the labor demand is expected to be met by workers in Putnam County, the Jacksonville metropolitan area and nearby counties. Population and housing impacts will be minimal because migration into the area during both construction and operation of the Project is anticipated to be modest and the existing communities have sufficient resources to accommodate the expected modest increase in Project-related employment, wages, and sales.

7.1.1.1 Project Economic Profile

Construction of the Project is anticipated to begin in 2008 and conclude in 2012. The peak daily construction workforce is estimated to be 1,500 people with an average annual daily construction workforce estimated at 600 employees over a four year period.

The development cost for the Project will be approximately $1.4 billion for the new Unit 3. The major costs associated with construction includes environmental controls (about $440 million), other major equipment (about $320 million), labor (about $180 million over four years), and materials (about $265 million). Remaining costs of $195 million for development of the Project are associated with engineering, licensing, financing, contingencies, and other miscellaneous costs.

The estimated construction workforce by trade is presented below:

Trade	Percent of Total Employment
Laborers	11%
Carpenters	5%
Operators	6%
Ironworkers	5%
Millwrights	7%
Boilermakers	17%
Pipefitters	18%
Insulators	1%
Electricians	19%
Painters	3%

Trade	Percent of Total Employment
Supervision	5%
Other	3%
Total	100%

Ongoing operation of the plant will employ approximately 50 new employees who will supplement an existing workforce of approximately 280 employees. Assuming average wages of $70,000 annually per person, the annual operational payroll increase will be approximately $3,500,000.

7.1.1.2 Fiscal Impacts

Property tax revenues from the overall SGS facility, including Unit 3 Project for Putnam County and other governmental entities is estimated to be over $150 million for the first ten years of the life of the plant subsequent to construction and commercial operation of Unit 3. Because SGS is largely self-sufficient it will not require many public utilities or services that residential and commercial development typically requires. In 2004, Seminole paid Putnam County approximately $5.8 million in *ad valorem* and sales tax revenue for the existing units.

The net economic impact of the Project on Putnam County and local communities for the life of the Project is the difference between the total operating revenue and operating costs. Operating revenues consist of *ad valorem* tax revenue, franchise fees, occupational licenses, building permits, utility taxes, state revenue proceeds, charges for county services, etc, paid by Seminole Electric to various governmental agencies. Operating costs include costs for services such as financial and administrative expenses, emergency, and disaster relief, legislative and executive expenses, and comprehensive planning incurred by governmental agencies. Capital revenues and expenses are also earned and paid by the County. Capital revenues are based on impact fees, and capital expenses include costs related to purchases related to roads, fire rescue, law enforcement, etc. The sum total of operating and capital revenues and costs from the Project is expected to be a substantial net surplus to Putnam County.

The total net economic benefit to Putnam County is based on current tax rates for each taxing authority, as determined for the State of Florida and Putnam County and an estimated property and onsite facility value. As tax rates and property and facility values change for each taxing authority over the life of the Project, revenue will change accordingly. Based on the breakdown of 2005 millage rates for the existing taxing authorities, ad valorem revenue generated during the first 10 years for the individual taxing authorities is:

General County	$72,647,000
Fire Municipal Service Taxing Unit	$6,317,000
School Board	$67,388,000
SJRWMD	$3,648,000
TOTAL	$150,000,000

The ad valorem revenue that will accrue to SJRWMD during the 40-year operation period is used for a wide variety of purposes, including environmentally sensitive land acquisition through the Save Our Rivers program and land stewardship of these properties.

Payments made to the School Board are applied to operations as well as capital expenditures for new or upgraded facilities.

In addition to local government fiscal benefits, sales and income tax benefits will accrue to the State of Florida. Sales tax revenue is estimated to accrue during construction and operation. These taxes will be placed in the State's general fund and will be available for use as deemed appropriate by the State. The amount of sales tax anticipated to accrue to the state and Putnam County is estimated at $1,400,000.

7.1.1.3 Economic Impacts

Among the primary direct benefits of plant construction and operation will be the increase in job opportunities for Putnam County and adjacent areas. It is anticipated that construction employment will average 600 workers annually over the four-year construction period commencing in 2008. Once fully operational in 2012, the Unit 3 Project will result in approximately 50 additional full-time jobs at the SGS site. Payroll for construction and operation employment is estimated to average $45 M per year during construction and an additional $3.5 M per year during full operation. SGS payroll in 2004 was estimated at approximately $20 M.

Direct benefits of plant construction and operation will also result from the purchase of materials and equipment such as hardware, small parts, concrete, paint and other similar supplies as well as construction materials and equipment purchased or leased within the state. A significant portion of these purchases will be made in Putnam County and other nearby counties. Local expenditures are expected to be substantial.

7.1.2 Indirect Economic Benefits

Employment opportunities and the purchases of goods and services to support the construction of the Unit 3 Project are anticipated to occur over a four-year period beginning in 2008 and ending in 2012. It is expected that the majority of the construction wages paid by Seminole and Seminole contractors for Unit 3 Project construction will be spent within Putnam County and the surrounding area. These wages will create additional demands for goods and services. As this money is spent, it will create a multiplier effect within the area, thereby generating economic activity, including additional jobs and earnings. These earnings are indirect or secondary benefits of the Unit 3 Project, which will be enjoyed by other companies whose payrolls will increase from the construction of the Unit 3 Project. Materials such as concrete, stone, drainage piping, and other building materials are expected to be manufactured or produced in Putnam County and adjacent areas. Rental of construction equipment would also be obtained locally or within the region.

Average annual jobs directly created during the construction of the Unit 3 Project are estimated at 600 employees. Due to the multiplier effect described above, the indirect employment increase from the Unit 3 Project will also occur and result in additional jobs in the County and surrounding area. During operation, the Unit 3 Project will generate 50 direct jobs. Additional indirect jobs will be created by expenditures in the County and surrounding areas for materials and supplies required for ongoing operation and maintenance such as paint, lumber, hardware, office supplies and the like.

The direct earnings from ongoing plant operations will also generate indirect earnings benefits. The direct wages are expected to be spent mostly within Putnam County and the surrounding area and will increase the demand for goods and services. Earnings paid directly to plant personnel and indirectly through indirect local jobs created by Unit 3 Project expenditures are expected to generate additional earnings annually during the life of the Plant.

7.1.3 Other Economic Benefits

The major costs of operating the Unit 3 Project are associated with fuel, limestone, water treatment chemicals, and urea. These costs not only include the cost of the commodity but the cost of transportation to the Site. For example, coal and the alternate fuel, petroleum coke, will be transported to the Site by railroad, while limestone and urea may be transported to the site by rail or truck. Improvements planned by SGS to enhance traffic flow and safety considerations during construction and operation include additional ingress and egress lanes at the U.S. Highway 17 entrance, adding deceleration lane capacity and left turn lane capacity on U.S. Highway 17, and signalization of the SGS driveway at the U.S. Highway 17 SGS entrance to accommodate increased use through the intersection.

7.1.4 Recreational and Environmental Values

Construction and operation of the Unit 3 Project will not cause a significant impact on the recreational and environmental value and visual quality of the area.

Disturbance during construction of the proposed Unit 3 Project will be insignificant to non-existent at the closest recreation facilities and along the St. Johns River since the recreational facility and river are located outside the area affected by facility construction. During construction and operation of the Unit 3 Project, impacts are anticipated to be non-existent to minimal due to the following reasons:

- Collocation of Unit 3 Project facilities with existing SGS facilities
- Adherence to County-required setbacks for the Unit 3 Project facilities from the Unit 3 Project's boundaries;
- Extensive air pollution controls and reductions for point source emissions and fugitive dust;
- Minimal use of groundwater resources;
- A stormwater management system that includes design for retention of the 25-year, 24-hour storm event;
- An outdoor lighting plan that incorporates lighting standards and fixtures to minimize upward light spill and glare; and

- Views of SGS Unit 3 along the St. Johns River will generally be limited to the upper portions of the new stack which will be located in a viewshed that already includes the Units 1 and 2 stacks as well as the existing natural draft cooling towers. It should be noted that Unit 3 will use a mechanical draft tower that will not be visible along the St. Johns River.

Emission controls will be added to Units 1 and 2 and result in a "no net increase" in air emissions for NO_X, SO_2, SAM and mercury. Zero Liquid Discharge (ZLD) improvements for all three units will result in net water quality improvements to the St. Johns River by eliminating most of the current wastewater discharges from the SGS.

In addition, the beneficial use of gypsum, bottom ash, and fly ash are recognized as additional environmental and economic benefits, and reduces local disposal requirements for these coal combustion products.

7.1.5 Onsite Enhancements

Seminole intends to minimize the SGS Unit 3 Project's impacts on the environment and the community by incorporating design features that reduce visual and environmental impacts. These major features include air pollution control equipment and an extensive stormwater management and process wastewater system that will also provide a source of makeup water for Unit 3 Project use. Seminole will expend about $440 million for these environmental control features. In addition, improvements will be made to the access road at the U.S. Highway 17 entrance during construction and operation.

The use of the extensive air pollution control equipment and the stormwater and ZLD systems, and other design features, combined with the location of the Unit 3 Project and associated facilities within the property boundary, will ensure minimal impacts to the surrounding areas and the scattered existing residential development along County Road 209. For example, the location of the Unit 3 Project's power generation facilities is well buffered from the borders of the Site by a variable distance that exceeds County requirements. Both the location on the Unit 3 Project Site and the design features for the Unit 3 Project will minimize the impacts to aesthetics, ambient noise levels, and transportation.

7.1.6 Offsite Enhancements

Improvements at the intersection of SGS's entrance road with U.S. Highway 17 may be necessary during the construction of the Unit 3 Project and some or all of the improvements may be maintained during facility operations, subject to FDOT approvals. These potential improvements include driveway widening, lengthening acceleration and deceleration lanes, and the installation of a traffic signal at this intersection.

7.1.7 Environmental Benefits

The Unit 3 Project will provide a wide variety of environmental benefits for Putnam County and the State of Florida. The Unit 3 Project maximizes beneficial use of an existing coal-fired generation plant site. This minimizes the potential environmental impacts associated with the generation of electrical power. The Unit 3 Project also capitalizes on the use of existing linear facilities and utilities serving SGS, including transmission lines, rail lines, and water intake and discharge infrastructure. The use of this infrastructure minimizes the extent of offsite infrastructure development, which can have the potential to impact wetlands or wildlife habitat. The Unit 3 Project will also reuse excess process wastewater from Units 1 and 2, and therefore, reduce the process wastewater discharge currently going into the St. Johns River.

7.1.8 Summary of Benefits

Impacts to the economy associated with construction and operation of the Unit 3 Project are expected to be positive. Labor demands associated with the construction and operation of the Unit 3 Project are not expected to create any labor shortages. Expenditures for Unit 3 Project materials and expenditures by newly hired workers will boost economic activity and incomes in Putnam and surrounding counties. Population and housing impacts associated with the Unit 3 Project will be slight due to minimal in-migration into the area.

Construction activities will increase tax revenues to the county and state governments due to sales and property taxes from the purchase of equipment and material to support construction activities. Once operational, Putnam County, Putnam County School and Fire Districts, and other taxing authorities are expected to receive millions of dollars in tax revenues more than expenditures on public services due to the minimum requirements for public service facilities needed to support the Unit 3 Project.

Transportation impacts are expected to be related primarily to increased traffic associated with the daily commute of construction workers to and from the Unit 3 Project Site. Construction worker traffic will vary with the Unit 3 Project staging, with peak traffic expected to occur during 2010. The levels of service will decline on local roadway segments and intersections during morning and afternoon peak hours but will be minimized through intersection improvements proposed by Seminole. Once operational, transportation impacts on area roads will be negligible and effects from train deliveries will be minor. As presented in Subsection 5.9.1, truck traffic for service and maintenance activities and automobile traffic from operations and maintenance workers should not impact other traffic using roadways or impact levels of service on local roadways.

Overall land use impacts from the construction and operation of the Project are expected to be minor due to the remote location of the proposed Project and the buffers to adjacent properties. No direct land use impacts are anticipated to be associated with the operation and maintenance of the Project.

Visual impacts from the construction and operation of the Project will be minimal and localized.

Cultural and historical resources in the vicinity of the area will be unaffected by construction and operation of the Project. No sites of historic or cultural significance are located on the SGS Site.

Overall, socioeconomic impacts associated with the construction and operation of the Project in general will be favorable. Although the local community may experience some temporary impacts during peak construction periods, economic impacts overall are positive.

7.2 Socio-Economic Costs

7.2.1 Temporary External Costs

Over 35,000 construction workers reside within the five-county region including Putnam County, with the majority of these workers located in Duval County. Since ample labor supply exists within commuting distance, it is anticipated that many workers will be hired from within the region, with minimal relocation required. Consequently, construction should have no adverse effect on permanent housing.

As is typical with longer construction projects, some workers commuting from longer distances may choose to live in transient accommodations (motels/hotels) on a weekly basis, returning to their permanent homes and families on weekends. It is not anticipated that construction workers will create any new or unusual impacts or demands on public facilities or services.

Temporary external costs include the generation of construction traffic and noise from delivery trucks each day, as discussed in Sections 4.5.5 and 4.5.2, respectively. Construction will last approximately four years, with a peak period in 2010.

7.2.2 Long-Term External Costs

The Unit 3 Project's external cost impacts will be minimal and localized. Unit 3 will be located adjacent to two existing coal-fired units. With the incorporation of environmental mitigation measures, the operation of the Unit 3 Project will not cause any impairment to recreational values, result in any deterioration of aesthetic and scenic values, or restrict access to areas of scenic values. The Unit 3 Project also will not displace any persons or result in any significant costs to local government.

Since the increase in operational workforce is expected to be approximately 50 employees and most are assumed to be residing within commuting distance to the plant, the Unit 3 Project's direct and indirect impacts to local services (e.g., schools, police) are expected to be minimal and the Unit 3 Project's incremental *ad valorem* revenue will be significantly greater than the minimal cost for services associated with Unit 3 and the new SGS employees. Overall, the Unit 3 Project will have a long-term economic benefit for Putnam County and the surrounding communities.

7.3 References

Burns and McDonnell, Seminole Generating Station 750-MW Solid Fuel Fired Unit Feasibility Study, February 2005.

Pinellas County Property Appraisers Office - www1.putnam-fl.com.

Seminole Electric Cooperative Inc., Personal Communication, 2006.

8.0 ALTERNATIVES ANALYSIS

The following section provides an overview of the factors which led to the decision to build the proposed 750 MW coal-fired unit at the existing SGS Site. As required by NEPA regulations, this section is intended for use in the environmental analysis and subsequently the supplemental environmental impact statement (SEIS) to be prepared by Rural Utility Service and other cooperating agencies.

In addressing the future power supply needs of its members, Seminole evaluated generation and supply alternatives that could be considered in lieu of the self-build 750 MW coal-fired unit. The need to acquire new electrical power is driven primarily by projected load requirements and purchased power contract expirations and is further defined by planning studies. The plan to add base load capacity in 2012 is the result of a two-fold process 1) to meet reliability needs and 2) to provide Seminole Members with a stable and competitive price for wholesale power. Seminole determined that neither conservation nor load management could obviate the need to develop base load capacity.

To meet the 2012 baseload capacity need, an "all-source" Request for Proposals (RFP) for purchased power alternatives was issued on April 19, 2004. The RFP was structured to allow bidders the flexibility in the type of capacity proposed and the contract term. Seminole received fourteen (14) proposals from five (5) different entities, including independent power producers and investor-owned utilities. Base load and intermediate capacity was offered in amounts ranging from 100 MW to 750 MW for terms of twenty to forty years and included capacity from proposed base load and combined cycle units. The following table summarizes the responses:

SUMMARY OF OFFERS RECEIVED					
Bidder	Type	No. of Offers	Capacity Type (Location)	MW	Term (Years)
Invenergy	IPP	2	New pulverized coal/new CC unit (Florida)	520-650	20 or 30
LS Power	IPP	1	New pulverized coal (Georgia)	400-600	20 or 30
Pasco Cogen	IPP	2	Existing LM 6000 CC (Florida)	104-115	20
Peabody	IPP	1	New pulverized coal (Kentucky)	100-750	10-40
Southern	IOU	8	New CC (Florida)	493-635	20

Seminole's competitive bidding process sought base load capacity. In conjunction with related economic studies Seminole demonstrated that a self-build 750 MW coal-fired unit is the best alternative to meet a portion of Seminole's capacity needs in 2012 and beyond (SECI RUS Loan Guarantee Application Package, September 2005).

Concurrent with the RFP process, Seminole performed a feasibility study to add a third coal unit at the existing SGS Site (the self-build option). In addition, Seminole also participated in a feasibility study for a 600 MW jointly owned coal-fired unit with several Florida municipalities at a 20 percent participation level (Solid-Fuel Power Plant Project, Site Selection and Feasibility Assessment, 2003). The joint unit participation was determined not to be the best economic alternative for SECI and the self-build option was updated for a 750 MW unit at the SGS Site.

Because the proposed SGS Unit 3 project is an incremental increase to the previously certified SGS Site, a formal siting study was not conducted by Seminole, rather Seminole participated in a multiple-entity siting study. Construction and operation of the SGS Unit 3 project at the existing SGS Site ensures the beneficial use of numerous site generation and ancillary resources when compared to new construction at a greenfield site. Additionally, SGS Unit 3 will be integrated into the SGS Site and can be served by much of the existing plant infrastructure including site access, fuel delivery and handling, make-up water supply and wastewater disposal, and transmission interconnection.

8.1 Site Alternatives

Seminole participated in a formal site-selection and feasibility study with several municipalities in 2003. This study focused on the siting of a supercritical coal-fired power plant in the state of Florida and identified five greenfield site areas and one existing power plant as potential site locations. The areas were evaluated with regard to air emission/impacts, water supply, wastewater discharge, proximity to transmission and rail lines, and land use/ownership. Based on the results of this feasibility study, the conduct of a similar analysis by Seminole of the existing SGS power plant site's potential for expansion, and Seminole's need for additional capacity, Seminole decided to instead pursue a self-build option at the existing SGS power plant site due to its more favorable economics and reduced environmental impacts.

Specific benefits of locating the SGS Unit 3 at the SGS Project Site are summarized below:

- The new unit will be located within an existing power plant site;
- No new off-site transmission line or substation facilities will be required;

- Impacts to onsite wetland communities will be minimal;
- The new unit will utilize advanced supercritical boiler technology;
- The new unit will be designed and constructed with state of the art pollution control technologies;
- The station, which consists of existing Units 1 and 2 as well as Unit 3, will be equipped with a ZLD system to service the proposed and existing units and to eliminate discharge of process wastewater, except for cooling tower blowdown, to the St. Johns River; and
- The installation of SGS Unit 3 will coincide with significant environmental/air pollution control retrofits to Units 1 and 2, resulting in a decrease in total emissions of NO_X, SO_2, SAM and mercury.
- Where feasible, the capabilities of the existing Unit 1 and 2 common plant facilities and infrastructure will be used to also serve Unit 3, including: access roads and entrances, the administration buildings, the rail system, coal unloading and handling systems, lined coal storage area, wastewater treatment systems, water supply wells, intake and discharge facilities on the St. Johns River, coal combustion product management areas and certified landfill facilities.

None of the sites considered in the formal siting study would have resulted in the cumulative environmental benefits derived from collocating a new unit at the existing SGS Site.

8.2 Alternative Fuels

Seminole maintains a diverse mix of fuel resources to enhance supply chain reliability, availability, and transportation costs, and mitigate market price risks. The overall fuel management program is designed to provide a balanced portfolio of long and short term fuel, transportation, and service agreements to provide fuel availability, reliability, and cost control. Active management of fuel supply, transportation, and related assets provide competitive access to alternate fuel markets. To support the Seminole daily and long-range operational plan, fuel supply management maintains a diverse supply portfolio of reliable, cost effective fuel sources that are procured in an ever-changing market environment. The primary fuel for the SGS Unit 3 project is coal/pet coke with No. 2 diesel fuel oil for unit start up and flame stabilization.

8.2.1 Solid Fuels – Coal, Coal Synfuel and Petroleum Coke

SGS Units 1 and 2 use high volatile bituminous coal as its primary fuel and is permitted to blend petroleum coke up to a maximum of 30 percent of the burn by volume. Seminole has negotiated a long term coal supply agreement (pending final execution) with Alliance Coal, LLC to supply 2,750,000 tons of coal, more than 60 percent of its solid fuel requirements, through the year 2012, with an option to extend four years through the year 2016. The long-term contract with Alliance provides terms and conditions that provide stability and act as a physical hedge to mitigate price and availability risks.

The remaining annual requirements for solid fuels (coal and petroleum coke) are secured through spot market agreements for specified quantities for periods ranging from one month up to 18 months. Seminole routinely reviews the short and long-term markets for opportunities to enter into spot agreements of various durations. Seminole also provides for the supply of coal synfuel through the year 2007 on an "as-available," "as-needed" basis, at a discount below various contract and market prices. Seminole continually researches other alternative fuel sources such as petroleum coke, or other non-traditional fuel types, to obtain the lowest delivered cost of fuel at the quality parameters required. Petroleum coke is an opportunity fuel from both domestic and international refineries that can be delivered directly to SGS Site by rail, or to terminal facilities located along the coastal U.S. The supply of petroleum coke is impacted by various world oil situations. Seminole purchases petroleum coke on a short-term, spot basis when it is economical to do so, thereby limiting Seminole's risk of the reliability of supply.

As explained in the Air Construction and PSD Application, Section 2.2 of the Appendix 10.1.5, Seminole also evaluated the use of lower sulfur coal for Unit 3, and determined such fuel to be cost-prohibitive. The use of the same coal and No. 2 oil in all three units also maximizes the co-use of existing equipment. Accordingly, the fuel proposed for Unit 3 is the same fuel currently used in Units 1 and 2.

8.2.2 Natural Gas

Seminole manages the overall physical requirements for natural gas for its Payne Creek Generating Station and for those purchase power facilities for which Seminole has the responsibility for natural gas management. The new SGS Unit 3 is not expected to use natural gas as a fuel source.

8.2.3 Diesel Fuel Oil

Diesel fuel oil will be used for flame stabilization, unit start up, emergency reserve capacity, limited supplemental load, and to supply the on-site mobile equipment used in coal stockpile management at

SGS. The current storage facilities at the site consist of two-150,000 gallon tanks. An additional 200,000 gallon tank will be added to support the operational needs of SGS Unit 3. Resupply of diesel fuel oil is by truck deliveries from a local terminal in Jacksonville or other east coast Florida terminals.

8.2.4 Conclusion

It is the intention of Seminole to utilize the same fuel blends in all three units. Burning the same fuel in Unit 3 as is burned in Units 1 and 2 maximizes the co-use of existing coal handling areas and equipment (for example, rail lines, unloading facilities, storage areas, conveyor systems, etc.), avoiding the need to construct separate facilities dedicated solely to Unit 3, and avoids the substantially increased costs associated with purchasing and transporting lower sulfur coals from other mines.

The existing Units 1 and 2 are burning coal with a sulfur content that typically ranges up to 3.8 percent, although individual shipments can exceed this value. The Unit 3 Project is demonstrating a net decrease in facility SO_2 emissions, and there is no regulatory restriction on fuel sulfur content. Nonetheless, Seminole is committed to achieving the proposed 0.165 lb/MMBtu SO_2 limit regardless of the fuel sulfur content. The existing units are currently utilizing 0.5 percent sulfur oil and, to maximize the co-use of existing equipment, Seminole proposes the same choice for the Unit 3 Project.

8.3 Alternative Technologies

Seminole's current power supply portfolio includes base load, intermediate load and peaking resources. A suitable resource mix by capacity type is important for cost effectiveness, just as adequate capacity is important for reliability purposes. The most appropriate combination of technology types is a function of economics, fuel prices, and load forecast. Optimization studies were conducted using a combination of spreadsheet analyses, graphical techniques, and production costing studies based on the most recent planning assumptions and market economics. The analyses indicated that the need beginning in the 2012 time period would be best served by a 750 MW coal fired base load unit because of the economic advantages over other types of generation technologies and fuel. To meet its base capacity need, SECI compared pulverized coal to advanced nuclear technology, circulating fluidized bed (CFB) technology, integrated gasification combined cycle (IGCC) and gas fired combined cycle technology.

8.3.1 Nuclear Technology

A resurgence of potential interest in nuclear technology has been underway recently. Three industry consortia have been formed and have been engaged with the Department of Energy (DOE) to pre-license and potentially develop sites for new advanced nuclear plants consistent with the recent Energy Policy Act of 2005 provisions. Recently, participation opportunities have been suggested by participants in these consortia, but the earliest target date for commercial operation is the 2015/16 time frame. It is not known whether this potential target date can be achieved. Seminole remains interested in advanced nuclear technology and its prospective development as an economic and environmentally positive alternative for future base load capacity needs. However, Seminole concluded that participation in these projects would have to be in partnership with others and that these projects would not be viable until well after Seminole's capacity need anticipated in 2012.

8.3.2 CFB Technology

Seminole concluded, based on industry information available, that large scale CFB projects would be more costly than a pulverized coal project and that CFB technology did not provide any modularity benefits or significant environmental emissions advantages. Additionally, CFB alternatives would present a waste disposal problem for Seminole which would otherwise be mitigated by a pulverized coal design (i.e., via wallboard quality gypsum production and sale). Seminole did not receive any fluidized bed proposals in response to the RFP. Seminole deemed the economic and reliability risks too high as a self-build alternative.

8.3.3 IGCC Technology

Seminole considered IGCC to be a potentially promising technology, from both operational and environmental perspectives. However, in 2004 there were only two commercial scale plants operating in the U.S., and both were built with federal assistance. Existing plant infrastructure confirms that in the absence of more project experience in electric utility applications, IGCC technology at a scale that would meet Seminole's needs would subject Seminole to availability and cost risks that were considered unacceptable for a utility of Seminole's size. A further test of the readiness and cost-effectiveness of IGCC technology would be the industry responses to Seminole's all-source competitive bidding process. The RFP produced no IGCC bids from utility or non-utility providers. Accordingly, Seminole deemed the economic and reliability risks too high as a self-build alternative. An independent engineering firm's assessment commissioned by Seminole, confirmed

Seminole's conclusion. Moreover, IGCC technology does not afford meaningful environmental benefits compared to proposed Unit 3 especially in light of the proposed pollution control upgrades associated with Units 1 and 2. Constructing an IGCC facility would also eliminate the substantial benefits derived from co-utilizing the existing infrastructure, and create additional complexities associated with the chemical processes of gasifying coal.

8.3.4 Combined cycle –Natural Gas Technology

Seminole also considered natural gas-fired combined cycle technology as an alternative. Seminole assessed it to be a proven technology. In fact, Seminole does operate a combined-cycle system at another plant. Seminole also assessed it was likely to be significantly more costly than pulverized coal, therefore, it was eliminated based on economic considerations.

8.4 Conclusion

Prior to proceeding with the preliminary development of Unit 3, Seminole Electric entered into a series of investigations and studies that evaluated, in connection with other municipalities, alternative sites. Seminole also conducted comprehensive evaluations of alternative fuels and alternative generation technologies. In addition, Seminole issued a RFP to meet it's projected needs. The results of these investigations led to the selection of the self-build option to develop a 750 MW PC coal-fired unit. Because the proposed unit will be located adjacent to Seminole's existing units at the SGS Site, the project can and will result in a number of environmental benefits identified in Section 8.1 that would not accrue unless the proposed unit were collocated with the existing units at the SGS Site.

8.5 References

Burns and McDonnell, Seminole Generating Station 650-MW Solid Fuel Fired Unit Feasibility Study, August 2004.

Burns and McDonnell, Seminole Generating Station 750-MW Solid Fuel Fired Unit Feasibility Study, February 2005.

Seminole Electric Cooperative, Inc, Ten Year Site Plan 2005 -- 2014, 2005

Solid-Fuel Power Plant Project, Site Selection and Feasibility Assessment, 2003

9.0 COORDINATION

Federal, State, Regional and Local agencies, as well as the general public, were contacted to provide input to the SGS Unit 3 Project. The contacts included formal, multi-agency meetings and workshops, individual agency meetings and discussions, as well as meetings with several public organizations. The following is a list of formal multiple-agency meetings and/or workshops that were held to support the SGS Unit 3 Project:

9.1 Putnam County

June 17, 2005: Palatka, Florida
Introduction of the SGS Unit 3 project to Putnam County Planning and Zoning staff and discussion of the county review and approval process.

August 23, 2005: Palatka, Florida
Introduction of SGS Unit 3 project to Putnam County Board of County Commissioners.

November 23, 2005: Palatka, Florida
Meeting with staff from Putnam County Planning and Zoning staff to discuss the Class III Development Review and Rezoning process/schedule.

December 14, 2005: Palatka, Florida
P&Z Commission Hearing (public meeting)

January 10, 2005: Palatka, Florida
Putnam County BOCC Hearing (public meeting)

9.2 U.S.D.A. Rural Utility Service

July 12, 2005: Washington D. C.
Introduction of SGS Unit 3 project to USDA RUS staff.

August 12, 2005: Teleconference
Discussion of RUS scoping requirements and third party review process.

October 20, 2005: Palatka, Florida
Public Scoping Meeting (public meeting)

9.3 Florida Department Environmental Protection

August 9, 2005: Tallahassee, Florida
Introduction of SGS Unit 3 project to FDEP and PSC PPSA Siting Team.

September 7, 2005: Teleconference
Discussion of modeling issues associated with the 1) SGS Unit 1 and 2 upgrade project and the 2) SGS Unit 3 project and associated PSD application submittals.

November 1, 2005: Tallahassee, Florida
PSD pre-application meeting with FDEP Air Quality permitting staff.

February 9, 2006: Tallahassee, Florida
PSD pre-application meeting to discuss the SCA and PSD permit application package with FDEP Air Quality permitting staff.

February 24, 2006: Tallahassee, Florida
Pre-application meeting with Buck Oven to discuss the schedule for the submittal and review of the SGS Unit 3 SCA Modification Application.