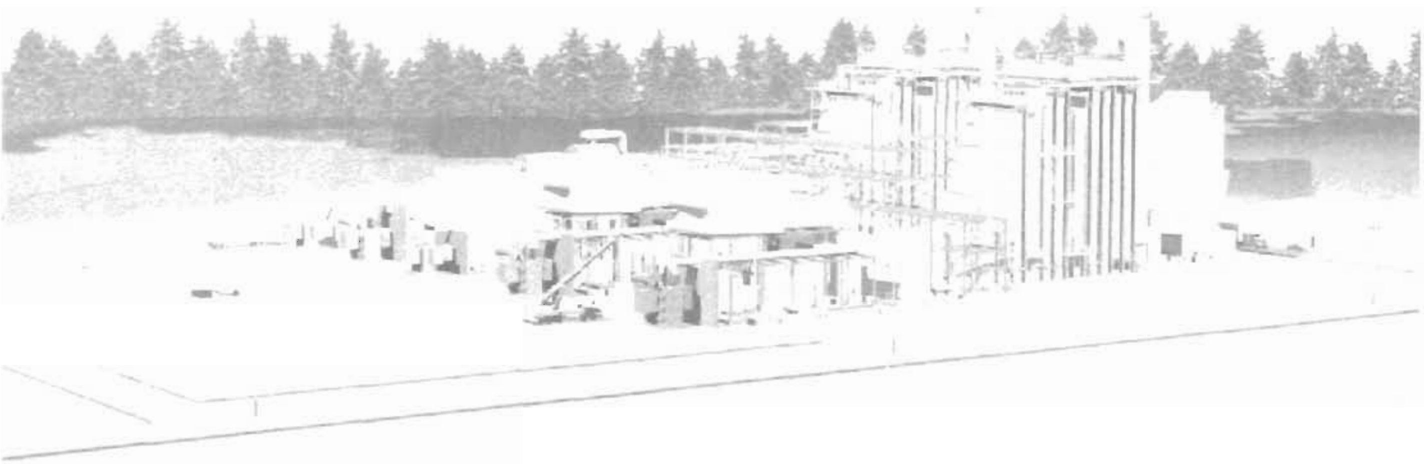
GULF POWER
SMITH UNIT 3
Site Certification Application



Volume 1 **June 1999**

GULF POWER
A SOUTHERN COMPANY

ECT
Environmental Consulting & Technology, Inc.

HOPPING GREEN SAMS & SMITH
PROFESSIONAL ASSOCIATION
ATTORNEYS AND COUNSELORS

One Energy Place
Pensacola, Florida 32520

850 444.6111

GULF POWER
A SOUTHERN COMPANY

June 7, 1999

Mr. Hamilton S. Oven, Jr.
Siting Coordination Office
Florida Department of Environmental Protection
2600 Blair Stone Road, Mail Stop 48
Tallahassee, FL 32399

Re: Smith Unit 3 Project

Dear Mr. Oven:

Enclosed are 14 copies of the Site Certification Application (SCA) for the Smith Unit 3 Project. The SCA is being submitted on behalf of Gulf Power Company as the applicant. An application for determination of need for the Project was filed with the Florida Public Service Commission on March 15, 1999.

Also enclosed is a check for $125,000 to cover the application processing fee. Upon the Department's determination of "completeness", please advise us regarding the number of additional copies required by the Department.

We look forward to working with you and the Department on the certification process. If you should have any questions regarding our application, please do not hesitate to call Jim Vick, Manager of our Environmental Affairs Department at 850.444.6311. Also, feel free to contact our environmental consultant, Environmental Consulting & Technology, Inc. (ECT), or our counsel, Hopping Green Sams and Smith (HGSS). Phil Simpson can be reached at ECT at 352.332.0444 and Doug Roberts can be reached at HGSS at 850.425.2320.

Sincerely,

Robert G. Moore

Robert G. Moore
Vice-President of Power Generation / Transmission

Enclosures
mrf
cc: James O. Vick
Phil Simpson
Doug Roberts

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APPLICANT INFORMATION

Applicant's Official Name: Gulf Power Company

Applicant's Address: One Energy Place
Pensacola, FL 32520-0328

Address of Official Headquarters: One Energy Place
Pensacola, FL 32520-0328

Business Entity (corporation, partnership, co-operative): Corporation

Owner: Southern Company

Names and Titles of Chief Executive Officers: Travis J. Bowden, President
One Energy Place
Pensacola, FL 32520-0328

Names, Addresses, and Phone Numbers of Official Representative Responsible for Obtaining Certification: James O. Vick
One Energy Place
Pensacola, FL 32520-0328

Site Location (County): Bay County

Nearest Incorporated City: Lynn Haven

Latitude and Longitude: 30° 16' 15W" 85° 42' 05N"

UTMs: Northerly: 3,349,600 Easterly: 625,250 Zone: 16

Section, Township, Range: 26 – 2S – 15W

Location of any directly associated transmission facilities (counties): Bay County

Name Plate Generating Capacity: 574 MW

Capacity of Proposed Additions and Ultimate Site Capacity (where applicable): N/A

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

SITE CERTIFICATION APPLICATION

FOR THE

GULF POWER COMPANY SMITH UNIT 3 POWER PROJECT

Environmental Consulting &
Technology, Inc.
3701 Northwest 98th Street
Gainesville, Florida 32606

Thomas W. Davis, P.E.	Ivan B. Chou, P.E.
Florida No. 36777	Florida No. 30688
6/4/99	6-4-1999
Date	Date

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LIST OF ABBREVIATIONS, ACRONYMS, AND UNITS OF MEASURE

AAQS	ambient air quality standards
ADT	average daily traffic
ANSI	American National Standards Institute
APCo	Alabama Power Company
ASTM	American Society for Testing and Materials
ATS	advanced technology systems
BACT	best available control technology
BMP	best management practices
bpf	blows per foot
Btu/ft^3	British thermal unit per cubic foot
Btu/kwh	British thermal unit per kilowatt-hour
°C	degrees Celsius
CAA	Clean Air Act
CAES	compressed air energy storage
CC	combined cycle
CEC	cation exchange capacity
CFR	Code of Federal Regulations
cfs	cubic feet per second
cm/sec	centimeter per second
CO	carbon monoxide
CO_2	carbon dioxide
CR	County Road
CTG	combustion turbine generator
dBA	A-weighted decibel
DOT	Department of Transportation
DSM	demand-side measures
EAR	Evaluation and Appraisal Review
EFOR	equivalent forced outage rate
EMF	electric-magnetic field
EPA	U.S. Environmental Protection Agency
EPC	engineering, procurement and construction
EPRI	Electric Power Research Institute
ESP	electrostatic precipitator
°F	degrees Fahrenheit
F.A.C.	Florida Administrative Code
FDACS	Florida Department of Agriculture and Consumer Services
FDCA	Department of Community Affairs
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
FEPPSA	Florida Electrical Power Plant Siting Act
FGD	flue gas desulfurization
FGFWFC	Florida Game and Fresh Water Fish Commission
FGS	Florida Geological Survey

FGT	Florida Gas Transmission
FLUCFCS	Florida Land Use, Cover, and Forms Classification System
FLUM	Future Land Use Map
FNAI	Florida Natural Areas Inventory
FPC	Florida Power Corporation
FPSC	Florida Public Service Commission
ft	feet
ft/day	feet per day
ft bls	feet below land surface
ft-msl	feet above mean sea level
ft/sec	foot per second
FTU	nephelometric turbidity unit
g/s	gram per second
GE	General Electric
gpd	gallons per day
gpm	gallon per minute
gr S/100 scf	grains of sulfur per 100 standard cubic feet
gr/100 scf	grains per 100 standard cubic foot
gr/100 dscf	grains per 100 dry standard cubic feet
Gulf	Gulf Power Company
ha	hectares
HRSG	heat recovery steam generator
hr/yr	hour per year
H_2SO_4	sulfuric acid
IGCC	integrated gasification combined cycle
IRP	integrated resource planning
ISCST3	Industrial Source Complex Short-Term
ISO	International Standards Organization
K	Kelvin
$kg/km^2/month$	kilograms per square kilometer per month
$kg/km^2/yr$	kilograms per square kilometer per year
km	kilometer
km^2	square kilometer
kV	kilovolt
kw-yr	kilowatt-year
lb/hr	pound per hour
LHV	lower heating value
LOS	level of service
m	meter
meq/100g	milli-equivalents per 100 grams
MGD	million gallons per day
mg/kg	milligram per kilogram
mg/L	milligram per liter

MMBtu/day	million British thermal units per day
MMBtu/hr	million British thermal units per hour
mmhos/cm	millimhos per centimeter
MPCo	Mississippi Power Company
mph	miles per hour
msl	mean sea level
MW	megawatt
mwh	megawatt-hour
NCDC	National Climatic Data Center
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NSPS	new source performance standards
NSR	new source review
NWFWMD	Northwest Florida Water Management District
NWS	National Weather Service
NPV	net present value
OAQPS	Office of Air Quality Planning and Standards
O&M	operation and maintenance
O_2	oxygen
OSHA	Occupational Safety and Health Administration
PCFB	pressurized circulating fluidized bed
PM	particulate matter
PM_{10}	particulate matter less than or equal to 10 micrometers aerodynamic diameter
POD	point of discharge
ppm	part per million
ppmvd	part per million by dry volume
PSD	prevention of significant deterioration
psf	pound per square foot
PSH	pumped storage hydro
psia	pound per square inch absolute
psig	pound per square inch gauge
PWRR	present worth of revenue requirements
RARE	roadless area review and evaluation
RCRA	Resource Conservation and Recovery Act
RFP	request for proposal
RQD	rock quality designation
SACTI	Seasonal/Annual Cooling Tower Impact
SCA	site certification application
SCS	Southern Company Services
SES	Southern Electric System
SO_2	sulfur dioxide

SR	State Road
SRPP	Strategic Regional Policy Plan
SSC	species of special concern
SWMP	storm water management plan
tpy	tons per year
TYSP	ten-year site plan
μg/L	microgram per liter
$\mu g/m^3$	microgram per cubic meter
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VMT	vehicle miles traveled
VOC	volatile organic compound
WFRPC	West Florida Regional Planning Council
WWTP	wastewater treatment plant

EXECUTIVE SUMMARY

Gulf Power Company (Gulf) plans to construct, own, and operate a new electric power generating plant in Bay County, Florida. The Smith Unit 3 Project (Smith Unit 3 or the Project) will be capable of producing up to 574 megawatts (MW) of electricity using state-of-the-art technology and clean, natural gas fuel.

Gulf, which is a wholly-owned subsidiary of Southern Company, serves approximately 350,000 customers in northwest Florida. Gulf has determined that in order to continue providing reliable, cost-effective service to its customers, it must add at least 427 MW of new generating resources to its system by summer of 2002. The most cost-effective means to meet this need is construction of Smith Unit 3 at Gulf's existing Lansing Smith Electric Generating Plant north of Panama City, Florida.

On March 15, 1999, Gulf filed a petition with the Florida Public Service Commission to demonstrate that the Project is needed to meet the growing demand for power in the Florida panhandle. The need petition shows that the Project will be a reliable, cost-effective, and environmentally friendly power generation resource in Florida.

ES.1 THE SITE CERTIFICATION APPLICATION

The licensing of electrical power plants in Florida requires compliance with applicable federal, state, and local laws, regulations, and ordinances. The most comprehensive state law governing the licensing of the Smith Unit 3 Project is the Florida Electrical Power Plant Siting Act (FEPPSA). The FEPPSA establishes the State's policy to balance the need for new power plant facilities with the potential effects of the facility's construction and operation on human health, welfare, and environmental resources of the state. To implement this policy, the FEPPSA establishes a centrally coordinated permitting process. The FEPPSA proceedings are initiated when the applicant files a site certification application (SCA) with the Florida Department of Environmental Protection (FDEP), which administers and coordinates the process with affected agencies, governmental entities, other parties, and the applicant. The process concludes with the approval or certification of the power plant by the Governor and Cabinet, sitting as the Siting Board.

The FDEP procedures for implementing the FEPPSA are contained in Chapter 62-17, Florida Administrative Code (F.A.C.). In this case, the SCA for the Project has been prepared in compliance with the requirements contained in the FDEP *Instruction Guide For Certification Applications* (FDEP Form 62-1.211[1], F.A.C.). The SCA demonstrates that the Project will comply with all applicable laws, regulations, and standards.

ES.2 SITE AND VICINITY CHARACTERISTICS

The proposed site for the Project is located at Gulf's existing Lansing Smith Plant in central Bay County, northwest of Panama City (T2S, R15W, Section 36). The site is owned by Gulf, as is all the surrounding property to the site.

Figures ES-1 and ES-2 show the location of the Project within the State of Florida and within Bay County, respectively. Figure ES-3 shows the location of the proposed 50.1-acre site relative to the existing Smith Plant. The site is located at the end of County Road (CR) 2300 which connects to State Road (SR) 77.

The site is currently in silvicultural operations, with planted pine dominating the site. The existing Smith plant is an industrial land use, but otherwise the surrounding vicinity is rural and in a natural state. No residential development is found within a 2-mile radius.

ZONING AND LAND USE REGULATIONS

The Project site is currently located in the Agricultural land use classification as depicted on Bay County's 1990 Adopted Comprehensive Plan Future Land Use Map (FLUM). Power plants are not an allowable use in this land use designation.

To be consistent with the adopted comprehensive plan, Gulf has submitted a large-scale plan amendment application to change the FLUM from Agriculture to Industrial. The Industrial category will allow for development of the Project and will be consistent with the existing designation for the adjacent Lansing Smith Plant (Units 1 and 2). The plan amendment was submitted in May 1999 and is expected to be adopted in Fall 1999.

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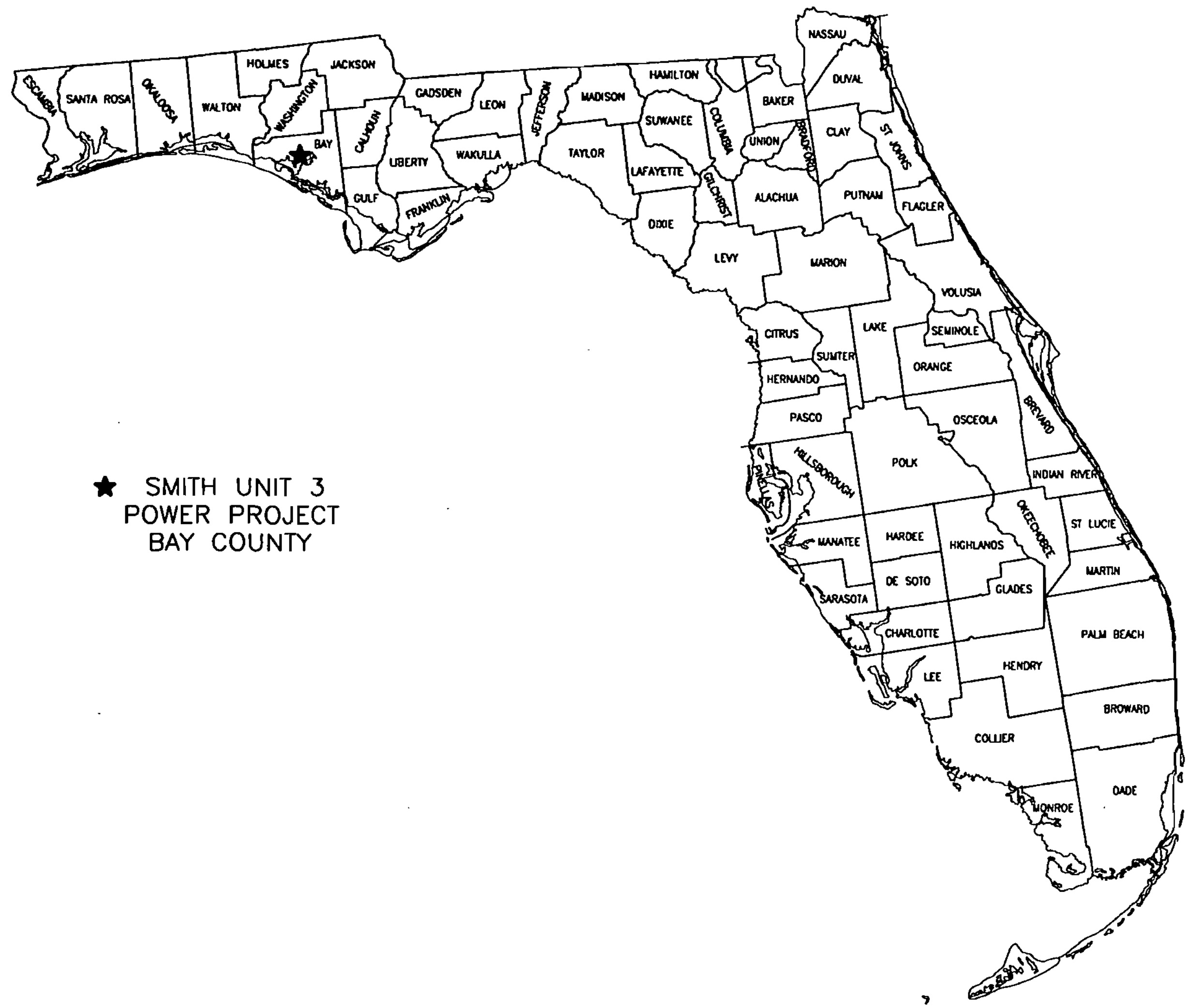

FIGURE ES-1.

SITE LOCATION

Source: ECT, 1999.

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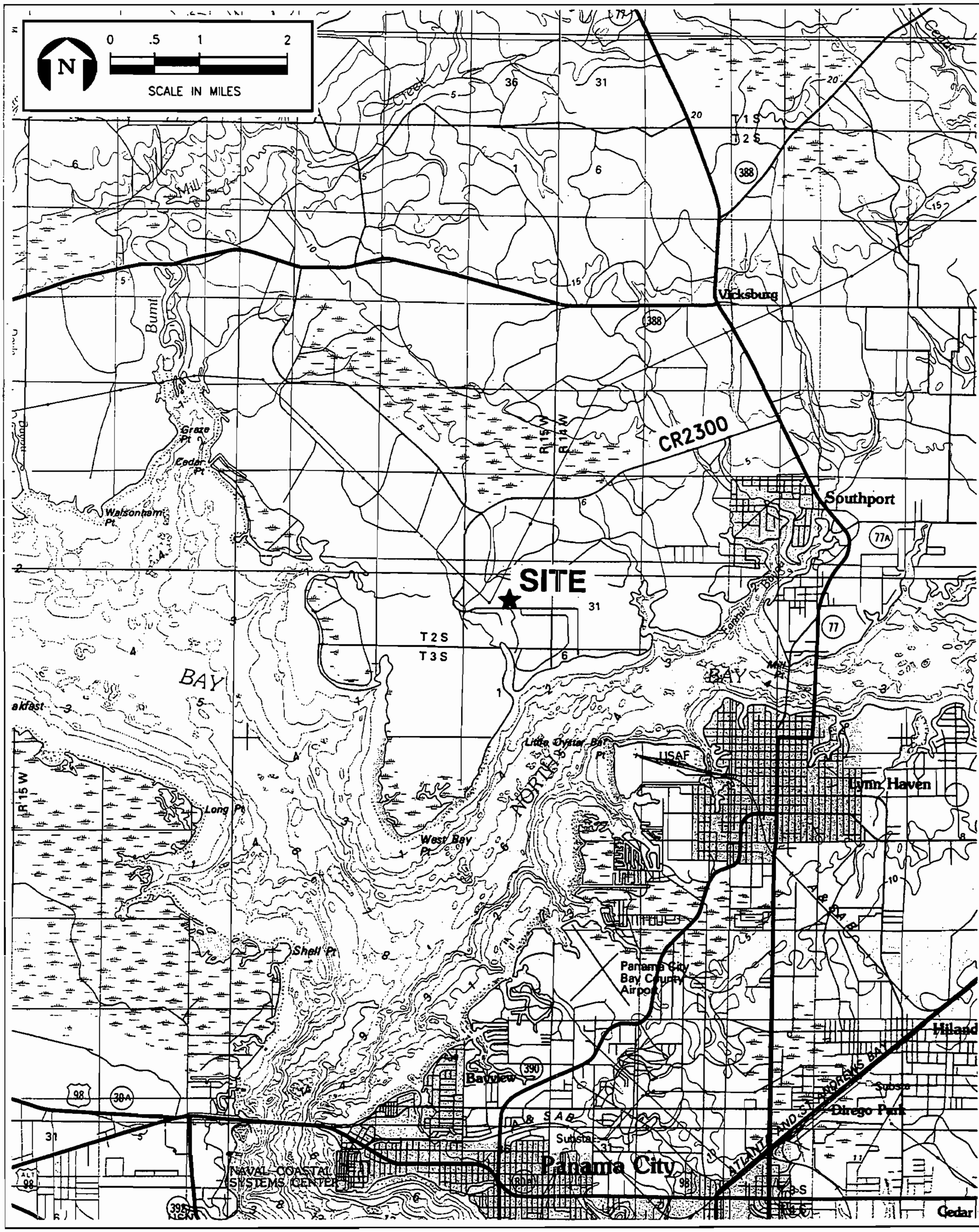

FIGURE ES-2.

SITE LOCATION WITHIN BAY COUNTY

Sources: USGS 30x60-minute topo map: Panama City, FL, 1981.

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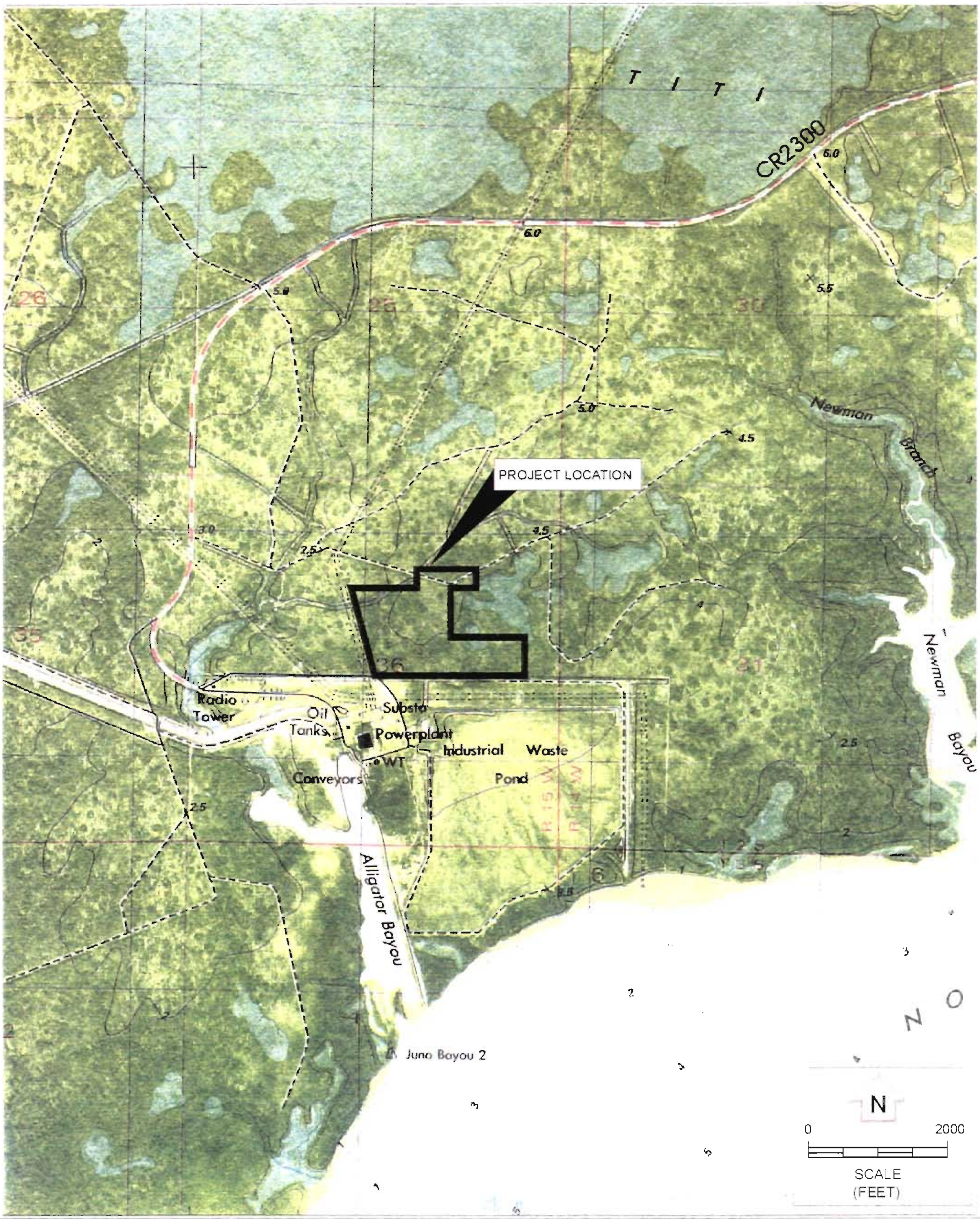

FIGURE ES-3.

PROJECT SITE LOCATION RELATIVE TO LANSING SMITH PLANT

Sources: USGS topo map of Southport, Fl., 1992; ECT, 1999.

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In Bay County, zoning is consistent with the land use plan designations. Therefore, when the FLUM is approved, so will the corresponding zoning for the site.

No sensitive natural resource, scenic, or cultural lands are located on the proposed site. No known archaeological or historic resources are located on the site.

GEOLOGICAL FEATURES

The Project site is located on the Pamlico Terrace in an area of low relief between elevation 5 and 8 feet above mean sea level. The site is underlain by a thick sequence of Tertiary-age sediments that generally dip to the southwest. Formations range from the Pleistocene marine terraces (loose, permeable silts and sands) that extend to 20 feet below land surface, to the Bruce Creek Limestone formation (a limestone dominated by macrofossils) that is approximately 300 feet thick.

No geologic faults have been mapped for the site; therefore, faults pose no hazard to site development. Karst development and sinkhole potential are low. Geotechnical investigations performed on the site indicate it can be safely used for the intended Project, providing standard engineering practices are employed.

GROUND WATER

The Smith Unit 3 Project is located in the Econfina Creek Basin. Four hydrogeologic units define the regional system:

- The surficial aquifer system.
- The intermediate system.
- The Floridan aquifer system.
- The sub-Floridan confining unit.

The Floridan aquifer system provides over 90 percent of the ground water supplies for northwest Florida. The surficial aquifer system is of poor quality and is only used for irrigation and surface water recharge.

SURFACE WATER

There are numerous fresh water wetlands intermixed with the pine plantations of the site vicinity. No natural lakes, ponds, streams, or rivers are found on the site. Most of these wetlands drain to the southwest or west, eventually to West Bay.

The marine environment of St. Andrew Bay is the major surface water feature in the site vicinity. This system has been well studied by Gulf and others. Currently, the Lansing Smith Plant uses surface water from North Bay for once-through cooling at Units 1 and 2. The cooling water is ultimately discharged through a nearly 2-mile-long canal to West Bay, where the thermal mixing zone occurs. The current discharge meets all applicable water quality standards for the Bay which is a Class II water.

ECOLOGICAL FEATURES

Approximately 95 percent of the site is vegetated. Wetlands cover approximately 50 percent of the site but most of these are wet, planted pine plantations. Cypress-titi swamps represent the higher quality wetlands found onsite.

No unique habitats are found onsite. No listed wildlife species were observed onsite and none are likely to depend on the site's resources for their habitat needs. Four listed plant species were found onsite, one of which, the panhandle spiderlily, is endangered. Several specimens of this rare plant were observed in wetlands onsite and offsite.

Existing stresses to terrestrial systems include the presence of the existing Lansing Smith units, logging practices, and prescribed burning. Existing stresses to the marine systems include storm water runoff, pollution from non-point sources, and the thermal discharge of the existing Lansing Smith cooling system.

AIR RESOURCES AND NOISE

Climate in the site vicinity is characteristic of the upper Gulf Coast with mild winters and summer heat, tempered by breezes off the Gulf of Mexico. Prevailing winds are from the north.

The Smith Unit 3 site is located in an area that has been classified as attainment for all criteria air pollutants, which means the site meets all applicable state and federal air standards. The only major air emissions sources in the area are the Smith Units 1 and 2 and a few industrial facilities around St. Andrew Bay.

Ambient noise at the proposed site is dominated by the day-to-day operations of Smith Units 1 and 2. Noise surveys performed by Gulf indicate noise levels around the property boundary currently fall well below the Bay County noise code.

ES.3 PROJECT DESCRIPTION

The Smith Unit 3 Project will utilize state-of-the-art combined cycle (CC) design concepts and equipment to achieve a high level of efficiency in electrical power production. The Project will employ two General Electric Model PG 7241 (FA) gas turbine units which have a proven operating record around the world. These machines will utilize the latest developments in dry low-nitrogen oxides (NO_x) combustion technology to achieve low emissions.

Each combustion turbine generator (CTG) will exhaust into a heat recovery steam generator (HRSG), which will produce steam-generated electricity to supplement the CTGs. Typical plant operation is expected to produce 519 MW when operating at full load. When Gulf employs power augmentation, the unit will be capable of generating up to 574 MW.

Cooling of Smith Unit 3 will feature a creative and environmentally sound combination of utilizing existing Smith Units 1 and 2 cooling water discharge with a cooling tower. This means the Project will actually use hot water from the existing cooling system and discharge cooler water back to the existing discharge canal. The average annual water requirements for this cooling system will be approximately 7.5 million gallons per day (MGD) obtained from the existing 274 MGD hot water discharge from Units 1 and 2.

Other uses of the existing Lansing Smith infrastructure will include the uses of ground water from Gulf's onsite wells, use of the existing domestic wastewater treatment package plant, use of existing electric transmission and road access, and use of the existing potable water system.

Air pollution control equipment utilizing clean-burning natural gas as a fuel and low-NO_x burners will benefit the air quality in the region. Use of low-sulfur natural gas will limit emissions of particulate matter including particulate matter less than or equal to 10 micrometers diameter. Carbon monoxide and volatile organic compound emissions will be controlled by the use of advanced combustion equipment and operational practices. Dry low-NO_x combustors and low-NO_x burner technology will abate NO_x emissions. Sulfur dioxide and sulfuric acid mist emissions will be controlled by the use of low-sulfur natural gas. Drift eliminators will be employed to limit cooling tower drift to no more than 0.001 percent of the circulating water.

Gulf will require a natural gas supply to the site via a new pipeline lateral. However, Gulf will not own, build, or operate the pipeline. A gas pipeline route will be permitted and licensed separately by the supplier.

No new electric transmission line corridors are required to place Smith Unit 3 into service. A 1,000-foot wire bus connecting Smith Unit 3 to the existing Lansing Smith 230-kilovolt (kV) substation will be constructed across already developed plant property. Smith Unit 3 will require replacement of existing conductors (wires) on approximately 20 miles of existing Gulf 115-kV transmission lines in the Panama City vicinity. However, no new right-of-way, access roads, structures, dredging, or filling will be required for these upgrades. No environmental or land use impacts are anticipated from these upgrades.

ES.4 IMPACTS OF PROJECT CONSTRUCTION

The Smith Unit 3 Project will be located on a 50.1-acre site with development occurring on 32.7 acres of that total. Construction activities will include clearing, grading, development of storm water ponds, power plant construction, final grading, and landscaping.

No explosives will be used in the construction of the facility. Construction impacts will be reduced by use of existing access roads to the site and the Lansing Smith barging terminal for delivery and offloading heavy equipment. Gulf is also proposing use of benign fly ash from the existing Lansing Smith Plant as a fill substitute to help reduce the volume of fill and corresponding truck traffic to the site. Trash and construction debris will be removed or recycled by a licensed contractor.

Construction impacts to surface water systems (including wetlands) will be minimized by developing a drainage plan to allow postconstruction drainage to match preconstruction drainage. Storm water basins will be used to minimize offsite runoff and sedimentation. Best management practices (BMPs) employed for Smith Units 1 and 2 will be modified to include Smith Unit 3 and to protect potential offsite aquatic resources.

Construction impacts on ground water resources are expected to be short term and minimal. Any site dewatering will include the use of storm water ponds to collect and treat the water before recharge or discharge. Construction will not impact any drinking water supplies or other uses of the Floridan aquifer.

Approximately 15.2 acres of wetlands will be impacted during construction. Gulf is submitting a joint FDEP/U.S. Army Corps of Engineers dredge-and-fill application to quantify these impacts. The application will contain a proposed mitigation plan for these lost resources. The remaining acreage (17.4) will be left as natural, vegetated communities (e.g., pine plantation and wetlands). Construction will have minimal impacts on flora and fauna. No impacts to regional populations of any listed species are expected. The panhandle spiderlily (a state-endangered plant) is proposed to be relocated out of construction areas to nearby undisturbed wetlands.

The socioeconomic impacts are largely beneficial. A maximum construction workforce of 325 people will be required, the great majority coming from the Panama City/Bay County area. An average of 180 employees will be used over the 21-month construction period. Construction payroll is expected to total over $18.4 million, and the impact of construction on industrial output in Bay County is estimated to be $113.5 million. Numerous local contractors and vendors will be utilized.

Although traffic on SR 77 and CR 2300 will increase over the construction period due to construction employees and hauling fill to the site, levels are not expected to exceed existing level of service (LOS) on any access road (primarily SR 77) to the site. Gulf is further reducing traffic impacts by spreading out fill hauling over a longer period than the construction period, and by stockpiling fill at the existing Lansing Smith property. This will dilute the truck trips required per day to and from local borrow pits. Gulf is also proposing use of benign fly ash as an alternative fill material which will be used in combination with imported clean fill. Use of fly ash could reduce truck hauling by over 50 percent.

Existing services (schools, fire, police, medical, etc.) in Bay County and nearby communities are adequate to meet short-term demands of construction.

Noise will be generated during construction which will exceed ambient levels. However, noise will be below Bay County standards at Gulf's property boundary. The nearest residential receptor is nearly 2 miles away and will not be affected by construction noise.

ES.5 IMPACTS OF PROJECT OPERATION

Overall, the Project will be a highly efficient and environmentally clean method of producing electrical power. Two positive benefits will be produced over the existing Lansing Smith Generating Facility. First, the reuse of cooling water discharge will mean no additional surface water requirements for once-through cooling will be needed. With the use of the cooling tower, the net impact of operation of Smith Unit 3 will be no increase in the temperature of the existing discharge and a reduction in the discharge volume. Consequently, the heat rejection rate will be reduced by 1.3 percent which will slightly reduce the thermal impacts on the receiving waters of West Bay.

A second major benefit of Smith Unit 3 operations will be a net reduction in NO_x emissions from Lansing Smith due to installation of low-NO_x burner technology and a burner management system on Smith Unit 1. This results in a significant increase in electrical generating capacity with no increase in NO_x emissions.

The limited use of ground water for process water needs at the Lansing Smith site including Smith Unit 3 will not adversely affect the surficial aquifer or Floridan aquifer at the site. No impacts to existing water supplies or water wells are expected.

During operations, the storm water management plan and BMPs will protect adjacent areas from any storm water runoff impacts. Solid wastes generated will be disposed offsite by licensed contractors.

The best available control technology and PSD review required for Smith Unit 3 will ensure emissions of air-borne pollutants will be minimized. The Project will not cause or contribute to any violation of ambient air quality standards or PSD increments. Secondary air impacts will be negligible. Types and concentrations of air pollutants will not adversely affect soil or vegetation.

No significant ecological effects are anticipated from plant operation. The plant will not affect regional plant and wildlife populations.

Noise impacts will be minimal and confined to the near-plant limits. Noise levels are calculated to be well below Bay County standards.

Existing infrastructure and facilities in Bay County will be sufficient to handle the relatively small increase in operational workforce (29). This workforce will most likely reside locally, but impacts to roads, schools, police, fire, and medical services will be negligible.

Socioeconomic benefits of the Project will be positive. In addition to providing additional inexpensive and reliable electricity to rate payers in Florida, the Project will generate approximately $1.5 million in additional payroll to Bay County residents. Much of this money will be spent on goods and services. Additionally, Gulf expects to contract $1.8

million per year to local suppliers of maintenance services/supplies. Traffic generated by the 29 employees will be insignificant on SR 77 and CR 2300. Existing LOSs will not be impacted on area roadways.

ES.6 ALTERNATIVES

The site selected for Smith Unit 3 was driven by the need to be in or close to Panama City and the objective to minimize environmental impacts by locating near existing power plant infrastructure. Smith Unit 3 accomplishes these needs.

The extensive technology and project alternatives analysis performed by Gulf showed that a CC unit located at Gulf's Lansing Smith site using natural gas fuel was the best and lowest cost alternative.

Location at the existing Smith Generating site maximizes use of existing power plant infrastructure (cooling discharge canal, wastewater, potable water, electric transmission, and roads). The site was located on Gulf's property at Lansing Smith to best utilize these infrastructure requirements and minimize onsite environmental impacts. The proposed location, while impacting some wetlands, will avoid wetland impacts associated with longer, interconnecting facility corridors if the site were further from the existing facilities on available Smith property. Moving the site elsewhere would also have the potential to fragment natural communities and wildlife habitat onsite.

ES.7 CONCLUSIONS

In summary, the Project will provide needed low-cost electrical power for Gulf Power rate payers, while minimizing the potential impacts of power generation. The Project will comply with all applicable land use and environmental regulations. The Project should be approved by the Siting Board because it meets pressing local and state needs for electrical power in an environmentally sound manner.

1.0 NEED FOR POWER AND THE PROPOSED FACILITY

This chapter of the Site Certification Application (SCA) introduces Gulf Power Company (Gulf) and explains why the new generating unit at Gulf's Lansing Smith Plant is needed.

1.1 OVERVIEW

Gulf has determined that in order to provide reliable, cost-effective service to its customers, it must add at least 427 megawatts (MW) of generating resources to its system by the summer of 2002. The most cost-effective way for Gulf to meet this need is to construct a 574-MW natural gas-fired combined cycle (CC) unit at its existing Lansing Smith Electric Generating Plant north of Panama City, Bay County, Florida. This unit will be designated as Smith Unit 3 (or the Project).

Smith Unit 3 is subject to the Florida Electrical Power Plant Siting Act (FEPPSA), Chapter 403, Part II, Florida Statutes. On March 15, 1999, Gulf filed with the Florida Public Service Commission (FPSC) a petition for a Determination of Need for this Project under Section 403.519, Florida Statutes. The following paragraphs summarize the key portions of Gulf's petition to the FPSC. This summary is for informational purposes only. A copy of the petition for need determination is contained as Appendix 10.1. A copy of the FPSC final order will be distributed when that order is issued.

1.2 THE APPLICANT

1.2.1 GENERAL

Gulf Power Company is a wholly-owned subsidiary of the Southern Company. Gulf serves approximately 350,000 customers in Northwest Florida. Gulf's service area is bounded by the Apalachicola River on the east and the Florida/Alabama state line on the west. Gulf's service area is shown on the system map shown in Figure 1.2.1-1.

1.2.2 GENERATION RESOURCES

Gulf owns and operates 11 fossil steam units, one peaking combustion turbine generator (CTG), and one cogeneration facility in Northwest Florida. In addition, Gulf has a 50-percent ownership in two coal units at Mississippi Power Company's (MPCo's) Plant

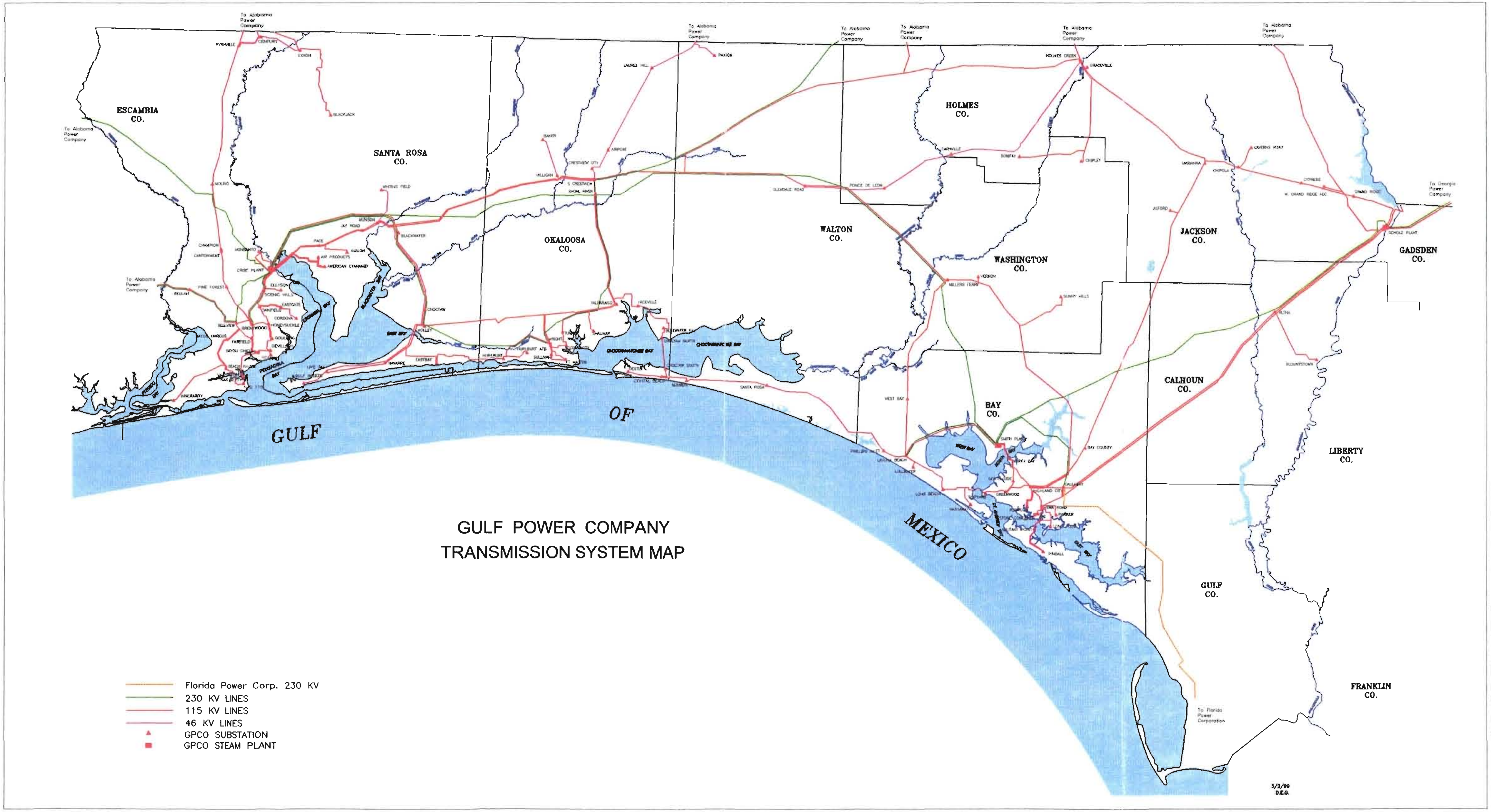

FIGURE 1.2.1-1.

GULF POWER COMPANY SYSTEM MAP

Source: Gulf, 1999.

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Daniel, and has a 25 percent ownership in Georgia Power Company's Plant Scherer Unit No. 3. Table 1.2.2-1 is a tabulation of Gulf's current generating facilities.

As shown in Table 1.2.2-1, the units owned and operated by Gulf within its service area provide a net summer capability totaling 1,531 MW. Including Gulf's ownership interests of 753 MW in Daniel Units Nos. 1 and 2 and Scherer Unit No. 3, Gulf has a total net summer generating capability of 2,284 MW and a total net winter generating capability of 2,292 MW as of June 1, 1999. In addition to Gulf's installed generating resources, Gulf has a contract with Solutia Corporation for 19 MW of firm capacity that will be in effect until May 31, 2005.

1.2.3 TRANSMISSION FACILITIES

Gulf owns approximately 1,426 miles of 115-kilovolt (kV) and 230-kV transmission lines. Within this transmission system, Gulf has 14 points of interconnection with Alabama Power Company (APCo), Georgia Power Company, Alabama Electric Cooperative, and Florida Power Corporation (FPC). The existing Gulf system in Northwest Florida, including generating plants, substations, transmission lines, and service area, is shown in Figure 1.2.1-1.

1.3 PROJECTED CAPACITY RESOURCE NEEDS

1.3.1 OVERVIEW OF THE PLANNING PROCESS

The planning process for Gulf is tightly coordinated with Southern's integrated resource planning (IRP) process. Gulf participates in that process along with the other Southern operating companies, APCo, Georgia Power, MPCo, and Savannah Electric and Power.

The capacity resource needs of Gulf and the entire Southern Electric System (SES) are driven by the summer peak demand forecast and by the Southern reliability criterion of a 13.5-percent reserve margin target. The demand forecast used for capacity planning is a net number, which already reflects the impact of demand-side measures (DSM). Given the demand forecast and the target reserve margin, the planning process uses a computer simulation model called PROVIEW® to produce a listing of preferred capacity resource plans which provide sufficient capacity to reliably meet the system's needs. The best,

Table 1.2.2-1. Existing Generating Facilities

Unit	Location	Type	Fuel	Commercial Service Date	Retirement Date*	Summer Net Capacity (MW)
Crist 1	Escambia County	FS	Gas	1/45	12/11	24.0
Crist 2	Escambia County	FS	Gas	6/49	12/11	24.0
Crist 3	Escambia County	FS	Gas	2/52	12/11	35.0
Crist 4	Escambia County	FS	Coal	7/59	12/14	78.0
Crist 5	Escambia County	FS	Coal	6/61	12/16	80.0
Crist 6	Escambia County	FS	Coal	5/70	12/15	302.0
Crist 7	Escambia County	FS	Coal	8/73	12/18	495.0
					Crist Total	1,038.0
Scholz 1	Jackson County	FS	Coal	3/53	12/11	46.0
Scholz 2	Jackson County	FS	Coal	10/53	12/11	46.0
					Scholz Total	92.0
Smith 1	Bay County	FS	Coal	6/65	12/15	162.0
Smith 2	Bay County	FS	Coal	6/67	12/17	192.6
Smith A	Bay County	CTG	Oil	5/71	12/06	31.6
					Smith Total	386.2
Pea Ridge	Santa Rosa County	Cogen	Gas	5/98	12/28	14.4
		GULF TERRITORIAL UNIT TOTAL				1,530.6
Daniel 1	Mississippi	FS	Coal	9/77	12/27	265.0
Daniel 2	Mississippi	FS	Coal	6/81	12/31	265.0
					Daniel Total	530.0
Scherer 3	Georgia	FS	Coal	1/87	12/42	223.3
		GULF OFF-SYSTEM UNIT TOTAL				753.3
		GULF OWNED GENERATION TOTAL				**2,283.9**

Note: Cogen = cogeneration.
CTG = combustion turbine generator.
FS = fossil steam.

*Retirement dates (2006 through 2042).

Source: Gulf Power Company, 1999.

most cost-effective plan for the entire SES is identified by considering the cost of the various plans on a present worth of revenue requirements (PWRR) basis. The resulting system resource needs are allocated among the operating companies based on reserve requirements. Each company then performs the company-specific studies needed to choose the best way to meet its own capacity and reliability needs.

1.3.2 RESULTS OF RECENT RESOURCE PLANS

The 1998 ten-year site plan (TYSP) showed that Gulf is relying on firm purchased power contracts totaling 143 MW, along with Gulf's reliance on Southern capacity resources, to meet its capacity needs through the year 2001. Due to the decreasing availability of firm power purchases, it is not feasible to replace the purchased power contracts when they expire in 2001. As shown in the 1998 TYSP, Gulf would require an additional 352 MW of capacity in 2002 in order to provide its share of Southern's 13.5-percent minimum reserve margin target. Subsequent updates to Gulf's planning studies show that the summer 2002 capacity shortfall has increased to 427 MW without the addition of new capacity resources. In fact, if no additional capacity is added by 2002, Gulf will have a negative reserve margin on an individual company basis. Table 1.3.2-1 depicts Gulf's reserves both with and without the addition of Smith Unit 3.

The load forecast on which this 427-MW need is based included substantial demand reductions resulting from Gulf's DSM programs and other conservation initiatives. These measures reduced Gulf's summer peak demand by 255 MW in 1998 and will reduce it by a total of 365 MW by the end of 2002. Due to the size of Gulf's need in 2002, Smith Unit 3 cannot be avoided or delayed further by additional DSM programs.

1.3.3 CAPACITY RESOURCE ADDITIONS

Gulf's need for additional supply-side resources through 2001 will be satisfied by the reliance upon SES generation resources as well as purchased power. However, such purchases are only available on a short-term basis. When these arrangements expire at the end of 2001, Gulf must replace them with additional generating capacity to meet its share of system reserve margin requirements.

Table 1.3.2-1. Gulf Power Projected Reserves With and Without Smith Unit 3

Year	Peak Demand (MW)	Starting Capacity (MW)	Capacity Addition (MW)	Ending Capacity (MW)	Reserves (%)
1999	2,175	2,123	198	2,321	6.7
2000	2,207	2,321	-55	2,266	2.7
2001	2,234	2,266	0	2,266	1.4
		WITHOUT SMITH UNIT 3			
2002	2,265	2,266	-143	2,123	-6.3
2003	2,280	2,123	0	2,123	-6.9
2004	2,309	2,123	0	2,123	-8.1
2005	2,347	2,123	-19	2,104	-10.4
2006	2,383	2,104	0	2,104	-11.7
2007	2,425	2,104	148	2,252	-7.1
2008	2,466	2,252	0	2,252	-8.7
		WITH SMITH UNIT 3			
2002	2,265	2,123	574	2,663	19.1
2003	2,280	2,663	0	2,663	18.3
2004	2,309	2,663	0	2,663	16.8
2005	2,347	2,663	-19	2,644	14.1
2006	2,383	2,644	0	2,644	12.4
2007	2,425	2,640	148	2,788	16.4
2008	2,466	2,784	0	2,784	14.3

Source: Gulf Power Company, 1999.

Beginning in 1997, Gulf performed a number of economic evaluations of potential supply options to determine Gulf's most cost-effective means of meeting its 2002 capacity needs. Based on those evaluations, Gulf determined in early April 1998 that a 500-MW class CC unit at its Lansing Smith Generating Plant (Smith Unit 3) was its best internal choice for meeting the 2002 needs. This option saved over $40 million net present value (NPV) (1998 dollars) compared to the next best self-build alternative. In order to determine if other, more cost-effective alternatives were available, and to comply with the FPSC rules, Gulf issued a Request for Proposal (RFP) in August 1998 to solicit alternatives to Gulf's construction of this CC unit. After evaluating the proposals, Gulf determined that the self-build option represented by Smith Unit 3 was the most cost-effective alternative available.

1.4 SMITH UNIT 3

1.4.1 OVERVIEW

Smith Unit 3 will be what is commonly referred to as a 2-on-1 CC unit, using the General Electric (GE) "F" Class CTG technology. The two CTGs comprising this unit will have a nominal generating capability of approximately 170 MW each in the absence of power augmentation. The exhaust gases from each of these CTGs will flow through its own heat recovery steam generator (HRSG). On a combined basis, the HRSGs will produce 1,800 pounds per square inch gauge (psig) steam in sufficient quantities to power about 200 MW of a steam turbine/generator capacity. Power augmentation to the two CTGs will increase the total capacity of this unit to 574 MW.

Smith Unit 3 will be a highly efficient, state-of-the-art CC generating unit. Because the new unit will be fueled by natural gas, the environmental concerns associated with the Project are minimal. Smith Unit 3 is expected to provide the customers of Gulf with many years of low cost, reliable, clean energy.

Smith Unit 3 will have a firm supply of natural gas that will come from a new pipeline installation to the Lansing Smith Plant. That pipeline will be owned, permitted, constructed, and operated by a separate and independent gas transmission company. Currently, Gulf does not have any plans to provide for a secondary fuel source for this unit because of the expected firmness of the natural gas supply. Since this new natural gas pipeline is to be built and owned by someone other than Gulf, the cost estimate does not include any major gas pipeline costs, but does include connection and metering costs.

Smith Unit 3 will be located approximately 1,000 feet (ft) north of the existing Lansing Smith Plant substation. The unit's output will reach Gulf's transmission grid by means of less than 1,000 ft of 230-kV bus.

Smith Unit 3 will have an average annual output of 566 MW, utilizing duct burners at an efficiency of 6,924 British thermal units per kilowatt-hour (Btu/kwh). The unit will have the capability for power augmentation by steam injection to generate up to 574 MW for up to 1,000 hours per year (hr/yr) of peaking generation at a reduced efficiency of 7,271 Btu/ kwh. The costs for the necessary equipment associated with the power augmentation operation are included in the estimate below.

The following is a listing of some of the specific unit characteristics:

- Forced outage rate—3.4 percent.
- Scheduled maintenance outage—2 weeks per year (average).
- Equivalent availability—92 percent.
- Expected average capacity factor—62 percent.
- Fuel consumption (full load)—3,900 million British thermal units per hour (MMBtu/hr).
- Annual fixed operation and maintenance (O&M) (1998$)—$2.84 per kilowatt year (kw-yr).
- Variable O&M (1998$)—$1.89 per megawatt hour (mwh).

1.4.2 PROJECTED UNIT CONSTRUCTION COSTS

The following is a breakdown of estimated installed costs for Smith Unit 3. This estimate is based on a combination of actual vendor quotes and refined engineering cost analyses and includes the costs necessary to comply with all applicable environmental regulations.

With respect to most of the components that comprise the following costs, this estimate can be considered relatively firm (±10 percent).

Installed Cost Estimate for Smith Unit 3

Indirects	$ 25,661,966
Site, general	6,701,846
Steam generator area	39,741,570
Turbine and generator area	91,143,505
Fuel facilities (metering only)	856,111
Plant water systems	13,443,351
Electrical distribution and switchyard (onsite)	12,847,183
Plant instrumentation and controls	2,591,303
Other	3,936,065
TOTAL	$196,922,900

1.5 COST EFFECTIVENESS OF SMITH UNIT 3

A Need Study, filed with the FPSC Petition for Need Determination, demonstrates that Gulf has a clear need for more capacity; and that Smith Unit 3 is the most cost-effective alternative available, taking into consideration both other Gulf-constructed capacity options and options offered by third parties in response to Gulf's RFP for power supply alternatives.

1.5.1 SELF-BUILD ANALYSIS

1.5.1.1 Initiation of Site–Specific Studies

By the summer of 1997, it was apparent that Gulf would need to add generating resources by 2002 to reliably meet its customers' needs. This need was the result of several factors. Gulf's existing short-term power purchase agreements were scheduled to expire at the end of 2001, at which time Gulf would be left with a negative reserve margin. Continuing to meet Gulf's capacity needs with new, short-term power purchase options was not feasible, since such purchases were becoming not only scarce, but extremely expensive as a resource option. In addition, total SES reserve margins were declining, and Gulf could no longer rely on system-wide reserves to offset its own reserve shortfall. Two of the other operating companies in the SES, APCo and MPCo had engaged in a study to determine their best self-build alternatives in the early part of 1997. This led to the filing for certification of APCo's Barry CC unit and MPCo's Daniel CC unit in August of 1997. As a member of the SES, Gulf was offered the opportunity to participate in the ownership of the proposed Daniel CC unit.

Based on all these circumstances, Gulf, in late 1997, began evaluating a number of site-specific, self-build generation options for meeting its future demand needs. The following is a listing of the self-build alternatives that were ultimately considered in this evaluation process:

- Participation in MPCo's Daniel CC unit scheduled for a 2001 in-service date.
- Construction of CTGs at Smith Plant.
- Construction of a CC unit at Smith Plant.
- Participation in a cogeneration unit in the Pensacola area.

The self-build evaluation process required the development of plant-specific cost and operating data for each of the alternatives. These data were then used to calculate the total 20-year NPV of costs for each of the generating alternatives. The components of cost considered in the analysis included capital expenditures, fuel supply and transportation costs, O&M expense, transmission improvements, and system energy savings. These options were compared on both a cost per kilowatt and total NPV basis.

1.5.1.2 Significant Cost Drivers

There are several significant cost drivers in the 20-year NPV cost analyses of site-specific alternatives. These include the cost of natural gas transportation, the cost of required transmission improvements, and the amount of energy savings that result from the displacement of less efficient generation.

1.5.1.3 Natural Gas Transportation Costs

One of the key elements in the cost analyses was the development of natural gas (fuel) supply costs for the self-build options. As discussed in Section 5 of the Need Study filed with the Petition for Need Determination, the SES's Fuel Panel creates a forecast of generic fuel costs by type; however, a more refined and site-specific projection must be used in the self-build analysis. Since most of the self-build options were natural gas-fired alternatives, a number of different fuel assumptions were explored in the evaluation.

Natural gas commodity prices and storage costs are fairly competitive throughout the region and can be treated as basically equivalent for any of the specific sites under consideration. On the other hand, there is a great variety in the natural gas transportation rates, particularly when the cost of gas delivered into the State of Florida is compared to gas delivered outside of Florida.

1.5.1.4 System Energy Savings

Another key economic factor is the amount of system energy savings associated with each alternative. System energy savings are dependent on the marginal fuel cost of the alternative. Units with lower delivered fuel prices will dispatch earlier and will run at higher capacity factors than units with higher fuel costs. In turn, these units displace a greater amount of high-priced generation from other units and maximize system energy savings. This factor tended to penalize lower efficiency CTG units, as well as units with fuel purchased under currently existing gas tariff rates inside the state of Florida. The Daniel CC provided the greatest system energy savings because of its low gas transportation costs. The energy savings of the Smith CC with the new pipeline option were slightly less than those of the Daniel unit, although the pipeline capital cost would be an offset to any savings of this option.

1.5.1.5 Transmission Costs

The geographic location of the alternatives surfaced as a major factor in the cost evaluations due to the impact of location on the electric transmission system and the associated cost of needed improvements. Each of the self-build options was analyzed separately to determine any incremental transmission impacts resulting from its installation. These studies revealed that the prevailing network flows through Gulf's system are from the west to the east. As generation is added, particularly west of Gulf's service area, transmission improvements are required to reliably transport the power and provide voltage support to Gulf's load centers. It was determined that capacity additions located almost anywhere except near the Panama City, Florida, area had some negative impact on the transmission system. In fact, the study revealed that the further west the generation alternative was located, the greater the impact on Gulf's transmission system. The cost of overcoming these impacts was added to the overall cost of each self-build alternative in the evaluation.

1.5.1.6 Capital And O&M Costs

The various options' capital and O&M costs were probably the most straight forward elements of the evaluation. It was clear that participating in a sister company project would have the least capital cost, by enabling Gulf to take advantage of economies of scale. It was also clear that CTGs had lower capital cost and higher operating costs than the CC units.

1.5.1.7 Economic Evaluation

The economic evaluation of the self-build alternatives was approached from a total cost basis using common financial factors to develop a total NPV for each alternative over a 20-year period. The capital costs for the units, pipeline, and transmission were calculated for each self-build alternative as a traditional PWRR. The capacity costs of the cogeneration project and other fixed annual costs were treated like an expense and discounted to yield a NPV of cost. Each self-build option was modeled as an input to the entire SES to determine its effect on the total production and energy costs or savings to the system. The final result of combining these cost components was the total NPV of cost for all of the self-build options.

The evaluation process, which began the previous fall, was completed in April of 1998. As mentioned earlier, in the final analysis the evaluation considered options that were comparable in size to a 2-on-1, F-Class CC technology (approximately 500-MW class) and included all incremental costs associated with the installation of each alternative.

1.5.1.8 Results

The results of the evaluation showed that the Smith CC unit was the lowest cost alternative. Although energy savings was a major factor in the evaluation process, the primary factor that eliminated many of the options was the cost of the transmission improvements required to support new generation at any location outside the Panama City area. The table below provides the results of the self-build analyses which demonstrate that Smith Unit 3 is Gulf's most cost-effective self-build alternative.

Self-Build Alternative	NPV of Costs (98$—millions)
Smith Unit 3	117.1
Smith CTG	158.5
Daniel CC	236.7
Mulat Tower (cogeneration)	239.0

1.6 CONSEQUENCES OF PROJECT DELAY

Beginning with the decision in April 1998 to pursue the installation of Smith Unit 3, Gulf established a project timeline to pinpoint critical dates associated with the successful completion of this unit. Table 1.6.0-1 represents the timeline for Smith Unit 3.

There are a number of elements in the timeline that can and most likely will overlap. For example, the need determination can precede and overlap the permitting, which can overlap equipment procurement. The fact that these elements overlap does not necessarily affect the other processes. However, there are some elements that can affect other elements. For instance, if the need determination were delayed or denied, the environmental permitting would not proceed until the need is resolved.

As mentioned before, recent inquiries in the purchased power market have resulted in fewer and far more costly offers for capacity and energy. Gulf has demonstrated through the steps taken to date that its selection of Smith Unit 3 is the most cost-effective alternative available to meets its customers' load requirements beginning in 2002. Gulf believes that its timeline is reasonable and achievable for a summer 2002 commercial in-service date for Smith Unit 3 in order to prevent having to use this high-priced purchased power. However, if there is a delay of Smith Unit 3 that prevents meeting its June 2002 in-service date, Gulf's customers may pay more for their electrical energy than necessary. Gulf is also concerned with the possibility that without this unit's timely installation, which helps to support SES reserves, there will be additional reliability issues that could affect customer service.

Table 1.6.0-1. Smith Unit 3—Project Timeline

August 21, 1998	Issue RFP
October 16, 1998	Receive proposals and begin evaluations
November 13, 1998	Initial screening complete
December 15, 1999	Begin detailed screening
January 9, 1999	Select short list for negotiations or move forward with self-build option
January 15, 1999	Begin final selection process for gas supplier
February 1, 1999	Solicit vendor proposals for equipment
March 15, 1999	Lock down preliminary engineering for environmental study work for SCA
March 31, 1999	File application for Need Determination
June 1999	File environmental SCA
June 7-8, 1999	Need Determination hearings
August 25, 1999	Final decision on Need Determination
October 31, 1999	Finalize plant design
November 22, 1999	Order remaining equipment
August 1, 2000	Issue bid package for erection of the unit
September 15, 2000	Receive state and federal environmental permits
October 1, 2000	Award erection contract
November 1, 2000	Begin site preparation and begin construction and substation work
January 15, 2002	Complete natural gas supply to plant
February 1, 2002	Begin unit testing and performance checks
May 31, 2002	Project complete

Source: Gulf Power Company, 1999.

2.0 SITE AND VICINITY CHARACTERIZATION

To assess the potential impacts a project may have, it is necessary to characterize the environment in which the project will be located. This chapter provides that characterization for the Smith Unit 3 Project. This chapter begins by describing the Project site and its Bay County environs. Following the site description are detailed characterizations of the socio-political and bio-physical environment. This chapter contains the following specific sections, per the Florida Department of Environmental Protection (FDEP) *Instruction Guide*:

- 2.1—Site and Associated Facilities Delineation.
- 2.2—Socio-Political Environment.
- 2.3—Biophysical Environment.

2.1 SITE AND ASSOCIATED FACILITIES DELINEATION

The proposed site for the construction of the Smith Unit 3 Project is located in central Bay County northwest of Panama City (Township 2 South, Range 15 West, Section 36). The site is owned by Gulf and lies immediately north of their existing Lansing Smith Generating Plant.

Figures 2.1.0-1 and 2.1.0-2 show the location of the Project within the state of Florida and within Bay County, respectively. The approximately 50-acre site is bordered on the south by the existing Lansing Smith Generating Plant, on the west by a Gulf electric transmission line corridor, and on the north and east by undeveloped property owned by Gulf. Figure 2.1.0-3 shows the site location on U.S. Geological Survey (USGS) 1:24,000 scale topographic maps (USGS, 1992). Access to the site is provided by County Road (CR) 2300 which terminates at the existing power plant entrance. CR 2300 connects to State Road (SR) 77 to the east.

Figure 2.1.0-4 shows the outline of the proposed site on a recent aerial photograph (dated March 1999) at a scale of 1-inch equals 1,000 ft. Additionally, the joint state/federal dredge-and-fill permit application form (Appendix 10.2.4) will contain a 1-inch equals 400-ft aerial photograph of the site. The site is completely forested and has been logged for many years.

The 574-MW Smith Unit 3 Project will require development of the majority of the 50-acre site. Included in the proposed development will be the generating facility footprint, construction laydown area, gas metering station, storm water ponds, and administration building and parking. The proposed Smith Unit 3 will share facilities with the existing power plant units to the south, including the discharge canal, water wells, the domestic wastewater treatment plant (WWTP), electric transmission lines, and transportation access.

The site is fairly level and low in elevation averaging approximately 5 feet above mean sea level (ft-msl). According to the Federal Emergency Management Agency (FEMA) floodplain map (Figure 2.1.0-5), the entire site is located outside of the 100-year floodplain.

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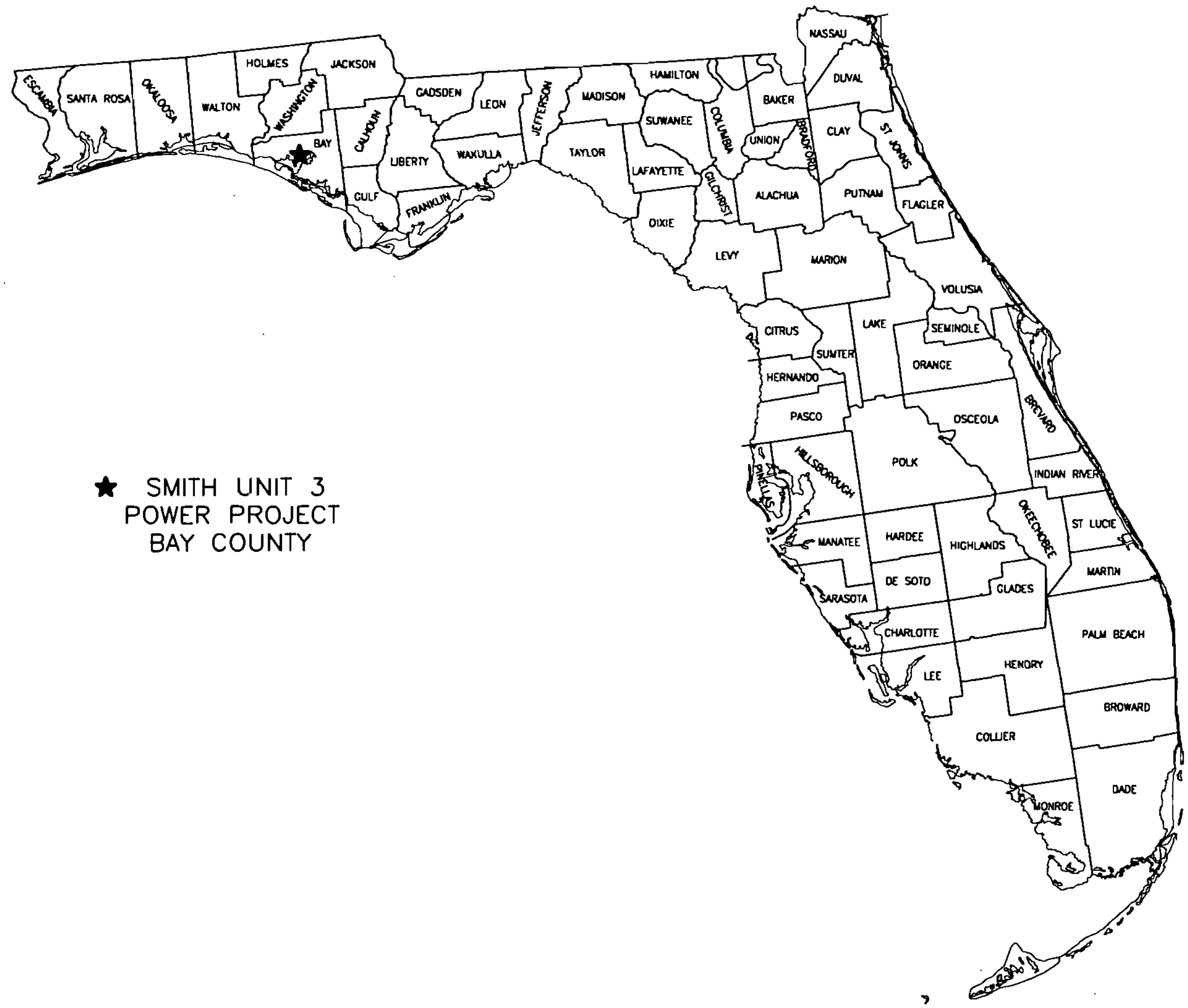

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FIGURE 2.1.0-1.

SITE LOCATION WITHIN THE STATE OF FLORIDA

Source: ECT, 1999.

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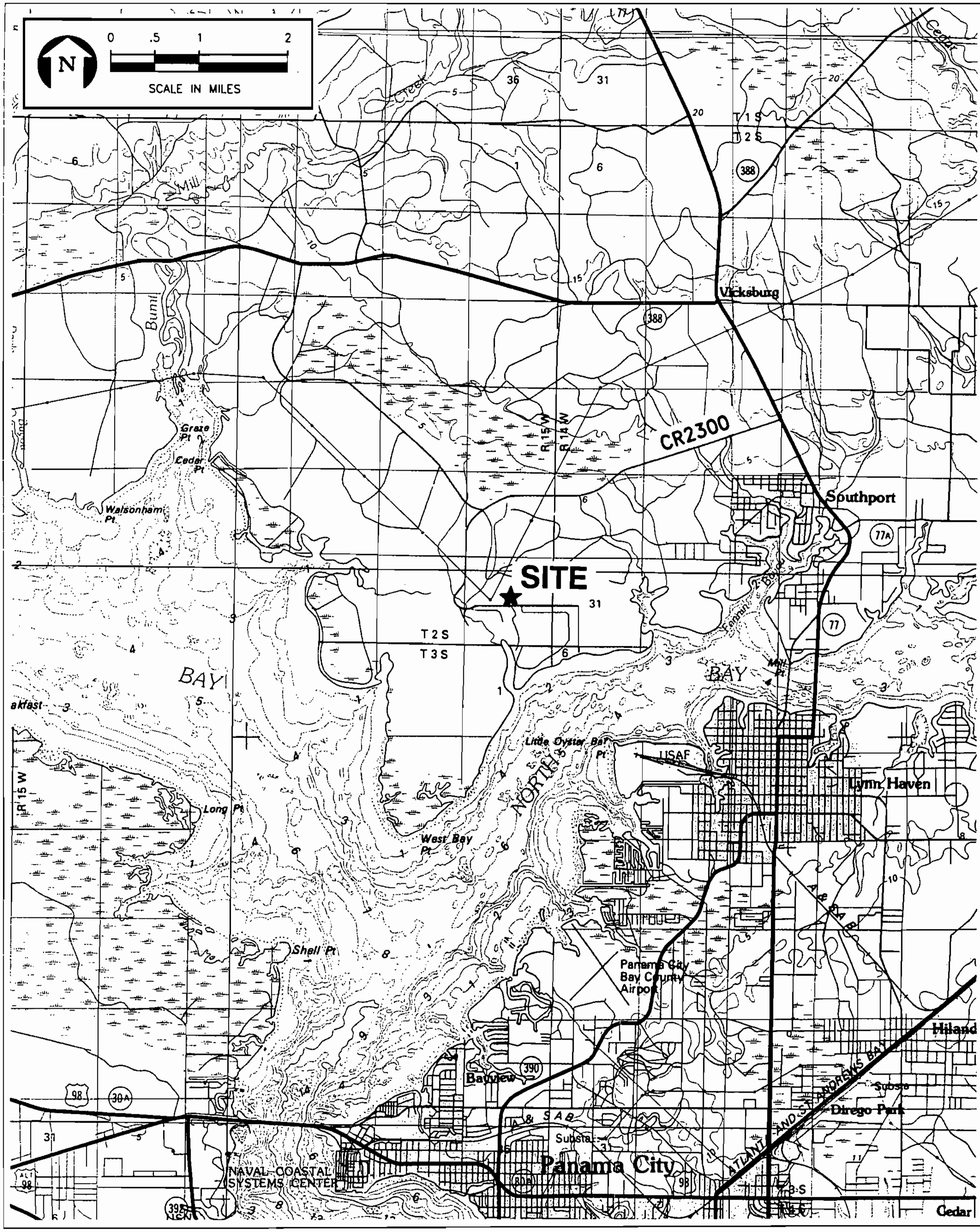

FIGURE 2.1.0-2.

SITE LOCATION RELATIVE TO LOCAL LANDMARKS

Source: USGS 30x60-minute topo map: Panama City, FL, 1981.

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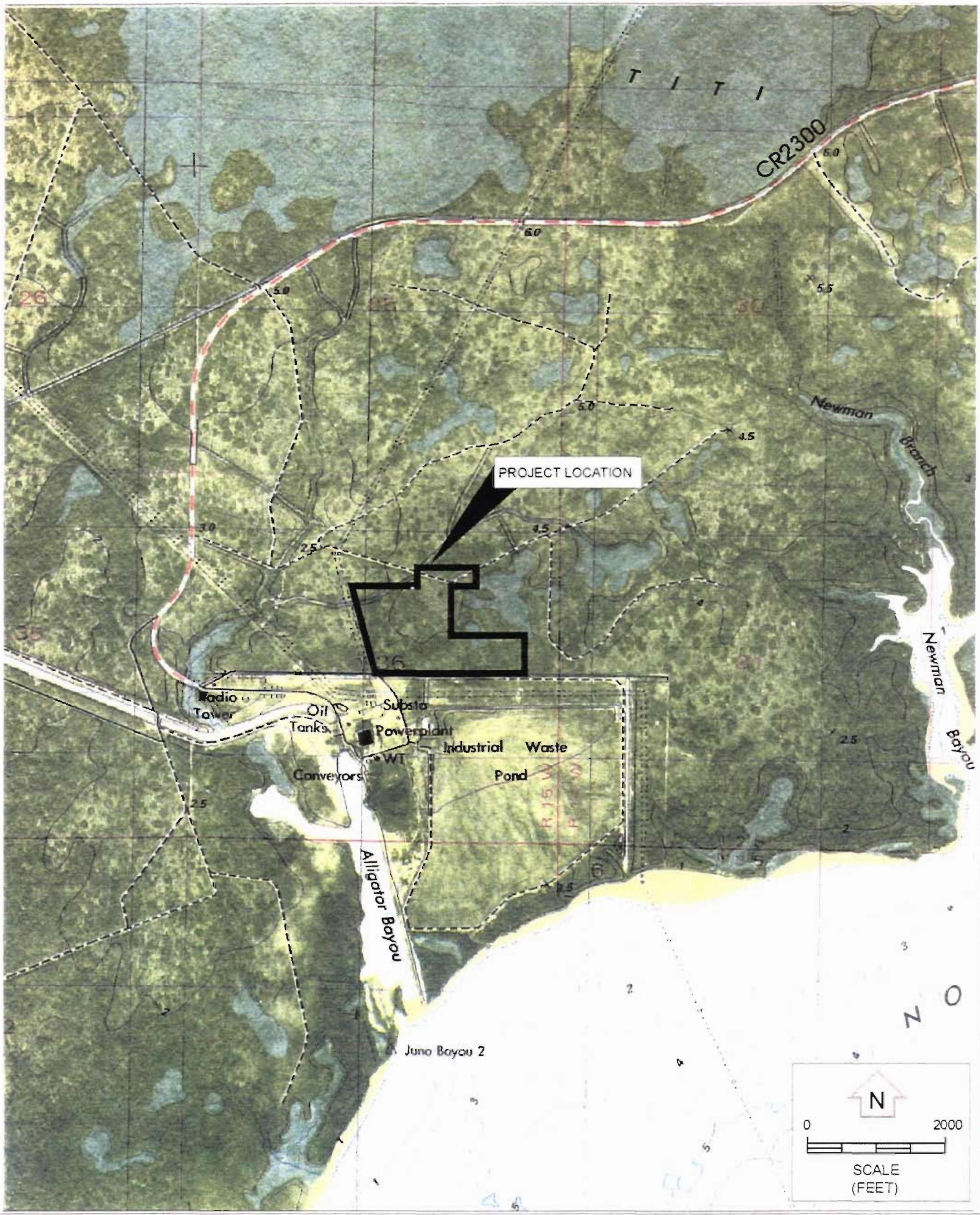

FIGURE 2.1.0-3.

PROJECT SITE LOCATION AND SURROUNDINGS

Sources: USGS topo map of Southport, Fl., 1992; ECT, 1999.

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FIGURE 2.1.0-4.

AERIAL PHOTOGRAPH OF SITE LOCATION

Source: Gulf Power, 1999.

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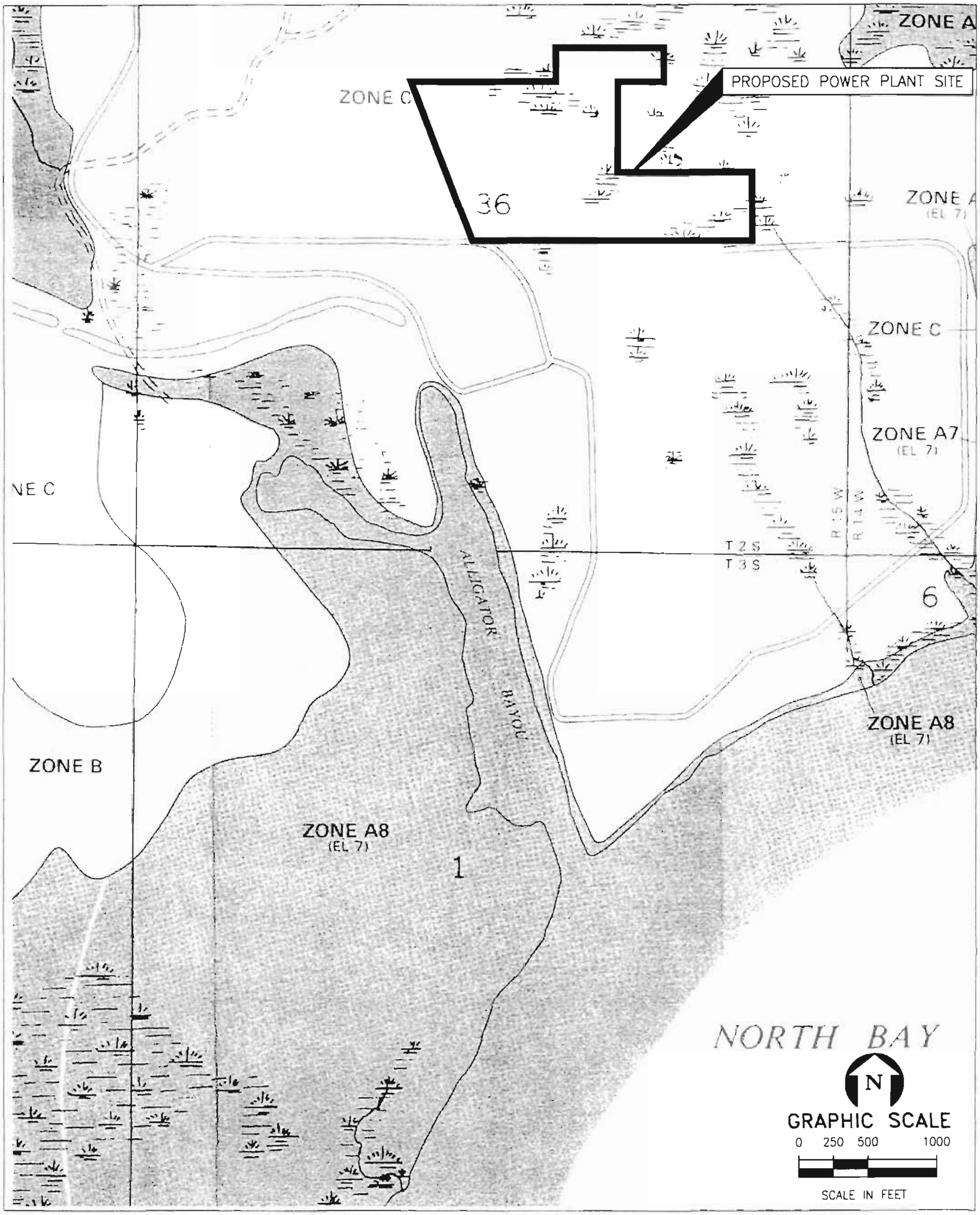

FIGURE 2.1.0-5.

FLOODPLAINS MAP - SMITH UNIT 3

Sources: FEMA; ECT, 1999.

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2.2 SOCIO-POLITICAL ENVIRONMENT

2.2.1 GOVERNMENTAL JURISDICTIONS

The Smith Unit 3 Project site is located in unincorporated Bay County, Florida. Figure 2.2.1-1 depicts the Project site location and its juxtaposition with incorporated and unincorporated areas in a 5-mile radius.

The nearest incorporated city is Lynn Haven, located approximately 2.5 miles southeast of the Project site. Recent annexations into Lynn Haven have included properties located approximately 3 miles east of the Project site. The Future Land Use Element of the Comprehensive Plan notes that the City of Lynn Haven has identified portions of Southport as probable areas for the expansion of sewer service. Panama City, the next closest incorporated city, is located approximately 3.5 miles to the southeast. The 1990 adopted Bay County Comprehensive Plan identifies Southport, located approximately 2 miles northeast of the Project site, as a community (currently unincorporated). Southport is currently undergoing an incorporation process.

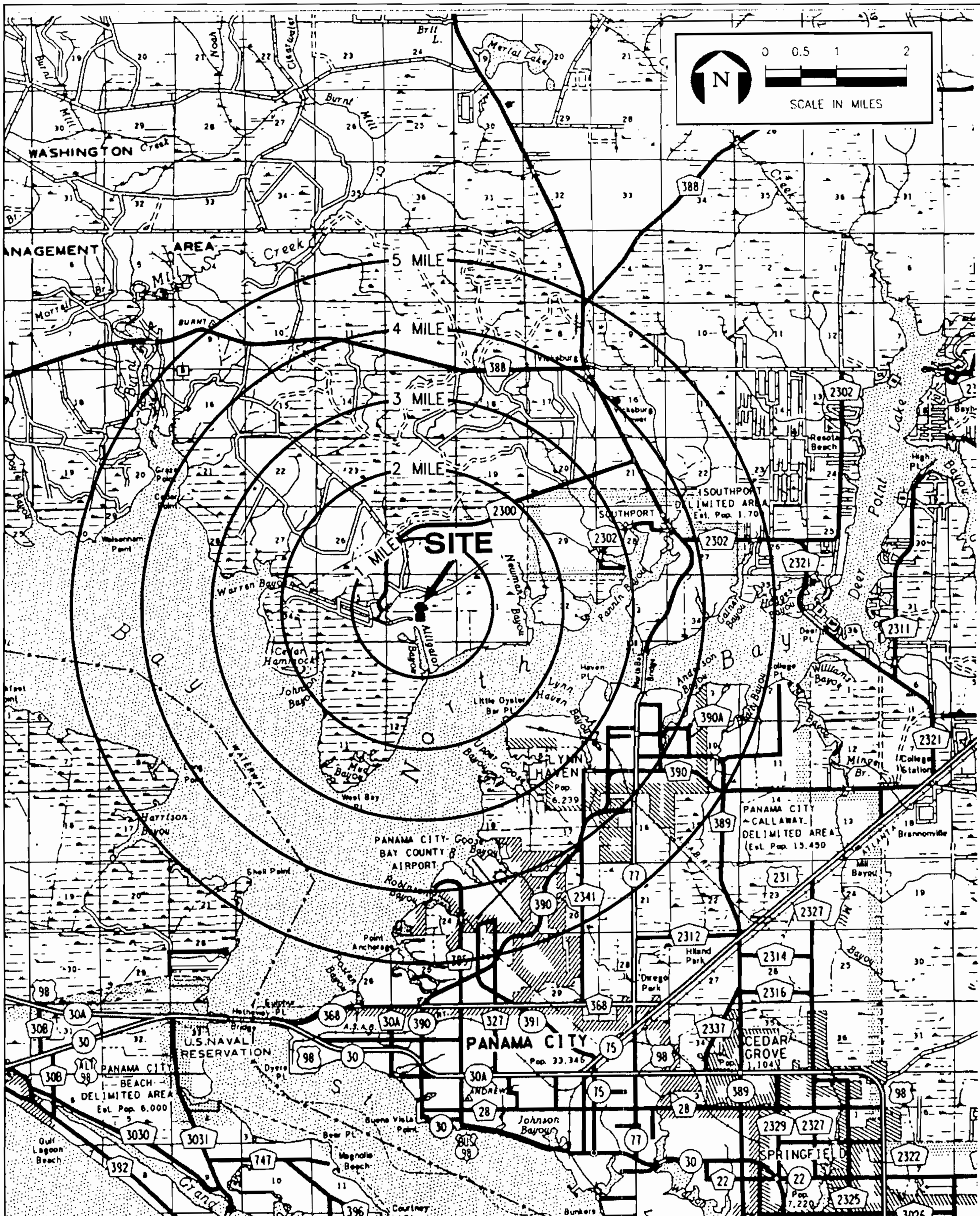

FIGURE 2.2.1-1.

SITE RELATIVE TO INCORPORATED/UNINCORPORATED AREAS

Sources: FDOT, 1993; ECT, 1999.

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2.2.2 ZONING AND LAND USE PLANS

The Project site is currently in silviculture, primarily, and has never been developed for other uses. Adjacent to the south is the existing Lansing Smith plant. To the west of the Project site are two power line transmission corridors. The current zoning and land use plan designations for the site are described in the following sections.

2.2.2.1 Comprehensive Plan Future Land Use Map

The Project site is currently located in the Agriculture land use classification as depicted on the 1990 Adopted Bay County Comprehensive Plan Future Land Use Map (FLUM). Figure 2.2.2-1 depicts the boundaries of the land use classifications in proximity to the Project site. The existing Lansing Smith plant is designated Industrial and the surrounding lands to the east, north, and west are designated as Agriculture. The allowable uses within the Agriculture designation cannot accommodate the proposed construction of Smith Unit 3.

Bay County is currently updating its 1990 Adopted Comprehensive Plan through the Evaluation and Appraisal Review (EAR) process. In the February 1998 version of the Comprehensive Plan passed by the Bay County Board of Commissioners and submitted to the Florida Department of Community Affairs (FDCA), the allowable uses within the Agriculture designation were expanded to include self-contained industry. While the proposed development of Smith Unit 3 may be compatible with the proposed change, the updated Comprehensive Plan may not be finally adopted and legally in effect until later in 1999.

In order to be consistent with the current adopted Comprehensive Plan, Gulf has submitted a large-scale (greater than 10 acres) plan amendment application to change the FLUM designation from Agriculture to Industrial. The Industrial designation will accommodate the proposed use of the property and is consistent with the existing designation for the adjacent Lansing Smith Plant (Smith Units 1 and 2). The plan amendment application submitted to Bay County included a review of the compatibility of the proposed FLUM change with both the adopted Comprehensive Plan and the February 1998 version of the Comprehensive Plan. The proposed change is compatible with the objectives and policies

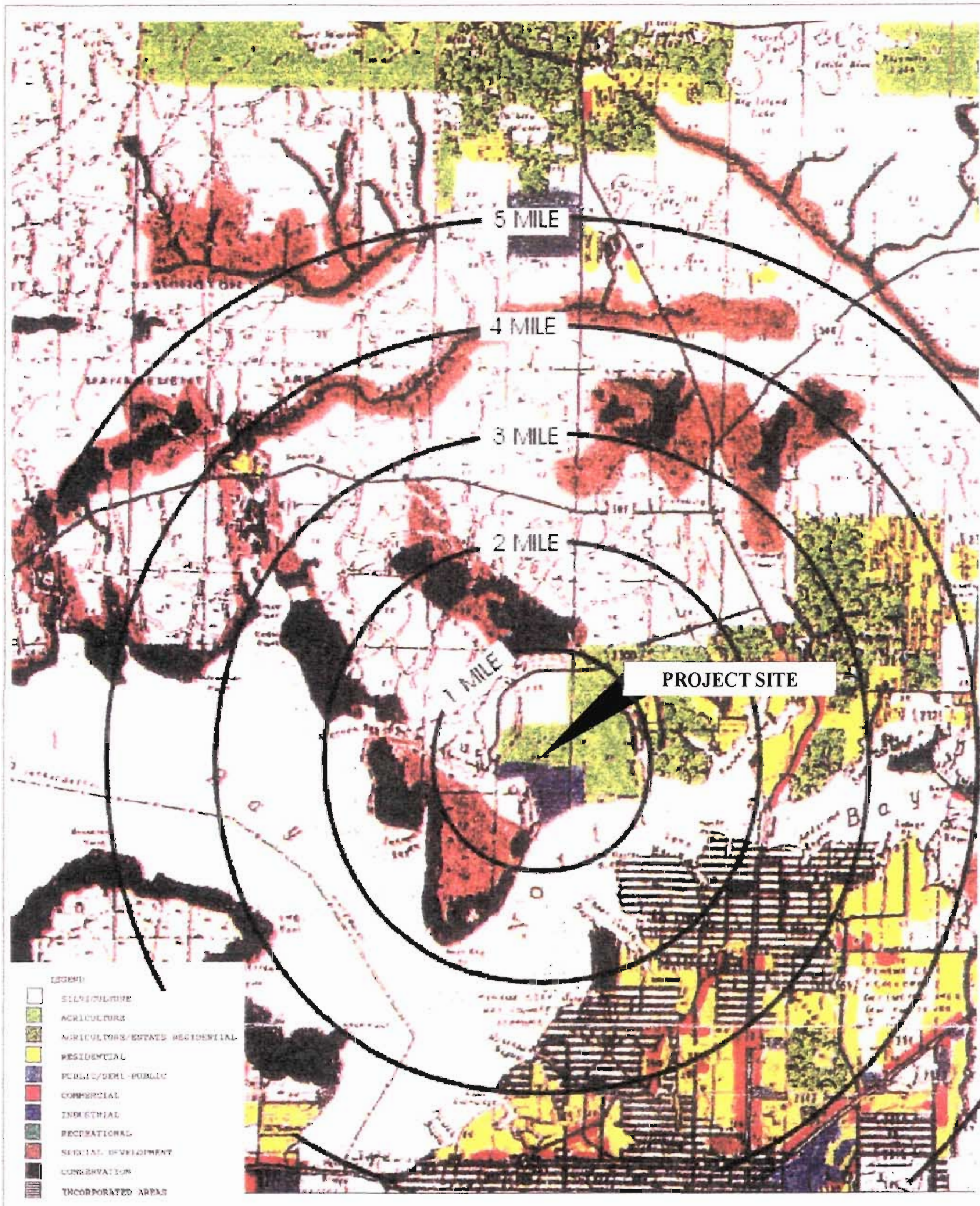

FIGURE 2.2.2-1.

BAY COUNTY LAND USE CATEGORIES

Sources: Bay County Planning Dept., 1991; ECT, 1999.

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of both plans and is consistent with the planning assumptions that industrial expansion would occur in much the same pattern as had existed in the past and those acreage requirements would not significantly change. Smith Unit 3 is an approximately 50-acre expansion of the existing, approximately 700-acre, built-out Lansing Smith plant site.

In May 1999, Bay County transmitted Gulf's requested plan amendment to the FDCA for review. It is anticipated the plan amendment for the site will be adopted by the county in Fall 1999. A copy of Gulf's submitted comprehensive plan amendment is included as Appendix 10.2.1.

2.2.2.2 Zoning

In Bay County, the zoning districts are coincident with the comprehensive plan land use designations. Gulf's large-scale plan amendment application thus seeks to change both the existing FLUM and zoning designation of Agriculture to Industrial. When the plan amendment is approved, the proposed development of Smith Unit 3 will meet all setback, required yard sizes, lot coverage, and other requirements of the Bay County Land Use Code.

2.2.3 DEMOGRAPHY AND ONGOING LAND USE

Recent population trends for the unincorporated areas of Bay County and the nearby incorporated areas of Panama City, Lynn Haven, and Cedar Grove are depicted on Figure 2.2.3-1. The rate of population growth for the state of Florida from 1970 to 1980 and from 1980 to 1990 exceeds that for the entire population of Bay County. The estimated change from 1990 to 1995 for the state and for all of Bay County is nearly the same (8.6 to 8.8 percent, respectively). The rate of increase for unincorporated Bay County exceeds that of the state of Florida for all three time periods. The rate of population increase in unincorporated Bay County exceeds that of Panama City and is generally less than that for Lynn Haven and Cedar Grove. The entire population of Bay County is projected to increase by 7.3 percent from 1995 to 2000, by 6.7 percent from 2000 to 2005, and by 6.1 percent from 2005 to 2010. These projected increases lag behind those for the projected state population increases as a whole.

Existing land uses within a 5-mile radius of the Project site are depicted in Figure 2.2.3-2. Surrounding land uses to the north, east, and west are silviculture. The industrial land use to the south is associated with the existing Lansing Smith Plant. An electric transmission line corridor abuts a portion of the western Project site boundary. The nearest residential development is located over 2 miles to the northeast of the Project site. Field verification of the surrounding land uses was conducted in February 1999. The cities of Lynn Haven, Panama City, and Cedar Grove are located southeast of the Project site across North Bay.

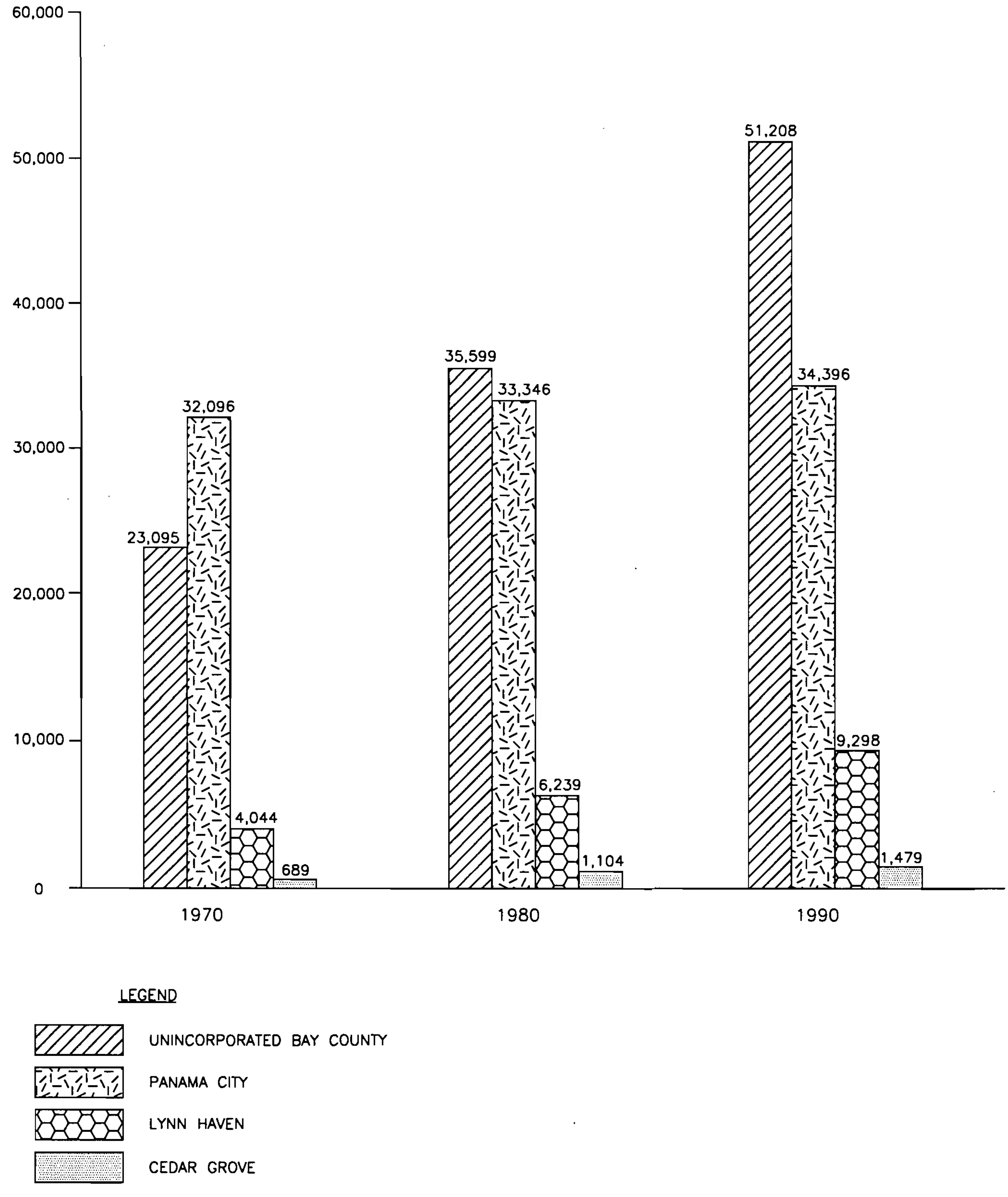

FIGURE 2.2.3-1.
POPULATION TRENDS

Sources: Florida Statistical Abstracts, Bay County Comprehensive Plan; ECT, 1999.

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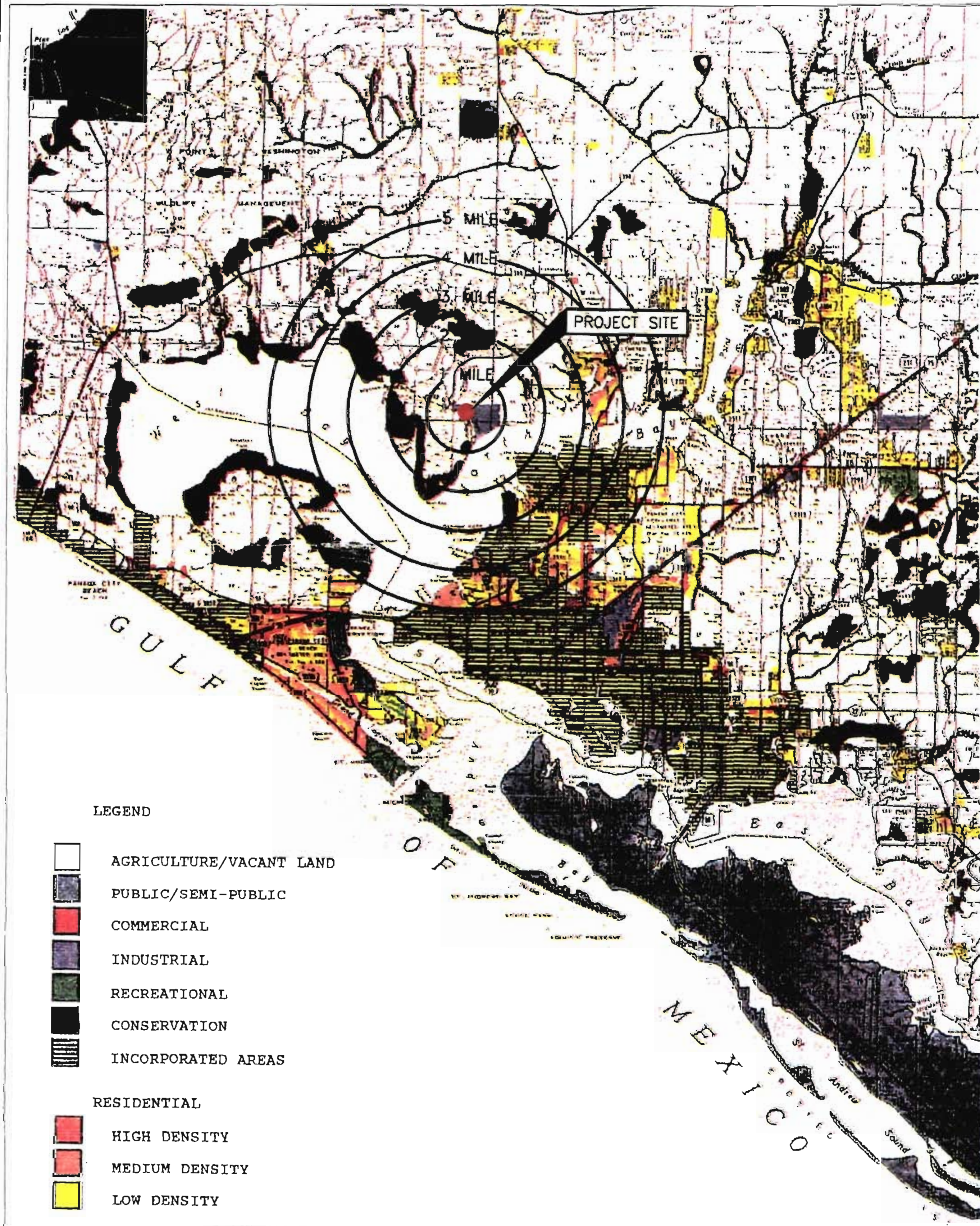

FIGURE 2.2.3-2.

EXISTING LAND USE MAP OF PROJECT VICINITY

Sources: Bay County Planning and Zoning Dept., 1991; ECT, 1999.

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2.2.4 EASEMENTS, TITLE, AGENCY WORKS

The Project does not need any approvals for easements, title, or crossing of works of any agency.

2.2.5 REGIONAL SCENIC, CULTURAL, AND NATURAL LANDMARKS

The West Florida Regional Planning Council (WFRPC) has prepared a Strategic Regional Policy Plan (SRPP) for its seven-county planning area. The SRPP, prepared in accordance with Section 186.507, Florida Statutes, is a long-range guide for the physical, economic, and social development of the region. The SRPP is required to identify and address significant regional resources and facilities. Using existing information from numerous state and federal agencies, natural resources inventory maps have been compiled for the region. Figures 2.2.5-1 through 2.2.5-6 depict the natural resources in the WFRPC planning area. Regionally significant natural resources within 5 miles of the Project site have been identified as North Bay (surface water resource) and wetlands.

The adopted 1990 Bay County Comprehensive Plan identifies the natural resources of Bay County including:

- Fish and wildlife habitats.
- Critical habitat areas.
- Deer Point Lake watershed.
- Wetlands.
- Vegetative communities.

There are no critical habitat areas or unique fish and wildlife habitats depicted within 5 miles of the Project site (Figure 2.2.5-7). The Project site is located approximately 5.5 miles from the nearest boundary of the Deer Point Lake watershed. The predominant onsite and proximate vegetative community is the North Florida pine flatwoods. This plant community, in Bay County in general, and the Project site specifically, has been extensively logged, resulting in low diversity of plants and a limited amount and diversity of wildlife. The onsite wetlands are isolated systems separate from the major regional wetland systems such as Jackson Titi to the north and Newman Branch to the east. The nearest Conservation land use designations on the FLUM are approximately 1 mile to the south along the northern shore of North Bay and approximately 1 mile northwest of the Project site, associated with Jackson Titi.

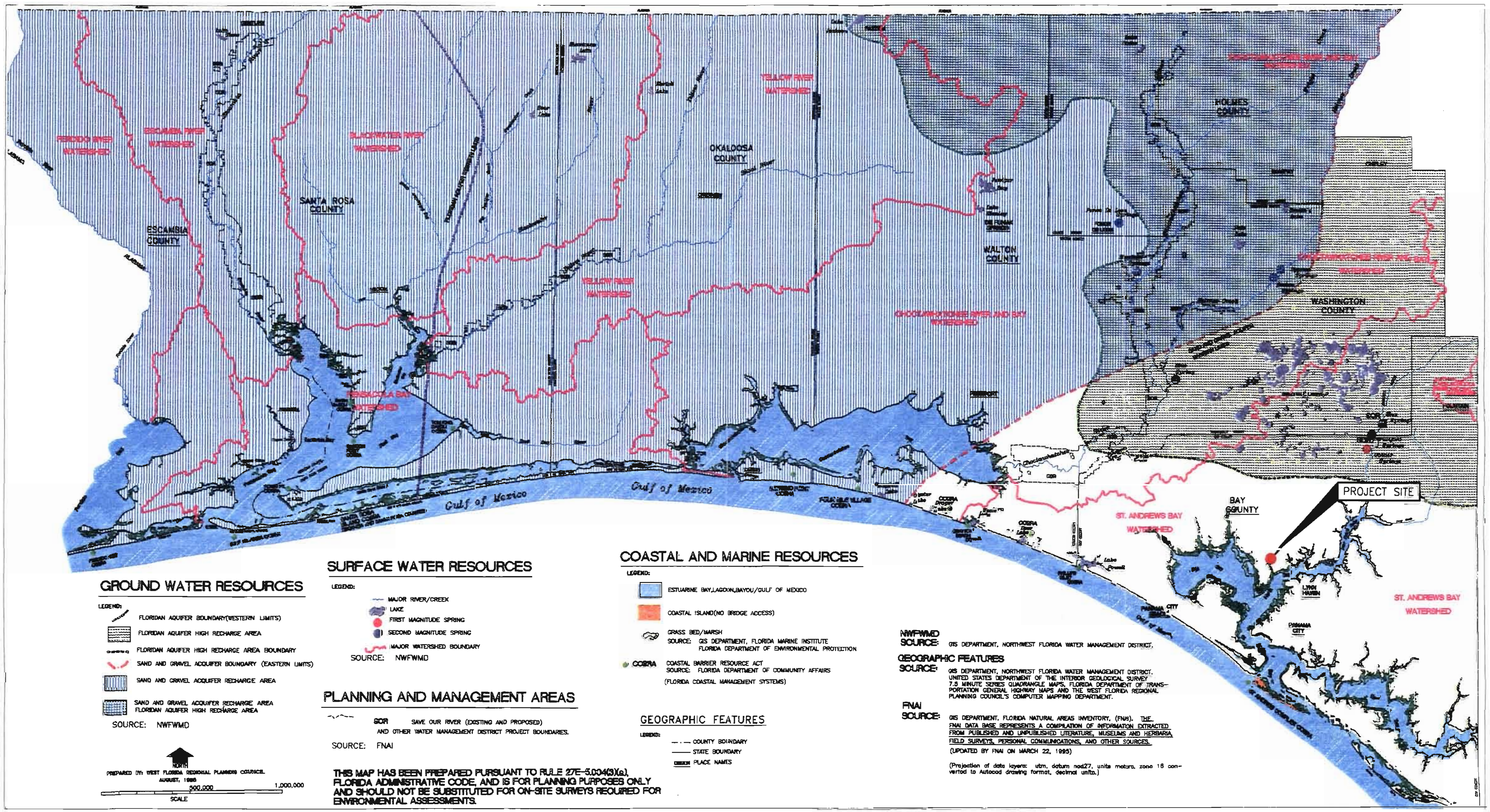

FIGURE 2.2.5-1.

WATER RESOURCES

Sources: West Florida Regional Planning Council, 1996; ECT, 1999.

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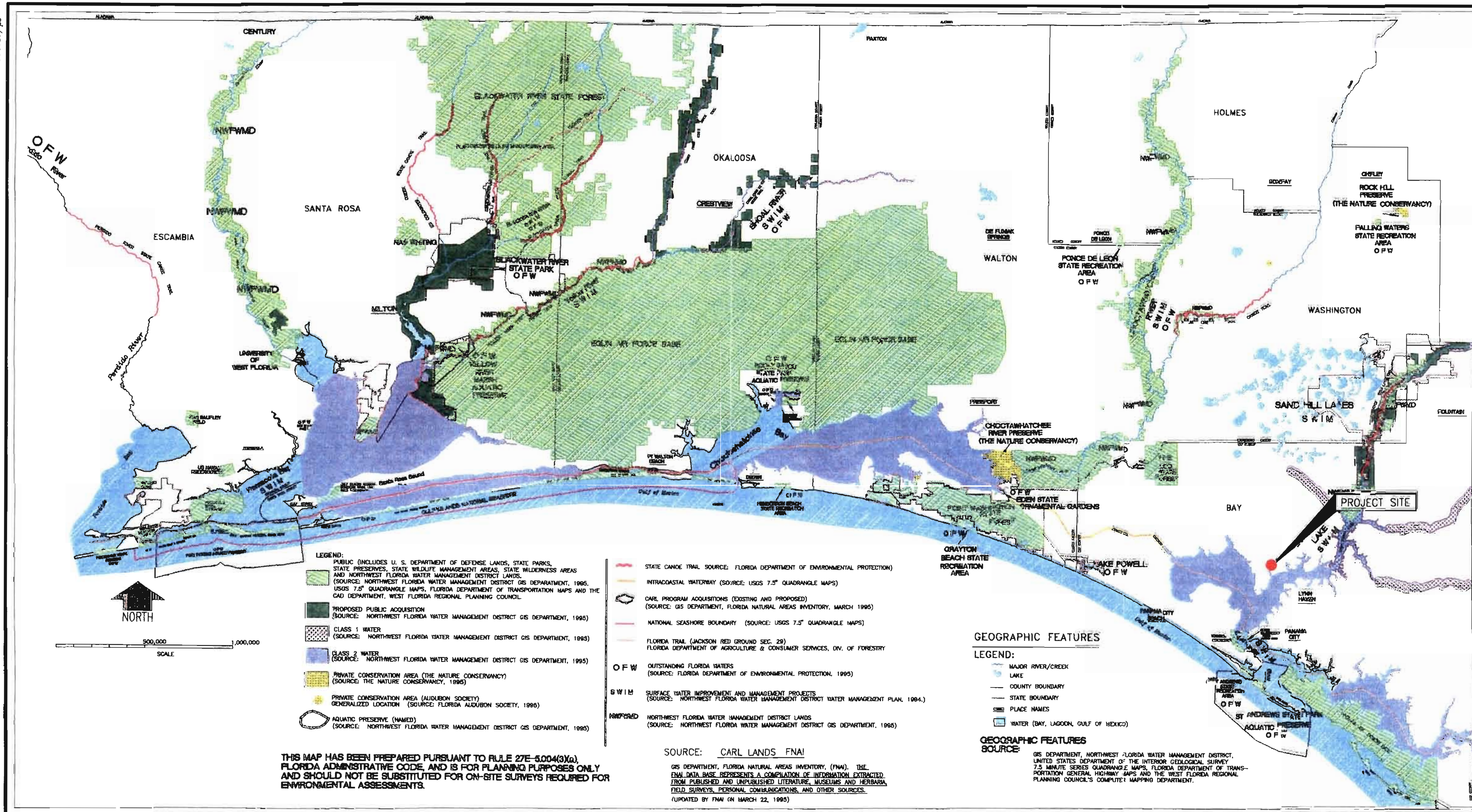

FIGURE 2.2.5-2.

PLANNING AND MANAGEMENT AREAS

Sources: West Florida Regional Planning Council, 1996; ECT, 1999.

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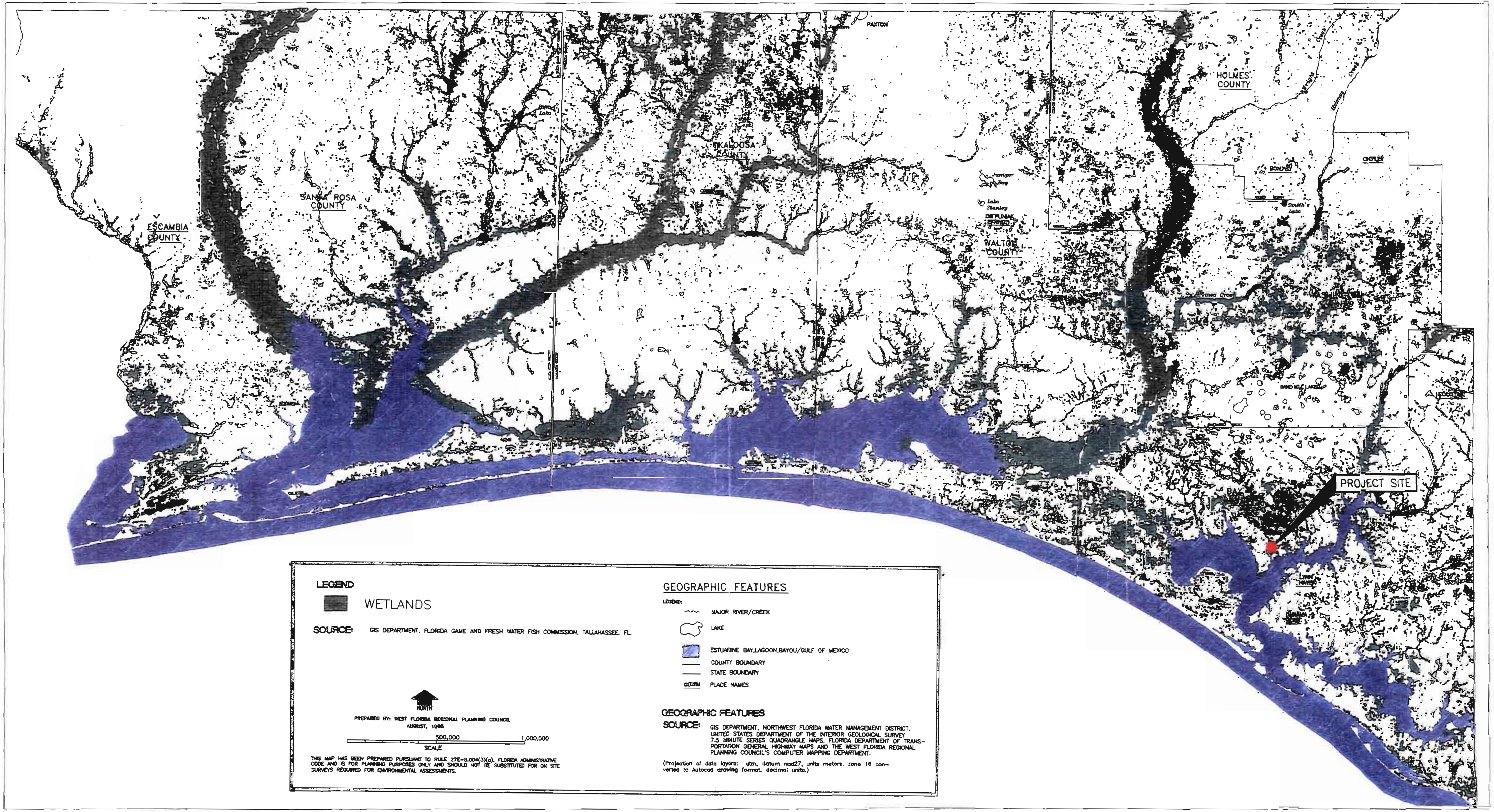

FIGURE 2.2.5-3.
WETLANDS

Sources: West Florida Regional Planning Council, 1996; ECT, 1999.

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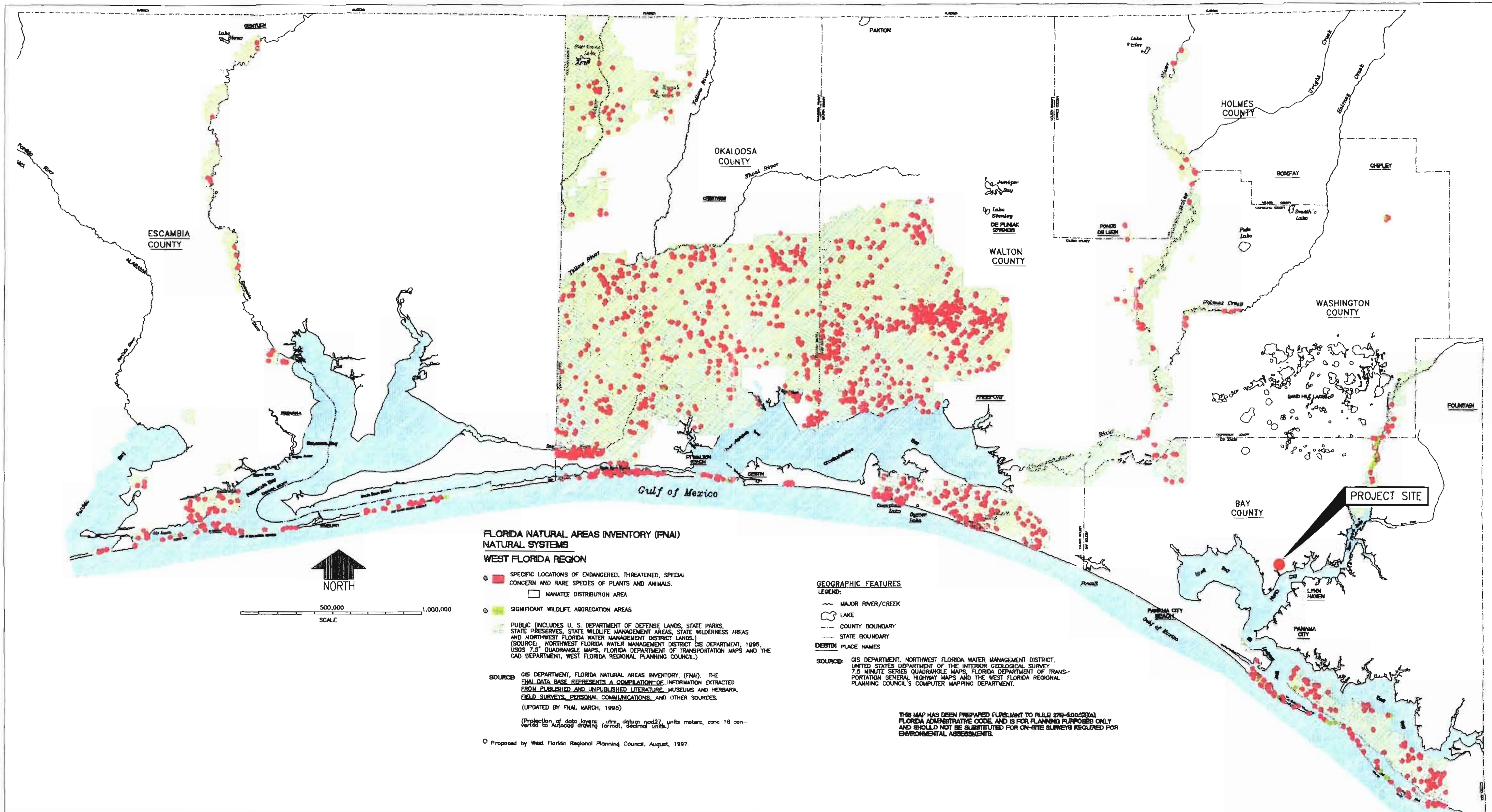

FIGURE 2.2.5-4.

NATURAL COMMUNITIES

Sources: West Florida Regional Planning Council, 1996; ECT, 1999.

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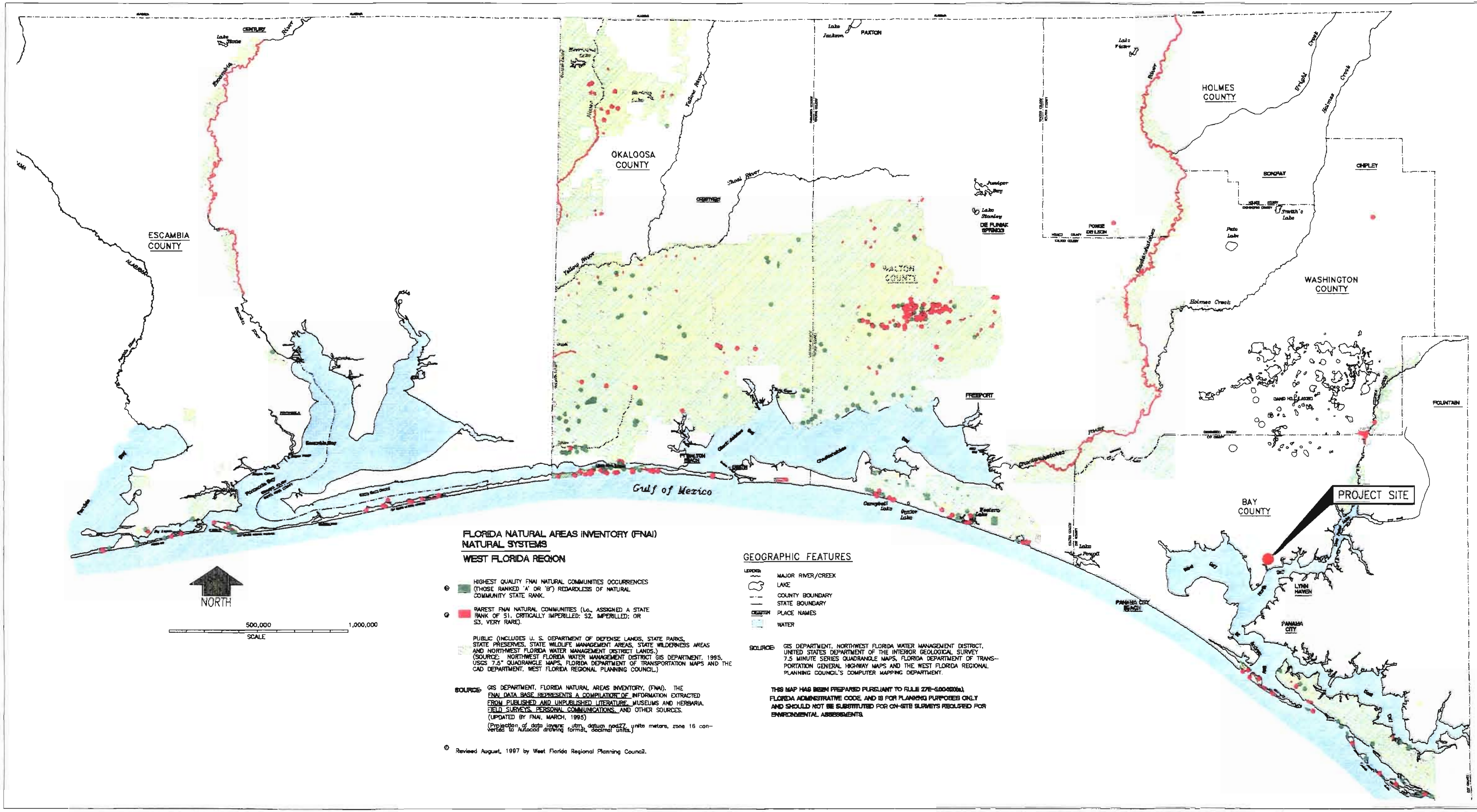

FIGURE 2.2.5-5.

ENDANGERED, THREATENED, SPECIAL CONCERN, AND RARE PLANT AND ANIMAL SPECIES

Sources: West Florida Regional Council, 1995; ECT, 1999.

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Environmental Consulting & Technology, Inc.

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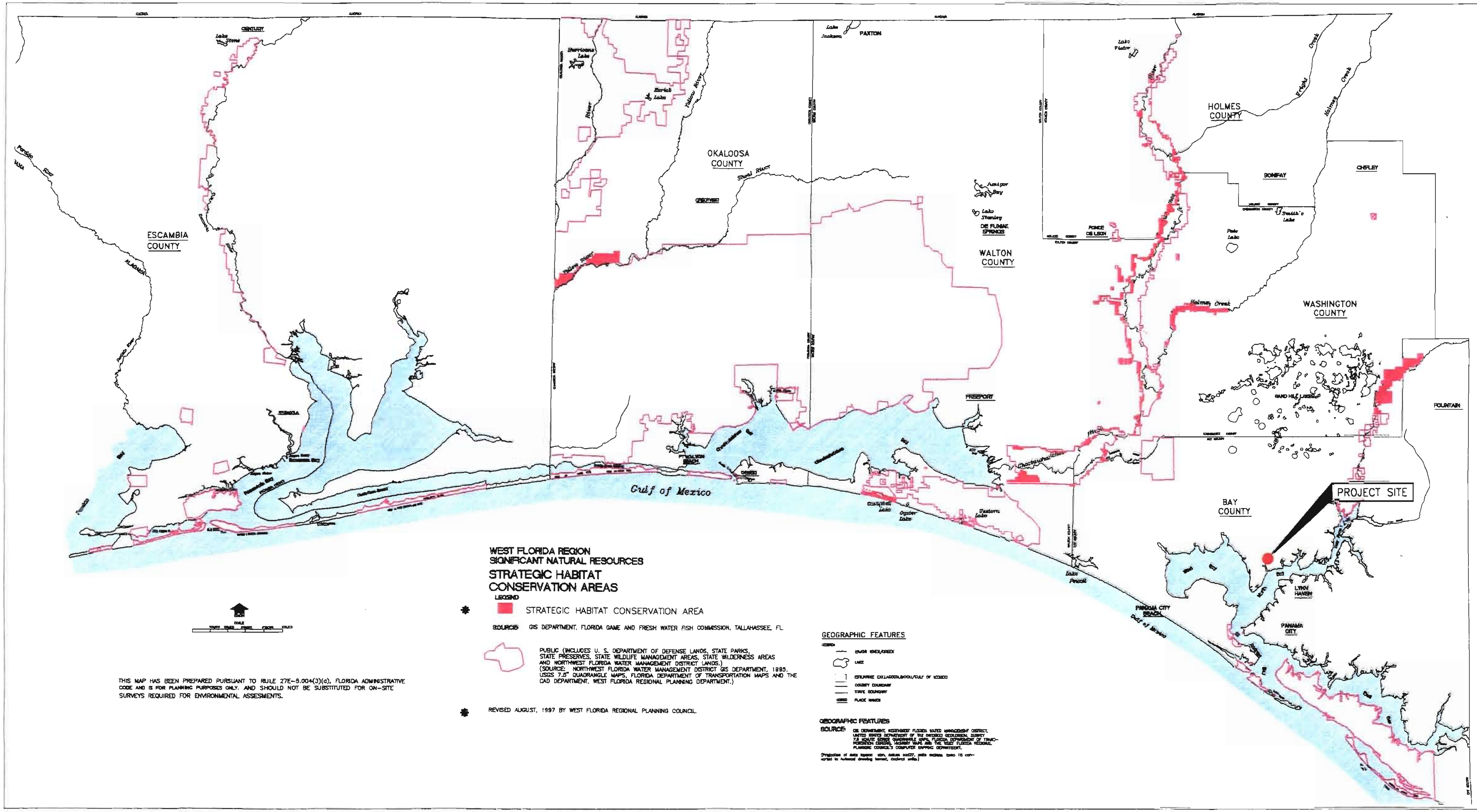

FIGURE 2.2.5-6.
STRATEGIC HABITAT CONSERVATION

Sources: West Florida Regional Planning Council, 1995; ECT, 1999.

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Environmental Consulting & Technology, Inc.

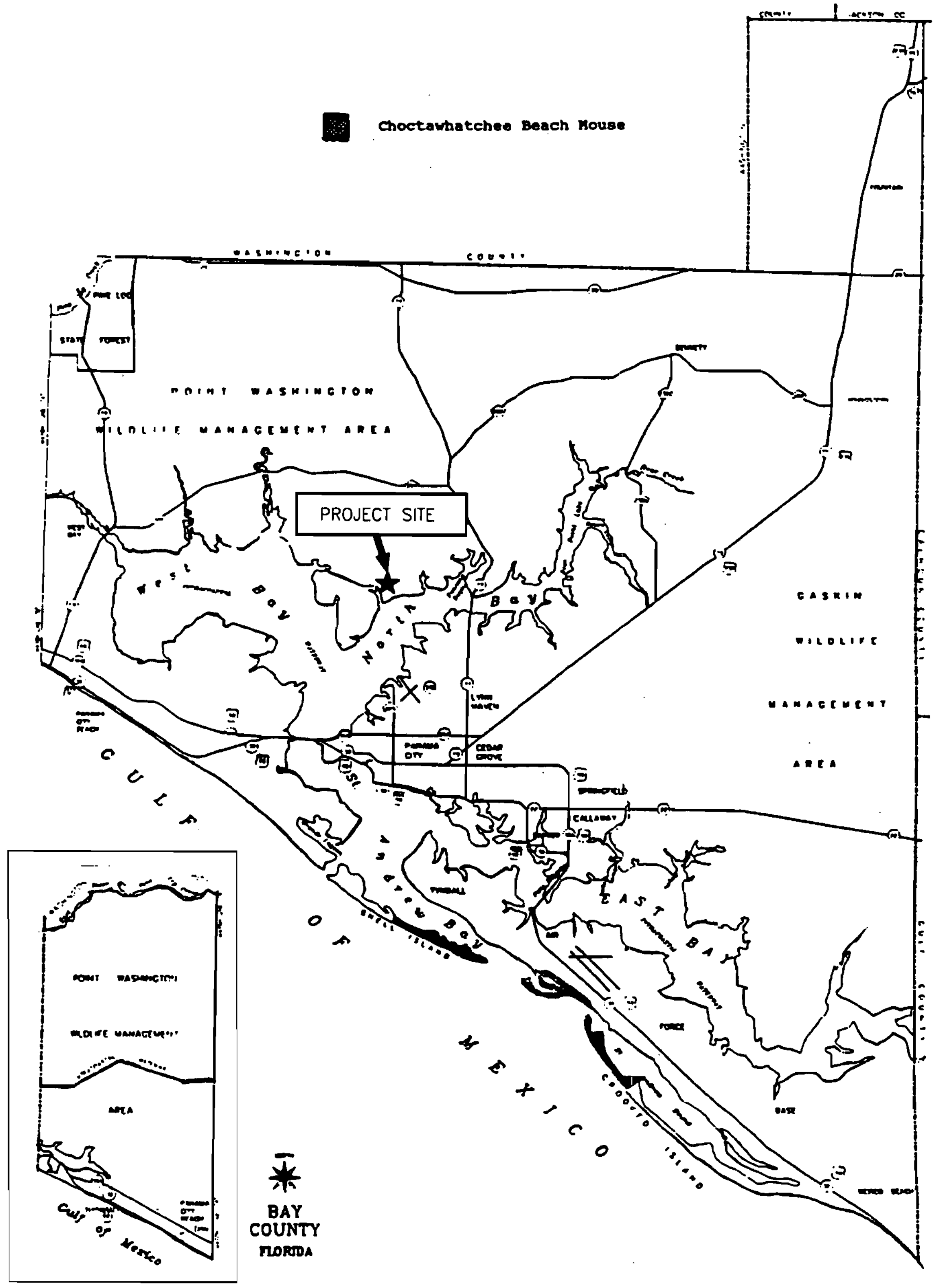

FIGURE 2.2.5-7.
CRITICAL HABITATS

Sources: Bay County Planning & Zoning Dept., 1991; ECT, 1999.

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Figures 2.2.5-8 through 2.2.5-10 depict state and county recreational facilities, federal and private recreational facilities, and potential future recreational facilities within Bay County, respectively. None of these existing or potential future sites are located in proximity to the Project site. The nearest local park is located approximately 4 miles east of the Project site, the nearest regional park is located approximately 10 miles to the south, the nearest federal recreational facility is located approximately 6 miles to the southwest, and the closest potential future recreational area is Deer Point Lake located over 5 miles to the northeast of the Project site.

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

- National parks.
- National forests.
- National seashores.
- National memorials or monuments.
- National marine and estuarine sanctuaries.
- Roadless area review and evaluation (RARE) areas.
- National wild and scenic rivers.
- State parks.
- State forests.
- Areas of critical state concern.
- Indian reservations.
- Military lands.

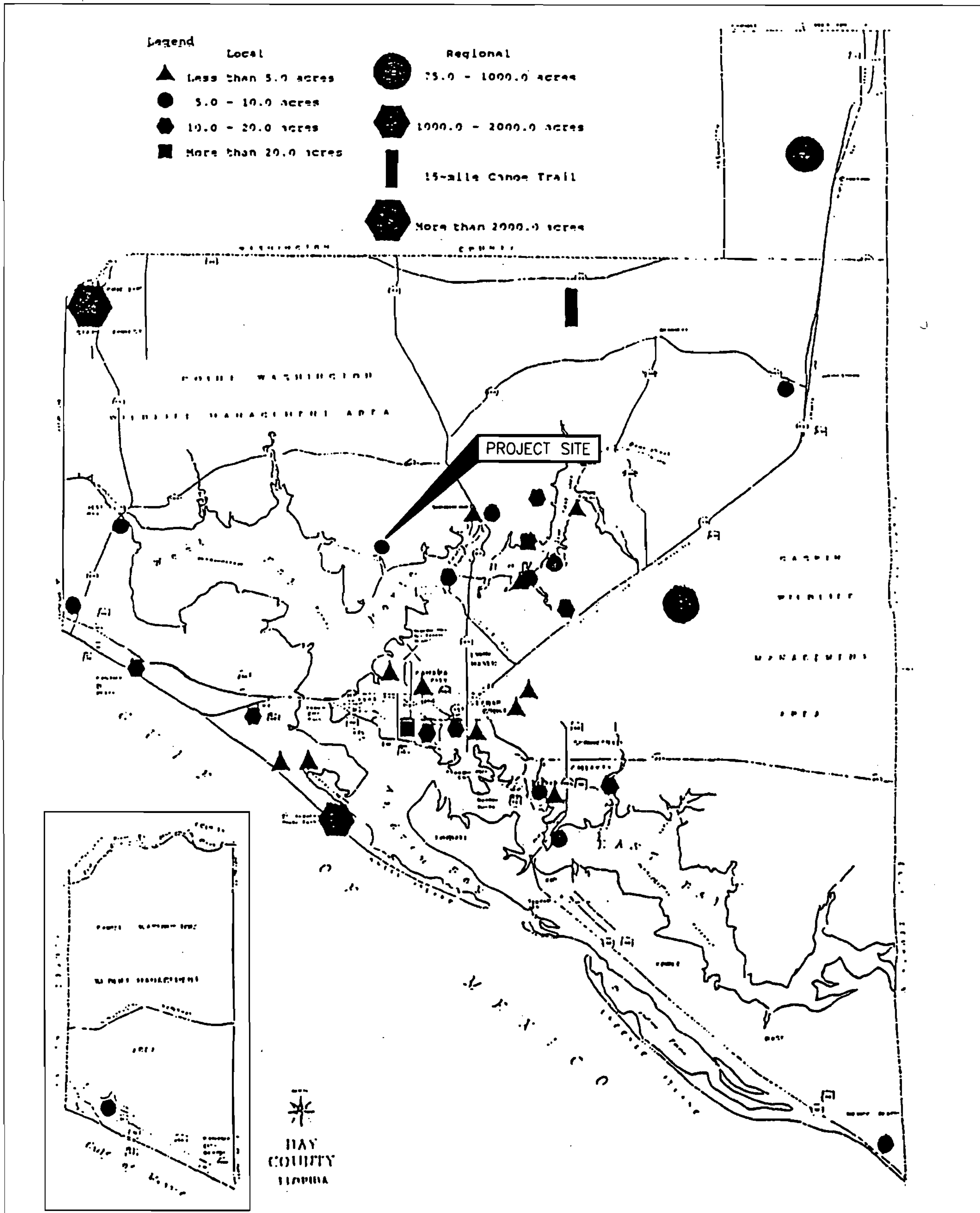

FIGURE 2.2.5-8.

STATE AND COUNTY RECREATIONAL FACILITIES

Sources: Bay County Planning & Zoning Dept., 1991; ECT, 1999.

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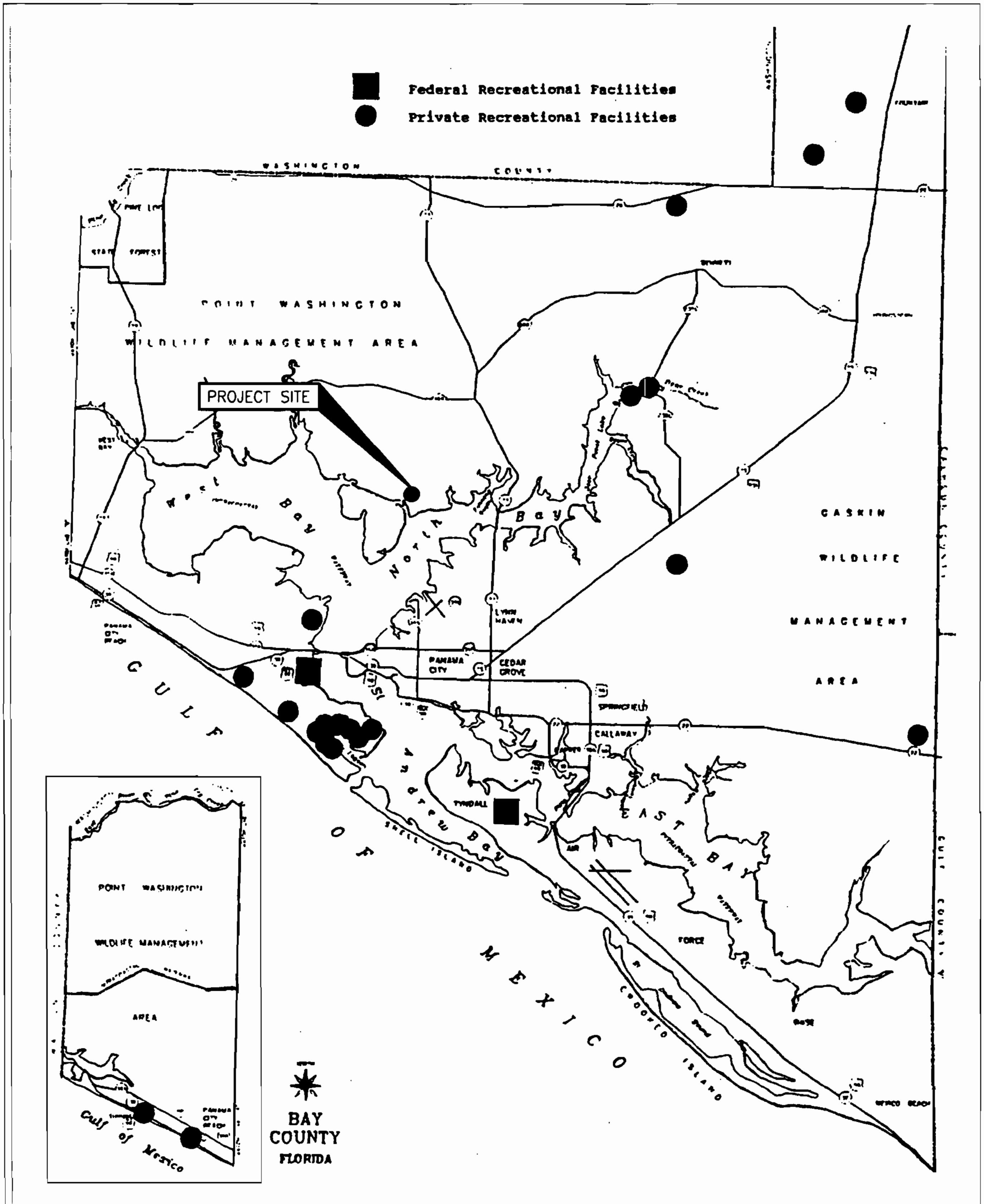

FIGURE 2.2.5-9.

FEDERAL AND PRIVATE RECREATIONAL FACILITIES

Sources: Bay County Planning & Zoning Dept., 1991; ECT, 1999.

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Environmental Consulting & Technology, Inc.

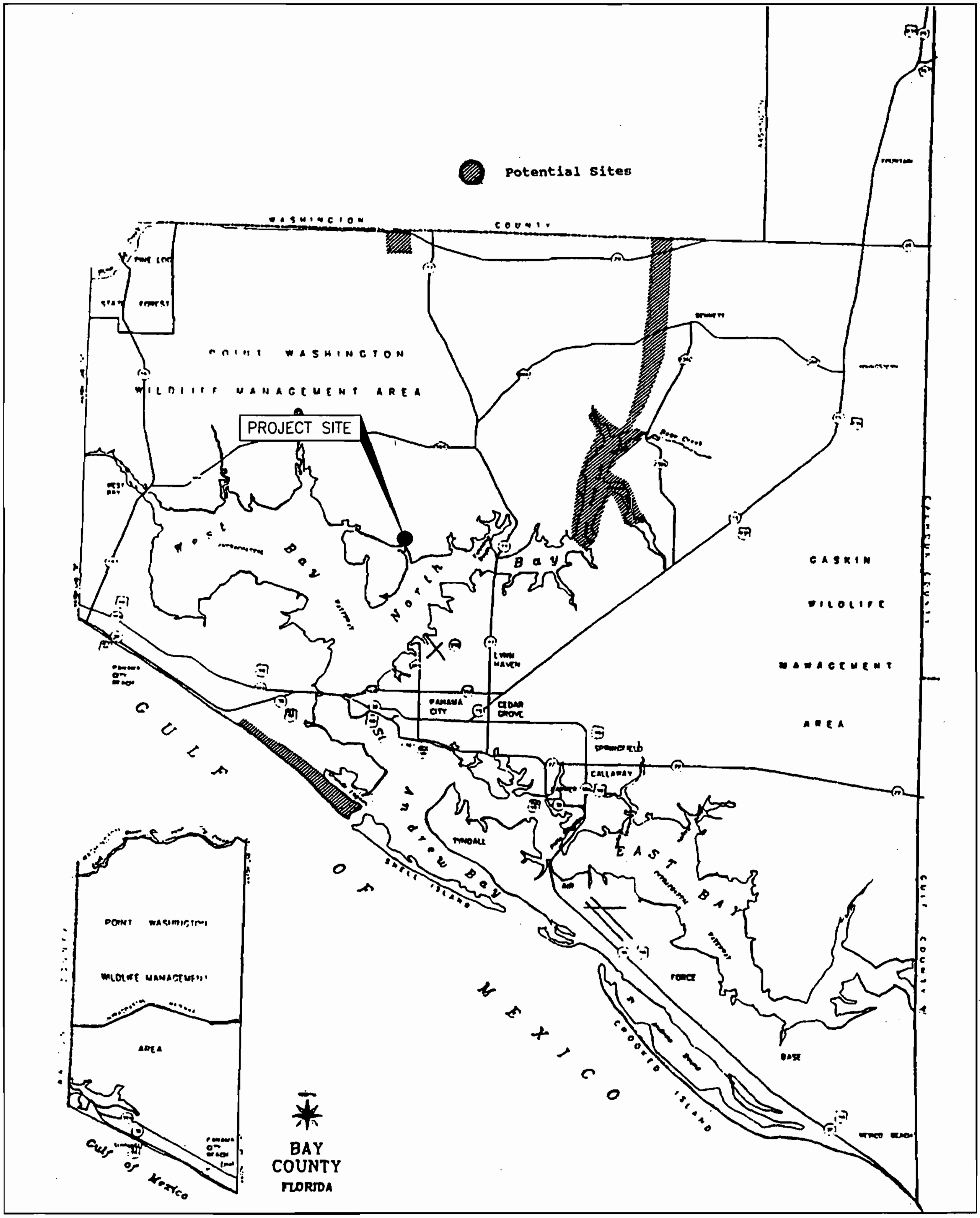

FIGURE 2.2.5-10.

POTENTIAL FUTURE RECREATIONAL FACILITIES

Sources: Boy County Planning & Zoning Dept., 1991; ECT, 1999.

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Environmental Consulting & Technology, Inc.

2.2.6 ARCHAEOLOGICAL AND HISTORIC SITES

A review of the Florida Site File and the National Register of Historic Places by the Florida Department of State, Division of Historical Resources (see Appendix 10.5, Attachment 10.5-A), identified no listed archaeological, historical, or architecturally valuable sites on the lands proposed for the Project. The review concluded that " . . . no significant archaeological or historical sites are recorded for or likely to be present within the project area."

2.2.7 SOCIOECONOMICS AND PUBLIC SERVICES

2.2.7.1 Socioeconomics

Employment and Income

Several years of the *Florida Statistical Abstract* (Bureau of Economic and Business Research, 1985 and 1990-1997) provide employment and economic information at the county level. Bay County had an estimated labor force of 65,636 persons in 1997. Unemployed persons in 1997 totaled 4,306, an unemployment rate of 6.6 percent. From 1980 to 1996, the unemployment rate in Bay County was consistently greater than the statewide unemployment rate, while the labor force in the same period increased by approximately 21,770 persons.

In terms of employment, major industries in Bay County in 1997 were retail trade (15,857 or 25.9 percent), services (15,387 or 25.1 percent), government (11,787 or 19.2 percent), construction (3,953 or 6.5 percent), and manufacturing (3,482 or 5.7 percent).

Per capita income for Bay County in 1996 was $22,832 compared to the Florida per capita figure of $26,804. The difference between nonfarm per capita income compared to the Florida average was less: $14,908 versus $16,530. While the population of Bay County ranks 24th out of the state's counties (1990 census and 1997 estimates), its per capita earnings rank 29th. Despite the fact that approximately 55 percent of the existing acreage in Bay County is designated or in use for silviculture, only 2,823 people were employed in agriculture in 1997, ranking Bay County 64th out of 67 counties. Reflecting the 29,000 acres of Bay County occupied by Tyndall Air Force Base and the 655 acres used as the Naval Coastal Systems Center, the 3,336 federal employees rank Bay County 4th in the state in the number of federal government employees.

Housing

According to the 1980 census, there were a total of 42,900 dwelling units in Bay County; 15,574 of which were located in the unincorporated areas. By 1989, the number of dwelling units in the unincorporated areas had increased to 33,494. The types of dwellings are described below:

Structural Type	1980 Number of Units	Percent of Total	1989 Number of Units	Percent of Total
Single family	10,201	65.5	15,150	46.6
Duplex	592	3.8	966	3.0
Multifamily	2,694	17.3	7,507	23.1
Mobile homes	2,087	13.4	8,884	27.3
TOTAL	15,574		32,507	

Sources: Bay County 1990 Comprehensive Plan.
ECT, 1999.

The obvious change from 1980 to 1989 is the large increase in the number of mobile homes and the percentage of the total dwelling units consisting of mobile homes. At least a portion of this increase can be attributed to the two military installations in Bay County, which adds to the mobility of the population. The Housing Element of the adopted 1990 Bay County Comprehensive Plan estimated that approximately 27.6 percent of the dwelling units are seasonally occupied.

Local Government Revenues and Expenditures

According to information provided by the Florida Department of Banking and Finance, revenue sources for Bay County for fiscal year 1994 (in descending amount) are taxes and impact fees (35.3 percent), other sources and transfers (28.1 percent), charges for services (26.8 percent), state and other governments (8.0 percent), fines and forfeits (1.0 percent), and federal grants (0.8 percent). Total revenues for the county for the fiscal year ending 1994 were $103,154,000.

In descending amount, expenditures for Bay County for fiscal year 1994 were physical and economic environment (32.9 percent); public safety (24.3 percent); transportation (17.3 percent); general government (16.2 percent); debt service (4.8 percent); and human services, cultural, and recreation (4.5 percent). Total expenditures were $96,366,000 for fiscal year 1994.

2.2.7.2 Public Services

Parks and Recreation

The closest designated recreational land use on the adopted FLUM is associated with Panama City Beach, approximately 8 miles south of the Project site. The Recreation and Open Space Element of the adopted Comprehensive Plan indicates that recreation facilities within Bay County are supplied by the county, the eight municipalities within the county, the state, the federal government, and the private sector. The federal recreation facilities within Bay County are those amenities, such as golf courses, softball/baseball fields, football/soccer fields, and 100 acres of primitive camping located at the Naval Coastal Systems Center and/or at Tyndall Air Force Base. The state-provided facilities are:

- Econfina Creek canoe trail (at least 9 miles northeast of the Project site).
- Pine Log State Forest (approximately 11 miles northwest of the Project site).
- St. Andrews State Recreation Area (approximately 10 miles south of the Project site).

There are 24 parks provided solely by Bay County or by Bay County and a local municipality listed in the Recreation and Open Space Element of the Comprehensive Plan. The closest of these are located in unincorporated Southport (approximately 4 miles east of the Project site) and within the city of Lynn Haven (approximately 2.5 miles to the southeast).

Educational Services

There are elementary schools located in Southport, Lynn Haven, and Panama City within or very close to a 5-mile radius of the Project site. The Mowat Middle School and the Mosley High School are located in Lynn Haven. Figure 2.2.7-1 depicts the locations of nearby educational facilities.

Public Safety

Locations of police stations and fire stations are also depicted on Figure 2.2.7-1. Law enforcement services would be provided by the Bay County Sheriff's office, with the nearest office at 3421 SR 77. The Sheriff's office has mutual aid agreements with the city of

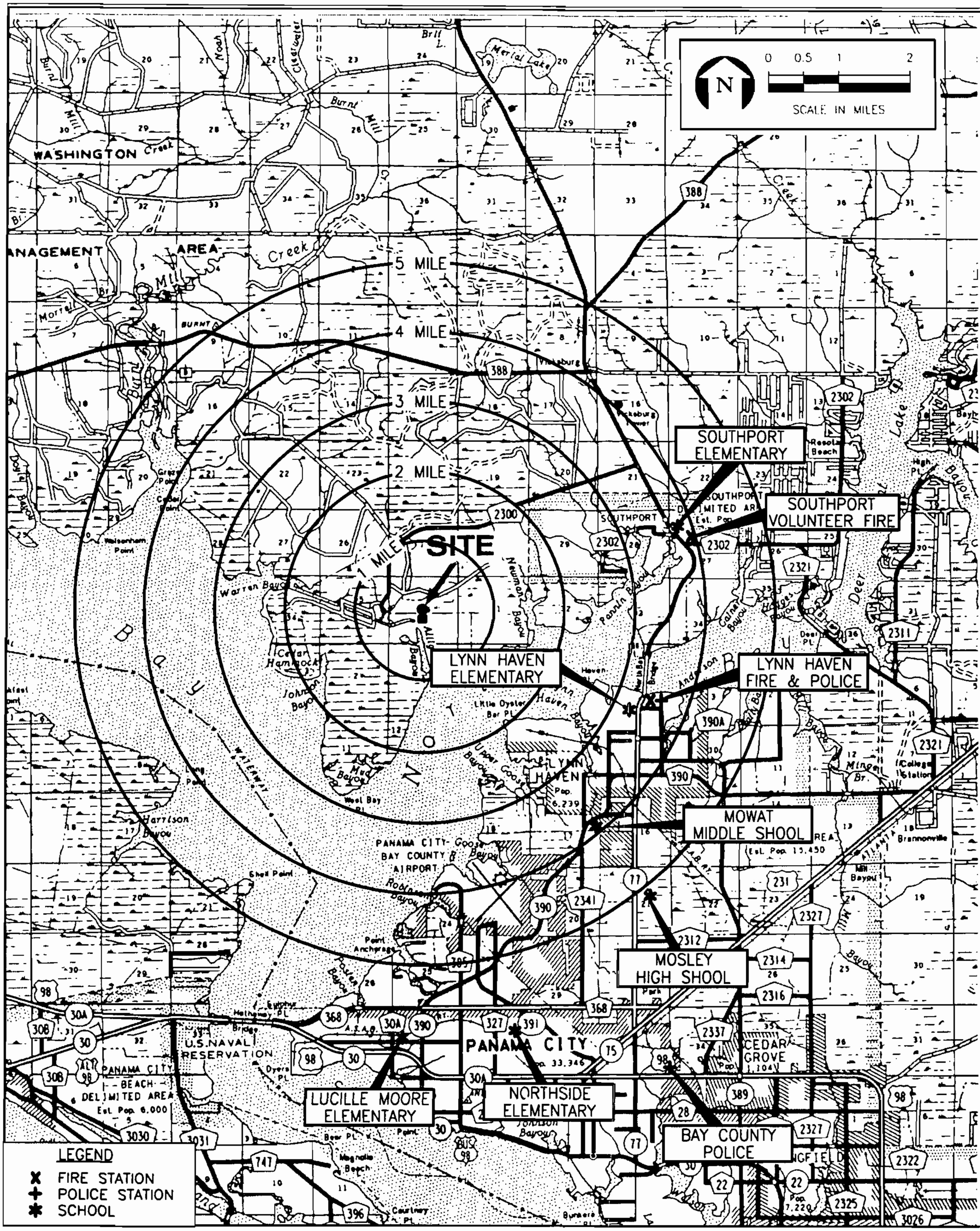

FIGURE 2.2.7-1.

LOCATION OF EDUCATIONAL FACILITIES, POLICE STATIONS, & FIRE STATIONS

Sources: DOT, 1993; ECT, 1999.

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Lynn Haven (station located at 1412 Pennsylvania Avenue) and Panama City (station located at 1209 15th Street).

The primary responding fire station is Southport Volunteer located on CR 2321, east of SR 77, under the Bay County Fire Control. Secondary response is available from the city of Lynn Haven at 1412 Pennsylvania Avenue. The nearest hospitals to the Project site are Columbia Gulf Coast Medical Center and Bay Medical Center located in Panama City.

Utility Services

There are no public sewer or water treatment facilities or distribution facilities located in proximity to the Project site. The city of Lynn Haven has expanded sanitary sewer distribution north of North Bay along SR 77. Potable water will be provided to Smith Unit 3 from the existing, permitted wells at the Lansing Smith plant. Water treatment facilities are available at the existing plant.

Domestic wastewater generated from the operation of Smith Unit 3 will be treated at the existing treatment plant at the Lansing Smith plant. Treated effluent is discharged to the existing ash pond that discharges intermittently in response to a design storm event. The existing treatment plant has sufficient capacity to treat the domestic wastewater to be generated by the estimated 29 additional full-time employees at Smith Unit 3.

Solid Waste Services

The existing Steelfield landfill has capacity to accommodate the limited amount of solid waste that will be produced when Smith Unit 3 is operational. Currently, solid waste is transported from the Lansing Smith plant by Waste Management, Inc., to the Steelfield landfill. Construction debris will be the responsibility of the selected contractor for construction of Smith Unit 3, which could be handled at the existing offsite landfill.

Transportation

The proposed Smith Unit 3 traffic generated by 29 full-time employees, 18 on the day shift, will access the property from CR 2300. This road provides access and egress to the Lansing Smith Plant, to a branch of the Gulf Coast Community College, and to several residences. It is not anticipated that the additional traffic generated by the operation of Smith Unit 3 will result in unacceptable level of service (LOS) standards on CR 2300 or SR 77. Both roads currently operate at an acceptable LOS.

2.3 BIOPHYSICAL ENVIRONMENT

Section 2.3 presents information to characterize the existing biophysical environment of the Project site and vicinity. This characterization provides the baseline from which impacts are assessed. Per the FDEP instructions, this section includes the following subsections:

- 2.3.1—Geohydrology.
- 2.3.2—Subsurface Hydrology.
- 2.3.3—Site Water Budget and Area Users.
- 2.3.4—Surficial Hydrology.
- 2.3.5—Vegetation/Land Use
- 2.3.6—Ecology.
- 2.3.7—Meteorology and Ambient Air Quality.
- 2.3.8—Noise.
- 2.3.9—Other Environmental Features.

These subsections include relevant existing information and the results of field data collection and analyses conducted specifically for the Project.

2.3.1 GEOHYDROLOGY

This section describes the general and site-specific geology of Bay County and the Smith Unit 3 Project area, respectively. The stratigraphy, lithology, structure, and physiography are presented. Several publications, including *Geology of Bay County* (Schmidt and Clark, 1980), and *Florida's Ground Water Quality Monitoring Program Background Hydrogeologic Framework* (Florida Geological Survey [FGS], 1991), characterize the area in detail and provide much of the information for this section.

2.3.1.1 General Geologic Description of the Site Area

Unconsolidated sediments and rock ranging in age from Recent to late Pre-Cambrian underlie Bay County. Figure 2.3.1-1 presents the stratigraphic nomenclature for the geology of Bay County (Schmidt and Clark, 1980). A description of the geologic units is outlined below.

Regional Stratigraphy

Very few deep wells have been drilled in Bay County. Granite of possible late Pre-Cambrian has been encountered in the deepest wells. Paleozoic sediments range from Early Ordovician to Early Devonian (Schmidt and Clark, 1980).

Overlying the Paleozoic rocks, the Triassic Eagle Mills Formation is present in most of Bay County, but thins toward the east. Upper Jurassic formations include the Norphlet, Smackover, Haynesville, and the Cotton Valley Group. Undifferentiated Lower Cretaceous sands and shales overlie the Cotton Valley Group. These sands are overlain by the Upper Cretaceous Tuscaloosa Group. The Eutaw Formation, a calcareous fine sandstone to a sandy chalk with limestone, overlies the Tuscaloosa. The remaining Upper Cretaceous sediments are, in ascending order, the Austin Age, Taylor Age and Navarro Age (Schmidt and Clark, 1980).

ERA	PERIOD	EPOCH	ROCK UNITS OR FORMATIONS, AND DESCRIPTIONS		APPROXIMATE DEPTH IN FEET BELOW SURFACE (NOT TO SCALE)
CENOZOIC	QUATERNARY	RECENT	UNDIFFERENTIATED QUARTZ SANDS		
		PLEISTOCENE	UNDIFFERENTIATED CLAYEY SANDS AND GRAVELS		100
	NEOGENE	PLIOCENE	JACKSON BLUFF FORMATION	GRAY-OLIVE GREEN, CLAYEY, SANDY, SHELL MARL.	
		MIOCENE UPPER	INTRACOASTAL FORMATION	GRAY-OLIVE GREEN, SANDY, ARGILLACIOUS, POORLY CONSOLIDATED VERY MICROFOSSILIFEROUS CALCARENITE.	300
		MIOCENE MIDDLE	BRUCE CREEK LIMESTONE	WHITE TO LIGHT YELLOW, MODERATELY INDURATED, GRANULAR LIMESTONE.	400
			CHIPOLA FORMATION	SANDY, VERY LIGHT-ORANGE, FOSSILIFEROUS LIMESTONE.	
		MIOCENE LOWER	TAMPA STAGE LIMESTONES	SANDY, MICRITIC, WHITE TO LIGHT GRAY LIMESTONES.	500
	PALEOGENE	OLIGOCENE	SUWANNEE LIMESTONE	LIGHT GRAY TO YELLOW GRAY, DOLOMITIC LIMESTONE, OFTEN HIGHLY ALTERED, SUCROSIC, ALTERED FOSSIL TYPES.	
			MARIANNA LIMESTONE	LIGHT GRAY, MASSIVE, CHALKY, GLAUCONITIC, SLIGHTLY SANDY LIMESTONE, ABUNDANT LARGE FORAMINIFERA.	
		EOCENE	OCALA LIMESTONES	LIGHT ORANGE TO WHITE, HIGH POROSITY LIMESTONES; SMALL AMOUNTS OF SAND AND CHERT; GLAUCONITE IN LOWER FACIES ABUNDANT MICRO-FOSSILS.	700
			LISBON	CREAM-COLORED, GLAUCONITIC, SANDY LIMESTONE; LIGHT GRAY CLAY; SOFT PYRITIC LIMESTONE; GRAY, CALCAREOUS, GLAUCONITIC SAND.	
			TALLAHATTA	CREAM-COLORED, GLAUCONITIC, SANDY, CLAYEY LIMESTONE, AND GRAY, SANDY, CALCAREOUS CLAY.	1,000
			UNDIFFERENTIATED WILCOX	SANDY, CREAM-COLORED, GLAUCONITIC LIMESTONE; CALCAREOUS SAND; GRAY, PASTY LIMESTONE; MICACEOUS CLAY.	
		PALEOCENE	UNDIFFERENTIATED MIDWAY	GRAY, MICACEOUS, SANDY CLAY; WITH SEAMS OF SANDY, SOFT LIMESTONE.	
MESOZOIC	CRETACEOUS	UPPER	SELMA GROUP	MARLS, CALCAREDUS CLAYS, AND LIMESTONE; INTERBEDDED SANDS, GLAUCONITIC, MICACEOUS.	3,000
			EUTAW FORMATION	CALCAREOUS SANDSTONE, SANDY CHALK.	
			TUSCALOOSA FORMATION	MARINE AND NON-MARINE SANDS AND SHALES.	
		LOWER	UNDIFFERENTIATED	REDDISH-BROWN SHALES AND SANDSTONES.	
	JURASSIC		COTTON VALLEY GROUP	VARICOLORED MUDSTONE AND SANDSTONE.	7,000
			HAYNESVILLE FORMATION	RED-GRAY, CALCAREOUS SHALES, SANDSTONES, MICRITE.	
			SMACKOVER FORMATION	LIMESTONE, DOLOMITIC LIMESTONES.	
			NORPHLET FORMATION	RED SANDSTONES, SILTSTONES AND SHALES.	
	TRIASSIC		EAGLE MILLS FORMATION	MICACEOUS SANDSTONES; ARGILLACEOUS SILTSTONES; WELL INDURATED SHALES; OFTEN CONTAINS SILLS AND DIKES OF IGNEOUS ROCKS.	10,000
PALEOZOIC	CAMBRIAN		QUARTZITE/META-ARKOSE		11,000
PRE-CAMBRIAN			GRANITE	"BASEMENT"?	13,000

FIGURE 2.3.1-1.
GEOLOGY OF BAY COUNTY

Sources: Schmidt and Clark, 1980; SCS, 1999; ECT, 1999.

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Cenozoic sediments lie unconformably over the upper Cretaceous sediments. The undifferentiated sandy clay and soft limestone of the Midway Stage is overlain by Undifferentiated Wilcox, which includes glauconitic shale. Overlying the Wilcox, in ascending order, are the Tallahatta and Lisbon Formations, Ocala, Marianna and Suwannee Limestones (Schmidt and Clark, 1980).

The Tampa Stage Limestone, which overlies the Suwannee, may grade into the overlying Chipola and Bruce Creek Limestones. The Bruce Creek Limestone is overlain by the Intracoastal Formation or the Jackson Bluff Formation. The Bruce Creek Limestone is more indurated than the Intracoastal Formation which can also be distinguished from the Bruce Creek by the olive-green color and abundant microfossils (Schmidt and Clark, 1980).

The Intracoastal Formation is overlain by the Jackson Bluff Formation. In Bay County, the Jackson Bluff Formation occurs as a thin, blanket-like deposit and consists of calcareous sandy clay to clayey sand with macrofossils. Sand covers the Jackson Bluff Formation. The surficial unit consists of clayey and silty sand and gravel (probably Citronelle), reworked clayey sands (Pliocene), terrace sands (Pleistocene), and Recent coastal sands. The Pliocene and Pleistocene sands are related to fluctuating sea levels during glacial and interglacial periods. The Recent sands are the result of longshore marine forces (Schmidt and Clark, 1980).

Lithology

Generalized descriptions of the hydrogeologic units in the vicinity of the Project site are presented in Figure 2.3.1-2. The units are summarized below:

- *Surficial Aquifer System* consists of undifferentiated terrace marine and fluvial deposits, the Citronelle, and underlying undifferentiated Pliocene deposits.
- *Intermediate System* consists of the coarse clastics of the Jackson Bluff Formation and the Intracoastal Formation.
- *Floridan Aquifer System* in this area includes the Bruce Creek Limestone and the Suwannee Limestone.

		PANHANDLE FLORIDA	
SYSTEM	SERIES	FORMATION	HYDROSTRATIGRAPHIC UNIT
QUARTERNARY	HOLOCENE	UNDIFFERENTIATED TERRACE MARINE AND FLUVIAL DEPOSITS	SURFICIAL AQUIFER SYSTEM
	PLEISTOCENE		
TERTIARY	PLIOCENE	CITRONELLE FORMATION UNDIFFERENTIATED	
	MIOCENE	COARSE CLASTICS/JACKSON BLUFF FORMATION ALUM BLUFF GROUP PENSACOLA CLAY INTERCOASTAL FORMATION HAWTHORN FORMATION CHIPOLA FORMATION BRUCE CREEK LIMESTONE ST. MARKS FORMATION CHATTAHOOCHEE FORMATION	INTERMEDIATE AQUIFER SYSTEM OR INTERMEDIATE CONFINING UNIT
	OLIGOCENE	CHICKASAWHAY LIMESTONE SUWANNEE LIMESTONE MARIANNA LIMESTONE BUCATUNNA CLAY	FLORIDAN AQUIFER SYSTEM
	EOCENE	OCALA GROUP LISBON FORMATION TALLAHATTA FORMATION OLDER ROCKS UNDIFFERENTIATED	
	PALEOCENE	UNDIFFERENTIATED	SUB-FLORIDAN CONFINING UNIT
CRETACEOUS AND OLDER		UNDIFFERENTIATED	

* Terminology follows usage of Florida Bureau of Geology.

FIGURE 2.3.1-2.

RELATIONSHIP BETWEEN REGIONAL HYDROGEOLOGIC UNITS AND MAJOR STRATIGRAPHIC UNITS IN THE FLORIDA PANHANDLE

Sources: Southeastern Geological Society, 1986; SCS, 1999; ECT, 1999.

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- *Sub-Floridan Confining Unit* is overlain by a vast thickness of sediment and rock, which effectively eliminates leakage from the bottom of the Floridan aquifer system and limits the importance of the unit in this area.

Site Area Stratigraphy

The Project site is located on the Pamlico Terrace in an area of low relief between elevation zero and 10 ft-msl. The site is underlain by a thick sequence of Tertiary-age sediments that generally dip to the southwest. Sediments in the area are primarily marine and estuarine and represent ancient coastal environments or marine terraces. After the marine terraces were deposited, they were mixed with underlying sediments during a marine transgression occurring in the Pleistocene Epoch. They consist of a sand, clay, silt, and shell mixture. Formations identified include:

- *Recent Sediments*—These units consist of loose, relatively permeable silts and sands and extend to approximately 20 feet below land surface (ft bls).
- *Jackson Bluff Formation*—A Pliocene-aged sandy clay to clayey sand unit found sporadically throughout Bay County. In the Project area, the unit is encountered at approximately 20 ft bls with variable thickness ranging from 1 to 7 ft.
- *Intracoastal Formation*—A wedge-shaped deposit of calcareous silts and sands with varying amounts of clay. This unit occurs below the Jackson Bluff Formation to approximately 100 ft bls in the vicinity of the Project site.
- *Bruce Creek Limestone*—A white to light yellow-gray, moderately indurated limestone dominated by macrofossils. The unit has a maximum thickness along the coast of about 300 ft.

Site Area Structure

The thick sequence of marine sediments underlying Bay County is controlled in part by the Apalachicola Embayment, which is the dominant geologic structure in the Central Florida Panhandle. The Apalachicola Embayment is a southwesterly plunging basin characterized by increased sedimentation toward the coast, where total thickness can reach up to 15,000 ft (Schmidt and Clark, 1980). Additional regional structures that affect the geology of Bay County include the Chattahoochee Anticline. Figure 2.3.1-3 presents the principal geologic structures in North Florida.

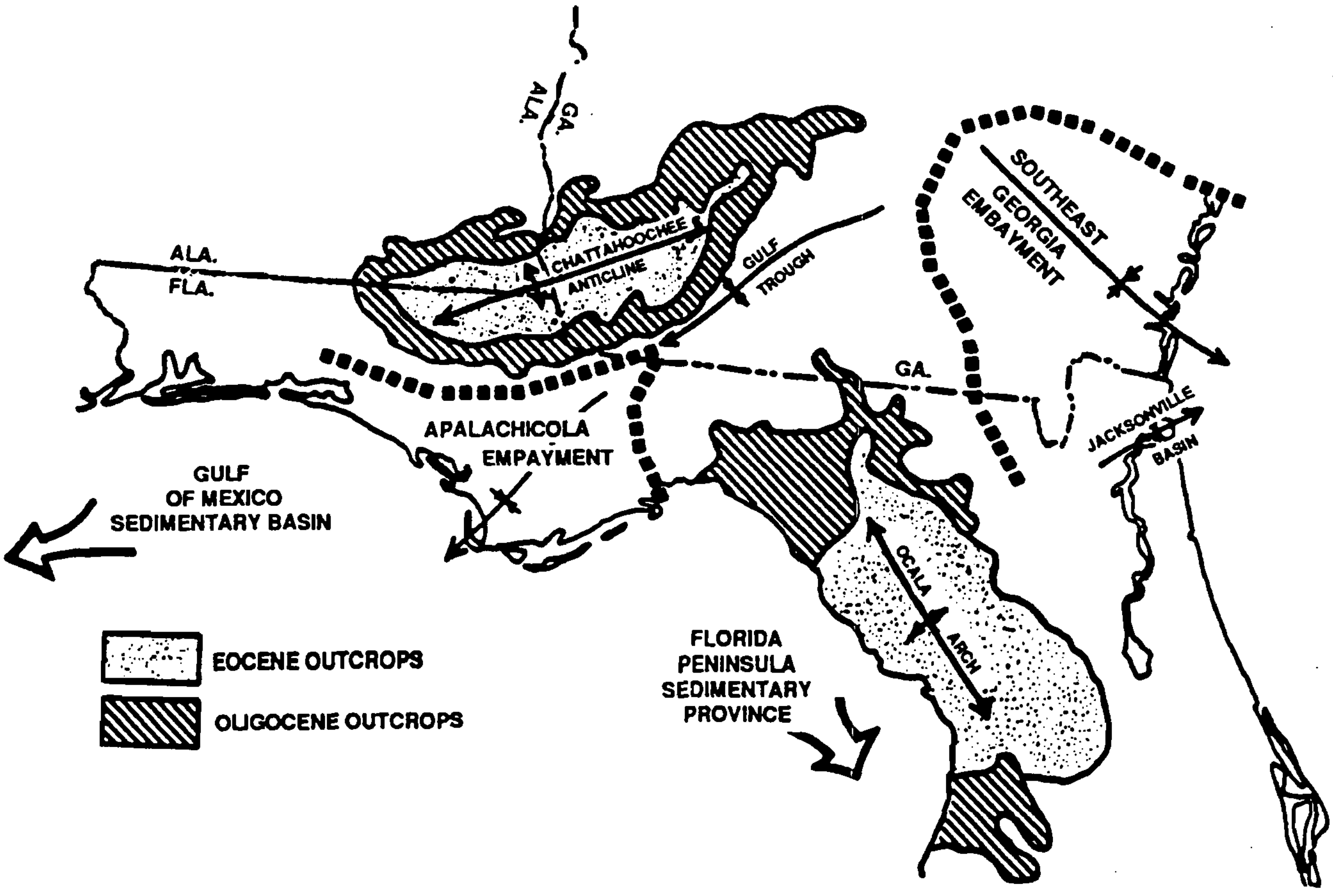

FIGURE 2.3.1-3.

REGIONAL GEOLOGIC STRUCTURES OF THE FLORIDA PANHANDLE

Sources: Schmidt, 1984; SCS, 1999.

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Although faults within the upper limestone of the Floridan aquifer have been reported, no geologic evidence supports this claim (Schmidt and Clark, 1980). Seismic activity should not pose a threat to the proposed development and operation of Smith Unit 3.

Site Area Physiography

Bay County is located within the Coastal Plain physiographic province, East Gulf Coastal Plain section. Bay County lies within four physiographic subdivisions: Sand Hills, Sinks and Lakes, Flat-Woods Forest, and Beach Dunes and Wave Cut Bluffs. The largest portion of the county, including the Project area, lies within the Flat-Woods Forest. This division is characterized by slightly rolling to flat terrace land at elevations below 70 ft-msl. The Flat-Woods Forest is generally well drained except for low-lying areas surrounding the bays. This includes the 0 to 10-ft terraces in the Project area. These low-lying areas may be inundated during extended rains.

The geomorphology of Northwest Florida is the result of the interaction of depositional and erosional events associated with sea level fluctuations. Bay County is located within the northern or proximal geomorphic division (White, 1970). Within this division, Bay County is predominantly located within the Gulf Coastal Lowlands, often characterized by poorly drained, swampy areas (FGS, 1991).

Ancient terraces in Bay County, in descending order, include:

- The Coharie and High Pliocene Terraces, at 170 to 215 and 215 to 320 ft-msl.
- The Wicomico and Okefenokee Terraces at 70 to 100 and 100 to 170 ft-msl.
- Talbot and Fenholoway Terraces at 25 to 42 and 42 to 70 ft-msl.
- Silver Bluff and Pamlico Terraces at 0 to 10 and 10 to 25 ft-msl.

2.3.1.2 Detailed Site Lithologic Description

In September 1998, a site investigation was initiated. Sampling locations were chosen based on the proposed location of Smith Unit 3 and access to the site. The drilling was performed by Southern Company Services' (SCS's) Geotechnical Field Services in Atlanta, Georgia, using a CME 850 truck-mounted rig. Soil characterization and permeability testing were performed at Southern Earth Sciences, Inc., in Panama City, Florida, and

SCS's Concrete and Soil Laboratory at Varnons, Alabama. Cation exchange capacity (CEC) testing was performed by Law Engineering in Pensacola, Florida.

Standard penetration test borings using hollow-stemmed augers and mud rotary were taken to refusal, approximately 100 ft bls. Seven deep borings were completed and 12 piezometers were installed in the proposed area. Seven piezometers were installed within the surficial sediments and five piezometers were installed within the deeper sediments of the Intracoastal Formation, below the clay of the Jackson Bluff Formation, which acts as a semi-confining bed at the site. Rock coring was performed at two locations; approximately 10 ft of consolidated limestone was cored. A boring location map is presented in Figure 2.3.1-4. Figures 2.3.1-5 and 2.3.1-6 present the geologic cross-sections based on the site investigation. Boring logs are included in Attachment 10.5-C of Appendix 10.5.

Based on the investigation, three hydrogeologic units were identified:

- The surficial aquifer system.
- The intermediate system.
- The Floridan aquifer system.

Surficial Aquifer System—The study area is underlain by approximately 15 to 20 ft of surficial sediments of black organic topsoil and tan to brown, slightly silty fine- to medium grained sands to medium- to coarse-grained sands. Laboratory grain-size classification identifies the surficial soils as SP to SM, poorly graded sands and silty sands.

Slug testing was performed in the shallow piezometers. Tests were analyzed using the Bouwer and Rice method (1976 and 1989). The slug tests were performed by quickly raising and lowering the water level of the well and measuring the rate of equilibrium. A solid slug was lowered rapidly into the well and the resulting change in head (ΔH) measured with respect to time. After the water stabilized, the slug was withdrawn and the resulting rise in water level recorded.

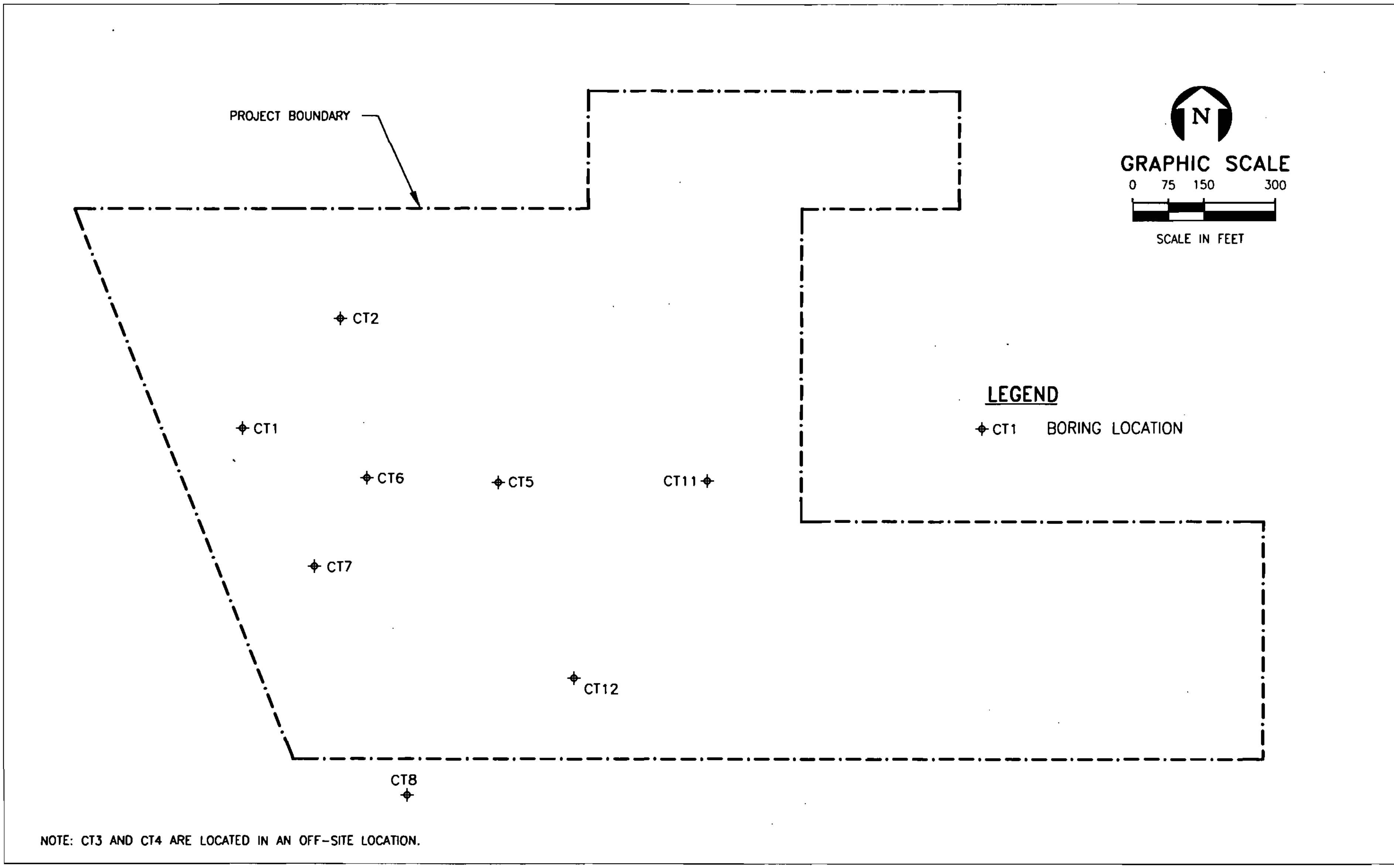

FIGURE 2.3.1-4.

SITE INVESTIGATION BORING LOCATION MAP

Source: SCS, 1999.

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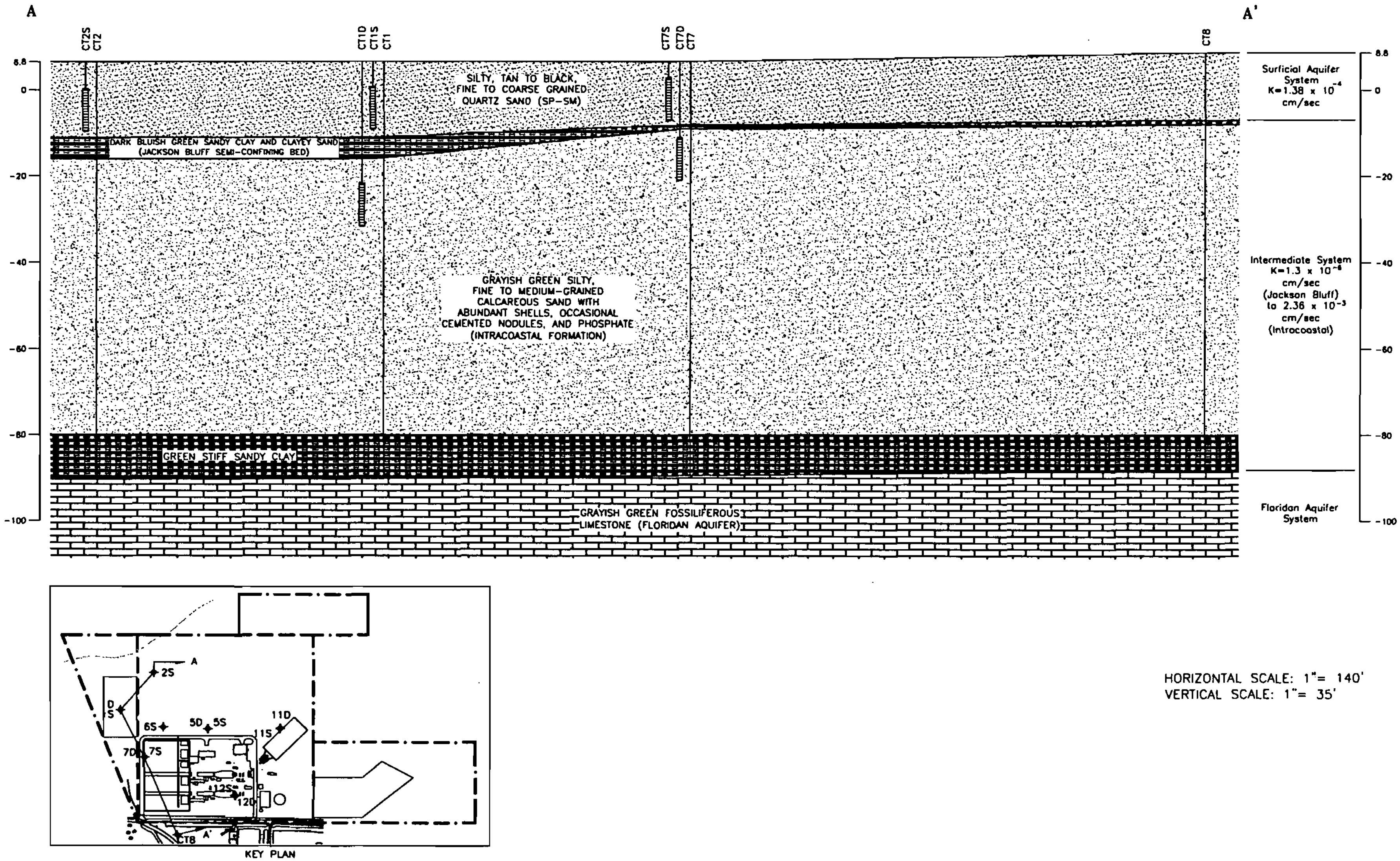

FIGURE 2.3.1-5.

GEOLOGIC CROSS-SECTION A-A'

Source: SCS, 1999.

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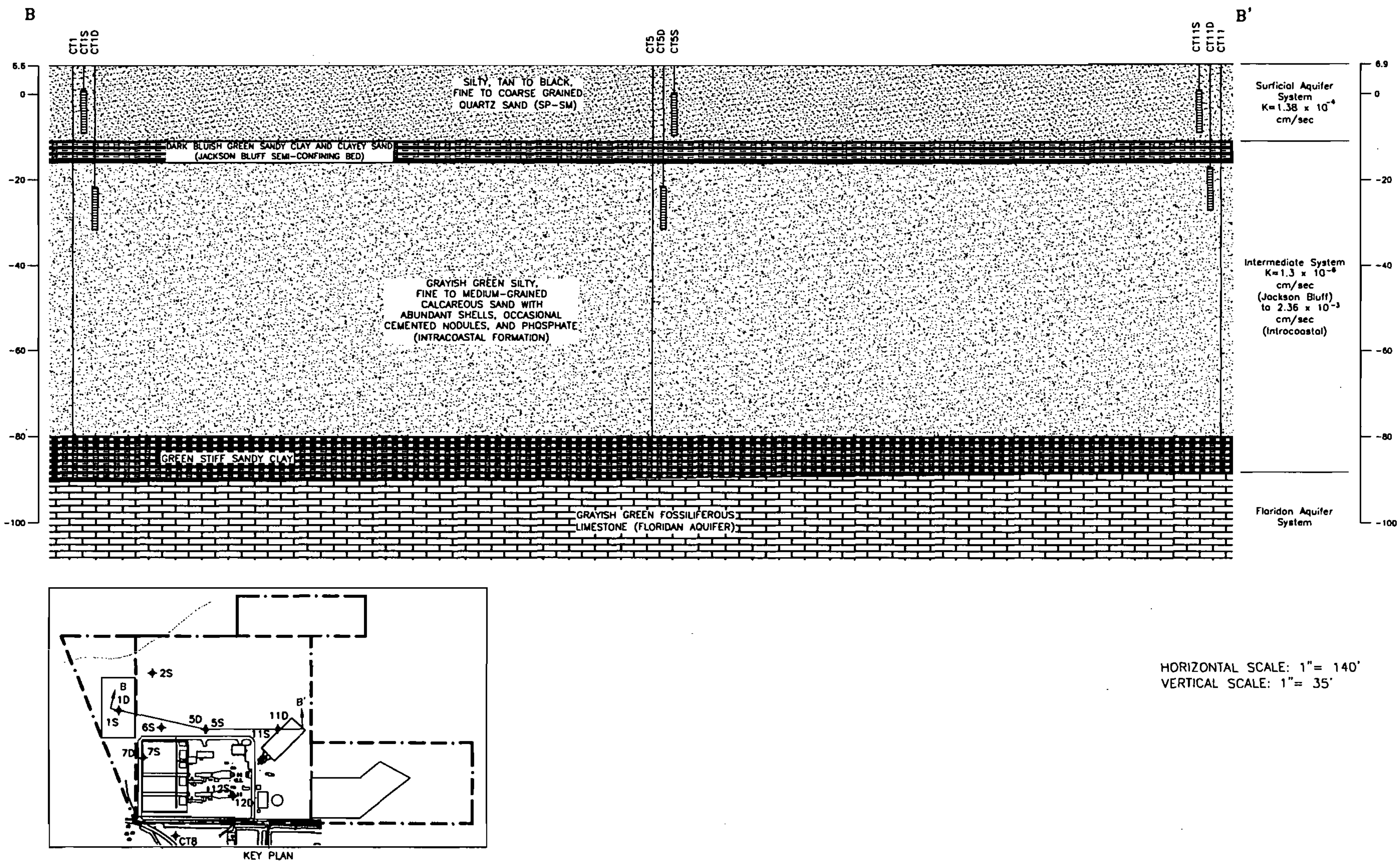

HORIZONTAL SCALE: 1"= 140'
VERTICAL SCALE: 1"= 35'

FIGURE 2.3.1-6.

GEOLOGIC CROSS-SECTION B-B'

Source: SCS, 1999.

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The average hydraulic conductivity of the surficial unit is 2.9 x 10^{-4} centimeters per second (cm/sec). The average results of the slug tests for the surficial aquifer are presented in Table 2.3.1-1. Test results and data sheets are included in Attachment 10.5-E of Appendix 10.5.

Table 2.3.1-1. Hydraulic Conductivity of the Surficial Aquifer

Surficial Piezometer	Hydraulic Conductivity (ft/day)	Hydraulic Conductivity (cm/sec)
CT1S	0.25	8.85 x 10^{-5}
CT2S	0.39	1.38 x 10^{-4}
CT5S	1.89	6.68 x 10^{-4}
CT6S	0.44	1.54 x 10^{-4}
CT7S	1.16	4.10 x 10^{-4}
Average	0.83	2.9 x 10^{-4}

Note: ft/day = feet per day.

Source: SCS, 1999.

Intermediate System—The intermediate system, below the surficial sands, consists of the Jackson Bluff Formation and the Intracoastal Formation. At about 20 ft bls, the sediments become dark bluish-green to olive-gray, clayey, fine- to medium-grained calcareous sands with shell fragments and abundant phosphorite. This is identified as the Jackson Bluff Formation. The Jackson Bluff Formation is consistent across the area and has been identified in other investigations at the Lansing Smith Plant as a leaky confining layer between the surficial aquifer and the Intracoastal Formation. In the Project area, the formation is from 1 to 7 ft thick. The unit is recognized by the distinct color and composition change from the overlying quartz sands and the consistently very low blow counts recorded from standard penetration tests. Counts are often weight of hammer. An undisturbed Shelby tube sample was collected from one boring and subjected to a falling head permeability test in the laboratory with a result of 1.3 x 10^{-6} cm/sec, indicating a silt or silty sand. Grain-size analysis of the sandy portion of the sample indicates a Unified Soil Classification of SM, a silty sand.

Below the Jackson Bluff Formation, the sediments are described as grayish green, silty, fine-grained calcareous sand with whole shells, shell fragments, loosely cemented nodules and abundant phosphorite. This unit, identified as the Intracoastal Formation, is approximately 75 ft thick in the Project area. Blow counts range from 17 to 1. Some thin layers of clay were observed in the split-spoon samples. Grain-size analyses of samples collected from the Intracoastal Formation identify the sediments as SM, silty sands with up to 40 percent fines. Above the contact with the underlying rock, approximately 10 ft of stiff, green clay was encountered. Grain-size analysis of the clay yields a Soil Classification of ML, a clayey silt with 76.5 percent fines. Laboratory testing on a sample indicates a permeability of 5.8×10^{-7} cm/sec.

Slug testing of three piezometers in the Intracoastal Formation indicate an average hydraulic conductivity of 2.09×10^{-3} cm/sec. The results of the slug testing are presented in Table 2.3.1-2.

Table 2.3.1-2. Hydraulic Conductivity of the Intermediate System

Intermediate Piezometer	Hydraulic Conductivity (ft/day)	Hydraulic Conductivity (cm/sec)
CT1D	5.66	2.00×10^{-3}
CT5D	5.47	1.93×10^{-3}
CT7D	6.69	2.36×10^{-3}
Average	5.94	2.09×10^{-3}

Source: SCS, 1999.

<u>**Floridan Aquifer System**</u>—Six borings were taken to auger refusal. The consolidated limestone was encountered between 95.5 and 98.3 ft bls at each boring, indicating that the top of the rock is very consistent across the site. Ten feet of rock was cored in two locations. Recovery in 5-ft runs ranged from 60 to 100 percent with some loss due to washout of fines. The upper foot is very hard and consolidated and darker in color. The underlying grayish green rock is softer, highly fossiliferous, porous, and shows some evidence of water movement along fractures. Complete loss of water occurred at the top of rock due to high porosity. The thickness of this unit was not determined in the drilling program but the thickness of the Floridan aquifer is estimated at over 700 ft in Bay County.

Cation Exchange Capacity—CEC is a measure of the uptake and release of ions from a clay surface. Exchange of ions between clay minerals and the surrounding environment can have a pronounced effect on the properties of the clay minerals (e.g., elasticity, compressibility, permeability, etc.) present in soils. The CEC of a clay mineral is one way to determine the extent to which the structure and properties of a clay mineral and the surrounding soil may change under certain conditions.

Four samples were collected from the borings for determination of CEC. Samples were taken at varying depths from borings CT-7 and CT-8 using a split-spoon sampler. The results of the CEC tests are listed in Table 2.3.1-3. The low CEC values indicate that the types of clays present in the soils are not highly reactive (i.e., will not readily exchange ions or water). These values are similar to CECs for clays in the kaolinite and illite groups, which are among the most common and least reactive of the clay minerals.

Table 2.3.1-3. CEC of Clayey Portions of the Intermediate System

Sample Location	Hydrogeologic Unit	Depth of Sample (ft)	CEC (meq/100g)
CT-7	Intermediate Unit	15-15.5	4.37
CT-8	Intermediate Unit	13-15	11.4
CT-8	Intermediate Unit	78.8-80.3	3.66
CT-8	Intermediate Unit	83.8-85.3	5.76
CT-8	Intermediate Unit	93.8-95.3	16.8

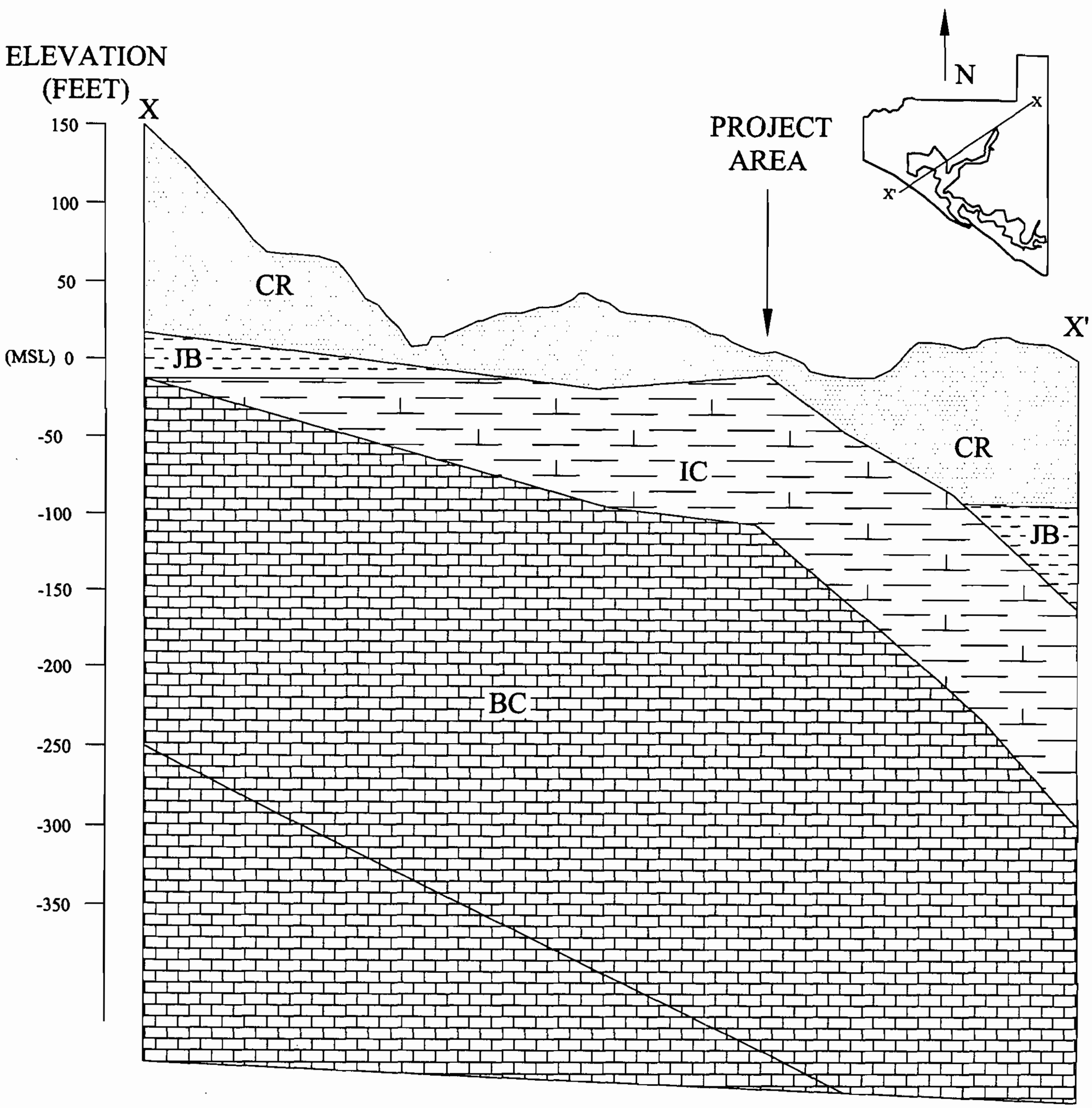
Note: meq/100g = milli-equivalents per 100 grams.

Source: SCS, 1999.

2.3.1.3 Geologic Maps

Geology

Figure 2.3.1-7 is based on a geologic cross-section of Bay County from Schmidt and Clark (1980). The cross-section shows the approximate location of the Lansing Smith Plant and the Project area. The surficial sediments are shown as Pliocene and Recent sands underlain by the Intracoastal Formation. The Jackson Bluff Formation, although not shown due to the thinness of the unit, was encountered during drilling.



LEGEND:
CR = CITRONELLE FORMATION AND RECENT SANDS
JB = JACKSON BLUFF FORMATION
IC = INTRACOASTAL FORMATION
BC = BRUCE CREEK LIMESTONE

FIGURE 2.3.1-7.

GEOLOGIC CROSS-SECTION OF BAY COUNTY, FLORIDA

Sources: Schmidt and Clark, 1980; SCS, 1999.

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Soil

Soil types in the area of the Project have been mapped by the Natural Resource Conservation Service, formerly known as the Soil Conservation Service (1984). The soils are within the low flatwood map unit known as Pottsburg-Leon-Rutlege (Figure 2.3.1-8).

Most of the soils in this unit occur in cutover woodlands in large, broad, nearly level areas of Bay County. The soils are described to a depth of about 80 inches (Soil Conservation Service, 1984).

The soil type underlying most of the Project site is the Pottsburg (30). This unit is poorly drained. The surficial layer is a dark gray sand over a grayish brown and light brownish gray sand. A layer of light gray to white sand grades into an organic, dark gray to black, stained sand; slopes are 0 to 2 percent. The water table occurs within 10 inches of the surface for 4 to 6 months of most years with some of the low-lying areas ponded for 2 to 6 months. The permeability is rapid to moderate and internal drainage is slow (Soil Conservation Service, 1984).

The Leon soils (13) are also poorly drained with a very dark gray surface layer overlying a light gray to gray sand. Below the light sand is a brown or black organic stained layer which grades into a light brownish gray sand over a very dark brown organic stained layer. The soils slope from 0 to 2 percent. The water table is within 10 inches of the surface for 1 to 4 months of the year and at 10 to 40 inches for up to 9 months. Permeability is rapid in the upper layers and moderate in the subsoil (Soil Conservation Service, 1984).

The Rutlege soils (29) are poorly drained sands with a black to very dark gray surface layer underlain by a gray or light gray sand. Slopes range from 0 to 2 percent. The water table is at or near the surface for 4 to 6 months or ponded for 4 to 6 months for most years. The permeability is rapid and internal drainage is very slow (Soil Conservation Service, 1984).

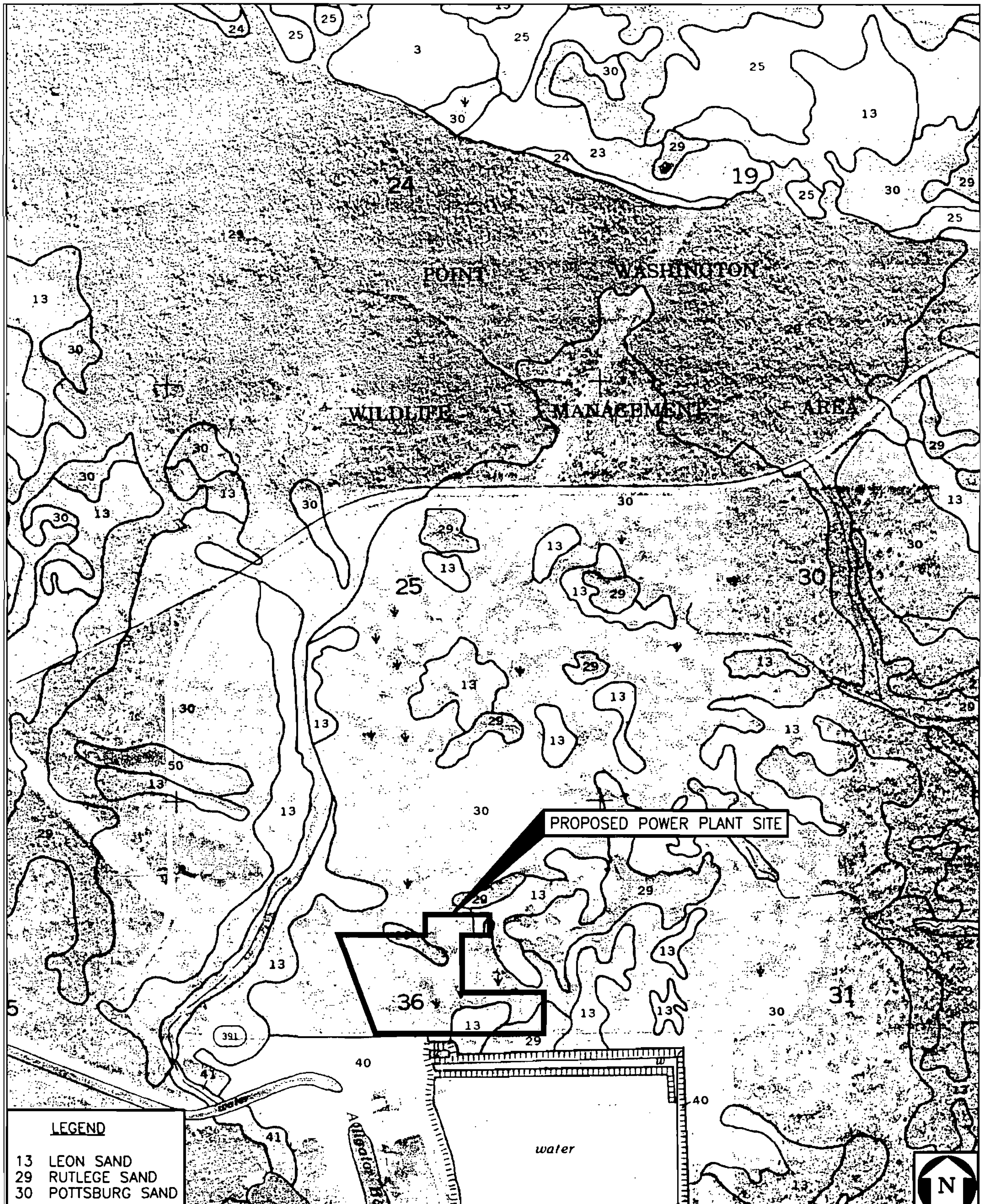

FIGURE 2.3.1-8.

SOIL TYPES IN THE PROJECT VICINITY

Sources: Soil Conservation Service, 1984; ECT, 1999.

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2.3.1.4 Bearing Strength

With little exception, the soils beneath the area to be developed offer low to moderate bearing capacity, and are subject to compression from structural loading and shock or vibration. This compression would yield intolerable settlement potential for the relatively high plant component loadings if placed on mats or conventional shallow-bearing foundations. Development and support of the components are possible by the use of deep foundations, soil density improvement, and preloading of the soils in select structural loading situations. These judgments are based on the geotechnical investigations and evaluations detailed below.

For this initial phase of work, seven soil test borings were performed in the general plant area, typically to depths of about 100 ft, to define top of rock. Test borings, performed according to the American Society for Testing and Materials (ASTM) D1586, provide standard penetration resistance (N) values which are general indicators of soil density or consistency and bearing capacity. The split spoon samples recovered are valuable for visual soils identification by the geologist, and laboratory testing for classification and engineering purposes. Select borings were also supplemented by rock coring (ASTM D2113) to determine the bearing character of the Floridan aquifer rock by way of percent recovery and rock quality designation (RQD). Additionally, about 30 shallow auger or posthole probes were conducted to map the distribution and thickness of surficial organics and topsoil across the site. Figures 2.3.1-6 and 2.3.1-7 present the generalized geologic profile constructed from the boring program, and Attachment 10.5-C of Appendix 10.5 presents detailed test boring logs.

The Smith Unit 3 facility components which will impose significant structural loading include:

- Engineered/constructed fill, 2 to 6 ft, to achieve underslab grade and meet flood freeboard requirements; this will produce a wide-area loading of 250 to 750 pounds per square foot (psf).
- HRSG which will apply an average slab loading in the range of 2,000 to 3,000 psf, with lateral loading as well.

- Stack and CTG, which will impose loading similar to the HRSG, but also include uplift (overturning) loads.
- Cooling Tower and Water Treatment Building, estimated at 750 to 1,000 psf.
- Demineralized Water Tank, up to 100 ft in diameter, for a uniform circular load of up to 3,000 psf.

The bearing capacity considerations and anticipated foundation behavior under the expected loadings outlined above can be summarized as follows, for each major stratum encountered.

Surface Organics

The 12 to 18 inches of very loose organic silts and silty sand topsoil are not suitable for foundation support, nor can they be densified sufficiently in place. They require excavation, and may be used as topsoil atop the new fill if blended properly with other soils to adjust the organic content and consistency.

Surficial Sands

N-values up to 30 blows per foot (bpf) in the upper 10 ft indicate firm to medium-dense relative density. The bearing capacity is limited by the denser sands' thickness, however, and only very light structures on narrow pads or footings bearing at 2,500 psf or less can be founded in these soils. Below 10 ft, N-values as low as 1 and 2 indicate very loose density, precluding any heavy loading without proper densification or preloading prior to construction.

Jackson Bluff Clay

This thin clay layer is normally encountered at about 20 ft deep. N-values of essentially zero (weight-of-hammer) up to two indicate very soft consistency and excessive settlement potential for sensitive structures such as the HRSG, turbines, and stack. Heavy structural loads will have to be transferred through this layer by means of piles or stone columns. Due to clayey consistency, an approach of preloading to minimize settlements for intermediate-loaded structures such as the tank, water treatment building, or cooling tower would probably require a minimum of 6 months for this layer.

Intracoastal Sands

These calcareous silty and clayey sands have relative densities of very loose to firm between depths of about 20 to 75 ft, as reflected by N-values varying from 2 to 16 bpf. Below 75 ft, N-values tend to increase, approaching 30 bpf in some cases, indicating medium relative density. The upper portion of this stratum presents the critical lower densities which dictate the need for deep foundations or soil density improvement in all but a few loading situations. Where both fines content and relative density are low (below 10 percent), these sands are susceptible to further densification from machinery vibration or pile driving. Additionally, where N-values occur at less than about 6 or 7 bpf, these sands could consolidate from the weight of added fill, and impose negative friction, or downdrag, on piles installed through them. The low bearing capacity or strength of this material thus dictates that any significant thickness of fill should be placed as early into the construction schedule as possible, to maximize available preload times, even if piling is used for structural loading.

Floridan Aquifer

The rock core samples obtained to date indicate a fairly competent top-of-rock condition, but only for the upper few feet. Fractured and voided portions further below would indicate that hard driving will be required to adequately and safely seat the piles extending to these depths, varying from 80 to 100 ft deep. The bearing capacity of the rock will be determined by the joint frequency, orientation, and hardness as determined by unconfined compressive strength testing on intact rock cores.

To support the detailed design phase of the Project, more quantitative subsurface information pertaining to allowable bearing capacity and settlement potential will be gathered through the use of Marchetti Dilatometer soundings, and unconfined compression test and RQD analyses of rock cores.

Geotechnical evaluation of data points to:

- Bearing on/into the Floridan aquifer limerock by full displacement piles to support the very heavy settlement-sensitive CTG components, HRSG, and stack.

- Increase of the compression modulus of the Intracoastal Sands by preloading of vibroreplacement (stone columns) to decrease settlement potential and increase bearing capacity sufficient to support lighter, less settlement-sensitive structures such as the cooling tower and water tank.

Neither pile driving nor vibrocompaction/vibroreplacement procedures present an undue threat to ground water quality.

With the very high water table at this site, the use of a single-stage well point dewatering system and sheet-pile bracing of an excavation up to 15 ft deep will be required for installation of large-diameter piping to be placed underground between the CTG units.

2.3.2 SUBSURFACE HYDROLOGY

The Smith Unit 3 Project is located in the Econfina Creek Basin. A recent Northwest Florida Water Management District (NWFWMD) publication (Richards, 1997) characterized the area in detail. The general and site-specific subsurface hydrology are summarized below.

Within the Project area, four hydrogeologic units define the regional system. The general hydrogeologic sequence includes:

- The surficial aquifer system.
- The intermediate system.
- The Floridan aquifer system.
- The Sub-Floridan confining unit.

The surficial and Floridan aquifer systems are composed of moderately to highly-permeable sediments. These systems transmit and store large quantities of water. The intermediate and Sub-Floridan systems are low-permeability sediments and form regionally extensive confining units (Richards, 1997). The Southeastern Geological Society's ad hoc Committee on Florida Hydrostratigraphic Unit Definition defined the various aquifer systems in the state. Figure 2.3.1-2 shows the nomenclature and relationship between the hydrogeologic sequence and major stratigraphic units in the Florida Panhandle.

2.3.2.1 <u>Subsurface Hydrological Data for the Site</u>

<u>Surficial Aquifer System</u>—The surficial aquifer system occurs over most of the NWFWMD area and the top of the system is the natural land surface. The surficial aquifer system is made up of unconsolidated silty and organic fine- to coarse-grained quartz sands. The sediments range in age from Pliocene to Holocene. Ground water normally occurs under water table conditions. Regionally, the surficial aquifer system ranges in thickness from 0 to 80 ft. The aquifer at the Project site normally has a thickness of 15 to 20 ft. Although the surficial aquifer has been developed in some areas of Bay county, low permeability and thickness preclude this system as a water source at the subject site (Gulf correspondence to NWFWMD, March 1999). Figure 2.3.2-1 shows the thickness of the

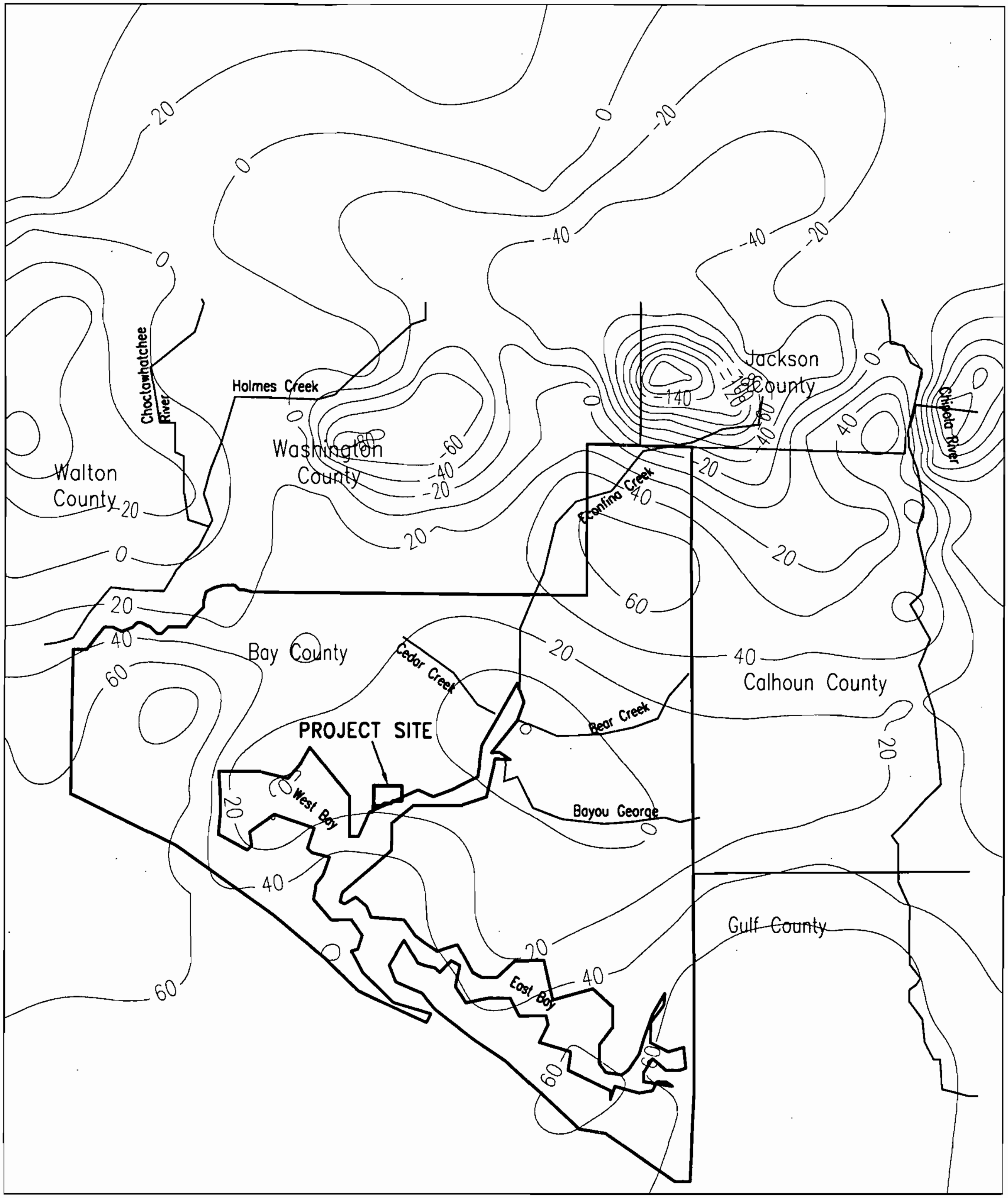

FIGURE 2.3.2-1.

THICKNESS OF THE SURFICIAL AQUIFER

Sources: Richards, 1997; SCS, 1999; ECT, 1999.

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surficial aquifer based on Richards (1997), modified to include site-specific information. This agrees with the thickness of the surficial unit as encountered in the site investigation.

In the Project area, seven piezometers were installed in the surficial aquifer system (Figure 2.3.2-2). Maximum and minimum readings since installation are given in Table 2.3.2-1. Seasonal fluctuations in the surficial aquifer at Plant Smith range from a low elevation of 2.07 in November to elevation 10.33 in February (adjacent monitoring well at existing Smith Plant). Figures 2.3.2-3 through 2.3.2-6 present the water table contour maps derived from the recently installed piezometers. Direction of ground water flow appears to be toward piezometer CT6S. Short-term flow directions can change with precipitation events.

Table 2.3.2-1. Water Table Elevations in the Surficial Aquifer

Piezometer ID	Water Table Elevation (ft)			
	February 1999	March 1999	April 1999	May 1999
CT1S	6.42	6.43	4.34	6.67
CT2S	6.49	6.49	4.39	6.76
CT5S	7.16	6.70	4.77	6.97
CT6S	5.84	6.18	4.17	6.28
CT7S	6.11	6.18	4.38	6.62
CT11S	NA	NA	6.93	9.07
CT12S	NA	NA	5.86	8.25

Source: Gulf Power Company, 1999.

Horizontal Ground Water Flow—Horizontal ground water flow velocity (V) for the surficial water bearing unit can be estimated using the formula:

$$V = KI/\eta$$

Where:
- K = hydraulic conductivity
- I = hydraulic gradient
- η = estimated effective porosity

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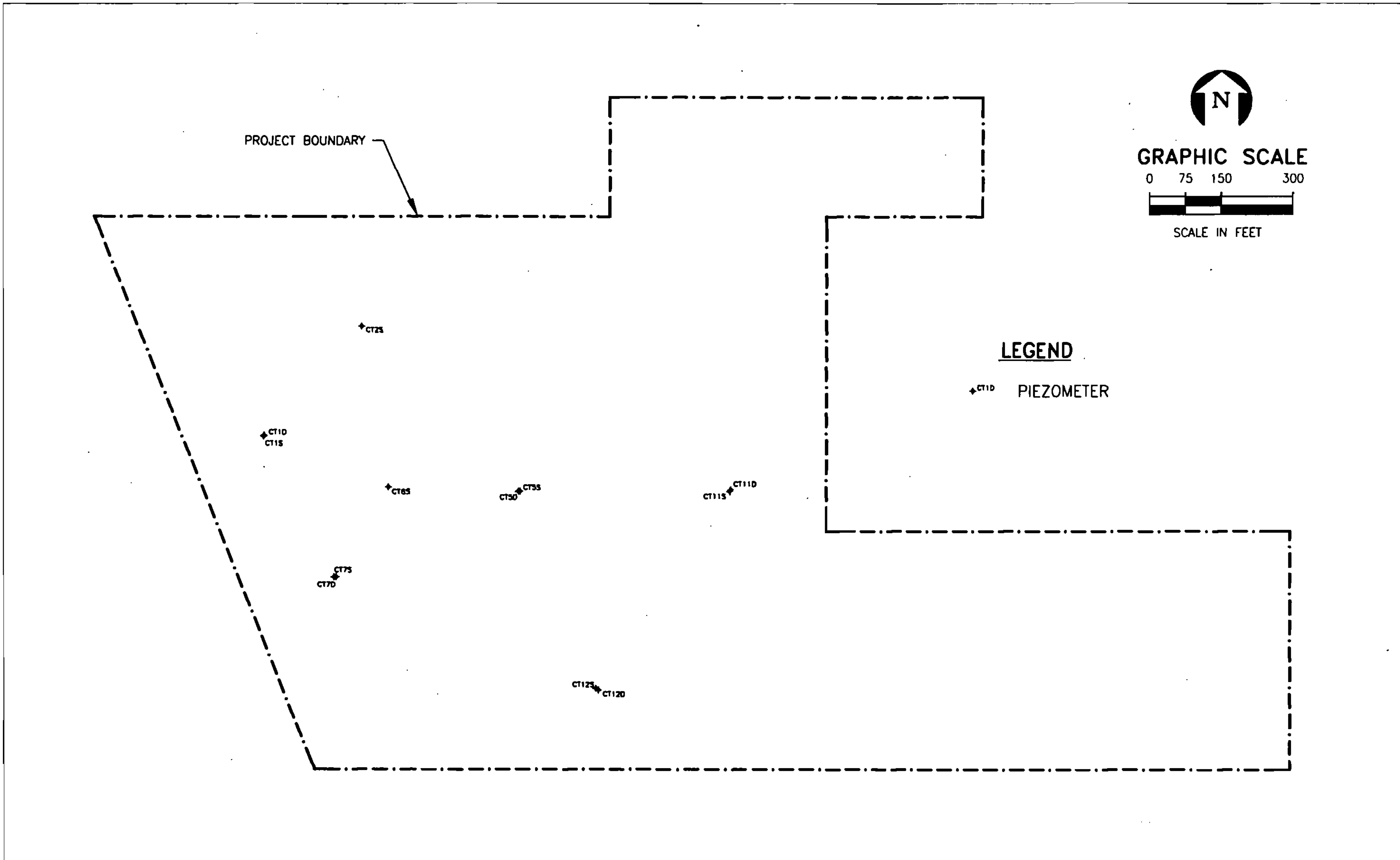

FIGURE 2.3.2-2.

PIEZOMETER LOCATION MAP

Sources: SCS, 1999; ECT, 1999.

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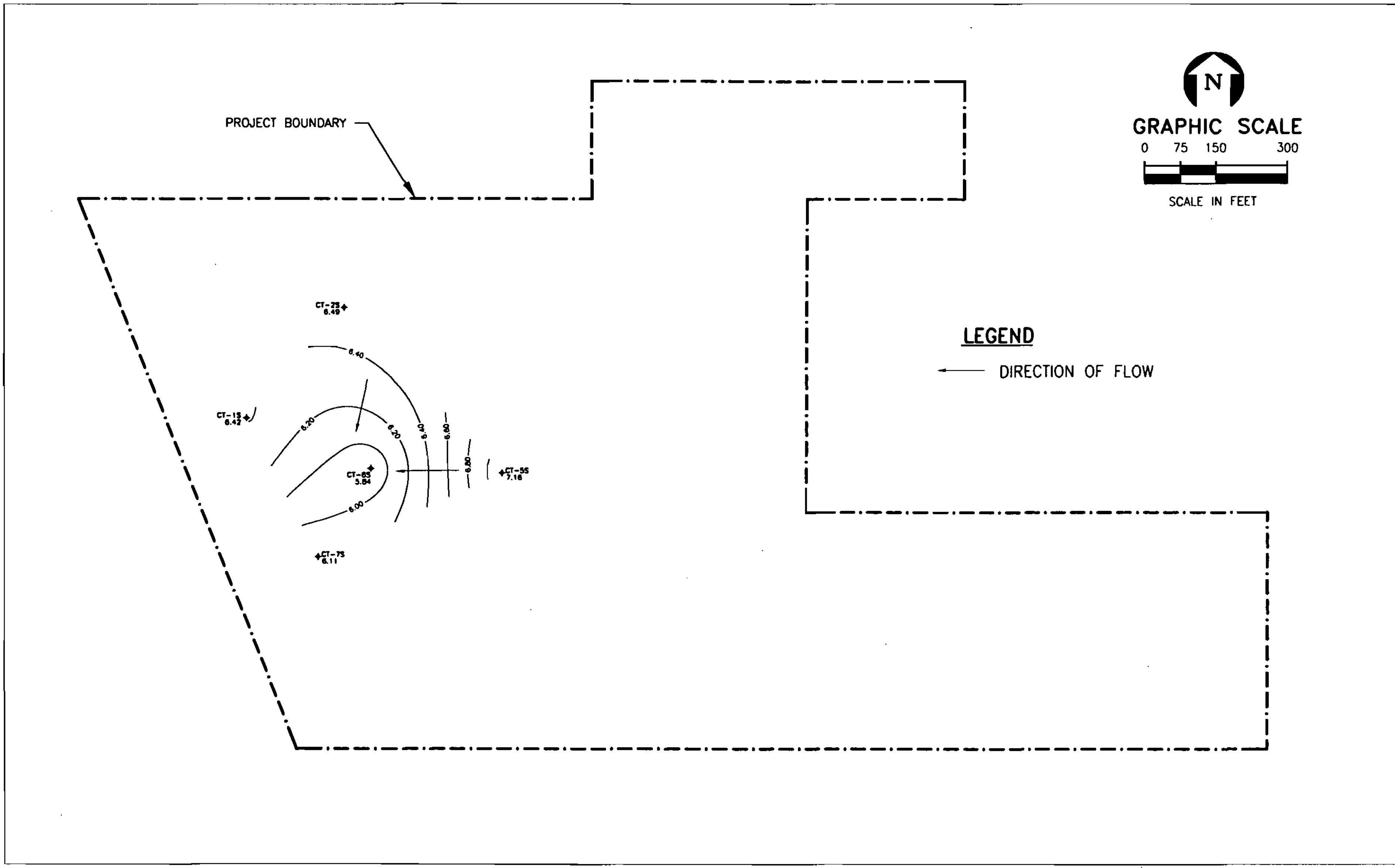

FIGURE 2.3.2-3.
WATER TABLE CONTOUR MAP OF THE SURFICIAL AQUIFER
FEBRUARY 1999
Source: SCS, 1999.

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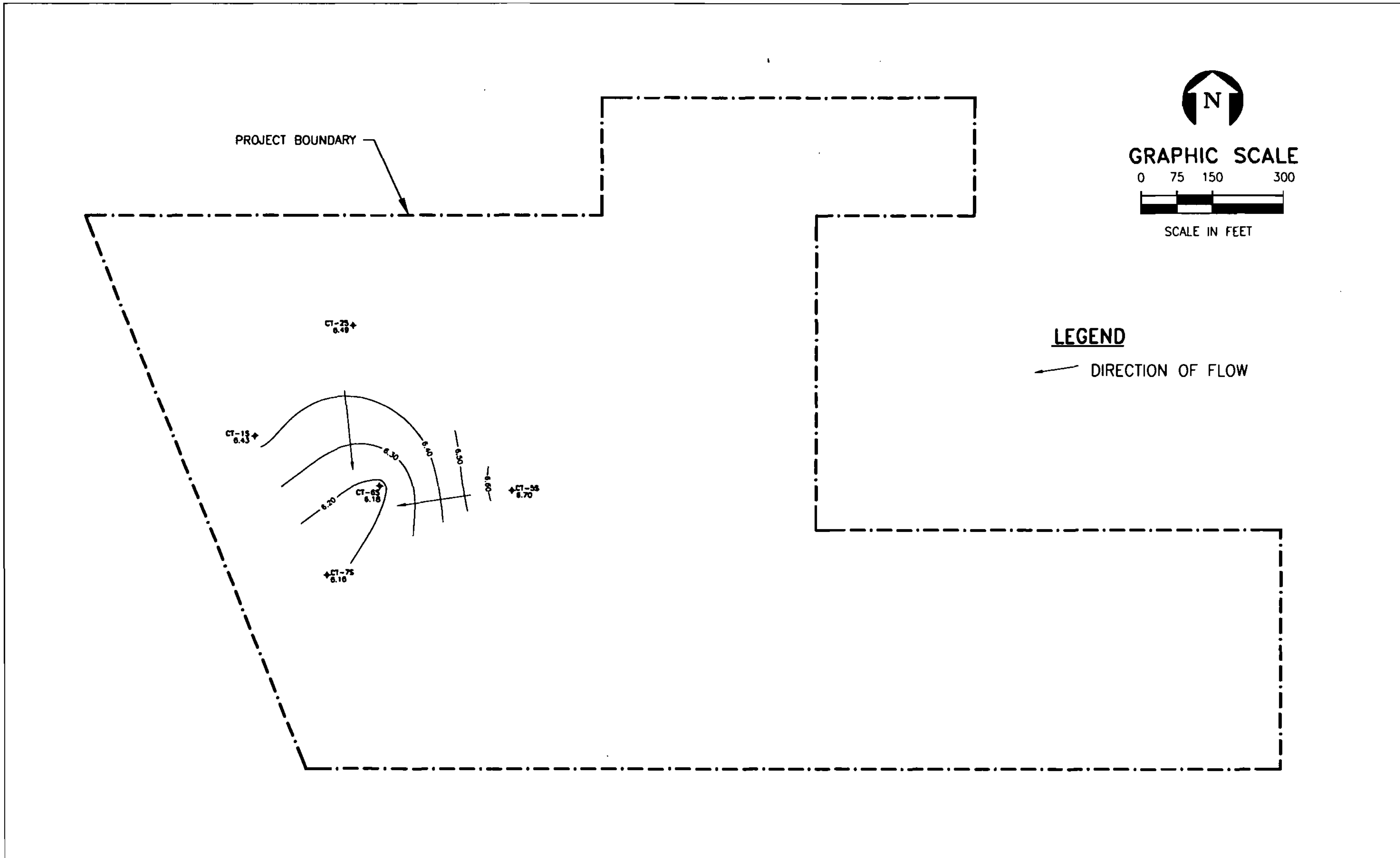

FIGURE 2.3.2-4.

WATER TABLE CONTOUR MAP OF THE SURFICIAL AQUIFER

MARCH 1999

Source: SCS, 1999.

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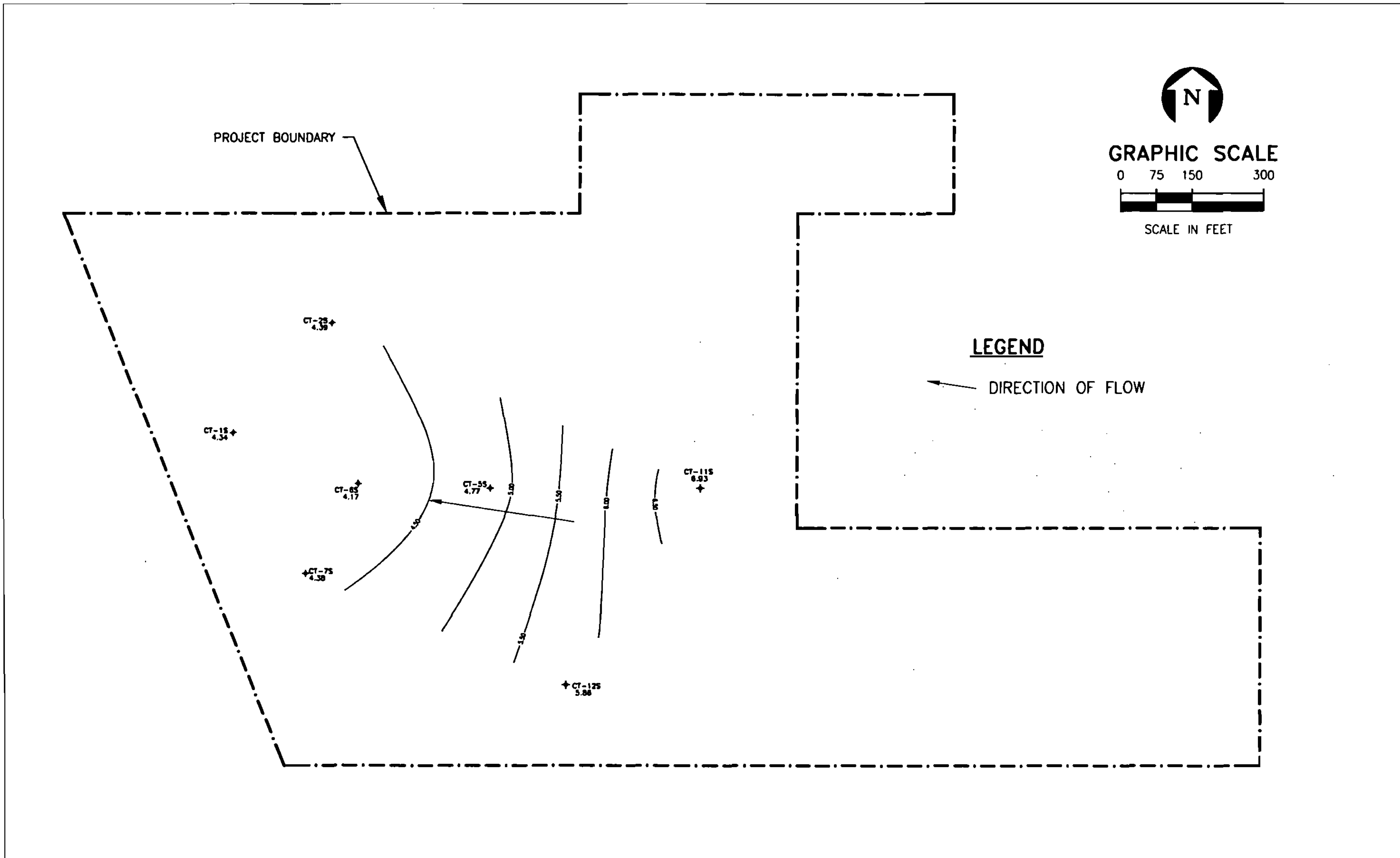

FIGURE 2.3.2-5.

WATER TABLE CONTOUR MAP OF THE SURFICIAL AQUIFER

APRİL 1999

Source: SCS, 1999.

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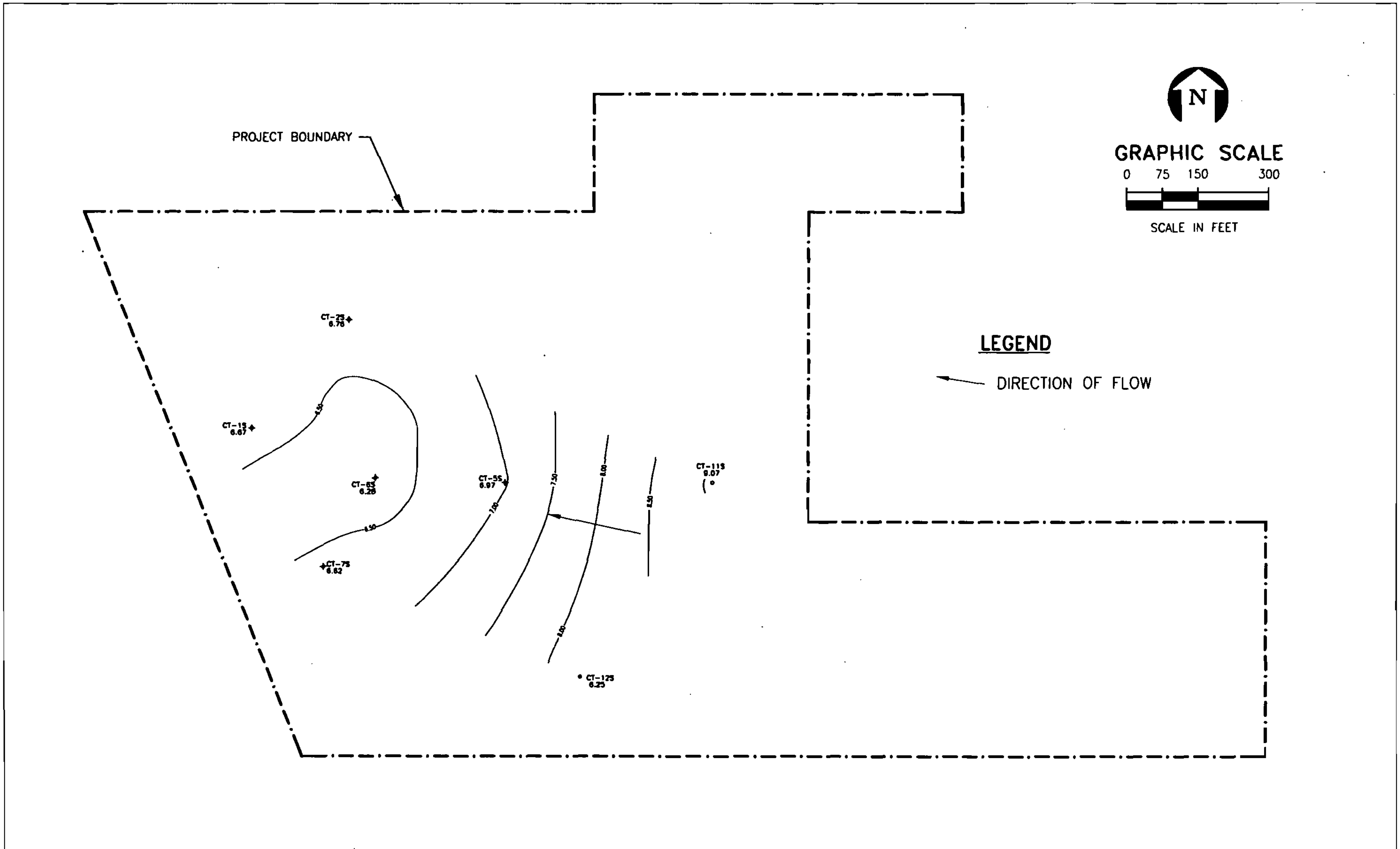

FIGURE 2.3.2-6.
WATER TABLE CONTOUR MAP OF THE SURFICIAL AQUIFER
MAY 1999
Sources: SCS, 1999; ECT, 1999.

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In the absence of measured values for effective porosity, a value of 0.20 was used. This is based on default values from *Volume II, RCRA Facility Investigation (RFI) Guidance* (U.S. Environmental Protection Agency [EPA], 1989), for soil classified as SP and SM. An average hydraulic conductivity value of 2.9 x 10^{-4} cm/sec (0.82 ft/day) was used in the calculation. Maximum difference in head (7.17 ft at CT5S and 5.84 ft at CT6S) over a distance of 270 ft gives a maximum hydraulic gradient of 4.93 x 10^{-3}.

$$V = \frac{(2.9 \times 10^{-4} \text{ cm/sec})(4.93 \times 10^{-3})}{0.20} = 7.15 \times 10^{-6} \text{ cm/sec} = 0.020 \text{ ft/day} = 7.39 \text{ ft/year}$$

Water Quality—The surficial aquifer system is not a major source of water in the NWFWMD but is mainly used for irrigation and to maintain surface water features. Water in the surficial aquifer is soft and generally unmineralized. The sand-rich aquifer has the ability to sorb metals and anions in moderate amounts.

The report entitled *Florida's Ground Water Quality Monitoring Program Background Hydrogeochemistry* (FGS, 1992) is a compilation of the initial quantification of background ground water quality in each of the major aquifer systems. The report provides details of the temperature, pH, total dissolved solids, specific conductance, cations, anions, trace metals and organics identified through analyses of thousands of wells throughout the state.

Based on the report, the total dissolved solids in the surficial aquifer system are low, which indicates minimum weathering of the host rock materials. Concentrations range from 15 to 1,000 milligrams per liter (mg/L). The median concentration is 74 mg/L, with concentration increasing toward the coast. The chloride distribution in the surficial aquifer in the NWFWMD is low due to the continental influences by precipitation. Concentrations ranges from 1.8 to a maximum of 410 mg/L, with a median of 7 mg/L (FGS, 1992). Figures 2.3.2-7 and 2.3.2-8 show the distribution of the total dissolved solids and chloride in the surficial aquifer system.

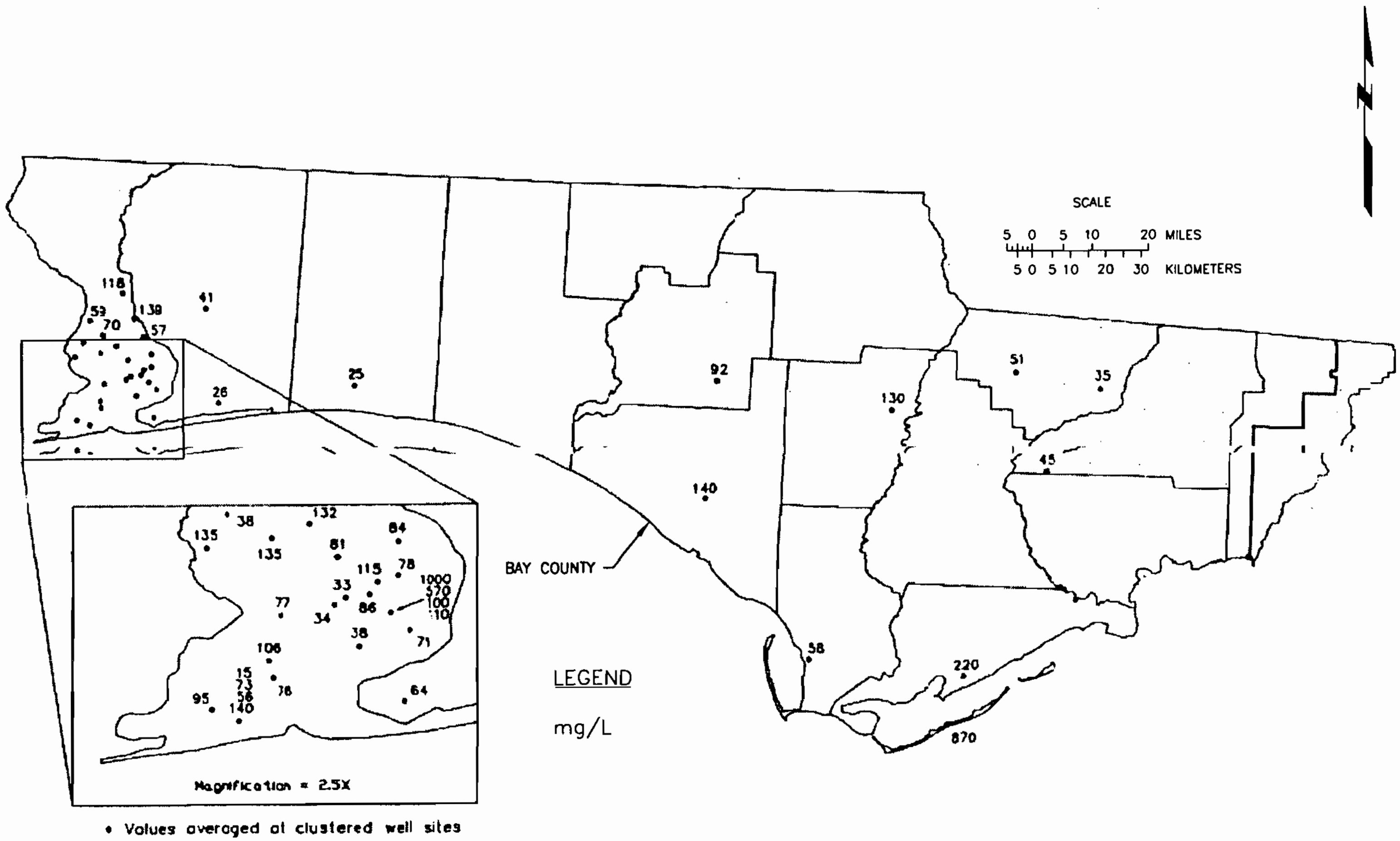

FIGURE 2.3.2-7.

DISTRIBUTION OF TOTAL DISSOLVED SOLIDS IN THE SURFICIAL AQUIFER SYSTEM OF THE PANHANDLE

Sources: FGS, 1992; SCS, 1999; ECT, 1999.

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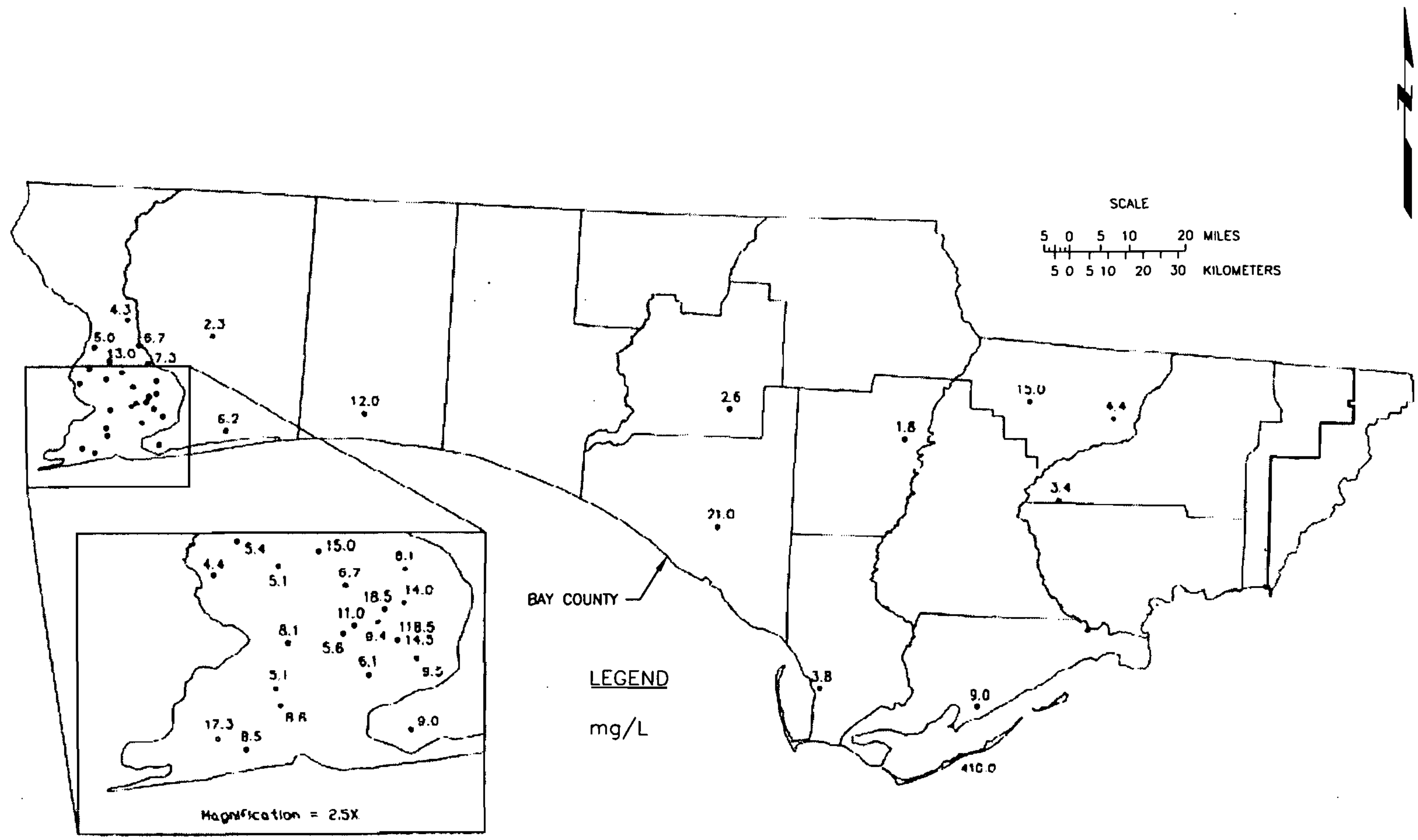

• Values averaged at clustered well sites

FIGURE 2.3.2-8.

DISTRIBUTION OF CHLORIDES IN THE SURFICIAL AQUIFER SYSTEM OF THE PANHANDLE

Sources: FGS, 1992; SCS, 1999; ECT, 1999.

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Specific Yield—A series of aquifer tests were conducted at the Lansing Smith Plant site in January 1995 to evaluate the water table well performance (*Lansing Smith Electric Generating Plant Combustion Turbine Area Remedial Action Plan* (SCS, 1995). The values derived from the pumping test are applicable to the Project area. Based on the testing, the average specific yield (Sy) of the surficial aquifer is 0.17.

Intermediate System—The thick heterogeneous intermediate system retards ground water exchange between the surficial aquifer and the Floridan aquifer system. The sediments exhibit lower permeability than the surficial sands. Clays in the unit may have high sorption capacities. In Bay County, carbonate beds and/or coarse clastics may be interbedded with the fine-grain sediments (Richards, 1997).

The intermediate system in the Econfina Creek Basin is Middle Miocene to Upper Pliocene in age and includes the Jackson Bluff and Intracoastal Formations. The thickness of the system ranges from less than 50 to approximately 100 ft. Figure 2.3.2-9 shows the regional thickness of the intermediate system (Richards, 1997). In the Project area, the thickness of the system as determined by borings ranges from 77.0 to 82.8 ft and includes the Jackson Bluff and the Intracoastal Formations (Figure 2.3.2-10).

The Jackson Bluff Formation ranges from 1 to 7 ft thick in the Project area. The unit was encountered in all borings in the Project area as well as unrelated investigations at the Lansing Smith Plant site, where the unit ranges in thickness from 2 to 4 ft. The sediments are clayey sands and act as a semi-confining bed between the surficial quartz sands and the underlying calcareous sands of the Intracoastal Formation. Falling head permeability testing in the laboratory yielded a value of 1.3×10^{-6} cm/sec for the clayey portion of a Shelby tube sample collected from the Jackson Bluff Formation.

The Intracoastal Formation at the site underlies the Jackson Bluff Formation. Five piezometers were installed in the Intracoastal below the clay. Slug testing yielded an average

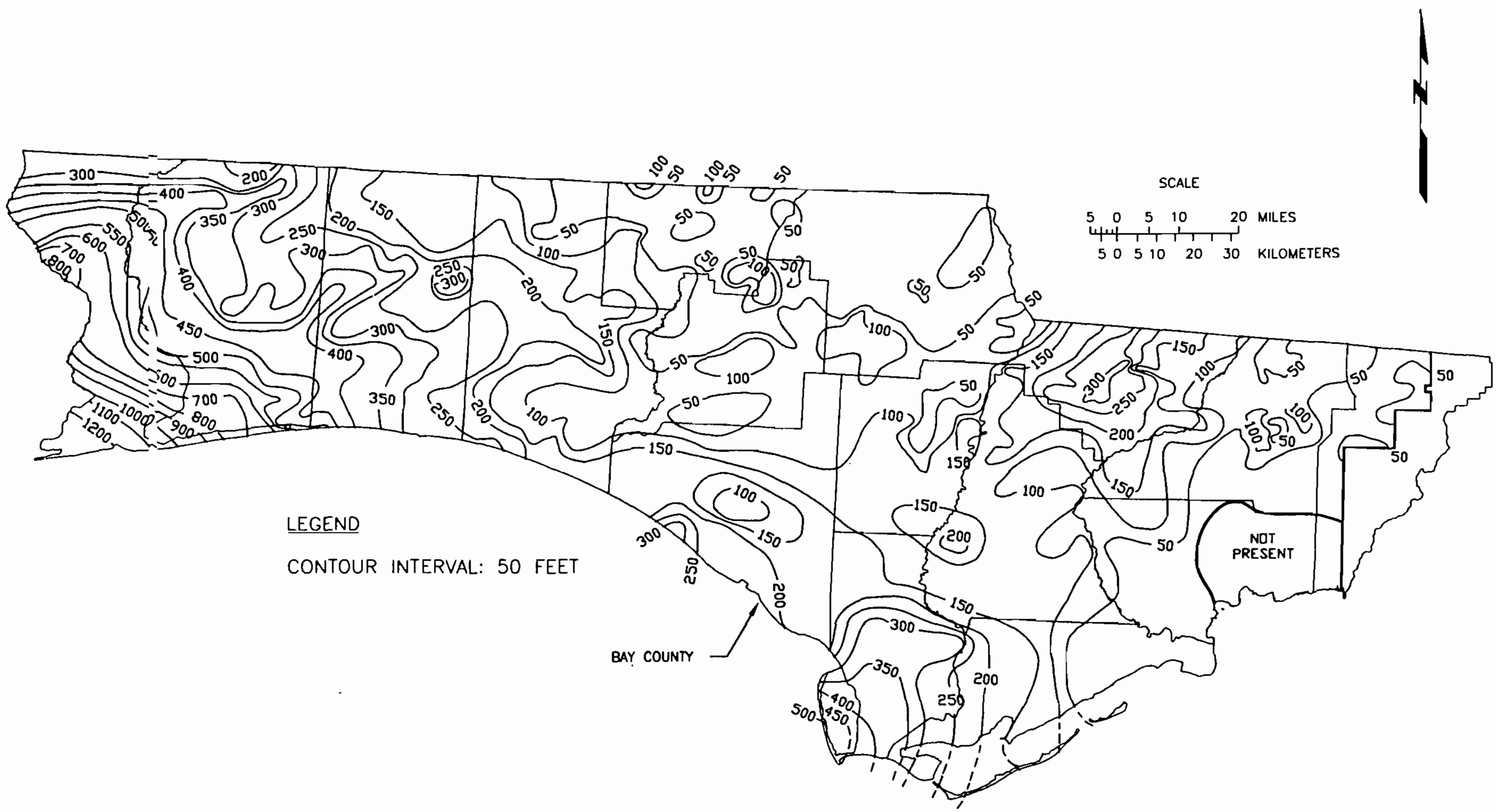

FIGURE 2.3.2-9.

REGIONAL THICKNESS OF THE INTERMEDIATE AQUIFER SYSTEM

Sources: FGS, 1991; SCS, 1999; ECT, 1999.

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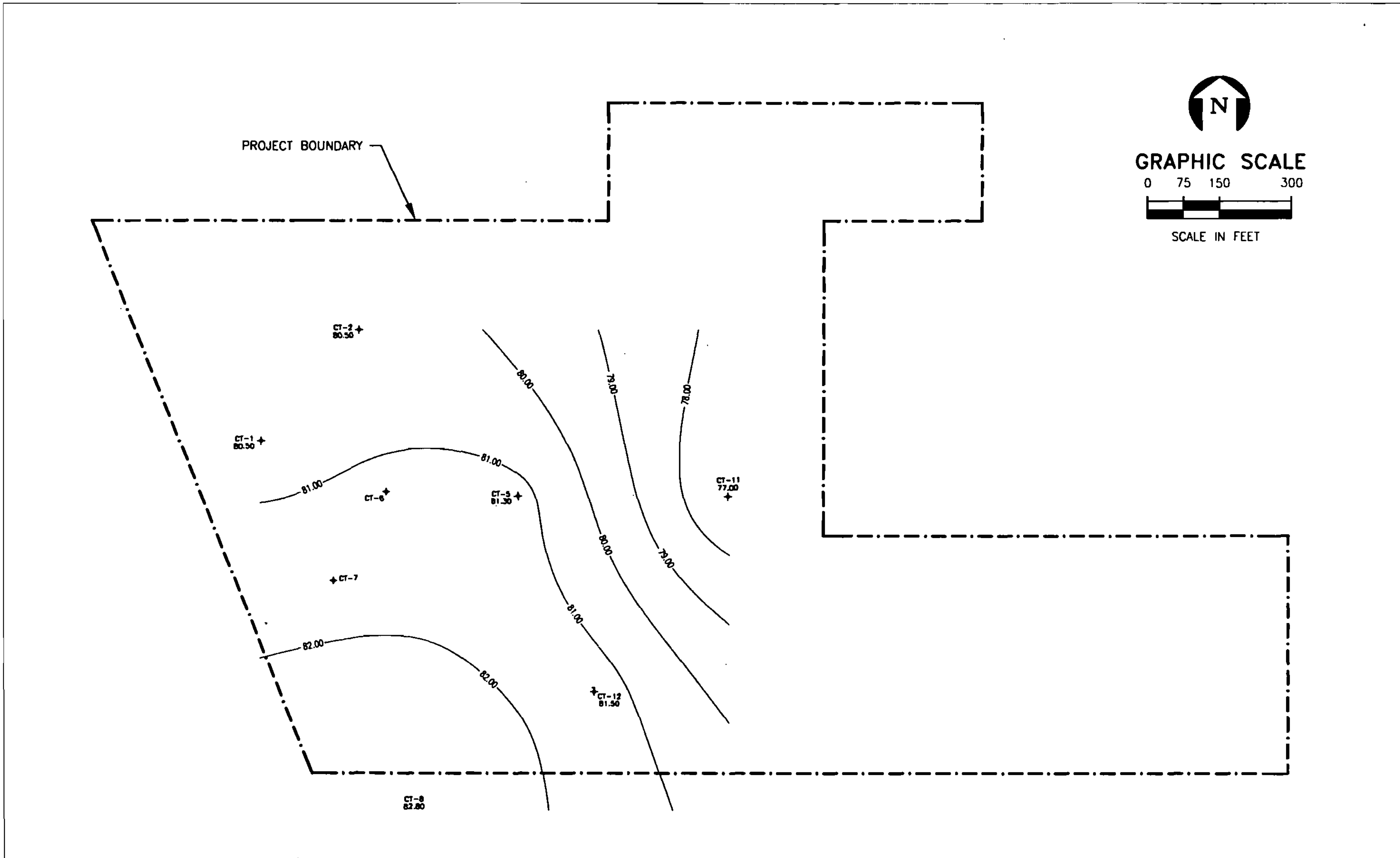

FIGURE 2.3.2-10.

ISOPACH MAP OF THE INTERMEDIATE SYSTEM IN THE PROJECT AREA

Source: SCS, 1999.

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hydraulic conductivity of 2.09 x 10^{-3} cm/sec (Table 2.3.2-2). Figures 2.3.2-11 through 2.3.2-14 present the piezometric surface maps. Ground water flow direction is to the west and southwest.

Table 2.3.2-3. Potentiometric Surface in the Intermediate Unit

Piezometer ID	Water Table Elevation February 1999	March 1999	April 1999	May 1999
CT1D	4.22	4.19	1.72	2.92
CT5D	4.42	4.63	2.15	3.25
CT7D	4.13	4.29	1.73	2.97
CT11D	NA	NA	5.70	6.98
CT12D	NA	NA	3.73	5.01

Source: SCS, 1999.

Horizontal Ground Water Flow—Horizontal ground water flow velocity for the intermediate water bearing unit can be estimated using the formula:

$$V = KI/\eta$$

Where: K = hydraulic conductivity

I = hydraulic gradient

η = estimated effective porosity

In the absence of measured values for effective porosity, a value of 0.20 was used. This is based on default values from *Volume II, RCRA Facility Investigation (RFI) Guidance*, (EPA, 1989) for soil classified as SM. An average hydraulic conductivity value of 2.09 x 10^{-3} cm/sec was used in the calculation. Hydraulic gradient was computed between CT-1D and CT-5D at the March reading. The difference in head between the two piezometers of 0.44 ft over a distance of 540 ft gives a gradient of 8.1 x 10^{-4}.

$$V = \frac{(2.09 \times 10^{-3} \text{ cm/sec})(8.1 \times 10^{-4})}{0.20} = 8.46 \times 10^{-6} \text{ cm/sec} = 0.024 \text{ ft/day} = 8.75 \text{ ft/year}$$

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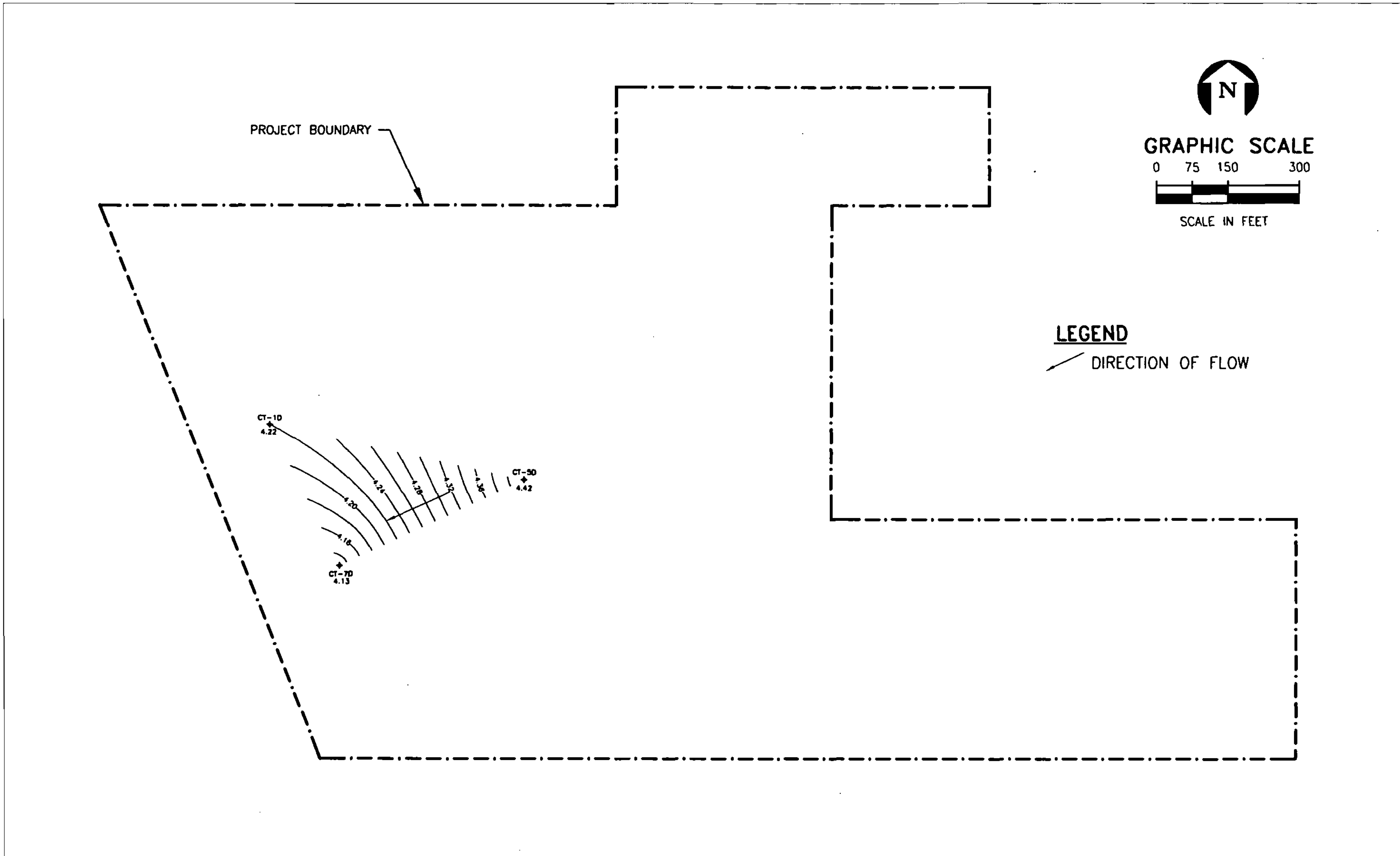

FIGURE 2.3.2-11.
POTENTIOMETRIC SURFACE OF THE INTERMEDIATE AQUIFER
FEBRUARY 1999
Source: SCS, 1999.

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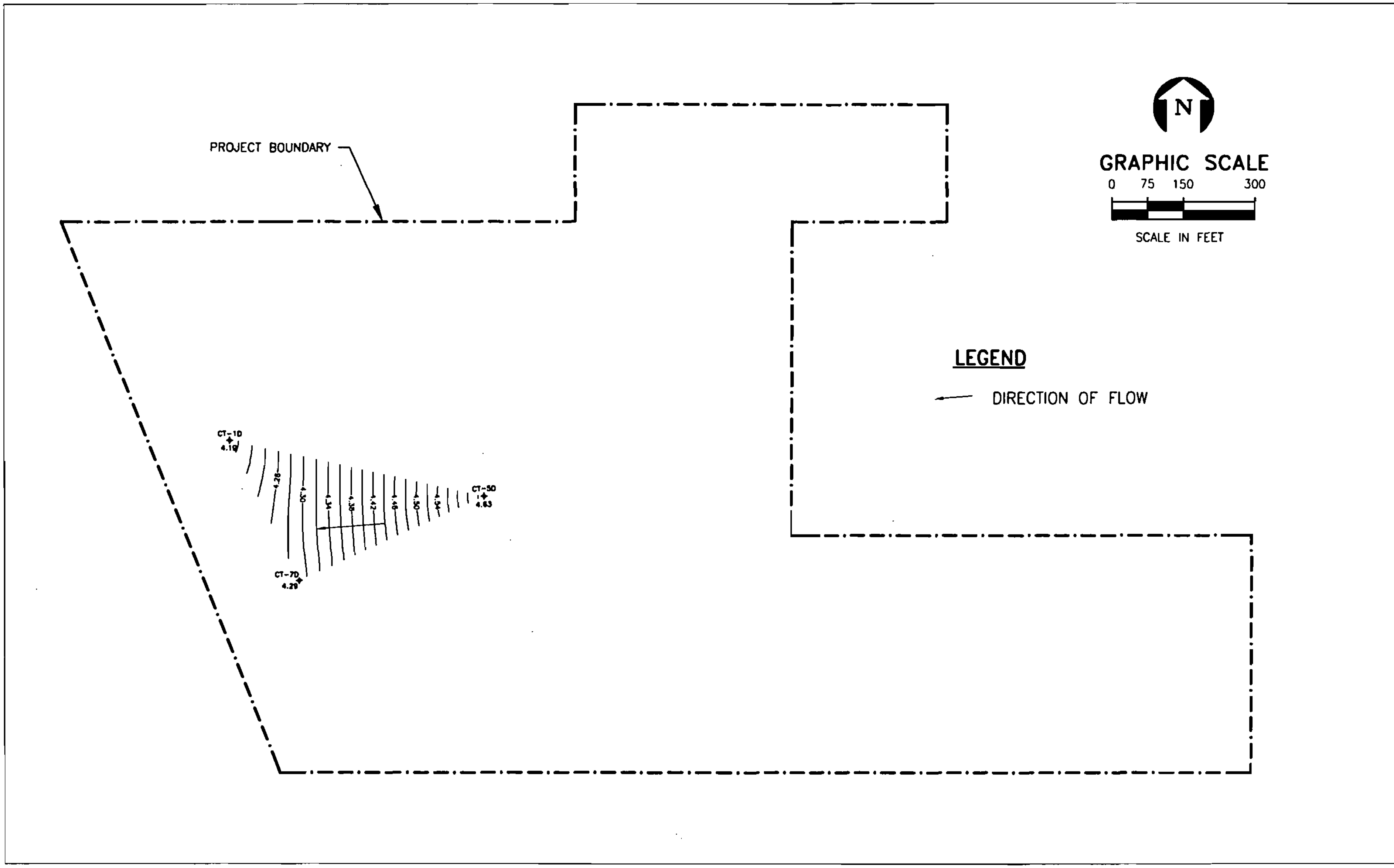

FIGURE 2.3.2-12.

POTENTIOMETRIC SURFACE OF THE INTERMEDIATE AQUIFER

MARCH 1999

Source: SCS, 1999.

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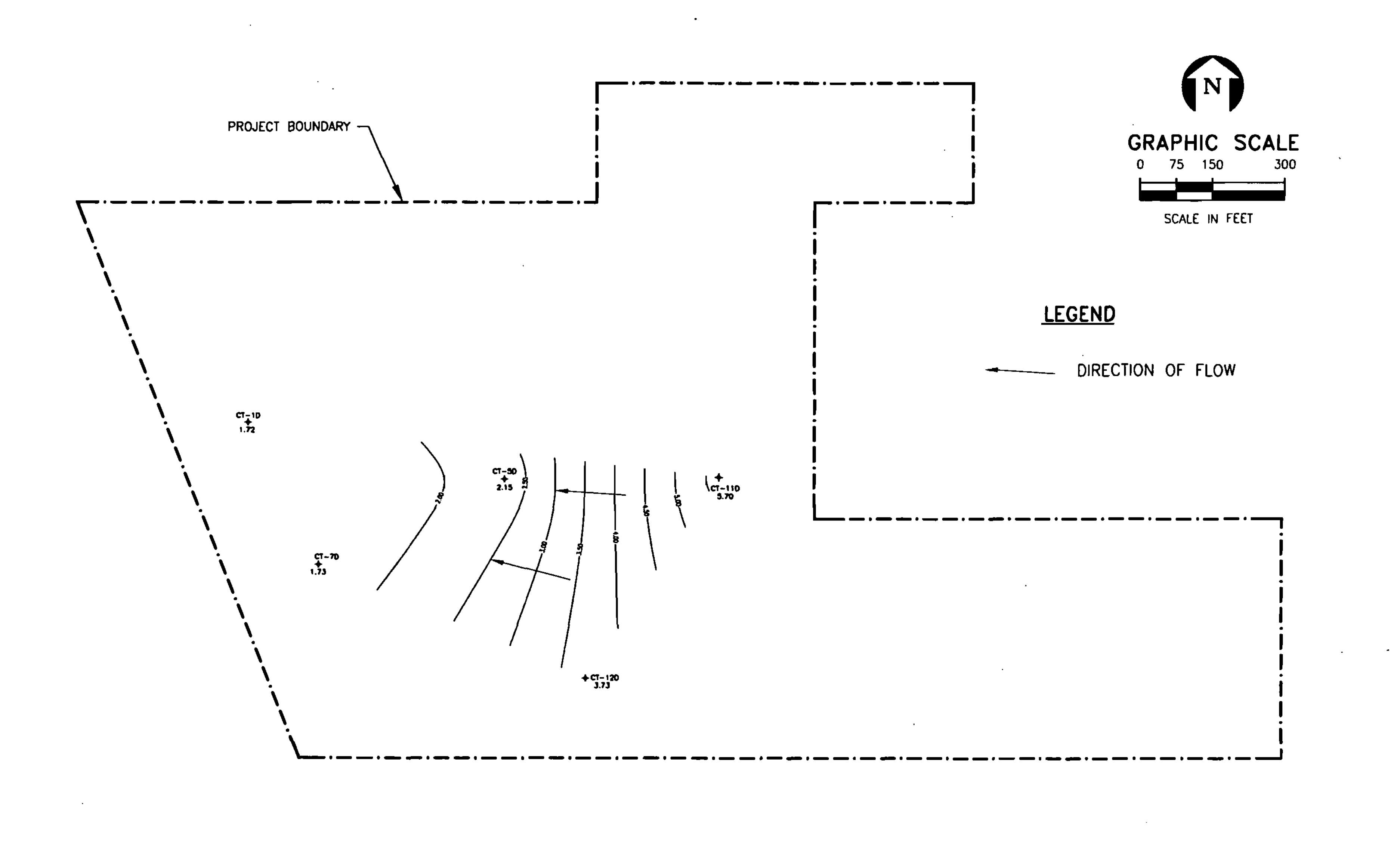

FIGURE 2.3.2-13.

POTENTIOMETRIC SURFACE OF THE INTERMEDIATE AQUIFER

APRÍL 1999

Source: SCS, 1999.

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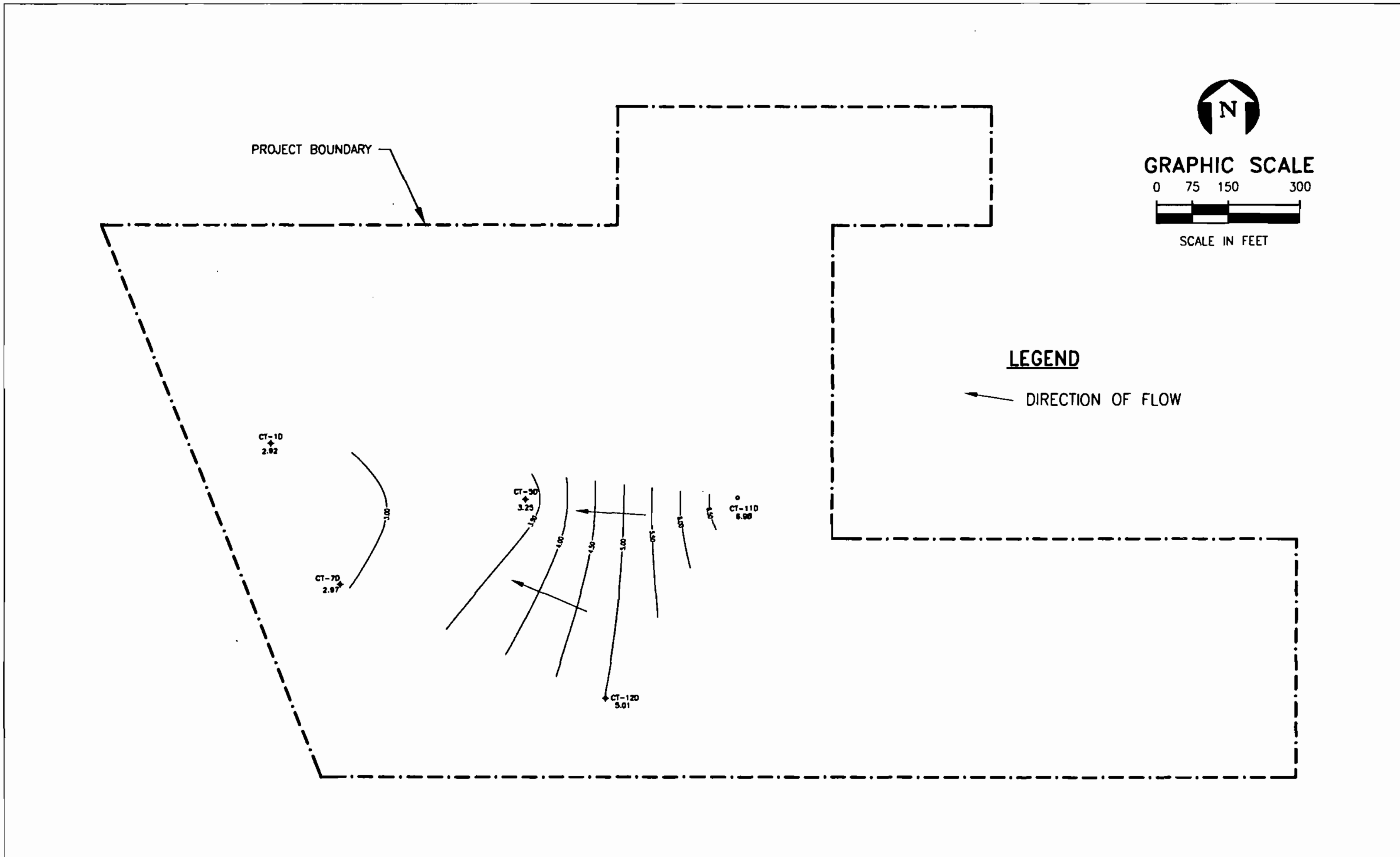

FIGURE 2.3.2-14.

POTENTIOMETRIC SURFACE OF THE INTERMEDIATE AQUIFER

MAY 1999

Source: SCS, 1999.

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Water Quality—The intermediate system aquifer is generally not an important water-bearing unit in Northwest Florida. Locally, the unit provides limited amounts of water for small, domestic potable wells. The total dissolved solids in the intermediate system range from 36 to 390 mg/L, with a median value of 165 mg/L (FGS, 1992). The distribution of chlorides in the aquifer shows considerable variability. Chloride concentrations are low in the northern part of the district where the rainfall is dominated by continental influence. Concentrations increase toward the coast. Based on the data from the Ground Water Quality Program, the minimum concentration within Northwest Florida is 1.7 mg/L and the maximum is 58.0 mg/L, with a median of 5.3 mg/L. Figures 2.3.2-15 and 2.3.2-16 show the distribution of the total dissolved solids and chloride in the intermediate system aquifer.

Floridan Aquifer System—The Floridan aquifer system is the most prolific aquifer system in the southeastern United States and underlies all of Florida. The system provides more than 90 percent of the water supplies in Northwest Florida except in parts of Santa Rosa County and Escambia County (FGS, 1992). The Floridan dips to the south and ranges from over 100 ft-msl in the northern part of the Panhandle to more than 300 ft below sea level in Bay County. The elevation of the top of the Floridan ranges from about 50 ft-msl to 50 ft below sea level throughout most of the Econfina Creek Basin where the aquifer is approximately 500 to 600 ft thick (Richards, 1997).

Ground water availability in the Floridan is a function of permeability, thickness, proximity to unsuitable water, and recharge rates. Where the intermediate system is thin and permeable, higher recharge rates occur and secondary porosity is enhanced, increasing aquifer permeability (Richards, 1997). In the Coastal portion of Bay County, in the Project area, the Floridan is thick but low recharge rates, low permeability, and proximity of salt water within and above the Floridan may result in low to moderate ground water availability.

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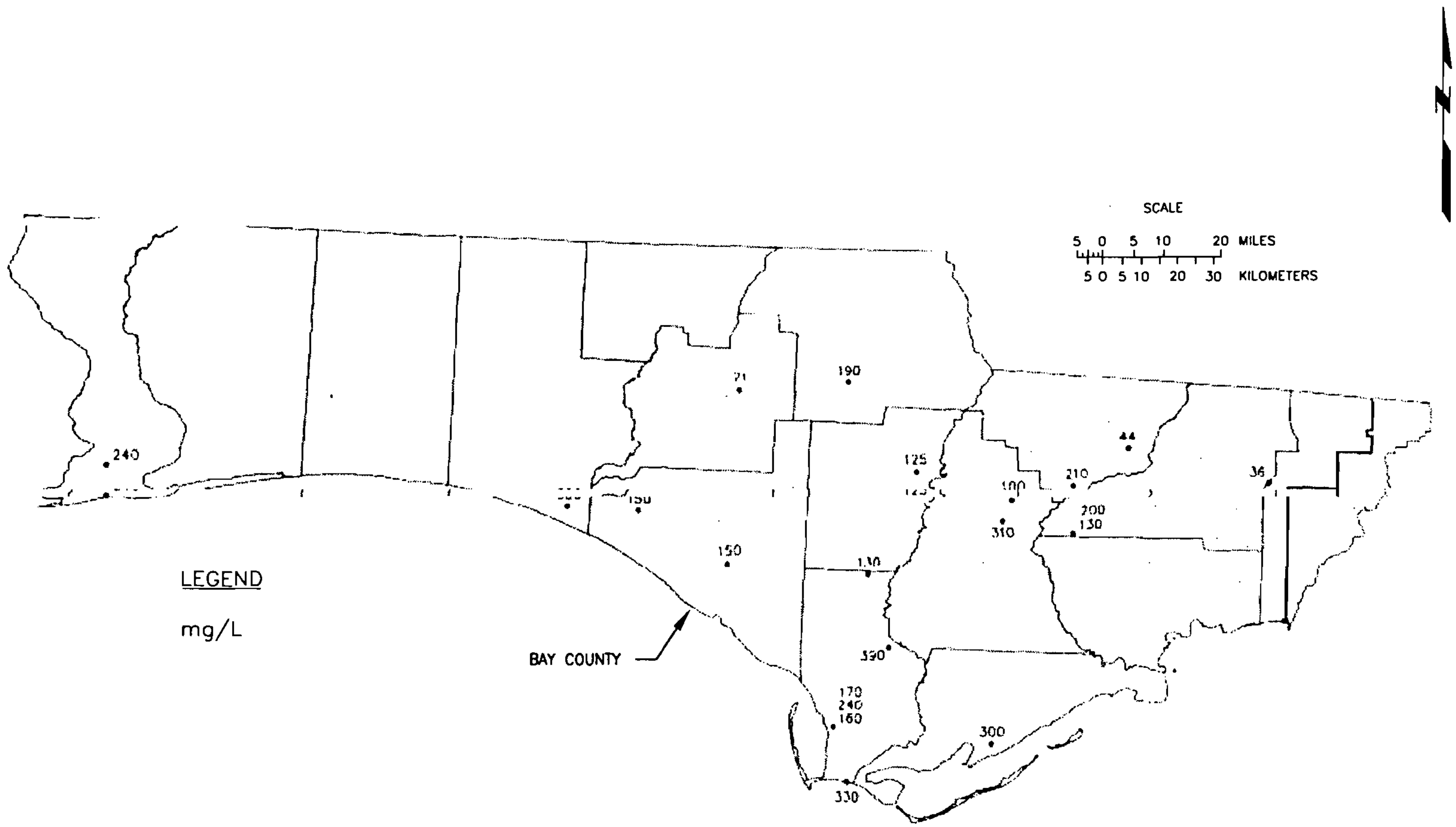

FIGURE 2.3.2-15.

DISTRIBUTION OF TOTAL DISSOLVED SOLIDS IN THE INTERMEDIATE AQUIFER SYSTEM

Sources: FGS, 1992; SCS, 1999; ECT, 1999.

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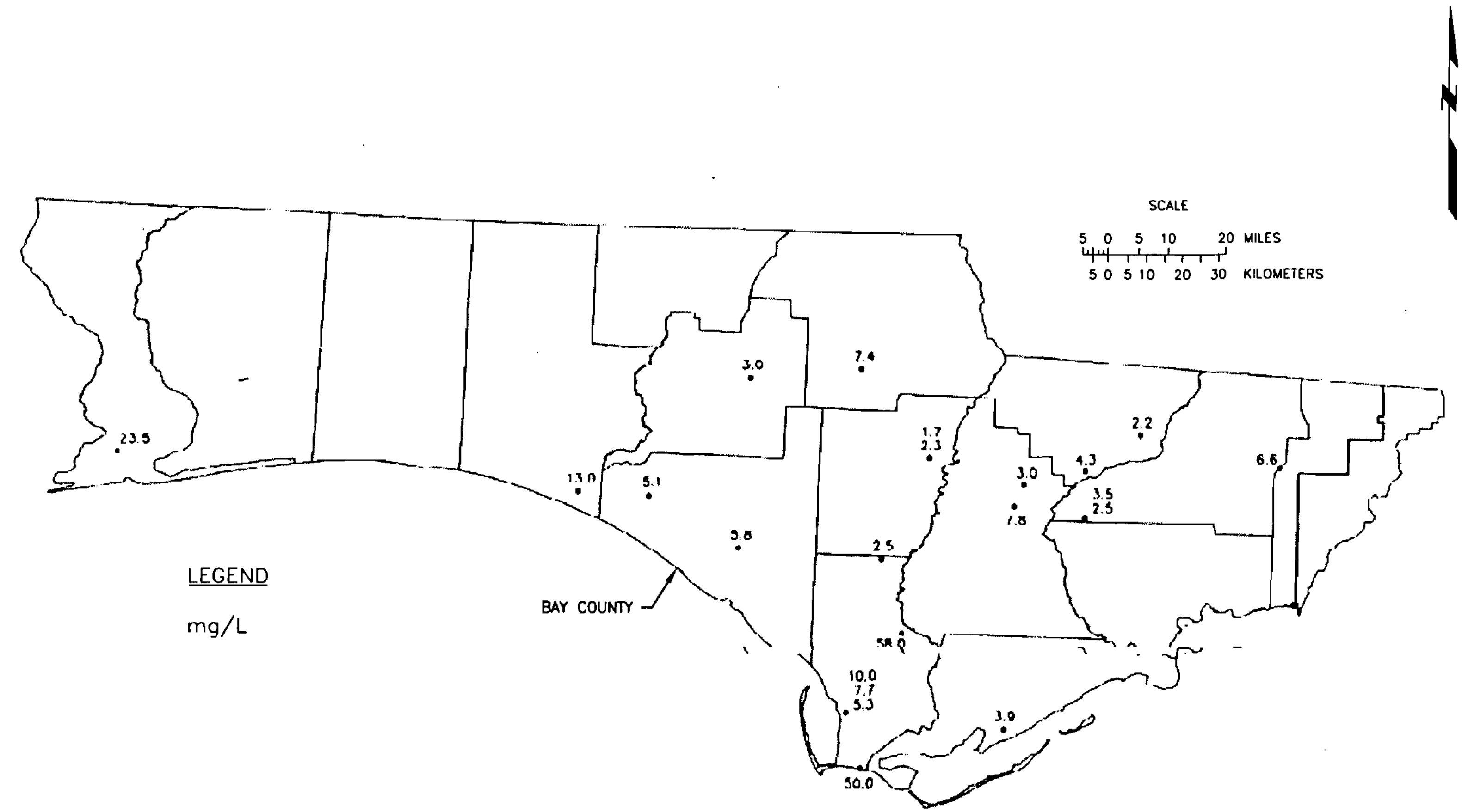

FIGURE 2.3.2-16.

DISTRIBUTION OF CHLORIDES IN THE INTERMEDIATE AQUIFER SYSTEM

Sources: FGS, 1992; SCS, 1999; ECT, 1999.

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Figures 2.3.2-17 and 2.3.2-18 represent the elevation of the top and bottom of the Floridan aquifer system in the Econfina Creek Basin and surrounding area. Figure 2.3.2-19 represents the top of the Floridan as defined by the drilling investigation at the Project site. Top of the rock of the Floridan was encountered at approximately 100 ft bls consistently across the site. The transmissivity of the Floridan in the Project area is estimated at 4,000 square feet per day.

The potentiometric surface varies widely throughout the state and may be affected by extensive pumping of ground water. Figure 2.3.2-20 shows the potentiometric surface of the Floridan in Bay and surrounding counties. No deep wells were installed in the Floridan aquifer during the drilling investigation.

Water Quality

The quality of the Floridan unit has been extensively studied since the aquifer is the most important source of water to the state. Compared to the surficial and intermediate sands and clays, the mineral assemblage in the Floridan is less complex, consisting mostly of calcite and dolomite and as a result, the unit contains a high calcium content compared to the overlying units. In Bay County, total dissolved solids in the Floridan are related to the salt-water zone and flow systems. High concentrations are often the result of contact with soluble carbonates and mixing with saline water at the bottom of the aquifer and at the coast. Concentrations are lowest in the interior areas where the aquifer is recharged by rainfall and the residence time is shorter. Within Northwest Florida, the total dissolved solids concentration of the Floridan ranges from 42 to 810 mg/L, with a median of 200 mg/L (FGS, 1992). Figure 2.3.2-21 shows the distribution of total dissolved solids in the Floridan aquifer.

The chloride distribution in the Floridan aquifer in the Project area is similar to the other aquifer systems in the state. Concentrations are generally low inland, in recharge areas and shallow wells. Concentrations are highest in deeper wells near the coast and in areas of salt water intrusion caused by pumping. Within Northwest Florida, the chloride distribution ranges from 1.7 to 300 mg/L, with a median of 6.3 mg/L. Figure 2.3.2-22 shows the distribution of chloride concentration in the Floridan aquifer.

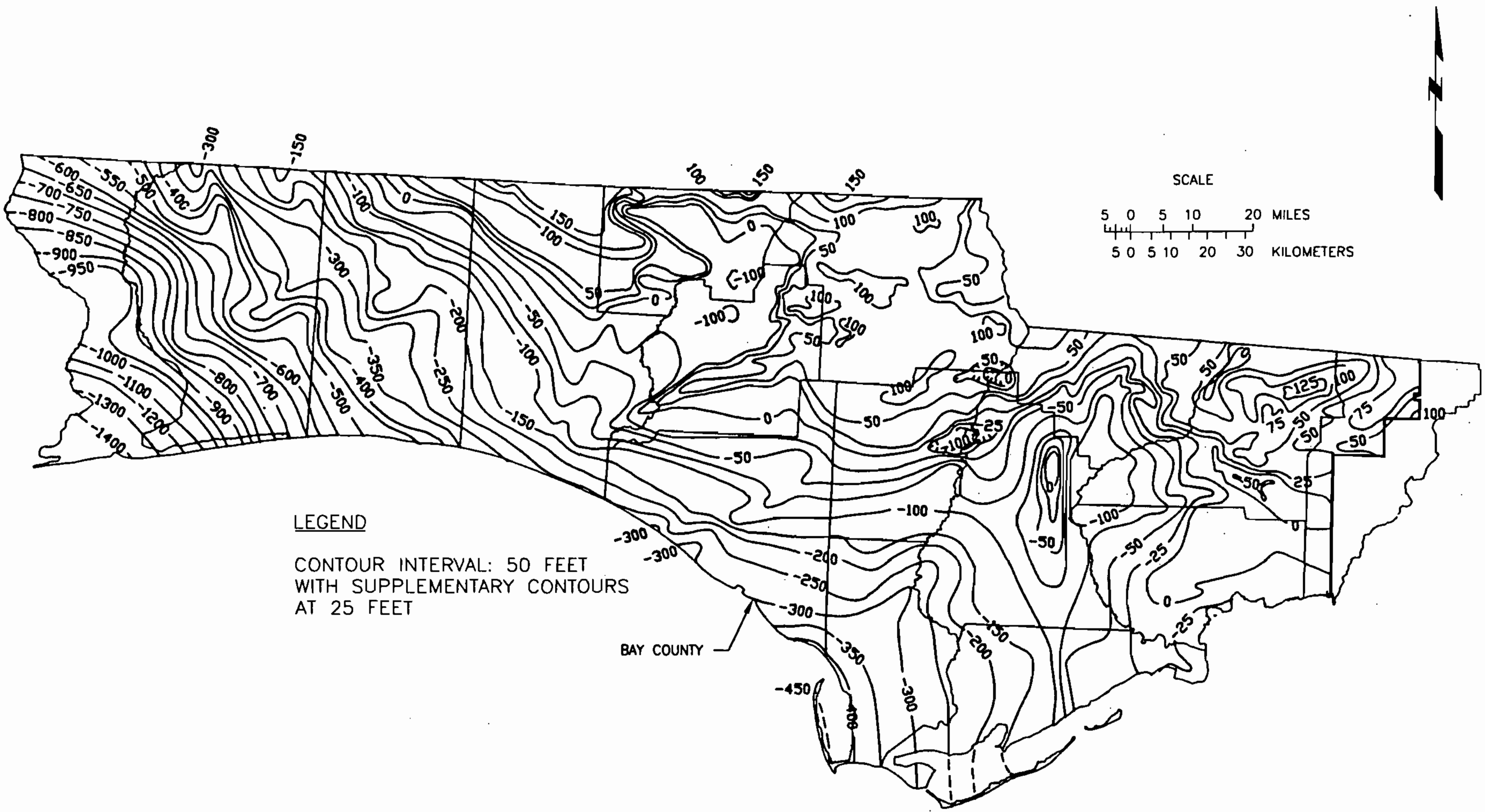

FIGURE 2.3.2-17.

ELEVATION OF THE TOP OF THE FLORIDAN AQUIFER

Sources: FGS, 1991; SCS, 1999; ECT, 1999.

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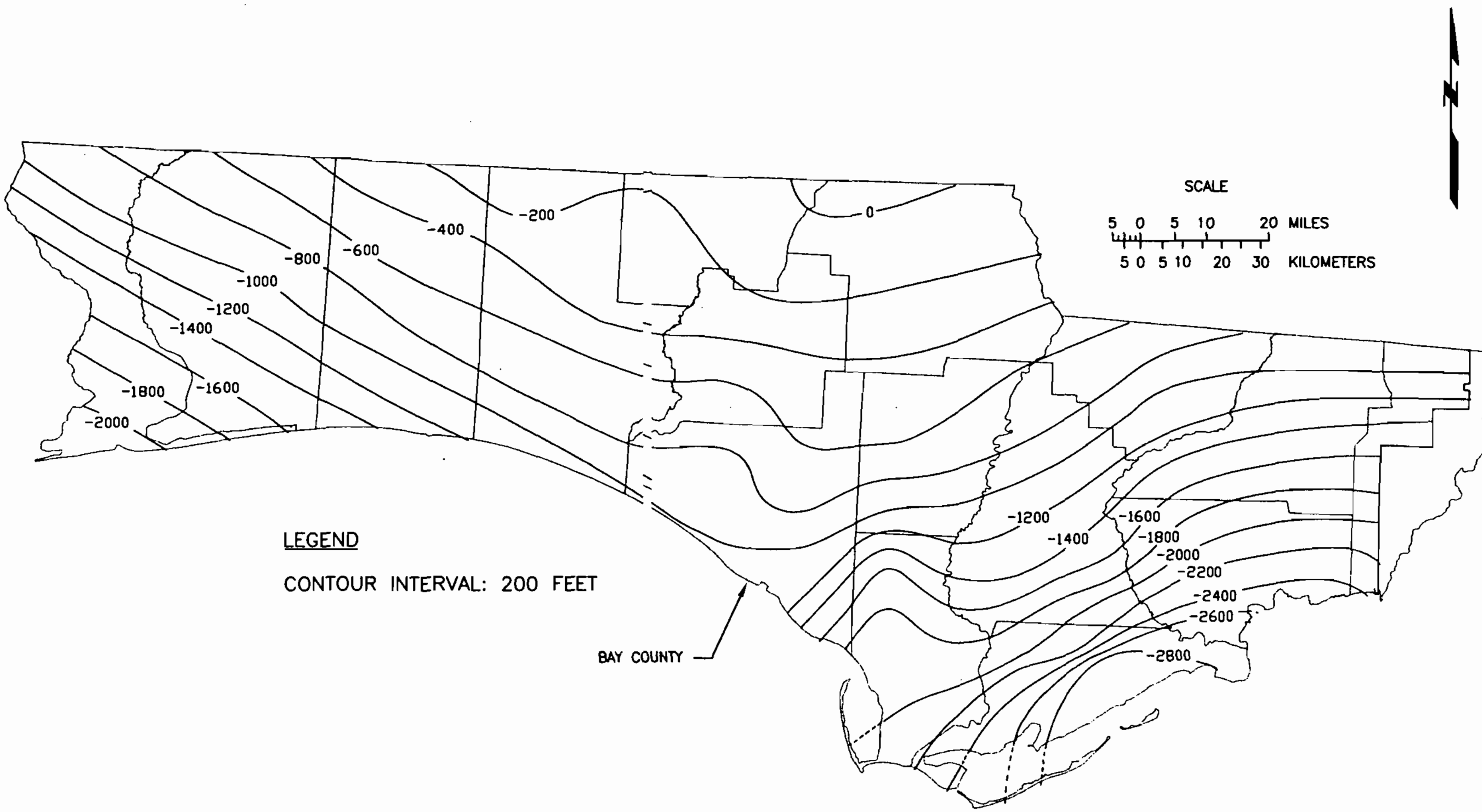

FIGURE 2.3.2-18.

ELEVATION OF THE BOTTOM OF THE FLORIDAN AQUIFER

Source: FGS, 1992.

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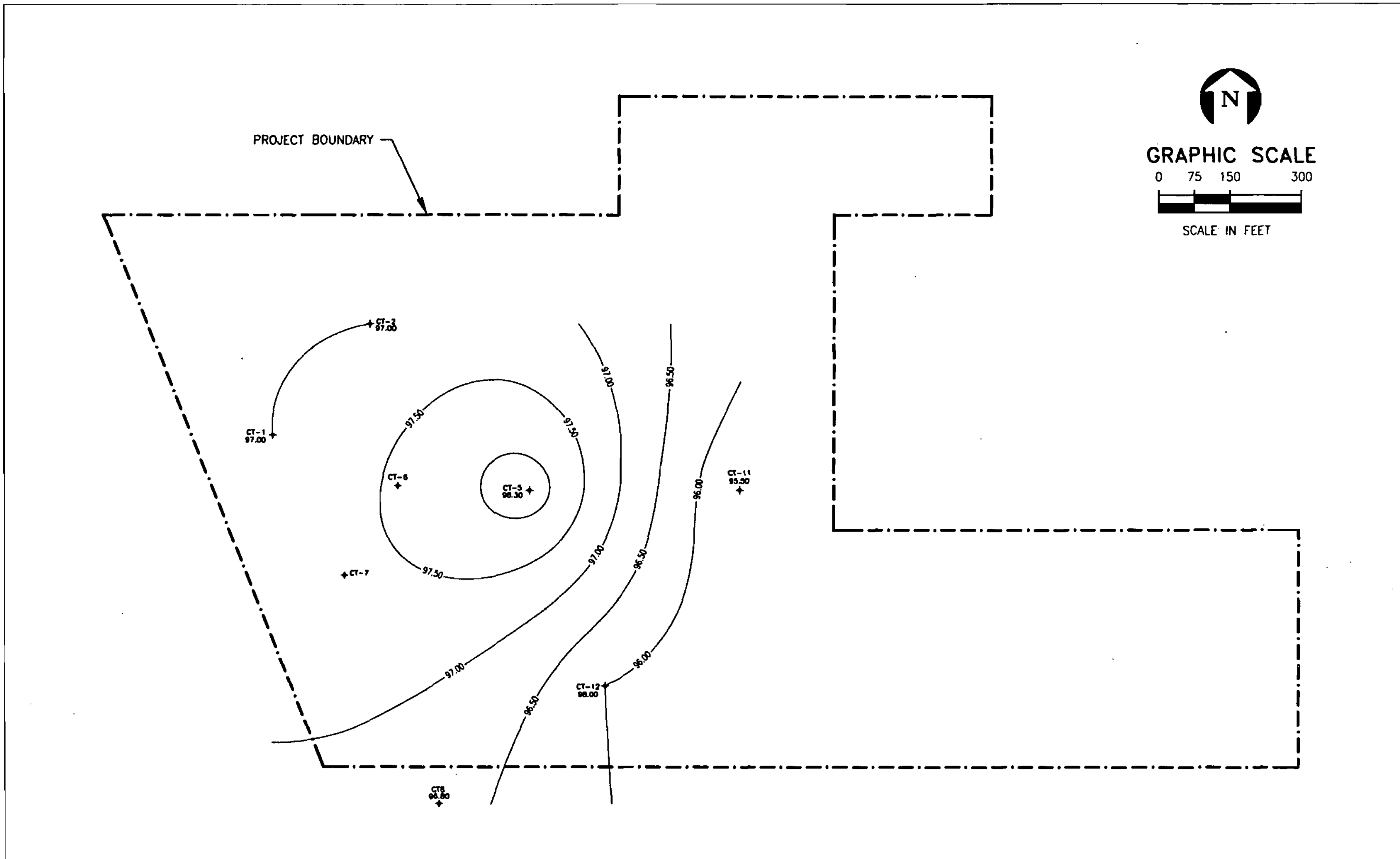

FIGURE 2.3.2-19.

ELEVATION OF THE TOP OF THE FLORIDAN AQUIFER IN PROJECT AREA

Source: SCS, 1999.

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Environmental Consulting & Technology, Inc.

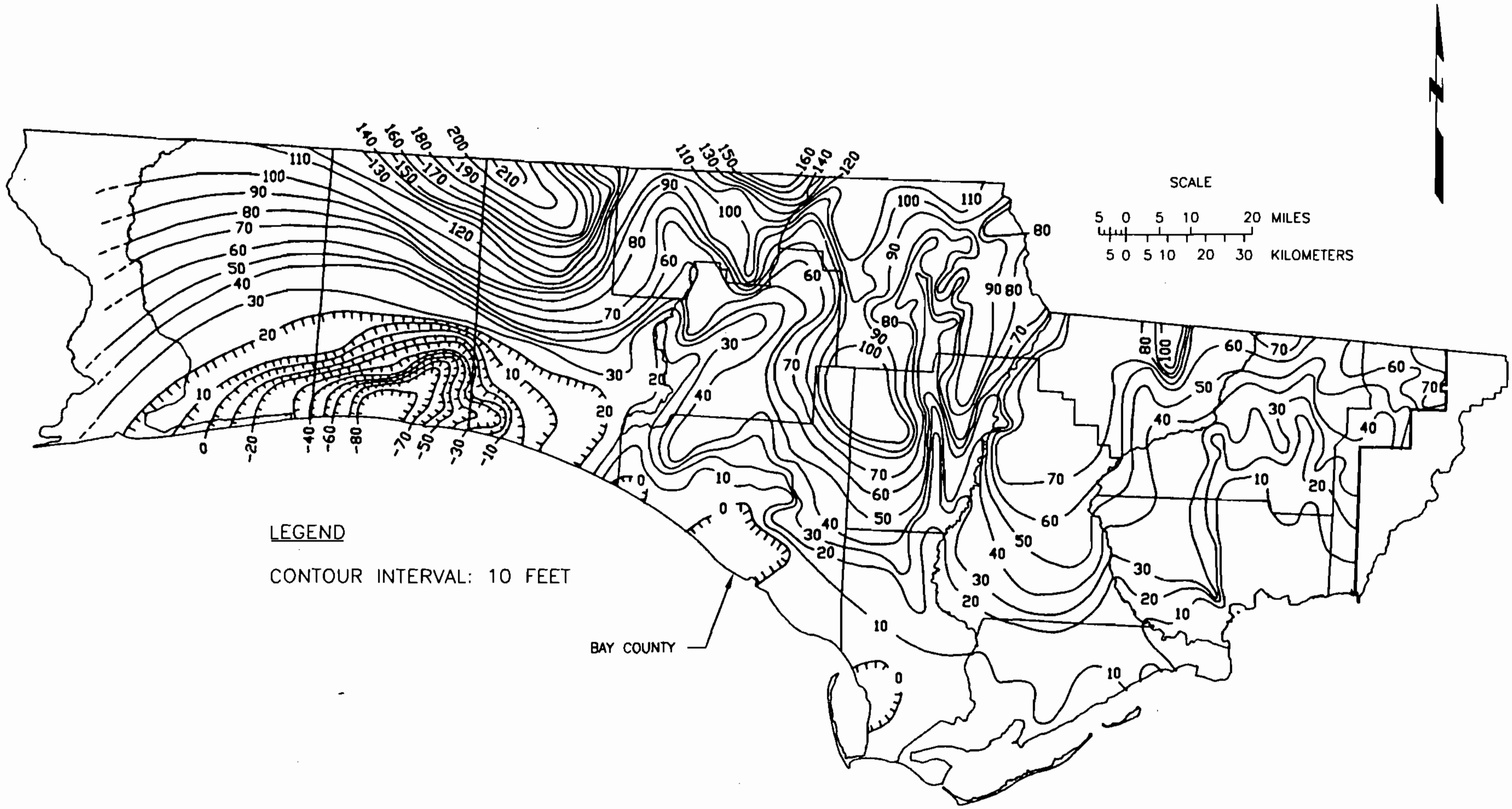

FIGURE 2.3.2-20.

POTENTIOMETRIC SURFACE OF THE FLORIDAN AQUIFER IN BAY AND SURROUNDING COUNTIES

Sources: FGS, 1991; SCS, 1999; ECT, 1999.

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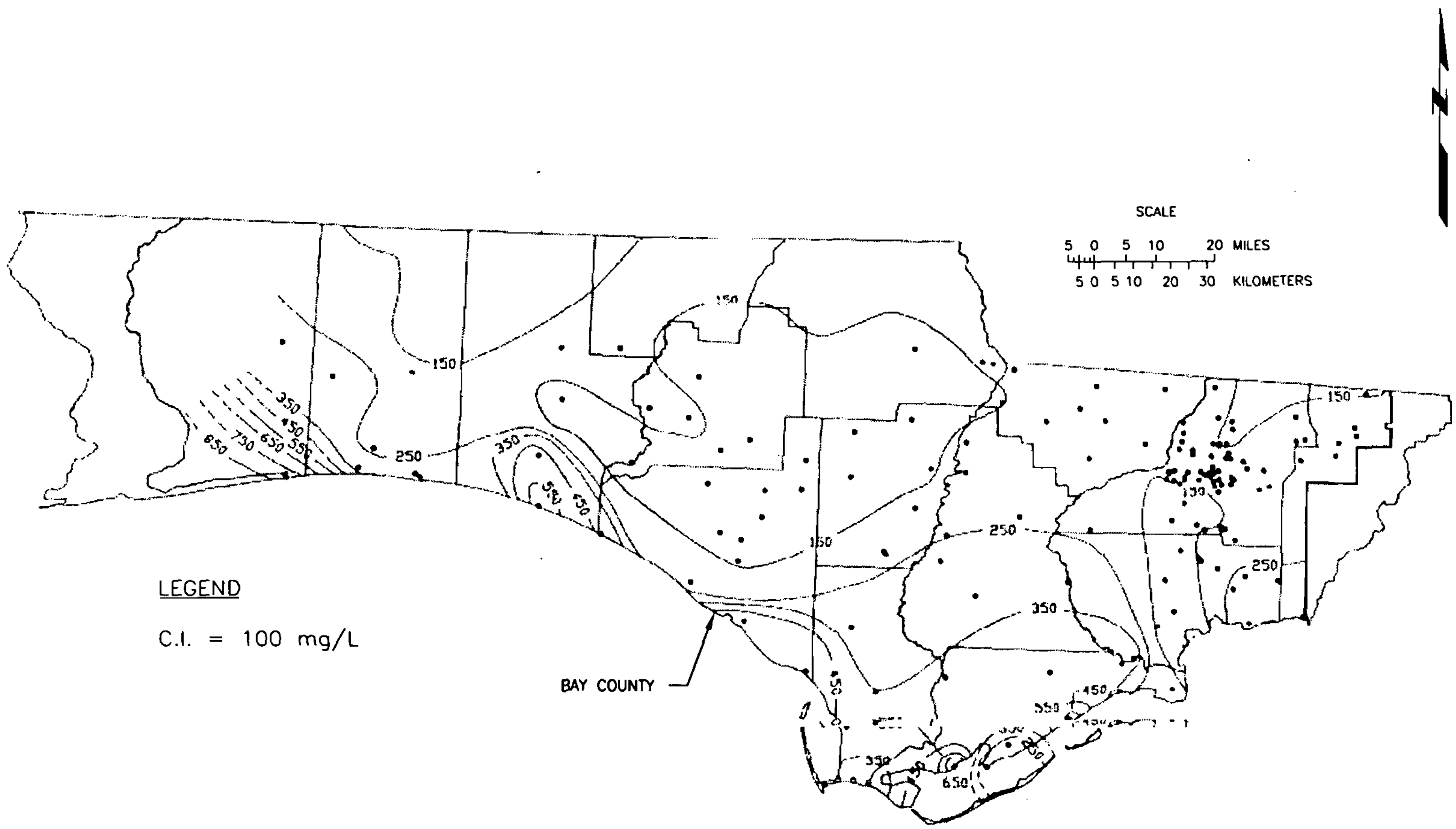

FIGURE 2.3.2-21.

DISTRIBUTION OF TOTAL DISSOLVED SOLIDS IN THE FLORIDAN AQUIFER

Sources: FGS, 1992; SCS, 1999; ECT, 1999.

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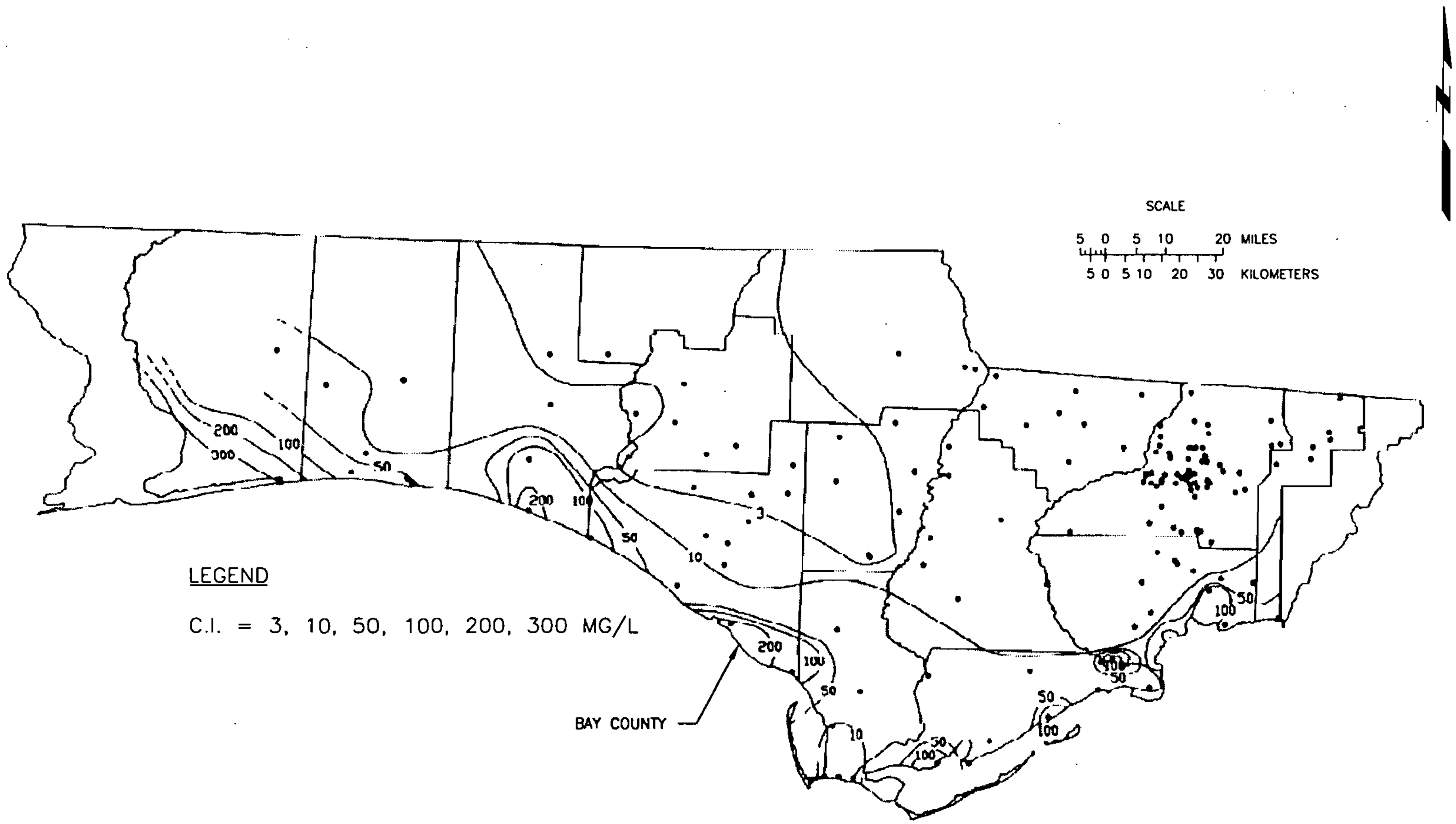

FIGURE 2.3.2-22.

DISTRIBUTION OF TOTAL CHLORIDE IN THE FLORIDAN AQUIFER

Sources: FGS, 1992; SCS, 1999; ECT, 1999.

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2.3.2.2 Karst Hydrogeology

Florida is underlain by carbonate units subject to dissolution by slightly acidic recharge from rainfall. Karst topography is the irregular surface that results from the solution cavities. Sinkholes are one of the most notable features of karst topography and are usually recognizable on topographic maps as circular features, often filled with water.

Figure 2.3.2-23, prepared by the NWFWMD, shows the areas of sinkhole development within the district. In the northern portion of Bay County within the Sand Hill Lakes area, karst topography is recognized by the lack of perennial or intermittent streams, and the presence of closed surface water drainage basins. The ground water within the surficial aquifer percolates through the intermediate system and recharges the Floridan aquifer. In the southern portion of the county, near the Project area, the limestone is deeply buried and sinkhole activity is extremely rare. Since sinkholes and collapse features are responses to water moving down into the limestone, they generally form in areas where the limestone aquifer is being recharged. The area around the Smith Unit 3 Project site is identified as an area of generally no recharge to the Floridan aquifer (Stewart, 1980).

The onsite investigation of the Project area found no evidence of sinkhole development. The probability of karst development is very low and unlikely to occur in the Project area.

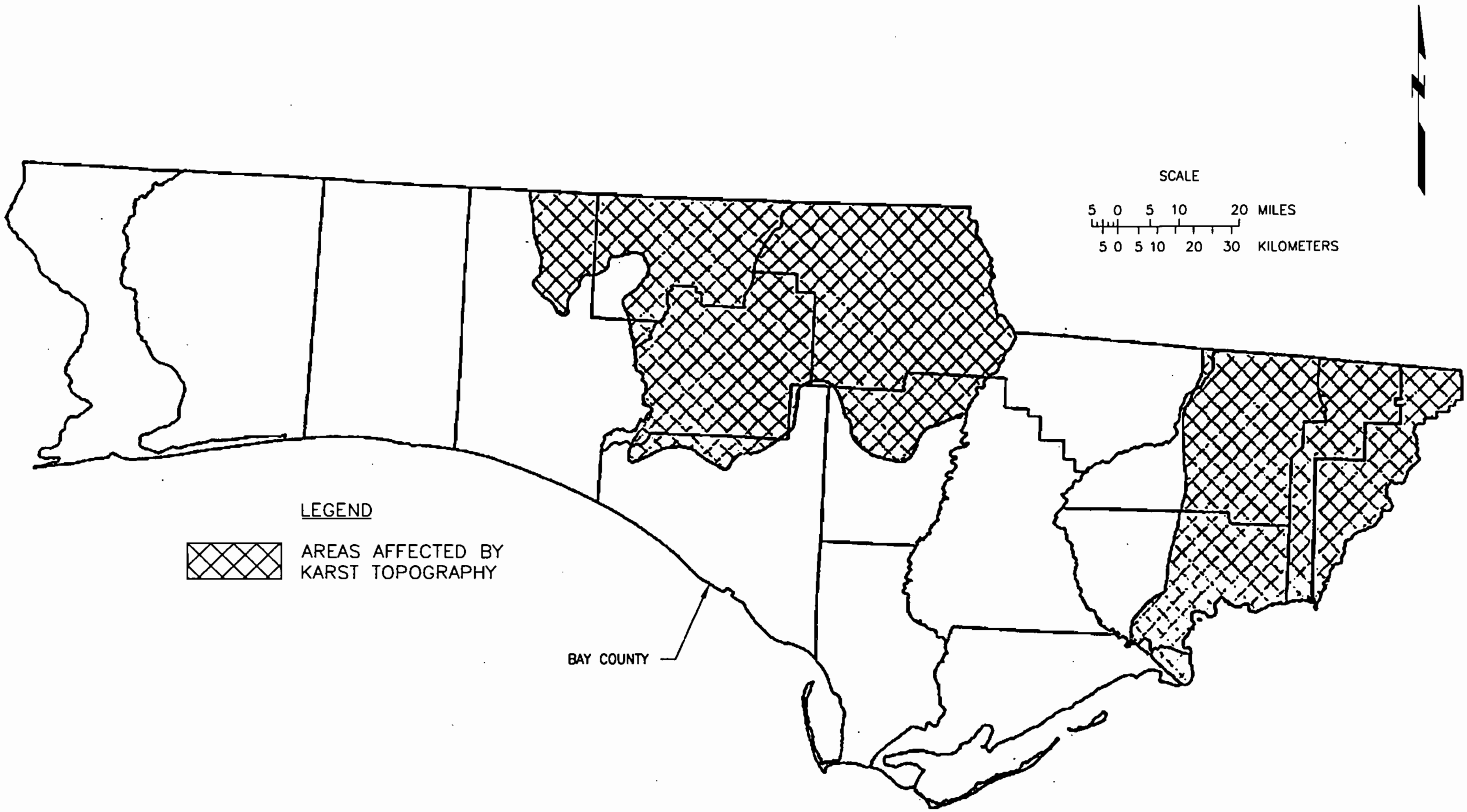

FIGURE 2.3.2-23.

AREAS OF KARST DEVELOPMENT IN THE NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT

Sources: FGS, 1991; SCS, 1999; ECT, 1999.

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2.3.3 SITE WATER BUDGET AND AREA USERS

2.3.3.1 Site Water Budget

The Project site is located in Northwest Florida near West Bay, near the city of Southport, north of Panama City. Most of the information in this section is taken from the NWFWMD *Water Resources Assessment 98-2* (1998), except as noted.

Precipitation

The weather conditions in the Project area are subtropical. Data on rainfall, including both monthly and yearly averages, were obtained for the Panama City rain gauging location. The monthly averages were calculated from the precipitation occurring from January 1931 to December 1997. These precipitation records were provided by the National Climatic Data Center (NCDC). The calculated monthly averages are shown in Table 2.3.3-1.

Table 2.3.3-1. Monthly Rainfall Averages in the Panama City Area

Month	Precipitation (inches)
January	4.47
February	4.41
March	5.63
April	4.1
May	3.14
June	5.28
July	8.53
August	8.08
September	5.85
October	3.26
November	3.91
December	4.33

Source: NCDC, 1999.

For the reported years of 1931 through 1997, the average yearly precipitation was calculated to be 61.52 inches of rain per year.

Average Monthly Temperature Information

From the temperature records of Panama City spanning the years of 1972 through 1997, the average monthly temperatures shown in Table 2.3.3-2 are recorded from the Southeast Regional Climate Center.

Table 2.3.3-2. Average Monthly Temperatures for the Panama City Area

Month	Temperature (°F)
January	51
February	54
March	60
April	66
May	73
June	79
July	81
August	81
September	77
October	68
November	60
December	53

Note: °F = degrees Fahrenheit.

Source: NCDC, 1999.

Estimated Yearly Evaporation

NCDC's Technical Report 33 (1982) indicates approximately 48 inches of lake evaporation occur yearly in the Panama City area.

Estimated Yearly Evapotranspiration

"The potential evapotranspiration can be estimated as being equal to the lake evaporation during the same period, since moisture is removed from leaves of plants by the same process as it is evaporated from water surfaces" (Roberson *et al.*, 1995). Therefore, the estimated evapotranspiration for the Panama City Area would be approximately 48 inches per year.

Estimated Yearly Runoff

From the 61.52 average inches per year of rain, the bay's drainage basin of 1,036 square miles, and a runoff coefficient of 0.3 (Roberson *et al.*, 1995), the rational equation was used to determine the average yearly runoff of 1,408 cubic feet per second (cfs).

Estimated Peak Runoff

From the *Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years*, or Technical Paper 40 (TP40) published by Soil Conservation Service (1961) the 1-hour, 100-year average extreme precipitation amount was given as 4.3 inches an hour. Using the 100-year flood figure, the area of the bay's drainage basin (1,036 square miles), and a runoff coefficient of 0.3 (Roberson *et al.*, 1995), the rational equation was used to determine the peak runoff as being 862,449 cfs.

Estimated Yearly Ground Water Recharge

Hydrologic inputs to the surficial aquifer system include infiltration from precipitation, irrigation application of water from the Upper Floridan aquifer, streamflow, and upward leakage from the Upper Floridan aquifer. The entire area is essentially a recharge area for the surficial aquifer. Outputs from the surficial aquifer system include evapotranspiration, streamflow, pumping/withdrawals, and downward discharge to the Upper Floridan aquifer in areas being pumped. Based on slug testing and pump testing in the area, lateral movement of ground water in and out of the basin is slight due to small gradients and low permeability.

Within the basin, recharge and discharge patterns for the surficial aquifer system are related to the hydrogeologic conditions of the Upper Floridan aquifer. In many areas, the surficial aquifer system serves to store water temporarily for later percolation to the Upper Floridan aquifer. This recharge function of the surficial aquifer system to the Upper Floridan aquifer is important because most of the water that is withdrawn from the Upper Floridan aquifer, as well as natural discharge, originated as locally derived recharge.

In areas where the potentiometric surface of the Upper Floridan aquifer is above the water table, a discharge condition exists for the Upper Floridan aquifer, and the water is discharged to the surficial aquifer system. However, where this condition exists, there also could be recharge to the surficial aquifer system due to precipitation if the surficial sediments have an unsaturated zone that is sufficiently thick to accommodate this infiltration. Therefore, in these areas the surficial aquifer system can receive recharge from above and below.

Surface drainage also affects the extent to which precipitation may become recharge. Where the definition of surface drainage is low, more water is available from gross precipitation to become recharge to the surficial aquifer system. Conversely, where stream systems are well defined, more precipitation is lost to runoff and less is available to recharge the aquifer.

Areas along the northern boundary of Bay County are recharge areas for both the surficial aquifer system and the Floridan aquifer. Recharge rates to the surficial aquifer system are high, and most of the water that enters the surficial aquifer system moves downward relatively quickly to recharge the Upper Floridan aquifer. Based on the information from *Florida's Ground Water Quality Monitoring Program Background Hydrogeologic Framework* (FGS, 1991), the area surrounding and including the existing Smith site and the Project area has generally no recharge to the Floridan aquifer system.

2.3.3.2 Area Uses

Historically, the Floridan and intermediate aquifer systems have supplied a large portion of public and industrial water supplies in Panama City. However, over time the steady growth of the area and increased pumping resulted in the depression of the potentiometric surface of the Floridan aquifer around Panama City. With the added threat of salt water intrusion in the area, an alternate source of fresh water was created. Deer Point Lake was completed in 1961 and now supplies two-thirds of the fresh water used in Bay County.

Most of the consumption is commercial self-supply use and public supply. In 1995, the total average water use in Bay County was 55 million gallons per day (MGD) of which public supply accounted for approximately 40 percent. Ground water, which supplies about one-quarter of all water used in the Bay County region, is withdrawn primarily for public supply, domestic self-supply, small public systems and recreational irrigation. Table 2.3.3-3 presents the 1995 water use and the projected uses for the year 2000 and 2020.

Table 2.3.3–3. County Water Use and Demand Data

Consumer	1995 (MGD)	2000 (MGD)	2020 (MGD)
Public supply	24.32	24.20	36.86
Domestic self supply and small public supply	2.24	1.77	4.33
Commercial-industrial	27.69	27.69	27.69
Recreational irrigation	1.90	1.99	2.53
Agricultural irrigation	0.00	0.00	0.00
Power generation	0.41	0.67	0.67
Total	56.56	59.06	72.08

Source: NWFWMD, 1998.

Domestic supply and small public supply systems account for approximately 4 percent of the total average water use in 1995. The commercial-industrial category accounts for approximately 52 percent. The Deer Point Lake Reservoir is the source of the majority of this water which is consumed mostly by Stone Container Corporation, Arizona Chemical Division of International Paper, and Tyndall Air Force Base. Recreation and irrigation use very small percentages of the total average water use. Golf courses were the major recreational users and agricultural irrigation is minimal, less than 1 MGD in 1995. Water consumed by Gulf for the Lansing Smith Electric Generating Plant is mostly used for once-through cooling and returned to West Bay.

The projected increase in water use from 1995 to 2020 is 15.5 MGD. The majority of the increase is expected from public supply. Currently, Panama City Beach gets approximately 3.5 MGD , or about one-third of its average daily demand, from the Floridan aquifer. It is assumed that by 2020, 90 percent of the freshwater demand will be met by surface water.

Major Water Sources

Deer Point Lake was created by constructing a low-head causeway dam across North Bay. The reservoir has approximately 285 miles of shoreline, 4,698 surface acres and a total drainage area of 442 square miles. Deer Point Lake has four principal tributaries: Econfina, Bear, Bayou George, and Big Cedar Creeks. Econfina Creek is the largest contributor of stream inflow under average flow conditions, contributing over 500 cfs. The Floridan aquifer discharges along the middle of Econfina Creek contributing to the large streamflow and base flow. Water quality of the ground and surface waters of the watershed are of high quality. Major surface waters within the Deer Point Lake drainage basin are designated as Class I waters based on their eventual use as public water supply.

The Floridan aquifer is the major ground water source in the Project area. The Floridan aquifer is thick but low recharge rates, low permeability, and proximity of salt water within and above the Floridan aquifer result in reduced ground water availability. A detailed discussion of hydrologic characteristics of the Floridan aquifer is included in Section 5.3.2.

Impacted Sources

The Smith Unit 3 Project will not impact the Deer Point Lake Reservoir. The water used at the plant is supplied by water wells installed at the plant. These wells are screened in the Floridan aquifer and Gulf has demonstrated in the ground water modeling report (Attachment 10.5-G of Appendix 10.5) that the withdrawal will not significantly affect the other users of the Floridan aquifer system.

Potable Water Wells Within 1 Mile of the Site

A water well inventory of public supply and private wells was conducted within a mile radius of the Project area. The survey included information obtained from Gulf files and data provided by the NWFWMD Office.

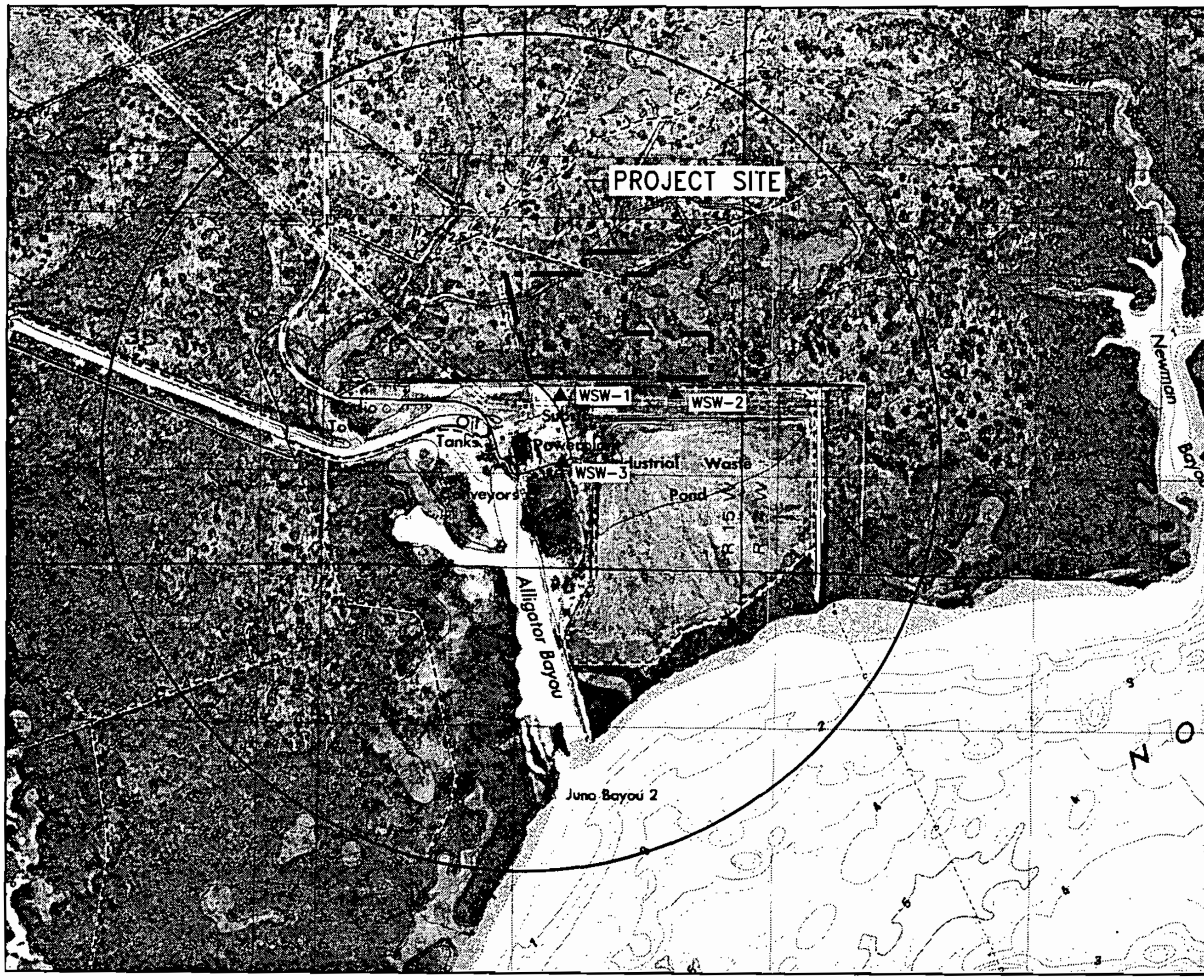
Results from the survey indicate that there are no private or municipal wells within 1 mile of the Project area, most of which is within Gulf's plant property. Three water supply wells, which are utilized for both drinking water and for production water supply, are located at the existing Plant site (Figure 2.3.3-1). The three wells were installed in 1961 and 1971 but one was redrilled in 1985. The plant's water supply wells are screened at depths approaching 150 ft or greater. Details are presented in Table 2.3.3-4.

Table 2.3.3-4. Existing Gulf Water Supply Well Details

Well Number*	Installation Date	Depth (ft)	Diameter (inches)	Screened (open) Interval
WSW1	06/23/61	370	18	148—370
WSW2	07/18/61	307	18	95—307
WSW3	10/18/85	400	14	150—400

*WSW4 is scheduled to be installed later this year.

Source: Gulf Power Company, 1999.



LEGEND

▲ APPROX. WATER WELL LOCATION

1000 0 1000 2000 3000 4000 5000 FEET

FIGURE 2.3.3-1.

WATER WELL INVENTORY WITHIN 1 MILE OF THE PROJECT AREA

Sources: USGS, 1992; SCS, 1999; ECT, 1999.

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2.3.4 SURFICIAL HYDROLOGY

2.3.4.1 Fresh Water Environment

The site is located on the northern end of a peninsula between North and West Bays of St. Andrew Bay in Panama City, Florida. Four hydrologic subbasins surround the proposed site as shown in Figure 2.3.4-1. Surface water runoff generally flows from the northeast to southwest, discharging to the existing cooling water outflow canal of the existing power plant. Warren Bayou, which is located at the end of the outfall canal, has special seasonal harvest restrictions from the Marine Fisheries Commission, and is a Class II surface water.

Surface waters in the area of the site consist of depressional features typically less than 12 inches in depth. These Class III surface water wetlands slowly convey runoff to the outfall canal. Stream sizes are of small width (less than 20 ft) with ephemeral flow habits. The floodplains of the streams are wide (greater than 10 times the channel width), with no apparent levees. Stream channels are not incised and are non-alluvial in nature. Tree coverage is greater than 90 percent along the banks of the streams. Sinuosity of the channels is generally straight, aided by the ditching as part of the silvicultural activities. Slopes in the vicinity of the site are mild (less than 0.1 percent).

Flow rates for the subbasins are summarized in Table 2.3.4-1. Flows are generally low due to the mild slopes and significant depressional storage available at the site.

2.3.4.2 Marine Environment

Gulf's existing Smith Plant uses water from North Bay of the St. Andrew Bay estuary system for its cooling water source and discharges into West Bay of the same estuary as shown in Figure 2.3.4-2. The proposed Smith Unit 3 Project will use the existing cooling system water as a cooling water source and discharge to the existing canal. Therefore, the baseline marine environment is described in this section.

The St. Andrew Bay estuarine system is located in northwest Florida and encompasses an area of approximately 243 square kilometers (km^2) or 60,045 acres (SCS, 1998). Most of the bay's drainage basin is located in Bay County and totals approximately 2,683 km^2 or

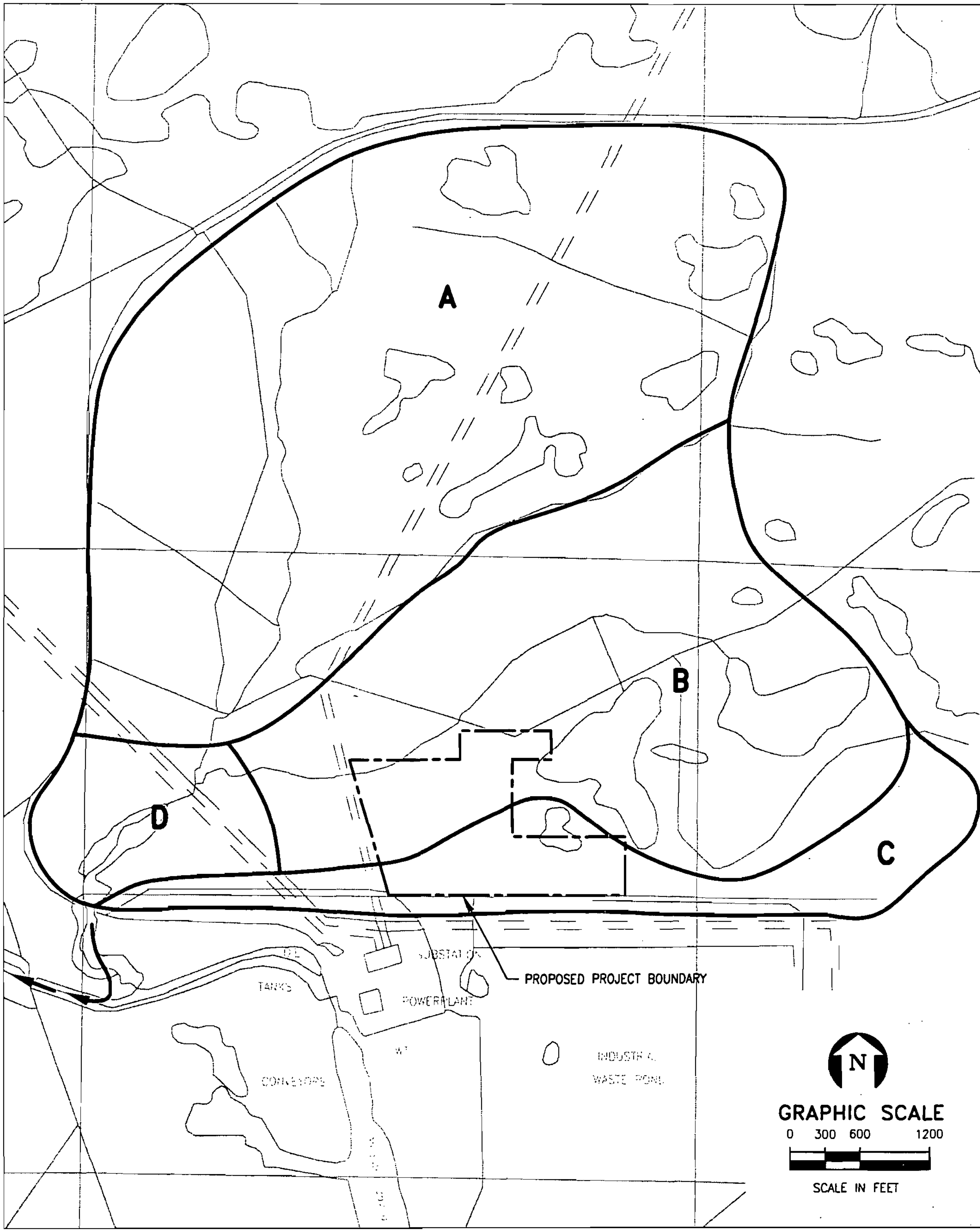

FIGURE 2.3.4-1.
HYDROLOGIC BASINS

Source: US Geodata, 1997; ECT, 1999.

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Table 2.3.4-1. Summary of Hydrologic Conditions

					Runoff (cfs)				
Basin	Hydrologic Soil Group	CN	TC (min)	Area (acres)	1-year	5-year	10-year	25-year	100 year
A	D	77	700	507.8	55	112	142	173	234
B	D	77	463	300.1	45	92	117	142	193
C	D	77	277	91.5	21	42	54	65	88
D	D	77	163	4.7	19	38	48	59	80

Note: CN = basin average curve number.
TC = time of concentration.

Runoff estimations were calculated using the Soil Conservation Services's Unit Hydrograph Methodology. Rainfall estimates for the site were taken from Soil Conservation Service's (1961) TP-40 for the 24-hour duration. The results reflect the site conditions for relatively long times of concentration due to the flat slopes and rills established during silvicultural activities at the site.

Source: Soil Conservation Service, 1961.

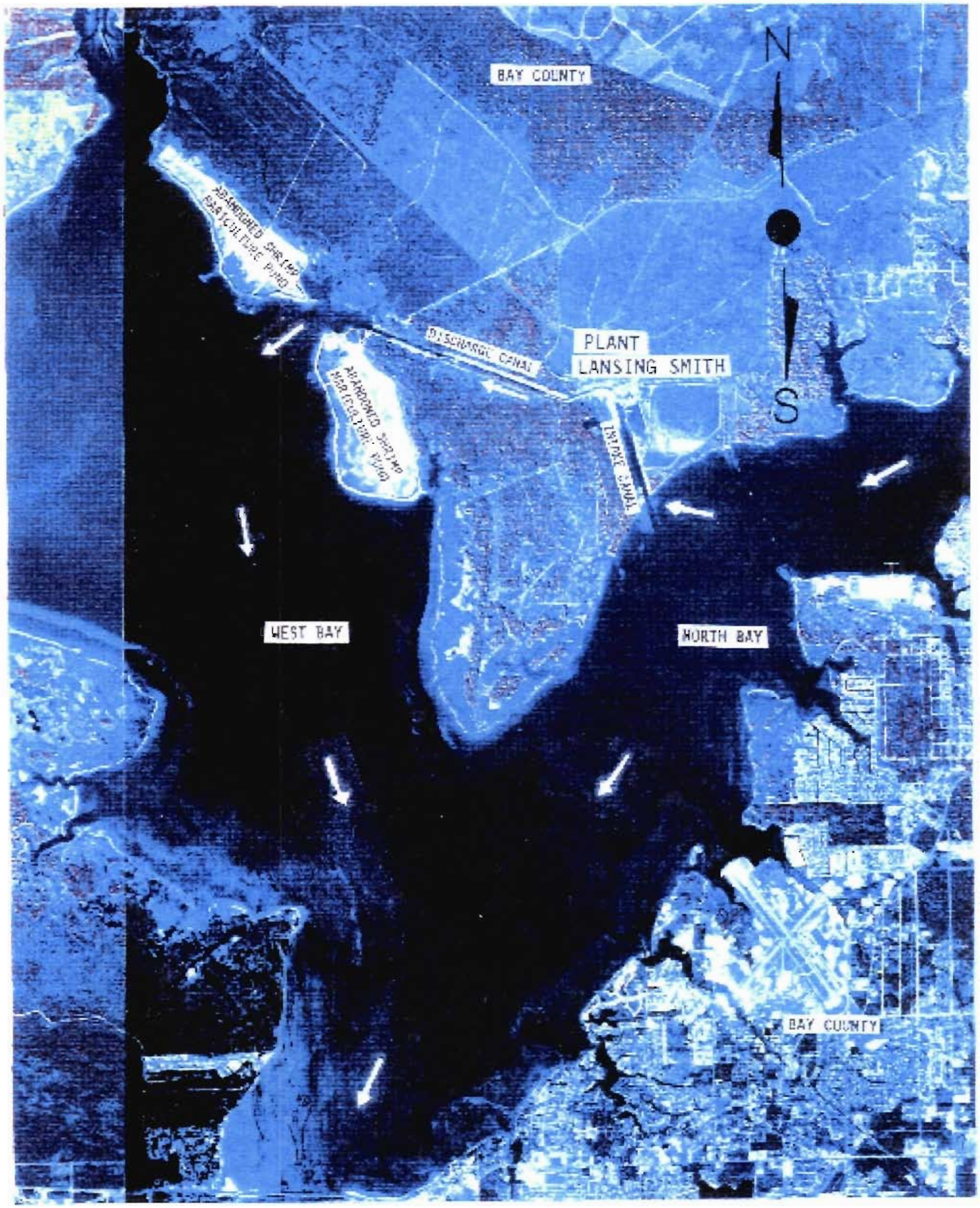

FIGURE 2.3.4-2.
WEST BAY AND NORTH BAY OF ST. ANDREW ESTUARY SHOWING THE PLANT LOCATION AND INTAKE AND DISCHARGE CANALS
Source: SCS, 1998.

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1,036 square miles of flatwood forests, sinks and lakes, sand hills, and coastal beach sand dunes.

West Bay, which receives the existing once-through cooling water, covers an area of approximately 7,627 hectares (ha) (18,846 acres) or 31 percent of the total surface area of the St. Andrew Bay system. West Bay has a mean depth of approximately 2.1 meters (6.9 ft) and receives approximately 7 percent of the total basin stream flow from Crooked Creek and Burnt Mill Creek. Major bayous draining into West Bay include Harrison Bayou, Botheration Bayou, Doyle Bayou, Warren Bayou, and Johnson Bayou. West Bay is considered a positive estuary in that drainage inflow exceeds evaporation. This results in a net inflow of saline water along the bottom towards the head of the estuary and a net outflow of less dense (fresher) water along the surface toward the Gulf of Mexico. The heavier, more saline waters from St. Andrew Bay are driven into the lowest layers of West Bay creating strong vertical density gradients due to differences in salinity concentration. This phenomenon occurs in West Bay even though this bay does not directly receive large volumes of fresh water. However, fresh water that North Bay receives from Deer Point Lake tends to be directed into West Bay by strong tidal currents in St. Andrew Bay. This results in large vertical differences in salinity concentrations in West Bay waters (SCS, 1998).

The cooling water discharge from the Lansing Smith Plant travels approximately 3,200 meters (3,501 yards) from the plant in a manmade canal and discharges into Warren Bayou and ultimately into West Bay, as shown in Figure 2.3.4-2. West Bay has very little commercial or residential development along its shores. Salt marsh and low swampy areas form most of the bay shorelines. A major alteration of the shoreline has occurred on both sides of Warren Bayou where Marifarms, Inc., constructed extensive dikes to create large ponds during the 1970s for shrimp farming. After Marifarms, Inc., ceased operations, the dikes were breached during the mid-1980s to allow the former marsh to become re-established. Salt marsh, dominated principally by black needlerush *(Juncus roemerianus)* and smooth cordgrass *(Spartina alterniflora),* forms most of the bay shoreline. Seagrass beds comprised of turtle grass *(Thalassia testudinum),* shoal grass *(Halodule* *wrightii),* and widgeon grass *(Ruppia sp.)* extend in the direction of the bay from shoreline mudflats to approximately the 2.0-meter (6.56 ft) depth contour (SCS, 1998).

Tides in West Bay are predominantly diurnal (i.e., one high and one low water level per day). The average difference in height between mean high water and mean low water is approximately 0.5 meter. Mean tide level is approximately 0.2 meter (0.66 ft) above mean sea level (msl) of 0.0 meter. Extreme low water occurs at approximately -0.6 meter (1.97 ft) msl. Daily tide cycles for West Bay are predicted from the Pensacola, Florida, tidal reference station for a subordinate tidal station located near the mouth of West Bay Creek (Intercoastal Waterway). High water levels in West Bay occur 18 minutes after high water levels at Pensacola and are slightly higher (<0.1 meter, or 0.33 ft). Low water levels in West Bay occur approximately 83 minutes later than in Pensacola. Low water level height predictions for West Bay are lower (<0.1 meter, or 0.33 ft) than in Pensacola (SCS, 1998).

West Bay has several distinct hydrological zones that are defined by tidal fluctuations. The salt marsh that lies along most of the shoreline is inundated at high tide and partially or wholly exposed during low tide periods. The marsh acts as a natural filter for the fresh water inputs flowing through them. Biologically, they provide food and habitat for marine organisms, and they are important nursery areas for a variety of fin and shellfish. The mud flats lying along the shore are a transition zone between marsh and marine pelagic ecosystems. Silt, plant, and animal detritus tend to settle out in this zone leaving an organic, anaerobic layer. The mud flats are normally exposed during low tides, and water depths at high tide vary between 0.2 to 0.5 meter (0.66 to 1.64 ft). The 0.3 to 0.9-meter (0.98 to 2.95 ft) depth contour area extending seaward from the mudflats consists of the intertidal zone (frequently exposed at low tide) and the infratidal zone (exposed at extreme low tides). In some areas of the bay, this zone may extend up to 1,234 meters (1,350 yards) from shore. In the area around Warren Bayou, the surface area between the 0.3 and 0.9-meter (0.98 and 2.95 ft) depth contour is the most extensive shallow water zone. At extreme low water (-0.6 meter, or 1.97 ft below msl) most of this area can be left exposed, but during normal low tides, the depth contour area greater than 0.3 meter (0.98 ft) is always covered with water. The 1.2- to 1.8-meter depth contour marks the beginning of the pelagic or open water zone. This zone is always covered with water. The 1.8-meter depth contour line is the transition zone between the shallow water and deeper bay water. The deep-water zones include the 2.1- to 3.7-meter (6.89 to 12.14 ft) depth contour, 4- to 5.5-meter (13.12 to 18.05 ft) depth contour, and greater than 5.8-meter (19.02 ft) depth contour (SCS, 1998).

North Bay (Figure 2.3.4-2), the source of the Lansing Smith Plant's cooling water, covers an area of approximately 3,569 ha (8,819 acres) or 15 percent of the total surface area of the St. Andrew Bay system. Average depth of the bay is approximately 3 meters (9.8 ft) at 0.0 msl tide. Deer Point Lake, to the northeast of the plant, is the major fresh water input into North Bay. Bear Creek and Econfina Creek are the major tributaries to Deer Point Lake. These two streams contribute approximately 60 percent of the total basin stream flow to the St. Andrew Bay system.

Tidal characteristics in North Bay are similar to those of West Bay. Mean tide level (0.2 meter, or 0.66 ft) diurnal range in tide level (0.5 meter, or 1.64 ft), and extreme low water (-0.6 meter, or 1.97 ft-msl) are the same in North Bay as in West Bay.

The phase of the tide for North Bay differs from West Bay and is predicted from the Pensacola, Florida, tidal reference station to the Lynn Haven subordinate station. High water level in North Bay occurs approximately 6 minutes earlier than in Pensacola and 24 minutes earlier than in West Bay. Low water level in North Bay occurs approximately 20 minutes later than in Pensacola and 63 minutes earlier than in West Bay. Water level height predictions for North Bay and West Bay are similar—that is, high water level predictions are higher (<0.1 meter, or 0.33 ft) and low water level predictions are lower (<0.1 meter, or 0.33 ft) than in Pensacola (SCS, 1998).

Several water quality studies have been completed on West Bay and North Bay, beginning in the early 1970s, and have continued to the present day. SCS (1998) summarized much of this water quality data that was available in STORET. The results for data from 1972 through 1991 for the following three locations are provided in Table 2.3.4-2:

(1) West Bay entrance (confluence with) to Warren Bayou; (2) West Bay N Breakfast Point—Buoy C5; and (3) North Bay—Flasher 5.

Table 2.3.4-2. STORET Data from 1972 through 1991

Parameter	(1) West Bay	(2) West Bay	(3) North Bay
Temperature. (°C)	34.08	22.17	21.38
Dissolved oxygen (mg/L)	5.53	6.82	6.37
pH (units)	7.76	7.59	8.1
Conductivity (mmhos/cm)	32,167	37,533	41,600
Dissolved oxygen, sat. (%)	72.3	78.9	71.69
Chlorides (mg/L)	13,967	—	7,884.3
Turbidity (FTU)	3.0	4.7	2.0
Alkalinity (mg/L)	91	—	110.0
Total organic carbon (mg/L)	—	13.57	
Total Nitrogen (mg/L)	0.46	0.12	0.250
Total Phosphorus (mg/L)	0.023	—	0.019
Aluminum (μg/L)	—	1,000.0	—
Cadmium (μg/L)	0.50	7.0	—
Chromium (μg/L)	25.0	100.0	—
Copper (μg/L)	25.0	20.0	—
Iron (μg/L)	90.0	140.0	—
Lead (μg/L)	9.7	17.0	—
Manganese (μg/L)	—	20.0	—
Mercury (μg/L)	0.20	0.43	—
Nickel (μg/L)	—	20.0	—
Zinc (μg/L)	10.0	—	—

Note: °C = degrees Celsius.
FTU = nephelometric turbidity unit.
mg/L = milligram per liter.
mmhos/cm = millimhos per centimeter.
μg/L = microgram per liter.

Source: SCS, 1998.

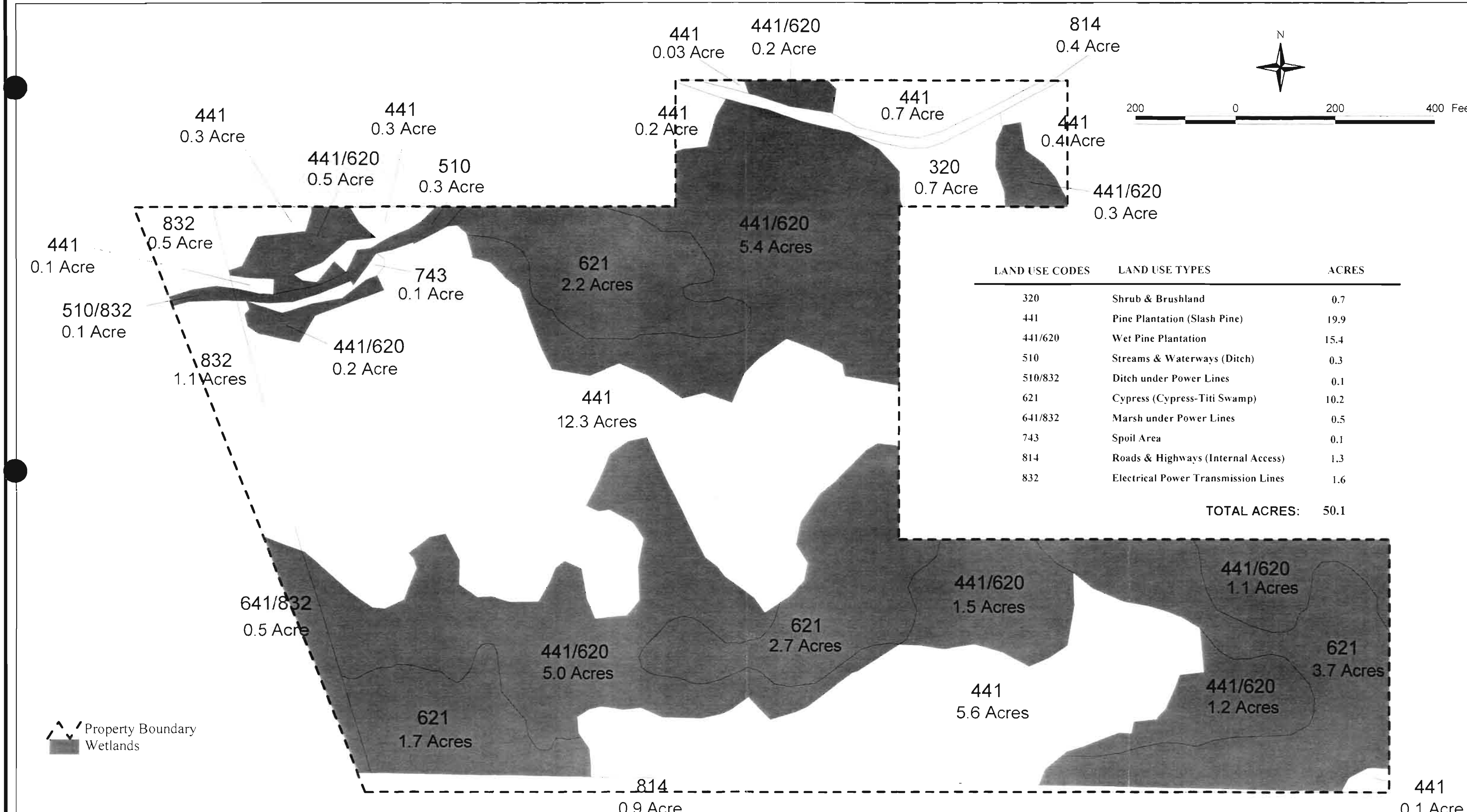
2.3.5 VEGETATION/LAND USE

The land use/vegetation types present at the Smith Unit 3 Project site were characterized during site visits on March 8 and 9, April 7 through 9, and May 17-18, 1999. There are no natural water bodies or waterways on the Project site. The only water bodies on the Project site are manmade ditches that either occur along the edges of the internal roadways or that form connections to the natural drainage features. Since these water bodies are artificially created systems, no aquatic baseline studies were performed onsite. Impacts to these drainages are assessed in subsequent sections of this SCA; therefore, the analyses focused on the terrestrial ecological resources on the site. During these ecological surveys, vegetation and land uses were inspected and described qualitatively.

The majority of the site consists of pine plantation and cypress-titi swamp. The existing land use and vegetation types occurring on the site are shown in Figure 2.3.5-1. Figure 2.3.5-2 depicts land use and vegetative cover types within a 5-mile radius of the site.

The currently developed portions of the site (unpaved road) comprise about 1.3 acres or 2.6 percent of the site; vegetated portions, including a transmission line corridor, cover 48.8 acres or 97.4 percent of the site. Approximately 26.5 acres (52.9 percent) support wetland communities: 10.2 acres of cypress-titi swamp, 15.4 acres of wet pine plantation, 0.4 acre of ditch, and 0.5 acre of marsh. The marsh and 0.1-acre of ditch are situated underneath the existing transmission line right-of-way.

Table 2.3.5-1 is a list of the land use/vegetation types present on the site classified according to Levels II and III as per the Florida Land Use, Cover, and Forms Classification System (FLUCFCS).



LAND USE CODES	LAND USE TYPES	ACRES
320	Shrub & Brushland	0.7
441	Pine Plantation (Slash Pine)	19.9
441/620	Wet Pine Plantation	15.4
510	Streams & Waterways (Ditch)	0.3
510/832	Ditch under Power Lines	0.1
621	Cypress (Cypress-Titi Swamp)	10.2
641/832	Marsh under Power Lines	0.5
743	Spoil Area	0.1
814	Roads & Highways (Internal Access)	1.3
832	Electrical Power Transmission Lines	1.6
	TOTAL ACRES:	50.1

FIGURE 2.3.5-1.

LAND COVER/VEGETATION MAP

Source: ECT, 1999.

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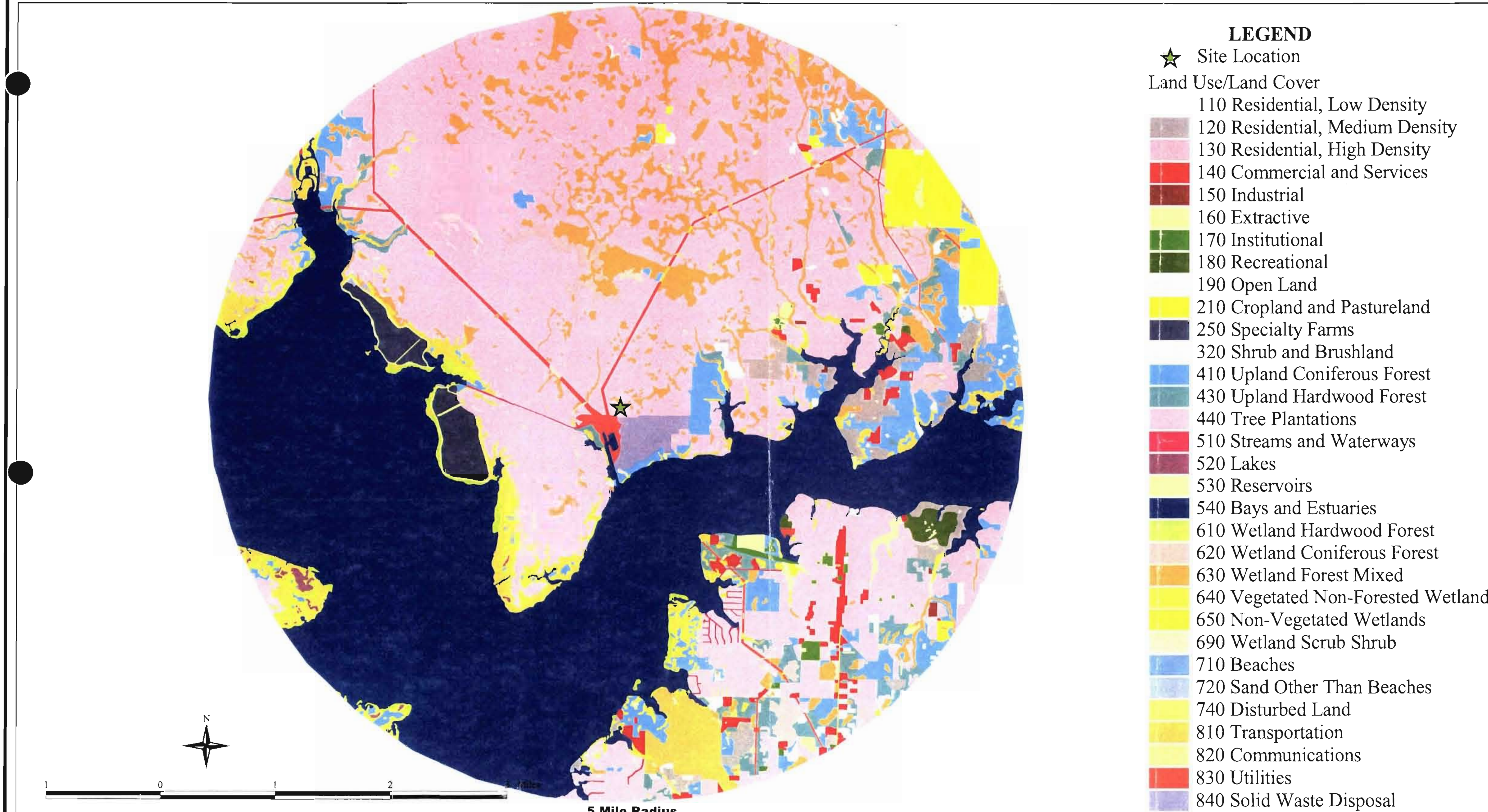

FIGURE 2.3.5-2.

LAND USE/VEGETATION TYPES WITHIN A 5-MILE RADIUS OF THE SMITH UNIT 3 PLANT SITE

Sources: FDEP, 1999 ; ECT, 1999.

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Table 2.3.5-1. Land Cover Types Present on the Smith Unit 3 Site

FLUCFCS Land Use Code	Land Use Type	Aerial Coverage (acres)
320	Shrub and brushland	0.7
441	Pine plantation (slash pine)	19.9
441/620	Wet pine plantation	15.4
510	Streams and waterways (ditch)	0.3
510/832	Ditch under power lines	0.1
621	Cypress (cypress-titi)	10.2
641/832	Marsh under power lines	0.5
743	Spoil areas	0.1
814	Roads and highways (internal access)	1.3
832	Electrical power transmission lines	1.6
	TOTAL	50.1

Source: ECT, 1999.

2.3.6 ECOLOGY

2.3.6.1 Species-Environmental Relationships

Aquatic Systems (Fresh Water)

No natural fresh water streams, rivers, or lakes exist on the site of the proposed Project; therefore, no fresh water aquatic systems are described.

Aquatic Systems (Marine)

Several major studies describing the aquatic ecology of North Bay and West Bay have been completed at Gulf's facility that include the 316(b) study (Law Engineering Testing Company, 1977); *A Thermal Plume Characterization and Environmental Assessment: Warren Bayou and West Bay, St. Andrew Bay* (Law Environmental, Inc., 1993); and *Plant Lansing Smith Environmental Monitoring Program* (SCS, 1998). In addition, several earlier studies were completed by the Florida Game and Fresh Water Fish Commission (FGFWFC) that described the general aquatic community.

The general region that encompasses the intake and discharge canals is bounded by deltas, which support an extensive salt marsh. Feeder bayous are sluggish, slow-moving streams with currents noticeable only at high tide. To the south, salt marsh dominated principally by black needlerush, and smooth cordgrass form most of the bays' shorelines (SCS, 1998).

Early fishery studies in the mid to late 1950s conducted on the North Bay area in the vicinity of what is now Deer Point Lake, provided descriptions of fish populations of the study area. Gill nets, rotenone, explosives, and an otter trawl were used in sampling the fish populations of North Bay and its tributaries. As expected, marine fishes were found to predominate in the waters of high salinity. The principal commercial marine species in order of decreasing numerical abundance were mullet, pinfish, sea catfish, speckled trout, silver perch, and redfish. FGFWFC also reported that these relative amounts are expected to fluctuate during the year. At spawning time, mullet and redfish move into open Gulf waters, while speckled trout move into the inner bays. Pinfish probably move into open deep waters to spawn. Some of the less abundant species, such as the naked and large-mouth gobies and hogchokers are believed to spawn in water of low salinity under certain conditions (SCS, 1998).

In the mid-1970s, the distribution of sea grasses, benthic macroinvertebrates, and fishes was studied by Law Engineering in detail within the study area. SCUBA procedures were used to map the location and extent of sea grass zones and to collect quantitative samples of macrophytes. Quantitative samples were taken in each sea grass zone, along each transect with an Ekman dredge. In addition, qualitative and limited quantitative sampling of fishes was performed along each transect. Warren Bayou was found to be essentially devoid of grasses, but so was an unaffected area in Johnson Bayou. Benthos productivity was reported to be highest "immediately adjacent" to the thermal discharge (confluence of Warren Bayou with West Bay). Some of the more abundant fish species collected in West Bay were the bay anchovy and spotted sea trout (SCS, 1998).

Many of the surveys conducted in the mid-1970s were repeated by Law Environmental, Inc. (1993). They conducted extensive benthic macroinvertebrate and sea grass surveys to help document potential thermal impacts from the Lansing Smith facility thermal plume. They developed a sea grass map of the area as shown in Figure 2.3.6-1, and compared the results to a similar study completed in 1975 (Law Engineering Testing Company, 1977). They concluded that (although there is considerable seasonal variation) the estimates of sea grass biomass were greater in 1992 than reported in 1975. The greatest sea grass biomass occurred at stations within the influence of the thermal plume; however, no sea grass was observed in the discharge canal and the immediate discharge area into Warren Bayou.

The results of the benthic macroinvertebrate study from 1991 and 1992 (Law Environmental, Inc., 1993) stated that 238 taxa comprised of 104,568 individuals were enumerated during the program. Collections from sample stations located within the thermal influence of the Lansing Smith Plant's heated discharge yielded 199 taxa comprised of 46,880 organisms (156 sample replicates), compared to 202 taxa comprised of 57,688 benthic macroinvertebrates (132 sample replicates) collected from control areas.

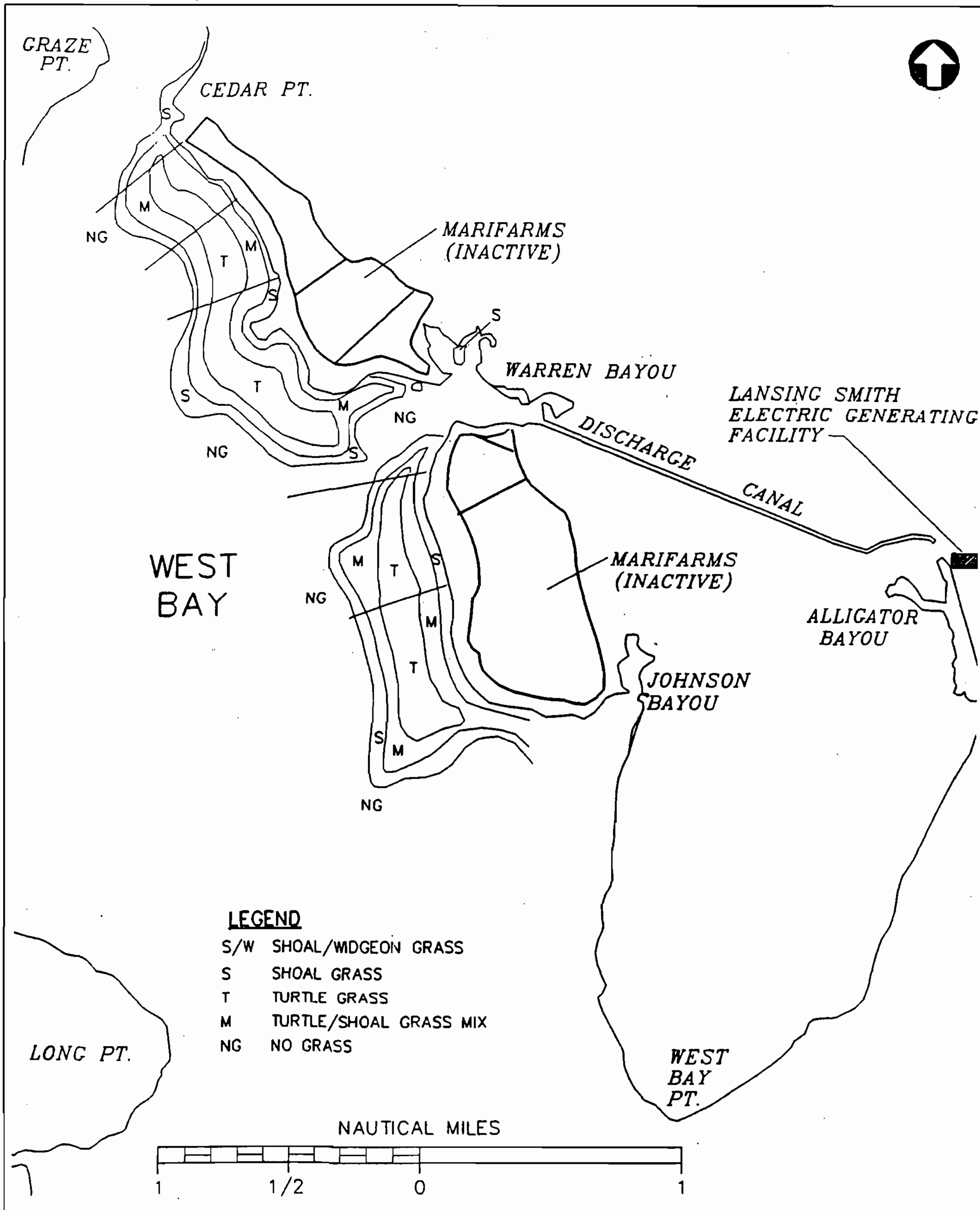

FIGURE 2.3.6-1.

SEA GRASS DISTRIBUTION

Source: Law Environmental, Inc., 1993.

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The results exhibited some seasonality with the number of taxa, number of individuals, and organisms the lowest for all sample stations during August 1991. Sample stations located closest to the discharge canal had fewer benthic macroinvertebrates compared to other stations within the area of thermal influence and compared to control stations. Benthic macroinvertebrate population parameters improved by November 1991 and remained largely unchanged in February and May 1992.

The study also reported that the Shannon-Weaver Diversity values for individual sample stations and grouped stations were lowest during August 1991, with November 1991 values slightly higher. The sample located in the direct thermal discharge had the lowest Shannon-Weaver Diversity value (0.92) of the study during August 1991. This value had improved by 137 percent by November 1991 and remained constant through May 1992. Similar low species diversity was reported for this sample station by Law (1982).

The benthic macroinvertebrate communities within the area of thermal influence were compared to communities in background (control) areas. The Shannon-Weaver Diversity values were at least 95 percent of control areas during all seasons studied. This value exceeded the FDEP biological integrity criterion of 75 percent of established background levels.

In addition to the extensive aquatic impact assessment conducted in 1991 and 1992, Gulf initiated an annual monitoring program in 1993. Field studies focused on pertinent physical, chemical, and biological characteristics during the warmest season of the year to coincide with periods of maximum power plant generation and maximum thermal stress. Three control stations and three stations within the thermal plume region were established and monitored. A total of 305 species of benthic macroinvertebrates was identified (SCS, 1998), of which 220 were classified as salt water tolerant.

Most of the previous work in the study area focused on sea grasses and macroinvertebrates to help assess potential impacts of the thermal plume. Consequently, most of the aquatic ecology information available refers to these two components of the aquatic system. The area is also an important recreational fishing area, and the thermal plume tends to concentrate fish in the area during the cooler months. Also, parts of the area are classified as Class II waters designed to support shellfish propagation and harvesting, although no major shellfish beds were observed within the direct influence of the thermal discharge. There was no mention in any of the literature reviewed of any threatened or endangered aquatic species within the influence of the thermal plume. However, listed aquatic species that exist in the general region include those listed in Table 2.3.6-1.

Table 2.3.6-1. Marine/Aquatic Species Likely to Occur in the Project Vicinity (Discharge Outfall)

Common Name/ Scientific Name	Status*		Likelihood of Occurrence
	USFWS	State	
Atlantic ridley turtle *Lepidochelys kempi*	E	E	Low
Atlantic loggerhead turtle *Caretta c. caretta*	T	T	Low
Atlantic sturgeon *Acipenser oxyrhynchus*	—	SSC	Low
West Indian manatee *Trichechus manatus latirostris*	E	E	Low

*Status: USFWS = U.S. Fish and Wildlife Service.
State = Florida Game and Fresh Water Fish Commission.
E = endangered.
T = threatened.
SSC = Species of Special Concern.

Source: ECT, 1999.

Terrestrial Systems—Flora

The following descriptions of plant community/association types and land uses are based upon qualitative vegetation field surveys conducted in March, April, and May 1999. A plant species inventory of the site by plant community type is provided in Table 2.3.6-2. Taxonomy of plant species names follows the *Guide to Vascular Plants of Florida* (Wunderlin, 1998). A discussion of potential impacts to these habitat types resulting from power plant development is provided in Section 4.4.

Shrub and Brushland—320

Approximately 0.7 acre (1.4 percent) of the site contains shrub and brushland. The only area of the shrub and brushland vegetation type occurs at the northern portion of the site

Table 2.3.6-2. Plant Species Inventory by Plant Community Type

Scientific Name	Common Name	Plant Community Type* 441 320 832	441/620	621	641/832	510 510/832	743 814
Trees							
Acer rubrum	Red maple		X				
Cliftonia monophylla	Black titi		X	X			
Cyrilla racemiflora	Titi	X	X	X	X	X	X
Ilex myrtifolia	Myrtle-leaf holly		X	X			
Juniperus silicicola	Southern red cedar						X
Magnolia grandiflora	Southern magnolia	X					
Magnolia virginiana	Sweet bay	X	X	X	X		
Nyssa sylvatica	Swamp tupelo			X			
Persea palustris	Swamp bay		X				
Pinus elliottii	Slash pine	X	X	X			
Quercus laurifolia	Laurel oak		X				X
Quercus nigra	Water oak		X				
Quercus virginiana	Live oak	X					X
Sapium sebiferum	Popcorn tree						X
Taxodium ascendens	Pond cypress		X	X			
Shrubs							
Callicarpa americana	Beautyberry	X					
Clethra alnifolia	Sweet pepperbush			X		X	
Hypericum fasciculatum	Sandweed		X				
Hypericum myrtifolium	St. John's wort						X
Ilex coriacea	Large gallberry			X			
Ilex glabra	Gallberry	X	X		X		

Table 2.3.6-2. Plant Species Inventory by Plant Community Type (Continued, Page 2 of 5)

		Plant Community Type*					
Scientific Name	Common Name	441 320 832	441/620	621	641/832	510 510/832	743 814
Lyonia ferruginea	Staggerbush	X					
Lyonia lucida	Fetterbush	X	X	X			
Lythrum alatum	Losestrife					X	
Myrica cerifera	Wax myrtle	X	X	X			X
Myrica heterophyla	Northern bayberry			X			
Rhus copallina	Winged sumac	X					
Serenoa repens	Saw palmetto	X					X
Stillingia aquatica	Corkwood			X			
Vaccinium corymbosum	Highbush blueberry		X	X			
Vaccinium stamineum	Deerberry	X					
Herbs							
Aletris lutea	Yellow colic-root		X				
Andropogon virginicus	Broomsedge	X	X				X
Aristida beyrichiana	Wiregrass	X	X		X		X
Aster eryngiifolius	Thistleleaf aster	X	X				
Calopogon pallidus	Pale grasspink	X					
Carex glaucescens	Sedge		X				
Crotalaria lanceolata	Rattle-box	X					
Dichanthelium erectifolium	Dichanthelium grass	X	X				
Dichanthelium scoparium	Velvet grass			X	X	X	
Dichanthelium sp.	Dichanthelium grass	X	X				
Drosera capillaris	Pink sundew					X	

Table 2.3.6-2. Plant Species Inventory by Plant Community Type (Continued, Page 3 of 5)

Scientific Name	Common Name	Plant Community Type* 441 320 832	441/620	621	641/832	510 510/832	743 814
Eriocaulon compressum	Pipewort		X		X		
Eriocaulon decangulare	Common pipewort		X		X		
Eupatorium capillifolium	Dog fennel						X
Euthamia caroliniana	Slender goldenrod	X					
Hymenocallis henryae	Panhandle spiderlily		X		X		
Hypoxis juncea	Common stargrass	X					
Juncus marginatus	Shore rush				X		
Juncus scirpoides	Rush				X		
Lachnanthes caroliniana	Red root		X		X		
Lachnocaulon anceps	Bog buttons		X				
Lophiola aurea	Goldencrest	X					
Ludwigia lanceolata	Lance-leaf primrose willow				X	X	
Lycopodiella sp.	Clubmoss	X	X				
Medicago lupulina	Black medic						X
Melilotus albus	White sweet clover						X
Osmunda cinnamomea	Cinnamon fern		X	X			
Osmunda regalis	Royal fern		X	X	X		
Panicum hemitomon	Maidencane					X	
Panicum rigidulum	Redtop panicum				X	X	
Polygala lutea	Bog bachelor's button	X	X				
Pontederia cordata	Pickerelweed					X	
Proserpinaca pectinata	Mermaid-weed				X	X	
Pteridium aquilinum	Bracken fern	X					

Table 2.3.6-2. Plant Species Inventory by Plant Community Type (Continued, Page 4 of 5)

		Plant Community Type*					
Scientific Name	Common Name	441 320 832	441/620	621	641/832	510 510/832	743 814
Pterocaulon pycnostachyum	Blackroot	X					
Rhexia alifanus	Meadow beauty	X					
Rhexia lutea	Yellow meadowbeauty	X	X				
Rhexia mariana	Pale meadow beauty		X				
Rubus argutus	Blackberry	X	X				X
Rudbeckia fulgida	Orange coneflower	X					
Sagittaria graminea	Grassy arrowhead		X		X		
Sarracenia flava	Trumpets		X		X		
Spiranthes vernalis	Spring ladiestresses	X					
Syngonanthus flavidulus	Shoe buttons	X	X				
Utricularia subulata	Bladderwort					X	
Verbena braziliensis	Brazilian vervain						X
Verbesina chapmanii	Chapmans crownbeard	X					
Viola lanceolata	Bog-white violet		X		X		
Viola palmata	Early blue violet	X					
Woodwardia areolata	Netted chainfern		X	X			
Woodwardia virginica	Virginia chainfern		X	X			
Xyris caroliniana	Yellow-eyed grass		X				X
Vines							
Smilax bona-nox	Catbrier	X	X				
Smilax glauca	Wild sarsaparilla		X				
Smilax laurifolia	Bamboo-vine		X	X			

Table 2.3.6-2. Plant Species Inventory by Plant Community Type (Continued, Page 5 of 5)

		Plant Community Type*					
Scientific Name	Common Name	441 320 832	441/620	621	641/832	510 510/832	743 814
Toxicodendron radicans	Poison ivy	X	X				
Vitis rotundifolia	Scuppernong	X	X				X

*The plant community types on the site have been classified using the Florida Land Use, Cover, and Forms Classification System (FLUCFCS):

320	Shrub and brushland.	621	Cypress (cypress-titi)
441	Pine plantation (slash pine).	641/832	Marsh under power lines.
441/620	Wet pine plantation.	743	Spoil areas.
510	Streams and waterways (ditch).	814	Roads and highways (internal access).
510/832	Ditch under power lines.	832	Electrical power transmission lines.

Source: ECT, 1999.

along the southern edge of the existing roadway. This area was created by clearing and allowing the regrowth of vegetation. Currently, the area is vegetated by the same species as occur in the adjacent dry pine plantation, except for the planted pines.

Pine Plantation (Slash Pine)—441

Approximately 35.3 acres (70.4 percent) of the site contains slash pine plantation. The original natural pinelands in the area were cleared of the existing vegetation and have been planted with slash pine, harvested, and then replanted over the years. These silvicultural activities have significantly altered the vegetation composition/distribution of the pine stand over time. Currently, the pine plantation on the site is characterized by a dense canopy of even-aged slash pines approximately 20 years old. The site was recently burned. The controlled fire did not damage the planted pines, but much of the understory vegetation was consumed by the burn. Consequently, the understory layers were open and sparsely vegetated in places. The pine plantation on the site consists of both dry and wet communities. Dry pine plantation comprises 19.9 acres or 39.7 percent of the site. The dry pine plantations are characterized by the presence of bracken fern in the ground layer. Other nonwoody components of the ground layer include broomsedge, wiregrass, shoe buttons, blackberry, meadow beauty, slender goldenrod, and dichanthelium grasses. The shrub layer contains gallberry, saw palmetto, wax myrtle, fetterbush, staggerbush, winged sumac, beautyberry, and deerberry. The subcanopy contains widely spaced individuals of southern magnolia, titi, live oak, and water oak.

Approximately 15.4 acres or 30.7 percent of the site contains wet pine plantation. Wet pine plantation is situated along the landward edge of the natural drainage features on the site. Wet pine plantation has a subcanopy of swamp bay, sweet bay, titi, myrtle-leaf holly, laurel oak, and water oak. The shrub layer contains wax myrtle, sweet pepperbush, fetterbush, and sandweed. The herb layer is characterized by the presence of red root, broomsedge, pipewort, sedges, yellow-eyed grass, grassy arrowhead, netted chain fern, Virginia chain fern, royal fern, yellow colic-root, and trumpets. Vines also occur throughout the pine plantation and consist mostly of scuppernong, catbrier, bamboo-vine, wild sarsaparilla and poison ivy. The wet pine plantation areas are marginal wetlands consisting of relatively low to moderate habitat quality.

Streams and Waterways (Ditches)—510

Ditches occur along the roadsides and as upland cut connections to the natural drainage features on the site. The ditched connections to the swamps on the site had standing water during the site surveys in the spring of 1999. The ditches are all small with the largest being approximately 10 ft in width and about 3 ft deep. The ditches support the growth of herbs along the shallow reaches of the ditch bottom, such as lance-leaf primrose willow, mermaids'-weed, red-top panicum, velvet grass, netted chain fern, pickerelweed, and grassy arrowhead. Shrubs, such as sweet pepperbush, fetterbush, titi, and black titi also occur along the ditch edges. The drainage ditches that partially cross the transmission line right-of-way and the site are about 0.4 acre in size or 0.8 percent of the site.

Cypress (Cypress-Titi Swamp)—621

This forested wetland community occurs on 10.2 acres (20.3 percent) of the site and forms the natural drainage patterns on the property. This swampland is dominated by pond cypress in the canopy. The dense subcanopy/shrub strata are vegetated by black titi, sweet bay, fetterbush, myrtle-leaf holly, titi, highbush blueberry, wax myrtle, large gall-berry, and sweet pepperbush. The ground layer is rather depauperate consisting mostly of royal fern, netted chain fern, and Virginia chain fern. Cypress-titi swamp is a forested wetland of relatively moderate to high quality.

Marsh—641

A portion of the transmission line right-of-way that occurs along the southwestern corner of the site contains a marshy area. The marsh was probably created when cypress-tit-swamp and/or wet pineland was cleared for construction of the power lines. This marsh area is periodically maintained in a slow growing, primarily herbaceous stage of growth. This marshy area is approximately 0.5 acre in size or 1 percent of the site. Herbaceous plants of the marsh include trumpets, red root, red-top panicum, grassy arrowhead, royal fern, lance-leaf primrose willow, pipewort, shore rush, and mermaid's-weed. Several root sprouts of woody species were also observed and include sweet bay, titi, and gallberry. This marsh habitat is of relatively low quality.

Spoil Areas—743

Spoil taken from the excavation of the ditches on the site was deposited in piles along the sides of the ditches. These spoil piles have become vegetated by plants primarily associated with the pine plantations. The largest spoil area occurs at the northwestern corner of the site (0.1 acre or 0.2 percent).

Roads and Highways (Internal Access Roads)—814

A roadway forms the southern site boundary and another roadway also crosses the most northern portion of the site. These roadways are unvegetated and occupy 1.3 acres (2.6 percent of the site).

Electrical Transmission Lines—832

A portion of an existing electrical transmission line right-of-way forms the western property boundary. The southern portion of the existing right-of-way consists of marsh (0.5 acre or 1 percent of the site). Another smaller area is crossed by a ditch (0.1 acre or 0.2 percent of the site). The remainder is upland, which occupies about 1.6 acres (3.2 percent) of the site. The upland portion of the right-of-way is maintained in an herbaceous stage of growth for safety and access reasons. The herbs and woody root sprouts in the upland areas are plants associated with the adjacent pine plantations.

<u>Terrestrial Systems—Fauna</u>

Wildlife

Presence and likelihood of onsite terrestrial vertebrates were assessed during site visits by terrestrial ecologists on March 8 through 9 and on April 7 through 8, 1999. Table 2.3.6-3 presents a list of wildlife species observed during the site surveys.

Birds

The approximately 50-acre Smith Unit 3 Project site consists of low slash pine plantation with wetland forest systems across the site. Approximately half of the site is considered uplands and half is considered wetlands. All of the property has been the subject of silvicultural activities for many years. Therefore, wildlife diversity is not especially high and contains those species normally expected in pine flatwoods habitats. Lack of shrub

Table 2.3.6-3. Wildlife Species Observed Onsite March 8-9 and April 7-8, 1999

Common Name	Scientific Name
Amphibians	
Southern toad	*Bufo terrestris*
Pinewoods tree frog	*Hyla femoralis*
Cricket frog	*Acris gryllus*
Southern chorus frog	*Psuedacris nigrita*
Reptiles	
Florida box turtle	*Terrapene carolina bauri*
Dusky pygmy rattlesnake	*Sistrurus miliarius barbouri*
Birds	
Eastern brown pelican*	*Pelecanus occidentalis*
Southern bald eagle*	*Haliaeetus l. leucocephalus*
Red shouldered hawk	*Buteo lineatus*
American kestrel	*Falco sparverius*
Killdeer	*Charadrius vociferous*
Mourning dove	*Zenaida macroura*
Red-bellied woodpecker	*Melanerpes carolinus*
Pileated woodpeaker	*Dryocopus pileatus*
Eastern phoebe	*Sayornis phoebe*
Great crested flycatcher	*Myiarchus crinitus*
Bluejay	*Cyanocitta cristata*
American crow	*Corvus brachyrhynchos*
Purple martin*	*Progne subis*
Carolina chickadee	*Parus carolinensis*
Tufted titmouse	*Parus bicolor*
Carolina wren	*Thryothorus ludovicianus*
American robin	*Turdus migratorius*
Gray catbird	*Dumetella carolinensis*
Northern mockingbird	*Mimus polyglottos*
Pine warbler	*Dendroica pinus*
Palm warbler	*Dendroica palmarum*
Common yellowthroat	*Geothlypis trichas*
Northern cardinal	*Cardinalis cardinalis*
Eastern towhee	*Pipilo erythrophthalmus*
Red-winged blackbird	*Agelaius phoeniceus*
Common grackle	*Quiscalus quiscala*
Mammals	
Opossum	*Didelphis virginiana*
Raccoon	*Procyon lotor*
Bobcat	*Felis rufus*
Eastern gray squirrel	*Sciurus carolinensis*
White-tailed deer	*Odocoileus virginianus*

*Species observed offsite near the existing Lansing Smith plant.

Source: ECT, 1999.

wetlands or extensive marsh habitats onsite exclude the use of the site by wading bird species.

Shorebirds and other water-loving birds (e.g., eagles, ospreys) are present offsite to the south along St. Andrew Bay. Although such species may fly over the site, the habitats onsite do not represent valuable habitats for foraging or nesting for these species. No nests of these species were observed onsite. Common bird species present onsite include bluejays, cardinals, pine and palm warblers, chickadees, titmice, wrens, catbirds, mockingbirds, red-bellied woodpeckers, and red-shouldered hawks.

No listed bird species were observed onsite, although the listed brown pelican and bald eagle were observed offsite along the Lansing Smith Plant intake canal and near St. Andrew Bay.

Mammals

Common species of mammals are present onsite and evidence was found of five species: raccoon, opossum, bobcat, gray squirrel, and white-tailed deer.

Reptiles and Amphibians

The low wet habitats onsite support various amphibians and reptiles. Commonly heard amphibians included the pinewoods treefrog, cricket frog, and chorus frog. Reptiles observed included the Florida box turtle and dusky pygmy rattlesnake. Surveyors onsite reported seeing an eastern diamondback rattlesnake. The site is generally too low and wet to support the gopher tortoise or its commensals.

Threatened and Endangered Species

Flora

Potentially occurring listed plant species for the Project site are shown in Table 2.3.6-4. This list was derived from a review of the existing literature and the most recent databases of the U.S. Fish and Wildlife Service (USFWS), Florida Natural Areas Inventory (FNAI), and FGFWFC. Listed plant species searches of the site were conducted in March through May 1999.

Table 2.3.6-4. Protected Plant Species Known to Occur in Bay County and Potential for Occurrence in the Project Area

Scientific Name Common Name	Designated Status USFWS	 State	Habitat	Likelihood of Occurrence
Andropogon arctatus Pine-woods bluestem	—	T	Flatwoods	Not likely; marginal habitat
Asclepias viridula Southern milkweed	—	T	Wet pinelands, flatwoods	Suitable habitat, species not observed on Project site
Aster spinulosus Pine-woods aster	—	E	Moist to dry pineland and swamps	Suitable habitat, species not observed on Project site
Baptisia megacarpa Apalachicola wild indigo	—	E	Woodlands, ravines, near streams	Not likely; suitable habitat lacking
Calamintha dentata Toothed savory	—	T	Sandhills, dry bluffs	No suitable habitat present
Calamovilfa curtissii Curtiss' sandgrass	—	T	Pineland, wet prairie, marsh	Suitable habitat, species not observed on Project site
Calycanthus floridus Sweet shrub	—	E	Slope and bottomland forest	Not likely; marginal habitat
Carex baltzellii Baltzell's sedge	—	T	Hammocks, bluffs	No suitable habitat present
Chrysopsis godfreyi Godfrey's golden aster	—	E	Dunes and scrub	No suitable habitat present
Cornus alternifolia Alternate-leaved dogwood	—	E	Rich woods, near streams	No suitable habitat present
Drosera filiformis Thread-leaf sundew	—	E	Edges of lakes	No suitable habitat present
Drosera intermedia Spoon-leaved sundew	—	T	Seepage slopes, wet flatwoods, marshes, sinkholes, ditches	Suitable habitat, species not observed on the Project site
Epidendron conopseum Green-fly orchid	—	C	Cypress and hardwood swamps, moist hammocks	Suitable habitat, species not observed on Project site
Eriocaulon nigrobracteatum Dark-headed hatpins	—	E	Seepage bogs	No suitable habitat present

Table 2.3.6-4. Protected Plant Species Known to Occur in Bay County and Potential for Occurrence in the Project Area

Scientific Name Common Name	Designated Status USFWS	 State	Habitat	Likelihood of Occurrence
Euphorbia telephioides Telephus spurge	T	E	Wet flatwoods	Suitable habitat, species not observed on Project site
Gentiana pennelliana Wiregrass gentian	—	E	Wet flatwoods, pine plantations, roadside ditches	High likelihood of occurrence
Habenaria nivea Snowy orchid	—	T	Bogs, wet pine savannas and flatwoods, wet prairies	No suitable habitat present
Hedeoma graveolens Mock pennyroyal	—	E	Sandhills, wet flatwoods, pond margins	High likelihood of occurrence
Hymenocallis henryae Panhandle spiderlily	—	E	Cypress, pine flatwoods, pine plantations	Present
Hypericum lissophloeus Smooth-barked St. John's wort	—	E	Pond margins, sinks	No suitable habitat present
Illicium floridanum Florida anise	—	T	Wooded ravines, steep heads, floodplain forest	No suitable habitat present
Kalmia latifolia Mountain laurel	—	T	Slope forest, river banks, creek swamps	No suitable habitat present
Lachnocaulon digynum Bog button	—	T	Wet acid sands, bogs, pond margins	No suitable habitat present
Lilium catesbaei Southern red lily	—	T	Wet flatwoods, bogs	No suitable habitat present
Lupinus westianus Gulf Coast lupine	—	T	Coastal dunes, disturbed open sandy areas	No suitable habitat present
Lycopodiella cernua Nodding club-moss	—	C	Wet depressions, ditches, moist areas	Suitable habitat, species not observed on Project site
Lythrum curtissii Curtiss' loosestrife	—	E	Swampy woods, seepages	No suitable habitat present

Table 2.3.6-4. Protected Plant Species Known to Occur in Bay County and Potential for Occurrence in the Project Area

Scientific Name Common Name	Designated Status USFWS	 State	Habitat	Likelihood of Occurrence
Macbridea alba White birds-in-a-nest	T	E	Wet pine flatwoods and savannahs	Suitable habitat, species not observed on Project site
Macranthera flammea Hummingbird flower	—	E	Bogs, acid swamps, creek banks	No suitable habitat present
Magnolia macrophylla Bigleaf magnolia	—	E	Bluffs, hammocks, bayheads	No suitable habitat present
Magnolia pyramidata Pyramid magnolia	—	E	Forest bluffs	No suitable habitat present
Osmunda cinnamomea Cinnamon fern	—	C	Swamps and wetland	Present
Osmunda regalis Royal fern	—	C	Swamps and wetlands	Present
Oxypolis filiformis sub. *greenmanii* Giant water-dropwort	—	E	Acid swamps, shallow water of cypress ponds and flatwoods depressions, roadside ditches	Suitable habitat, species not observed on the Project site
Paronychia chartacea Crystal lake nailwort	T	E	Shores of karst lake, scrub	No suitable habitat present
Physostegia godfreyi Apalachicola dragon-head	—	T	Bogs, pine flatwoods, savannas, ditches	Suitable habitat, species not observed on the Project site
Pinckneya bracteata Hairy fever tree	—	T	Bays, seepage swamps, hillside bogs	No suitable habitat present
Pinguicula ionantha Violet-flowered butterwort	T	E	Flatwoods, bogs, shallow water	High likelihood of occurrence
Pinguicula lutea Yellow butterwort	—	T	Bays, seepage swamps, hillside bogs	No suitable habitat present
Pinguicula planifolia Chapman's butterwort	—	T	Bogs, swamps, margins of peaty ponds, ditches and canals	No suitable habitat present
Pinguicula primuliflora Primrose-flowered butterwort	—	E	Shallow water, swamps, boggy banks, and seepage heads of streams	No suitable habitat present

Table 2.3.6-4. Protected Plant Species Known to Occur in Bay County and Potential for Occurrence in the Project Area

Scientific Name Common Name	Designated Status USFWS	 State	Habitat	Likelihood of Occurrence
Pityopsis flexuosa Bent golden aster	—	E	Sandy oak and pine woods	No suitable habitat present
Platanthera ciliaris Yellow fringed orchid	—	T	Bogs, swamps, marshes, pine savannas, flatwoods, floodplain forests, forest slopes	Suitable habitat, species not observed on Project site
Platanthera integra Yellow fringeless orchid	—	E	Swampy meadows, boggy depressions in wet woods	No suitable habitat present
Pogonia divaricata Rosebud orchid	—	T	Low pinelands and savannas, pitcher plant bogs, swamps, steep banks	Suitable habitat, species not observed on the Project site
Polygonella macrophylla Large-leaved jointweed	—	T	Sand pine-oak scrub	No suitable habitat present
Rhexia parviflora Small-flowered meadowbeauty	—	E	Margins of open cypress swamps	Suitable habitat, species not observed on the Project site
Rhexia salicifolia Panhandle meadowbeauty	—	T	Pond margins, coastal swales	No suitable habitat present
Rhynchospora crinipes Hairy-peduncled beakrush	—	E	Roadsides, ditches, pond borders	Suitable habitat, species not observed on the Project site
Rhynchospora stenophylla Narrow-leaved beakrush	—	T	Bogs, flatwoods	Suitable habitat, species not observed on the Project site
Rudbeckia nitida St. John's Susan	—	E	Moist flatwoods, prairies, roadside ditches	Suitable habitat, species not observed on the Project site
Sarracenia leucophylla White-top pitcherplant	—	E	Bogs, creek swamps, wet prairies	Suitable habitat, species not observed on the Project site
Sarracenia psittacina Parrot pitcher plant	—	T	Flatwoods, bogs	Suitable habitat, species not observed on the Project site

Table 2.3.6-4. Protected Plant Species Known to Occur in Bay County and Potential for Occurrence in the Project Area

Scientific Name Common Name	Designated Status USFWS	 State	Habitat	Likelihood of Occurrence
Sarracenia purpurea Decumbent pitcher plant	—	T	Bogs, swamps, savannas, flatwoods	Suitable habitat, species not observed on the Project site
Sarracenia rubra Sweet pitcherplant	—	T	Bogs, wet pinelands, seepage slopes	Not likely; marginal habitat
Scutellaria floridana Florida skullcap	E	E	Wet flatwoods, grassy openings	Not likely; marginal habitat
Silene virginica Virginia campion	—	E	Rich or dry woods	No suitable habitat present
Spiranthes laciniata Lace-lip	—	T	Swamps, marshes, flatwoods	Not likely; marginal habitat
Stewartia malacodendron Silky camellia	—	E	Bluffs, steepheads, bayheads	No suitable habitat present
Verbesina chapmanii Chapman's crownbeard	—	T	Wet flatwoods, seepage slopes	Present
Xyris isoetifolia Quillwort yellow-eyed grass	—	E	Bogs, acid pond margins	No suitable habitat present
Xyris longisepala Karst pond xyris	—	E	Margins of sandhill ponds	No suitable habitat present
Xyris scabrifolia Harper's yellow-eyed grass	—	T	Bog, seepage slope, wet prairie	Suitable habitat, species not observed on the Project site

Notes: USFWS = U.S. Fish and Wildlife Service.
State = Florida Department of Agriculture and Consumer Services.
E = Endangered.
T = Threatened.
C = Commercially exploited.

Source: ECT, 1999.

Four listed plant species were found on the site: royal fern (*Osmunda regalis*), cinnamon fern (*Osmunda cinnamonea*), Panhandle spiderlily (*Hymenocallis henryrae*), and Chapman's crownbeard (*Verbesina chapmanii*). Royal fern and cinnamon fern occur within all of the wetlands on the site. These ferns are very common within the state of Florida. They are listed as commercially exploited species by the Florida Department of Agriculture and Consumer Services (FDACS) and it is illegal to remove them from a site without a property owner's permission. Panhandle spiderlily is a state-listed endangered species. This endemic spiderlily is a perennial herb with green and white flowers that are usually borne two per stem. It occurs in cypress depressions in flatwoods, margins of pine flatwoods, and the scrubby borders to pine plantations in Bay, Gulf, Liberty, and Walton Counties. It blooms from May through June. Several populations of this rare spiderlily were present throughout the wet pine plantation and marsh on the site.

Chapman's crownbeard (*Verbesina chapmanii*) is a perennial herb in the daisy family with opposite leaves and solitary yellowish-orange flowers. This composite inhabits wet flatwoods and seepage slopes within Bay, Franklin, Gulf, Liberty, Wakulla, and Washington Counties. It blooms May through August. This state-listed threatened species that is currently under federal consideration for listing has been found on the site along the existing transmission corridor.

Three other listed plant species have a high likelihood for occurrence on the site due to the presence of suitable habitat on the site and records for these species within the Project vicinity. Wiregrass gentian (*Gentiana pennelliana*) is a small herb with linear-spatulate leaves and solitary white flowers spotted with blue-green on the inside of the corolla. It occurs in wet flatwoods, slash pine plantations, and roadside ditches in Bay, Calhoun, Franklin, Gadsden, Gulf, Leon, Liberty, Wakulla, and Walton Counties. It blooms from October through February. This state-listed endangered species has been found just outside a 5-mile radius of the site. Potential habitat does exist on the site for wiregrass gentian; however, no populations of this species were observed on the Project site in March, April, or May 1999.

The Panhandle butterwort (*Pinguicula ionantha*) is a perennial herb with flat basal rosettes of bright green, gladular leaves and light violet to white flowers. This carnivorous plant occurs in flatwoods, bogs, and shallow water areas in Bay, Franklin, Gulf, Liberty, and Wakulla Counties. It blooms from February through April. This species, which is federally-listed as threatened and state-listed as endangered, has been found within a 5-mile radius of the site and could potentially occur on the property. However, Panhandle butterwort was not observed during the site surveys in March, April, or May 1999.

Mock pennyroyal (*Hedeoma [Stachydeoma] graveolens*) is an herbaceous to woody mint with white flowers having a lower lip with a distinctive mottled purple band and purple lobes. This species, which is being considered for federal listing, inhabits sandhills, wet flatwoods, and pond margins in Bay, Calhoun, Franklin, Leon, and Liberty Counties. It blooms from May through October. Populations of mock pennyroyal have been found at or just outside a 5-mile radius of the power plant site. Although potential habitat exists on the site, no individuals of mock pennyroyal were discovered during site searches in the spring of 1999.

Twenty-one other listed plant species were determined as potentially occurring on the site due to the availability of suitable habitat. None of these species were observed during the searches conducted on the property.

Fauna

Table 2.3.6-5 presents potentially occurring state or federally listed wildlife species on the site. The list was developed from the FNAI matrix, FGFWFC, and USFWS records as well as personal observations by Gulf employees or its consultants.

As previously mentioned, the only potentially occurring listed species actually observed were the Southern bald eagle and brown pelican. The eagle was observed flying offsite to the south of the site. This threatened species is not known to nest in the site vicinity. The nearest known nests are found approximately 5 miles to the east along North Bay (Pers. communication from FGFWFC, 1999). Certainly the eagles forage along the bay near the

Table 2.3.6-5. State or Federally Listed Wildlife Species Potentially Occurring Onsite*

Common Name Scientific Name	Status† USFWS	FGFWFC	Likelihood of Occurrence
Amphibians			
Gopher frog *Rana capito*	—	SSC	Suitable habitat is marginal. Not likely to occur onsite.
Reptiles			
American alligator *Alligator mississippiensis*	T (S/A)	SSC	Marginal habitat exists onsite. Likelihood of occurrence is low.
Eastern indigo snake *Drymarchon corais couperi*	T	T	Suitable habitat is present; species not observed onsite.
Gopher tortoise *Gopherus polyphemus*	—	SSC	Suitable habitat is marginal due to wetness. Likelihood of occurrence is low.
Alligator snapping turtle *Macroclemys temminckii*	—	SSC	Suitable habitat is lacking. Not likely to occur onsite.
Florida pine snake *Pituophis melanoleucus mugitus*	—	SSC	Xeric habitats lacking; not likely to occur onsite.
Birds			
Little blue heron *Egretta caerula*	—	SSC	Suitable habitat is marginal. Likelihood of occurring onsite is low.
Snowy egret *Egretta thula*	—	SSC	Suitable habitat is marginal. Likelihood of occurring onsite is low.
Tricolored heron *Egretta tricolor*	—	SSC	Suitable habitat is marginal. Likelihood of occurring onsite is low.
White ibis *Eudocimus albus*	—	SSC	Suitable habitat is marginal. Likelihood of occurring onsite is low.
Arctic peregrine falcon *Falco peregrinus tundruis*	E (S/A)	E	Migratory species may forage over coastal areas near the site. Suitable habitat onsite is lacking.
Southeastern kestrel *Falco sparverius paulus*	—	T	Suitable habitat onsite is lacking. Corridor next to site may provide suitable foraging habitat.
Bald eagle *Haliaeetus l. lueocephalus*	T	T	Nesting habitat is lacking. Birds are present (foraging) just south of site along bay.
Woodstork *Mycteria americana*	E	E	Suitable habitat is marginal. Likelihood of occurrence onsite is low.

Table 2.3.6-5. State or Federally Listed Wildlife Species Potentially Occurring Onsite*

Common Name Scientific Name	Status† USFWS	FGFWFC	Likelihood of Occurrence
Brown pelican *Pelecanus occidentalis*	—	SSC	Suitable habitat onsite is lacking. Birds use open water areas of bay and discharge canal to the south.
Red-cockaded woodpecker *Picoides borealis*	E	T	Nesting habitat is absent due to logging. Foraging habitat is present onsite. No known colonies within 5 miles.
Least tern *Sterna antillarum*	—	T	No known nesting within 5 miles of site. Habitat is lacking onsite.
Mammals			
Florida black bear *Ursus americanus floridanus*	—	T	Habitat is present although more suitable black bear habitat is several miles northwest of the site according to FGFWFC (1999).

*List developed from FNAI (1999), FGFWFC (1999), and USFWS (1999). Marine species are not included.

†Status:
E = endangered.
T = threatened.
SSC = species of special concern.
E (S/A) = endangered due to similarity of appearance.
USFWS = U.S. Fish and Wildlife Service (1999).
FGFWFC = Florida Game and Fresh Water Fish Commission (1999).
FNAI = Florida Natural Areas Inventory (1999).

existing Lansing Smith Plant, but the proposed Project site does not represent suitable habitat for foraging or nesting for this species.

The brown pelican, now listed as a species of special concern (SSC) by FGFWFC was observed along the existing Lansing Smith Plant's discharge canal southwest of the Project site. No significant habitats for this bird are present on the Project site.

No wading birds were observed onsite and the site does not contain any suitable nesting habitats for these species. Foraging would most likely be limited to the marshy area under the existing powerline right-of-way. The FGFWFC (Pers. communication, 1999) does not show any known wading bird colony sites within 6 miles of the Project site.

The nearest designated Critical Habitat is along the Gulf of Mexico on Shell Island and Crooked Island which has been designated Critical Habitat for the Choctawhatchee beach mouse (*Peronyscus polionotus allophrys*). This mouse is federally and state endangered. However, this habitat area is well over 15 miles from the Project site.

FNAI records indicate two other listed species occurring within 5 miles of the Project site. These are the red-cockaded woodpecker (*Picoides borealis*) and the Eastern indigo snake (*Drymarchon corais couperi*). The red-cockaded woodpecker has been reported 5 miles from the site to the northwest. There is no suitable habitat onsite due to past logging practices. The Eastern indigo snake has been reported approximately 4 miles away to the northeast. Habitat is suitable onsite for this species although none were observed during 4 days of wildlife surveys.

2.3.6.2 <u>Preexisting Stresses</u>

Terrestrial

The existing Lansing Smith Plant facility, transmission line corridor, and access roads are the greatest preexisting stresses to biota on the site. The original vegetation was cleared and has been periodically maintained within the transmission line right-of-way for safety and access reasons. The second greatest preexisting stress on the site was the logging of the original pinelands for timber. These areas were also cleared of the original understory layers and plowed before the replanting with slash pine. The lands are now managed by controlled fires to reduce the amount of fuel within the understory. Additionally, the logging practices have altered drainage patterns across the site due to logging roads and culverts; furrows for the rows of pine trees; and during harvest, excessive site disturbances due to heavy equipment.

Aquatic/Marine

In order to assess potential impacts of the modifications to the Lansing Smith facility on the aquatic community, it is first necessary to identify the existing stresses (both natural and anthropogenic) on the region. Typical natural stresses to the aquatic community include temperature extremes, salinity variations, water level fluctuations, turbidity increases, and dissolved oxygen reductions. The natural phenomena that can produce these stresses include drought, excessive rainfall, severe weather (freezing, high temperature, wind, etc.), and hurricanes. The natural stresses that have been best documented in the study area are salinity variations and excess temperature. During the 1991 and 1992 surveys (Law Environmental, Inc., 1993), a decrease in the presence of sea grass was reported with increased temperature for the August and November 1991 sampling episodes. In addition, benthic macroinvertebrate populations were generally at their lowest during August 1991 for both the thermally influenced areas and control areas. In contrast, the highest values occurred in November 1991 which suggests (1) there is natural seasonal variability in the region, probably influenced by temperature; and (2) the populations respond/recover quickly as the communities increased from low values in August to high values in November. This observation of natural seasonal variability, in part, was the impetus for initiating the monitoring program in 1993 to examine the aquatic community and effects of the thermal plume during the high water temperature season (SCS, 1998).

In addition to natural seasonal temperature stress, the effect of variable salinity was documented in the region. In 1994, abnormally high fresh water runoff resulting from torrential rains produced a reduction in salinity, temperature, and other associated chemical parameters. This natural change in the estuary resulted in an 85 percent reduction in benthic fish food production from 1993 to 1994 (SCS, 1998). This amounted to a reduction of benthic productivity of 258 pounds per acre in 1993 to 75 pounds per acre in 1994. Despite this dramatic change, the estuary responded to normal production in 1995.

In addition to the natural stresses mentioned above, the receiving water in the estuary is subject to potential stress from effluent from the existing facility. To examine the potential stress from the effluent, an extensive water quality monitoring program near the facility was completed (SCS, 1998) from 1993 to 1997 at 18 stations in North and West Bays. The study reported the water quality as good and the summary results of the water quality analyses are presented in Table 2.3.6-6. In summary, water quality stress from manmade sources appears minimal and water quality parameters are within applicable water quality standards.

The thermal effluent from the Lansing Smith facility provides an existing source of potential stress to the aquatic community. The extent of the thermal plume and the effects of the discharge have been studied extensively (Law Engineering, 1976; Law Environmental, Inc., 1982; Law Environmental, Inc., 1993; and SCS, 1998). The National Pollutant Discharge Elimination System (NPDES) permit for the facility limits the monthly average temperature rise above ambient to 18.0 °F between April and September, and 20°F between October and March. The historical monthly average intake and discharge temperatures for the past 3 years are plotted in Figure 2.3.6-2. In addition, the monthly average plant discharge and ΔT are provided in the same figure. This information is provided as a record of existing conditions at the site to help assess the potential impacts of the proposed additions to the facility.

The effects of this thermal discharge on the aquatic community have been studied for three decades. The extent of the thermal plume and, consequently, the aerial extent of potential impacts is shown in Figure 2.3.6-3 for a plume during ebb tide and in Figure 2.3.6-4 for a plume during flood tide. These illustrations were obtained during a study by Law Environmental, Inc. (1993), that was conducted specifically to delineate the extent of the thermal plume during worst-case conditions (i.e., summer) and evaluate if the

Table 2.3.6-6. Summary of Water Quality Data from 18 Background Stations Collected Between 1993 and 1997

Parameter	West Bay	North Bay
Dissolved oxygen (mg/L)	3.13 to 10.39	4.96 to 9.53
pH (units)	7.26 to 9.15	7.17 to 9.54
Turbidity (FTU)	0.6 to 3.50	<0.20 to 9.10
Conductivity (mmhos/cm)	10.8 to 45.7	7.38 to 41.5
Hardness (mg/L)	940 to 13,000	700 to 4,400
Alkalinity (mg/L)	28 to 100	25 to 91
Total nitrogen (mg/L)	0.16 to 2.10	<0.10 to 1.90
Total phosphorus (mg/L)	0.010 to 0.17	0.029 to 0.064
Total organic carbon (mg/L)	<2.0 to 13.0	<2.0 to 14.0
Chloride (mg/L)	3,300 to 18,000	2,500 to 15,000
Total suspended solids (mg/L)	2.2 to 41.0	1.2 to 21.0
Sulfate (mg/L)	460 to 2,400	370 to 2,200
Aluminum (mg/L)	<0.10 to 28.0	0.075 to 0.70
Arsenic (mg/L)	<0.0020 to 0.0028	<0.0020 to 0.0140
Boron (mg/L)	0.76 to 3.4	0.60 to 13.0
Calcium (mg/L)	65 to 930	49 to 330
Chromium(mg/L)	<0.01 to <0.01	<0.01 to <0.01
Copper (mg/L)	<0.01 to <0.01	<0.01 to <0.01
Iron (mg/L)	<0.03 to 0.79	<0.03 to 0.72
Lead (mg/L)	<0.005 to <0.01	<0.005 to 0.005
Magnesium (mg/L)	190 to 2,800	140 to 940
Mercury (mg/L)	<0.0002 to 0.0004	<0.0002 to 0.00035
Nickel(mg/L)	<0.02 to 0.51	<0.02 to 0.023
Potassium(mg/L)	60 to 1,000	47 to 360
Selenium (mg/L)	<0.002 to <0.002	<0.002 to 0.002
Sodium (mg/L)	1,800 to 22,000	1,400 to 9,800
Vanadium (mg/L)	<0.01 to 0.012	<0.01 to <0.10
Zinc (mg/L)	<0.02 to <0.04	<0.02 to <0.04

Source: SCS, 1998.

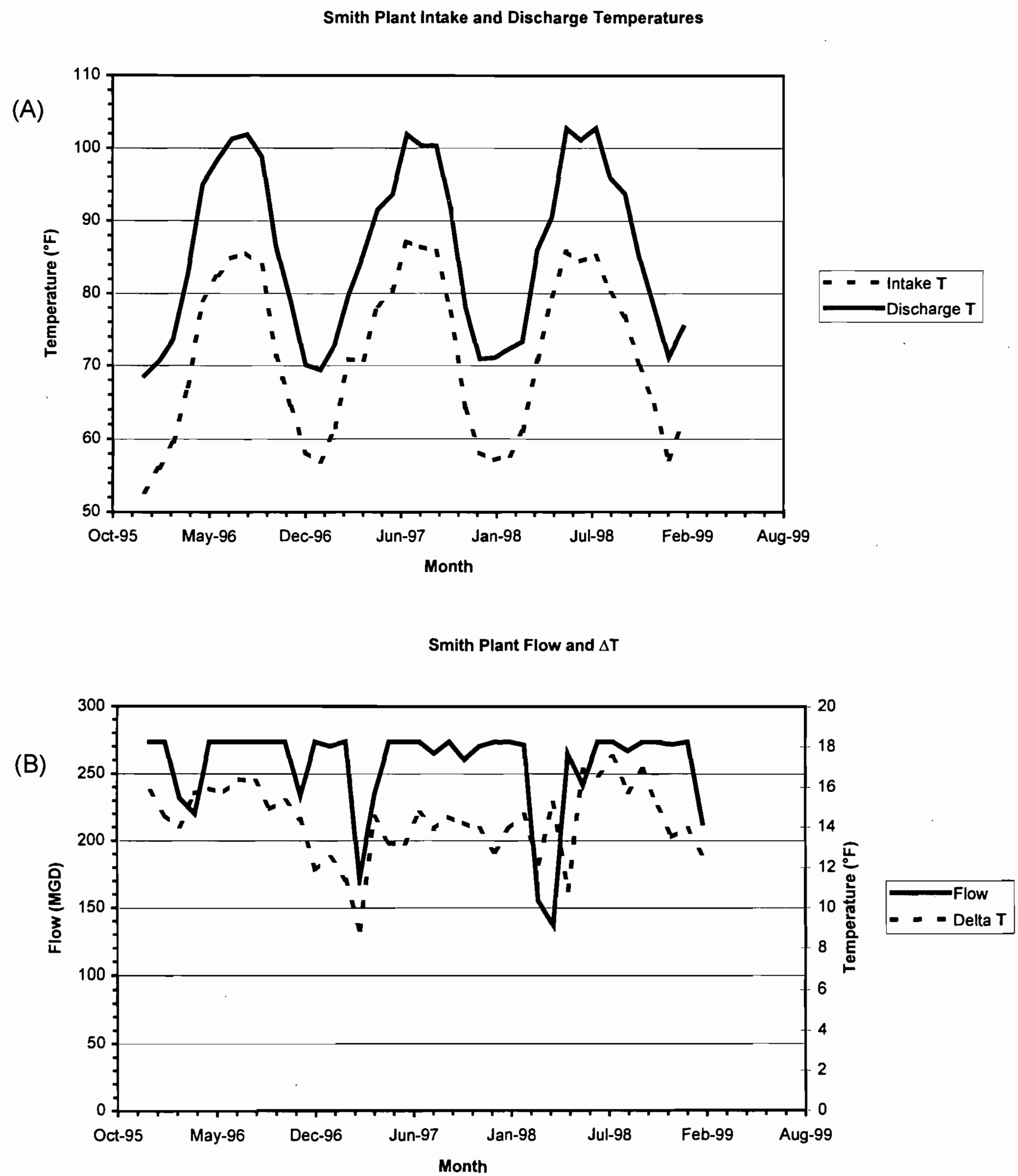


FIGURE 2.3.6-2.

THE LANSING SMITH PLANT MONTHLY INTAKE AND DISCHARGE TEMPERATURE (A) AND DISCHARGE FLOW AND ΔT (B)

Sources: GPC, 1999; ECT, 1999.

ECT
Environmental Consulting & Technology, Inc.

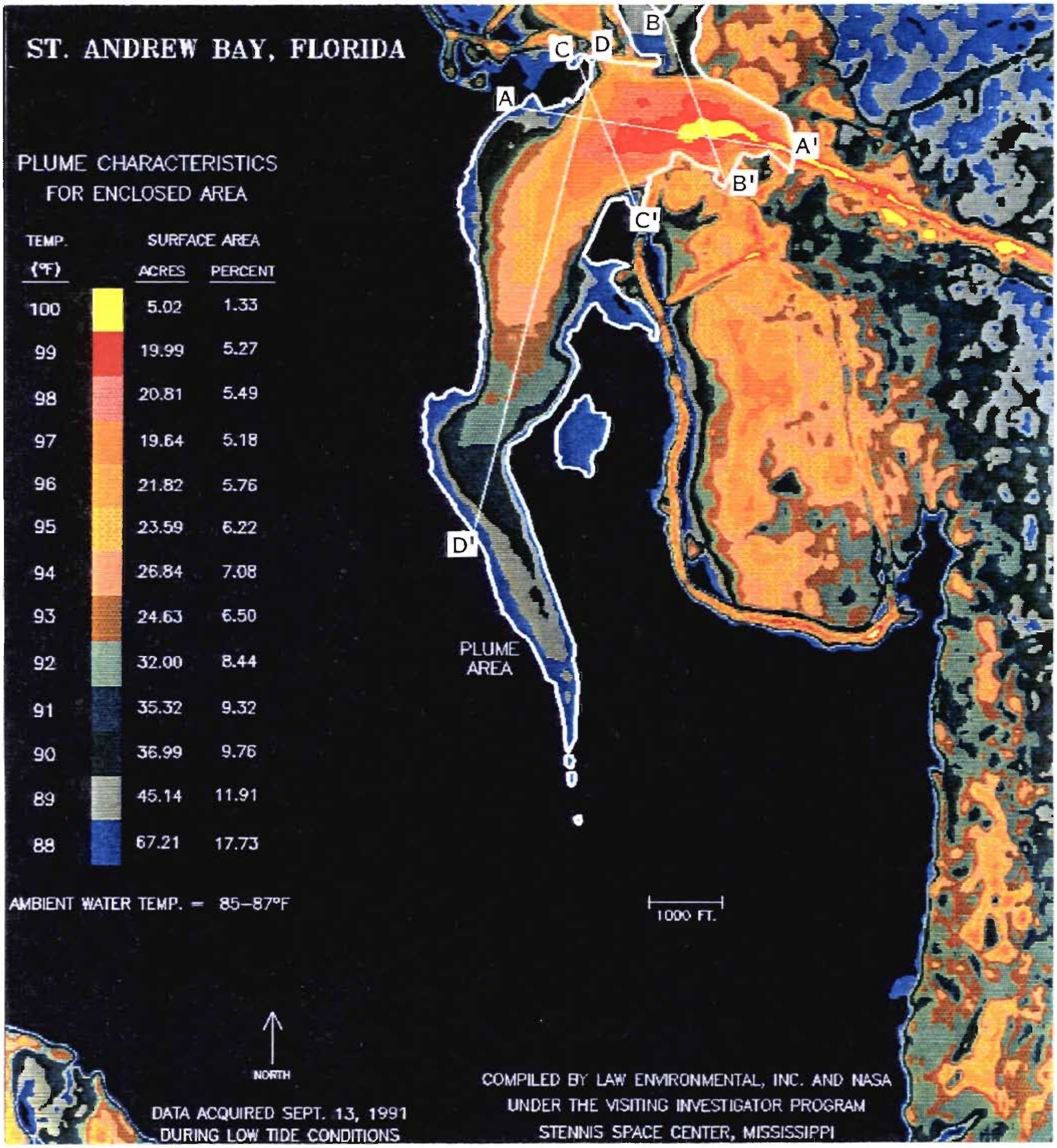


FIGURE 2.3.6-3.

THERMAL PLUME DURING EBB TIDE

Source: Law Environmental, Inc., 1993.

ECT
Environmental Consulting & Technology, Inc.

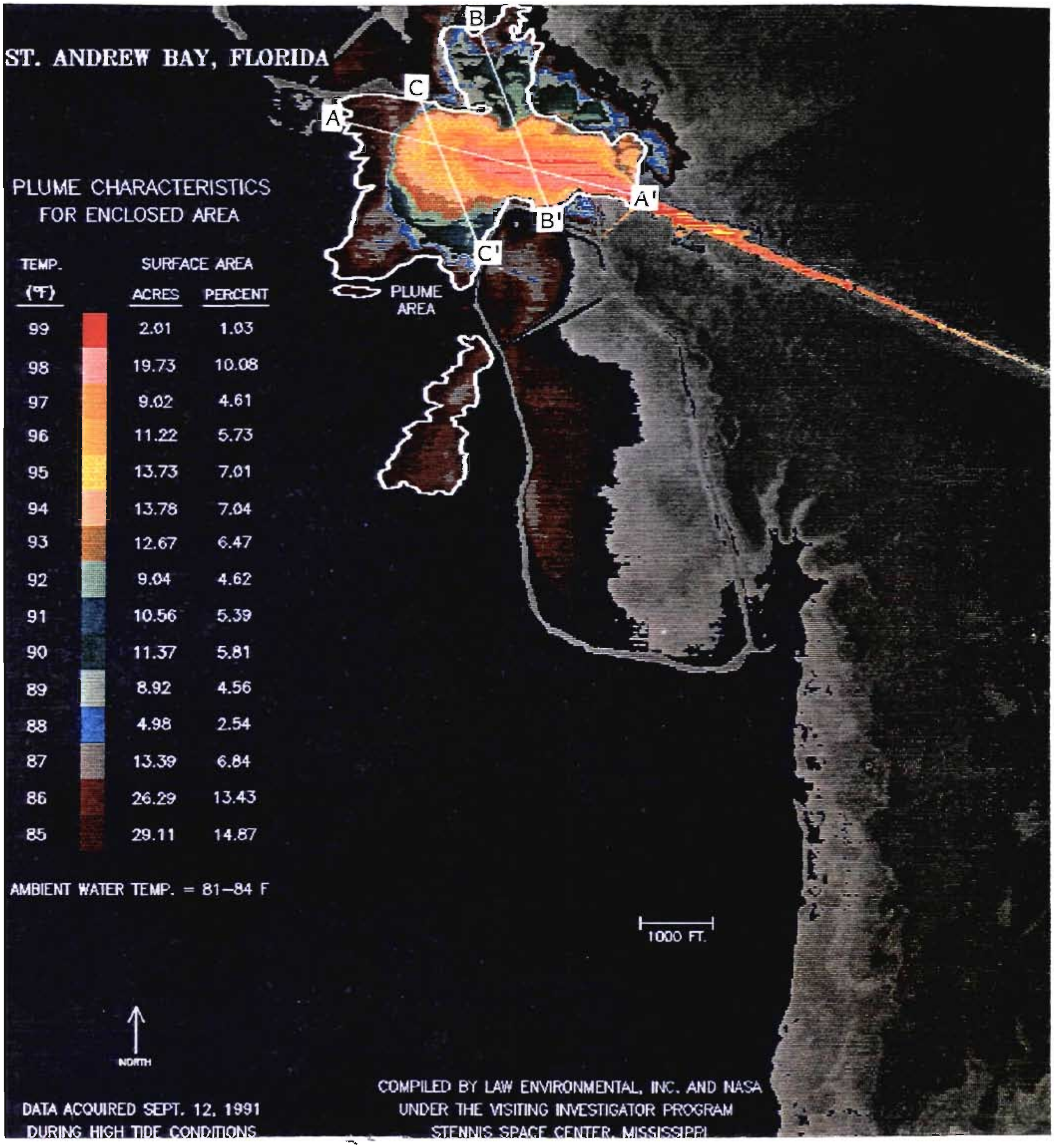


FIGURE 2.3.6-4.

THERMAL PLUME DURING FLOOD TIDE

Source: Law Environmental, Inc., 1993.

ECT
Environmental Consulting & Technology, Inc.

thermal plume might "...cause substantial damage or harm to the aquatic life or vegetation." Thermal plume delineation was completed using remote sensing techniques. Potential stress to the system was assessed by establishing biological and environmental sampling stations within and outside of the thermally affected areas. The study included thermal plume delineation, sea grass mapping, *in situ* water quality measurements, benthic macroinvertebrate sampling, and sediment analysis. The study (Law, 1993) provided the following conclusions:

Thermal Plume Characterization

- Using remote sensing technology, the areal coverage of the thermal plume under low water level/ebb current conditions and high water level/flood current conditions was determined to be approximately 153 ha (379 acres) and 79 ha (196 acres), respectively. The areal extent of the thermally influenced area has remained largely unchanged.
- Over 57 percent (88 ha [217 acres]) of the surface area of the plume was 2.8°C (5°F) or less above ambient water temperature under low water level/ebb current conditions, compared to 42 percent (33 ha [82 acres]) noted during high water level/flood current conditions.
- The zone of greatest thermal influence was more spatially restricted in Warren Bayou during low water level/ebb current conditions.
- There was rapid cooling of the thermal discharge in the receiving waters. The rapid cooling was attributed to dilution of the plume with the cooler waters of West Bay combined with increased tidal, current, and wind/wave actions.

Sea Grass Communities

- Estimates of sea grass biomass were greater in 1991 and 1993 (Law, 1993) studies for comparable seasons and sample stations than reported in previous studies.
- The greatest total sea grass biomass estimates were measured at sample stations located within the area of thermal influence.
- Areal distribution of sea grasses within the study area has not changed substantially from1975 to 1992.

- Overall, sea grass species composition and estimated biomass within thermally influenced areas were similar to or exceeded control area measurements.

Benthic Macroinvertebrates

- Number of taxa, number of individuals, and organisms per square meter were lowest for all sample stations during August 1991. Sample stations located closest to the discharge canal had considerably fewer benthic macroinvertebrates compared to other stations within the area of thermal influence and compared to control stations. Benthic macroinvertebrate population parameters improved by November 1991 and remained largely unchanged in February and May 1992.
- Comparing benthic macroinvertebrate communities within the area of thermal influence to communities in background (control) areas, Shannon-Weaver Diversity values were at least 95 percent of control areas during all seasons studied. This value exceeded the biological integrity criterion of 75 percent of established background levels.

The study concluded that other than the station located directly in the discharge canal, there was no substantial damage to the aquatic life and/or vegetation in the region.

Following this study, a continued monitoring program was begun in 1993 (SCS, 1998) to document potential thermal stresses on the aquatic community during the summer season. Water quality, temperature, benthic macroinvertebrate, and artificial substrate (oyster-shell samplers) sampling was conducted annually at nine stations in West Bay (thermally influenced) and nine stations in North Bay (controls). Biological components were sampled only at three of the nine stations in each Bay. Through the first 5 years of monitoring (1993 through 1997) the study has concluded:

- Based on the biological stability, the water quality conditions in West Bay are essentially unaffected by the discharge and significant impact has been found to be limited to less than 0.15 mile of Warren Bayou.
- Based on biological integrity tests and effluent toxicity tests, no toxicity problems have been indicated to exist.

2.3.6.3 Measurement Programs

The terrestrial ecology surveys conducted for this Project were specifically designed to obtain the baseline information necessary to characterize the site as required by specific regulatory requirements and as needed for the impact assessment. The required information includes: (1) identification of important flora and fauna on and in the vicinity of the site, including state and federally listed species; (2) the relationship between species and their environment; and (3) the identification of the extent, distribution, type, successional status, preexisting stresses, species composition, and diversity of plant communities on the site.

As preparation for site reconnaissance and field surveys, a literature search/agency consultation was conducted to review maps and aerial photographs and to obtain current listings of endangered and threatened species. Subsequent to the review of maps and literature, up to four ecologists conducted three site evaluations: one on March 8—9, 1999; one on April 7 through 9, 1999; and one on May 17—18, 1999. The purposes of these site visits were to locate potentially sensitive or unique areas, classify major vegetation communities on the site, identify land uses and existing stresses and impacts, identify any observed endangered or threatened species, delineate all wetland areas both natural and artificially created, verify the wetland delineations with FDEP and the U.S. Army Corps of Engineers (USACE) personnel, and conduct qualitative studies of the habitats onsite.

For the aquatic environments near the site, Gulf Power and its consultants have studied various physical and biological components for years. In addition, Gulf monitors various aquatic parameters for compliance with its existing industrial wastewater permit (NPDES). Much of these studies are summarized throughout this SCA.

2.3.7 METEOROLOGY AND AMBIENT AIR QUALITY

2.3.7.1 Climatology/Meteorology

The climate in the panhandle of Florida is typical of the upper Gulf Coast. Winters are mild and the summer heat is tempered by the southern breezes from the Gulf of Mexico.

The National Weather Service (NWS) station at the Apalachicola Municipal Airport, 88 kilometers (km) southeast of the site, is the nearest first-order surface observation facility. Due to limited data available for dispersion modeling input, the Apalachicola data has been supplemented with Pensacola data. The NWS station at the Pensacola Regional Airport, 161 km west of the site, is the next closest first-order surface observation facility. The nearest east coast station recording mixing heights is Apalachicola. Thus, consistent with FDEP guidance, NWS surface and mixing height observations from Pensacola and Apalachicola were used as dispersion modeling input.

Table 2.3.7-1 provides a summary of monthly mean and extreme temperatures based on NWS data collected at the Apalachicola Municipal Airport (NCDC, 1992); the period of record for these data is through 1991. The Apalachicola NWS station is located approximately 88 km southeast of the Project site. Based on these data, January exhibits the lowest mean minimum temperature (45.1°F) and the lowest normal mean monthly temperature (52.8°F). The highest mean daily maximum temperature (88°F) occurs in July and August. The maximum mean monthly temperature (81.5°F) occurs in July. The highest and lowest record temperatures of 102°F and 9°F were experienced in July 1932 and January 1935, respectively.

Normal annual rainfall is approximately 55 inches. Rainfall is generally well distributed throughout the year, with the greatest amounts falling in July through September. The highest normal monthly rainfall is 8.7 inches in September. May and October are the driest months, with an average of 3 inches of precipitation. Record monthly precipitation occurred in September 1946, when 22.6 inches of rain were recorded. February has the highest mean monthly windspeed of 8.9 miles per hour (mph). The lowest mean monthly windspeed of 6.4 occurs in July and August. The prevailing wind is from the north. The

Table 2.3.7-1. Meteorological Data from Apalachicola, Florida

LATITUDE: 29°44'N LONGITUDE: 85°02'W ELEVATION: FT. GRND 19 BARO 22 TIME ZONE: EASTERN WBAN: 12632

	(a)	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F:														
Normals														
-Daily Maximum		60.5	62.4	68.0	75.1	81.7	86.6	88.0	88.0	85.3	78.2	69.2	63.0	75.5
-Daily Minimum		45.1	46.9	53.4	60.7	67.3	72.9	75.0	74.7	72.3	62.1	52.7	47.0	60.8
-Monthly		52.8	54.7	60.7	67.9	74.5	79.8	81.5	81.4	78.9	70.2	61.0	55.0	68.2
Extremes														
-Record Highest	62	79	80	85	90	98	101	102	99	96	93	87	82	102
-Year		1957	1957	1982	1967	1986	1930	1932	1986	1932	1941	1935	1931	JUL 1932
-Record Lowest	62	9	21	22	36	47	48	63	62	50	37	24	13	9
-Year		1985	1951	1980	1987	1981	1984	1981	1986	1967	1989	1950	1962	JAN 1985
NORMAL DEGREE DAYS:														
Heating (base 65°F)		401	311	168	30	0	0	0	0	0	24	154	320	1408
Cooling (base 65°F)		23	23	35	117	295	444	512	508	417	185	34	10	2603
% OF POSSIBLE SUNSHINE	56	58	61	65	74	77	71	64	64	66	74	67	57	67
MEAN SKY COVER (tenths)														
Sunrise - Sunset	58	5.7	5.6	5.6	4.8	4.7	5.3	6.1	5.9	5.5	4.0	4.6	5.7	5.3
MEAN NUMBER OF DAYS:														
Sunrise to Sunset														
-Clear	61	10.1	9.7	10.6	12.4	12.7	9.1	6.4	7.1	10.0	16.1	13.3	9.9	127.7
-Partly Cloudy	61	7.6	6.7	8.2	8.8	10.3	13.0	13.1	13.0	9.8	7.5	7.7	7.7	113.5
-Cloudy	61	5.1	11.8	12.2	8.8	8.0	7.9	11.5	10.8	10.2	7.4	8.9	13.4	115.9
Precipitation														
.01 inches or more	62	8.9	8.5	7.8	5.6	5.4	9.6	14.7	13.7	11.1	5.3	6.3	8.1	104.9
Snow,Ice pellets,hail														
1.0 inches or more	62	0.0	0.*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*
Thunderstorms	55	1.6	2.4	3.8	3.4	4.9	9.8	16.3	15.7	9.8	1.7	1.5	1.6	72.4
Heavy Fog Visibility														
1/4 mile or less	55	6.2	4.6	5.4	2.5	0.9	0.3	0.1	0.1	0.1	0.6	2.1	4.3	27.2
Temperature °F														
-Maximum														
90° and above	62	0.0	0.0	0.0	0.*	0.6	5.8	8.3	8.1	3.5	0.1	0.0	0.0	26.6
32° and below	62	0.*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.*	*
-Minimum														
32° and below	62	3.0	1.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.7	6.8
0° and below	62	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AVG. STATION PRESS.(mb)	16	1020.3	1019.4	1017.3	1016.4	1015.3	1015.9	1016.9	1016.3	1015.6	1017.3	1018.8	1020.6	1017.5
RELATIVE HUMIDITY (%)														
Hour 01	37	83	83	86	86	87	87	87	88	86	83	83	84	85
Hour 07 (Local Time)	41	85	86	86	86	85	85	86	88	88	86	85	86	86
Hour 13	37	66	65	65	64	65	67	71	75	69	62	63	67	67
Hour 19	41	79	76	76	74	72	74	76	77	78	76	78	79	76
PRECIPITATION (inches):														
Water Equivalent														
-Normal		3.51	3.64	4.04	3.25	2.94	4.81	7.09	7.53	8.66	3.19	2.82	3.50	54.98
-Maximum Monthly	62	20.80	9.19	14.33	12.14	12.14	18.32	18.07	21.08	22.55	12.09	9.00	9.68	22.55
-Year		1991	1960	1959	1983	1991	1965	1984	1970	1946	1959	1947	1986	SEP 1946
-Minimum Monthly	62	0.04	0.38	0.71	0.09	0.25	0.30	0.75	1.85	0.60	0.01	0.04	0.30	0.01
-Year		1957	1938	1939	1942	1983	1977	1976	1951	1972	1935	1931	1955	OCT 1935
-Maximum in 24 hrs	62	6.18	7.12	8.17	7.76	7.07	5.34	6.75	5.93	11.71	6.32	5.84	4.15	11.71
-Year		1991	1988	1948	1964	1959	1949	1975	1986	1932	1965	1930	1931	SEP 1932
Snow,Ice pellets,hail														
-Maximum Monthly	62	0.4	1.2	T	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	T	1.2
-Year		1977	1958	1980									1989	FEB 1958
-Maximum in 24 hrs	62	0.4	1.2	T	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	T	1.2
-Year		1977	1958	1980									1989	FEB 1958
WIND:														
Mean Speed (mph)	43	8.3	8.7	8.9	8.5	7.7	7.1	6.4	6.4	7.8	8.0	8.0	8.0	7.8
Prevailing Direction through 1956		N	N	SE	SE	SE	SW	W	SW	NE	NE	N	N	N
Fastest Mile														
-Direction (!!!)	47	E	E	E	SE	SE	E	N	NE	E	NW	SE	SE	E
-Speed (MPH)	47	48	42	54	51	47	55	63	59	67	56	47	42	67
-Year		1960	1969	1931	1933	1937	1972	1930	1939	1947	1941	1948	1945	SEP 1947
Peak Gust														
-Direction (!!!)	6	W	W	NW	W	N	NW	S	E	SE	SE	SW	E	SW
-Speed (mph)	6	41	49	41	43	61	38	41	68	68	44	85	47	85
-Date		1991	1991	1990	1988	1990	1986	1988	1985	1985	1985	1985	1986	NOV 1985

Source: NCDC, 1992.

annual average windspeed is 7.8 mph. The highest recorded windspeed was 67 mph in September 1947.

Table 2.3.7-2 provides a summary of monthly mean and extreme temperatures based on NWS data collected at the Pensacola Regional Airport (NCDC, 1998); the period of record for these data is through 1997. The Pensacola NWS station is located approximately 100 miles (161 km) west of the Project site. Based on these data, January exhibits the lowest mean minimum temperature (43.0°F) and the lowest normal mean monthly temperature (52.1°F). The highest mean daily maximum temperature (90.1°F) and the maximum mean monthly temperature (82.2°F) occur in July. The highest and lowest record temperatures of 106°F and 5°F were experienced in July 1980 and January 1985, respectively.

Normal annual rainfall is approximately 62 inches. Rainfall is generally well distributed throughout the year, with the greatest amounts falling in July and August. Summer rainfall is generally derived from local showers or thunderstorms. The highest normal monthly rainfall is 7.4 inches in July. April and November are the driest months, with an average between 3 to 4 inches of precipitation. Record monthly precipitation occurred in June 1994, when 21.1 inches of rain were recorded. April has the highest mean monthly windspeed of 12.1 mph. The lowest mean monthly windspeed of 7.3 mph occurs in August. The prevailing wind is from the north. The annual average windspeed is 9.7 mph. The highest recorded windspeed was 53 mph in September 1979.

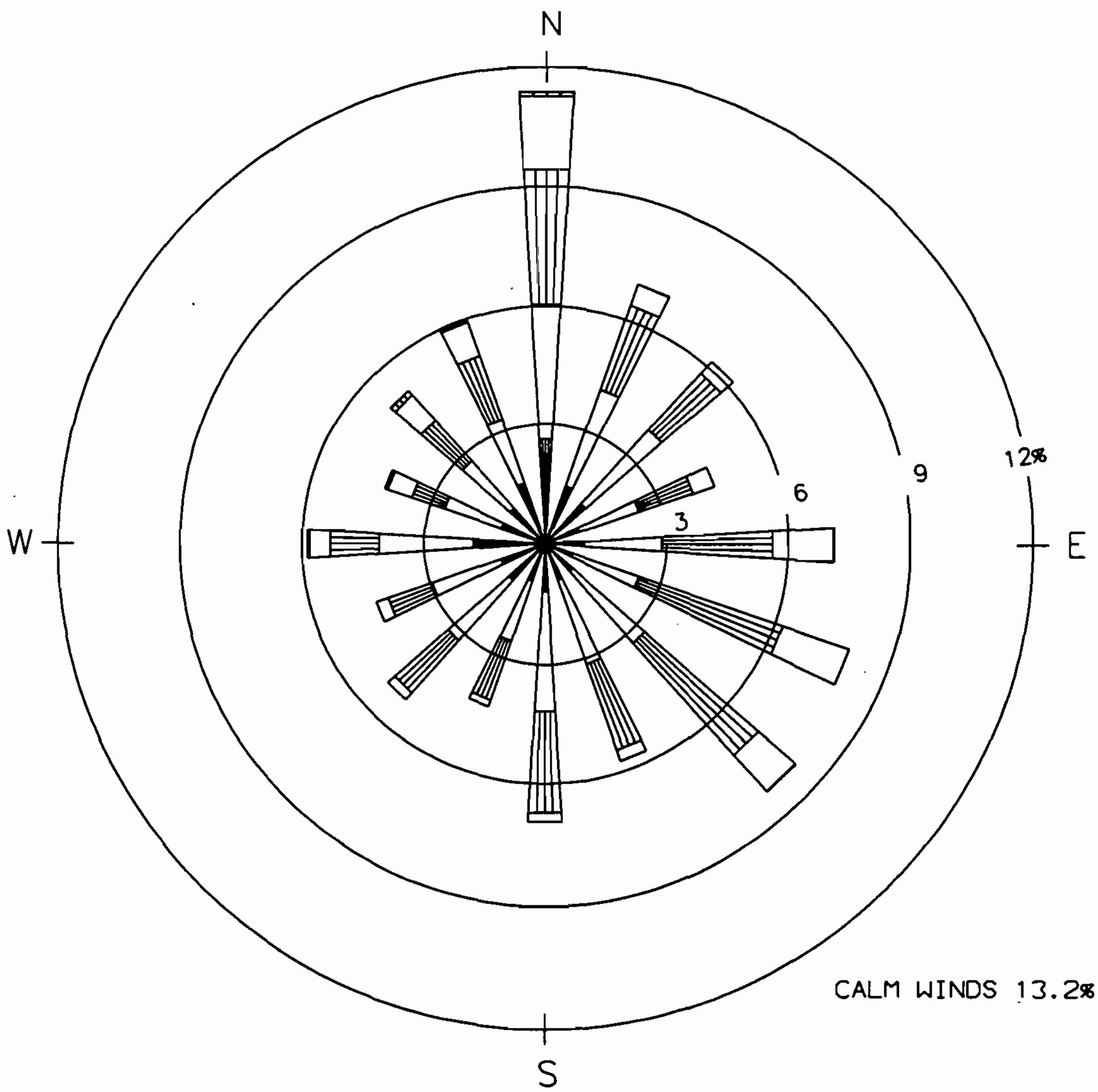
Summarizing the surface data used for modeling, Figures 2.3.7-1 and 2.3.7-2 present a 3-year annual wind rose (1988-1990) for Apalachicola Municipal Airport, and a 5-year annual wind rose (1986-1990) for Pensacola Regional Airport, respectively. The wind roses are based on surface wind direction and windspeed observed at the two stations. Figures 2.3.7-3 and 2.3.7-4 present the seasonal wind roses for the same stations. The values presented in the figures represent the percent of the time that the wind blows from a particular direction at a given speed. The predominant wind direction at both stations is from the north, which occurred approximately 11 percent of the time at Apalachicola and 16 percent of the time at Pensacola.

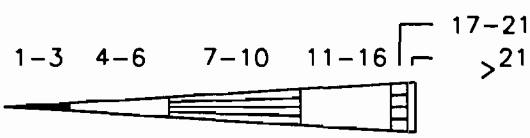
Table 2.3.7-2. Meteorological Data from Pensacola, Florida

LATITUDE: 30° 28' 23" N LONGITUDE: 87° 11' 15" W ELEVATION (FT): GRND: 121 BARO: 121 TIME ZONE: CENTRAL (UTC+ 6) WBAN: 13899

	ELEMENT	POR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F	NORMAL DAILY MAXIMUM	30	59.8	62.9	69.4	76.6	83.2	88.7	89.9	89.2	86.4	79.1	70.1	62.9	76.5
	MEAN DAILY MAXIMUM	41	61.2	63.9	69.8	76.4	83.4	89.1	90.1	89.8	86.7	79.5	69.6	63.2	76.9
	HIGHEST DAILY MAXIMUM	34	80	82	86	96	98	101	106	104	98	92	85	81	106
	YEAR OF OCCURRENCE		1997	1972	1991	1987	1996	1988	1980	1986	1997	1973	1973	1978	JUL 1980
	MEAN OF EXTREME MAXS.	41	74.7	75.8	81.3	85.3	91.8	96.0	96.6	95.7	93.8	88.5	80.7	76.4	86.4
	NORMAL DAILY MINIMUM	30	41.4	44.1	51.3	58.5	65.7	71.8	74.2	73.8	70.3	59.4	51.0	44.4	58.8
	MEAN DAILY MINIMUM	41	43.0	45.0	51.4	58.3	65.8	72.0	74.3	73.8	70.2	59.8	49.9	44.6	59.0
	LOWEST DAILY MINIMUM	34	5	15	22	33	48	56	61	62	43	32	25	11	5
	YEAR OF OCCURRENCE		1985	1996	1980	1987	1997	1984	1967	1992	1967	1993	1976	1989	JAN 1985
	MEAN OF EXTREME MINS.	41	24.6	27.2	33.8	43.5	54.3	64.0	69.6	68.6	58.6	43.4	33.3	26.5	45.6
	NORMAL DRY BULB	30	50.6	53.6	60.4	67.6	74.5	80.3	82.1	81.5	78.4	69.3	60.6	53.7	67.7
	MEAN DRY BULB	41	52.1	54.5	60.6	67.3	74.5	80.5	82.2	81.8	78.4	69.7	59.8	53.9	67.9
	MEAN WET BULB	13	43.9	47.2	51.7	56.5	63.3	68.2	69.4	69.2	66.1	58.0	52.1	46.7	57.7
	MEAN DEW POINT	13	39.1	42.4	47.2	52.2	59.9	65.4	67.1	67.0	63.3	54.1	48.2	42.6	54.0
	NORMAL NO. DAYS WITH:														
	MAXIMUM ≥ 90°	30	0.0	0.0	0.0	0.1	2.3	13.3	17.4	15.3	8.1	0.4	0.0	0.0	56.9
	MAXIMUM ≤ 32°	30	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3
	MINIMUM ≤ 32°	30	7.0	3.9	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	4.7	17.1
	MINIMUM ≤ 0°	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H/C	NORMAL HEATING DEG. DAYS	30	471	331	184	38	0	0	0	0	0	39	183	371	1617
	NORMAL COOLING DEG. DAYS	30	25	12	42	116	295	459	530	512	402	172	51	20	2636
RH	NORMAL (PERCENT)	30	73	71	72	72	73	74	77	78	75	71	74	75	74
	HOUR 00 LST	30	79	78	80	82	84	84	86	87	84	80	81	80	82
	HOUR 06 LST	30	81	81	83	85	86	86	88	90	87	84	84	83	85
	HOUR 12 LST	30	62	59	58	56	58	60	64	65	61	55	60	63	60
	HOUR 18 LST	30	71	68	68	66	67	68	71	74	71	69	74	74	70
S	PERCENT POSSIBLE SUNSHINE	5	48	53	61	63	67	67	57	58	60	71	64	49	60
W/O	MEAN NO. DAYS WITH:														
	HEAVY FOG(VISBY≤1/4 MI)	27	5.7	4.7	5.6	3.8	1.6	0.4	0.4	0.2	0.6	1.6	3.5	4.5	32.6
	THUNDERSTORMS	27	1.7	2.9	4.2	3.9	5.4	10.0	14.6	13.7	6.6	1.8	1.9	1.5	68.2
CLOUDINESS	MEAN:														
	SUNRISE-SUNSET (OKTAS)	29	5.2	4.7	4.8	4.3	4.4	4.4	4.7	4.6	4.2	3.6	4.0	4.8	4.5
	MIDNIGHT-MIDNIGHT (OKTAS)	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MEAN NO. DAYS WITH:														
	CLEAR	29	7.8	8.7	8.8	9.8	9.4	7.0	4.4	5.9	9.9	13.3	11.3	8.6	104.9
	PARTLY CLOUDY	29	7.1	6.7	8.2	9.5	11.1	14.9	16.9	15.1	10.7	9.0	7.8	6.7	123.7
	CLOUDY	29	16.1	12.9	14.0	10.7	10.6	8.1	9.7	10.1	9.5	8.7	10.9	15.7	137.0
PR	MEAN STATION PRESSURE(IN)	23	30.02	29.98	29.92	29.91	29.86	29.87	29.91	29.90	29.89	29.95	29.99	30.02	29.93
	MEAN SEA-LEVEL PRES. (IN)	12	30.15	30.11	30.06	30.02	30.00	30.00	30.05	30.02	30.03	30.06	30.11	30.16	30.06
WINDS	MEAN SPEED (MPH)	21	9.9	10.8	11.2	12.1	9.9	9.6	7.9	7.3	9.1	8.8	9.3	9.9	9.7
	PREVAIL.DIR(TENS OF DEGS)	16	36	36	12	14	18	18	21	18	01	36	36	35	35
	MAXIMUM 2-MINUTE:														
	SPEED (MPH)	25	35	35	35	35	32	32	35	35	53	35	35	34	53
	DIR. (TENS OF DEGS)		22	16	31	32	24	33	09	32	10	13	21	10	10
	YEAR OF OCCURRENCE		1987	1984	1993	1990	1994	1972	1993	1993	1979	1985	1972	1988	SEP 1979
	PEAK GUST :														
	SPEED (MPH)														
	DIR. (TENS OF DEGS)														
	YEAR OF OCCURRENCE														
PRECIPITATION	NORMAL (IN)	30	4.68	5.40	5.63	3.77	4.20	6.40	7.42	7.39	5.32	4.21	3.54	4.29	62.25
	MAXIMUM MONTHLY (IN)	34	18.77	11.66	12.96	15.52	10.31	21.14	20.36	14.14	15.71	16.15	13.27	9.58	21.14
	YEAR OF OCCURRENCE		1991	1966	1979	1964	1987	1994	1979	1987	1988	1995	1995	1982	JUN 1994
	MINIMUM MONTHLY (IN)	34	0.60	1.06	0.87	0.38	0.08	0.86	1.69	2.53	0.39	0.00	0.30	0.57	0.00
	YEAR OF OCCURRENCE		1981	1991	1967	1987	1988	1979	1970	1990	1984	1978	1981	1980	OCT 1978
	MAXIMUM IN 24 HOURS (IN)	34	5.44	4.70	11.10	7.51	5.01	6.77	5.14	5.92	10.02	15.40	4.90	4.52	15.40
	YEAR OF OCCURRENCE		1978	1982	1979	1964	1987	1970	1975	1987	1967	1995	1995	1964	OCT 1995
	NORMAL NO. DAYS WITH:														
	PRECIPITATION ≥ 0.01	30	9.8	9.2	9.0	6.1	7.1	10.2	13.6	12.6	8.8	4.8	7.6	9.7	108.5
	PRECIPITATION ≥ 1.00	30	1.3	1.6	1.9	1.2	1.5	1.9	2.2	2.6	1.7	1.3	1.1	1.4	19.7
SNOWFALL	NORMAL (IN)	30	0.1	0.1	T	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	T	0.2
	MAXIMUM MONTHLY (IN)	34	2.5	1.9	T	0.0	0.0	0.0	T	0.0	0.0	0.0	0.0	T	2.5
	YEAR OF OCCURRENCE		1977	1973	1993				1993					1993	JAN 1977
	MAXIMUM IN 24 HOURS (IN)	34	1.5	1.9	T	0.0	0.0	0.0	T	0.0	0.0	0.0	0.0	T	1.9
	YEAR OF OCCURRENCE		1977	1973	1993				1993					1993	FEB 1973
	MAXIMUM SNOW DEPTH (IN)	39	0	2	0	0	0	0	0	0	0	0	0	0	2
	YEAR OF OCCURRENCE			1973											FEB 1973
	NORMAL NO. DAYS WITH:														
	SNOWFALL ≥ 1.0	30	0.1	0.*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1

Source: NCDC Asheville, NC; 1998.





WIND SPEED CLASSES
(KNOTS)

NOTES:
DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE – WIND IS BLOWING FROM THE NORTH 11.4 PERCENT OF THE TIME.

WINDROSE
STATION NO. 12832
Apalachicola, FL
PERIOD: 1988–1990

FIGURE 2.3.7-1.

3-YEAR ANNUAL WIND ROSE FOR APALACHICOLA MUNICIPAL AIRPORT (1988 - 1990)
Sources: NCDC, 1999; ECT, 1999.

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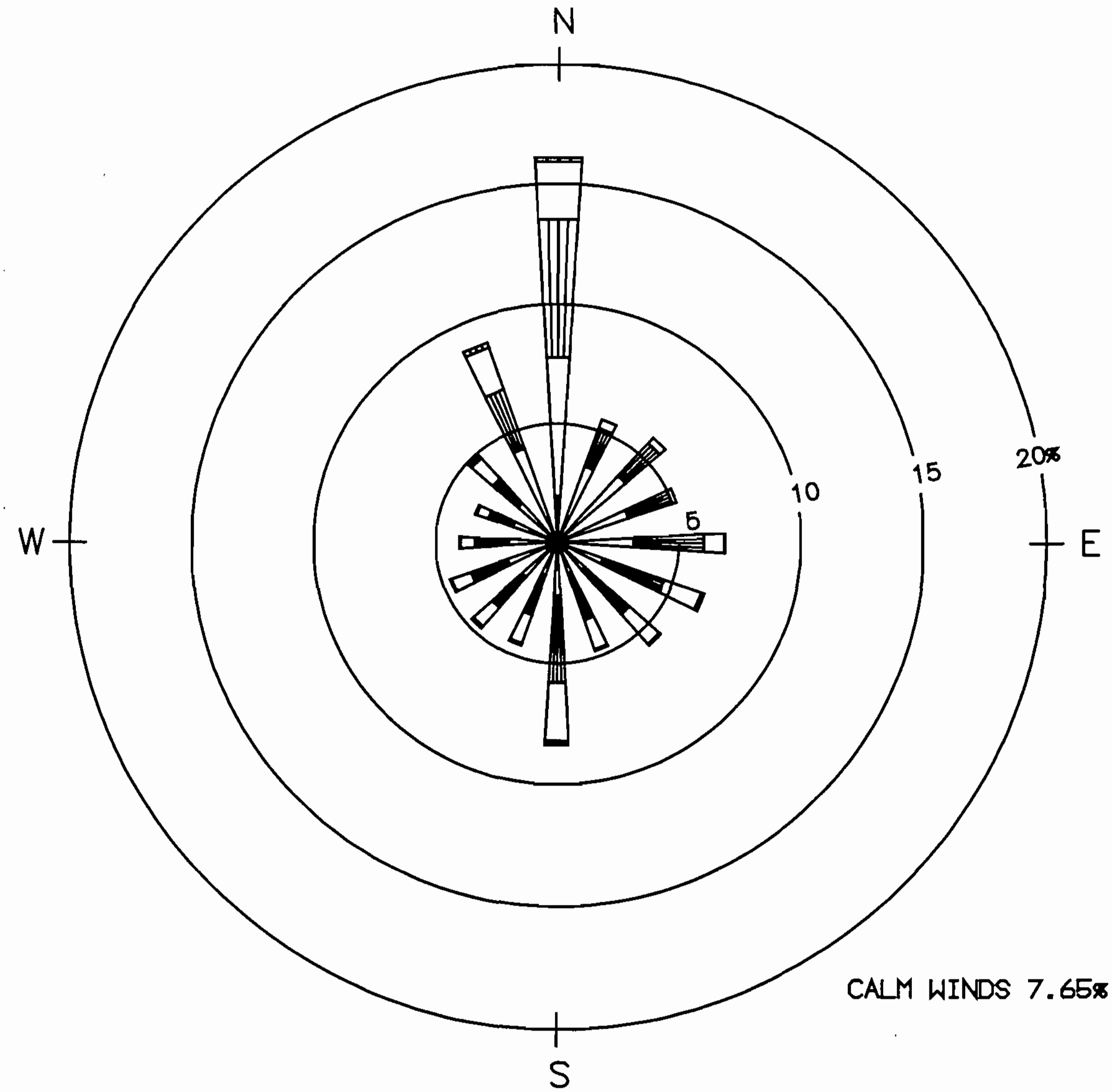
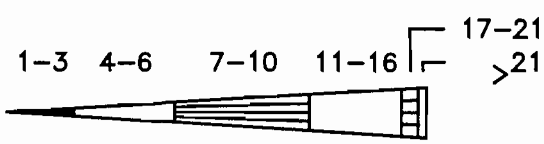




WIND SPEED CLASSES
(KNOTS)

NOTES:
DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE – WIND IS BLOWING FROM THE NORTH 16.1 PERCENT OF THE TIME.

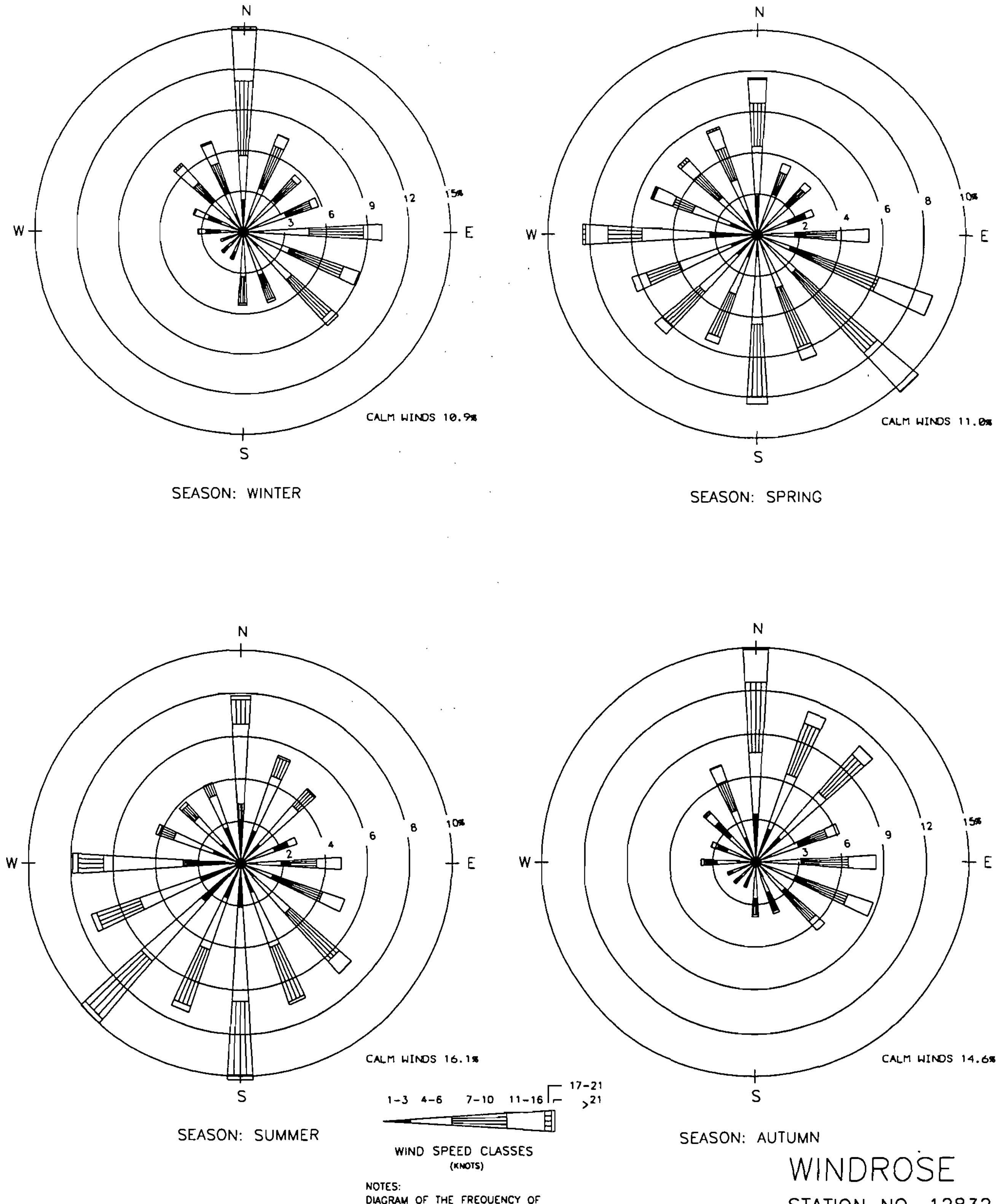
WINDROSE
STATION NO. 13899
Pensacola, Florida
PERIOD: 1986–1990

FIGURE 2.3.7-2.

5-YEAR ANNUAL WIND ROSE FOR PENSACOLA REGIONAL AIRPORT (1986 - 1990)

Source: NCDC, 1999; ECT, 1999.

ECT
Environmental Consulting & Technology, Inc.



NOTES:
DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION.
WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING.
EXAMPLE – WIND IS BLOWING FROM THE NORTH 14.9 PERCENT OF THE TIME.

WINDROSE
STATION NO. 12832
Apalachicola, FL
PERIOD: 1988–1990

FIGURE 2.3.7-3.

3-YEAR SEASONAL WIND ROSE FOR APALACHICOLA MUNICIPAL AIRPORT (1988 - 1990)

Sources: NCDC, 1999; ECT, 1999.

ECT
Environmental Consulting & Technology, Inc.

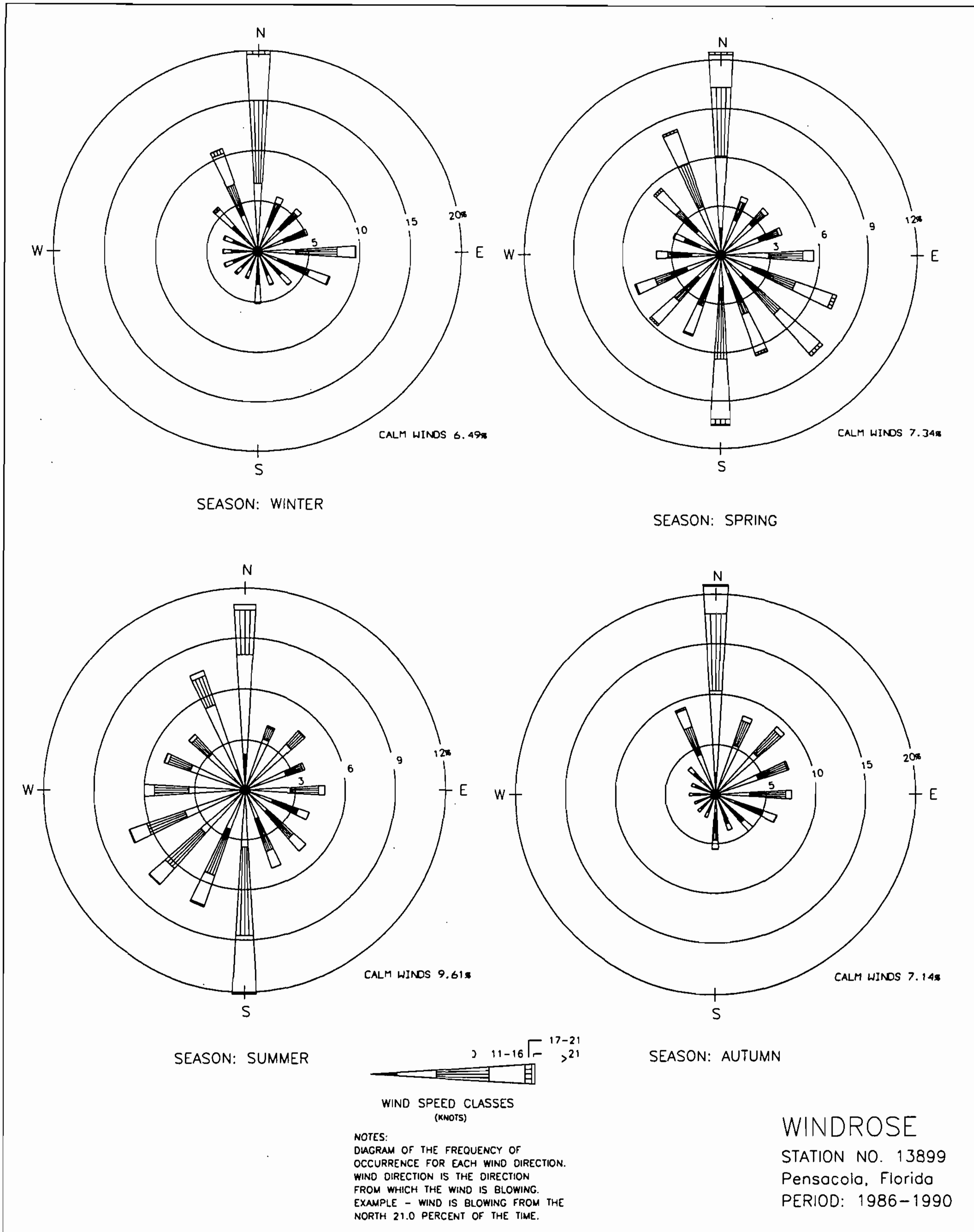


FIGURE 2.3.7-4.

5-YEAR SEASONAL WIND ROSE FOR PENSACOLA REGIONAL AIRPORT (1986 - 1990)

Source: NCDC, 1999; ECT, 1999.

ECT
Environmental Consulting & Technology, Inc.

Table 2.3.7-3 presents the annual and seasonal pattern of atmospheric stability in the Apalachicola area, as characterized by the 3-year modeling period of record. During the summer, unstable conditions are present approximately 17 percent of the time because of strong insulation. During the winter, the occurrence of unstable conditions is reduced to 2 percent of the time. Neutral stability is more common in the winter, occurring approximately 46 percent of the time. Stable conditions are uniformly distributed throughout the year, occurring 39 to 47 percent of the time.

Table 2.3.7-4 presents the annual and seasonal pattern of atmospheric stability in the Pensacola area, as characterized by the 5-year period of record. During the summer, unstable conditions are present approximately 13 percent of the time because of strong insulation. During the winter, the occurrence of unstable conditions is reduced to 2 percent of the time. Neutral stability is more common in the winter, occurring approximately 43 percent of the time. Stable conditions are uniformly distributed throughout the year, occurring 39 to 44 percent of the time.

The mixing height defines the upper limit of the surface boundary layer and, thus, is an important factor in determining the atmosphere's dispersion characteristics. The annual and seasonal averaging morning and afternoon mixing heights for Apalachicola, as calculated by NWS, are presented in Table 2.3.7-5. The lowest mixing heights occur in the morning in the winter and the highest mixing heights occur in the afternoon in the summer.

Thunderstorms are the most common severe weather in the area, occurring on an average of 72 days each year at the NWS Apalachicola observation station and 68 days each year at the NWS Pensacola observation station. Thunderstorms occur most frequently during the summer, but may occur at any time during the year.

Table 2.3.7-3. Annual and Seasonal Average Distribution of Atmospheric Stability Classes for Apalachicola, Florida (1986 through 1990)

Season	Occurrence (%) of Stability Class					
	Very Unstable	Moderately Unstable	Slightly Unstable	Neutral	Slightly Stable	Moderately Stable
Winter	<0.1	2.3	12.0	46.8	13.9	25.1
Spring	0.6	8.3	18.7	33.0	11.8	27.6
Summer	1.6	15.8	20.6	16.9	11.8	33.3
Fall	0.2	6.3	17.1	29.1	13.3	33.9
Annual	**0.6**	**8.2**	**17.2**	**31.4**	**12.7**	**30.0**

Sources: NCDC, 1999.
ECT, 1999.

Table 2.3.7-4. Annual and Seasonal Average Distribution of Atmospheric Stability Classes for Pensacola, Florida (1986 through 1990)

	Occurrence (%) of Stability Class					
Season	Very Unstable	Moderately Unstable	Slightly Unstable	Neutral	Slightly Stable	Moderately Stable
Winter	<0.1	1.8	7.9	59.4	14.7	16.2
Spring	0.8	5.7	14.7	43.7	15.0	20.1
Summer	2.5	10.7	18.5	25.4	15.9	27.0
Fall	0.3	6.6	14.3	35.3	17.2	26.5
Annual	**0.9**	**6.2**	**13.8**	**40.8**	**15.7**	**22.5**

Sources: NCDC, 1999.
ECT, 1999.

Table 2.3.7-5. Annual and Seasonal Average Mixing Heights for Apalachicola, Florida (1986 through 1990)

Season	Mixing Height (meters)	
	Morning	Afternoon
Winter	395.1	604.1
Spring	486.7	1,114.2
Summer	607.9	1,287.9
Fall	460.2	1,031.7
Annual	**487.5**	**1,031.6**

Sources: NCDC, 1999.
ECT, 1999.

2.3.7.2 Ambient Air Quality

The Smith Unit 3 Project site is located in an area that FDEP classifies as attainment for all criteria pollutants (Section 62-204.240, F.A.C.). This means that the area meets all state and federal ambient air quality standards (AAQS), which are given in Table 2.3.7-6. Ambient air monitoring data are available with which to generally characterize the existing conditions in the vicinity of the site. Table 2.3.7-7 lists the ambient monitoring stations closest to the Project site for each criteria pollutant, per FDEP reports for calendar years 1997 and 1998. Figure 2.3.7-5 shows the locations of these stations relative to the Project site. Data for particulate matter less than or equal to 10 micrometers aerodynamic diameter (PM_{10}) are available at one location in Bay County. For all other pollutants the closest monitoring stations are outside the county. Ambient data for sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), ozone, and lead have been collected in the Pensacola, Tallahassee, and Jacksonville areas and would not be truly representative of Bay County. Given the rural nature of the site, existing concentrations of these pollutants, which are usually associated more closely with urban environments, should be well below the applicable standards.

With the caveats just given as to the extent to which available monitoring data are representative of the Project site, Tables 2.3.7-8 through 2.3.7-13 present summaries of the available data. In addition, Tables 2.3.7-14 through 2.3.7-16 present Gulf Power's air monitoring data summaries for NO_2, TSP, and SO_2, respectively. These presentations of data are consistent with the conclusion that the Project site—Bay County in general—is characterized as having good air quality.

Another indicator of existing air quality is proximity to other emission sources. In this vein, the air quality of the Project site benefits from a lack of other sources in the area. Bay County has, in general, less heavy industry than many counties in Florida. The largest sources of air emissions are the existing units of the Lansing Smith Plant, the Stone Container Corporation pulp mill, the Arizona Chemical Company gum and wood chemicals plant, and the Bay County waste incinerator (information according to EPA's

Table 2.3.7-6. National and Florida AAQS (microgram per cubic meter [μg/m^3])

Pollutant	Averaging Time	National AAQS Primary	National AAQS Secondary	Florida AAQS
PM_{10}	Annual arithmetic mean	50	50	50
	24-hour maximum*	150	150	150
$PM_{2.5}$	Annual arithmetic mean	15	15	NA
	24-hour maximum†	65	65	NA
SO_2	Annual arithmetic mean	80	NA	60
	24-hour maximum‡	365	NA	260
	3-hour maximum‡	NA	1,300	1,300
NO_2	Annual arithmetic mean	100	100	100
CO	8-hour maximum‡	10,000	NA	10,000
	1-hour maximum‡	40,000	NA	40,000
Ozone	8-hour maximum**	157	157	NA
	1-hour maximum††	235	235	235
Lead	Calendar quarter arithmetic mean	1.5	1.5	1.5

*Standard is attained when the 99th percentile 24-hour concentration is less than or equal to the standard.
†Standard is attained when the 98th percentile 24-hour concentration is less than or equal to the standard.
‡ Maximum concentration not to be exceeded more than once per year.
** Standard is attained when the average of the annual 4th highest daily maximum 8-hour average concentration is less than or equal to the standard.
†† Standard is attained when the 3-year average number of days with a maximum hourly concentration above the standard is less than 1.0. (The national AAQS 1-hour standard is no longer in effect in Florida. It has been replaced by the 8-hour standard.)

Note: NA = not applicable.

Sources: 40 CFR 50.
Rule 62-204.240, F.A.C.
ECT, 1999.

Table 2.3.7-7. Ambient Air Quality Monitoring Stations Closest to the Smith Unit 3 Project Site

Pollutant	FDEP Station No.	Station Location		Relative to Project Site (km)
		County	City	
PM_{10}	3480-004-F02 12-005-1004	Bay	Panama City	13 SE
	3740-003-F02 12-045-1003	Gulf	Port St. Joe	60 SE
SO_2	3540-004-F01 12-033-0004	Escambia	Pensacola	161 W
	3540-022-F02 12-033-0022	Escambia	Pensacola	161 W
NO_2	3540-004-F01	Escambia	Pensacola	161 W
CO	1960-080-H01 12-031-0080	Duval	Jacksonville	441 E
	1960-083-H01 12-031-0083	Duval	Jacksonville	441 E
	1960-084-H01 12-031-0084	Duval	Jacksonville	441 E
	1960-095-H01 12-031-0085	Duval	Jacksonville	441 E
Ozone	2340-003-F01	Leon	Tallahassee	158 NE
	12-073-0012	Leon	Tallahassee	158 NE
Lead	1960 032 H01 12-031-0032	Duval	Jacksonville	441 E
	1960-084-H01 12-031-0084	Duval	Jacksonville	441 E

Sources: FDEP, 1997 and 1998.
ECT, 1999.

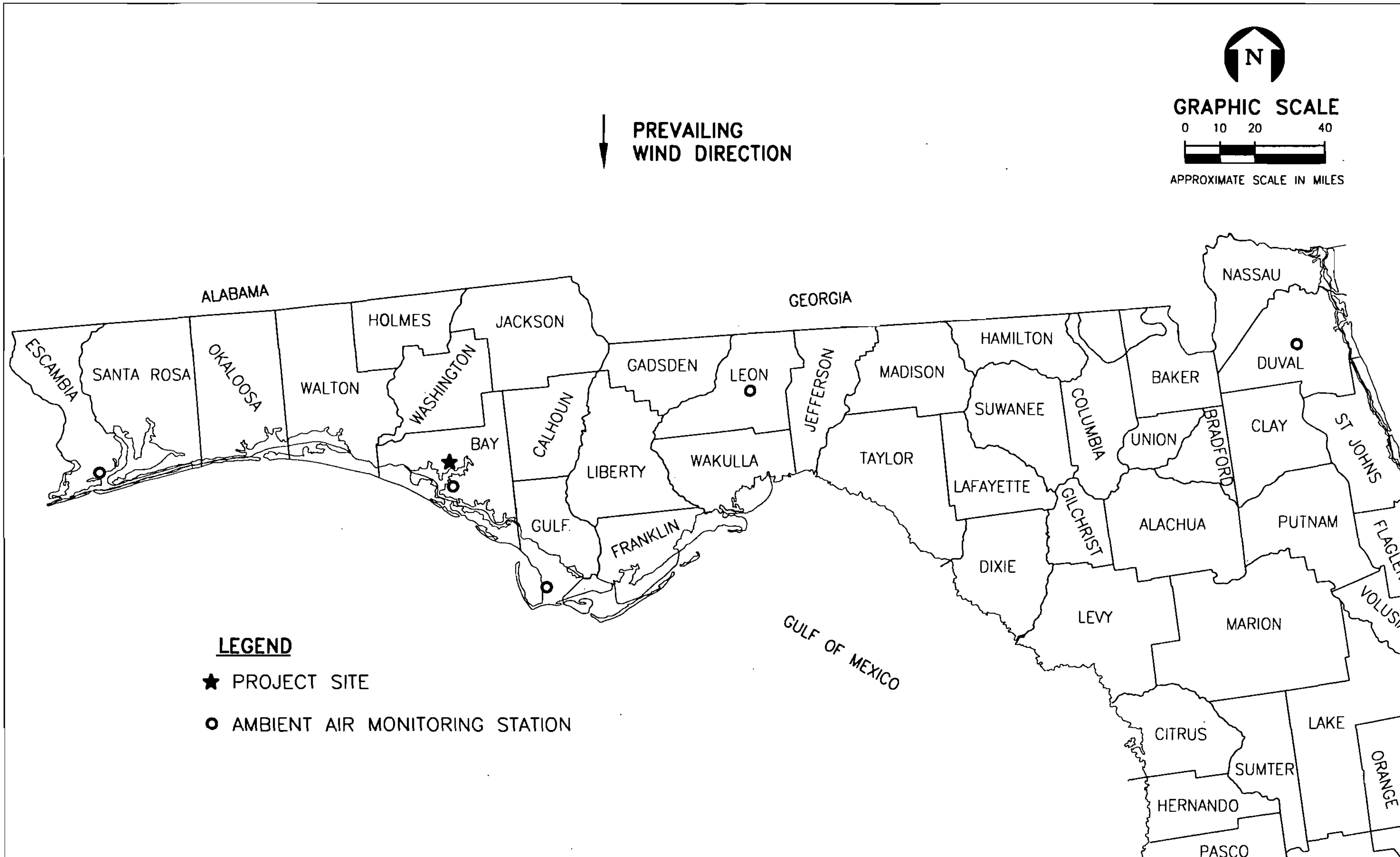


FIGURE 2.3.7-5.
LOCATIONS OF CLOSEST FDEP
AIR QUALITY MONITORING STATIONS
Source: ECT, 1998.

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Table 2.3.7-8. Summary of FDEP PM_{10} Monitoring Near the Smith Unit 3 Project Site

Location	Site Identification Number	Year	24-Hour Measurement Highest (μg/m³)	Second-highest (μg/m³)	Annual Arithmetic Mean (μg/m³)
Panama City	3480-004-F02	1997	62	52	25
	12-005-1004	1998	73	64	28
Port St. Joe	3740-003-F02	1997	65	54	23
	12-045-1003	1998	73	65	26

Note: The 24-hour ambient PM_{10} standard is 150 μg/m³, attained when the 99th percentile concentration is less than or equal to the standard; the annual ambient PM_{10} standard is 50 μg/m³, annual arithmetic mean.

Source: FDEP, 1998 and 1999.

Table 2.3.7-9. Summary of FDEP SO_2 Monitoring Near the Smith Unit 3 Project Site

Location	Site Identification Number	Year	Highest 3-Hour Average (μg/m³)	Highest 24-Hour Average (μg/m³)	Annual Average (μg/m³)
Pensacola	3540-004-F01	1997	233	98	11
	12-033-0004	1998	253	60	10
Pensacola	3540-022-F02	1997	333	114	12
	12-033-0022	1998	264	63	10

Note: The 3-hour ambient standard is 1,300 μg/m³, not to be exceeded more than once per year.
The 24-hour ambient standard is 260 μg/m³, not to be exceeded more than once per year.
The annual ambient standard is 60 μg/m³, arithmetic mean.

Source: FDEP, 1998 and 1999.

Table 2.3.7-10. Summary of FDEP NO_2 Monitoring Near the Smith Unit 3 Project Site

Location	Site Identification Number	Year	Annual Average ($\mu g/m^3$)
Pensacola	3540-004-F01	1997	16

Note: The annual ambient standard is 100 $\mu g/m^3$, arithmetic mean.

Source: FDEP, 1998 and 1999.

Table 2.3.7-11. Summary of FDEP CO Monitoring Near the Smith Unit 3 Project Site

Location	Site Identification Number	Year	Highest 1-Hour Average ($\mu g/m^3$)	Highest 8-Hour Average ($\mu g/m^3$)
Jacksonville	1960-080-H01	1997	3,420	2,280
	12-031-0080	1998	9,576	5,130
Jacksonville	1960-083-H01	1997	7,980	3,420
	12-031-0083	1998	5,586	3,534
Jacksonville	1960-084-H01	1997	6,840	4,560
	12-031-0084	1998	6,954	3,762
Jacksonville	1960-095-H01	1997	7,980	3,420
	12-031-0095	1998	5,016	2,280

Note: The 1-hour ambient standard is 40,000 $\mu g/m^3$, not to be exceeded more than once per year.
The 8-hour ambient standard is 10,000 $\mu g/m^3$, not to be exceeded more than once per year.

Source: FDEP, 1998 and 1999.

Table 2.3.7-12. Summary of FDEP Ozone Monitoring Near the Smith Unit 3 Project Site

Location	Site Identification Number	Year	1-Hour Measurement Highest ($\mu g/m^3$)	1-Hour Measurement Second-highest ($\mu g/m^3$)
Tallahassee	2340-003-F01	1997	135	110
Tallahassee	12-073-0012	1998	202	190

Note: The 1-hour ambient ozone standard is 235 $\mu g/m^3$, attained when the 3-year average number of days with a maximum hourly concentration above the standard is less than 1.0.

Source: FDEP, 1998 and 1999.

Table 2.3.7-13. Summary of FDEP Lead Monitoring Near the Smith Unit 3 Project Site

Location	Site Identification Number	Year	Quarterly Arithmetic Average ($\mu g/m^3$) 1	2	3	4
Jacksonville	1960-032-H01	1997	0.0	0.0	0.0	0.0
	12-031-0032	1998	0.01	0.02	0.01	0.02
Jacksonville	1960-084-H01	1997	0.0	0.0	0.0	0.0
	12-031-0084	1998	0.01	0.01	0.01	0.02

Note: The ambient standard is 1.5 $\mu g/m^3$, calendar quarterly arithmetic mean.

Source: FDEP, 1998 and 1999.

Table 2.3.7-14. Summary of 1993-1998 Gulf Power NO_2 Monitoring

Location	Site Identification Number	Year	Geometric Mean* ($\mu g/m^3$)
North remote Lynn Haven	2420-004J02	1993	5
		1994	5
		1995	5
		1996	6
		1997	13
		1998	3

Note: The annual ambient standard is 100 $\mu g/m^3$, arithmetic mean.

*Average of four quarterly geometric means.

Sources: Gulf Power Company, 1999.
ECT, 1999.

Table 2.3.7-15. Summary of 1993-1998 Gulf Power TSP Monitoring

Location	Year	Geometric Mean* (μg/m^3)
Smith Plant	1993	22
	1994	22
	1995	23
	1996	19
	1997	19
	1998	25

*Average of four quarterly geometric means.

Sources: Gulf Power Company, 1999.
ECT, 1999.

Table 2.3.7-16. Summary of 1993-1998 Gulf Power SO_2 Monitoring

Location	Site Identification Number	Year	Highest 3-Hour Average ($\mu g/m^3$)	Highest 24-Hour Average ($\mu g/m^3$)	Annual Average ($\mu g/m^3$)
North remote Lynn Haven	2420-007J02	1993	138	47	
		1994	238	44	
		1995	700	154	
		1996	1,005	76	
		1997	529	152	16
		1998	584	199	6
East remote Lynn Haven	2420-005J02	1993	183	27	
		1994	597	166	
		1995	504	256	
		1996	721	248	
		1997	490	178	17
		1998	629	202	11

Note: The 3-hour ambient standard is 1,300 $\mu g/m^3$, not to be exceeded more than once per year.
The 24-hour ambient standard is 260 $\mu g/m^3$, not to be exceeded more than once per year.
The annual ambient standard is 60 $\mu g/m^3$, arithmetic mean.

Sources: Gulf Power Company, 1999.
ECT, 1999.

"AIRSData" online emissions database, 1997 data). These three other facilities are located in Panama City, approximately 19 km east, and 16 km southeast of the Project site, as shown in Figure 2.3.7-6.

2.3.7.3 Measurement Programs

No program to measure existing meteorological or ambient air quality conditions was undertaken for the Project. Given the low impacts predicted for the Project's combustion emissions, the use of existing data was deemed appropriate. Section 8.0 of the PSD application (Appendix 10.2.7) provides justification for the use of available ambient air data.

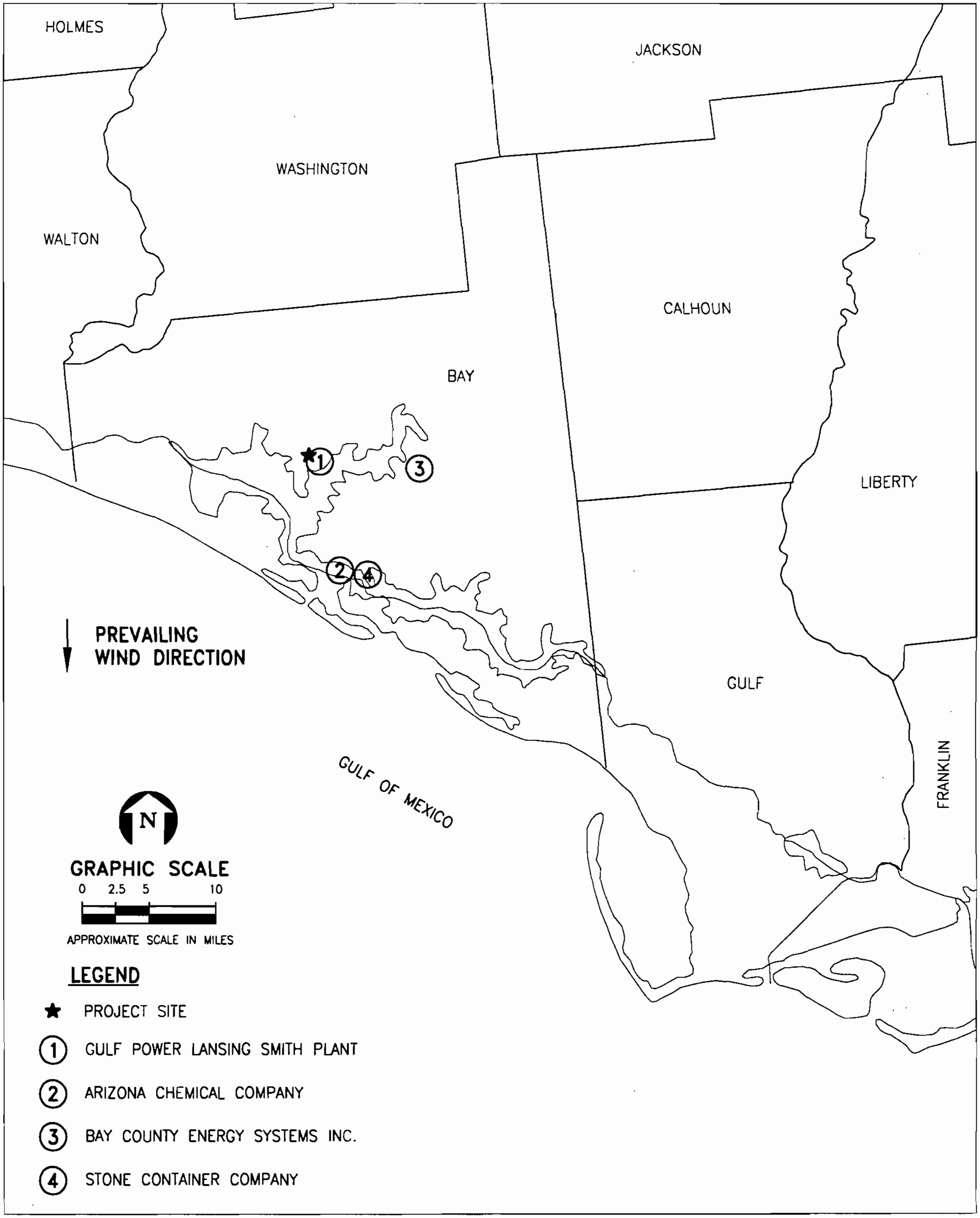

FIGURE 2.3.7-6.

OTHER AIR EMISSION SOURCES IN BAY COUNTY

Source: ECT, 1999.

ECT
Environmental Consulting & Technology, Inc.

2.3.8 NOISE

The Smith Unit 3 Project site is located directly north of the existing Lansing Smith Plant property and approximately 3,000 ft east of the southern terminus of CR 2300 at the plant entrance. The closest residence is approximately 2 miles to the northeast. The plant site is currently planted in pine for silvicultural purposes as are the surrounding properties to the east, west, and north. The area to the south is designated industrial (existing Lansing Smith plant).

The only manmade noise sources in the area are from the existing Lansing Smith Plant. Every 20 to 25 years the pine is harvested. This adds to the noise levels from the Lansing Smith plant. Natural noise sources include wind, insects, and birds.

A comprehensive sound level survey was conducted at the existing plant and at the coal handling system during June 1989. Sound level measurements were made throughout the plant and at numerous points around the plant site boundaries at that time.

Measurements of the A-weighted sound level were made using a Bruel & Kjaer Model 2215 sound level meter. The instrument was equipped with a Bruel & Kjaer Model 4165 microphone to meet the requirements of American National Standards Institute (ANSI) S1.4-1983 for Type 1 precision sound level meters. A windscreen was used to reduce, but not eliminate, wind-generated noise. Calibration of the sound level meter was performed before and after each group of measurements using a Bruel & Kjaer Model 4230 calibrator. Sound level measurements were made for 5- to 10-minute periods around the plant. The overall sound levels measured at the west Gulf property boundary from the existing Smith Plant were 40.3 A-weighted decibels (dBA) and from the coal handling area were 42.3 dBA.

The Bay County Land Use Code defines the maximum noise level that shall not be exceeded in the receiving land use. The receiving land uses in the area are silvicultural to the east, west, and north, and residential 2 miles to the northeast of the site. For agricultural, silvicultural or industrial land use, noise levels shall not exceed 75 dBA. For residential, conservation, or special development land use, daytime noise levels shall not exceed 60 dBA and 55 dBA at night. The distance between the existing power plant and these land uses will attenuate the noise so as not to exceed the limits.

2.3.9 OTHER ENVIRONMENTAL FEATURES

The previous sections have provided detailed descriptions of the environmental features of the Smith Unit 3 Project site and surrounding areas. No other special or significant environmental features exist on the site which require additional information.

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