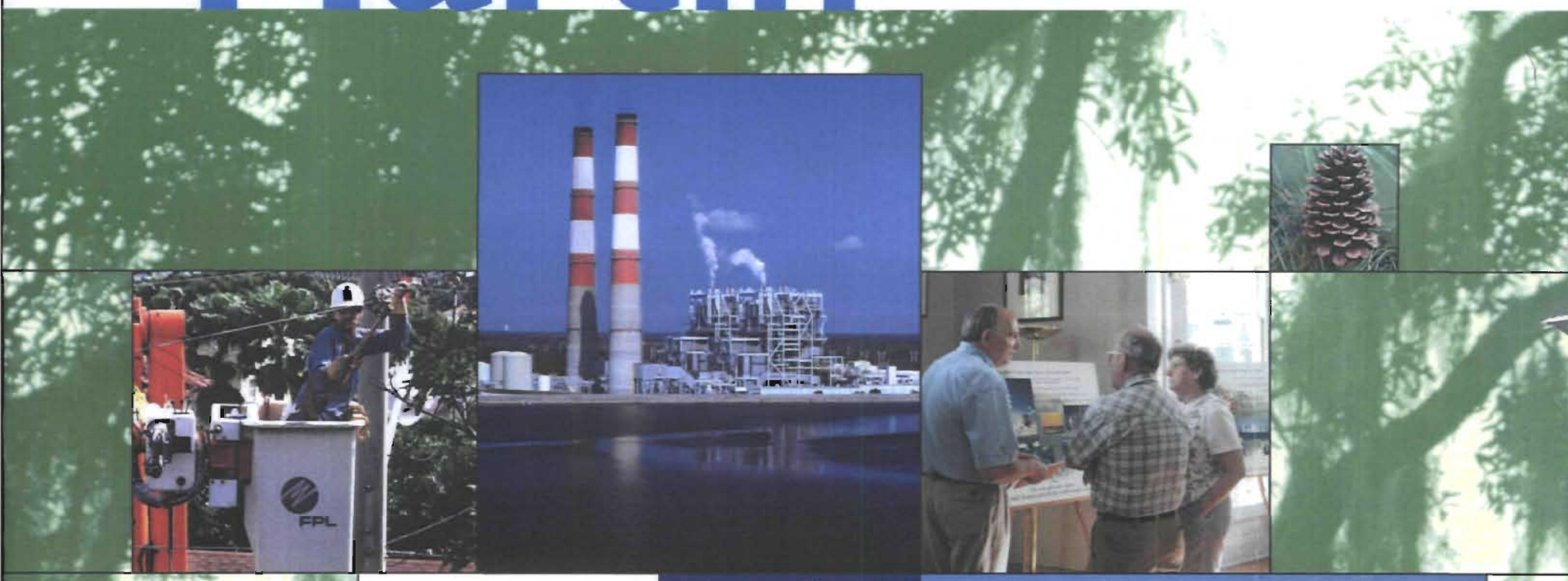
Martin

expansion project









Volume I of III

FPL

Florida Power & Light Company, Environmental Services Dept., P.O. Box 14000, Juno Beach,FL 33408

FPL

January 28, 2002

Hamilton S. Oven, P.E., Administrator
Bureau of Air Resources Management
Department of Environmental Protection
Siting Coordinating Office
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Martin Expansion Project
Application for Site Certification

Dear Mr. Oven:

Florida Power & Light Company (FPL) is pleased to submit to the Department its Application for Site Certification (SCA) for the Martin Expansion Project, pursuant to the Florida Electrical Power Plant Siting Act and Florida Administrative Code Rule 62-17.051(1)(a). Also enclosed is FPL Check No. 0309679 made payable to the Department in the amount of $134,000.00 and provided as the application fee pursuant to Florida Administrative Code 62-17.293(1)(b)1. At this time, we are providing 14 copies of the Application, with 4 of those copies being sent by copy of this letter to the Department's Southeast District Office in West Palm Beach. Upon the Department's determination that the Application is complete, FPL will distribute the Application to the other required recipients.

The SCA addresses the environmental and socioeconomic aspects of the Martin Expansion Project by presenting information in accordance with the Department's "Instruction Guide for Certification Application", DEP Form 62-1.211(1).

FPL looks forward to working with the Department and other interested agencies in the certification process. If you should have any questions regarding our Application, please do not hesitate to call me at 561-691-2216.

Sincerely,

K. H. Summerlin

Manager
New Capacity Projects

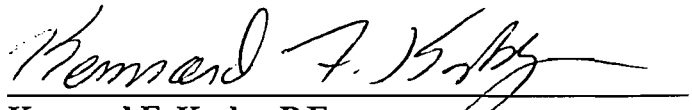
cc: Tom Tittle, FDEP SE District (w/ 4 copies SCA)

SITE CERTIFICATION APPLICATION
MARTIN EXPANSION PROJECT

VOLUME I OF III

Submitted by:

Florida Power & Light Company
700 Universe Boulevard
Juno Beach, Florida 33408



Kennard F. Kosky, P.E.
Professional Registered Engineer No. 14996

Golder Associates Inc.
6241 NW 23rd Street, Suite 500
Gainesville, Florida 32653-1500

1/31/02

January 2002
0137609

FPL

APPLICANT INFORMATION

Please supply the following information:

Applicant's Official Name *Florida Power and Light Company*

Address *700 Universe Boulevard, Juno Beach, FL 33408*

Address of Official Headquarters *700 Universe Boulevard, Juno Beach, FL 33408*

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

Names, owners, etc. *Florida Power and Light Company (an investor-owned electric utility)*

Name and Title of Chief Executive Officer *Paul J. Evanson, President*

Name, Address, and Phone Number of Official Representative responsible

for obtaining certification: *K. H. Simmons, Manager of New Capacity Projects, Environmental Services*

700 Universe Boulevard, Juno Beach, FL 33408 Phone: (561) 691-2216 Fax: (561) 691-7049

Site Location (county) *7 miles north of Indiantown on SR 710, Martin County, Fl 34956*

Nearest Incorporated City *Okeechobee, FL (about 19 miles) and Stuart, FL (about 19 miles)*

Latitude and Longitude *27°3' 12" N 80°33' 54" E*

UTM's Northerly *2,992.24 km N*

Easterly *543.16 km E*

Section, Township, Range *Portions of Sections 29 and 30 of Township 39S, Range 37E*

Location of any directly associated transmission

facilities (counties) *Martin County*

Name Plate Generating Capacity *Nominal 1,150 MW; Existing two turbines nominal 170 MW each*

Capacity of Proposed Additions and Ultimate Site

Capacity (where applicable) *Capacity Addition is 800 MW nominal*

Remarks (additional information that will help identify

the applicant): *Project Name: Martin Expansion Project (a.k.a. Martin Unit 8)*

LIST OF ORGANIZATIONS THAT PARTICIPATED IN THE PREPARATION OF THE SCA

Florida Power & Light Company
700 Universe Boulevard
Juno Beach, FL 33408
- Overall SCA Management and Direction, Power Plant and Transmission Engineering

Golder Associates, Inc.
6241 N.W. 23rd Street, Suite 500
Gainesville, FL 32653
- Overall Environmental Contractor

Black & Veatch Corporation
11000 Regency Parkway, Suite 100
Cary, NC 27513
- Engineering Contractor

Foster Wheeler Environmental Corporation
210 Hollyridge Drive
Roswell, GA 30076
- Water Resources Engineering Contractor (Cooling Pond and Stormwater)

Hopping Green and Sams
123 South Calhoun Street
Tallahassee, FL 32314
- Environmental Attorneys for FPL

TABLE OF CONTENTS

1.0 NEED FOR POWER AND THE PROPOSED FACILITIES 1-1

1.1 INTRODUCTION 1-1

1.2 THE APPLICANT 1-2

1.3 OVERVIEW OF THE PROJECT 1-3

1.4 FPL'S RESOURCE PLANNING PROCESS 1-5

1.5 NEED FOR THE PROJECT 1-5

1.5.1 FPL'S CAPACITY NEEDS 1-5

1.5.2 FPL'S REQUEST FOR PROPOSALS AND RESULTS OF RFP ANALYSES 1-8

1.5.3 THE TIMING OF THE UNIT ADDITIONS 1-10

1.6 BENEFITS OF THE PROJECT 1-10

1.7 SUMMARY OF PUBLIC OUTREACH PROGRAM 1-11

2.0 SITE VICINITY CHARACTERIZATION 2-1

2.1 SITE AND ASSOCIATED FACILITIES DELINEATION 2-1

2.1.1 SITE LOCATION 2-1

2.1.2 EXISTING SITE USES 2-1

2.1.3 ADJACENT PROPERTIES 2-2

2.2 SOCIO-POLITICAL ENVIRONMENT 2-2

2.2.1 GOVERNMENTAL JURISDICTIONS 2-2

2.2.2 ZONING AND LAND USE PLANS 2-2

2.2.3 DEMOGRAPHY AND ONGOING LAND USE 2-3

2.2.4 EASEMENTS, TITLE, AGENCY WORKS 2-4

2.2.5 REGIONAL SCENIC, CULTURAL AND NATURAL LANDMARKS 2-4

2.2.6 ARCHAEOLOGICAL AND HISTORIC SITES 2-4

2.2.7 SOCIOECONOMICS AND PUBLIC SERVICES 2-6

2.3 BIO-PHYSICAL ENVIRONMENT 2-11

2.3.1 GEOHYDROLOGY 2-11

2.3.2 SUBSURFACE HYDROLOGY 2-14

2.3.3 SITE WATER BUDGET AND AREA USERS 2-18

2.3.4 SURFICIAL HYDROLOGY 2-21

2.3.5 VEGETATION/LAND USE 2-23

2.3.6 ECOLOGY 2-23

TABLE OF CONTENTS - continued

2.3.7 METEOROLOGICAL AND AMBIENT AIR QUALITY 2-33
2.3.8 NOISE 2-39
3.0 THE PLANT AND DIRECTLY ASSOCIATED FACILITIES 3-1
3.1 BACKGROUND 3-1
3.2 SITE LAYOUT 3-1
3.3 FUEL 3-1
3.4 AIR EMISSIONS CONTROLS 3-1
3.4.1 AIR EMISSIONS TYPES AND SOURCES 3-6
3.4.2 AIR EMISSION CONTROLS 3-7
3.4.3 CONTROL TECHNOLOGY DESCRIPTION AND BEST AVAILABLE CONTROL TECHNOLOGY (BACT) 3-8
3.4.4 DESIGN DATA FOR CONTROL EQUIPMENT 3-10
3.4.5 DESIGN PHILOSOPHY 3-10
3.5 PLANT WATER USE 3-11
3.5.1 CIRCULATING WATER HEAT REJECTION SYSTEM 3-12
3.5.2 DOMESTIC/SANITARY WASTEWATER 3-13
3.5.3 POTABLE WATER SYSTEMS 3-13
3.5.4 PROCESS WATER SYSTEMS 3-14
3.6 CHEMICAL AND BIOCIDE WASTE 3-14
3.6.1 COOLING SYSTEM WATER CHEMICAL TREATMENT 3-15
3.6.2 STEAM CYCLE WATER TREATMENT 3-15
3.6.3 SANITARY WASTEWATER TREATMENT 3-15
3.6.4 MAKEUP WATER DEMINERALIZATION 3-15
3.6.5 CHEMICAL CLEANING 3-16
3.6.6 MISCELLANEOUS CHEMICAL DRAINS 3-16
3.7 SOLID AND HAZARDOUS WASTE 3-17
3.7.1 SOLID WASTE 3-17
3.7.2 HAZARDOUS WASTE 3-17
3.8 SITE DRAINAGE 3-17
3.8.1 EXISTING SITE DRAINAGE 3-17
3.8.2 DESIGN CRITERIA AND APPLICABLE REGULATIONS 3-17
3.8.3 STORMWATER DETENTION POND 3-18
3.8.4 CONSTRUCTION DRAINAGE 3-18

TABLE OF CONTENTS - continued

3.8.5 OPERATIONAL SITE DRAINAGE 3-19
3.8.6 PEAK RUNOFF FLOW RATES 3-19
3.9 MATERIALS HANDLING 3-19
3.9.1 CONSTRUCTION MATERIALS AND EQUIPMENT 3-19
3.9.2 ROADS 3-19
3.9.3 RAILROAD 3-20
4.0 ENVIRONMENTAL EFFECTS OF SITE PREPARATION AND PLANT AND ASSOCIATED FACILITIES CONSTRUCTION 4-1
4.1 LAND IMPACTS 4-1
4.1.1 GENERAL CONSTRUCTION IMPACTS 4-1
4.1.2 ROADS 4-4
4.1.3 FLOOD ZONES 4-4
4.1.4 TOPOGRAPHY AND SOILS 4-4
4.2 IMPACT ON SURFACE WATER BODIES AND USES 4-5
4.2.1 IMPACT ASSESSMENT 4-5
4.2.2 MEASURING AND MONITORING PROGRAMS 4-7
4.3 GROUNDWATER IMPACTS 4-7
4.3.1 PHYSICAL AND CHEMICAL IMPACTS 4-7
4.3.2 MEASURING AND MONITORING PROGRAM 4-8
4.4 ECOLOGICAL IMPACTS 4-8
4.4.1 IMPACT ASSESSMENT 4-8
4.4.2 MEASURING AND MONITORING PROGRAMS 4-10
4.5 AIR IMPACTS 4-10
4.5.1 AIR EMISSIONS 4-10
4.5.2 CONTROL MEASURES 4-11
4.5.3 POTENTIAL IMPACTS 4-11
4.6 IMPACT ON HUMAN POPULATIONS 4-12
4.6.1 TRANSPORTATION 4-12
4.6.2 CONSTRUCTION NOISE IMPACTS 4-13
4.6.3 CONSTRUCTION EMPLOYMENT 4-15
4.7 IMPACTS ON LANDMARKS AND SENSITIVE AREAS 4-16
4.8 IMPACT ON ARCHAEOLOGICAL AND HISTORIC SITES 4-17
4.9 SPECIAL FEATURES 4-17

TABLE OF CONTENTS - continued

4.10 BENEFITS OF CONSTRUCTION 4-17

4.11 VARIANCES 4-17

5.0 EFFECTS OF THE OPERATION OF THE HEAT DISSIPATION SYSTEM 5-1

5.1 EFFECTS OF THE OPERATION OF THE HEAT DISSIPATION SYSTEM 5-1

5.1.1 TEMPERATURE EFFECT ON RECEIVING BODY OF WATER 5-2

5.1.2 EFFECTS ON AQUATIC LIFE 5-2

5.1.3 BIOLOGICAL EFFECTS OF MODIFIED CIRCULATION 5-3

5.1.4 EFFECTS OF OFFSTREAM COOLING 5-4

5.1.5 MEASUREMENT PROGRAM 5-8

5.2 EFFECTS OF CHEMICAL AND BIOCIDE DISCHARGES 5-9

5.2.1 INDUSTRIAL WASTEWATER DISCHARGES 5-10

5.2.2 MEASUREMENT PROGRAMS 5-11

5.3 IMPACTS ON WATER SUPPLIES 5-11

5.3.1 SURFACE WATER 5-11

5.3.2 GROUNDWATER 5-12

5.3.3 DRINKING WATER 5-12

5.3.4 RUNOFF AND LEACHATE 5-12

5.4 IMPACTS FROM DISPOSAL OF BYPRODUCTS AND SOLID AND HAZARDOUS WASTES 5-13

5.4.1 SOLID WASTE 5-13

5.4.2 HAZARDOUS WASTE 5-13

5.5 SANITARY AND OTHER WASTE DISCHARGES 5-13

5.6 AIR QUALITY IMPACTS 5-14

5.6.1 IMPACT ASSESSMENT 5-14

5.6.2 MONITORING PROGRAMS 5-26

5.7 NOISE 5-27

5.7.1 IMPACTS TO ADJACENT PROPERTIES 5-27

5.8 CHANGES TO NON-AQUATIC SPECIES POPULATION 5-30

5.8.1 IMPACTS 5-30

5.8.2 MONITORING 5-31

6.0 TRANSMISSION LINES 6-1

6.1 PROJECT INTRODUCTION 6-1

TABLE OF CONTENTS - continued

6.1.1 CORRIDOR LOCATION AND LAYOUT 6-1

6.1.2 TRANSMISSION LINE AND ROAD DESIGN CHARACTERISTICS 6-3

6.1.3 COST PROJECTIONS 6-5

6.1.4 CORRIDOR SELECTION 6-5

6.1.5 SOCIOPOLITICAL ENVIRONMENT OF THE PROPOSED TRANSMISSION LINES 6-7

6.1.6 BIO-PHYSICAL ENVIRONMENT OF THE TRANSMISSION LINE ROWS 6-11

6.1.7 EFFECTS OF ROW PREPARATION AND TRANSMISSION LINE CONSTRUCTION 6-22

6.1.8 POST-CONSTRUCTION IMPACTS AND EFFECTS OF MAINTENANCE 6-27

6.1.9 OTHER POST-CONSTRUCTION EFFECTS 6-28

6.2 ASSOCIATED LINEAR FACILITIES 6-30

7.0 ECONOMIC AND SOCIAL EFFECTS OF PLANT CONSTRUCTION AND OPERATION 7-1

7.1 SOCIO-ECONOMIC BENEFITS 7-1

7.1.1 DIRECT SOCIO-ECONOMIC BENEFITS 7-1

7.1.2 INDIRECT ECONOMIC BENEFITS 7-3

7.1.3 OTHER ECONOMIC BENEFITS 7-4

7.1.4 RECREATIONAL AND ENVIRONMENTAL VALUES 7-4

7.1.5 ONSITE ENHANCEMENTS 7-4

7.1.6 OTHER ENVIRONMENTAL BENEFITS 7-5

7.1.7 SUMMARY OF BENEFITS 7-5

7.2 SOCIO-ECONOMIC COSTS 7-6

7.2.1 TEMPORARY EXTERNAL COSTS 7-6

7.2.2 LONG-TERM EXTERNAL COSTS 7-6

8.0 SITE AND DESIGN ALTERNATIVES 8-1

9.0 COORDINATION 9-1

REFERENCES REF-1

TABLE OF CONTENTS - continued

LIST OF TABLES

2.2-1 Areas Not Found within 5 Miles of the Martin Unit 8 Project Area

2.2-2a Permanent Population - Martin County

2.2-2b Peak Population - Martin County

2.2-3 Weighted Average Population Estimates and Projections - Martin County

2.2-4 Martin County Estimated Housing Units by Type and Area - January 1, 1987 - April 1995

2.2-5 1989 Current Inventory of Community Parks of Martin County

2.3-1 Mean Monthly Temperature, Precipitation, and Evaporation

2.3-2 Mean Discharges (flows in cfs) – St. Lucie Canal

2.3-3 Water Use - Martin Plant Vicinity by SFWMD - Water Use Permit Number

2.3-4 State Water Quality Criteria for Monitored Parameters at S308, Port Mayaca

2.3-5 Water Quality Data for Martin Plant Cooling Pond 1997-2001

2.3-6 Florida Natural Areas Inventory - Species Summary for Martin County

2.3-7 Monthly and Annual Average Temperatures Measured at Palm Beach International Airport

2.3-8 Monthly and Annual Average Precipitation and Relative Humidity Measured at Palm Beach International Airport

2.3-9 Seasonal and Annual Average Wind Direction and Wind Speed Measured at Palm Beach International Airport

2.3-10 Seasonal and Annual Average Atmospheric Stability Classes Determined at Palm Beach International Airport

2.3-11 Seasonal and Annual Average Morning and Afternoon Mixing Heights Determined at Palm Beach International Airport

2.3-12 National and State AAQS, Allowable PSD Increments, and Significant Impact Levels

2.3-13 Summary of Maximum Measured PM_{10}, O_3, NO_2, CO, and SO_2 Concentrations Representative of the Martin Plant Site, 1998 to 2001

2.3-14 Baseline Ambient Sound Pressure Level Data for FPL Martin Power Plant

3.3-1 Typical Natural Gas Composition

3.3-2 Typical Light Oil Composition

3.4-1 Summary of Maximum Potential Annual Emissions for the FPL Martin Unit 8 Combined Cycle Project

4.5-1 Summary of Maximum Pollutant Concentrations for the Project Operating in Simple Cycle Configuration

TABLE OF CONTENTS - continued

LIST OF TABLES - continued

4.5-2	Summary of Maximum Pollutant Concentrations Predicted for Simple Cycle Operation at the PSD Class I Area of the Everglades National Park Compared to the Proposed EPA Class I Significant Impact Levels
4.6-1	Summary of Construction Noise Sources Associated with Heavy Construction Activities
4.6-2	Predicted Construction Noise Impacts for the Repowering of Martin Power Plant
5.1-1	Spillway Releases Between January 1997 and December 2000
5.1-2	Performance and Emission Information for Martin Unit 8 Optional Cooling Tower
5.1-3	Particle Size Distribution of Drift of Martin Unit 8 Options Cooling Tower
5.1-4	Predicted Plume Characteristics and Drift Deposition from Optional Mechanical Draft Cooling Tower
5.2-1	Water Quality Screening Analysis Results
5.6-1	Maximum Emissions Due to the Proposed Project Compared to the PSD Significant Emission Rates
5.6-2	Summary of Maximum Pollutant Concentration Predicted for the Project, Compared to the EPA Class II Significant Impact Levels
5.6-3	Summary of Maximum Pollutant Concentration Predicted for the Project at the PSD Class I Area of the Everglades NP Compared to the Proposed EPA Class I Significant Impact Levels
5.6-4	Maximum Predicted SO_2 Impacts for Comparison to AAQS, PSD Class II Increment, and PSD Class I Increment
5.7-1	Summary of Noise Source Data Used in the Operational Impact Analysis for the Martin Power Plant
5.7-2	Summary of Noise Source Data Used in the Operational Impact Analysis for the Martin Power Plant with Cooling Towers
5.7-3	Observed and Predicted Sound Levels for the Martin Unit 8 Combined Cycle Project During Operations (without Cooling Tower)
5.7-4	Observed and Predicted Sound Levels for the Martin Unit 8 Combined Cycle Project During Operations (with Cooling Tower)
6.1-1	Plant Species Associated with the Dominant Vegetative Communities of the Proposed Corridor and Existing Transmission Line ROW
6.1-2	Wildlife Species Observed Along the Proposed Corridor and Existing Transmission Line ROW
6.1-3	Listed Flora and Fauna Occurring Along the Proposed Corridor and Existing Transmission Line ROW
6.1-4	Maximum Electric and Magnetic Fields Expected to be Produced by the Transmission Lines

TABLE OF CONTENTS - continued

LIST OF FIGURES

1.2-1	FPL Service Territory
1.3-1	FPL Martin Site Location
2.1-1	FPL Martin Plant Site Location
2.1-2	Government Jurisdictions Within a 5-Mile Radius of Martin Unit 8
2.1-3	FPL Martin CG/CC Project Area
2.1-4	Recent Aerial View of Martin Plant
2.2-1	Land Use and Zoning Within 1 Mile of Project
2.2-2	Martin County Planning Areas
2.2-3	Vegetation/Land Use Map of the Project Area
2.2-4	Martin County Parks and Facilities
2.3-1	Generalized Hydrostratigraphy of Martin County
2.3-2	Regional Geologic Cross Section
2.3-3	Summary of the Hydrogeologic Regime
2.3-4	Florida Natural Areas Inventory
2.3-5	Annual Wind Rose for Palm Beach International Airport, Florida (1987-1991)
2.3-6	Winter Wind Rose for Palm Beach International Airport, Florida (December - February 1987 - 1991)
2.3-7	Spring Wind Rose for Palm Beach International Airport, Florida (March - May 1987 - 1991)
2.3-8	Summer Wind Rose for Palm Beach International Airport, Florida (June - August 1987 - 1991)
2.3-9	Fall Wind Rose for Palm Beach International Airport, Florida (September - November 1987 - 1991)
2.3-10	Noise Monitoring Sites
2.3-11	Observed Sound Pressure Levels for the Martin Plant Site
3.1-1	Combined Cycle Flow Schematic
3.2-1	Project Area Boundary
3.2-2	Overall Site Arrangement
3.2-3	Profile of Combustion Turbine and Heat Recovery Steam Generator
3.2-4	General Site Drainage Information
3.5-1	Alternative 1 – Water Balance Without Cooling Tower
3.5-2	Alternative 2 – Water Balance With Cooling Tower

TABLE OF CONTENTS - continued

LIST OF FIGURES - continued

3.8-1	Existing Drainage for New Power Block Area Associated With Martin CG/CC Project
3.8-2	New Power Block
4.1-1	Site Construction Facilities
4.1-2	Construction Schedule
4.1-3	Construction Employment
4.4-1	Martin Unit 8 Project Area, Views from Southeast
4.4-2	Martin Unit 8 Project Area, Views Looking North
4.6-1	Maximum Predicted Sound Levels During Construction
5.7-1	Sound Level Isopleths, Without the Cooling Towers
5.7-2	Sound Level Isopleths, With the Cooling Towers
6.1-1	General Location Map
6.1-2	Project Corridor Location
6.1-3	Proposed Transmission Right-of-Way Indiantown-Martin #2 230 kV Line into Martin Plant Cross Section 1
6.1-4	Proposed Transmission Right-of-Way Indiantown-Martin #2 230 kV Line Cross Section 2
6.1-5	Proposed Transmission Right-of-Way Indiantown-Martin #2 230 kV Line Cross Section 3
6.1-5A	Proposed Transmission Right-of-Way Indiantown-Martin #2 230 kV Line Cross Section 3A
6.1-6	Proposed Transmission Right-of-Way Indiantown-Martin #2 230 kV Line Cross Section 4
6.1-7	Proposed Transmission Right-of-Way Indiantown-Martin #2 230 kV Line Cross Section 5
6.1-8	Proposed Transmission Right-of-Way Indiantown-Martin #2 230 kV Line Cross Section 6
6.1-9	Proposed Transmission Right-of-Way Bridge - Indiantown #2 230 kV Line Cross Section 1
6.1-10	Proposed Transmission Right-of-Way Bridge - Indiantown #2 230 kV Line Cross Section 2
6.1-11	Project Corridor Location and Existing Transmission Line Map (within 5 miles of Project)
6.1-12	Aerial Photographs (28 pages)
6.1-13	Typical Structure Indiantown-Martin #2 230 kV Line Cross Sections 1, 2, & 3

TABLE OF CONTENTS - continued

LIST OF FIGURES - continued

6.1-14	Typical Structure Indiantown-Martin #2 230 kV Line Cross Section 4
6.1-15	Typical Structure Indiantown-Martin #2 230 kV Line Cross Section 5
6.1-16	Typical Structure Indiantown-Martin #2 230 kV Line Cross Section 6
6.1-17	Typical Structure Bridge - Indiantown #2 230 kV Line Cross Section 1
6.1-18	Typical Structure Bridge - Indiantown #2 230 kV Line Cross Section 2
6.1-19	Alternative Corridor Location Map
6.1-20	Governmental Jurisdictions within ¼ and ½ Mile Area
6.1-21	Future Land Use Plan Categories
6.1-22	FLUCFCS for Transmission Line Corridor and Existing Right-of-Way (6 sheets)

TABLE OF CONTENTS - continued

LIST OF ACRONYMS AND ABBREVIATIONS

AADT	average annual daily trips
AAQS	Ambient Air Quality Standards
ANSI	American National Standard Institute
BACT	best available control technology
BOCC	Board of County Commissioners
Btu/lb	British thermal units per pound
°C	degrees Celsius
CAA	Clean Air Act
CC	combined cycle
CFR	Code of Federal Regulations
cfs	cubic feet per second
CG/CC	Coal Gasification/Combined Cycle
Cl	chloride
cm	centimeter
CO	carbon monoxide
CR	County Road
CT	combustion turbine
dB	decibels
DLN	dry-low NO_x
DHR	Florida Department of State, Division of Historical Resources
DSM	demand side management
EMT	emergency medical technician
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
°F	degrees Fahrenheit
F.A.C.	Florida Administrative Code
FCREPA	Florida Committee on Rare and Endangered Plants and Animals
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FEC	Florida East Coast

TABLE OF CONTENTS - continued

LIST OF ACRONYMS AND ABBREVIATIONS - continued

FEMA	Federal Emergency Management Agency
FFWCC	Florida Fish and Wildlife Conservation Commission
FGD	flue gas desulphurization
FGT	Florida Gas Transmission Company
FLUCFCS	Florida Land Use, Cover and Forms Classification System
FMSF	State of Florida Master Site File
FPL	Florida Power & Light Company
FPSC	Florida Public Service Commission
F.S.	Florida Statutes
ft	foot
ft^2	square foot
ft-bls	feet below land surface
ft-msl	feet above mean sea level
FWCC	Florida Fish and Wildlife Conservation
gpd	gallons per day
gpm	gallons per minute
gr/100 scf	grains per 100 standard cubic feet
HHV	high heating value
HRSG	heat recovery steam generators
Hz	hertz
I	Interstate Highway
In/yr	inches per year
IRP	integrated resource planning
kg	kilogram
kg/km^2-mo	kilograms per square kilometer per month
km	kilometer
kWh	kilowatt hour
lb/hr	pounds per hour
LHV	lower heating value
LOLP	loss-of-load probability
LOS	Level of Service
m	meter

TABLE OF CONTENTS - continued

LIST OF ACRONYMS AND ABBREVIATIONS - continued

Martin Expansion Project	Martin Unit 8 Combined Cycle Project or the Project
MB	mixed bed
MCR	maximum current rating
mg/L	milligrams per liter
mi^2	square mile
MMBtu	million British thermal units
mph	miles per hour
MW	megawatt
Na	sodium
NEPA	National Environmental Policy Act
NERC	National Electric Reliability Council
NESC	National Electrical Safety Code
NO_2	nitrogen dioxide
NO_x	nitrogen oxide
NP	National Park
NSPS	New Source Performance Standards
NWS	National Weather Service
O_2	oxygen
O_3	ozone
Pb	lead
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter of 10 micrometers or less
ppm	parts per million
ppmvd	parts per million-dry conditions
PPSA	Power Plant Siting Act
PSD	prevention of significant deterioration
PUD	planned unit development
RO	reverse osmosis
ROW	Right-of-Way
SCA	Site Certification Application
SCR	selective catalytic reduction

TABLE OF CONTENTS - continued

LIST OF ACRONYMS AND ABBREVIATIONS - continued

SFWMD	South Florida Water Management District
SI	saturation index
SIP	site implementation plan
SO_2	sulfur dioxide
SPCC	Spill Prevention Control and Countermeasure
SPL	sound pressure level
SR	State Road
TIITF	Trustees of the Internal Improvement Trust Fund
TPY	tons per year
$\mu g/m^3$	micrograms per cubic meter
µm	micrometer
µS	microSiemens
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
WSE	Water Supply and Environmental
yr^3	cubic feet per year

1.0 NEED FOR POWER AND THE PROPOSED FACILITIES

This chapter of the Site Certification Application (SCA) introduces Florida Power & Light Company (FPL) and explains the need for a new generating unit at FPL's Martin Power Plant site.

1.1 INTRODUCTION

FPL proposes to construct a new combined cycle generating unit, providing an additional 800 megawatts (MW), at its existing power plant site near Indiantown in Martin County, Florida. The new unit will utilize two recently constructed combustion turbines (CTs) already in operation at the Martin Plant site, along with two new CTs, four new heat recovery steam generators (HRSGs) and a new steam turbine/electric generator. The resulting combined cycle unit (Martin Unit 8) will be capable of generating approximately 1,100 MW.

The Martin Expansion Project (also referred to as the Martin Unit 8 Combined Cycle Project or the Project) is part of FPL's plan to meet its customers' increased need for electricity in 2005 and 2006. FPL's plan would add a total of 1,900 MW of new, cleaner-burning natural gas-fueled combined cycle generation at two existing power plant sites (the Martin Plant site and FPL's Manatee Plant site). These two projects would increase FPL's system-wide capability to provide electricity by 10 percent.

The plan would allow FPL to serve more than 400,000 new customers by 2005 and maintain a 20-percent reserve margin. The decision to meet customer need with the Martin and Manatee Projects is the result of a comprehensive evaluation of power purchase alternatives and FPL-formulated alternatives. The evaluation showed that these two projects are the most cost-effective option for FPL's customers, representing the best balance of economic and environmental considerations.

FPL is seeking approval of the Martin Expansion Project under the Florida Electrical Power Plant Siting Act (PPSA), Chapter 403, Part II, Florida Statutes (F.S.). The PPSA provides a centralized review process for new electrical generating facilities in Florida, involving a balancing of "the increasing demand for electrical power plants with the broad interests of the public". The Florida Public Service Commission (FPSC) is the sole forum for the determination of need for a proposed facility. The Florida Department of Environmental Protection (FDEP) acts as the coordinator for the

remainder of the site certification process, with input from various state, regional and local agencies, along with interested citizens. Ultimate disposition of the SCA is by the Governor and Cabinet sitting as the Siting Board.

FPL plans to submit a Petition to Determine Need for the Martin Expansion Project (and for the Manatee Expansion Project) to the FPSC in March 2002. That Petition, along with supporting documentation, will address the manner in which FPL's Martin and Manatee projects will meet the need for electric system reliability, integrity and adequacy at reasonable cost and be the most cost-effective alternatives available. Section 1.5 contains a summary of FPL's capacity needs, its Request for Proposal process and analyses of the proposals, and the timing of unit additions.

This SCA is being filed with FDEP pursuant to Chapter 62-17, Florida Administrative Code (F.A.C.). The SCA describes the Martin Expansion Project and addresses its environmental and socioeconomic aspects by presenting information on the existing natural and human environment, on the new facilities to be constructed and generated, and on the impacts of those facilities on those environments.

1.2 THE APPLICANT

FPL, the principal subsidiary of FPL Group, is the largest electric utility in Florida. FPL serves more than 7 million people (approximately 3.9 million customer accounts) along the eastern seaboard and the southern portion of Florida. FPL serves customers in all or parts of 35 Florida counties (see Figure 1.2-1). FPL owns and operates 34 major generating units and more than 68,000 miles of transmission and distribution lines to serve its customers.

FPL uses a combination of gas-, oil-, coal-, and nuclear-fueled plants to generate electricity. This diverse mix provides FPL with reliability, operating flexibility, and the ability to minimize fuel costs.

FPL has seen significant growth in the number of customers and the demand for electricity over the past ten years. In the coming decade, FPL expects continued growth in the demand for electricity to meet its customers' needs.

1.3 OVERVIEW OF THE PROJECT

FPL has determined that in order to continue to provide reliable and cost-effective service to its customers, and to meet future load growth, it must add generating resources in the near future. FPL's plan to best meet the need projected in the years 2005 and 2006 includes construction of a new combined cycle generating unit at the Martin Plant site.

The Martin Plant has reliably supplied electric power to FPL's residential, commercial and industrial customers since 1980, when Unit 1 began operation. The Martin Plant site occupies 11,300 acres near Indiantown, Florida (see Figure 1.3-1). The generating capacity of the Martin Plant has increased over the years through addition of new units to meet increasing demand for electricity. Generating units at the Martin Plant site presently include: Units 1 and 2 (each nominal 800-MW residual oil/natural gas-fired steam units); Units 3 and 4 (each nominal 500-MW natural gas-fired combined cycle units) and Units 8A and 8B (each nominal 170-MW natural gas-fired, simple cycle combustion turbines). The Martin Plant site currently has a total summer net generating capability of approximately 2,800 MW. The site includes a 6,800-acre cooling pond that serves Units 1, 2, 3, and 4.

The Martin Plant site has long been identified for additional generating capacity. When site certification for Units 3 and 4 was issued in 1991, the Siting Board also recognized the Martin Plant site's suitability for further capacity expansions through its "ultimate site capacity" approval. The Martin Plant site has continued to be identified as a preferred location for additional generating capacity in each of FPL's Ten Year Power Plant Site Plans for the past decade.

The Project will combine two recently constructed CTs now operating at the Martin Plant site with two new CTs, four new HRSGs, and a new steam turbine/electric generator to create a "four-on-one" combined cycle unit. The CTs are similar to, but larger and more efficient than, traditional jet engines. They produce electrical energy by direct connection to an electric generator. Natural gas will be the primary fuel for the CTs, with light oil as an alternative fuel. The exhaust heat from the CTs, which would otherwise be wasted energy released to the atmosphere, will be routed through the HRSGs to produce steam for the new turbine generator. The HRSGs will have duct burners to optimize the Unit's generating capacity. Cooling water for Martin Unit 8 will come from the existing

cooling pond at the Martin Plant site. A cooling tower may be used for the new unit to enhance reliability.

Martin Unit 8, with generating capacity of approximately 1,100 MW, will be among the most efficient electric generators in Florida. It will result in a net increase of approximately 800 MW in the Martin Plant site's capacity.

The portion of the Martin Plant site that will be occupied by Project facilities comprises approximately 44 acres within the defined Project area of approximately 100 acres. The entire Project area is within the existing certified portion of the site. Existing Units 1, 2, 3, and 4 will remain in operation and will not be affected by the Project.

Natural gas is currently supplied to the Martin Plant site by two laterals from Florida Gas Transmission's pipeline. FPL may contract with another supplier who would independently undertake necessary permitting and construction for additional gas supply to the Martin Plant site.

The electricity generated by Martin Unit 8 will interconnect with FPL's existing transmission network at the existing system substation at the Martin site. In conjunction with the Martin Project, FPL plans to make certain upgrades to its existing transmission system to ensure system reliability. For this purpose, new transmission lines will be added between the Martin substation and the Indiantown substation, and between the Indiantown substation and the Bridge substation. These new lines will carry electricity generated at the Martin Plant, as well as electricity generated elsewhere as is characteristic of the electric grid. System upgrades such as this, which occur beyond the initial connection to the transmission network at the onsite system substation, are "integration" facilities as distinct from "interconnection" facilities.

Protecting the environment while providing safe, reliable and adequate power to its customers is of great importance to FPL. FPL's Martin Plant will continue to comply with all applicable regulatory standards through construction and operation of Martin Unit 8. The Project will have much lower overall impacts than were previously reviewed and found acceptable in the 1991 "ultimate site capacity" certification for the Martin Plant site.

1.4 FPL'S RESOURCE PLANNING PROCESS

FPL uses an integrated resource planning (IRP) process in order to determine when new resources are needed, the magnitude of the resources needed, and the type of resources that should be added. The timing and type of potential new power plants are determined as part of this process. A description of FPL's IRP process is contained in FPL's Ten Year Power Plant Site Plan 2001-2010.

There are four basic steps which are fundamental to FPL's resource planning:

Step 1: Determine the magnitude and timing of FPL's resource needs.

Step 2: Identify which resource options and resource plans can meet the determined magnitude and timing of these resource needs (i.e., identify competing options and resource plans).

Step 3: Determine the economics for the total utility system with each of the competing options and resource plans.

Step 4: Select a resource plan and commit, as needed, to near-term options.

1.5 NEED FOR THE PROJECT

1.5.1 FPL'S CAPACITY NEEDS

FPL's IRP work in 2001 confirmed what its work in previous years had shown: that FPL will have a need for additional resources in 2005 and 2006. This part of the IRP process is generally called a "reliability assessment", and it is designed to determine both the magnitude and timing of FPL's resource needs. In other words, it is a determination of how many megawatts of load reduction, new capacity, or a combination of both load reduction (including consumption) and new capacity options are needed and when these megawatts are needed to meet FPL's planning criteria.

In the reliability assessment portion of its 2001 IRP work, FPL started with an updated load forecast and the updating of several databases. Examples of the database information that was updated include: delivered fuel price projections, current financial and economic assumptions, and power plant capability and reliability assumptions. In addition, three assumptions were made by FPL during its 2001 IRP work that had a direct impact on the reliability assessment. These three assumptions concerned near-term construction capacity additions, near-term firm capacity purchase additions, and long-term demand side management (DSM) implementation.

The first of these assumptions included FPL's announced plans to add near-term capacity through various construction projects. These construction projects include the repowering of several existing units and the addition of several new combustion turbines at existing FPL Plant sites. FPL committed in 1998 to repower both existing steam units at its Fort Myers Plant site and two of the three existing steam units at its Sanford Plant site. These two repowering efforts will add significant capacity to FPL's system and will greatly increase the efficiency of the capacity at those two sites. The repowered Fort Myers capacity is scheduled to come in-service by the summer of 2002. Six new CTs, which are components of the repowering effort, began coming in-service at Fort Myers in late 2000 and through their initial operation in a stand-alone mode have already increased FPL's system capacity. A somewhat different schedule is planned for the two Sanford units that will be repowered. Both of these units will be repowered without the combustion turbine components coming in-service during the process. Sanford Unit No. 5 came out-of-service in the fall of 2001 and will return fully repowered by the summer of 2002. Sanford Unit No. 4 will come out-of-service in the spring of 2002 and return fully repowered at the end of 2002. As a result of this commitment, FPL assumed that these capacity additions resulting from the Fort Myers and Sanford repowerings were a "given" in its 2001 IRP work.

Another part of FPL's construction capacity addition assumption was its previously announced (in earlier site plans) decision to add four new CTs in the 2001 through 2003 time frame. The first two CTs came in-service at FPL's existing Martin Plant site in mid-2001. The second pair of CT's is scheduled to be in-service in 2003 and will be placed at FPL's existing Fort Myers Plant site. FPL's 2001 resource planning work included these new CT capacity additions.

The second of these three assumptions involved a decision, which was made during FPL's 2000 resource planning work, to secure an amount of capacity for the next few years through firm capacity, short-term purchases. These firm capacity purchases are from a combination of utility and non-utility generators. These capacity purchases were not finalized at the time FPL filed its 2001 Site Plan, but were finalized later in 2001. The capacity and duration of these purchase totals are both greater than projected in the 2001 Site Plan. These purchases were also assumed as a "given" in FPL's 2001 IRP work.

The third of these assumptions involved DSM. Since 1994, FPL's resource planning work has used the DSM MW called for in FPL's approved DSM Goals as a "given" in its analyses. This was again the case in FPL's 2001 planning work as its recently approved new DSM goals through the year 2009 were taken as a "given".

These assumptions and much of the updated database information were then used to determine the magnitude and the timing of FPL's resource needs. This determination is accomplished by system reliability analyses, which are typically based on a dual planning criteria of a minimum peak period reserve margin of 15 percent (FPL applies this to both summer and winter peaks) and a maximum loss-of-load probability (LOLP) of 0.1 days/year criteria. Both of these criteria are commonly used throughout the utility industry. FPL also used a "third" reliability criterion in its 2001 planning work: a minimum 20-percent summer and winter reserve margin, which was applied in the analysis to the mid-2004–on time period due to a joint settlement reached among FPL, Florida Power Corporation, Tampa Electric Company, and the FPSC in Docket No. 981890-EU.

These three reliability criteria (15-percent reserve margin, 20-percent reserve margin, and 0.1 day per year) are utilized in two types of reliability assessment approaches: deterministic and probabilistic. Reserve margin analysis is a deterministic approach while LOLP analysis is a probabilistic approach. The reserve margin approach is essentially a calculation of excess firm capacity at the annual system peaks. This relatively simple calculation can be performed on a spreadsheet. It provides an indication of how well a generating system can meet its native load during peak periods.

However, a deterministic approach such as a reserve margin calculation does not take into account probabilistic-related elements such as: the reliability of individual generating units; the total number of generating units, or the sizes of these generating units. Nor does a deterministic approach fully take into account the value of being part of an interconnected system. Therefore, FPL also utilizes a probabilistic approach (LOLP) to provide additional information on the reliability of its generating system. Simply stated, LOLP is an index of how well a generating system may be able to meet its demand (i.e., a measure of how often load may exceed available resources). In contrast to reserve margin, the calculation of LOLP looks at the daily peak demands for each year, while taking into consideration such probabilistic events as the unavailability of individual generators due to scheduled maintenance or forced outages. LOLP is expressed in units of "number of times per year" that the

system demand could not be served. The standard for LOLP accepted throughout the industry is a maximum of 0.1 day per year. This analysis requires a more complicated calculation methodology than does reserve margin analysis.

In a reliability assessment, either a reserve margin criterion or the LOLP criterion will be violated first. This means that, for a given future year, FPL's system will not have a 15 percent or a 20 percent (whatever the criterion is for the year in question) reserve margin or it will have a projected LOLP value greater than 0.1. Whichever criterion is violated first is said to "drive" FPL's future resource needs. For the last few years, summer reserve margin has driven FPL's future needs. This again was the case in FPL's most current reliability assessment work performed as part of its 2001 IRP work.

FPL's work showed that with no additional resources beyond its existing generating units and purchases, plus the repowerings, new CTs, new purchases, and DSM implementation mentioned above, FPL would begin to fall below its summer reserve margin criterion of 20 percent starting with the summer of 2005. A minimum of 1,122 MW of additional resources would be needed by mid-2005 and an additional 600 MW by mid-2006 in order for FPL to continue to meet its summer reserve margin criterion for those years. Without these combined additions of 1,722 MW, FPL's summer reserve margin would fall significantly below the 20-percent criterion in both years. FPL's summer reserve margins would fall to 14.1 percent in 2005 and to 11.1 percent in 2006 with no additional capacity additions.

Consequently, FPL determined that it needed to add new resources for 2005 and 2006. In order to meet those needs by building new generating units, FPL would need to begin that process in 2001.

1.5.2 FPL'S REQUEST FOR PROPOSALS AND RESULTS OF RFP ANALYSES

FPL's resource planning work conducted in previous years showed that the most economic type of new generation to add to its system would be new combined cycle units. This type of generating unit falls under the FPSC's "Bidding Rule" (Rule 25-22.082, F.A.C.). This rule requires electric utilities seeking to build such a unit to first solicit bids from interested parties in order to determine whether the utility's construction of this unit is the most economical alternative available. Consequently, FPL issued a Request for Proposals (RFP) in mid-August of 2001. This RFP solicited proposals for 1,150

MW beginning on or before mid-2005, and for an additional 600 MW on or before mid-2006, for a total of 1,750 MW for the 2005 and 2006 time frame. The RFP was announced in an advertisement in the Wall Street Journal and in a press release that was carried in numerous Florida newspapers and trade publications.

On the proposal due date of September 28, 2001, FPL received proposals from 15 organizations (Bidders) consisting of 3 electric utilities and 12 non-utilities. A number of these Bidders submitted more than one proposal. Furthermore, in the course of e-mail and telephone conversations with these Bidders designed to clarify the information contained in their proposals, the number of proposals to be evaluated increased. (This occurred as some Bidders decided they wanted their proposals evaluated for both 2005 and 2006, while other Bidders wanted a variation(s) of their proposal evaluated as well.) Ultimately, 81 proposals were evaluated by FPL in response to the RFP. The vast majority of these were power purchase offerings from yet-to-be built new generating units. Most of these new generating units were natural gas-fired CC units. The amount of capacity offered in these proposals was approximately 14,500 MW.

After a lengthy period of clarifying information in the proposals, FPL evaluated these "outside proposals" as well as 13 self-build FPL construction options. Most of FPL's construction options were also natural gas-fired CC units. FPL's analysis first determined the best combination of only outside proposals that could meet FPL's resource needs. Next, FPL determined the best combination of only FPL construction options. Then FPL determined the best "combined" combination of outside proposals and FPL construction options. Finally, these "best combinations" were all compared to one another to determine the most economical combination of options for meeting FPL's needs.

FPL's RFP analysis determined that a combination of two FPL self-build construction options was the most economic way to meet its 2005 and 2006 capacity needs. These two construction options are:

1. A conversion of the two existing CTs at FPL's Martin Plant site into a four CT-based CC unit. Two additional CTs, plus heat recovery steam generators, electric generators, and steam turbine would be added to the existing CTs as part of this conversion.

2. A new, four CT-based CC unit at FPL's Manatee Plant site. Its design would be essentially identical to the new CC unit to be added at Martin as a result of the CT-to-CC conversion previously described.

FPL plans to petition the FPSC in March of this year for approval of a Determination of Need filing for both of these construction projects.

1.5.3 THE TIMING OF THE UNIT ADDITIONS

The two FPL construction options selected as the most economical options in the RFP analysis work allow FPL to meet its 2005 and 2006 resource needs. Together the Martin Expansion Project and the Manatee Expansion Project will result in new combined cycle units that are able to provide 1,107 MW of summer capability. Since the Martin Project utilizes two existing CT units that would otherwise be capable of providing a combined total of 318 MW of summer capacity in 2005 without the conversion, it will add 789 incremental MW (1,107 MW from the completed unit minus 318 MW of existing CT capacity = 789 MW). The resulting total capacity addition of these two FPL construction options is almost 1,900 MW and that amount meets the combined total MW need for 2005 and 2006 of 1,722 MW.

In order to meet its FPSC-approved 20-percent summer reserve margin in 2005, both the Martin and Manatee Projects need to be in service by then. Consequently, FPL plans to complete construction and have both projects in-service by mid-2005.

1.6 BENEFITS OF THE PROJECT

The most significant benefit of the Martin Expansion Project is the continued supply of reliable, cost-effective electrical service to FPL's customers. Project benefits also include increased tax revenues to local government and increased employment during construction of the Project, as well as additional opportunities for incorporating community involvement into Plant development activities.

The Martin Project is another step in FPL's continuing efforts to attain and maintain a diversified fuel mix. Over the past two decades, FPL has significantly reduced its reliance on oil-fired generation by diversifying its range of fuels.

1.7 SUMMARY OF PUBLIC OUTREACH PROGRAM

Employees of the Martin Plant have a long standing involvement with the local community, including ongoing communication regarding Plant activities and plans. The potential for addition of more capacity at the site has been a part of these discussions. FPL will continue this dialogue with citizens in the area. One goal will be to build shared understanding about this new Project between FPL and citizens, as well as to explore other shared individual and community interests. This process includes various outreach activities focused on a wide variety of individuals and groups that have, or may have, an interest in the project. These activities involve FPL employees, Indiantown residents, customers, and individuals or groups.

In addition to generating well-informed decisions concerning the Project, FPL also hopes to achieve a high degree of alignment between project features and citizen interests and priorities in the community. FPL hopes to maximize the potential for the people of Martin County to participate in the Project and plans to maintain outreach efforts throughout the project and into the future.

Primary activities for accomplishing the outreach goals include continuing dialogue with citizens through one-on-one discussions, group meetings, plant tours, and other opportunities as may be of interest to residents. All activities will be focused on listening to people's needs, issues, and concerns and responding to their comments and questions in a timely manner.

FPL will also be talking with residents to determine what people know about the project, what they are interested in learning about it, and how to best communicate with them. Findings from these conversations, plus continuing feedback from the community, will be used as a basis for all future communication initiatives.

FPL plans to regularly inform the community on the Project using the kinds of forums people request, including information on the FPL website and in various print materials.

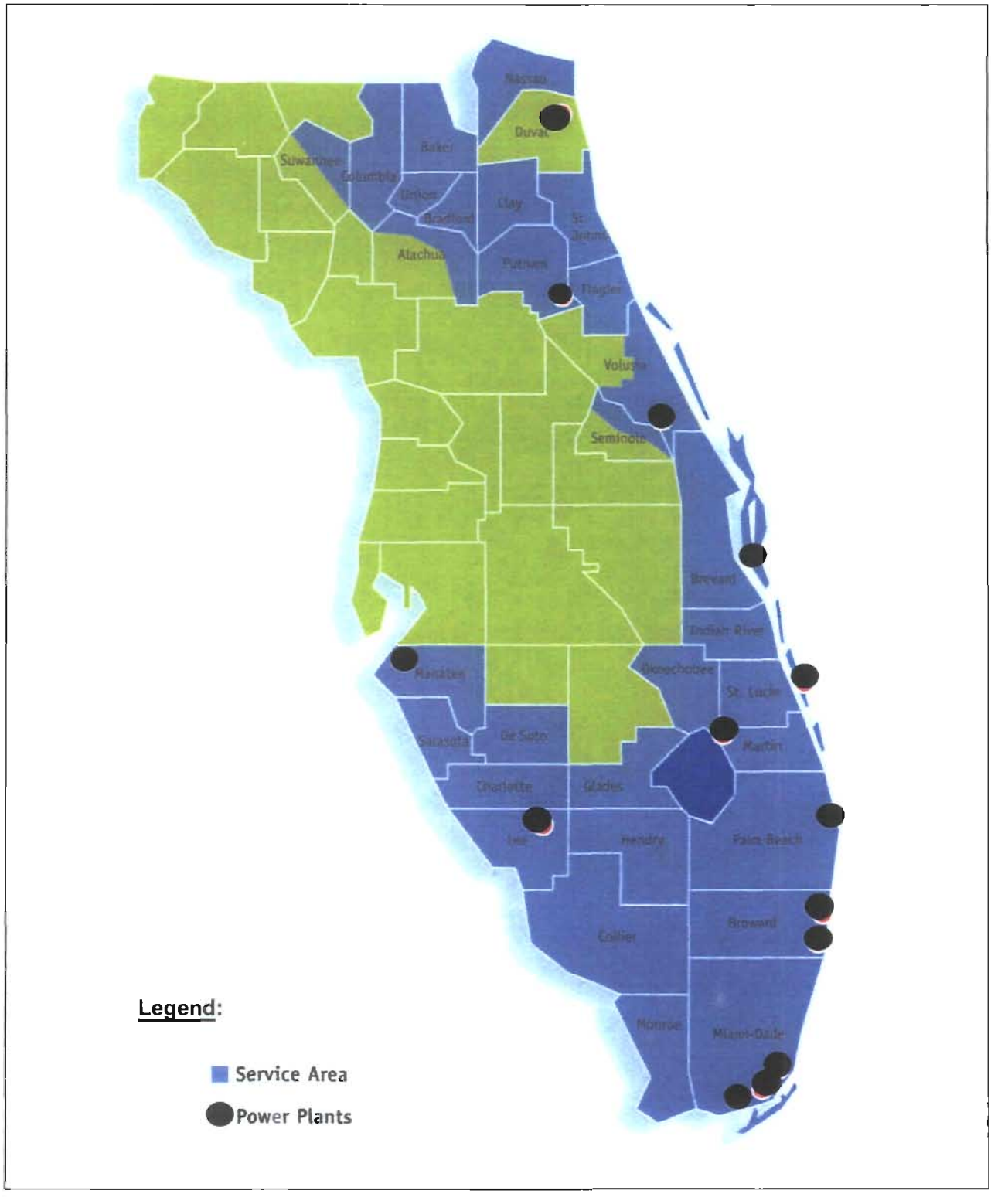


Figure 1.2-1. FPL Service Territory

Source: FPL, 2001; Golder, 2002.

FPL

Martin Unit 8

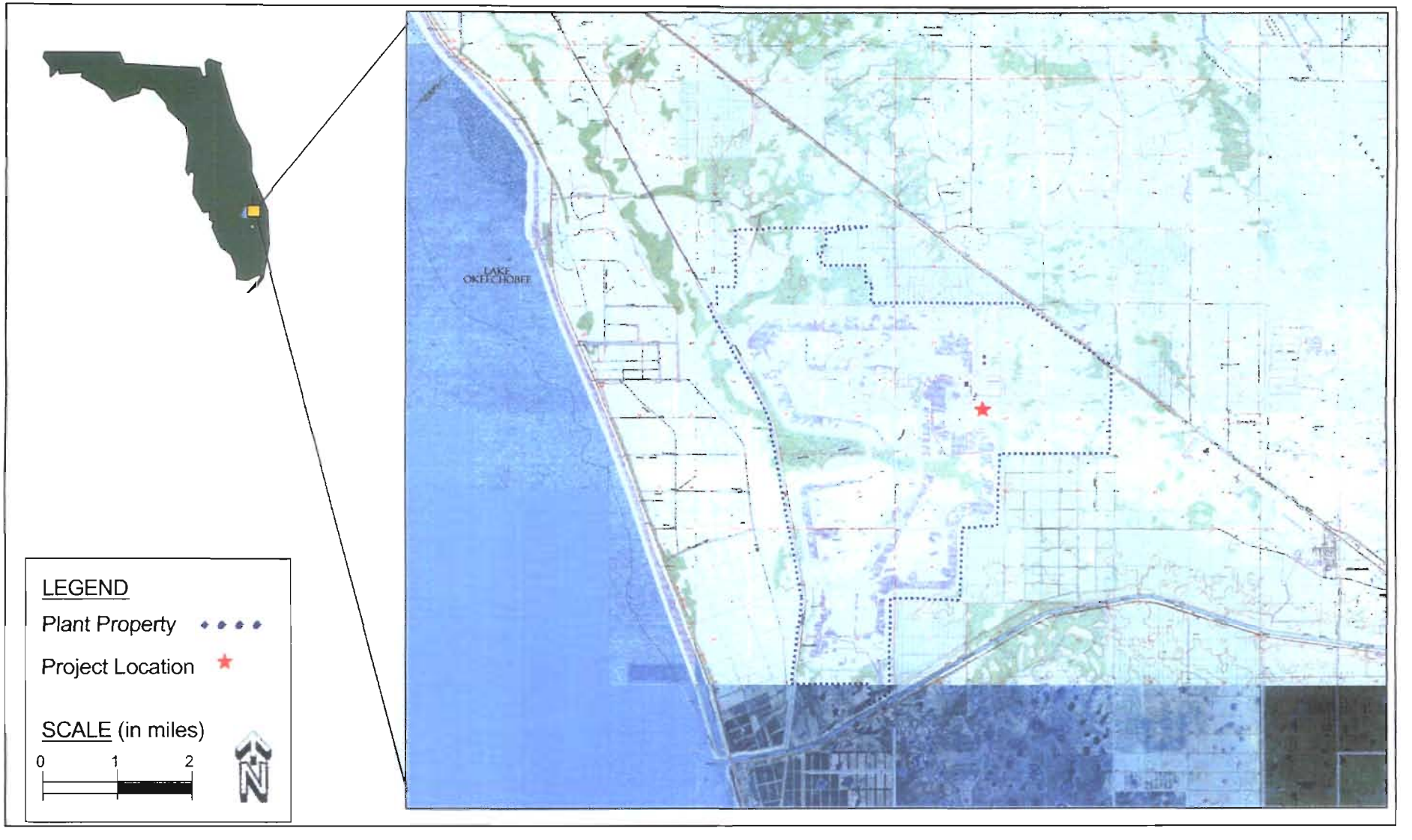


Figure 1.3-1. FPL Martin Plant Site Location

Source: Bechtel Power Corporation, 1989; Golder, 2002.

FPL

Martin Unit 8

2.0 SITE VICINITY CHARACTERIZATION

2.1 SITE AND ASSOCIATED FACILITIES DELINEATION

2.1.1 SITE LOCATION

The Martin Expansion Project will be located on the existing FPL Martin Plant site in unincorporated Martin County, Florida. The Martin Plant site is located in southwestern Martin County about 40 miles northwest of West Palm Beach and 5 miles east of Lake Okeechobee (Figure 2.1-1). The Martin Plant site is bounded by State Road (SR) 710 and a CSX Railroad line (east and north), a Florida East Coast Railway line and South Florida Water Management District L-65 Canal (west), and the St. Lucie Waterway (south).

The Project is located within the Martin Plant site, south of the existing Units 3 and 4 (Township 39 South, Range 38 East). The Project will be located on a 110-acre parcel (Project Area) within the larger Martin Plant site and within the area certified for the Martin CG/CC Project. Figure 2.1-2 presents the Project location with 1-, 2-, 3-, 4-, and 5-mile radii from the Project area.

The Project will be connecting to the existing transmission network at the Martin Substation. The new transmission lines will need to be constructed (see Figures 6.1-1 and 6.1-2) to integrate the new generation into the transmission network.

2.1.2 EXISTING SITE USES

Total site acreage for the existing Martin Plant site is approximately 11,300 acres, which represents land owned by FPL. The site consists of a 6,800 acre cooling pond (6,500 acres of water surface and 300 acres of embankment) and approximately 400 acres for existing Units 1 through 4, simple cycle Units 8A and 8B, and associated facilities. Units 1 and 2 are nominal 800-MW steam electric generating units that use natural gas and low-sulfur residual oil. Unit 1 was in commercial operation in 1980 and Unit 2 was in commercial operation in 1981. Unit 3 and 4 are nominal 500 MW combined cycle units use natural gas. Units 3 and 4 were the initial phase of the CG/CC Project. These units obtained site certification in 1991. Figure 2.1-3 shows the boundary for the Martin CG/CC Project. Units 8A and 8B are simple cycle CTs with a nominal capacity of 170 MW. These units began operation in 2000 and use natural gas and very low-sulfur light oil. The other onsite facilities include water and wastewater treatment facilities, residual and light fuel oil storage, switchyards and transmission lines, offices, warehouses, maintenance buildings and other

miscellaneous uses. Figure 2.1-4 presents a recent color aerial photograph of the Martin Plant, and shows the Martin Expansion Project area.

The remainder of the site is undeveloped land or land used for agriculture. This includes the Barley Barber Swamp and a 1,200-acre parcel known as the Northwest Parcel. The latter has been used as a wetland mitigation site associated with licensing of the Martin CG/CC Project.

2.1.3 ADJACENT PROPERTIES

Agricultural uses such as croplands, pastures, and groves account for much of the land use and cover within 5 miles of the Martin Plant site. Three types of wetlands, forested freshwater, non-forested freshwater, and mixed forested and forested freshwater, also account for a great deal of nearby land use. Coniferous species and other mixed species represent the forested cover that is found nearby.

2.2 SOCIO-POLITICAL ENVIRONMENT

2.2.1 GOVERNMENTAL JURISDICTIONS

Martin County is the local government in whose jurisdiction the proposed Project will be located. The majority of Martin County's urban development lies along the eastern boundary of the county (Atlantic coast), which is approximately 22 miles from the Martin Plant site. The community nearest the site is the unincorporated community of Indiantown, which is approximately 7 miles southeast of the entrance to the Martin Plant site, on SR 710.

With the exception of Lake Okeechobee and the Barley Barber Swamp, none of the areas listed in Table 2.2-1 are within 5 miles of the Project area.

2.2.2 ZONING AND LAND USE PLANS

Martin County has adopted the Comprehensive Growth Management Plan in order to meet the requirements of the Local Government Comprehensive Planning and Land Development Regulation Act, Chapter 163, Part II, Florida Statutes and of Chapter 9J-5, F.A.C. Figure 2.2-1 depicts the Project area in relation to the county's land use plan categories.

The Martin Plant site that includes Units 1 and 2 was developed prior to the county's adoption of a future land use map. In 1982, at the time of the original land use plan map adoption, the portion of the site surrounding the existing units was designated Industrial. The Electric Utility Element of the

Comprehensive Plan acknowledged FPL's plans to construct two coal-fired plants at the site and encouraged the facilities to be developed under the industrial planned unit development [PUD(i)] zoning designation. In September 1988, FPL requested a comprehensive plan land use amendment to industrial for the licensing of Martin CG/CC Project area and a rezoning of that area to PUD(i). In August 1989, the Martin County Board of County Commissioners (BOCC) approved the comprehensive plan amendment and the rezoning request.

Following the BOCC approval of the rezoning, a PUD Zoning Agreement was executed between Martin County and FPL in which development standards and special conditions were addressed. A copy of the Agreement is presented in Appendix 10.2. Appendix 10.2 also includes a compilation of information pertaining to procedures previously followed to accomplish compliance with the Martin County Comprehensive Plan and the Martin County Code. Most of the special conditions were addressed during earlier phases of developing the Martin Plant site. The area designated as PUD(i) allowed equipment such as CTs, HRSG and steam electric turbines; Martin Expansion Project will be located within the area designated Industrial and zoned PUD (i).

Subsequent to the certification of the CG/CC Project, which includes the area of the Martin Expansion Project, Martin County has amended its future land use element and map to designate 7,300 acres in the Martin Plant site as Public Utilities – Major Public Power Generation Facilities.

2.2.3 DEMOGRAPHY AND ONGOING LAND USE

There are no incorporated towns or cities within a 5-mile radius of the Martin Plant site, as it is almost completely surrounded by agricultural and undeveloped areas. A small, undeveloped portion of the community of Indiantown can be found just within the 5-mile radius and the sparsely populated subdivision of Sunset Groves lies to the north of the site.

The Martin County Growth Management Department has divided the county into several planning areas (see Figure 2.2-2). The Indiantown Planning Area was estimated to have approximately 5,554 residents in the year 2000, while the West County Planning Area had a population of about 2,372. In 2000, the entire county was estimated to have a population of 126,731, a 25.6 percent increase since 1990.

The permanent population for Martin County for the year 1996 through the year 1999, including the totals for all Comprehensive Planning Areas is presented in Table 2.2-2a, along with the peak population estimates in Table 2.2-2b. The projected population forecasts for 2001 through 2010 are also presented in these tables. The weighted average population estimates and projections for Martin County are given in Table 2.2-3. Figure 2.2-3 presents the generalized Level II Florida Land Use, Cover and Forms Classification System (FLUCFCS) within 5 miles of the Project area.

2.2.4 EASEMENTS, TITLE, AGENCY WORKS

No easements, title, or agency works approvals are anticipated for the onsite facilities.

2.2.5 REGIONAL SCENIC, CULTURAL AND NATURAL LANDMARKS

Lake Okeechobee, the second largest freshwater lake within the United States, is located approximately 5 miles west of the Project area (see Figure 2.1-1). The lake forms part of a complex drainage system, which recharges the surficial aquifer for most of South Florida.

The Barley Barber Swamp, which is located about 2 miles from the Project area, is a private landholding of FPL for which the primary purpose is environmental protection. This 400-acre freshwater swamp, plus the surrounding land, was purchased by FPL in 1972. When the cooling pond for the existing Martin Plant was constructed, the Barley Barber Swamp was set aside as a nature preserve. It is managed as a unique wetland and upland community as it may have existed over 100 years ago.

Other designated park sites in Martin County include the Indian Riverside Park/Sustainable Resource Center, JV Reed Park, Palm City Recreation Center, Phipps Park, Rocky Point Hammock Park, and Tropical Farms Park.

2.2.6 ARCHAEOLOGICAL AND HISTORIC SITES

A detailed cultural resource assessment was conducted in 1989 as part of the studies performed for the Martin CG/CC Project. Approximately 1,300 acres of the Martin Plant site were proposed for use for that Project which encompasses the area for the Martin Expansion Project. As a result, an evaluation of sites with archaeological or historical importance was performed for the Martin CG/CC Project.

The evaluation consisted of a review of the State of Florida Master Site File (FMSF), and the examination of the historical and archaeological literature, as well as of the historic records. The FMSF search revealed that no archaeological sites have been recorded on the FPL Martin Plant site.

Areas of potential high archaeological importance were identified using U.S. Geological Survey (USGS) Quadrangle Maps and aerial photographs prior to the 1989 field survey. The archaeological field survey included all of these areas plus areas identified in the field as having potential significance. The survey strategy required an intensive, systematic cultural resource survey of these areas, and limited systematic and judgmental survey of the remaining areas.

Based on the known relationship between archaeological sites and environmental variables, it was expected that the majority of sites would be located adjacent to or near freshwater sloughs, which originally flowed into Lake Okeechobee. Furthermore, it was determined that the most likely type of prehistoric site to be discovered in these areas would be late period midden or mound. Smaller extractive type campsites, represented by small scatters of lithic, ceramic, or shell artifacts, would also be a possibility on elevated knolls or ridges in the flatwoods if a source of potable water was located nearby.

Shovel tests were placed systematically in areas of high site potential as described above. The tests were placed at 50-meter (m) intervals along transects spaced at distances appropriate to the specific locale. In no case did the transect spacing exceed 100 m. In addition to the systematic tests, judgmentally placed shovel tests were also excavated when appropriate to adequately test an area.

All shovel tests measured approximately 40 to 50 centimeter (cm) in diameter and were excavated to a depth of one meter unless prevented by groundwater seepage or other soil conditions. All soil was screened through ¼-inch-mesh hardware cloth. Samples from several test pits were also passed through a 1/16-inch-mesh screen to test for the presence of very small faunal remains that might go through a larger mesh size. No such remains were discovered.

The location of each shovel test was plotted on a 1" = 400' aerial photograph and soil stratigraphy records were maintained for each test pit. Recordation of the soil profiles was carried out to the nearest half decimeter. Photographs of the general environment and of discovered sites were taken, and site sketch maps were drawn.

Good surface exposure was provided by the many dirt roads, cleared areas, trails, and animal burrows which were discovered throughout the property. These exposures were visually inspected for cultural material, but no material was encountered.

In addition to the above, stereo pairs of infra-red aerial photographs of the Project area were examined with stereoscopes. These provided a means of determining whether or not any large earthworks might be present within the CG/CC Project area parcels. No such earthworks were found, however, areas of high site potential were identified on the aerial photographs and subsequently investigated.

No archaeological finds were found for the areas designated for the Martin CG/CC Project. The proposed area for Martin Expansion Project utilizes only a small portion of the area included in the full scope (1,300 acres) of the Martin CG/CC Project.

2.2.7 SOCIOECONOMICS AND PUBLIC SERVICES

2.2.7.1 Labor Force

The total labor force in Martin County for 2000 was 49,480 with employment of 47,302. Unemployment in 2000 was 2,178 or 4.4 percent. For the State of Florida and the United States, unemployment was 3.6 and 4.0 percent, respectively, for the same period. The service and retail industries provided the most employment in Martin County with about 39 and 25 percent, respectively of the employment. Construction, manufacturing and agricultural industries provided about 10, 6.5 and 4.7 percent of the County's employment.

General Income

Martin County has ranked among the top three counties in the state for per capita personal income. Martin County had a per capita personal income of $41,114 for 1999 compared to the State of Florida and United States per capita personal income of $27,781 and $28,546, respectively (Florida Statistical Abstract, 2001). Approximately 98 percent of the personal income is derived from non-farm origins with about 50 percent coming from dividends, interest, and rent.

Housing

Table 2.2-4 shows the net growth of housing units by type in both the incorporated and unincorporated areas of Martin County from January 1987 to April 1995. According to 1987

building permit data gathered from the 1995 housing inventory data, county-wide total units increased 11 percent from the 1987 estimate of 49,147 units, to the 1995 estimate of 55,156 units. During this period, a growth of 10,307 units occurred within the incorporated areas and represents 44,626 units within the unincorporated areas of the County. Of the 55,156 housing units, 33,079 (61 percent) were owner occupied. According to the data provided by the Martin County Property Appraiser's office, 39,407 dwelling units were sold during this period. Approximately 23,750 of those units were considered affordable to very low, low, and moderate income households. This was determined by utilizing the Fannie Mae mortgage calculator and assuming an interest rate factor of 9% and household debt payments of zero.

The major issue in Martin County that has and is projected to continue influencing planning and growth management programs is the continuous population growth. According to statistics, the County's permanent population grew 26 percent from a population of 100,000 in 1990 to 126,731 in 2000. Population is expected to reach approximately 151,500 in 2010.

2.2.7.2 Area Public Service And Utilities

Education

Public education in Florida is operated on a countywide basis. Each county's respective school district establishes educational policies and staffing requirements. According to the Florida Department of Education, Martin County had a total enrollment of 16,076 for the 2000-2001 school year. A total of 36 schools exist in the county, with approximately 1,931 full-time staff employees. In comparison, the neighboring Okeechobee County reported a total enrollment of 6,671 students in the 19 county schools. Approximately 839 full-time employees were reported. St. Lucie County was estimated to have 29,114 students and 44 school facilities staffed with 4,060 full-time employees. Total enrollment for the state of Florida was estimated to be 2,388,755.

Transportation

The Florida Turnpike and Interstate 95 are considered the major transportation corridors for north-south traffic movement in Martin County. These limited access, multi-lane facilities roadways are located about 10 miles from the Project area, but access is about 20 miles from the site. In Western Martin County, SR 710 and U.S. Highway 441/98 (also identified as SR 700) function as the major arterials. SR 76 is the primary connector of the western portion of the county with the eastern portion.

SR 710 is a two lane, undivided highway that has an operating capacity of 17,400 average annual daily trips (AADT) between the Okeechobee and Palm Beach County lines. Traffic counts taken by the Florida Department of Transportation (FDOT) in 2000 indicated 7,300 AADT in the area near the Martin Plant site. Martin County defines this volume of traffic as an acceptable Level of Service (LOS) for this road.

The Florida East Coast (FEC) Railway has two tracks within the boundaries of Martin County. The main track-that carries freight generally parallels the Atlantic coastline. A secondary track, located in the western portion of the county, runs northeasterly from the Palm Beach County line and across SR 710. Amtrak runs passenger service using the CSX railroad along SR 710 from the Okeechobee County Line to Palm Beach County. These railroads generally provide freight service between Jacksonville, Miami, and the Tampa area.

There are two licensed public use airports in Martin County. Witham Field is a publicly owned general aviation airport located in the Stuart urban area just south of Monterey Road and east of Dixie Highway [County Road (CR) A1A]. A small privately owned, public use airport is located northeast of Indiantown.

Medical Facilities

Martin Memorial Hospital in Stuart is the primary health care provider in Martin County. Martin Memorial has two facilities: South Hospital, which is licensed for 100 beds and North Hospital, which is licensed for 236 beds. Emergency medical transport is provided within Martin County by emergency medical technicians (EMT) stationed at each of the county's fire stations. Facilities in Indiantown, the community closest to the Martin Plant site, include one of the county's EMT staffed fire stations.

Firefighting Facilities

There are 219 full time fire fighters located at 11 stations in Martin County. During non-seasonal months, this provides an average of 1.4 fire fighters per 1,000 residents. During seasonal months (November through April), the average is approximately 1.1 fire fighters per every thousand residents. The County does supplement these employees with additional volunteers, as well as four volunteer stations. Response times are reported by each fire department to be between 6 and

8 minutes in urban areas and between 12 and 20 minutes for rural areas. The closest fire station to the Martin Plant area is located in Indiantown.

Police Protection

Law enforcement in the vicinity of the Martin Plant site is provided by the Martin County Sheriff's Department. The Martin County Sheriff's Department had in 2001 approximately 228 law enforcement officers operating from four stations. The Sheriff's Department patrols the area surrounding the Martin Plant area. FPL has contracted a private security company to control unauthorized access to the Martin Plant site.

Recreation Facilities

Due to its predominantly rural/agricultural character, Martin County and the surrounding region offer many unique recreational activities. Lake Okeechobee, the second largest freshwater lake entirely within the United States, provides the majority of the focus on regional recreation activities.

As part of their individual Comprehensive Plans, each county is required to adopt level of service standards for their various recreational facilities. According to the Martin County Comprehensive Plan, no deficiency was identified between 1995 and 1998, and from 1998 to 2005, no deficiencies are projected. Table 2.2-5 identifies the current inventory of Martin County Community Parks as last updated in 1989. These are shown in Figure 2.2-4. No changes have been made to this inventory in the Martin County Comprehensive Plan.

Electricity and Gas

Electricity is provided to Martin County residents by FPL. The four principal generating stations located in or near Martin County are the FPL Martin Power Plant and the Indiantown Cogeneration Plant located in Martin County, the St. Lucie Nuclear Power Plant located on Hutchinson Island in St. Lucie County and the Riveria Power Plant located in Palm Beach County.

Two natural gas laterals connected to the Florida Gas Transmission Company (FGT) natural gas pipeline serve the Martin Plant site. Prior to the construction of Units 3 and 4, the site was served by an 18-inch 38-mile lateral connected to FGT mainline. This lateral also supplies residual oil to the Martin Plant. As part of the construction of Units 3 and 4, a 20-inch 23-mile lateral connected to the

FGT mainline located on the Florida Turnpike was installed. Residential and commercial natural gas needs are met by private suppliers.

Water Supply Facilities

Two major aquifers exist in Martin County: 1) the Surficial (non-artesian) Aquifer, which is 15 to 150 feet below land surface (ft-bls), and 2) the Floridan (artesian) aquifer, which is 600 to 1,500 ft-bls. Both aquifers provide water to wells in Martin County. Water from the Floridan aquifer is used for irrigation and stock watering, and with advanced treatment, for potable water. The majority of the water in Martin County is obtained from the Surficial aquifer.

According to the Martin County Comprehensive Growth Management Plan, residents obtain potable water from a variety of water systems, including governmental, private systems or individual wells. The government and private supply systems are regulated by the FDEP.

Sewage Treatment Facilities

According to the Martin County Comprehensive Growth Management Plan, Martin County residents are served by one of the following wastewater facilities: septic tanks, package plants, or regional facilities. Septic tanks provide service to individual residences or small developments that produce flows of less than 2,000 gallons per day (gpd). Use of a septic tank is permitted by the Martin County Public Health Unit where soil and drainage conditions are suitable and when the requirements of the Martin County Code of Laws and Ordinances are met.

Package plants are generally small and pre-constructed, serving isolated developments. Applicants for development within the primary Urban Service District are required to connect to a government owned or investor owned sewerage system, unless they qualify for septic tanks or an interim package plant. An interim package plant system may be used, provided the applicant agrees to connect to a regional system when such system becomes available. Use of package plants will be allowed outside the primary and secondary Urban Service District provided the criteria of the Future Land Use Element has been met.

Regional facilities are large systems that serve areas of densely populated development. According to the Martin County Comprehensive Growth Management Plan, problems associated with septic tanks and package plants has prompted the County to pursue a policy of consolidation of wastewater

systems. Seven private and/or governmentally owned systems were designated as regional systems. Acquisition of wastewater treatment facilities by the County has been used in an effort to consolidate.

The sanitary wastes at the Martin Plant are treated in two approved extended aeration package plants. The effluent, after treatment and disinfection, is routed to the cooling pond.

Solid Waste Disposal

Martin County and the State of Florida have encouraged disposal of wastes in a cost-effective and environmentally safe manner. Both County and Municipal laws require the collection of all household refuse for disposal in the County landfill, which is located about 1.5 miles northeast of the intersection of SR 714 and Interstate Highway (I) 95. Treated sludge from sewage treatment plants, construction debris, and septic tank pumpout are also accepted at this location. The landfill is operated under permit from the Florida Department of Environmental Protection and the South Florida Water Management District. Conditions of the permit are based on protecting surface water, groundwater and air from contamination.

Solid wastes generated at the Martin Plant are disposed of by an approved solid waste contractor.

2.3 BIO-PHYSICAL ENVIRONMENT

2.3.1 GEOHYDROLOGY

The SCA for the Martin CG/CC Project (FPL, 1989) contained extensive baseline descriptions of onsite and offsite geohydrologic conditions in the vicinity of the Martin Plant site. The scope of the Martin CG/CC Project included four combined cycle units, coal gasification and byproduct storage that covered about 1,300 acres of the Martin Plant site. The information presented in this Section for Martin Unit 8, draws upon the previous information and provides a brief summary of the geo-hydrologic baseline information. Information in this Section has been updated as necessary and appropriate. More detailed site descriptions are contained in the SCA for the Martin CG/CC Project (FPL, 1989).

2.3.1.1 Geologic Description of the Site Vicinity

The generalized hydrostratigraphy for Martin County, including the FPL Martin Plant site, is shown in Figure 2.3-1. Generally in Martin County, the surficial aquifer is from 90- to 200-feet (ft) thick.

The surficial aquifer is typically composed of Pamlico Sand, the Fort Thompson and Anastasia Formations (lateral equivalents), Caloosahatchee Marl and the Tamiami formation. The lower confining layers, below the surficial aquifer, range in thickness from 350- to 600-ft and are composed of Peace River and Arcadia Formations, both of the Hawthorn Group. Beneath the Hawthorn Group, the Floridan Aquifer System ranges from 2,800- to 3,400-ft thick and consists of Suwannee Limestone, Ocala Limestone, Avon Park Limestone, Lake City Limestone and the Oldsmar and Cedar Keys Formations. Figure 2.3-2 shows a regional geologic cross section.

2.3.1.2 Site Lithologic Description

Detailed evaluation on site lithology based on numerous borings made at the time of construction of the existing reservoir, reservoir embankment, and other facilities associated with the construction of Units 1 and 2 was developed for the Martin Plant site (FPL, 1989). The description of the site lithology is summarized below. All elevations indicated are in mean sea level.

Borings drilled in the area of just east of the existing peaking units show that the predominant soil type is sand from the ground surface [approximately 30 feet above mean sea level (ft-msl)] to -70 ft-msl. The sands vary in color from light to dark gray and brown. Clayey sand and sandy clay seams from a few inches to several feet in thickness are generally found at 10 ft-msl. A thin layer of greenish-gray sandy clay was found in the borings at approximately -25 ft-msl. The logs of borings were contained in the Martin CG/CC Project SCA (FPL, 1989; Section 10.5.3) along with associated laboratory test data.

The Pamlico and Anastasia Formations extend from the ground surface (20 to 30 ft-msl) to an average of -3 ft-msl. These strata consist of fine sands and silty sands with shell fragments. Thin beds of limestone and cemented sand occur sporadically at depths ranging from 2 to 4.5 ft-msl in localized areas; this zone may represent the boundary between the Pamlico and Anastasia Formations. In areas where the cemented sands and limestone are absent, it is not possible to differentiate the two formations.

The underlying Caloosahatchee Group extends to an average -80 ft-msl. This formation can be subdivided into two units, namely an upper limestone interbedded with sand and shell present to an average -12 ft-msl, and a lower unit of silty sand with shell fragments and shell beds to -80 ft-msl.

The Tamiami Formation underlies the Caloosahatchee from -105 ft-msl to -150 ft-msl. This formation consists of silty sand varying with depth to clayey sand from -72 ft-msl. The color of the formation also varies from gray in the sands to predominantly green in the clayey zone.

The top of the Hawthorn Group occurs at approximately -105 ft-msl to -150 ft-msl. These elevations are based on the logs of test wells and exploratory borings drilled in the area. The Hawthorn, approximately 550-ft thick, consists predominantly of greenish clay with subordinate amounts of shell, limestone, silt, and sand. Major limestone zones generally occur near the base of the formation. Due to very low vertical permeability, the Hawthorn acts as a confining bed overlying the Floridan Aquifer.

2.3.1.3 Bearing Strength

Data generated from 43 borings in the immediate area of Units 1 and 2 show that the predominant soil type is sand, ranging from medium to very dense, extending from the ground surface (about 30 ft-msl) to –70 ft-msl. The subsurface investigation conducted for Units 3 and 4 and Units 8A and 8B were consistent with the previous data.

Heavily loaded structures including the heat recovery generators can be constructed on mat foundations. Allowable bearing capacity format foundations in the order of 2ksf should provide a factor of safety of about 2 with estimated settlements of less than 1 inch. Depending on the wind loads associated with the HRSGs a pile supported foundation system could be required.

Lightly loaded structures can be designed on shallow foundations consisting of spread and strip footings with a maximum allowable capacity of 3ksf and 2.5 klf, respectively. Shallow footings should be constructed with a minimum embedment depth of 1.5 ft. Settlement for shallow footings are estimated to be less than 1 inch.

The planned development is suitable from a geotechnical standpoint, provided that the recommendations presented in the geotechnical investigation report are followed.

2.3.2 SUBSURFACE HYDROLOGY

2.3.2.1 Subsurface Hydrologic Data for the Site Aquifers

There are three major components to the subsurface hydrogeologic framework of southern Florida: the unconfined surficial aquifer; the confined Floridan Aquifer System; and the nearly impermeable sediments of the Hawthorn Group, which separate the two aquifer units.

The Surficial Aquifer

The surficial aquifer in the Martin County area extends from the water table to about -150 ft-msl. It is a nonartesian aquifer composed principally of sand, but containing relatively thin beds or lenses of limestone, sandstone or shell, which are generally more permeable than the sand. Most large-capacity wells are developed in the limestone, sandstone or shell. The lithology of the aquifer changes laterally as well as vertically, so that the permeable beds are not always found at the same depth; in fact, in some areas they are missing entirely (Lichtler, 1960).

Figure 2.3-3 represents the site hydrogeologic regime of the surficial aquifer beneath the Project area. The surficial aquifer extends to the top of the Hawthorn Group (-120 ft-msl). Vertical and horizontal hydraulic conductivities are shown in the figure and range from 10^2 to 10^{-2} gpd/square foot (ft^2). Groundwater elevations are generally at, or within 5 ft of the ground surface. Groundwater elevations will typically be higher as it approaches the reservoir and will drop off at the seepage collection ditches surrounding the reservoir. Water elevations tend to fluctuate approximately 1 ft from wet to dry seasons.

In the vicinity of the site, the regional groundwater flow is from the northeast to the southwest towards Lake Okeechobee. Area canals such as the L-65 and the St. Lucie Canal, and onsite lakes and ditching, influence the flows. Groundwater mounding occurs beneath the cooling pond and radiates outward from the cooling pond. Seepage ditches and area canals surround the pond and intercept the subsurface flow. Seepage pumps return the water to the pond.

The Floridan Aquifer System

The Floridan Aquifer System underlies all of Florida and southern Georgia. This system consists of a sequence of interbedded limestone and dolomite that is approximately 2,800 to 3,400 ft thick in Martin County. Figure 2.3-1 shows the stratigraphic units, which comprise the Floridan. The top of the Floridan dips from the northwest to the southeast across Florida, and ranges from -600 to

-1,500 ft-msl in Martin County. The Floridan is a confined series of aquifer zones separated by aquacludes throughout south Florida. The permeability of the Floridan Aquifer components is several orders of magnitude greater than the surficial aquifer. These high permeability values are the result of both fractured limestone and extensive secondary porosity derived from dissolution of carbonates. The transmissivity of the upper part of the Floridan ranges from 16,000 to 83,000 gpd/ft. At the base of the Floridan Aquifer System is the "boulder zone", a highly cavernous zone of saline water utilized for underground injection of industrial and domestic wastes in South Florida. Transmissivity ranges from 374,000 gpd/ft to 748,000 gpd/ft. An existing FPL well, LFM-1, was tested and found to have a calculated transmissivity of 4.8 million gpd/ft. Samples collected during the flow test showed that the water was moderately saline with 2,488 milligrams per liter (mg/L) chlorides and a total dissolved solids concentration of 4,735 mg/L.

The Hawthorn Group

The lithology of the Hawthorn varies greatly and is characterized by complex interbedding, the group as a whole has very low permeability and tightly confines the Floridan Aquifer System in Martin County. The top of the Hawthorn Group occurs at approximately –105 to –150 ft-msl in the vicinity of the site and is approximately 550 to 600 ft thick. In the site vicinity, the Hawthorn group consists of beds of dark green to white phosphatic clay containing silt and quartz sand. The lower part of the formation varies from thin layers of sandy phosphatic limestone and chert to lenses and thin layers of phosphatic sand and shells.

2.3.2.2 Karst Hydrogeology

Detailed evaluations of the Karst hydrogeology at the Martin Plant site has been performed, given the importance of this subject for above ground reservoir (FPL, 1989). A summary of these evaluations is presented below.

Several studies were conducted during the design phase of the Martin cooling pond (NSS, 1972, 1973, 1974) and a regional screening study by FPL of a 25 county area of the central and south Florida peninsula (FPL, 1979) to determine the presence of karstic (solution cavity/sinkhole) features and the potential for their development at the site. The 1979 FPL study, which included Martin County, was based on a review of topographic maps of the area, published reports on the local geology and groundwater resources, analysis of satellite imagery, and regional reports of sinkhole occurrence. The study concluded that favorable conditions for Karst development were not present

at the Martin Plant site. The NSS studies included geotechnical investigations of local depressions. These studies reached a conclusion similar to the conclusion drawn by FPL; however, they also present evidence for the existence of buried Karst in the limestone layers of the Pliocene Caloosahatchee Marl at the site.

For the regional siting study (FPL, 1979) criteria were developed to delineate areas of karstic conditions or conditions that may be favorable for Karst development and that could have a severe impact on the foundations of major plant facilities. On a regional basis, the development of karstic features in Florida is most common in areas where:

- Pre-Miocene-age carbonate rocks are at or near the ground surface,
- Floridan Aquifer recharge occurs,
- Lakes per unit area are at high density, and
- Sinkhole occurrence reports are persistent.

With respect to the near-surface occurrence of carbonate rocks, local experience generally shows that post-Miocene (Pleistocene) age carbonates do not pose the same potential for karstic development as do older carbonates in Florida, nor do they show the same correlation of occurrence with a high density of lakes, as do the pre-Miocene carbonates. There are no near-surface limestones in south Florida (Lake Okeechobee and south) and the closest limestones of the pre-Miocene age in the near surface are approximately 140 miles northwest of the site. Major limestone formations that experience solution and cavity development are pre-Miocene in age, occur approximately -850 ft-msl at the Martin Plant site, and are overlain by thick, impervious strata. The solutioning of these limestones has allowed the development of the very permeable zones of the Floridan Aquifer.

The FPL Siting Study (1979) relied on published information and the lack of surficial expressions of Karst development to identify areas not susceptible to the formation of Karst. No subsurface investigations to identify buried Karst conditions were performed as part of the study. Investigations conducted at the Martin Plant site by NSS (1973, 1974) included studies to determine the origin of numerous shallow, closed depressions occurring throughout the area and to evaluate their potential impact on construction of plant facilities proposed at that time. A total of 46 depressions were investigated. The thickness of organic filling in the depressions and the relative difference in elevation between the center and edge of each depression were determined. The depressions' maximum dimensions ranged in size from 200 to 1,750 ft. For classification and correlation

purposes, borings were drilled to maximum depths, ranging from approximately 50 to 60 ft, to obtain samples of the materials in and surrounding the depressions.

Based on the studies of the shallow depressions, it was concluded by NSS that the depressions were caused by the solution of calcite and aragonite in the shallow Pleistocene Pamlico and Anastasia sands and possibly in upper zones of the lenticular limestone of the Pliocene Caloosahatchee Marl. Solution of shell fragments from silty sands of the Anastasia Formation appears to be the primary cause of the depressions. However, some solution of the limestone has also undoubtedly occurred.

The studies indicated that development of the paleokarst features occurred during the Pleistocene epoch when the sea level was lower than it is now. Lower groundwater levels and increased rates of vertical and lateral percolation during the epoch resulted in increased solution activity.

The conclusion reached by NSS (1974) was that current solution activity is negligible because of shallow groundwater levels and low rates of infiltration.

Mid-Valley, Inc. (1980) prepared a report in conjunction with other studies performed following the breach of the cooling pond embankment. It documents the drilling and grouting of 533 exploratory borings, drilled on 200-ft centers along the inside toe of the embankment and at other locations in the embankment area, to provide supplemental subsurface information.

Two areas characterized by caving, loss of drilling fluid, sudden "drops" of the drill rods during hole advancement, and decreased penetration resistance by the Standard Penetration Test Sampler, were selected for additional subsurface exploration.

Supplemental borings and excavation of a test pit were done in one of these areas. Detailed mapping of the test pit walls was performed. The bottom of the pit was excavated about 1- to 2-ft into the top of the "cemented coquina rock." Open voids and sand-filled voids within the coquina were described. (The term coquina in the Mid-Valley, Inc. report refers to a poorly- to well-cemented sand and shell formation. The cemented coquina rock and coquina are probably the upper portion of the Caloosahatchee Marl.)

Subsequent to repair of the Martin cooling pond embankment and refilling of the pond, FPL conducted an ongoing sampling program to determine the settlement potential of the "shell layer" which extends under the embankment. Water samples from several locations within the cooling pond and monitor wells in the cooling pond embankment are obtained annually for chemical analyses. The chemical constituents of the water are analyzed to determine saturation index (SI) values for aragonite and calcite (Stone and Webster, 1983). The amount of settlement potential due to solutioning of calcium carbonate is estimated based on calculations using the SI values.

The findings of the study for 1988 indicate that the estimated settlement potential from solutioning is 0.0037 inches per year (in/yr). This is the same rate reported for 1986 and 1987. The rates for 1984 and 1985 were 0.0035 in/yr. For 1983, the rate was 0.0020 in/yr (Stone and Webster, 1983); this rate is thought to reflect a change in the chemistry of the Lake Okeechobee-derived water in the pond. The conclusion drawn from the results of these yearly analyses is that while desolutioning of calcium carbonate is occurring within the "shell layer" under the embankment. The rate of solutioning is very low.

From the subsurface investigations performed prior to the construction of the Martin cooling pond and subsequent to the breach of the cooling pond embankment, it is apparent that the limestone layers at the top of the Caloosahatchee Marl exhibit paleokarstic features, which are the result of previous erosion and desolutioning of the limestone, probably during the Pleistocene epoch. Dissolutioning of the calcium carbonate in the shell and limestone layers under the cooling pond is presently occurring at a very low rate, as indicated by the results of the monitoring program.

2.3.3 SITE WATER BUDGET AND AREA USERS

2.3.3.1 Site Water Budget

Climate and Meteorology

The Martin Plant site is located in central peninsular Florida, which has a climate characterized as mild subtropical. Temperatures in the vicinity of the plant site (measured at Belle Glade, Florida) range from an average low of about 62.8 degrees Fahrenheit (°F) in January, to an average high of about 80.7°F in August, with an annual average of about 72.3°F. The highest temperature recorded was 100°F and 24°F was the lowest at Belle Glade.

Mean total annual rainfall at Structure S308 on Lake Okeechobee, as shown in Table 2.3-1, is 46.51 inches, with mean monthly totals ranging from 1.60 to 6.54 inches. Generally, the period of the year with the heaviest rainfall in southeast Florida is from June to October.

Mean total evaporation at Structure S308 on Lake Okeechobee, as shown in Table 2.3-1, is 57.86 inches, with mean monthly totals ranging from 2.97 to 6.84 inches.

Groundwater Resources

The two major aquifers in Martin County are recharged by separate sources. The shallow (non-artesian) aquifer, -15 to -150 ft-msl, is supplied by rainfall in Martin County. A small amount of recharge to the shallow aquifer results from seepage of water used for agricultural irrigation. The Floridan (artesian) Aquifer, -600 to -1,500 ft-msl, is supplied by rainfall in the topographically high areas centered in Polk and Pasco Counties. No estimates of the amount of recharge to the Floridan aquifer from these areas are available. The piezometric surface within the Floridan aquifer is higher than the water table in all parts of Martin County, thus, there is no recharge of the Floridan aquifer within Martin County. The two aquifers are separated by a thick layer of sand and clay of low permeability (Lichtler, 1960).

Surface Water Resources

A little more than 2 miles west of the site is Lake Okeechobee, which covers an area about 740 mi^2. Lake Okeechobee is connected ultimately to the Atlantic Ocean and the Gulf of Mexico by numerous canals. The St. Lucie Canal, also known as C-44, is one of two principal means of controlling the level of Lake Okeechobee. The canal also serves as the eastern portion of the Okeechobee Waterway, a U.S. Army Corps of Engineers (USACE) canal with a design depth of 8 ft that connects the St. Lucie River to Lake Okeechobee.

Optimum lake levels have been determined for various hydrologic conditions (dependent on both season and lake level) by the Corps of Engineers. A new lake level regulation schedule, Water Supply and Environmental (WSE), was adopted by federal agencies in July 2000. The WSE schedule was developed to provide a greater balance between water supply and the environmental needs of the lake. The WSE schedule lowers the lake stage on average and large discharges were made in mid-2000 through various canals, including the St. Lucie Canal, to drop lake levels.

Modeling by the SFWMD has shown that implementation of the WSE schedule will have no significant adverse impact on water supply from the lake.

Flow into the St. Lucie Canal from Lake Okeechobee is regulated by a control structure (lock), S308, at Port Mayaca, while flow from the canal is regulated by another control structure (lock), S80, near Stuart, approximately 18 miles east-northeast of the Martin Plant site. Numerous secondary canals connect to the St. Lucie Canal to provide drainage for the area surrounding the site. The L-65 Canal runs north-south on the western side of the cooling pond.

The mean discharge (flow) of the St. Lucie Canal at Stuart, as measured at S80, for the period of record from 1963 through 1999, was approximately 748 cubic feet per second (cfs), with maximum and minimum daily discharges of 9,315 cfs and 0 cfs, respectively. The range of mean monthly discharges during the total period of record is shown in Table 2.3-2. Data collected at Structure S308 on the St. Lucie Canal at Lake Okeechobee (Port Mayaca) show the mean discharge for the period of record from 1963 through 1999, was approximately 284 cfs, with maximum and minimum daily discharges of 6,143 cfs and –1,107 cfs, respectively. The negative value indicates flow from the canal into Lake Okeechobee [South Florida Water Management District (SFWMD), 1999].

Groundwater/Surface Water Interactions

Approximately 44 cfs of seepage from the Martin Plant cooling pond enters the shallow aquifer adjacent to the pond. Of this amount, 21 cfs is collected by the pond underdrain system and returned to the pond. Of the seepage that the shallow aquifer, some is lost offsite by normal groundwater movement, and the rest enters adjacent surface water bodies (the Barley Barber Swamp, the St. Lucie and L-65 canals, and the eastern and northern perimeter ditches). FPL is permitted to withdraw water from the St. Lucie Canal via the Martin Plant intake/discharge canal for use as makeup to the cooling pond to replace net evaporative and seepage losses, and to maintain minimum flows in the Barley Barber Swamp (FPL, 1989). In accordance with the Revised Permit Agreement between SFWMD and FPL, FPL is allowed an average annual withdrawal of 32,000 acre-ft for replacement of net evaporation losses. The agreement limits replacement for evaporation to a maximum of 50,000 acre-ft in any 12-month period. Withdrawals to replace water lost due to seepage from the reservoir or to maintain minimum flows in the Barley Barber Swamp are considered non-consumptive use of water.

2.3.3.2 Area Users

Surface and groundwater use in the vicinity of the Martin Plant site is regulated by the SFWMD. Information gathered from the SFWMD was used to prepare this summary of water uses near the Martin Plant site. It should be noted that there is a possibility that other potable water wells are in existence in the vicinity of the Martin Plant site, and their presence has not been confirmed because they have not been permitted or otherwise reported to SFWMD. In any event, the Project will not increase groundwater withdrawals and therefore will not impact offsite wells.

Table 2.3-3 shows the surface and groundwater uses within 5 miles of the plant site, most of which are for industrial purposes and agricultural irrigation. Sources of water used for these purposes include the St. Lucie Canal (C-44), canals L-47 and C-23, the shallow water aquifer, and the Floridan aquifer. The South Florida Water Management District provided the permit data. The only known potable water wells located within 1 mile of the site are those operated by FPL.

2.3.4 SURFICIAL HYDROLOGY

2.3.4.1 Site Description

The Martin Plant site consists of 11,300 acres with three onsite water bodies: the Barley Barber Swamp, approximately 400 acres; the cooling pond, 6,500 acres water and 300 acres dike area; and the intake/discharge canal. A 1,200-acre area on the northwest portion of the site is managed as wetland mitigation by FPL. The remaining area consists of other undeveloped land used for agricultural purposes. The Martin Plant is bounded on the west by the L-65 Canal which runs from just north of Lake Okeechobee south to discharge into the St. Lucie Canal.

The Barley Barber Swamp is a relatively flat area just west of the Martin Plant. The swamp is surrounded by the Martin cooling pond on three sides and drains to the west through culverts to the L-65 Canal. The L-65 Canal was completed in 1970 and water levels are presently regulated by the SFWMD at about 19 ft-msl. The cooling pond was completed and filled in 1978. Water is drawn from the St. Lucie Canal by a short intake/discharge canal and from there is pumped into the pond. Seepage from the cooling pond takes place through the embankment and the bottom. The estimated seepage rate is about 44 cfs.

Makeup to the pond is withdrawn from the St. Lucie Canal as needed to replace net evaporation and seepage losses from the pond. The withdrawal of water to replace water lost due to seepage is

considered nonconsumptive use of water. An average annual allocation of 32,000 acre-ft is available to replace the net evaporation losses. The maximum authorized withdrawal is 50,000 acre-ft in any 12-month period.

There are two drainage systems serving the site, the northern perimeter ditch and the eastern perimeter ditch. The northern perimeter ditch drains the majority of the area north of the pond and discharges into the L-65 Canal at the northwestern corner of the site. The eastern drainage ditch drains the easternmost portions of the site as well as the power block area and discharges into the intake/discharge canal, which discharges to the St. Lucie Canal.

2.3.4.2 Streamflow Data

Historic discharges from Lake Okeechobee to the St. Lucie Canal are indicated in Table 2.3-2. The SFWMD Water Use Agreement allows for an average annual withdrawal of 32,000 acre-ft to replace the net evaporation losses. During the period from January 1997 through December 2000, the average monthly withdrawal for make up to the cooling pond was 21,558 acre-ft.

During the same period, releases were made from the cooling pond through the spillway structure 4 times to test the spill gates. Each release averaged only 0.078 acre-ft.

2.3.4.3 Water Quality

Extensive water quality analyses were reported in the 1989 SCA for the Martin CG/CC Project (FPL, 1989). Table 2.3-4 shows the recent water quality at S308, Port Mayaca. For the purposes of this table, values below the detection limit have been conservatively reported as the absolute value of the detection limit for that parameter.

The cooling pond receives makeup water from the St. Lucie Canal to replace evaporative and seepage losses. Consequently, the parameter concentrations in the cooling pond are similar to the average quality in the St. Lucie, though somewhat more concentrated, primarily due to evaporation. FPL has conducted annual sampling in accordance with exiting permit conditions, recent year results are shown in Table 2.3-5. With the exception of chlorides, all water quality parameters from the five sampling events are comparable to the values for the S308 Okeechobee Lake discharge. The cooling pond chloride level in the pond averaged 138 mg/L for the five sample events taken from

January 1997 to June 2001. Chloride levels at the confluence of the St. Lucie Canal and the cooling pond intake/discharge canal averaged 80 mg/L during releases from the pond.

2.3.5 VEGETATION/LAND USE

A vegetation/land use survey of the Project area and surrounding areas was completed utilizing the FLUCFCS. The resulting vegetation/land use map of the Project area is found in Figure 2.3-4. Vegetative communities in, and adjacent to, the Project area are discussed in detail in Section 2.3.6.1.

Existing vegetation/land use within the 110-acre Project area includes electrical utilities/open land (FLUCFCS Code 831/190), ditches (FLUCFCS Code 510, Streams and Waterways), a stormwater basin (FLUCFCS Code 166, Holding Ponds), pine flatwoods (FLUCFCS Code 411), and Brazilian pepper (FLUCFCS Code 422). The site proposed for construction of Unit 8 is a previously cleared area that currently contains two simple cycle CTs. The surrounding area is grassed or covered with limerock. Within the grassed area, several shallow, man-made drainage ditches are present, the largest of which flows into a stormwater basin (detention pond number 3) to the southeast of the proposed units.

Project facilities, including construction laydown and staging areas, will occupy about 44 acres within the Project area most of which has been affected by previous activities at the Martin Plant site.

Outside of the Project area, a variety of vegetative communities are located within the Martin Plant site, including pastures, rangeland, upland forest, the large cooling water pond, and forested and herbaceous wetlands.

2.3.6 ECOLOGY

2.3.6.1 Species-Environmental Relationships

The following subsections include descriptions of important flora and fauna at the Project area and surrounding areas within the Martin Plant site. The latter areas adjacent to the Project area were a portion of the site planned to be used for the Martin CG/CC Project. This discussion includes information related to the abundance of important species found and the value of the habitats present.

Terrestrial Ecology Systems- Flora

The following descriptions of the flora and fauna at or near the site follow the FLUCFCS-Level III codes.

Unit 8 Project Area

Electrical Power Facilities/Open Land (FLUCFCS Code 831/190)

Native vegetation in the vicinity of the power block has been cleared and replaced with a monoculture of cultivated Bahia grass (*Paspalum notatum*) turf that is periodically mowed. Weedy species characteristic of disturbed areas have become established within the lawn, such as coast sandspur (*Cenchrus incertus*) and match-head (*Phyla nodifera*), with pepper-grass (*Lepidium virginicum*), common beggar-ticks (*Bidens alba*), and ragweed (*Ambrosia artemisiifolia*) present along the edges. In addition to the open land surrounding the facility, other facilities within the Project area classified as electric power facilities include existing substations, a natural gas metering station, storage tanks, and circulating water system structures. Approximately 97 acres of the Project area are classified as Electrical Utilities/Open Land.

Ditches (FLUCFCS 510)

Man-made drainage ditches are found in several locations: on the perimeter of the Project area, connected to the existing detention pond number 3, and associated with an abandoned railroad spur. Vegetation occurring in these areas include sedges (*Cyperus* spp.), water primrose (*Ludwigia peruviana* and *L. octavalvis*), white-top sedge (*Dichromena* sp.), water hyssop (*Bacopa* sp.), bladderwort (*Utricularia* sp.), torpedo grass (*Panicum repens*), hurricane grass (*Fimbristylis spathacea*), arrowhead (*Sagittaria lancifolia*), match-head (*Phyla nodiflora*), beggar-ticks (*Bidens alba*), coinwort (*Centella asiatica*), cat-tail (*Typha domingensis*), smutgrass (*Sporobolus poiretii*), pickerelweed (*Pontederia cordata*), and some individuals of Brazilian pepper (*Schinus terebinthfolius*). Open water areas support floating aquatic species, including duckweed (*Lemna* sp.), mosquito fern (*Azolla caroliniana*), and giant duckweed (*Spirodela* sp.). A total of approximately 1 acre of ditches occur within the Project area.

Stormwater Basins (FLUCFCS 166)

Stormwater detention basin number 3 is located in the southwestern portion of the Project area, comprising approximately 3.2 acres. The basin is dominated by cat-tail, and also supports water primrose, arrowhead, smartweed (*Polygonum* sp.), pennywort (*Hydrocotyle* sp.), coinwort, hurricane

grass, water hyssop, torpedo grass, and match-heads. In addition to the emergent and herbaceous species, the stormwater basin also supports a few individuals of coastal plain willow (*Salix caroliniana*) near the edge of the basin.

Pine Flatwoods (FLUCFCS 411)

An undeveloped parcel of pine flatwoods is located to the east of the stormwater pond and south of the onsite switchyard. The canopy is dominated by slash pine (*Pinus elliotii*), with occasional cabbage palm and a dense understory of saw palmetto (*Serenoa repens*), with wax myrtle and Brazilian pepper also present. The edge of the pine flatwoods parcel has been ditched, most likely during the construction of the railroad line, and supports hydrophytic vegetation, including cat-tail, water primrose (*Ludwigia peruviana*), and arrowhead. The transitional zone between the interior of the pine flatwoods parcel and the perimeter ditch supports broomsedge (*Andropogon* sp.). Approximately 9 acres of pine flatwoods are within the Project area.

Bazilian Pepper (FLUCFCS 422)

A small parcel of Brazilian pepper (Schinus terebinthfolius) is found within the Project area to the west of the existing units, located on the site of an historic spent lime disposal area. This area supports a near-monoculture of Brazilian pepper, an invasive non-native shrub.

Vegetative Communities Adjacent to the Project Area

Outside of the Project area, within the 11,300-acre Martin Plant site, are found several vegetative communities, including improved pasture (FLUCFCS Code 211), unimproved pasture (FLUCFCS Code 212), herbaceous rangeland (FLUCFCS Code 310), shrub and brushland (FLUCFCS Code 320), palmetto prairies (FLUCFCS Code 321), pine flatwoods (FLUCFCS Code 411), cabbage palm/live oak (FLUCFCS Code 428/427), cabbage palm/pine (FLUCFCS Code 428/411), cypress (FLUCFCS Code 621), mixed wetland forest (FLUCFCS Code 630), sawgrass (FLUCFCS Code 6411), and wet prairie (FLUCFCS Code 643).

Extensive vegetative field surveys of the Martin Plant site surrounding the Project area were conducted for the Martin CG/CC Project (FPL, 1989). The results of these surveys were field verified in October and November 2001. The area described in the previous surveys has remained undeveloped and similar in vegetative composition, therefore the description is considered accurate

and applicable. Acreage and habitat quality of each vegetative cover type on the Martin Plant site surrounding the Project are described below.

Improved and Unimproved Pasture (FLUCFCS Codes 211 and 212)

Improved and unimproved pasture comprises approximately 46 and 332 acres of the Martin Plant site, respectively. The herbaceous layer is dominated by thin paspalum (*Paspalum setaceum*), flattop goldenrod (*Euthamia minor*), and broomsedge. The sparse shrub layer when present is dominated by wax myrtle with a low mean percent coverage of 6.5 percent. Although no canopy layer is associated with pastures, some individual trees are present, including punk tree (*Melaleuca quinquevervia*) and slash pine (*Pinus elliotii*). Unimproved pastures also include some individuals of Brazilian pepper (*Schinus terebinthfolius*), sand cordgrass (*Spartina bakeri*), and goldenrod (*Solidago* sp.). Some shallow depressional areas within unimproved pastures include low-growing herbaceous species such as coinwort (*Centella asiatica*), buttonweed (*Diodia virginiana*), and a variety of grasses and sedges.

Herbaceous Rangeland (FLUCFCS Code 310)

Herbaceous rangeland covers approximately 181 acres of the Martin Plant site outside of the Project area. The herbaceous layer is dominated by flattop goldenrod and broomsedge, with mean coverages of 17.6 percent and 14.2 percent, respectively. The shrub layer is dominated by wax myrtle (*Myrica cerifera*) with saw palmetto, runner oak (*Quercus minima*), and saltbush (*Baccharis halimifolia*) also common.

Shrub and Brushland (FLUCFCS Code 320)

The brushland habitat covers approximately 19 acres of the Martin Plant site. Shrub and brushland is dominated by a variety of species, including wax myrtle, cabbage palm, Brazilian pepper, oaks, fetterbush (*Lyonia* spp.), gallberry (*Ilex glabra*), and occasional slash pines. Groundcover vegetative species composition is similar to that of the unimproved pastures and herbaceous rangeland.

Palmetto Prairie (FLUCFCS Code 321)

Approximately 342 acres of the Martin Plant site is classified as palmetto prairie. The dominance of saw palmetto (50-percent average coverage) and the abundance of other shrub species such as wax myrtle, gallberry, and fetterbush is characteristic of palmetto prairies. Several groundcover species were recorded in transect samples, including runner oak and pennyroyal (*Piloblephis rigida*). The sparse canopy is comprised of slash pine and cabbage palm. Other tree species include laurel oak

(*Quercus laurifolia*) and individual specimens of toothache tree (X*anoxylum clava-herculis*) and governor's plum (*Flacoutria indica*).

Pine Flatwoods (FLUCFCS Code 411)

Pine flatwoods constitute approximately 574 acres of the Martin Plant site. The canopy is dominated by slash pine with occasional cabbage palm. Two epiphytes, shoestring fern (*Vittaria lineata*) and golden polypody (*Phlebodium aureum*), are found in association with the infrequent occurrence of cabbage palm in this habitat. The shrub layer is dominated by saw palmetto and wax myrtle with other shrub species characteristic of pine flatwoods, including shiny blueberry (*Vaccinium myrsinites*), gallberry, fetterbush, and rusty lyonia (*Lyonia ferruginea*). Saw palmetto is also dominant in the herbaceous layer, with a variety of subdominant species including blackroot (*Pterocaulon virgatum*), runner oak, pineland daisy (*Chaptalia tomentosa*), tarflower (*Befaria racemosa*), catbrier (*Smilax* sp.), pennyroyal, broomsedge, and sedges (*Rhynchospora* sp.).

Cabbage Palm/Live Oak (FLUCFCS Code 428/427)

The cabbage palm/live oak habitat comprises approximately 15 acres of the Martin Plant site outside of the Project area. The canopy is dominated by cabbage palm, live oak (*Quercus virginiana*), and laurel oak with mean coverages of 40.6 percent, 32.2 percent, and 28.9 percent, respectively. Within the canopy, epiphytic species include needle-leaf wild pine (*Tillandsia setacea*), reflexed wild pine (*Tillandsia balbisiana*), strap fern (*Campyloneurum phyllitidis*), and golden polypody. Vines such as poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), muscadine (*Vitis rotundifolia*), and catbrier are also abundant. The shrub layer is dominated by cabbage palm, while the herbaceous layer is dominated by swamp fern (*Blechnum serrulatum*).

Cabbage Palm/Pine Flatwoods (FLUCFCS Code 428/411)

Mixed cabbage palm and slash pine comprises approximately 56 acres of the Martin Plant site. The canopy is dominated by slash pine and cabbage palm with mean percent coverages of 26.4 percent and 23.2 percent, respectively. Other canopy species include laurel oak, live oak, red bay (*Persea borbonia*), dahoon holly (*Ilex cassine*), and the epiphytic species needle-leaf wild pine, reflexed wild pine, and golden polypody. The shrub layer is dominated by saw palmetto with a mean percent coverage of 44.9 percent, while the dominant groundcover species is swamp fern.

Cypress (FLUCFCS Code 621)

Cypress wetlands comprise approximately 13 acres of the Martin Plant site. The canopy is dominated by bald cypress (*Taxodium distichum*), with red maple, cabbage palm, and laurel oak common. Two bromeliads, needle- leaf wild pine and reflexed wild pine, are also found. The shrub layer is dominated by cabbage palm with a mean coverage of 27.1 percent, along with other common shrubs including elderberry (*Sambucus canadensis*), Virginia willow (*Itea virginica*), wild coffee (*Psychotria sulzneri*), and pond apple (*Annona glabra*). Herbaceous species include switchgrass (*Panicum virgatum*), false nettle (*Boehmeria cylindrica*), coinwort, water hyssop, dayflower (*Commelina diffusa*), fireweed (*Erechtites hieracifolia*), poison ivy, swamp fern, and lizard's tail (*Saururus cernuus*).

Mixed Wetland Forest (FLUCFCS Code 630)

The Martin Plant site contains approximately 14 acres classified as mixed wetland forest. Dominant canopy species include red maple, coastal plain willow, and blackgum (*Nyssa sylvatica* var. *biflora*). Three epiphytic bromeliads, needle-leaf wild pine, reflexed wild pine, and soft-leaved wild pine (*Tillandsia valenzuelana*) are found attached to canopy trees in this habitat. The shrub layer is dominated by primrose willow, while the herbaceous layer contains sawgrass (*Cladium jamaicense*), pickerelweed, smartweed (*Polygonium hydropiperoides*), mermaidweed (*Proserpiraca pectinata*), red ludwigia (*Ludwigia repens*), and fire flag (*Thalia geniculata*).

Sawgrass (FLUCFCS Code 6411)

Sawgrass marsh covers approximately 39 acres of the Martin Plant site in association with wet prairies. Sawgrass dominates the shrub layer of this habitat with a mean percent coverage of 53.0 percent. Other common species in the shrub layer include primrose willow, wax myrtle, buttonbush, and coastal plain willow. The herbaceous stratum is dominated by sawgrass, buttonbush (*Cephalanthus occidentalis*), maidencane (*Panicum hemitomon*), and pickerelweed.

Wet Prairie (FLUCFCS Code 643)

Approximately 110 acres of the Martin Plant site outside of the Project area is classified as wet prairies. The shrub layer is dominated by St. John's wort (*Hypericum fasciculatum*) and corkwood (*Stillingia aquatica*) with mean coverages of 9.9 and 3.1 percent; respectively. The diverse herbaceous layer contains maidencane (*Panicum hemitomon*), redroot (*Lachnanthes caroliniana*), marsh fleabane (*Pluchea rosea*), coinwort, broomsedge, yellow-eyed grass (*Xyris* sp.), sand

cordgrass (*Spartina bakeria*), pipewort (*Eriocaulon* sp.), sundew (*Drosera* sp.), mermaidweed, and sedges (*Rhynchospora* sp.). Small marshes are often located in the middle of some wet prairies on the property, which support pickerelweed, smartweed, and red ludwigia.

Terrestrial Ecology Systems–Fauna

The wildlife habitat in the region surrounding the Martin Plant site has been severely altered by past construction activity. The majority of native habitat within the Project area has been replaced by a manicured grass lawn, which provides poor wildlife habitat. The ditches and stormwater basin provide foraging opportunities for wading birds, although no roosting or nesting habitat occurs within the Project boundary. Habitat for fish and wildlife is provided by the approximately 6,800-acre cooling water reservoir.

Electrical Power Facilities/Open Land (FLUCFCS Code 831/190)

The existing plant and surrounding open areas are poor habitat for wildlife, due to the lack of cover, forage species of vegetation, and disturbance. No species of birds, mammals, or reptiles were observed in those areas classified as electrical power facilities.

Ditches (FLUCFCS 510)

A number of ditches are found within the Martin Plant site. These ditches, while containing no canopy component, still do provide foraging areas for wading birds. Wading birds, including great egret, little blue heron, great blue heron, snowy egret, and tricolor heron are commonly seen on the banks of these man-made ditches.

Stormwater Basins (FLUCFCS 166)

The stormwater detention basins within the Martin Plant site are typically dominated by cat-tail, which has limited value as wildlife habitat. Red-winged blackbirds (*Agelaius phoeniceus*) are known to use cat-tail marshes for foraging and roosting, while wading birds may utilize the edges of the stormwater basin to hunt for small fish.

Pine Flatwoods (FLUCFCS 411)

A small parcel of pine flatwoods is located at the eastern edge of the Project area. The proximity to the existing plant reduces the probability of this area's utilization by wildlife other than those common species acclimated to disturbance. Gray squirrel (*Sciurus carolinensis*), armadillo (*Dasypus*

novemcinctus), red bellied woodpecker (*Melanerpes carolinus*), mockingbird (*Mimus polyglottus*), and red headed woodpecker (*Melanerpes erythrocephalus*) are common inhabitants of pine flatwoods near disturbed sites. The dense understory of saw palmetto limits the habitat suitability for gopher tortoises.

Cooling Pond (FLUCFCS 531)

The cooling pond supports a diverse assemblage of emergent wetland plants, including cat-tail, spatterdock (*Nuphar luteum*), pickerelweed, and maidencane.

Threatened and Endangered Species--Flora and Fauna

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

There are a number of federally and state listed plants and animals that are associated or potentially associated with the Martin Plant site. A number of wetland dependent animal species (e.g., wading birds) have the potential to use the cooling pond, drainage ditches, and stormwater basin for resting and feeding. These species are common to the area and use other similar habitats which are found throughout the surrounding region.

Threatened and Endangered Species--Methodology

Prior to the field surveys, literature and agency surveys were undertaken to determine the species that could potentially be present in the habitats found on the Project area. Primary sources of information are the Florida Natural Areas Inventory (FNAI) database; Florida Committee on Rare and Endangered Plants and Animals (FCREPA) reports; Preservation of Native Flora of Florida Law, Rule Chapter 5B-40, F.A.C., the Regulated Plant Index (5B-40.0055); and Notes on Florida's Endangered and Threatened Plants, FDACS, Division of Plant Industry, Bureau of Entomology, Nematology and Plant Pathology - Botany Section, Contribution No. 38, Addition 2, Gainesville. In addition, previous reports of surveys conducted in and near the site were reviewed.

Plant and Animal Surveys

Because of the rareness and seasonality of threatened and endangered species, either multiseason surveys or an evaluation of threatened and endangered species habitat conditions are necessary to determine their presence or absence on the Project area. For this study an evaluation of the habitat conditions were used to determine the presence or absence of threatened and endangered species. Based on the literature review, federally and state listed species whose ranges include the Project area were identified.

Flora

Threatened, endangered, and/or plant species of special concern that occur within Martin County are listed in Table 2.3-6. Due to the impacted nature of the site, no suitable habitat for listed plant species exists within the Project boundary. The FNAI database review did not result in any occurrences of listed plant species in the vicinity of the Project area.

Fauna

Threatened, endangered, and/or animal species of special concern that occur within Martin County are listed in Table 2.3-6. No unique habitats for threatened and endangered species occur at the plant site. The Florida Natural Areas Inventory database review resulted in one occurrence of an active bald eagle nest approximately 1.5 miles to the west/southwest of the Project area in the Barley Barber Swamp (Figure 2.3-5). In addition, the Florida Game and Freshwater Fish Breeding Bird Atlas Project identified both the bald eagle and the Florida sandhill crane as breeding in the cooling pond to the west of the Project area (Figure 2.3-5).

2.3.6.2 Pre-Existing Stresses

Terrestrial Systems

The greatest pre-existing stress to terrestrial systems of the Project area and surrounding area is the result of past development activity. The natural topography, soils, and hydrology of the Project area are extensively altered as a result of the construction of the existing power plant facilities. As a result the natural ecosystems and wildlife habitat are disturbed. Natural drainage features have been modified.

Aquatic Systems

Aquatic systems in the vicinity of the Project area are subjected to stress from numerous sources. Pre-existing stresses include:

1. Channelization and dredging,
2. Water management practices for St. Lucie Canal,
3. Agricultural development, and
4. Highway construction and operation.

Agricultural development in the area has resulted in the loss of wetlands through ditching and dewatering.

2.3.6.3 Measurement Programs

Terrestrial Ecology

Terrestrial ecological resources were evaluated through site reconnaissance, agency review, previous studies, and literature searches. Vegetative communities, wildlife utilization, and potential for threatened and endangered wildlife occurrence were addressed during the site reconnaissance conducted in October and November 2001 and January 2002.

Threatened and Endangered Species–Methodology

Prior to the field surveys, literature and agency surveys were undertaken to determine the species that could potentially be present in the habitats found on the Project area. Primary sources of information are the FNAI database, FCREPA reports, Preservation of Native Flora of Florida Law, Rule Chapter 5B-40, F.A.C., and the Regulated Plant Index (5B-40.0055), and Notes on Florida's Endangered and Threatened Plants, FDACS. The SCA filed in 1989 for the proposed Martin CG/CC Project was also reviewed.

Wetland Methodology

Two agencies, USACE and FDEP, have rules that apply to wetlands on this site. To be jurisdictional, a wetland must ascribe to three characteristics defined by rule: presence of vegetation listed as belonging in wetlands, having a certain defined hydrology, and the presence of hydric soils.

Within the Project area, the only wetland areas are those man-made ditches and stormwater basins constructed as part of the original facility. Wetland impacts resulting from the construction and

expansion of the existing plant were mitigated through the restoration, preservation, and enhancement of wetlands within an FPL-owned parcel of land located north of the cooling pond.

2.3.7 METEOROLOGICAL AND AMBIENT AIR QUALITY

2.3.7.1 Meteorology

Meteorological data collected at existing monitoring stations were used to describe the local and regional climatology in the vicinity of the Martin Plant. The closest existing meteorological station to the Martin Plant with complete data is the National Weather Service (NWS) station located at the Palm Beach International Airport, situated approximately 45 kilometers (km) (28 miles) southeast of the Martin Plant. The NWS has recorded weather observations for more than 50 years at this site. These data are the most complete for, and representative of, the region surrounding the Project. FDEP has approved the use of these meteorological data in previous air permit applications for this area and recommended that these data be used for this Project.

The climate in the Martin Plant area is subtropical with a marine influence from the Atlantic Ocean. The monthly and annual average temperatures for this area are presented in Table 2.3-7. The annual average temperature is approximately 75°F with monthly average temperatures varying from a maximum of 90°F to a minimum of 56°F. Record extreme temperatures range from a low of 27°F to a record high of 101°F. During the summertime, temperatures rarely exceed 100°F due to the high relative humidities with subsequent cloud cover formation and the abundant convective-type (e.g., thunderstorms) precipitation.

The monthly and annual average precipitation data are presented in Table 2.3-8. Approximately 68 percent of the annual precipitation falls during the 6 warmest months, May through October. The average annual precipitation is approximately 61 in, but this has varied from as little as 39 inches to more than 86 inches in the past 30 years. The majority of rain is in the form of short-lived convection showers (e.g., thunderstorms). Large amounts of rain are also produced during the late summer or fall when tropical storms or hurricanes may pass near the Martin Plant area. These events may result in heavy downpours that reach torrential proportions; 24-hour amounts of from 6 to more than 10 inches are not uncommon.

Monthly and annual average relative humidities, which indicate the amount of moisture in the air at a given temperature, are presented in Table 2.3-8 for the morning hours of 1:00 a.m. and 7:00 a.m. and

early afternoon and evening hours of 1:00 p.m. and 7:00 p.m. The highest humidities are coincident with the coolest ambient temperatures, which generally occur at 7:00 a.m., or near dawn. The lowest humidities coincide with the highest ambient temperatures.

The Project area lies entirely within the trade wind belt (i.e., below 30°N latitude), resulting in predominant winds from the east. Because of the location of the Atlantic ocean, moderate to strong late afternoon sea breezes occur on days with strong land heating and produce localized onshore winds to reinforce the easterly winds. Annual and seasonal windroses for the 5-year period from 1987 through 1991 are given in Figures 2.3-6 through 2.3-10. A summary of the seasonal and annual average wind direction and wind speed, including calm conditions, is presented in Table 2.3-9. The data for this period were also used in the air quality impact analyses for the Project.

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

Atmospheric stability is a measure of the atmosphere's capability to disperse pollutants and potentially reduce ground-level concentrations. During the daytime with strong solar heating, the atmosphere can disperse pollutants very quickly for a relatively short period of time. This condition is considered as very unstable and generally occurs infrequently during the year. During the nighttime under clear skies and light wind speeds, the atmosphere is considered stable with minimal potential to disperse pollutants. During the day or night when wind speeds are moderate to high, pollutants are dispersed at moderate rates (i.e., dispersion rates that are lesser than those during unstable conditions but greater than those during stable conditions). This condition is considered neutral and occurs frequently throughout the year. The seasonal and annual average occurrences of atmospheric stability classes for this area for 1987 to 1991 are shown in Table 2.3-10. During the summer months, unstable conditions occur nearly 28 percent of the time due to strong solar heating, whereas unstable stability occurs only 7 percent of the time in the winter months. Neutral stability occurs most frequently during the winter months due to the higher wind speeds that occur in this season. The occurrence of stable stability is nearly uniform throughout the year.

The mixing height is a parameter used to define the vertical height to which pollutants can disperse and, therefore, is used in estimating the volume of air in which pollutants are emitted and can be

dispersed. In general, the higher the mixing height, the greater the potential for pollutants to be dispersed and for ground-level concentrations to be reduced.

The seasonal and annual average morning and afternoon mixing heights for the Martin Plant area for 1987 to 1991 determined using the Holzworth method are listed in Table 2.3-11. The highest afternoon mixing heights occur in the spring and the lowest morning mixing heights occur in winter.

Thunderstorms are the most frequent of severe storms, occurring an average of 79 days per year as reported by the NWS at Palm Beach International Airport. These storms occur throughout the year, but about 81 percent occur from May through October.

Hurricanes and tornadoes are other types of severe weather that can occur at the Project area, but the probability of a hurricane or tornado passing over the Martin Plant is low.

In the 80-km (50-mile) coastal strip from Jupiter to Vero Beach, there is about a 11 percent chance that a tropical storm will pass over the area during any given year (Gale Research Co., 1980). For storms of hurricane strength (i.e., wind speeds exceeding 73 mph), the chance decreases to about 8 percent with a 5-percent chance that the winds will be greater than 124 mph (i.e., wind speeds of a great hurricane).

Statistics compiled by the severe local storms branch of the national severe storms forecast center (Pautz, 1969) show that 3 tornadoes were spotted within the 1 degree latitude by 1 degree longitude square centered near the Martin Plant site from 1955 to 1967. This averages less than one tornado per year. The tornado recurrence interval for any specific point location within the 1 degree square was estimated by the methodology of Thom (1963). The recurrence interval, r, is equal to 1/p where p is the probability of a tornado striking within the 1 square area and is estimated as follows:

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

where: t = mean annual frequency of tornadoes occurring, and
a = area of the 1°square (square miles).

In this analysis, t was assumed to be 1.3 based on data collected from 1953 to 1962 and a was estimated to be 4,240 square mile (mi^2). Therefore, the mean recurrence interval for a tornado

striking a point within this square is more than 1,000 years. The month during which tornadoes occur most frequently is June.

2.3.7.2 Ambient Air Quality

Ambient Standards

The National and Florida Ambient Air Quality Standards (AAQS) are presented in Table 2.3-12. Primary National AAQS were promulgated to protect the public health, and secondary National AAQS were promulgated to protect the public welfare from any known or anticipated adverse effects associated with the presence of pollutants in the ambient air. Areas of the country in violation of AAQS are designated as nonattainment areas, and new sources to be located in or near these areas may be subject to more stringent air permitting requirements. Pollutants for which AAQS have been established are referred to as criteria pollutants. These pollutants include particulate matter with an aerodynamic particle size of 10 micrometers (μm) or less (PM_{10}), sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and lead (Pb).

On July 18, 1997 the U.S. Environmental Protection Agency (EPA) promulgated revisions to the National AAQS for O_3 and particulate matter (PM) (62 Federal Register No. 138). The O_3 standard was modified to be 0.08 parts per million (ppm) for a 3-hour average concentration; this standard is achieved when the 3-year average concentration of the 99th percentile values is 0.08 ppm or less. The revised PM AAQS included two new $PM_{2.5}$ standards ($PM_{2.5}$ represents PM with an aerodynamic diameter of 2.5 μm or less), a short-term 24-hour average standard and an annual average standard as well as a revised PM_{10} standard. The $PM_{2.5}$ standards were introduced with a 24-hour standard of 65 micrograms per cubic meter ($\mu g/m^3$) (3-year average concentration of the 98th percentile values) and an annual standard of 15 $\mu g/m^3$ (3-year average concentration at community monitors). The revised PM_{10} standard changes the form of compliance from an expected exceedance not to be exceeded more than once per year averaged over 3 years to a 3-year average concentration of the 99th percentile values. The courts have stayed these revised AAQS. As a result, the FDEP has not yet adopted them. Based on evaluations performed by FDEP, Martin County would meet the revised AAQS.

Martin County is classified as an attainment area for all criteria pollutants (Rule 62-204.340, F.A.C.). Adjacent counties, such as St. Lucie and Palm Beach Counties, are also classified as attainment areas for all criteria pollutants.

In promulgating the 1977 Clean Air Act (CAA) Amendments, congress specified that certain increases above an air quality *baseline concentration* level of SO_2 and PM concentrations would constitute *significant deterioration* for sources located in attainment areas. The magnitudes of the allowable increases, or prevention of significant deterioration (PSD) increments, depend on the classification of the area in which a new source (or modification) will be located or have an impact. Three PSD increment classifications were designated based on criteria established in the 1977CAA amendments. Initially, Congress promulgated areas as either Class I (national parks, national wilderness areas, and memorial parks larger than 5,000 acres, and national parks larger than 6,000 acres) or as Class II (all areas not designated as Class I). No Class III areas, which would be allowed greater deterioration than Class II areas, were designated. EPA then promulgated as regulations the requirements for classifications and area designations.

On October 17, 1988, EPA promulgated regulations to prevent significant deterioration due to NO_x emissions and established PSD increments for NO_2 concentrations. The EPA class designations and allowable PSD increments are presented in Table 2.3-12. Florida has adopted the EPA allowable increments for PM_{10}, SO_2, and NO_2.

Martin County is classified as a Class II area (Rule 62-204.340, F.A.C.) since it is an attainment area for all pollutants. The nearest Class I area to the Martin Plant is the Everglades National Park (NP) located about 144 km (86 miles) to the south.

Ambient Air Quality Data

The Martin Plant is located in a rural area of Martin County, which has a minimal number of air pollution sources. Air monitoring data are not collected in the county. Air monitoring data are collected for PM_{10}, O_3, and NO_2 in St. Lucie County. These data are representative of air quality in Martin County. Air monitoring data are collected for PM_{10}, O_3, SO_2, and CO in Palm Beach County, but these data are representative of air quality for areas with more industrial development than that around the Martin Plant site. The SO_2 and CO from Palm Beach County were used to provide a conservative indication of air quality in Martin County.

A summary of the maximum pollutant concentrations measured in St. Lucie and Palm Beach Counties from 1998 through 2001 is presented in Table 2.3-13. These data indicate that the maximum air quality concentrations measured in the region are well below applicable standards.

Given the lack of industrial development in the vicinity of the plant, existing concentrations of other criteria pollutants, i.e., SO_2, NO_2, CO, and Pb, which are usually associated with an urban environment, are expected to be well below the AAQS.

Existing Air Pollutant Sources

The Martin Plant is located in an area with a minimal number of air pollution sources. The existing Martin Plant consists of two fossil fuel-fired steam electric generators (Units 1 and 2), two combined cycle CTs (Units 3 and 4), and two simple cycle CTs (Units 8A and 8B). Units 1 and 2, have a nominal capacity of 1,600 MW and fire natural gas and low sulfur (0.7 percent) residual oil. Units 3 and 4 have a nominal capacity of 1,000 MW. Each of the combined cycle units consists of two General Electric Frame 7F CTs, associated HRSGs and a single steam turbine. Units 8A and 8B consist of two nominal 170-MW CTs that can fire natural gas with light oil used as a alternative fuel.

Existing major sources with PM, SO_2, or NO_x emissions greater than 100 tons per year (TPY) and within 25 km (16 miles) of the Martin Plant include the Indiantown Cogenerating Plant, Pratt & Whitney, Osceola Farms, and U.S. Sugar Bryant. In general, other major air pollution sources are located more than 30 km (19 miles) from the Martin Plant.

2.3.7.3 Measurement Programs

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

Meteorological data were obtained from the NWS surface and upper-air station at the Palm Beach International Airport. These data were obtained for a 5-year period from 1987 through 1991 from which the joint frequency of wind direction, wind speed, and atmospheric stability and a 5-year average of mixing heights were developed. Since 1986, the wind sensors at the Palm Beach International Airport have been located 33 ft above grade. Regular surface observations are taken just before each hour, 7 days per week. Upper-air soundings are conducted twice per day at 0700 and 1900 eastern standard time.

A PSD preconstruction ambient air monitoring analysis was developed as part of the licensing planning to satisfy PSD requirements. Since the estimated increase in potential emissions due to the Project exceeds the significant emission rates for several regulated pollutants, including CO and volatile organic compounds (VOC), an ambient air monitoring analysis is required for these pollutants (O_3 in the case of VOC emissions). However, monitoring is not required since the facility's impacts of applicable pollutants are predicted to be below the *de minimis* impact levels for certain pollutants (e.g., CO). For those pollutants, an exemption from monitoring is provided for impacts less than *de minimis* impact levels [Rule 62-212.400(3)(e), F.A.C.].

Available monitoring data recently collected from regional monitoring sites were used to support the impact evaluation and are included in the Air Permit/PSD Application.

2.3.8 NOISE

2.3.8.1 Background

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

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

$$SPL = 20 \log_{10} (P_e/P_o)$$

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

P_o = reference effective pressure of 20 Pa.

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

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

In 1998, Martin County amended the existing countywide noise control ordinance. Ordinance 531 and its enforcement are based on receiving land use categories as follows:

Receiving Land Use Category	Time	Sound Level Limit (dBA)
Institutional	7:00 a.m. – 9:00 p.m.	55 dBA
Includes the following designations: General Institutional, Recreational, and Public Conservation	9:00 p.m. – 7:00 a.m.	50 dBA
Residential	7:00 a.m. – 9:00 p.m.	60 dBA
Includes the following designations: Rural, Estate, Low, Medium, High, and Mobile Home Densities	9:00 p.m. – 7:00 a.m.	55 dBA
Commercial	7:00 a.m. – 9:00 p.m.	65 dBA
Includes the following designation: General, Limited, COR, and Waterfront Commercial	9:00 p.m. – 7:00 a.m.	60 dBA
Industrial	7:00 a.m. – 9:00 p.m.	70 dBA
	9:00 p.m. – 7:00 a.m.	65 dBA
Agricultural	7:00 a.m. – 9:00 p.m.	70 dBA
	9:00 p.m. – 7:00 a.m.	65 dBA

In addition to the sound level limits established for each receiving land use category, Martin County's noise ordinance requires a 5-dBA reduction for each sound level limit established for each receiving land use category for any source of sound which emits a pure tone, as defined by the ordinance. The noise ordinance is enforced by the Martin County Sheriff's Office as specified in the County's code. Under this ordinance, the residential sound level limits are 60 dBA during the daytime and 55 dBA during the nighttime.

2.3.8.2 Noise Measurement Procedures

A comprehensive ambient noise-monitoring program was performed to assess the existing ambient noise levels in the Project area and the FPL Martin Plant site. The field effort to collect the baseline noise level data was conducted on December 19 and 20, 2001. The equipment used to monitor the baseline noise levels operated in the slow response mode to obtain accurate, integrated, A-weighted sound pressure levels. A windscreen was used because all measurements were taken outdoors. The microphone was positioned so that a random incidence response, as specified by the American National Standard Institute (ANSI), was achieved. The sound level meter and octave band analyzer were calibrated immediately prior to and just after the sampling period to provide a quality control check of the sound level meter's operation during monitoring.

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

- L_{eq} The sound pressure level averaged over the measurement period; this parameter is the continuous steady sound pressure level that would have the same total acoustic energy as the real fluctuating noise over the same time period;
- Max The maximum sound pressure level for the sampling period;
- Min The minimum sound pressure level for the sampling period; and
- Ln The sound pressure levels, which were exceeded n% of the time during sampling period. For example, L_{50} is the sound level exceeded 50 percent of the time during the monitoring period.

The SPL data were analyzed and reported in both dB and dBA. The higher the decibel value, the louder the sound.

The SPLs and octave band data were collected at the monitoring locations, for a minimum of 15 continuous minutes, using measurement techniques set forth by American National Standard Institute (ANSI) S12.9-1993/Part 3 (ANSI, 1993).

The noise monitoring equipment used during the study included:

1. Continuous Noise Monitoring Equipment
   a. Larson Davis Model 824 Precision Integrating Sound Level Meter with Real Time Frequency Analyzer
   b. Larson Davis Model PRM902 Microphone Preamplifier
   c. Larson Davis Model 2560 Prepolarized 1/2" Condenser Microphone
   d. Windscreen, tripod, and various cables
2. Sound Level Meter Calibration Unit
   a. Larson Davis Model CAL200 Sound Level Calibrator, 94/114 dB at 1,000 Hz.

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

The SPLs and octave band data were collected at six different locations (Figure 2.3-11). These are the same six sample locations that were used in a background noise study that was conducted in January 2000 for the licensing of Units 8A and 8B. Four of the six monitoring locations, (Sites 3, 4, 5, and 6) were chosen to delineate the noise levels at or near the plant property boundaries. Additionally, Sites 3, 4, and 6 were selected because they are the nearest residential receptors to the Martin Plant. The two remaining monitoring sites (Sites 1 and 2) were selected to determine the existing noise levels within the Martin Plant property: at the location of Units 8A and 8B; (Site 2) and in the Barley Barber Swamp (Site 1). Noise monitoring was performed at the six sites during the daytime (7 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.).

The Larson Davis sound level meter complies with Type I--Precision requirements set forth for sound level meters and for one-third octave filters. The L_{eq} (equivalent sound pressure level averaged for the sampling period) as well as the maximum, minimum and Ln SPLs during each monitoring episode were recorded and are presented in Table 2.3-14. The one-third-octave band

information, recorded sound pressure over time, and calibration certificates are provided in Appendix 10.5.1. The average minimum, maximum, L_{90} and L_{eq} SPLs for each site were calculated. The SPL averages were calculated using the following formula:

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

where: N = number of observations.

SPL_i = individual sound pressure level in data set.

2.3.8.3 Existing Ambient Sound Pressure Level Conditions

The daytime and nighttime ambient noise levels measured in December 2001 and reported as an equivalent sound pressure level (L_{eq}), are presented in Table 2.3-14 for each of the monitoring sites. Figure 2.3-12 presents the observed sound pressure levels for each site relative to the minimum SPL, Ln(%) and maximum SPL.

The highest L_{eq} observed during the 2001 noise monitoring for the daytime and nighttime periods were 66.8 dBA and 64.0 dBA, respectively measured at Site 2. This monitoring site is located within the Martin Plant site and measured noise for the existing plant equipment. The highest L_{eq} noise levels measure observed off the Martin Plant site were 62.3 dBA measured during both the daytime nighttime periods at Site 4. The elevated noise levels at Site 4 were due to the persistent vehicular traffic on SR 710. The minimum sound levels observed at Site 4 for the daytime and nighttime periods were 36.9 and 35.3 dBA, respectively. Minimum sound pressure levels primarily represent sound contributions from continuous noise sources such as the generating equipment at the Martin Plant. This can be seen by the minimum sound pressure levels observed at Site 2, which is in very close proximity to the existing power generating equipment. As shown in Table 2.3-14, the minimum sound pressure levels for daytime and nighttime at Site 2 are less than 5 dBA different than the L_{eq}. In contrast, the influence of sporadic SR 710 traffic on observed sound levels at Site 4 can be seen from the difference between the minimum sound pressure level and L_{eq}, which is greater than 20 dBA. The minimum noise levels at all offsite locations, without the traffic, are far below the County's noise standards. During the monitoring, no pure tones were observed except for the nighttime sound levels at Sites 1 and 6. These pure tones were a result of insects and contributed to the observed L_{eq} levels.

The sound levels observed at Sites 1, 3, 4, 5, and 6 were similar and within the noise levels observed during the noise monitoring conducted in January 2000 and prior to the construction of Units 8A and 8B. The observed L_{eq} in January 2000 for Sites 1, 3, 4, 5, and 6 were 38.5, 54.2, 51.3, 50.4 and 52.6 dBA, respectively.

Sound monitoring was also conducted in 1989 as part of the Martin CG/CC Project. Three of the sites where monitoring was conducted in 1989 were the same as those where sound monitoring was conducted in 2001. The following shows a comparison of the observed L_{eq} during the daytime and nighttime at those three sites.

		L_{eq} Noise Levels	
Site	Period	1989	2001
4	Day	57.7	62.3
4	Night	46.4	62.3
5	Day	57.4	58.4
5	Night	52.3	52.1
6	Day	51.6	42.5
6	Night	39.1	46.8

The observed L_{eq} were almost identical for Site 5. Differences in L_{eq} observed at Site 4 were primarily due to traffic. However, observed L_{90} sound levels, which eliminate the influence of traffic were very similar at Site 4 during 1989 and 2001. The observed daytime L_{90} levels in 1989 and 2001 were 46.4 and 42.3, respectively. The observed nighttime L_{90} level in 1989 and 2001 were 38.4 and 35.9, respectively. At Site 6, the observed daytime L_{90} noise levels in 2001 were lower than those observed in 1989. The observed nighttime L_{eq} levels at Site 6 were primarily attributed to natural sounds (insects and alligators).

As shown in Figure 2.3-12, with the exception of Site 4, the noise levels observed on receiving land use outside the Martin Plant site (Sites 3, 5, and 6) were at/or less than 60 dBA for 99 percent of the daytime monitoring period (i.e., L_1). As previously mentioned, the sound levels observed at Site 4 were due to traffic on SR 710. The observed nighttime measurements at Sites 3, 5, and 6 were at/or less than 55 dBA for 99 percent of the daytime monitoring period.

The Martin County noise control ordinance defines "ambient noise level"as the L_{90}. This is the A-weighted sound pressure level exceeded ninety percent of the time. This ambient noise level would be the background sound level from which a comparison to the Martin County noise ordinance would be made. The L_{90} includes the noise from the existing Martin Plant since the power units operate continuously.

As shown in Table 2.3-14, the daytime L_{90} sound levels at the off-site monitoring locations (Sites 3, 4, 5, and 6) range from 37.3 dBA to 42.3 dBA at Sites 6 and 4, respectively. These are less than the Martin County maximum permissible daytime sound levels of 60 dBA for residential land use designations. The nighttime L_{90} sound levels at the off-site monitoring locations range from 35.9 dBA to 46.3 dBA at Sites 4 and 6, respectively. These are less than the Martin County maximum permissible nighttime sound levels of 55 dBA for residential land use designations.

The sound monitoring data indicate that the existing sound levels at receiving land use meet the applicable daytime and nighttime for residential and agricultural land use categories. Based on these monitoring results, the ambient noise levels at all the monitoring locations comply with the Martin County noise control ordinance.

Table 2.2-1. Areas Not Found within 5 Miles of the Martin Expansion Project Area

National	State	Other
Park	Park	County Park
Forest	Forest	Special Management Area Established by Law
Seashore	Archeological Landmarks or Landmark Zone	Indian Reservation
Wildlife Refuge	Save Our Rivers Land	Military Land
Wilderness Area	Area of Critical State Concern	Major Private Land-Holding for which the Primary Purpose is Environmental Protection
Memorial	Conservation and Recreation Lands	
Monument	Game Management Area	
Marine Sanctuary	Aquatic Preserve	
Estuarine Sanctuary	Outstanding Florida Waters	
Critical Habitat of Endangered Species	Scenic and Wild River	
Roadless Area Review and Evaluation (RARE) Area		
Wild and Scenic River		

Source: FPL, 1989; Golder, 2000.

Table 2.2-2a. Permanent Population - Martin County

Comprehensive Plan Planning Areas	Estimated 1 Apr 96	Estimated 1 Apr 97	Estimated 1 Apr 98	Estimated 1 Apr 99	Projected Apr 2000	Projected Apr 2001	Projected Apr 2002	Projected Apr 2003	Projected Apr 2004	Projected Apr 2005	Projected Apr 2010
Hutchinson Island	2158	2214	2291	2346	2413	2473	2534	2595	2655	2716	3009
Indiantown	5527	5498	5517	5530	5546	5561	5576	5591	5606	5621	5693
North County	14445	15047	15807	16348	17000	17596	18191	18786	19382	19977	22853
North-Mid County	1856	1942	2048	2123	2214	2297	2380	2463	2546	2629	3031
North River Shores	3345	3357	3401	3432	3469	3503	3537	3571	3605	3639	3803
Palm City	15835	16335	17000	17474	18045	18566	19087	19609	20130	20651	23170
Salerno/76 Corridor	24369	24544	24945	25231	25576	25890	26205	26520	26834	27149	28668
South County	23920	24204	24716	25081	25520	25922	26323	26724	27125	27526	29464
South-Mid County	3526	3795	4098	4314	4574	4812	5050	5287	5525	5763	6911
Stuart Urban	17250	17179	17260	17317	17387	17450	17513	17576	17640	17703	18008
West County	2222	2245	2288	2318	2355	2389	2423	2456	2490	2524	2687
Totals	114464	116359	119370	121514	124099	126459	128819	131179	133538	135898	147297

Table 2.2-2b. Peak Population - Martin County

Comprehensive Plan Planning Areas	Estimated 1 Apr 96	Estimated 1 Apr 97	Estimated 1 Apr 98	Estimated 1 Apr 99	Projected Apr 2000	Projected Apr 2001	Projected Apr 2002	Projected Apr 2003	Projected Apr 2004	Projected Apr 2005	Projected Apr 2010
Hutchinson Island	6151	6309	6530	6687	6876	7049	7222	7395	7568	7741	8576
Indiantown	6301	6267	6289	6304	6323	6340	6357	6374	6391	6408	6489
North County	17334	18056	18968	19617	20400	21115	21829	22544	23258	23973	27424
North-Mid County	2246	2349	2478	2569	2679	2780	2880	2981	3081	3182	3667
North River Shores	3813	3827	3877	3912	3954	3993	4032	4071	4109	4148	4335
Palm City	19161	19765	20570	21143	21834	22465	23096	23727	24357	24988	28035
Salerno/76 Corridor	30462	30680	31182	31539	31970	32363	32756	33149	33543	33936	35835
South County	28226	28561	29165	29595	30114	30587	31061	31534	32008	32481	34768
South-Mid County	3995	4288	4631	4875	5169	5438	5706	5975	6243	6512	7809
Stuart Urban	21045	20959	21057	21127	21212	21289	21366	21443	21520	21598	21970
West County	2334	2357	2402	2434	2473	2508	2544	2579	2615	2650	2821
Totals	141067	143419	147148	149802	153004	155927	158849	161771	164693	167615	181731

Source: Martin County Growth Management Department
Population Technical Bulletin, June 2000

Table 2.2-3. Weighted Average Population Estimates and Projections - Martin County

Comprehensive Plan Planning Areas	Estimated Apr 96	Estimated Apr 97	Estimated Apr 98	Estimated Apr 99	Projected Apr 2000	Projected Apr 2001	Projected Apr 2002	Projected Apr 2003	Projected Apr 2004	Projected Apr 2005	Projected Apr 2010
Hutchinson Island	3822	3920	4057	4155	4273	4380	4487	4595	4702	4810	5328
Indiantown	5849	5818	5838	5853	5870	5886	5901	5917	5933	5949	6025
North County	15649	16301	17124	17710	18417	19062	19707	20352	20997	21642	24758
North-Mid County	2019	2111	2227	2309	2408	2498	2588	2679	2769	2859	3296
North River Shores	3540	3553	3599	3632	3671	3707	3743	3779	3815	3851	4025
Palm City	17221	17764	18487	19002	19624	20191	20758	21325	21891	22458	25197
Salerno/76 Corridor	26908	27101	27544	27859	28240	28587	28935	29282	29629	29977	31655
South County	25714	26020	26570	26962	27434	27866	28297	28728	29160	29591	31647
South-Mid County	3727	4000	4320	4548	4822	5073	5323	5574	5824	6075	7285
Stuart Urban	18831	18754	18842	18905	18980	19049	19119	19188	19257	19326	19659
West County	2269	2291	2335	2367	2404	2439	2473	2508	2542	2577	2743
Totals	125549	127634	130944	133301	136143	138737	141331	143925	146519	149114	161644

Source: Martin County Growth Management Department
Population Technical Bulletin, June 2000

Table 2.2-4 Martin County Estimated Housing Units by Type and Area - January 1, 1987 - April, 1995

	1987	Dwelling Unit Growth	1995 Total	% Growth Change
Single family dwelling units by area - Incorporated				
Jupiter Island	459	20	479	4.2
Stuart	3,759	156	3,915	4
Sewall's Point	598	70	668	10.5
Unincorporated	22,809	3,511	26,320	13.3
Multi-family dwelling units by area - Incorporated				
Jupiter Island	0	0	0	0
Stuart	4,812	656	5,468	12
Sewall's Point	0	0	0	0
Unincorporated	16,710	1,596	18,306	8.7
Incorporated Total	9,628	902	10,530	8.6
Unincorporated Total	39,519	5,107	44,626	11.4
County-Wide Total	49,147	6,009	55,156	10.9

Sources: January, 1987 estimates were generated from Martin County building permit data. April, 1995 estimates were obtained from Martin County Growth Management Department Housing Inventory, EAR Appendix Table 6.b.11.

Table 2.2-5. 1989 Current Inventory of Community Parks of Martin County

Planning Areas	Park	Acreage
North County	Palm Lake Park	4.8
	Savanna Road Park	2
	Langford Park	17
	Jensen Elementary	12
	Stuart Beach	1
	Jensen Causeway	3.5
	Florida Institute of Technology (FIT)	4
	St. Martins Catholic Church	2.5
	Pinelake Park	0.8
	Wastewater Plant (1)	8
Unincorporated Stuart Area	YMCA	30
	Stuart Causeway	2
Port Salerno/76 Corridor	Lamar Howard Park	4
	Wojciescak Park	12
	New Monrovia Park	2
	Martin County High	28.34
	Murray Middle School	3
	Port Salerno Elementary	0.5
	Rocky Pt. Hammock Park	
Palm City	Leighton Park	5
	Palm City Park	24
	Palm City Elementary	3.5
	Danforth Creek Park (1)	20
North Mid-County	Tropical Farms Park	3
South Mid-County	South Fork High School	16.18
South County	J.V. Reed Park	10
	St. Christopher's ballfield	2.3
	Hobe Sound Elementary	5.6
	Zeus Park	4.5
	Eastridge	4
	Pettway	0.75
	Porter Park	0.5
	Greenfield	0.5
	Peck Lake (2)	5
West County	Big Mound Park	21
	Kiwanis Park	7.5
	Booker Park ballfield	5.5
	Warfield Elementary	3
	Indiantown Middle School	6.82
	Martin Grade	5
	Phipps	1
	West Brook	0.38
		174 acres
		294.47

Source: Martin County Parks and Recreation Department, October 1991.



Table 2.3-1. Mean Monthly Temperature, Precipitation, and Evaporation

Month	Temperature[1] (1924 – 1978)	Precipitation[2] (Jan. 1936 – March 1999)	Evaporation[2] (1941- 1954)
January	62.8 (°F)	1.75 (inches)	3.09 (inches)
February	63.7	2.04	3.40
March	67.3	2.93	4.60
April	71.3	2.36	6.30
May	75.1	3.85	6.84
June	78.8	6.54	5.71
July	80.3	6.28	5.08
August	80.7	5.94	5.32
September	79.7	6.41	4.47
October	75.1	4.43	3.99
November	68.6	1.81	3.55
December	64.0	1.60	2.97
Annual	72.3	46.51	57.86

Notes: [1] Belle Glade is approximately 24 miles SSE of the Martin Plant Site

[2] The S308 Structure is approximately 2.5 miles southeast of the site.

Source: NOAA, 1978; SFWMD, 1999.

Table 2.3-2. Mean Discharges (flows in cfs) – St. Lucie Canal (1963 through 1999)

	Location	
Month	Port Mayaca	Stuart Lock
January	326	509
February	402	555
March	669	760
April	739	812
May	128	382
June	41	567
July	261	807
August	255	1,178
September	-85	933
October	145	1,038
November	301	880
December	203	557
Yearly Mean	284 [a]	748 [b]

[a] 205,900 acre-ft.

[b] 542,300 acre-ft.

Source: SFWMD, 1999.

Table 2.3-3. Water Use - Martin Plant Vicinity by SFWMD - Water Use Permit Number

SFWMD Permit No.	Name	Source	Use	Annual Allocation (Million Gallons)	Location(s)
43-00001-W	Latt Maxcy Corporation	SW RIM CANAL	AGR	0.00000	S8, 9, 16, 20, 21/T39S/R37E
43-00018-W	Camayen Cattle Company	SW L-47 CANAL	AGR	5652.1500	S20-22, 27-29, 33-35/T39SR37E
43-00022-W	FPL Martin Plant	GW SHALLOW	IND	250.00000	S29/T39S/R38E S30/T39S/R38E
43-00028-W	Byron Grant Citrus Grove	GW FLORIDAN	AGR	54.09000	S4,5,8,9/T39S/R38E
43-00037-W	Camayen Cattle Company	SW L-47 CANAL	AGR	400.76000	S20-22/T39S/R37E
43-00038-W	Mayaca Land Corporation	SW C-44 CANAL	AGR	2992.17000	S13,14,22-26/T40S/R37E
43-00041-W	Indiantown Company, Inc.	GW SHALLOW	PWS	355.0000	S36/T39S/R38E S31/T39S/R39E S1/T40S/R38E S5-8/T40S/R39E
43-00071-W	Joseph D Farish, Jr.	GW SHALLOW FLORIDAN	AGR	57.49000	S32/T39S/R38E S5/T40S/R38E
43-00084-W	Indiantown Water Control Dist.	SW C-44	AGR	432.29000	S27-29,32-34/T39S/R38E S3-5/T40S/R38E
43-00112-W	Via Tropical Fruits, Inc., Groves	SW C-44	AGR	625.54000	S1-3, 10-12/T40S/R38E S34,35/T39S/R38E S6,7/T40S/R39E
43-00113-W	Via Tropical Fruits, Inc., Groves	SW C-44	AGR	331.17000	S32/T39S/R38E S13/T40S/R37E S5-8,18/T40S/R38E
43-00122-W	Via Tropical Fruits, Inc., Groves	SW C-44	AGR	3099.97000	S3,10-16,21-27,34/T40S/R38E S7,8,17,18/T40S/R39E
43-00159-W	Sullivan, Frank E., III & Jeanett; Huffman, Anthony & Mary Ann	GW FLORIDAN	AGR	49.21000	S22,27/T39S/R38E
43-00172-W	T & T Enterprises Orange Grove	GW FLORIDAN	AGR	73.59000	S28,29,32,33/T39S/R38E
43-00190-W	Macmillan, Neil E.	GW FLORIDAN SHALLOW	AGR	47.34000	S24,25,36/T38S/R37E S19,30/T38S/R38E S1,12/T39S/R37E

Table 2.3-3. Water Use - Martin Plant Vicinity by SFWMD - Water Use Permit Number

SFWMD Permit No.	Name	Source	Use	Annual Allocation (Million Gallons)	Location(s)
43-00206-W	Bloods Hammock Groves Inc	GW SHALLOW	AGR	18.40000	S32-33/T39S/R38E
43-00217-W	Caulkins Indiantown	GW SHALLOW	AGR	85.6000	S14,23,26/T39S/R38E
43-00229-W	Greene, Maccarthy, Abbot & Whitler	GW SHALLOW	AGR	15.64000	S29,32/T39S/R38E
43-00231-W	Greene, Maccarthy, Abbot & Whitler	GW SHALLOW	AGR	15.64000	S32/T39S/R38E
43-00247-W	Citrus Grove	SW C-44	AGR	34.50000	S9,10,15,16/T40S/R38E
43-00252-W	Camayen Cattle Company	SW C-44	AGR	230.17000	S13,14/T40S/R37E
43-00351-W	Hatcher. Walter	GW SHALLOW	AGR	63.57000	S22,23,26,27/T39S/R38E
43-00362-W	Caulkins Indiantown Citrus Co.	GW SHALLOW FLORIDA	IND	49.93200	S26,27,34,35/T39S/R38E
43-00418-W	Knight, S. N. & Sons, Inc.	GW SHALLOW	AGR	35.42000	S4,5/T40S/R38E
43-00445-W	Daniels Grove	GW SHALLOW	AGR	8.74000	S13/T39S/R37E
43-00501-W	Fennel, Howard 43-Acre Grove	GW FLORIDAN	AGR	15.27000	S21,22/T39S/R38E
43-00503-W	Fennel, Frank	GW FLORIDAN	AGR	11.29000	S12,15,22/T39S/R38E
43-00516-W	Bargas, John	GW SHALLOW	AGR	35.03000	S22,23/T39S/R38E
43-00540-W	V.B.Q. Tree Farm	GW SHALLOW	NUR	0.05510	S23/T39S/R38E
43-00541-W	Myers, C.B. Grove, Inc.	GW SHALLOW	AGR	55.19000	S33,34/T39S/R38E S4/T40S/R38E
43-00545-W	Heller Brothers	GW SHALLOW	AGR	160.98000	S3,4,10/T39S/R37E
43-00574-W	Taylor & Modeen Reality Company	GW SHALLOW FLORIDAN	NUR	0.03600	S11/T/39S/R38E
43-00617-W	Gray, James J. & Daniels, Freddie	GW SHALLOW	AGR	35.88000	S17/T39/R38E
43-00625-W	Via Tropical Fruits Inc.	GW SHALLOW FLORIDAN	AGR	253.89000	S13,13,23-26,35,36/T39S/R38E
43-00656-W	Alderman Grove	GW SHALLOW FLORIDAN	AGR	55.88000	S15,22/T39S/R38E
43-00724-W	Daniels, R; Dozier, J Gray	GW SHALLOW	AGR	28.26000	S12,13/T39S/R37E
43-00732-W	Bloods Hammock Grove	GW SHALLOW	AGR	38.18000	S33/T39S/R38E S3/T40S/R38E
43-00811-W	Carmine, Charles	GW SHALLOW	AGR	0.00000	S2/T39S/R37E
43-00866-W	Fox Brown Road Grove	GW SHALLOW FLORIDAN	AGR	221.49000	S15/T39S/R38E
43-00894-W	SFWMD (Dupuis Reserve)	GW SHALLOW	PWS	0.00000	S18/T40S/R38E
43-01074-W	Haverland Turf Farms	GW SHALLOW	AGR	117.73000	S22/T39S/R38E S27/T39S/R38E

Table 2.3-3. Water Use - Martin Plant Vicinity by SFWMD - Water Use Permit Number

SFWMD Permit No.	Name	Source	Use	Annual Allocation (Million Gallons)	Location(s)
43-01078-W	Salajai Farms	GW SHALLOW	AGR	0.00000	S22/T39S/R38E
43-01079-W	City of Pahokee Port Mayaca Cemetery Irrigation	SW C-24	LAN	0.00000	S13/T40S/R37E
43-01090-W	Frank Hill Nursery	SW ONSITE	NUR	0.00000	S36/T38S/R37E
43-01137-W	Frank R. Hill Tree Farm	SW ONSITE	AGR	0.00000	S14/T39S/R38E
82-00393-W	Phares, Jack	GW SHALLOW	IND	1.9000	S33/T39S/R38E
82-00394-W	Green, Harry	GW SHALLOW	AGR	1.9000	S33/T39S/R38E
83-00055-W	Ilake, Roger D.	GW SHALLOW	IND	0.0009	S31/T39S/R39E
84-00098	Lewis, Curtis R.	GW	PWS	0.0000	S8,17/T39S/R37E
87-00185-W	VFW Post 6023	GW SHALLOW	GEN	0.0005	S30/T39S/R39E
87-00361-W	Island Plant Nursuries	GW SHALLOW	NUR	0.0600	S14/T39S/R38E
87-00372-W	Tampa Farm Service, Inc.	GW SHALLOW	GEN	0.0909	S22/T39S/R38E S27/T39S/R38E S34/T39S/R38E
87-00451-W	Florida Steel Corporation	GW SHALLOW	GEN	0.0500	S35/T39S/R38E
88-00396-W	Schenk, Douglas	GW SHALLOW	PWS	0.0980	S2/T40S/R38E

AGR - Agriculture
PWS - Public Water Supply
IND - Industrial
NUR - Nursery
LAN - Landscape Irrigation
GEN – Generic permits issued for unspecified uses.

Table 2.3-4. State Water Quality Criteria and Monitored Parameters at S308, Port Mayaca

Parameter	State Criteria for Class III	Minimum	Maximum	Average	Number of Samples
Alkalinity	20 (min.)	55.2	195.8	115.5	92
Chloride	<110% of background	29.3	115.0	59.6	91
Hardness	--	96.1	265.2	154.2	22
TDS	--	206	478	304.1	24
TSS	--	1.2	541	54.7	111
Specific Conductance	1275	260	865	477.7	100
Turbidity	29	2.46	255	42.2	92
Sulfate	--	18.8	59.2	33.4	24
Nutrients					
Ammonia	0.02	.009[1]	0.321	0.071	96
Nitrate as N	Non-numeric limits	0.007[1]	0.705	0.248	96
Nitrite as N	Non-numeric limits	0.004[1]	0.080	0.0098	91
Orthophosphate as P	Non-numeric limits	0.004[1]	0.406	0.070	91
Total phosphate	Non-numeric limits	0.004[1]	0.908	0.204	110
Metals					
Arsenic	0.050	0.0015[1]	0.0021	0.0162	20
Cadmium	0.0016[2]	0.0003[1]	0.0014	0.00044	20
Copper	0.017[2]	0.0012[1]	0.00457	0.00252	20
Iron	1.0	0.288	4.67	1.24	20
Lead	0.0055[2]	0.0008[1]	0.00557	0.00137	20
Mercury	0.000012	0.0000064	0.000024	0.000014	4
Sodium	--	22.8	61.4	35.4	23
Zinc	0.03	0.004	0.0179	0.0072	20

Note: Units are mg/L unless otherwise noted.

Period of record is January 1996 - December 2001, SFWMD.

[1] Detection Limit Value

[2] Calculated based on average hardness of 154.2 mg/L.

Table 2.3-5 Water Quality Data for Martin Plant Cooling Pond 1997- 2001

Parameter (unit)	PMR Pond 1/7/97	PMR Pond 1/8/98	PMR Pond 1/11/99	PMR Pond 1/10/00	PMR Pond 6/4/01
pH		7.99	8.43	7.81	
Temp. (degrees F)		68.8	58.9	69.8	
Diss. Oxygen (mg/L)		9.2	8.3	9.6	
un-ionized NH3 (mg/L)		0.0046	0.0061	0.0048	
Ammonia (mg/L)	0.18	0.12	<0.10	0.18	<0.1
Chloride (mg/L)	140	130	120	120	180
Hardness (mg/L)	154	180	180	180	180
Nitrate (mg/L)	<0.07	0.03	<0.01	0.09	<0.03*
Nitrite (mg/L)	<0.06	<0.03	<0.008	<0.008	<0.02*
O-Phosphate (mg/L)	<0.05	<0.03	<0.03	<0.04	<0.04
T-Phosphate (mg/L)	<0.01	0.01	0.01	0.01	0.013
Sulfate (mg/L)	57	48	45	49	63
TDS (mg/L)	400	430	410	470	523
TSS (mg/L)	3	<3	<3	3	<3
Oil & Grease (mg/L)	<3	<3	<3	<3	<1.7
Turbidity (NTU)	0.34	0.32	0.27	0.42	0.52
Sp. Cond. (umho/cm)	619	770	710	750	900
Na (mg/L)	74	66	70	81	120
As (mg/L)	<.005	<0.004	<0.002	<0.024	<0.003
Cd (ug/L)	<1	<0.5	<0.1	<0.4	<0.2
Cr (ug/L)	<3	<3	<1	<8	<4.0
Cu (ug/L)	6.7	<5	7	10	<20
Fe (mg/L)	0.015	0.011	<0.010	<0.028	<.050
Hg (ug/L)	<0.2	<0.07	<0.06	<0.07	<0.07
Pb (ug/L)	<3	<3	<3	<6	<3.0
Se (ug/L)	<7	<7	<5	<3.7	<1.0
Zn (ug/L)	<11	<11	<11	<10	<20

* Original samples suspect and additional samples taken on January 23, 2002.

Note: Non-detectable concentrations shown as less than vaues (<) are 50 percent of the detection limit.

Source: FPL, 2001.

Table 2.3-6. Florida Natural Areas Inventory - Species Summary for Martin County

Scientific Name	Common Name	Federal Status	State Status	Occurrence Status
AMPHIBIANS				
Rana capito	Gopher frog	N	LS	C
REPTILES				
Alligator mississippiensis	American alligator	T(S/A)	LS	C
Caretta caretta	loggerhead	LT	LT	C
Chelonia mydas	green turtle	LE	LE	C
Dermochelys coriacea	leatherback	LE	LE	C
Drymarchon corais couperi	eastern indigo snake	LT	LT	C
Eretmochelys imbricata	hawksbill	LE	LE	N
Gopherus polyphemus	gopher tortoise	N	LS	C
BIRDS				
Ajaia ajaja	roseate spoonbill	N	LS	P
Aphelocoma coerulescens	Florida scrub-jay	LT	LT	C
Aramus guarauna	limpkin	N	LS	P
Caracara plancus	crested caracara	LT	LT	C
Charadrius melodus	piping plover	LT	LT	P
Egretta caerulea	little blue heron	N	LS	C
Egretta thula	snowy egret	N	LS	C
Egretta tricolor	tricolored heron	N	LS	C
Eudocimus albus	white ibis	N	LS	C
Falco peregrinus	peregrine falcon	LE	LE	C
Falco sparverius paulus	southeastern American kestrel	N	LT	P
Grus canadensis pratensis	Florida sandhill crane	N	LT	C
Haematopus palliatus	American oystercatcher	N	LS	P
Haliaeetus leucocephalus	bald eagle	LT	LT	C
Mycteria americana	wood stork	LE	LE	P
Pandion haliaetus	osprey	N	LS**	C
Pelecanus occidentalis	brown pelican	N	LS	C
Picoides borealis	red-cockaded woodpecker	LE	LT	C
Rostrhamus sociabilis plumbeus	snail kite	LE	LE	C
Rynchops niger	black skimmer	N	LS	C
Speotyto cunicularia floridana	Florida burrowing owl	N	LS	P
Sterna antillarum	least tern	N	LT	C
MAMMALS				
Felis concolor coryi	Florida panther	LE	LE	C
Podomys floridanus	Florida mouse	N	LS	C
Sciurus niger shermani	Sherman's fox squirrel	N	LS	P
Trichechus manatus	manatee	LE	LE	C
VASCULAR PLANTS				
Argusia gnaphalodes	sea lavender	N	LE	C
Asclepias curtissii	Curtiss' milkweed	N	LE	C
Asimina tetramera	four-petal pawpaw	LE	LE	C
Chamaesyce cumulicola	sand-dune spurge	N	LE	C
Cheiroglossa palmata	hand fern	N	LE	C
Conradina grandiflora	large-flowered rosemary	N	LE	C
Ctenitis sloanei	Florida tree fern	N	LE	C
Encyclia boothiana var *erythronioides*	dollar orchid	N	LE	C
Epidendrum nocturnum	night-scented orchid	N	LE	C
Eugenia confusa	tropical ironwood	N	LE	C
Glandularia maritima	coastal vervain	N	LE	C
Jacquemontia reclinata	beach jacquemontia	LE	LE	C
Lantana depressa var *floridana*	Atlantic Coast Florida lantana	N	LE	C
Lechea cernua	nodding pinweed	N	LT	C
Lechea divaricata	pine pinweed	N	LE	C
Linum carteri var *smallii*	Carter's large-flowered flax	N	LE	C
Okenia hypogaea	burrowing four-o'clock	N	LE	C
Oncidium bahamense	dancing-lady orchid	N	LE	C
Peperomia humilis	terrestrial peperomia	N	LE	C
Peperomia obtusifolia	blunt-leaved peperomia	N	LE	C
Polygala smallii	tiny polygala	LE	LE	C
Pteroglossaspis ecristata	wild coco	N	LT	C
Spiranthes polyantha	green ladies'-tresses	N	LE	C
Tillandsia flexuosa	banded wild-pine	N	LE	C
Vanilla mexicana	scentless vanilla	N	LE	C
Zephyranthes simpsonii	rain lily	N	LT	C
NON-VASCULAR PLANTS				
Cladonia perforata	perforate reindeer lichen	LE	LE	C

** See Rank and Status Explanations

COUNTY OCCURRENCE STATUS



Table 2.3-7. Monthly and Annual Average Temperatures Measured at Palm Beach International Airport

Month	Daily Temperatures (°F)[a]			Extremes (°F)[b]	
	Average	Maximum	Minimum	Maximum	Minimum
January	65.1	74.5	55.7	89	27
February	66.2	75.9	56.5	90	32
March	70.0	78.8	61.2	94	30
April	73.4	82.0	64.7	99	43
May	77.6	85.6	69.7	96	51
June	80.6	88.1	73.1	98	61
July	82.2	89.9	74.5	101	66
August	82.5	90.0	75.0	98	65
September	81.6	88.6	74.6	97	66
October	77.8	84.9	70.7	95	46
November	72.3	80.0	64.5	91	36
December	67.4	76.0	58.7	90	28
Annual	74.7	82.9	66.6	101	27

[a] 30-year period of record, climatological normal, 1961 to 1990.

[b] 63-year period of record, 1938 to 2000.

Source: National Oceanic and Atmospheric Administration (NOAA), 2000.

Table 2.3-8. Monthly and Annual Average Precipitation and Relative Humidity Measured at Palm Beach International Airport

Month	Precipitation (inches)			Humidity (%) hour (LT) [a]			
	Average[a]	Maximum[b]	Minimum[b]	1 a.m.	7 a.m.	1 p.m.	7 p.m.
January	2.80	11.18	0.22	81	83	59	72
February	2.69	8.71	0.29	80	83	56	70
March	3.66	16.78	0.33	78	81	56	68
April	2.91	18.26	0.04	76	79	54	65
May	6.13	15.22	0.39	79	80	59	71
June	8.09	17.91	1.07	84	84	65	76
July	6.14	17.74	1.22	85	85	64	75
August	6.02	13.52	1.73	84	85	64	75
September	8.53	24.86	1.77	84	87	66	78
October	6.60	18.74	0.56	80	83	62	74
November	4.69	14.63	0.23	80	83	61	73
December	2.49	11.69	0.06	80	82	59	73
Annual	60.75	24.86	0.04	81	83	60	72

Note: LT = local time.

[a] 30-year period of record, climatological normal, 1961 to 1990.

[b] 61-year period of record, 1940 to 2000.

Source: NOAA, 2000.

Table 2.3-9. Seasonal and Annual Average Wind Direction and Wind Speed Measured at Palm Beach International Airport [a]

			Prevailing Wind	
Season	Average Wind Speed (mph)	Calm(%)	Direction	Average Wind Speed (mph)
Winter	11.9	1.9	Northwest	10.7
Spring	12.4	1.5	Southeast	14.0
Summer	9.3	4.8	East-southeast	11.7
Fall	11.3	2.8	East	13.6
Annual	11.2	2.7	Southeast	12.8

[a] 5-year period of record, 1987 to 1991. The data for this period were also used in the air quality impact analyses for the Project.

Source: NOAA, 1991.

Table 2.3-10. Seasonal and Annual Average Atmospheric Stability Classes Determined at Palm Beach International Airport [a]

Season	Occurrence (%) of Stability Class					
	Very Unstable	Moderately Unstable	Slightly Unstable	Neutral	Slightly Stable	Moderately Stable
Winter	0.0	1.0	5.7	62.7	18.1	12.5
Spring	0.1	2.2	13.9	57.3	16.9	9.6
Summer	0.5	6.1	20.9	35.0	19.1	18.5
Fall	0.0	2.3	11.3	53.8	18.4	14.2
Annual	0.2	2.9	13.0	52.1	18.1	13.7

[a] 5-year period of record, 1987 to 1991. The data for this period were also used in the air quality impact analyses for the Project.

Source: NOAA, 1991.

Table 2.3-11. Seasonal and Annual Average Morning and Afternoon Mixing Heights Determined at Palm Beach International Airport [a]

Season	Mixing Height (m)	
	Morning	Afternoon
Winter	756	1,279
Spring	893	1,438
Summer	830	1,365
Fall	797	1,281
Annual	819	1,341

[a] 5-year period of record, 1987 to 1991. The data for this period were also used in the air quality impact analyses for the Project. Mixing heights based on surface temperatures and upper-air data from the NWS station at Palm Beach International Airport.

Source: NOAA, 1991.

Table 2.3-12. National and State AAQS, Allowable PSD Increments, and Significant Impact Levels

Pollutant	Averaging Time	National AAQS (µg/m³) Primary Standard	National AAQS (µg/m³) Secondary Standard	Florida AAQS [a] (µg/m³)	PSD Increments (µg/m³) [a] Class I	PSD Increments (µg/m³) [a] Class II	Significant Impact Levels [b] (µg/m³)
Particulate Matter [c] (PM_{10})	Annual Arithmetic Mean	50	50	50	4	17	1
	24-Hour Maximum	150	150	150	8	30	5
Sulfur Dioxide	Annual Arithmetic Mean	80	NA	60	2	20	1
	24-Hour Maximum	365	NA	260	5	91	5
	3-Hour Maximum	NA	1,300	1,300	25	512	25
Carbon Monoxide	8-Hour Maximum	10,000	10,000	10,000	NA	NA	500
	1-Hour Maximum	40,000	40,000	40,000	NA	NA	2,000
Nitrogen Dioxide	Annual Arithmetic Mean	100	100	100	2.5	25	1
Ozone [c]	1-Hour Maximum [d]	235	235	235	NA	NA	NA
Lead	Calendar Quarter Arithmetic Mean	1.5	1.5	15	NA	NA	NA

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

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

[b] Maximum concentrations are not to be exceeded.

[c] On July 18, 1997, EPA promulgated revised AAQS for particulate matter and ozone. For particulate matter, $PM_{2.5}$ standards were introduced with a 24-hour average standard of 65 µg/m³ (based on the 3-year averages of the 98th percentile values) and an annual standard of 15 µg/m³ (3-year averages at community monitors). The form of the 24-hour PM_{10} standard was changed; compliance is based on 3-year average of 99th percentile concentrations that is 150µg/m³ or less. The O_3 standard was modified to be 0.08 ppm for the 8-hour average; achieved when the 3-year average of 99th percentile values is 0.08 ppm or less. The courts have stayed these standards. Florida DEP has not yet adopted the revised standards.

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

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

FPL

Table 2.3-13. Summary of Maximum Measured PM_{10}, O_3, NO_2, CO and SO_2 Concentrations Representative of the Martin Plant Site, 1998 to 2001

AIRS/ Saroad Site No.	Operator	Location [a]	Measurement Period Year	Months	Concentration 1-Hour Highest	1-Hour 2nd Highest	3-Hour Highest	3-Hour 2nd Highest	8-Hour Highest	8-Hour 2nd Highest	8-Hour 3-year Average 4th Highest	24-Hour Highest	24-Hour 2nd Highest
PM_{10} [b]		**Florida AAQS**			NA	NA	NA	NA	NA	NA	NA	NA	**150 µg/m³**
St. Lucie County													
12-111-0012	FDEP	Fort Pierce/ 6120 SW Glades Cutoff	1998	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	82	45
1320-012-F02			1999	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	73	39
			2000	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	37	35
			2001	Jan-Jul	NA	NA	NA	NA	NA	NA	NA	40	37
Ozone [b]		**Florida AAQS**			NA	**0.12 ppm**	NA	NA	NA	NA	**0.08 ppm**	NA	NA
St. Lucie County													
12-111-0012	FDEP	Fort Pierce/ 6120 SW Glades Cutoff	1998	Jan-Dec	0.095	0.095	NA	NA	NA	NA	0.069	NA	NA
1320-012-F02			1999	Jan-Dec	0.083	0.083	NA	NA	NA	NA	0.072	NA	NA
			2000	Jan-Dec	0.082	0.078	NA	NA	NA	NA	0.073	NA	NA
			2001	Jan-Jul	0.100	0.095	NA	NA	NA	NA	0.072	NA	NA
Nitrogen dioxide													
		Florida AAQS			NA	NA	NA	NA	NA	NA	NA	NA	NA
St. Lucie County													
12-111-0012	FDEP	Fort Pierce/ 6120 SW Glades Cutoff	1998	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	NA	NA
1320-012-F02			1999	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	NA	NA
			2000	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	NA	NA
			2001	Jan-Jul	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon monoxide		**Florida AAQS**			NA	**35 ppm**	NA	NA	NA	**9 ppm**	NA	NA	NA
Palm Beach County													
12-099-1004	FDEP	Palm Beach/ 3700 Belvedere Road	1998	Jan-Dec	6.0	5.6	NA	NA	2.7	2.5	NA	NA	NA
4760-004-G01			1999	Jan-Dec	4.2	4.0	NA	NA	3.3	2.8	NA	NA	NA
			2000	Jan-Dec	3.8	3.8	NA	NA	2.7	2.6	NA	NA	NA
			2001	Jan-Jul	3.3	3.1	NA	NA	2.5	2.2	NA	NA	NA
Sulfur dioxide		**Florida AAQS**			NA	NA	NA	**0.5 ppm**	NA	NA	NA	NA	**0.1 ppm**
Palm Beach County													
12-099-3004	FDEP	Riviera Beach/ 1050 15th Street	1998	Jan-Dec	NA	NA	0.068	0.012	NA	NA	NA	0.009	0.004
4760-004-G01			1999	Jan-Dec	NA	NA	0.017	0.014	NA	NA	NA	0.013	0.013
			2000	Jan-Dec	NA	NA	0.043	0.027	NA	NA	NA	0.013	0.009
			2001	Jan-Jul	NA	NA	0.005	0.004	NA	NA	NA	0.003	0.003

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

[a] See Figure 2.3.7-3 for station locations

[b] On July 18, 1997, EPA promulgated revised AAQS for particulate matter and ozone. For particulate matter, $PM_{2.5}$ standards were introduced with a 24-hour average standard of 65 µg/m³ (based on the 3-year averages of the 98th percentile values) and an annual standard of 15 µg/m³ (3-year averages at community monitors). The form of the 24-hour PM_{10} standard was changed; compliance is based on 3-year average of 99th percentile concentrations that is 150 µg/m³ or less. The O_3 standard was modified to be 0.08 ppm for the 8-hour average, achieved when the 3-year average of 99th percentile values is 0.08 ppm or less. The courts have stayed these standards. Florida DEP has not yet adopted the revised standards.

FPL

Table 2.3-14. Baseline Ambient Sound Pressure Level Data for FPL Martin Power Plant (December 2001)

Site Number	Location	Date	Time	Wind Speed	Wind Direction	Sound Levels (dBA) Min	Max	L90	Leq	Comments/Notes
1	Cooling pond levee at Barley Barber Swamp	19-Dec-01	Day	1-3	NE	35.2	41.9	36.2	37.6	Plant operations and insects
		19-Dec-01	Night	9-11	West	36.5	44.7	36.9	38.4	Circulating water pumps (CWPs) and insects
2	105 feet east of new simple cycle units (8A abd 8B)	19-Dec-01	Day	1-3	East	62.0	71.8	63.5	66.8	Plant operations and maintenance work
		19-Dec-01	Night	3-5	NW	63.0	72.9	63.5	64.0	Plant operations
3	On cooling pond levee near southeast residence	19-Dec-01	Day	1-3	East	38.2	64.1	39.0	51.7	Nearby CWPs, truck, and birds
		19-Dec-01	Night	9-11	West	41.9	62.7	44.0	50.4	CWPs and insects
4	Adjacent to SR710 near the closest residence	19-Dec-01	Day	7-9	VAR	36.9	78.0	42.3	62.3	Moderate traffic on SR710
		19-Dec-01	Night	0	NA	35.3	82.2	35.9	62.3	Plant operations, light traffic on SR710, insects
5	Next to rail road on Amaryllis Road	19-Dec-01	Day	7-9	VAR	38.4	77.0	40.6	58.4	Moderate traffic on SR710
		19-Dec-01	Night	0	NA	36.0	70.5	38.2	52.1	Plant operations, light traffic on SR710, insects
6	On cooling pond levee near north residence	19-Dec-01	Day	1-3	NE	36.0	61.8	37.3	42.5	Equipment running at residence
		20-Dec-01	Night	3-5	NW	46.6	54.4	46.3	46.8	Insect and aligator noises

Source: Golder Associates Inc., 2001.

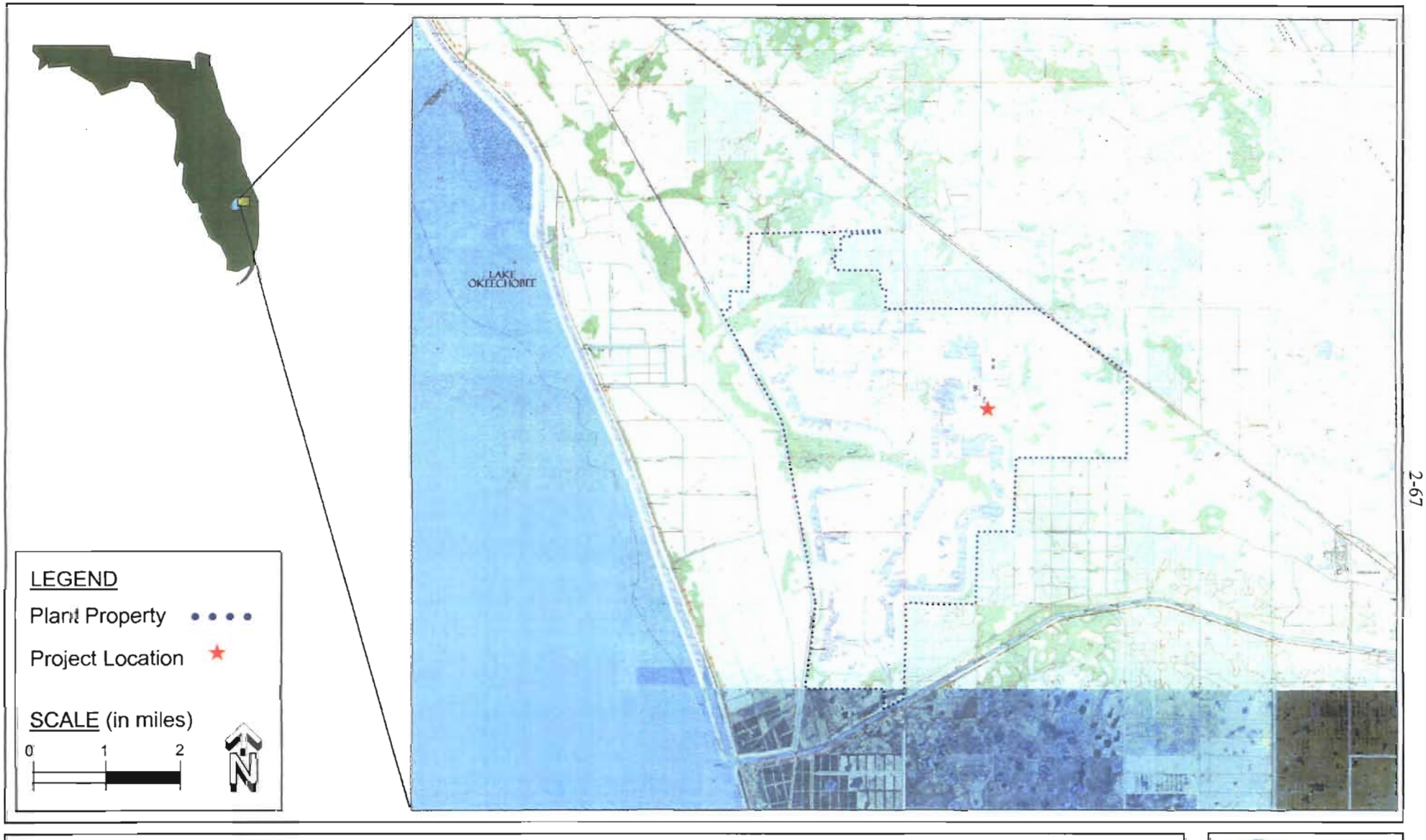


Figure 2.1-1. FPL Martin Plant Site Location

Source: Bechtel Power Corporation, 1989; Golder, 2002.

FPL

Martin Unit 8

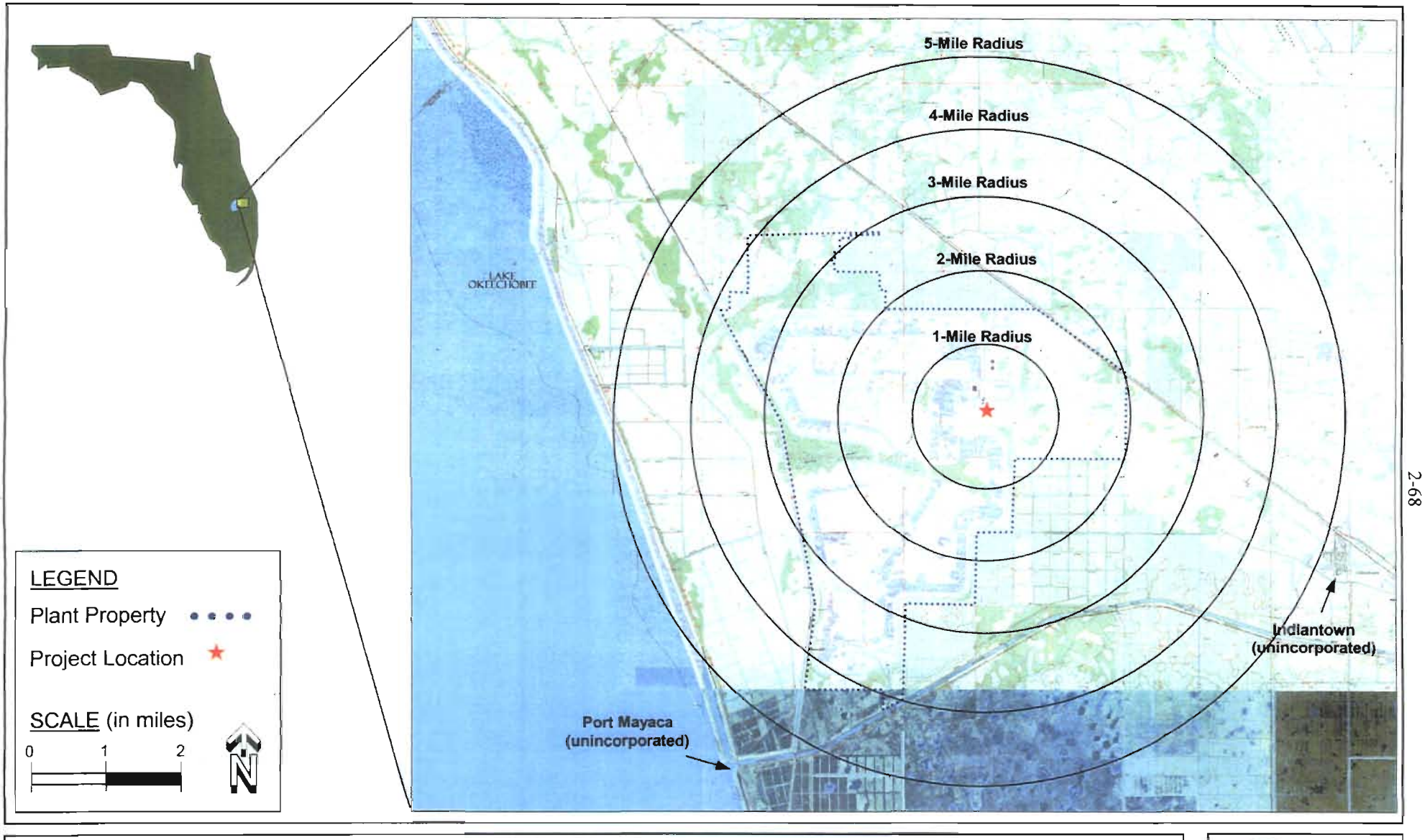


Figure 2.1-2. Governmental Jurisdictions Within a 5-Mile Radius of Martin Unit 8

Source: Resource Engineering and Planning, Inc., 1989; Golder, 2002.

FPL

Martin Unit 8

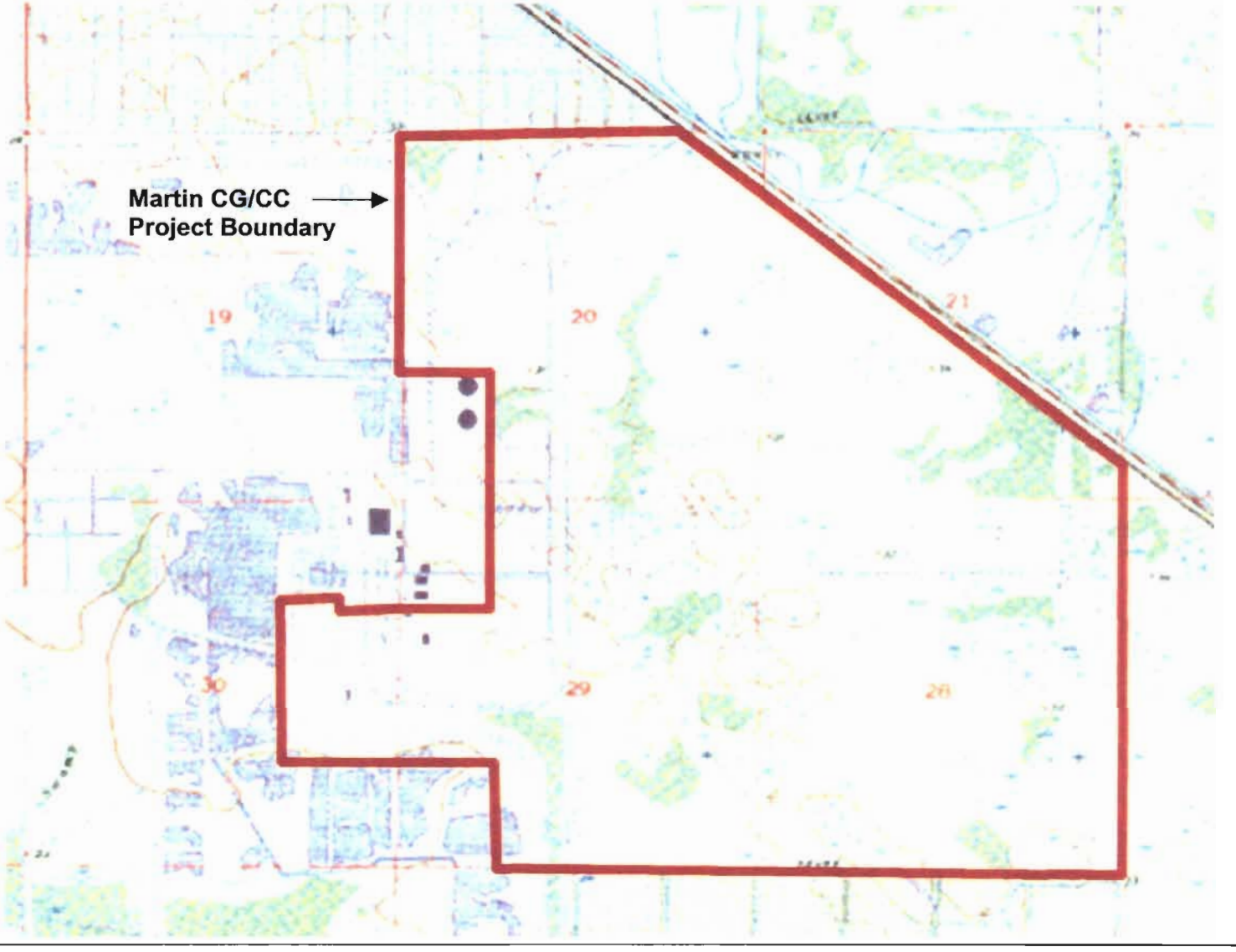


Figure 2.1-3. FPL Martin CG/CC Project Area

Source: Envirospere Company, 1989; Golder, 2002.

FPL
Martin Unit 8

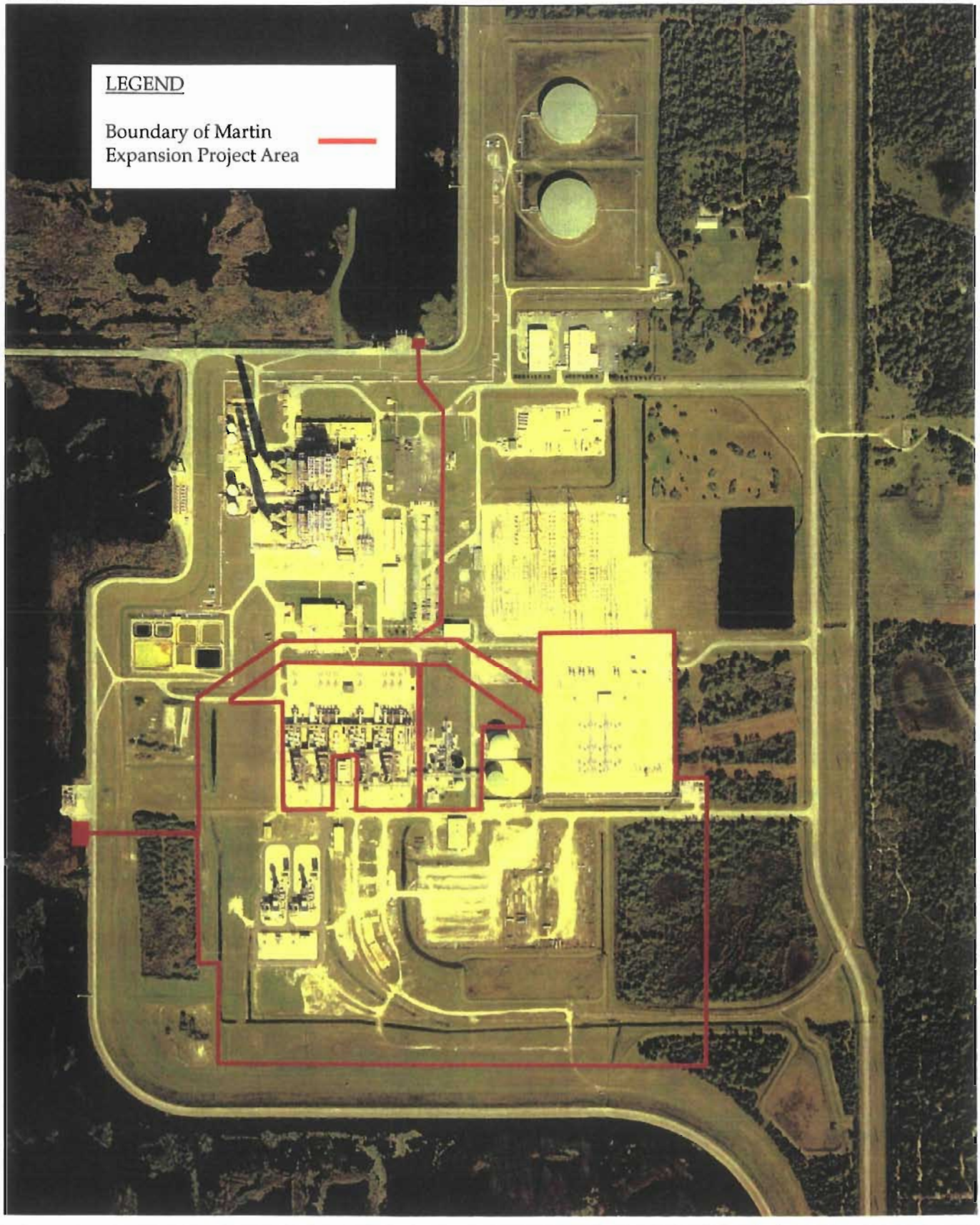


Figure 2.1-4. Recent Aerial View of Martin Plant

Source: SRM of Miami, Inc., 2001; Golder, 2002.

FPL
Martin Unit 8

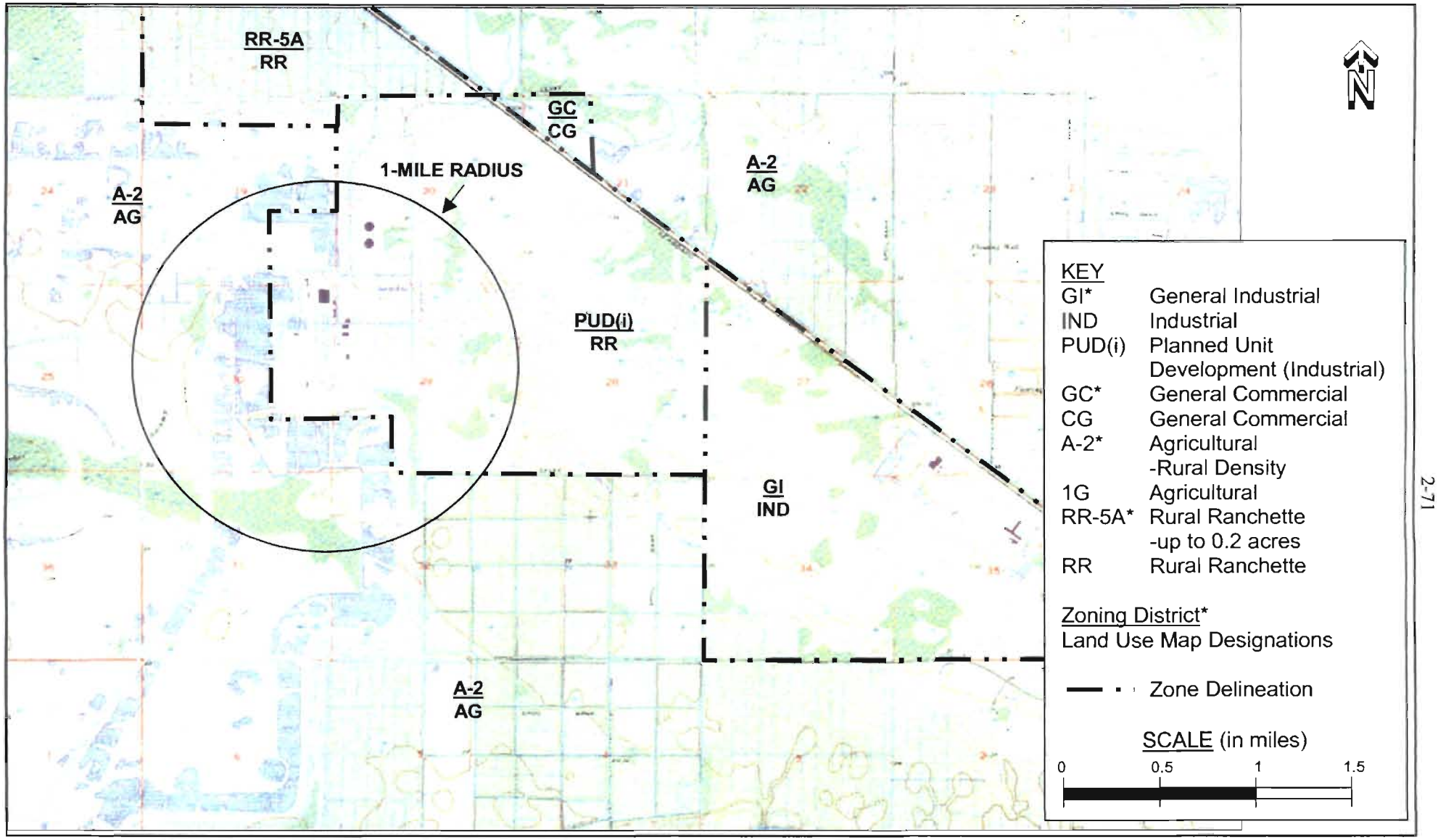


Figure 2.2-1. Land Use and Zoning Within 1 Mile of Project

Source: Martin County Growth Management Department, March 1989; Golder, 2002.

FPL
Martin Unit 8

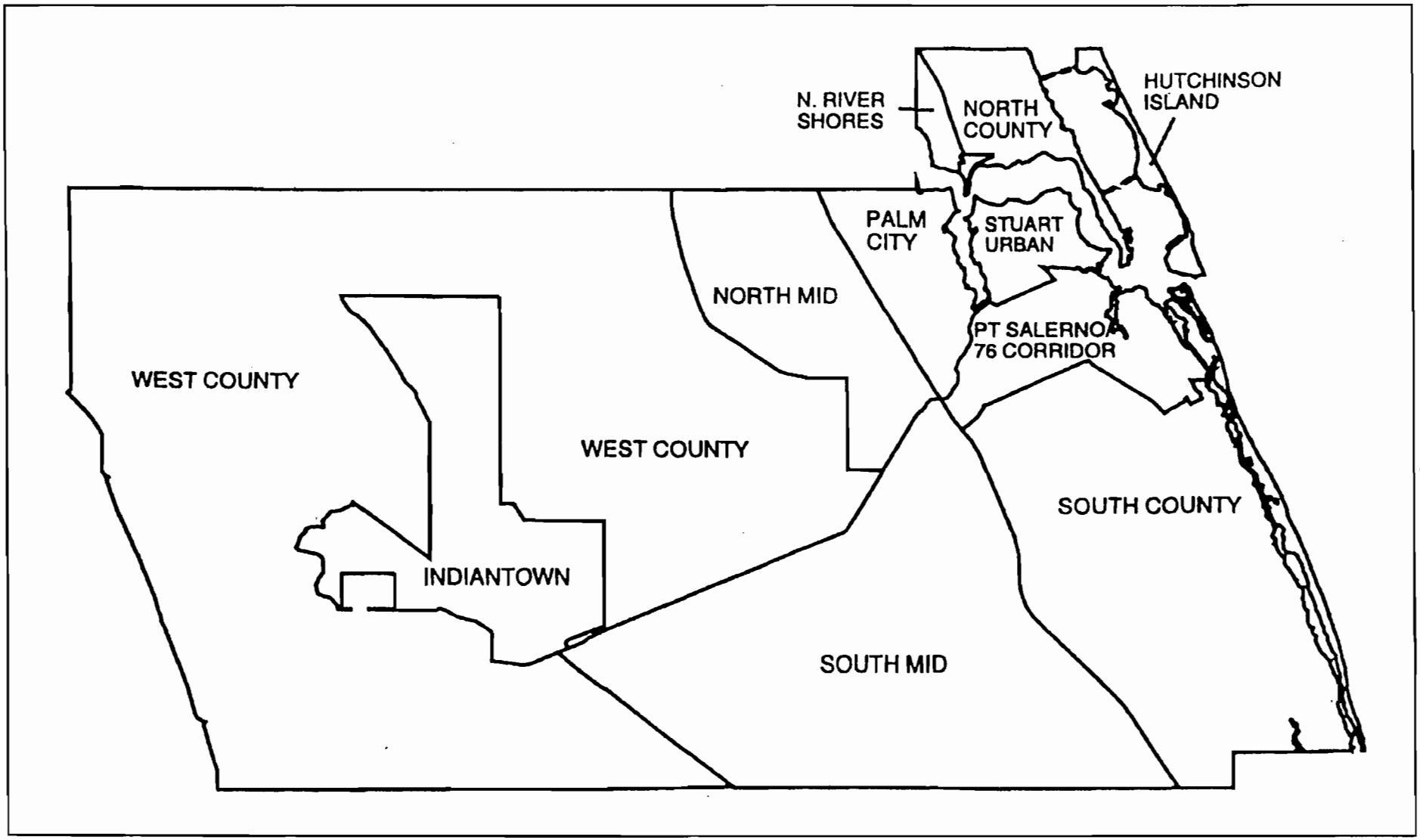
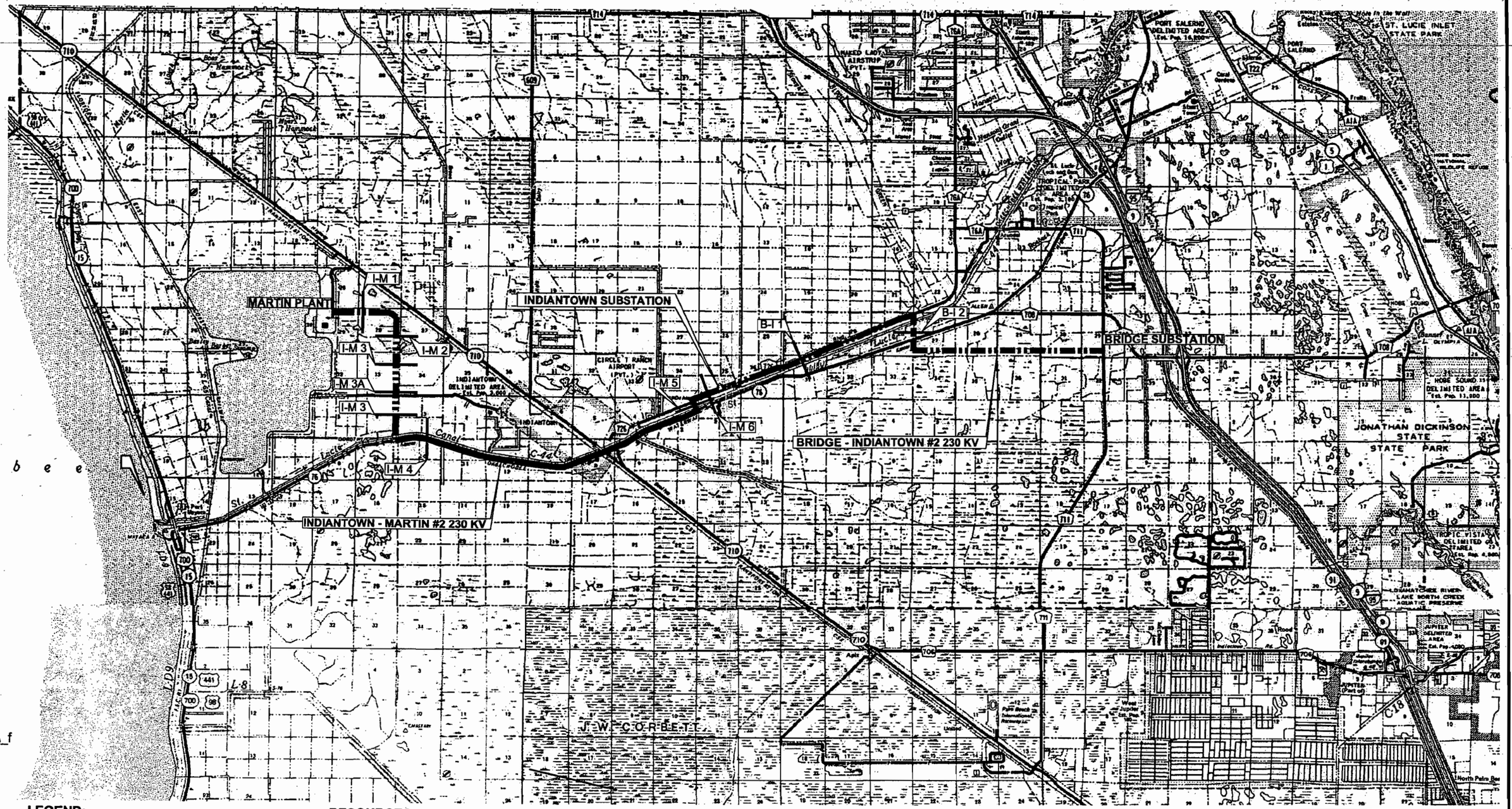


Figure 2.2-2. Martin County Planning Areas

Source: Martin County Growth Management Department, 2001; Golder, 2002.

FPL
Martin Unit 8



LEGEND:

- PROJECT CORRIDOR (TO BE CERTIFIED)
- CROSS SECTION #
- NEW 230 kv LINE ALONG EXISTING ROW (NOT TO BE CERTIFIED)

RESOURCES:

GENERAL HIGHWAY MAP, MARTIN COUNTY, FLORIDA, U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION, AUGUST 1985.

GENERAL HIGHWAY MAP, PALM BEACH COUNTY, FLORIDA, U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION, AUGUST 1975 (SHEETS 1 & 2).

Golder Associates
Tampa, Florida

FILE No.	0137609A012 FIG 6_1_2
PROJECT No.	0137609-1502 REV. 0

SCALE	1:126720
DATE	1/27/02
DESIGN	RAZ
CADD	DM
CHECK	
REVIEW	

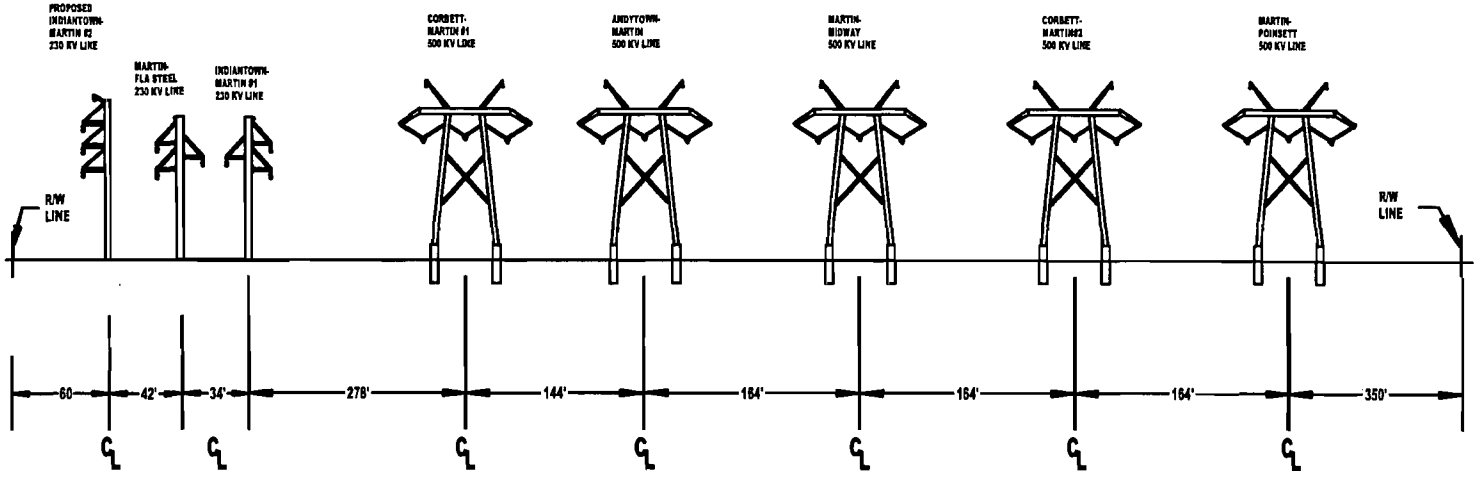
TITLE

PROJECT CORRIDOR LOCATION

MARTIN UNIT 8

FIGURE 6.1-2

Drawing file: 0137609A012 FIG 6_1_2.dwg Jan 28, 2002 - 9:22am



Golder Associates Tampa, Florida		SCALE	NTS
		DATE	01/27/02
		DESIGN	BR
		CADD	DM
FILE No.	0137609A033 FIG 6_1_3	CHECK	
PROJECT No.	0137609-1502 REV. 0	REVIEW	

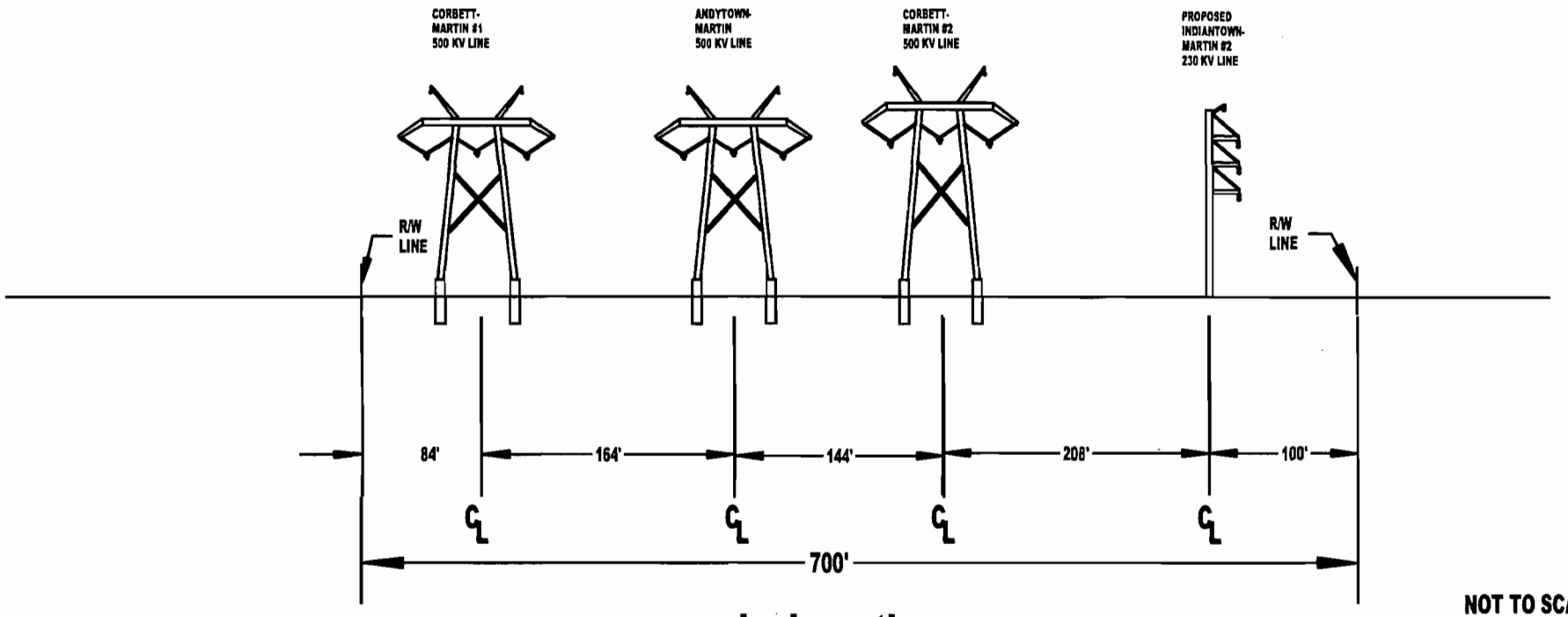
TITLE

PROPOSED TRANSMISSION RIGHT-OF-WAY INDIANTOWN-MARTIN #2 230 KV LINE INTO MARTIN PLANT CROSS SECTION 1

MARTIN UNIT 8

FIGURE **6.1-3**

Drawing file: 0137609A033 FIG 6_1_3.dwg Jan 27, 2002 - 12:10pm



look north

NOT TO SCALE

Golder Associates Tampa, Florida		SCALE	NTS
		DATE	01/27/02
		DESIGN	BR
		CADD	DM
FILE No.	0137609A032 FIG 6_1_4	CHECK	
PROJECT No.	0137609-1502 REV. 0	REVIEW	

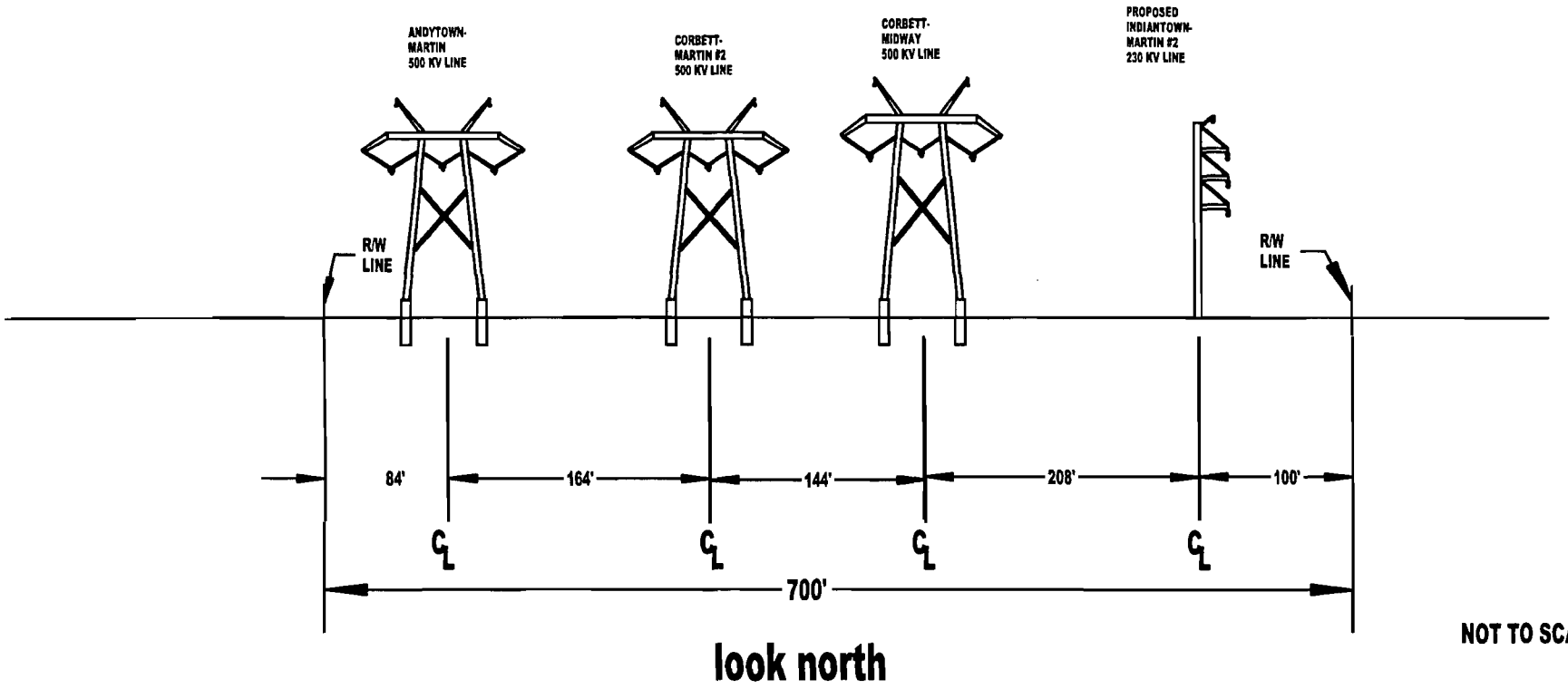
TITLE

PROPOSED TRANSMISSION RIGHT-OF-WAY INDIANTOWN-MARTIN #2 230 KV LINE CROSS SECTION 2

MARTIN UNIT 8

FIGURE 6.1-4

Drawing file: 0137609A032 FIG 6_1_4.dwg Jan 27, 2002 - 17:10pm



NOT TO SCALE

Golder Associates Tampa, Florida		SCALE	NTS
		DATE	01/27/02
		DESIGN	BR
		CADD	DM
FILE No.	0137609A031 FIG 6_1_5	CHECK	
PROJECT No.	0137609-1502 REV. 0	REVIEW	

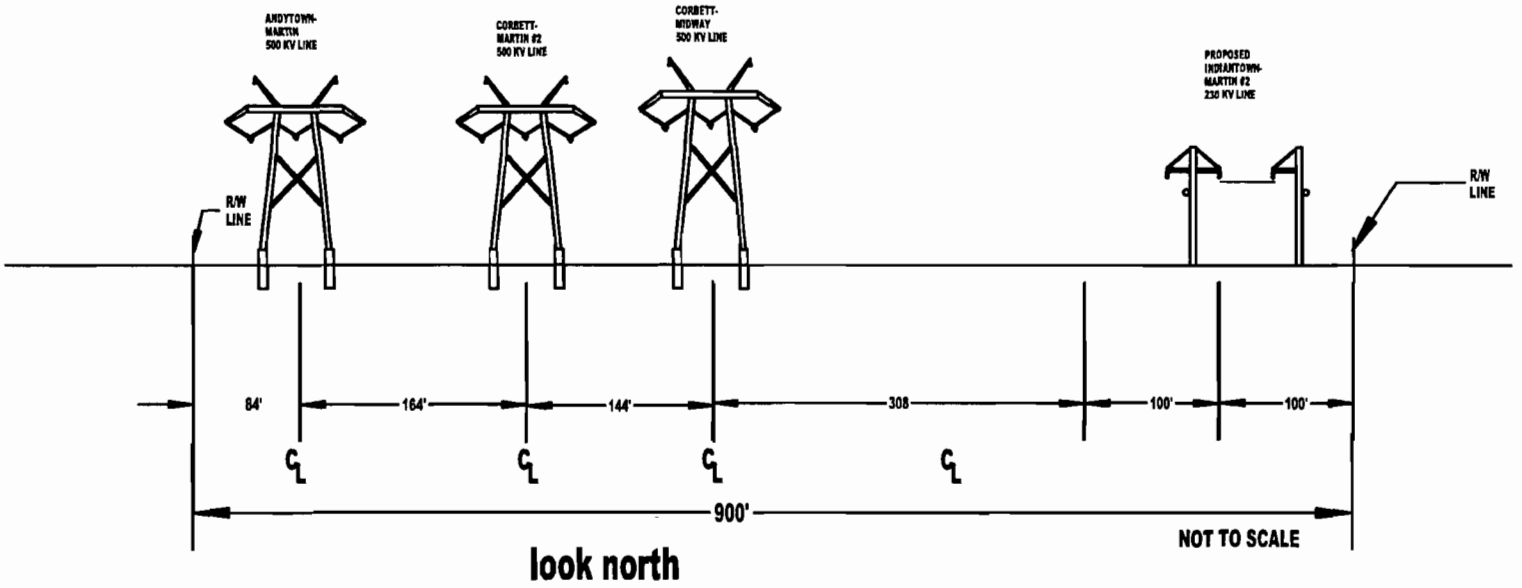
TITLE

PROPOSED TRANSMISSION RIGHT-OF-WAY INDIANTOWN-MARTIN #2 230 KV LINE CROSS SECTION 3

MARTIN UNIT 8

FIGURE 6.1-5

Drawing file: I:\0137609\001\FIG 6_1_5.dwg Jan 27, 2002 - 12:11pm



Golder Associates
Tampa, Florida

FILE No.	0137609A031 FIG 6_1_5A
PROJECT No.	0137609-1502
REV.	0

SCALE	NTS
DATE	01/27/02
DESIGN	BR
CADD	DM
CHECK	
REVIEW	

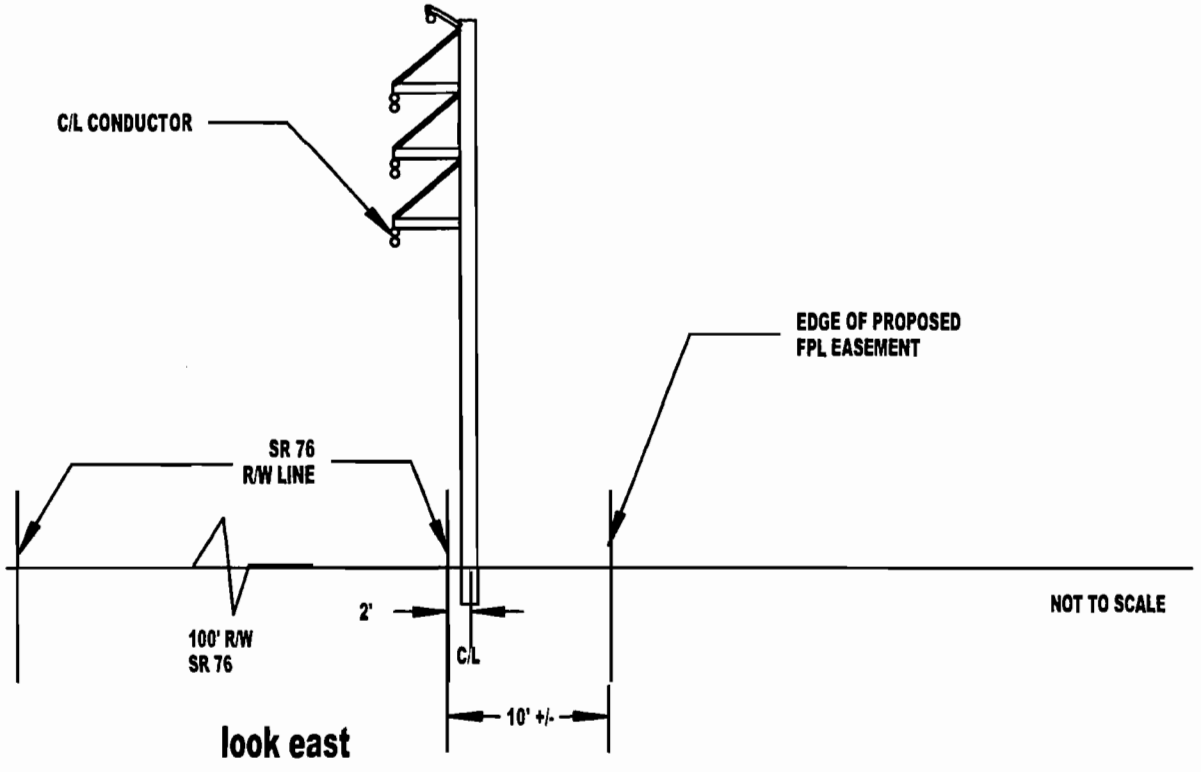
TITLE

PROPOSED TRANSMISSION RIGHT-OF-WAY INDIANTOWN-MARTIN #2 230 KV LINE CROSS SECTION 3 A

MARTIN UNIT 8

FIGURE 6.1-5A

Drawing file: 0137609A031 Fig 6_1_5A.dwg Jan 27, 2002 - 12:27pm



Golder Associates Tampa, Florida		SCALE	NTS
		DATE	01/27/02
		DESIGN	BR
		CADD	DM
FILE No.	0137609A030 FIG 6_1_6	CHECK	
PROJECT No.	0137609-1502 REV. 0	REVIEW	

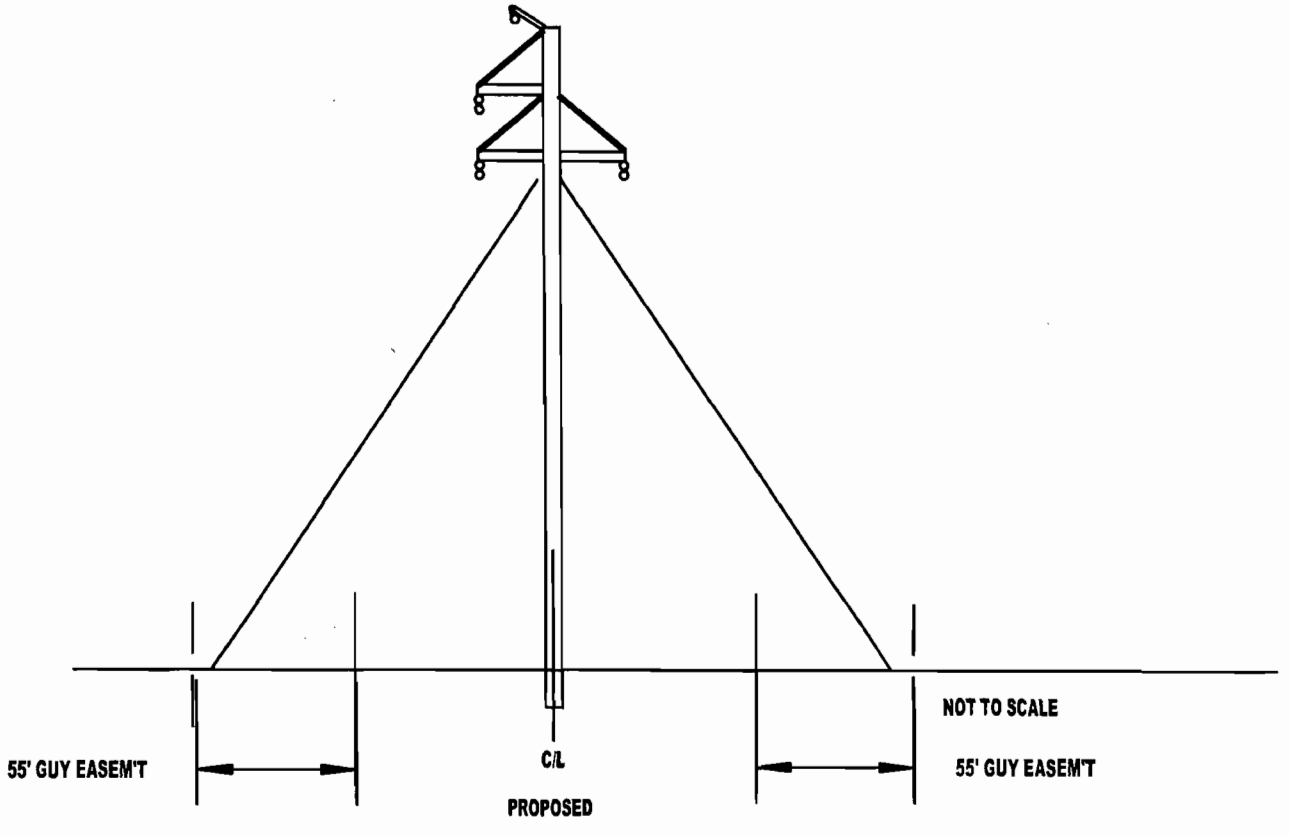
TITLE

PROPOSED TRANSMISSION RIGHT-OF-WAY INDIANTOWN-MARTIN #2 230 KV LINE CROSS SECTION 4

MARTIN UNIT 8

FIGURE 6.1-6

drawing: m:\drafting\fig 6_1_6.dwg plot: 17, 2002 - 12:53pm



look north

Golder Associates Tampa, Florida		SCALE	NTS
		DATE	01/27/02
		DESIGN	BR
		CADD	DM
FILE No.	0137609A029 FIG 6_1_7	CHECK	
PROJECT No.	0137609-1502 REV. 0	REVIEW	

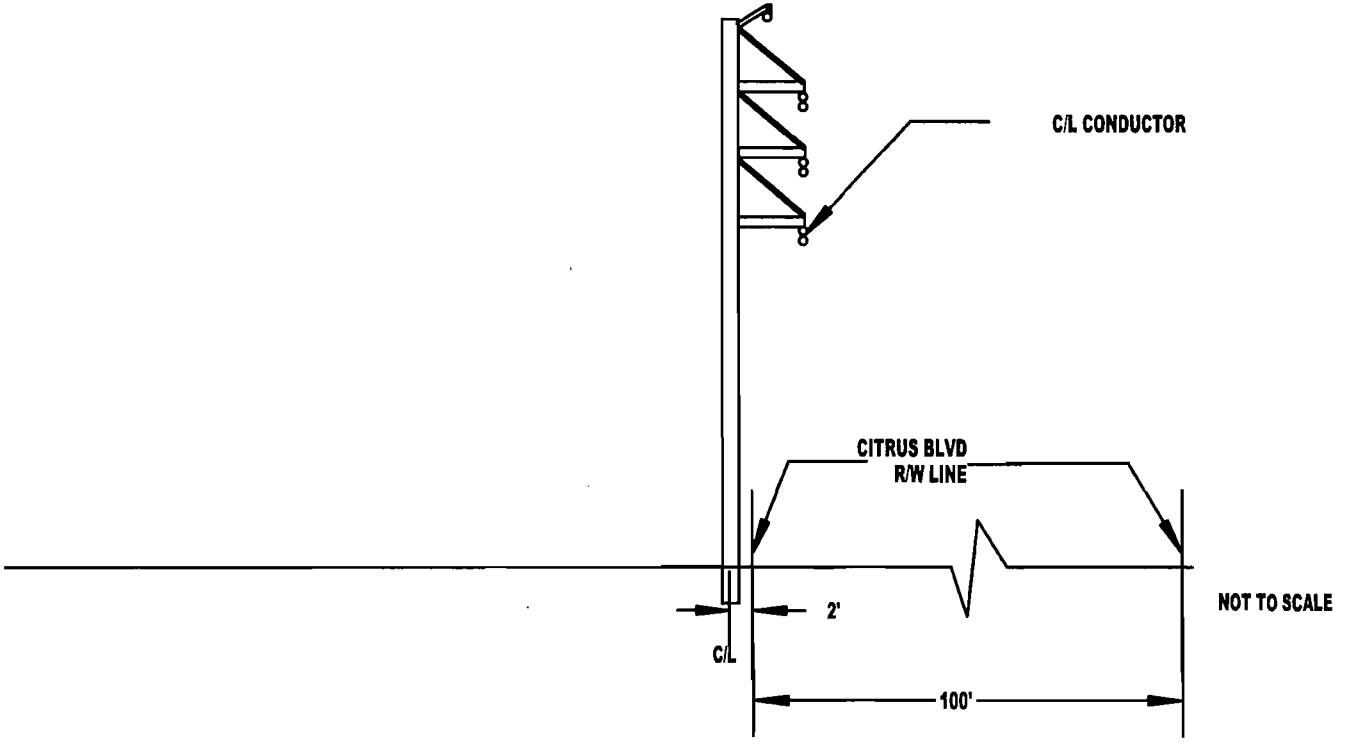
TITLE

PROPOSED TRANSMISSION RIGHT-OF-WAY INDIANTOWN-MARTIN #2 230 KV LINE CROSS SECTION 5

MARTIN UNIT 8

FIGURE 6.1-7

Drawing file: G:\GIS\0137609A029 FIG 6_1_7.dwg Jan 27, 2002 - 12:47pm



look east

Golder Associates Tampa, Florida		SCALE	NTS
		DATE	01/27/02
		DESIGN	BR
		CADD	DM
FILE No. 0137609A028 FIG 6_1_8		CHECK	
PROJECT No. 0137609-1502	REV. 0	REVIEW	

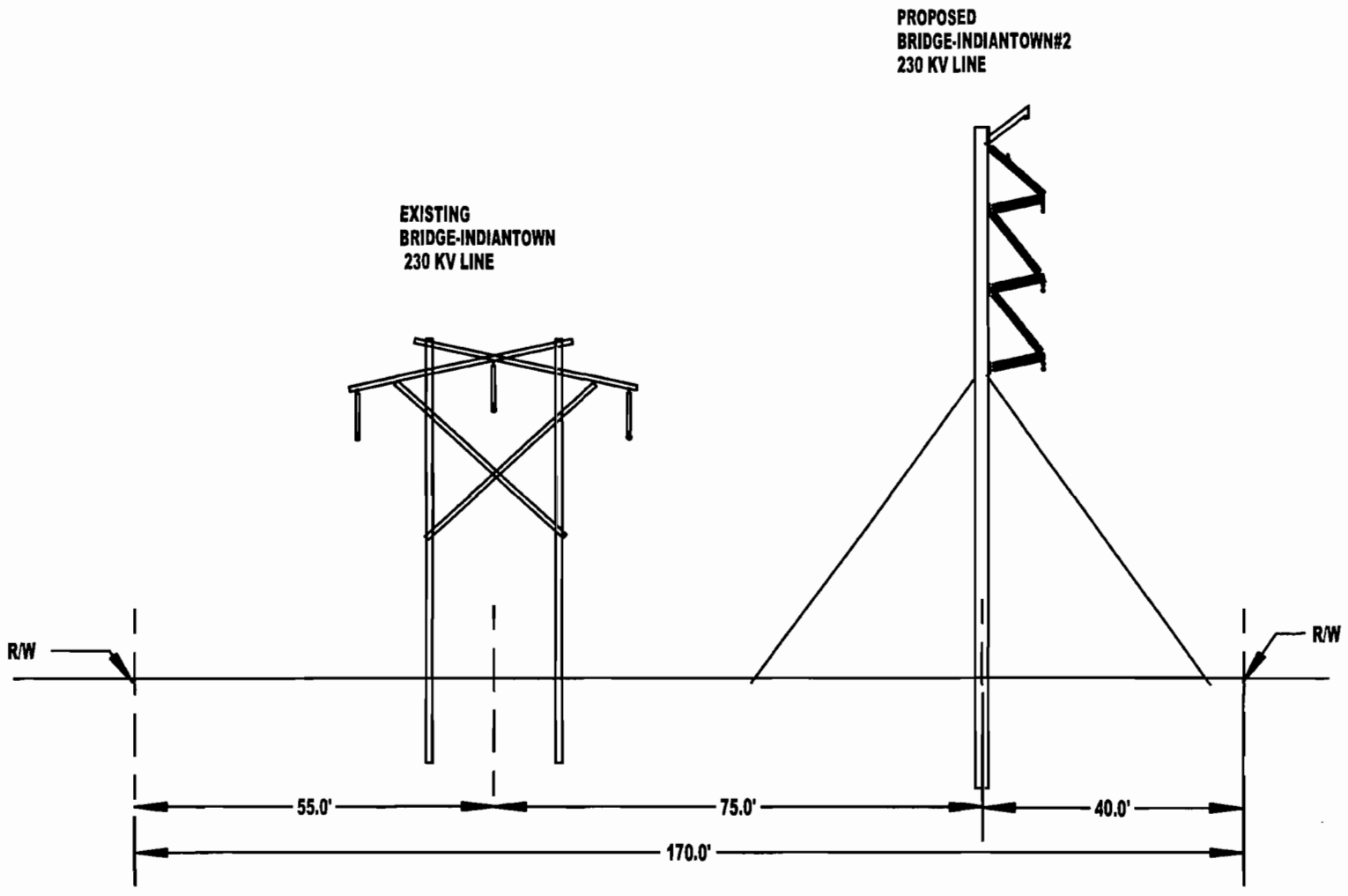
TITLE

PROPOSED TRANSMISSION RIGHT-OF-WAY INDIANTOWN-MARTIN #2 230 KV LINE CROSS SECTION 6

MARTIN UNIT 8

FIGURE 6.1-8

illustrator: 0137609a028 fig 6_1_8.ai, 1/27/2002 fam



look east and south

NOT TO SCALE

Golder Associates Tampa, Florida		SCALE	NTS
		DATE	01/27/02
		DESIGN	BR
		CADD	DM
FILE No. 0137609A026 FIG 6_1_9		CHECK	
PROJECT No. 0137609-1502	REV. 0	REVIEW	

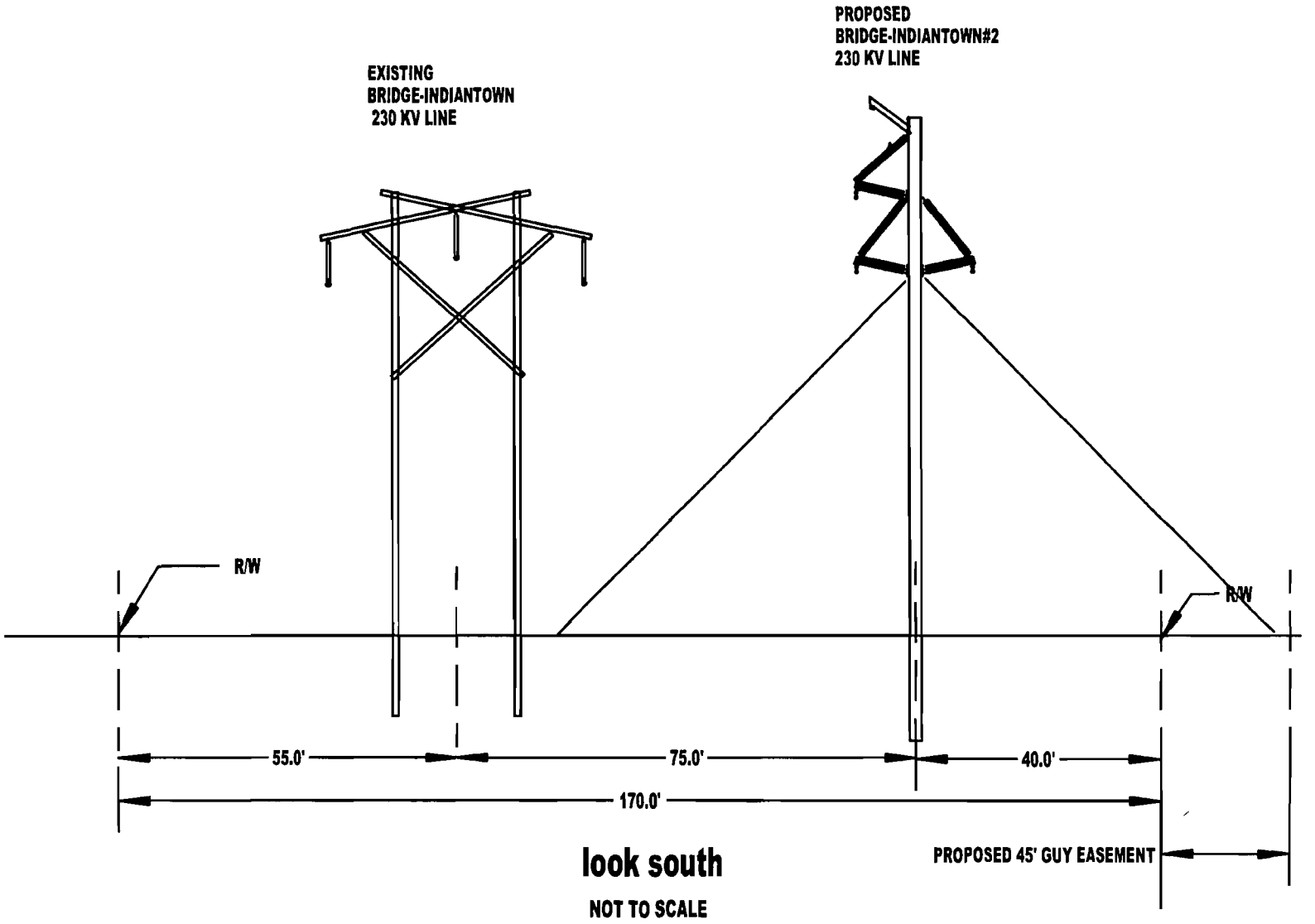
TITLE

PROPOSED TRANSMISSION RIGHT-OF-WAY
BRIDGE-INDIANTOWN #2 230 KV LINE
CROSS SECTION 1

MARTIN UNIT 8

FIGURE **6.1-9**

Drawing file: G:\0137609\GIS\FIG 6_1_9.dwg Jan 28, 2002 - 12:47:11



NOT TO SCALE

Golder Associates
Tampa, Florida

SCALE	NTS
DATE	01/27/02
DESIGN	BR
CADD	DM
CHECK	
REVIEW	

FILE No. 0137609A027 FIG 6_1_10
PROJECT No. 0137609-1502 REV. 0

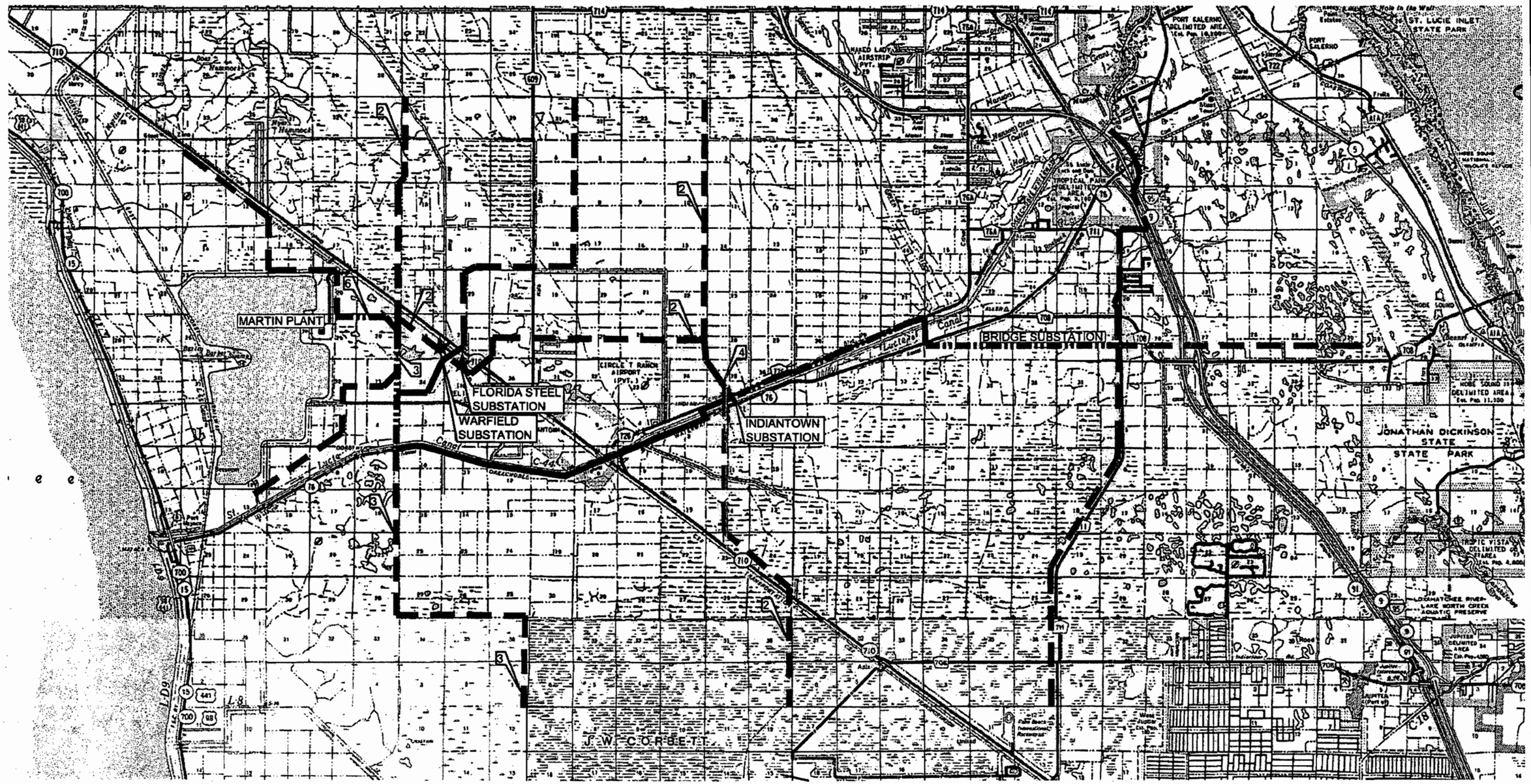
TITLE

PROPOSED TRANSMISSION RIGHT-OF-WAY BRIDGE-INDIANTOWN #2 230 KV LINE CROSS SECTION 2

MARTIN UNIT 8

FIGURE 6.1-10

Drawing file: 0137609A027 FIG 6_1_10.dwg Jan 28, 2002 - 9:27am



LEGEND:

- PROJECT CORRIDOR (TO BE CERTIFIED)
- NEW 230 kv LINE ALONG EXISTING ROW (NOT TO BE CERTIFIED)
- 3 NUMBER OF EXISTING TRANSMISSION LINES
- EXISTING TRANSMISSION LINES ONE LINE UNLESS OTHERWISE NOTED

RESOURCES:

GENERAL HIGHWAY MAP, MARTIN COUNTY, FLORIDA, U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION, AUGUST 1985.

GENERAL HIGHWAY MAP, PALM BEACH COUNTY, FLORIDA, U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION, AUGUST 1975 (SHEETS 1 & 2).

CORRIDOR LOCATION AND LAYOUT FPL, 2001.

0 0.5 1 2 3 4 MILES
0 0.5 1 2 3 4 5 6 KILOMETERS
SCALE

Golder Associates
Tampa, Florida

SCALE	1:126,720
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	
FILE No.	0137609A020 FIG 6_1_11
PROJECT No.	0137609-1502 REV. 0

TITLE:

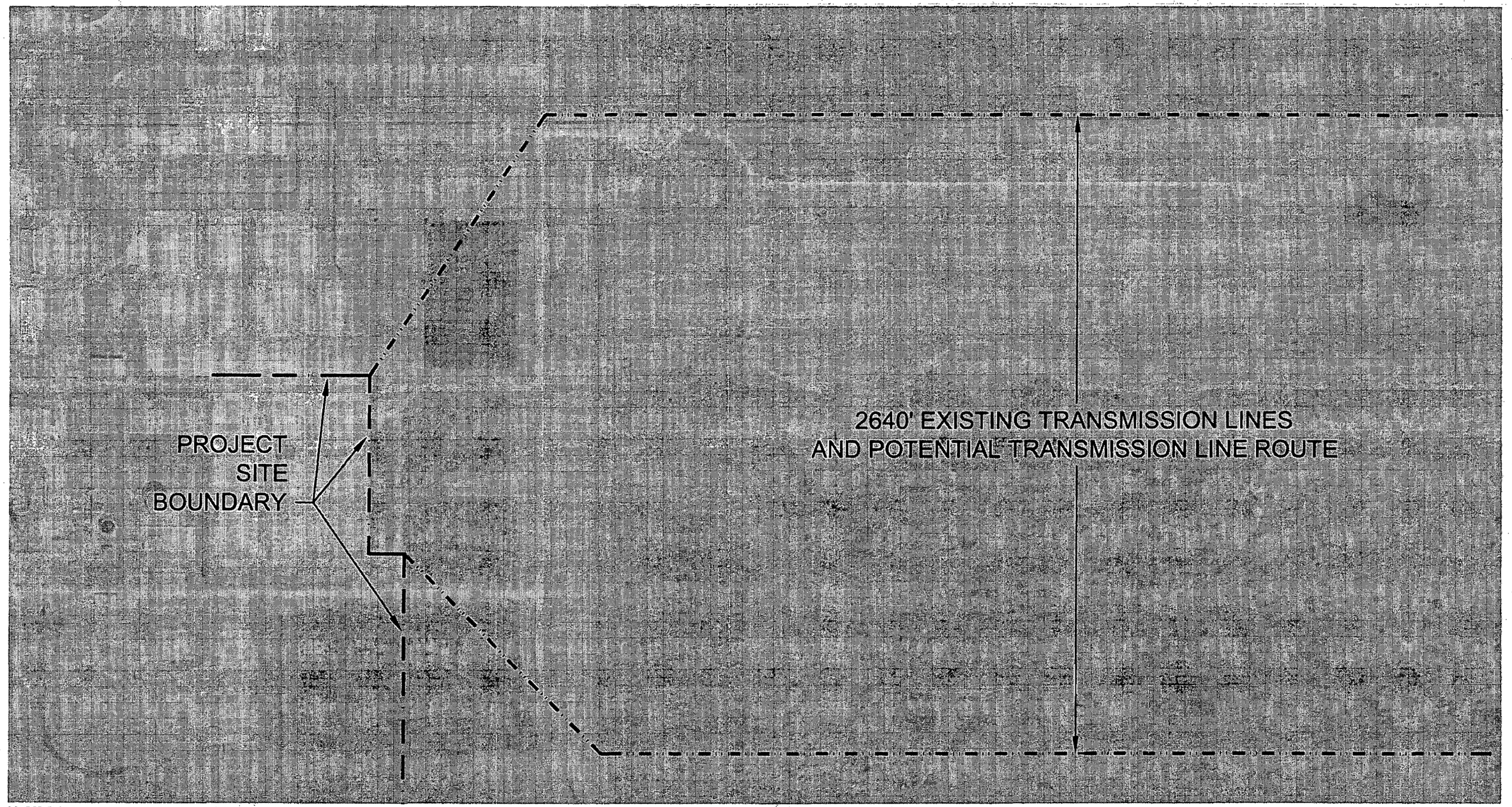
PROJECT CORRIDOR LOCATION AND EXISTING TRANSMISSION LINES MAP (WITHIN 5 MILES OF PROJECT)

MARTIN UNIT 8

FIGURE 6.1-11

Drawing file: 0137069A020 FIG 6_1_11.dwg Jan 28, 2002 - 9:11am

BEST AVAILABLE COPY



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

LEGEND

POTENTIAL TRANSMISSION LINE ROUTE

0 400 800 1200 1600

SCALE 1"=400'

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	
FILE No.	29 (SHEET 1)
PROJECT No.	0137609-1502
REV.	0

TITLE

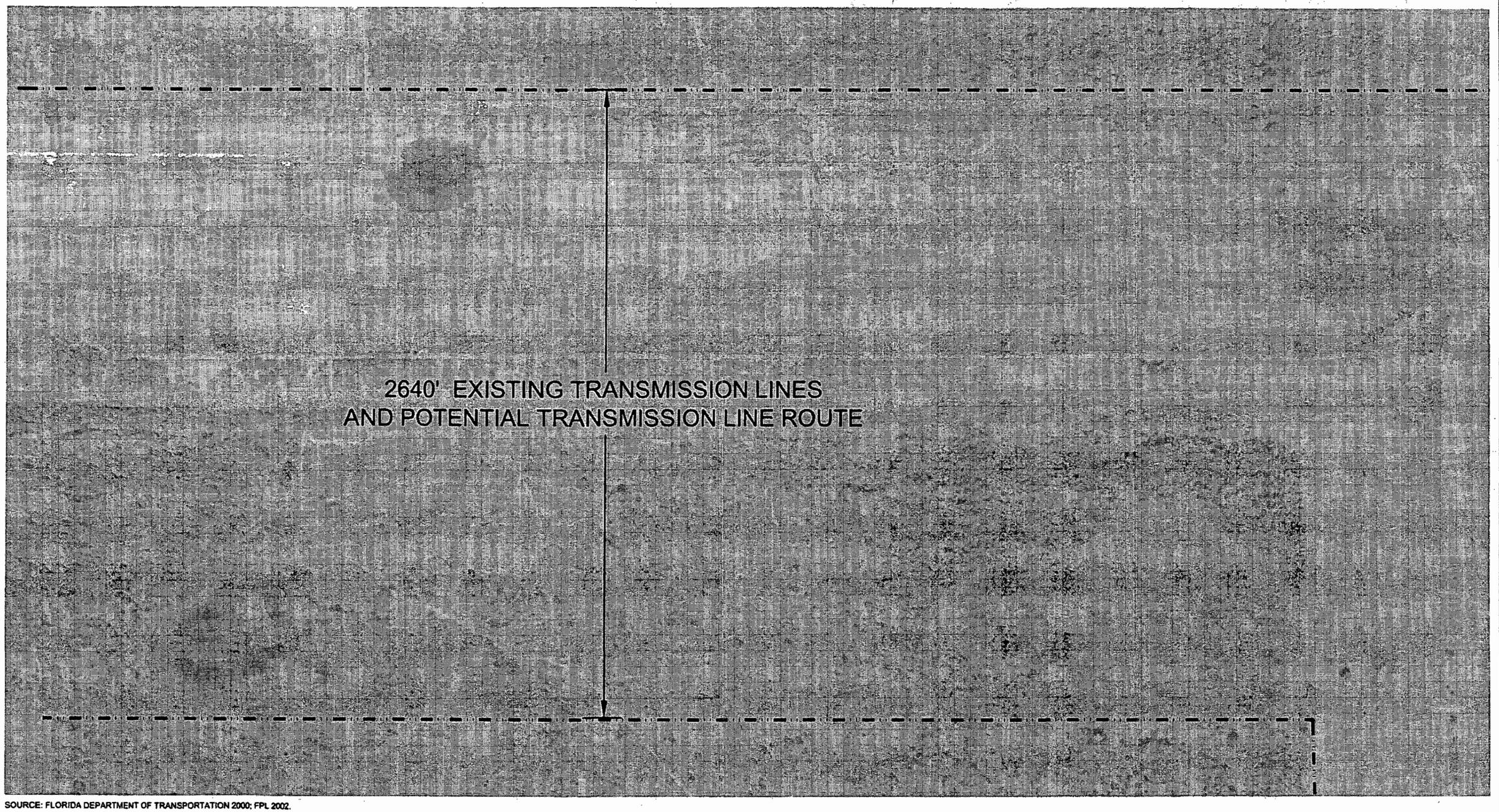
AERIAL PHOTOGRAPHS (PAGE 1 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 29.dwg Jan 27, 2002 - 4:26pm

BEST AVAILABLE COPY



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

LEGEND

POTENTIAL TRANSMISSION LINE ROUTE

0 400 800 1200 1600

SCALE 1"=400'

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	

FILE No. 38 (SHEET 2)
PROJECT No. 013-7609-1502 REV. 0

TITLE

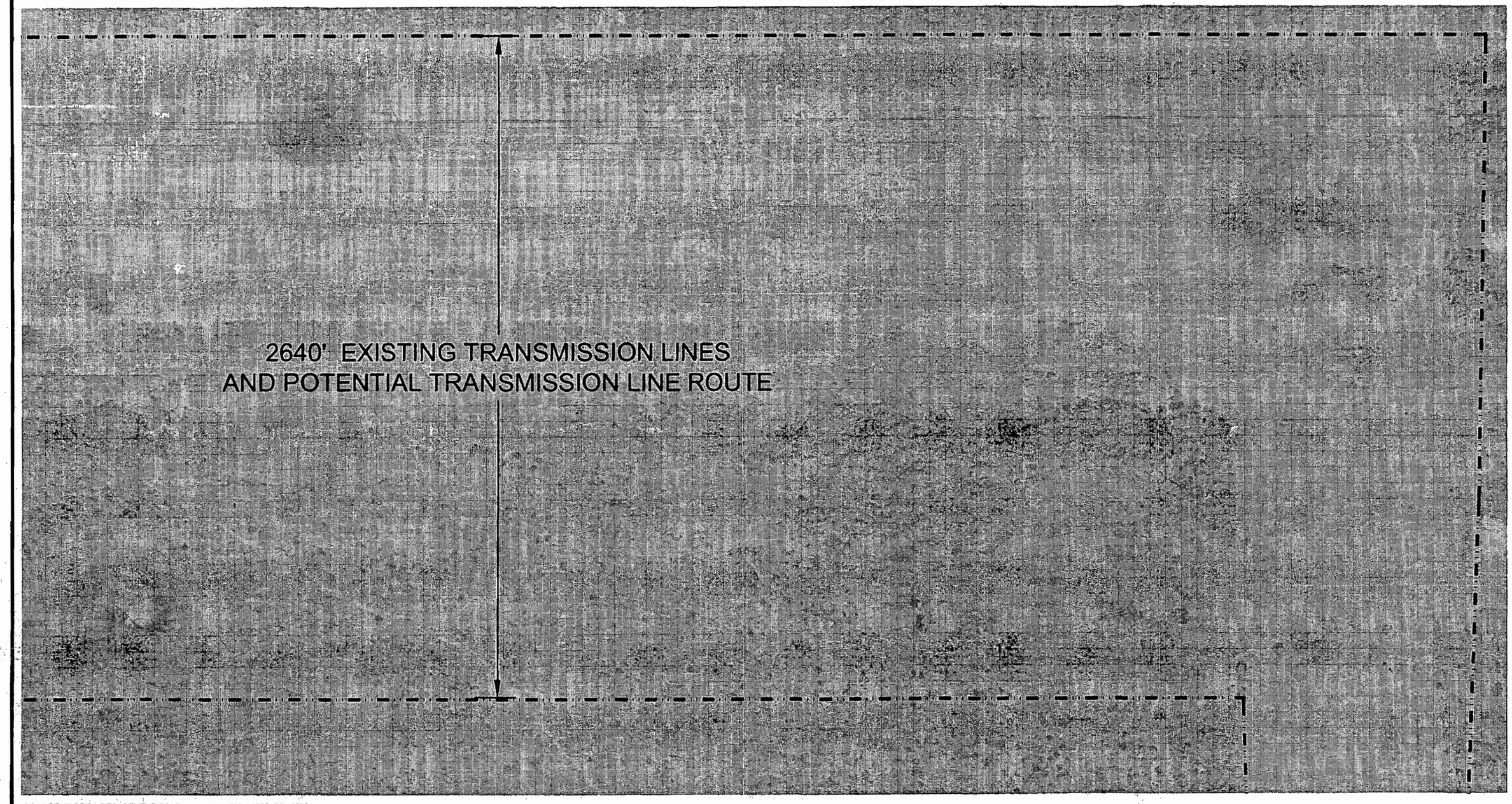
AERIAL PHOTOGRAPHS (PAGE 2 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 38.dwg Jan 27, 2002 - 4:26pm

BEST AVAILABLE COPY



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

LEGEND

POTENTIAL TRANSMISSION LINE ROUTE

0 400 800 1200 1600

SCALE 1"=400'

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	

FILE No. 38 (SHEET 3)
PROJECT No. 013-7609-1502 REV. 0

TITLE

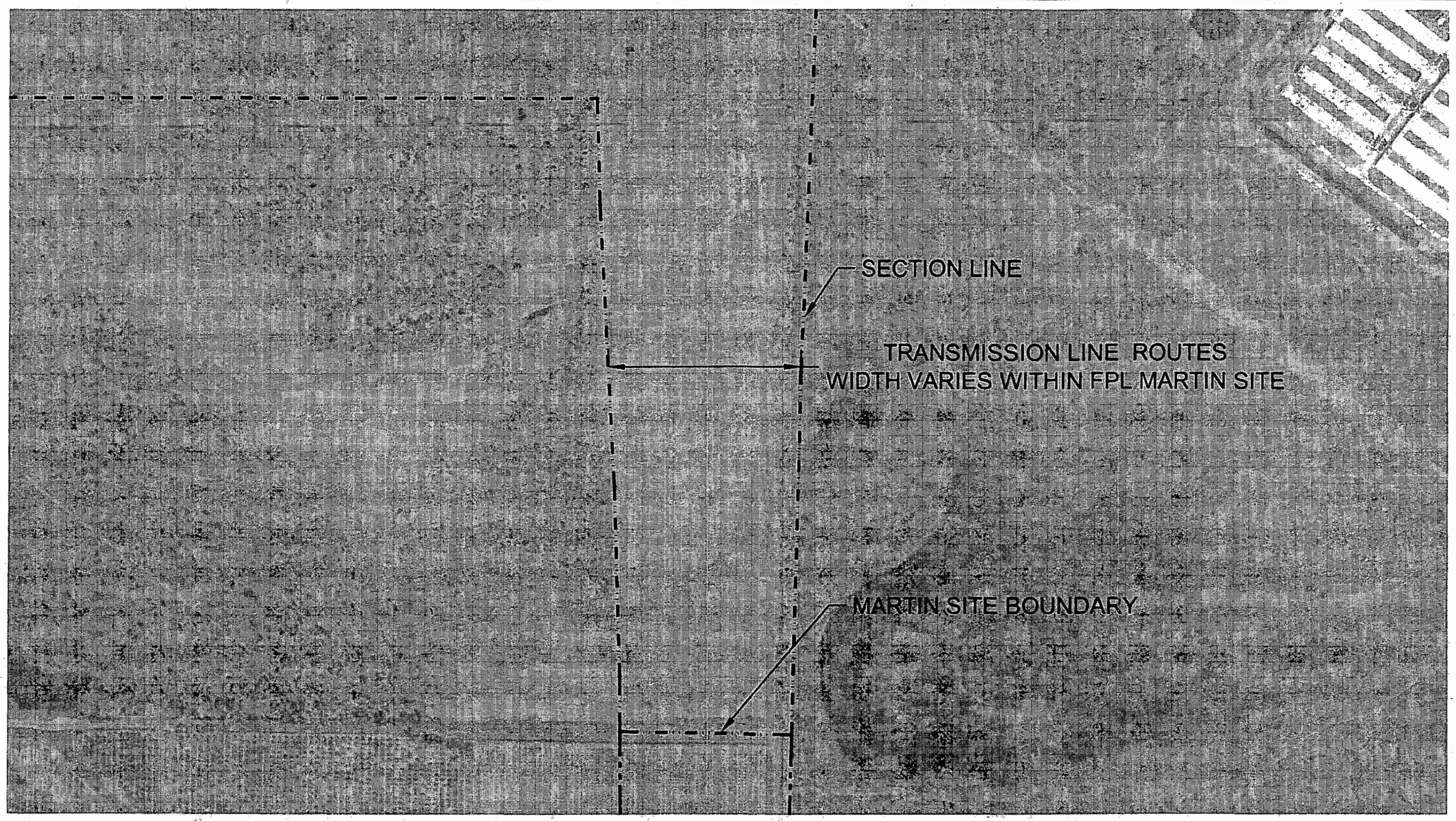
AERIAL PHOTOGRAPHS (PAGE 3 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 38.dwg Jan 27, 2002 - 4:26pm

BEST AVAILABLE COPY



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

LEGEND

POTENTIAL TRANSMISSION LINE ROUTE

EXISTING ROW

0 400 800 1200 1600

SCALE 1" = 400'

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	
FILE No.	38 (SHEET 4)
PROJECT No.	013-7609-1502
REV.	0

TITLE

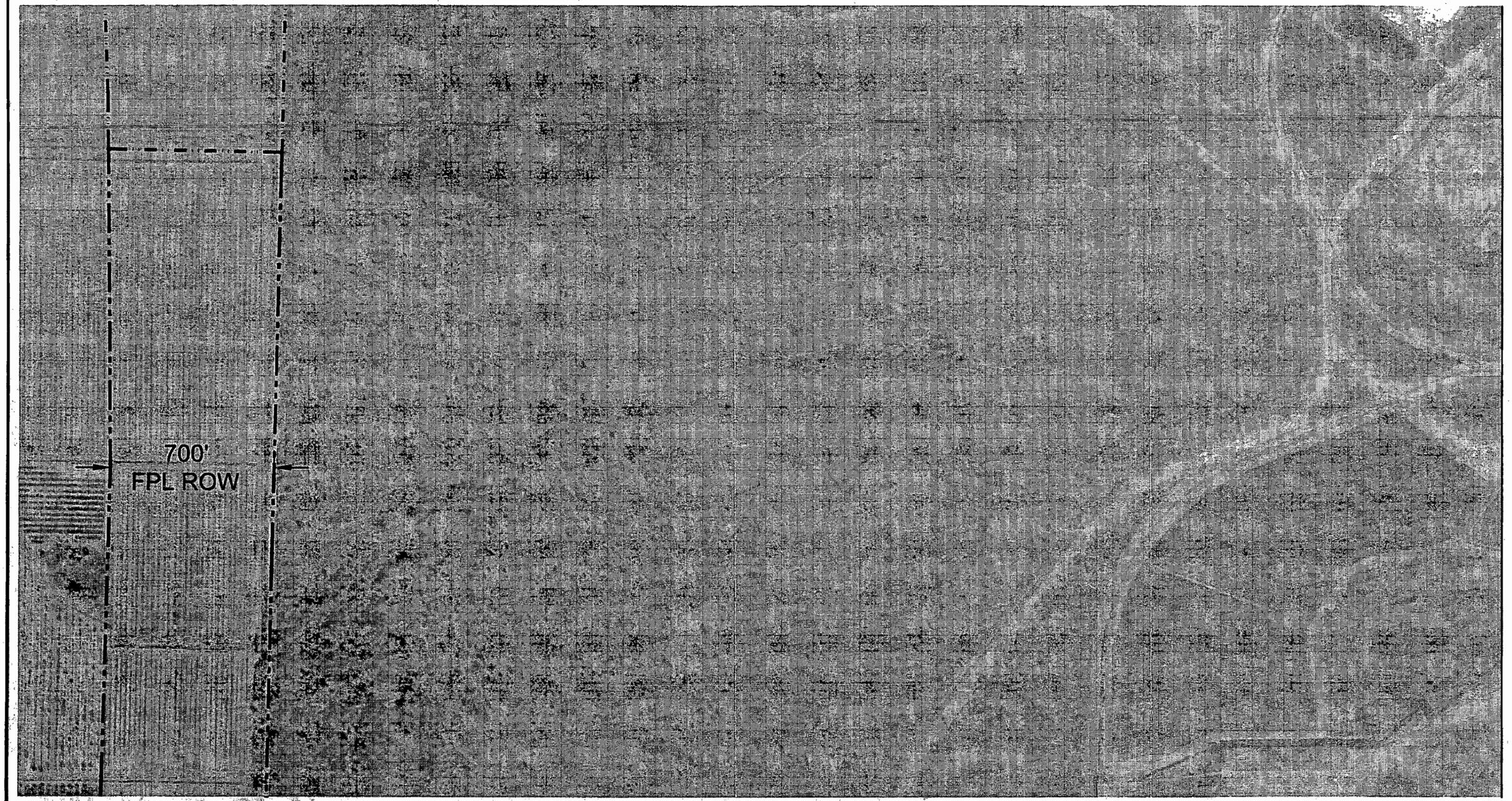
AERIAL PHOTOGRAPHS (PAGE 4 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 38.dwg Jan 27, 2002 - 6:31pm

BEST AVAILABLE COPY



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

LEGEND

POTENTIAL TRANSMISSION LINE ROUTE

EXISTING ROW

0 400 800 1200 1600

SCALE 1"=400'

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	
FILE No.	38 (SHEET 5)
PROJECT No.	0137609-1502 REV. 0

TITLE

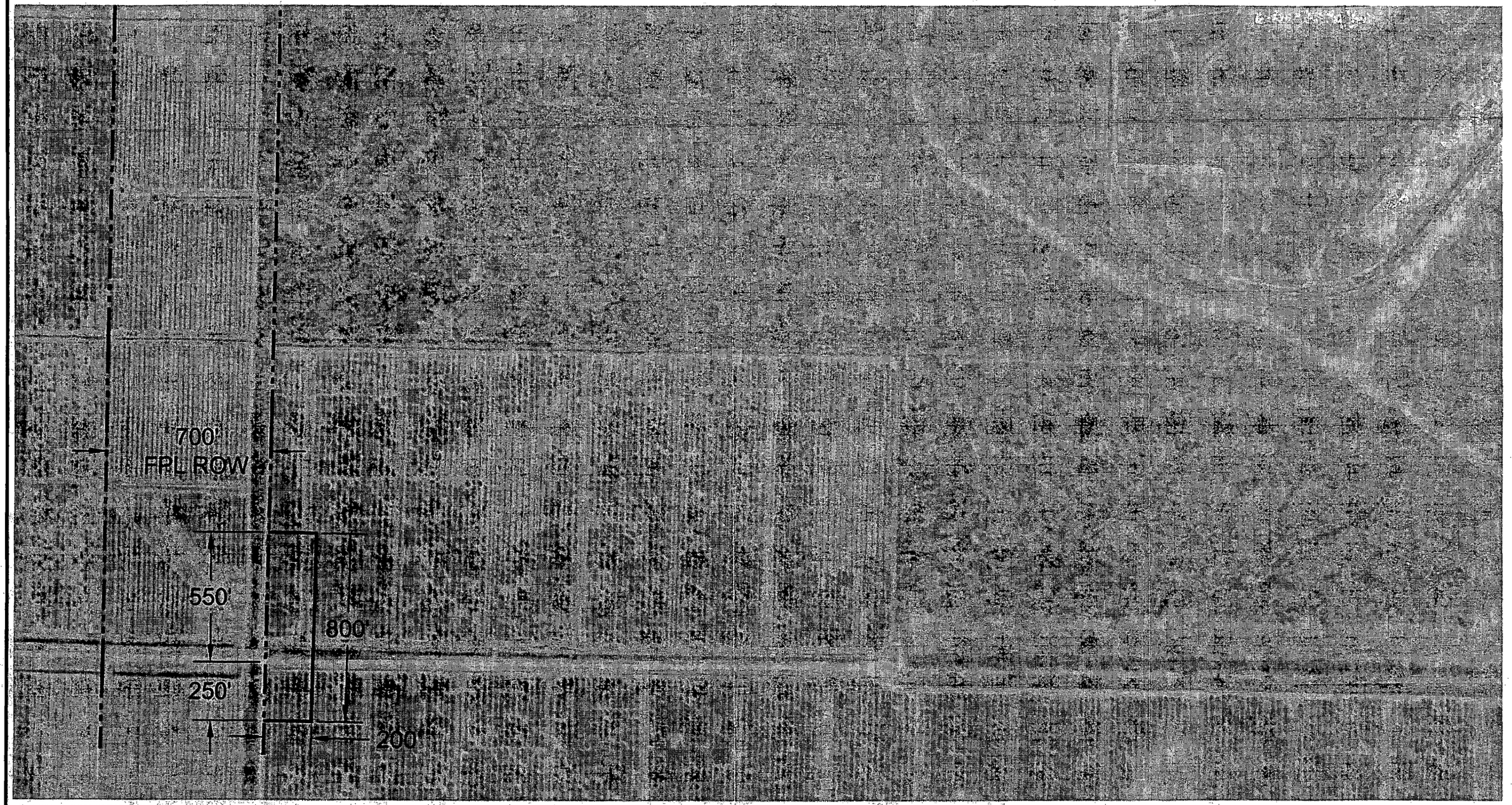
AERIAL PHOTOGRAPHS (PAGE 5 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 38.dwg Jan 27, 2002 - 4:50pm

BEST AVAILABLE COPY



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

LEGEND

EXISTING ROW

PROPOSED BUMP OUT

0 400 800 1200 1600

SCALE 1"=400'

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/01
DESIGN	LA
CADD	DM
CHECK	
REVIEW	
FILE No.	38 (SHEET 6)
PROJECT No.	013-7609-1502 REV. 0

TITLE

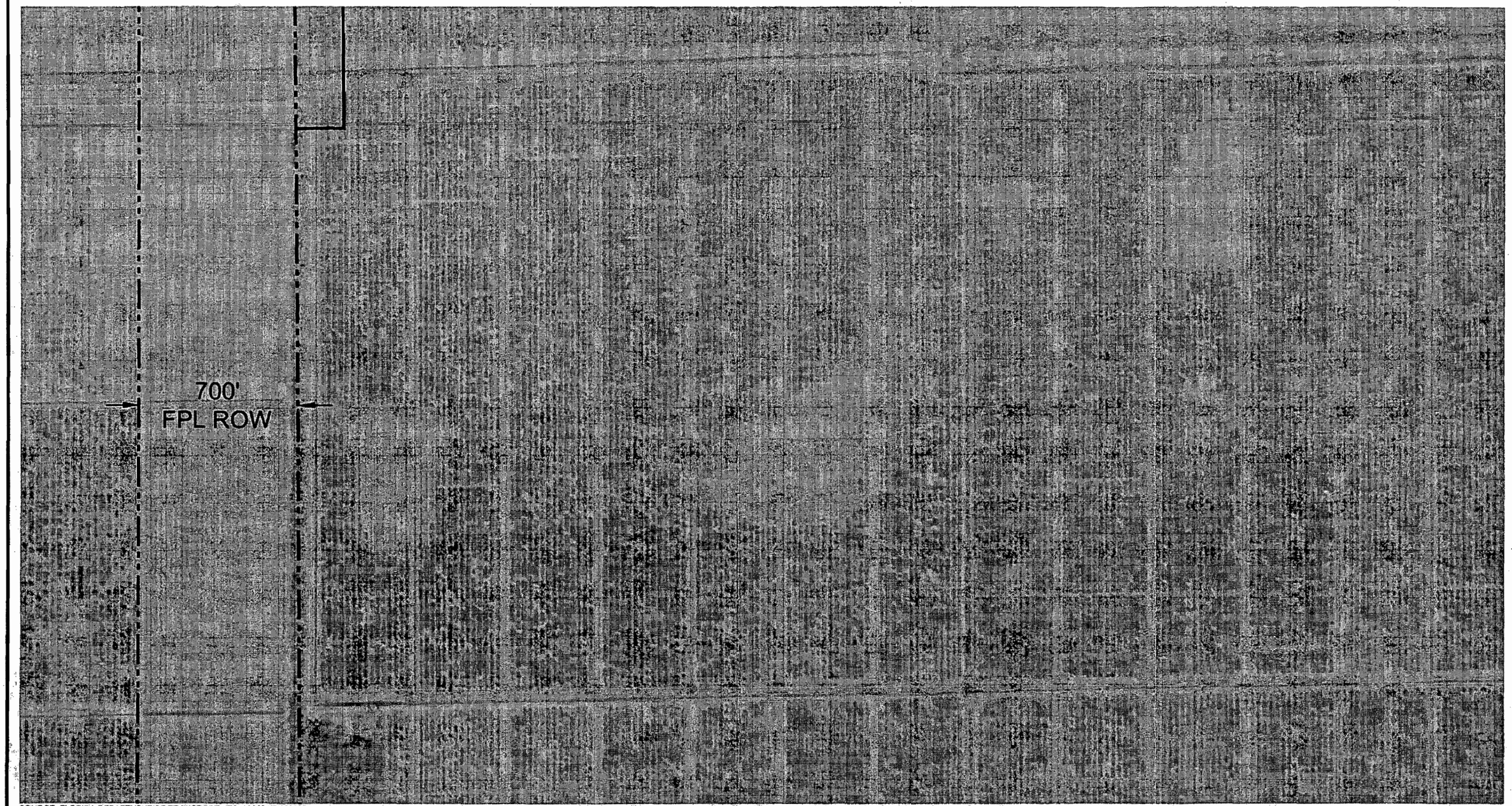
AERIAL PHOTOGRAPHS (PAGE 6 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 38.dwg Jan 27, 2002 - 7:17pm

BEST AVAILABLE COPY



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000;FPL 2002.

LEGEND

EXISTING ROW

PROPOSED BUMP OUT

0 400 800 1200 1600

SCALE 1"=400'

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	
FILE No.	39 (SHEET 7)
PROJECT No.	0137609-1502 REV. 0

TITLE

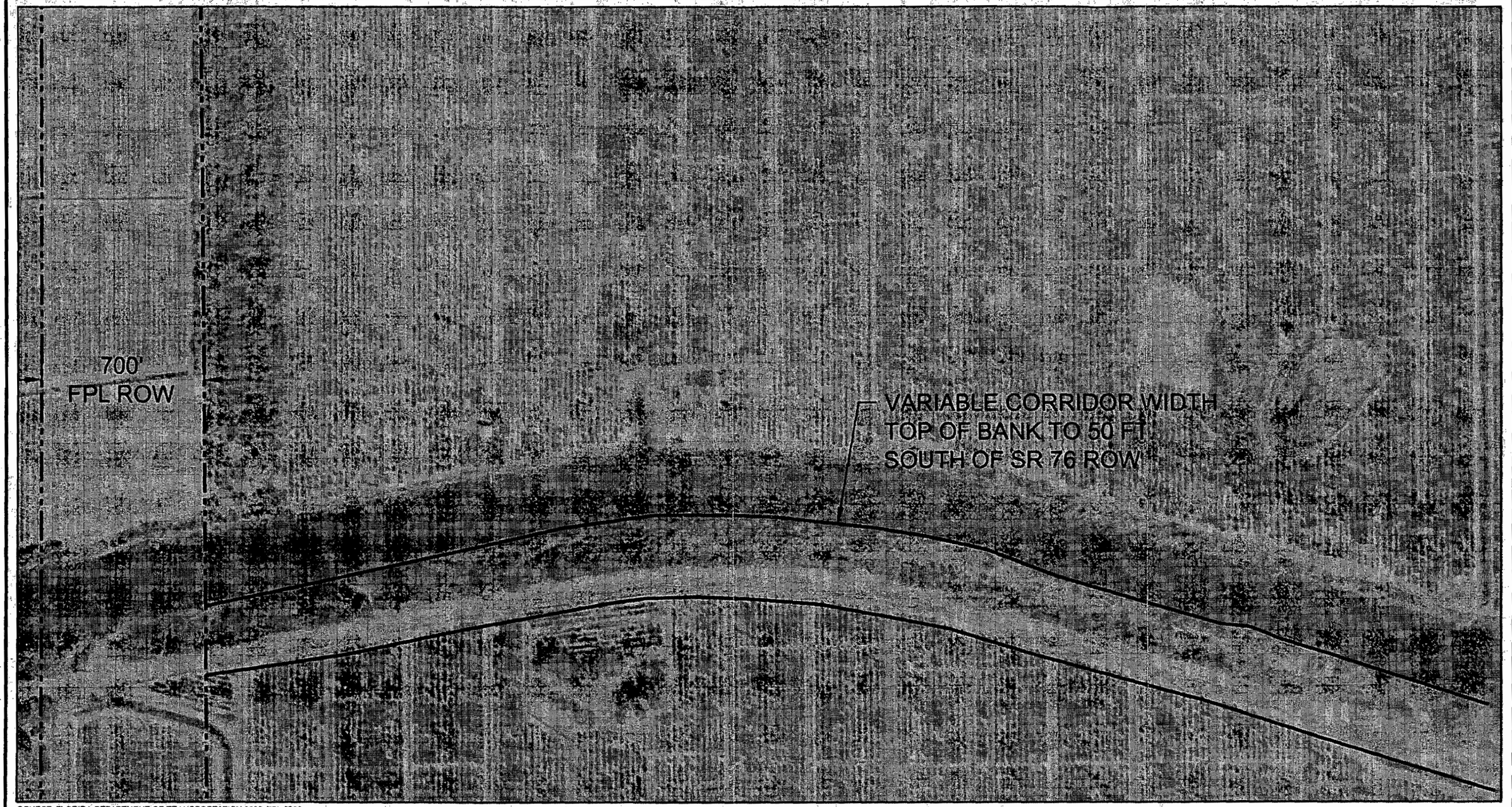
AERIAL PHOTOGRAPHS (PAGE 7 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 39.dwg Jan 27, 2002 - 4:58pm

BEST AVAILABLE COPY



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

LEGEND

EXISTING ROW

PROJECT CORRIDOR (TO BE CERTIFIED)

0 400 800 1200 1600

SCALE 1"=400'

NOTE:
FINAL CERTIFIED ROW TO BE ESTABLISHED AT A LATER DATE.

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	

FILE No. 39 (SHEET 8)
PROJECT No. 0137609-1502 REV. 0

TITLE

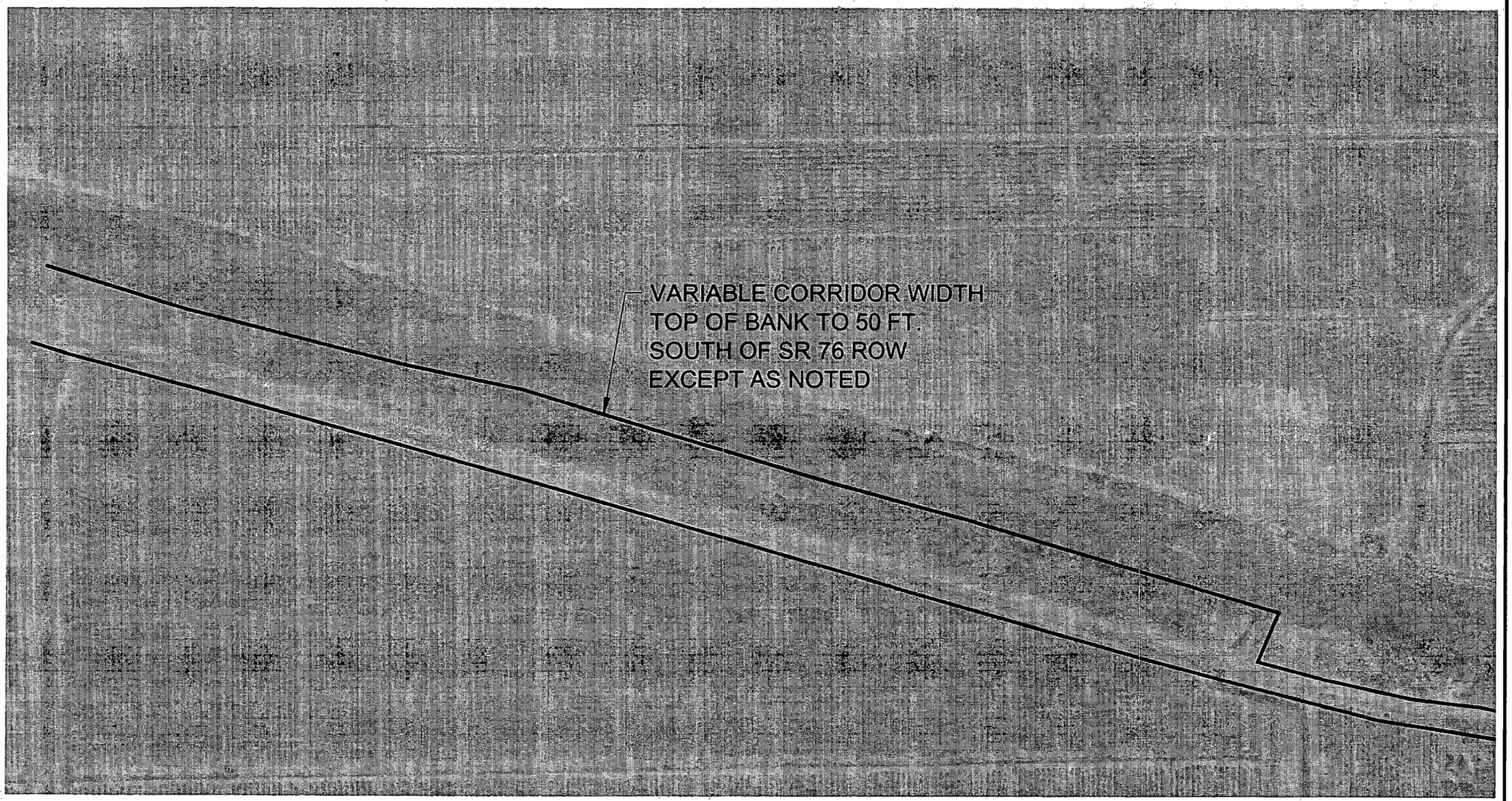
AERIAL PHOTOGRAPHS (PAGE 8 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 39.dwg Jan 27, 2002 - 5:15pm

BEST AVAILABLE COPY



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

NOTE:
FINAL CERTIFIED ROW TO BE
ESTABLISHED AT A LATER DATE.

LEGEND

PROJECT CORRIDOR
(TO BE CERTIFIED)

0 400 800 1200 1600

SCALE 1"=400'

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	
FILE No.	48 (SHEET 9)
PROJECT No.	0137609-1502
REV.	0

TITLE

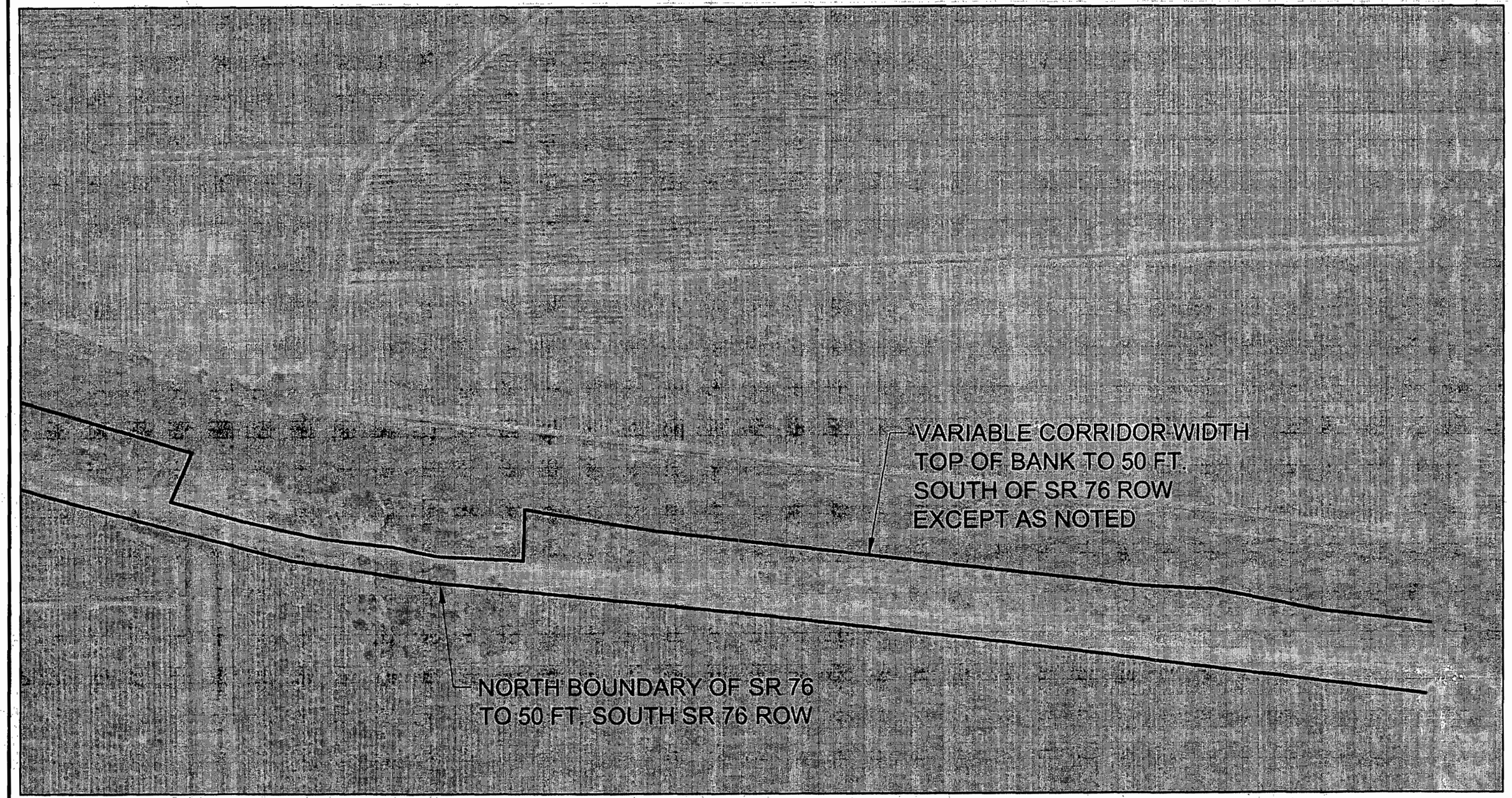
AERIAL PHOTOGRAPHS (PAGE 9 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 48.dwg Jan 27, 2002 - 5:17pm

BEST AVAILABLE COPY



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

NOTE:
FINAL CERTIFIED ROW TO BE
ESTABLISHED AT A LATER DATE.

LEGEND

PROJECT CORRIDOR
(TO BE CERTIFIED)

0 400 800 1200 1600
SCALE 1"=400'

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	
FILE No.	48 (SHEET 10)
PROJECT No.	0137609-1502
REV.	0

TITLE

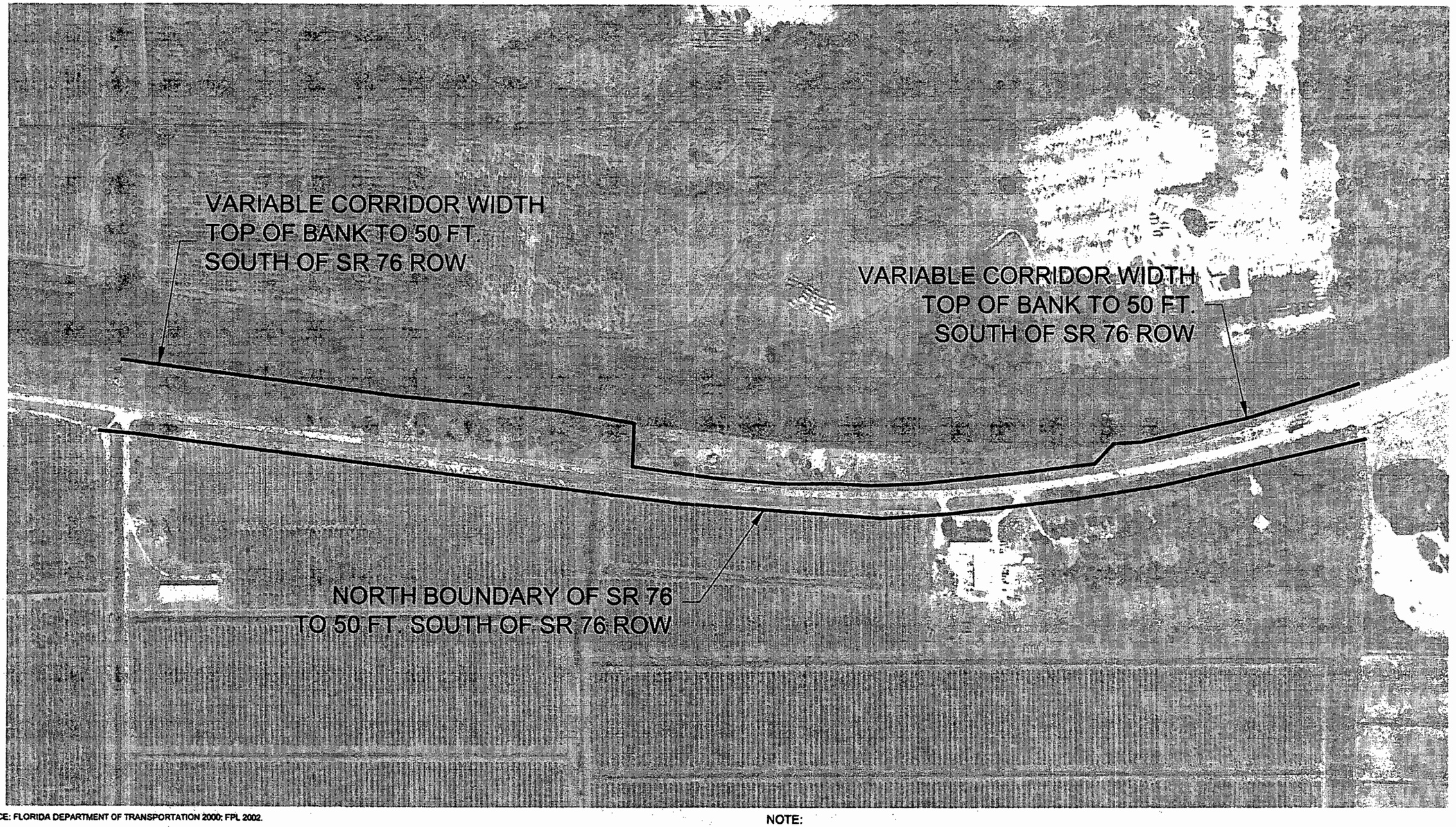
AERIAL PHOTOGRAPHS (PAGE 10 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 48.dwg Jan 27, 2002 - 5:17pm

BEST AVAILABLE COPY

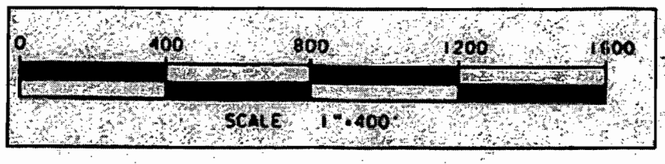


SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

NOTE:
FINAL CERTIFIED ROW TO BE
ESTABLISHED AT A LATER DATE.

LEGEND

PROJECT CORRIDOR
(TO BE CERTIFIED)



Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	
FILE No.	57C (SHEET 11)
PROJECT No.	0137609-1502
REV.	0

TITLE

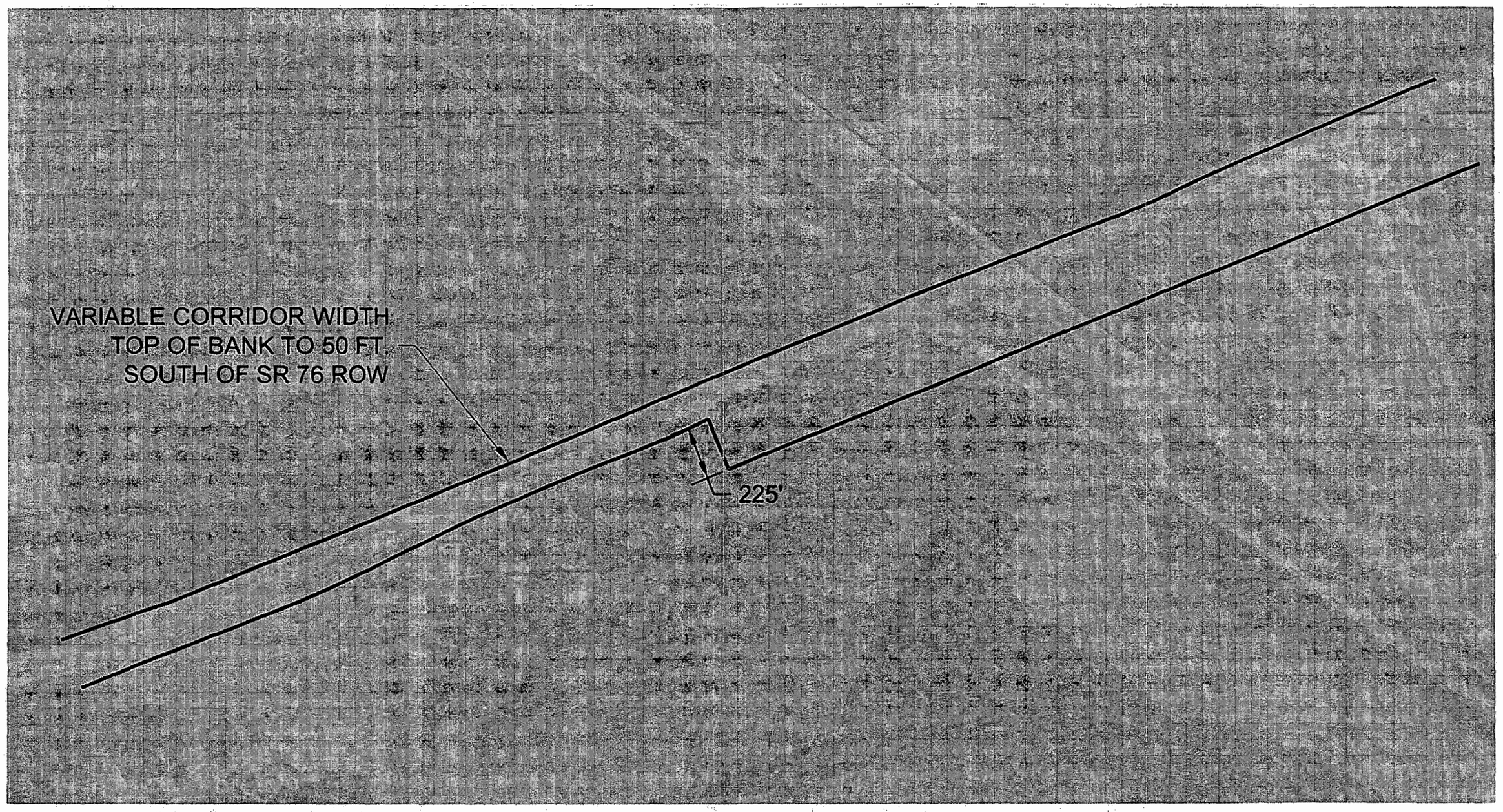
AERIAL PHOTOGRAPHS (PAGE 11 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 57c.dwg Jan 27, 2002 - 5:19pm

BEST AVAILABLE COPY



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

NOTE:
FINAL CERTIFIED ROW TO BE
ESTABLISHED AT A LATER DATE.

LEGEND

PROJECT CORRIDOR
(TO BE CERTIFIED)

0 400 800 1200 1600
SCALE 1" = 400'

Golder Associates
Tampa, Florida

FILE No.	57D (SHEET 12)	SCALE	1:400
PROJECT No.	0137609-1502 REV. 0	DATE	1/27/02
		DESIGN	LA
		CADD	DM
		CHECK	
		REVIEW	

TITLE

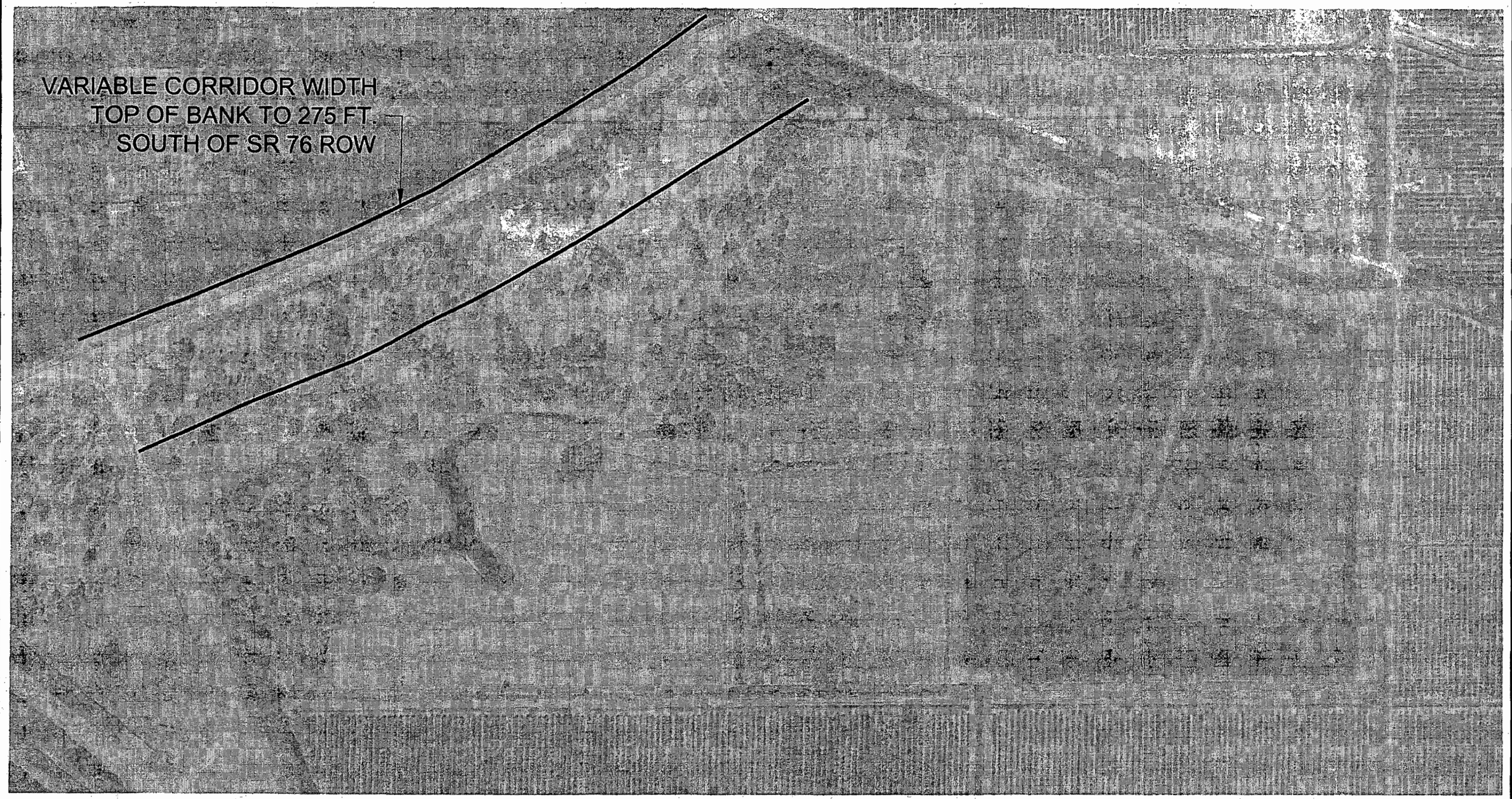
AERIAL PHOTOGRAPHS (PAGE 12 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 57d.dwg Jan 27, 2002 - 5:22pm

BEST AVAILABLE COPY



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

NOTE:
FINAL CERTIFIED ROW TO BE
ESTABLISHED AT A LATER DATE.

LEGEND

PROJECT CORRIDOR
(TO BE CERTIFIED)

0 400 800 1200 1600
SCALE 1"=400'

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	
FILE No.	66C (SHEET 13)
PROJECT No.	0137609-1502
REV.	0

TITLE

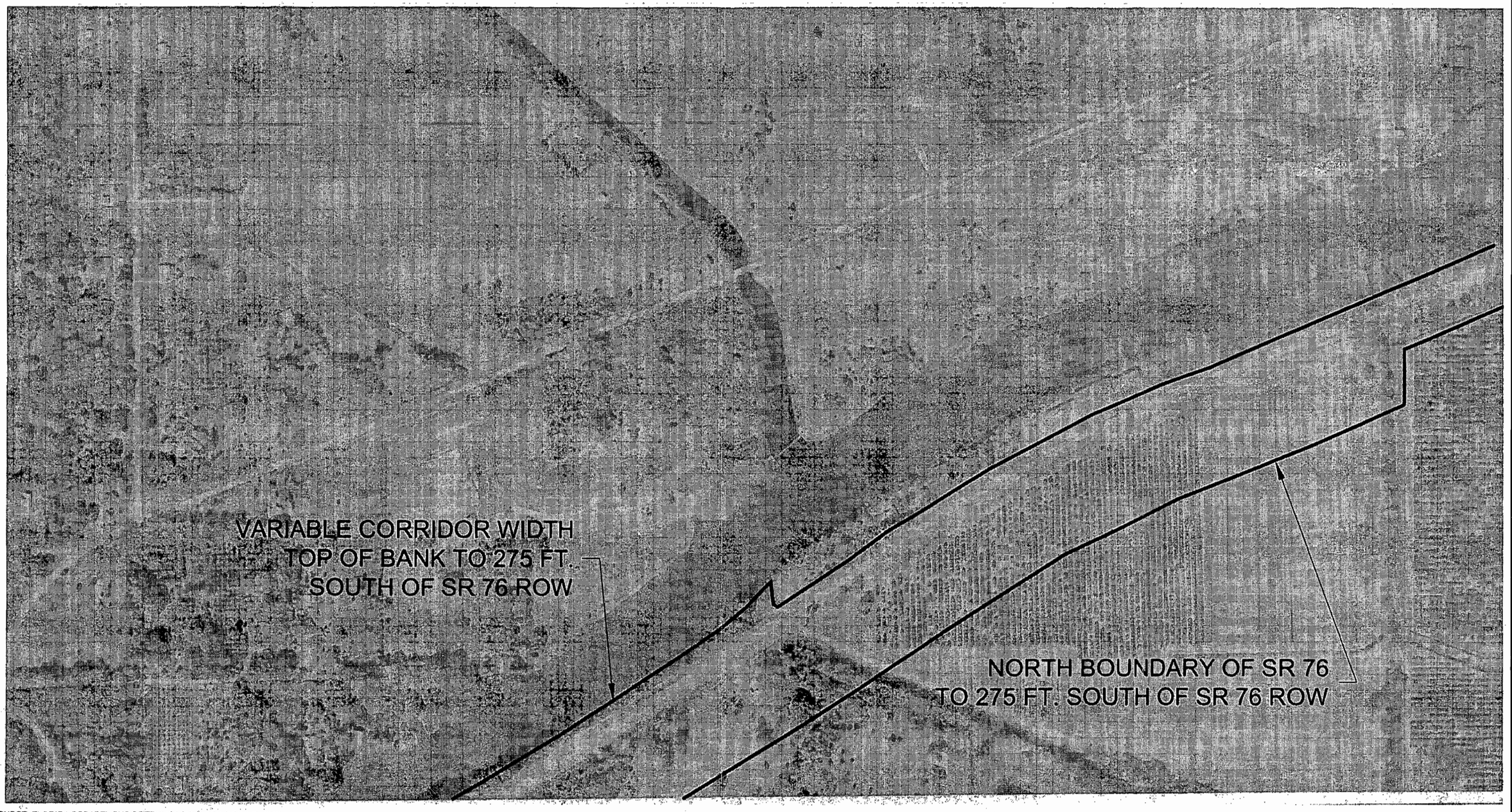
AERIAL PHOTOGRAPHS (PAGE 13 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 66c.dwg Jan 27, 2002 - 5:27pm

BEST AVAILABLE COPY



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

NOTE:
FINAL CERTIFIED ROW TO BE
ESTABLISHED AT A LATER DATE.

LEGEND

PROJECT CORRIDOR
(TO BE CERTIFIED)

0 400 800 1200 1600
SCALE 1" = 400'

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	
FILE No.	66B (SHEET 14)
PROJECT No.	0137609-1502
REV.	0

TITLE

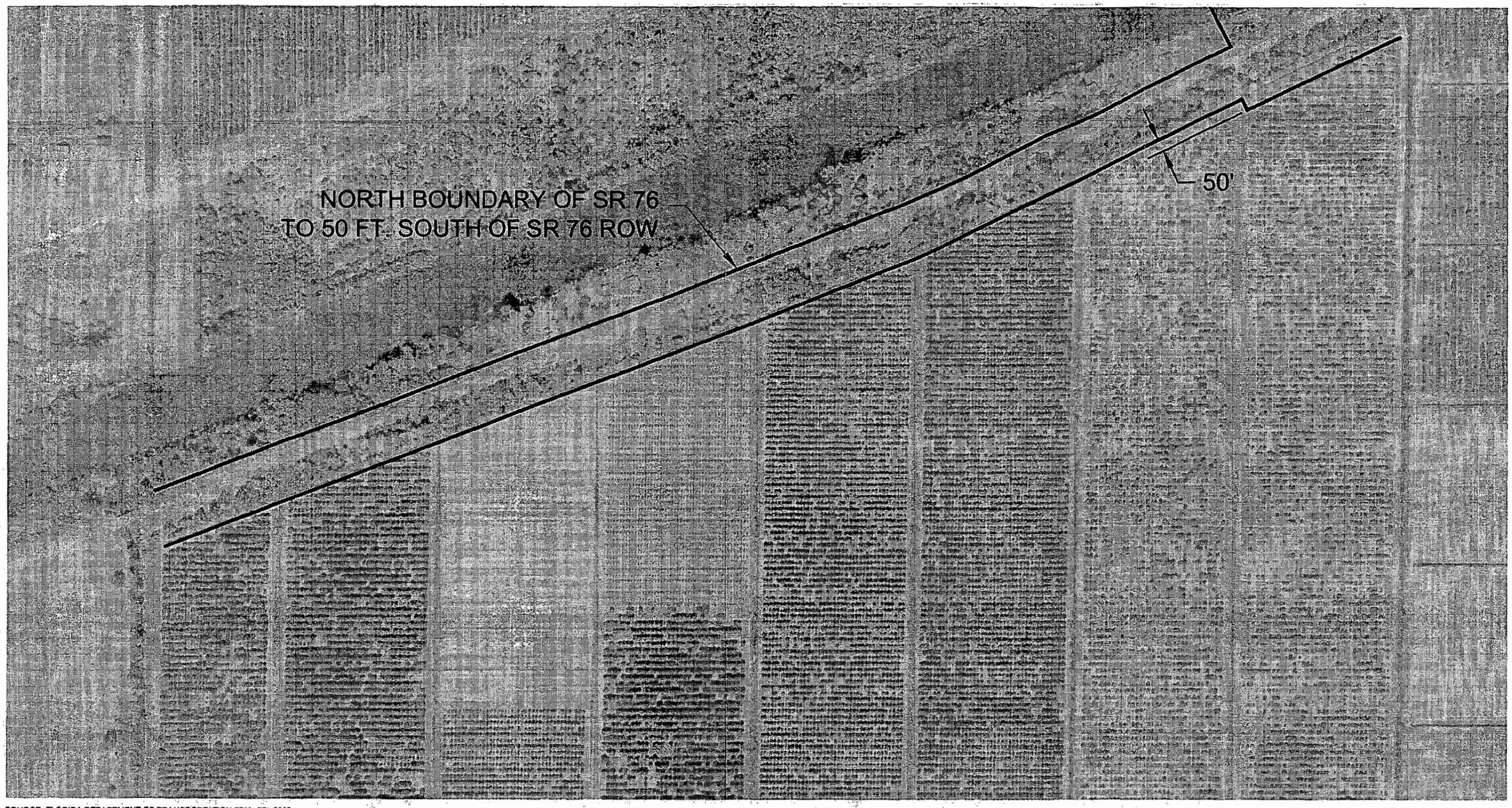
AERIAL PHOTOGRAPHS (PAGE 14 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing File: 66b.dwg Jan 27, 2002 - 5:27pm

BEST AVAILABLE COPY



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

NOTE:
FINAL CERTIFIED ROW TO BE
ESTABLISHED AT A LATER DATE.

LEGEND

PROJECT CORRIDOR
(TO BE CERTIFIED)

0 400 800 1200 1600
SCALE 1"=400'

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	

FILE No. 66A (SHEET 15)
PROJECT No. 0137609-1502 REV. 0

TITLE

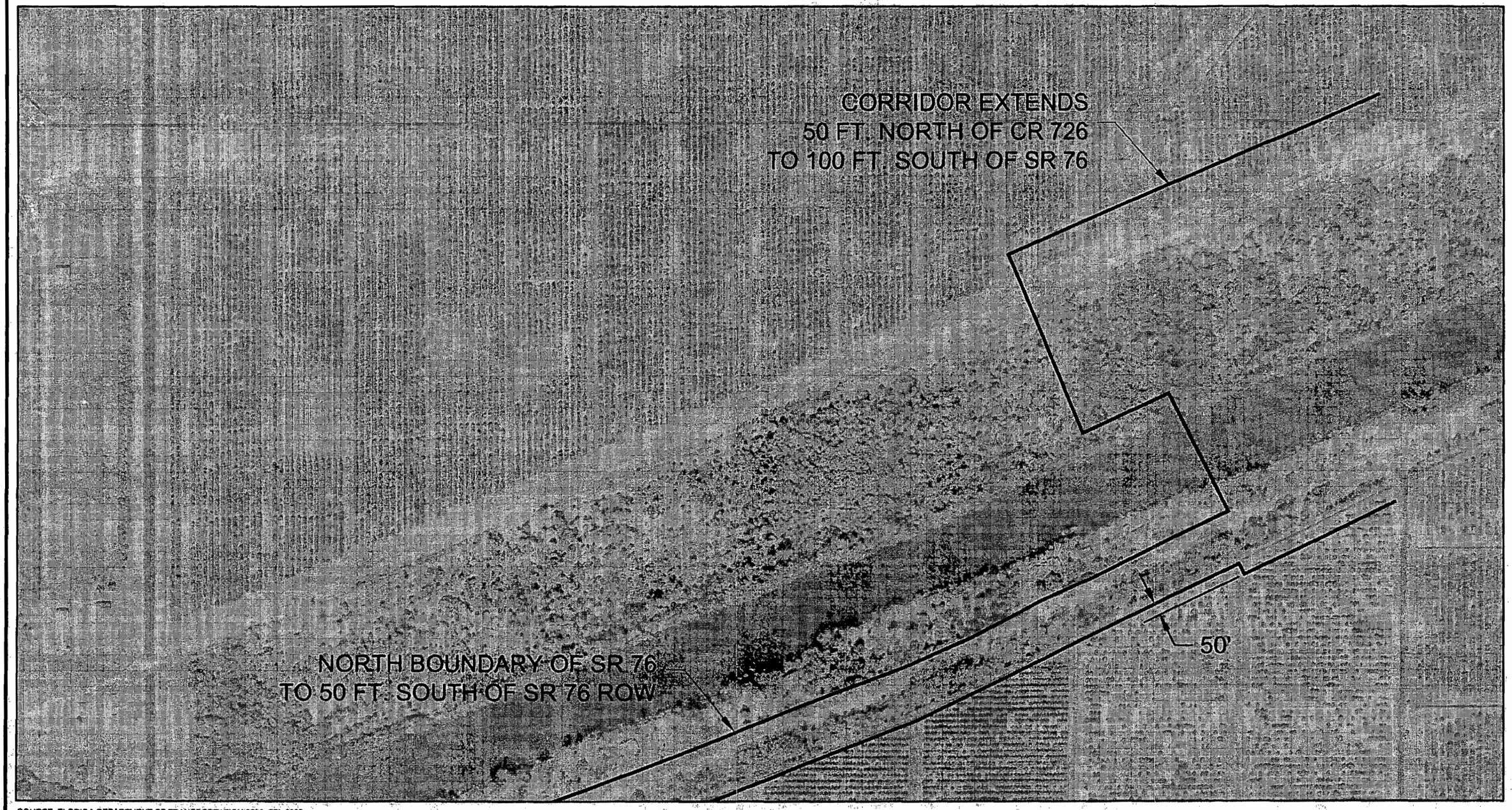
AERIAL PHOTOGRAPHS (PAGE 15 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 66a.dwg Jan 27, 2002 - 7:10pm

BEST AVAILABLE COPY



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

NOTE:
FINAL CERTIFIED ROW TO BE ESTABLISHED AT A LATER DATE.

LEGEND

PROJECT CORRIDOR (TO BE CERTIFIED)

0 400 800 1200 1600

SCALE 1" = 400'

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	
FILE No.	66A (SHEET 16)
PROJECT No.	0137609-1502
REV.	0

TITLE

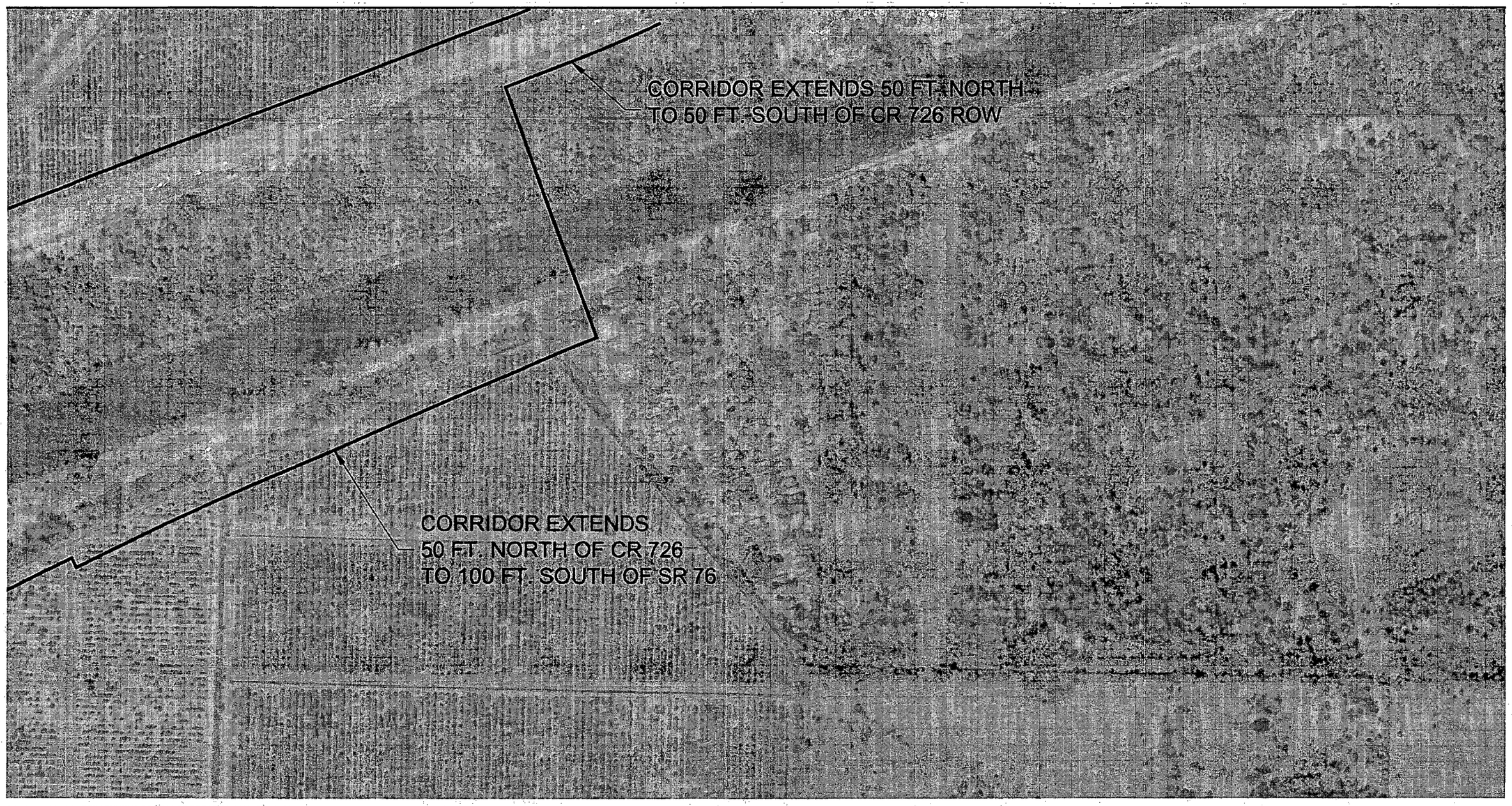
AERIAL PHOTOGRAPHS (PAGE 16 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 66a.dwg Jan 27, 2002 - 7:10pm

BEST AVAILABLE COPY



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

NOTE:
FINAL CERTIFIED ROW TO BE
ESTABLISHED AT A LATER DATE.

LEGEND

PROJECT CORRIDOR
(TO BE CERTIFIED)

0 400 800 1200 1600
SCALE 1" = 400'

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	
FILE No.	75 (SHEET 17)
PROJECT No.	0137609-1502
REV.	0

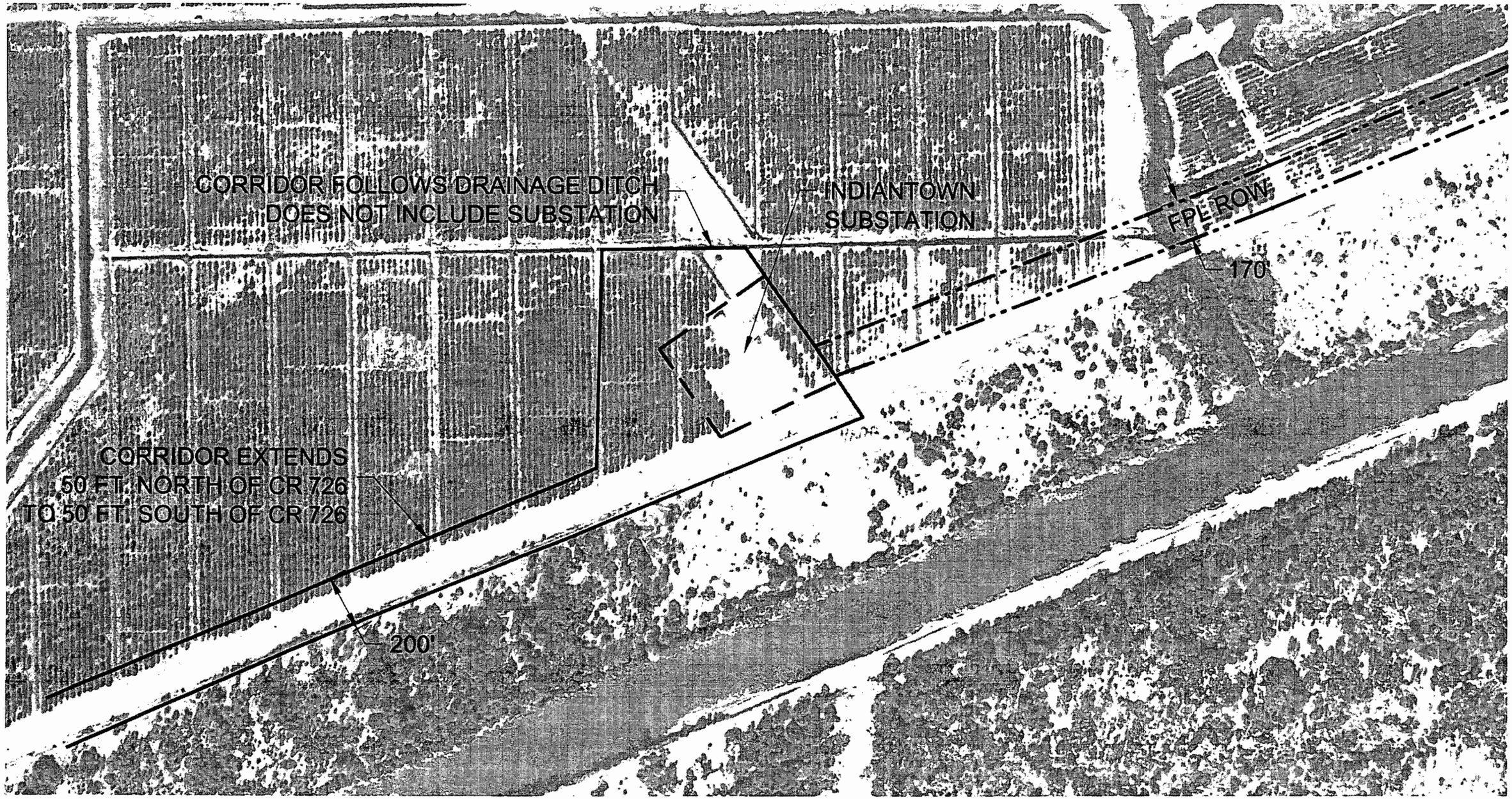
TITLE

AERIAL PHOTOGRAPHS (PAGE 17 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 75.dwg Jan 27, 2002 - 7:08pm



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

LEGEND

- EXISTING ROW
- PROJECT CORRIDOR (TO BE CERTIFIED)
- EXISTING ROW

0 400 800 1200 1600

SCALE 1" = 400'

NOTE:
FINAL CERTIFIED ROW TO BE ESTABLISHED AT A LATER DATE.

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	

FILE No. 74 (SHEET 18)
PROJECT No. 0137609-1502 REV. 0

TITLE

AERIAL PHOTOGRAPHS (PAGE 18 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 74.dwg Jan 27, 2002 - 7:13pm



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

LEGEND

EXISTING ROW

0 400 800 1200 1600

SCALE 1" = 400'

Golder Associates
Tampa, Florida

FILE No.	74 (SHEET 19)
PROJECT No.	0137609-1502
REV.	0
SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	

TITLE

AERIAL PHOTOGRAPHS (PAGE 19 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 74.dwg Jan 27, 2002 - 6:00pm



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

LEGEND

EXISTING ROW

0 400 800 1200 1600

SCALE 1" = 400'

Golder Associates
Tampa, Florida

FILE No.	83 (SHEET 20)
PROJECT No.	0137609-1502
REV.	0

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	

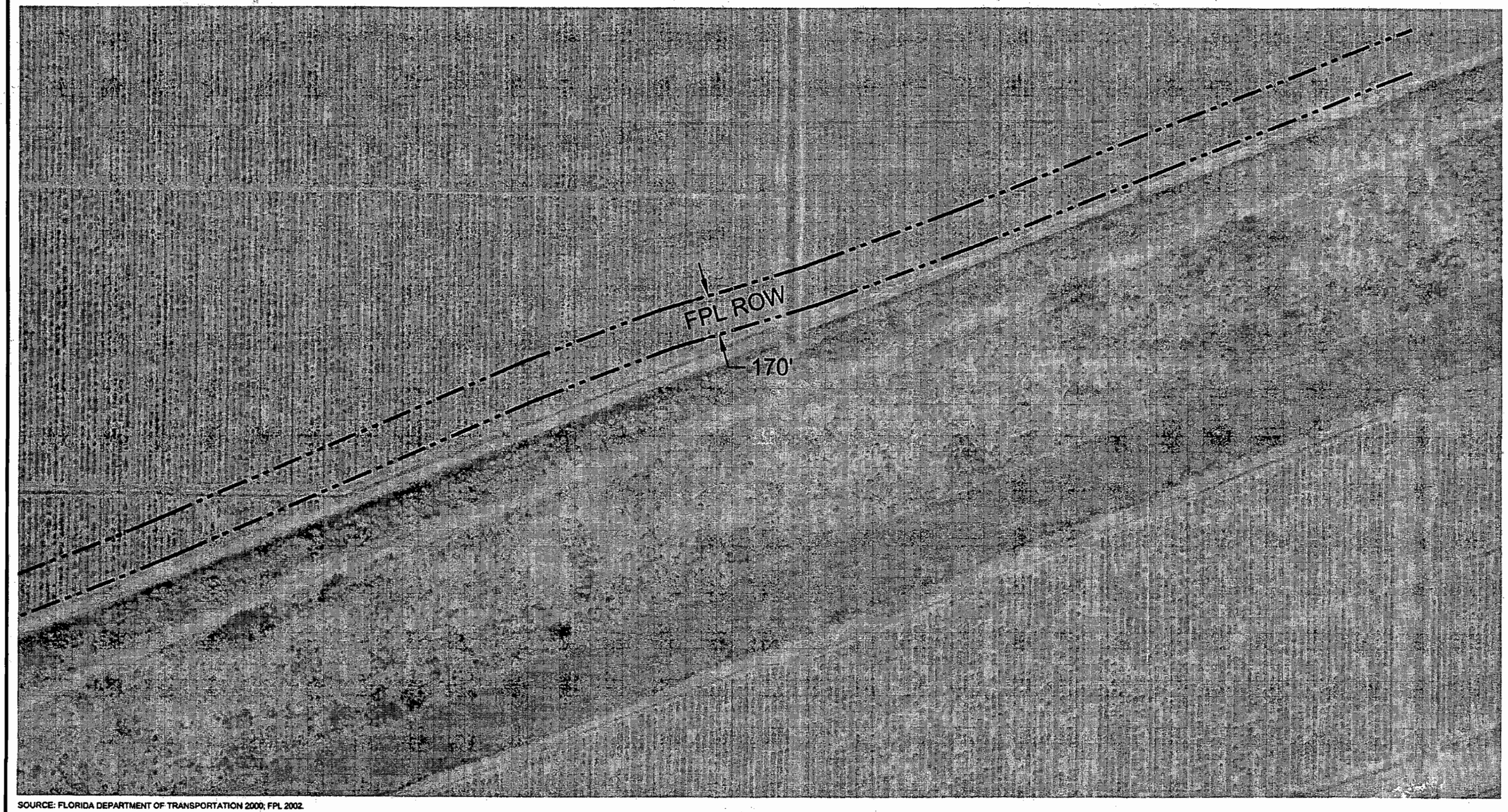
TITLE

AERIAL PHOTOGRAPHS (PAGE 20 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 83.dwg Jan 27, 2002 - 6:05pm



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

LEGEND

EXISTING ROW

0 400 800 1200 1600

SCALE 1" = 400'

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	
FILE No.	83 (SHEET 21)
PROJECT No.	0137609-1502
REV.	0

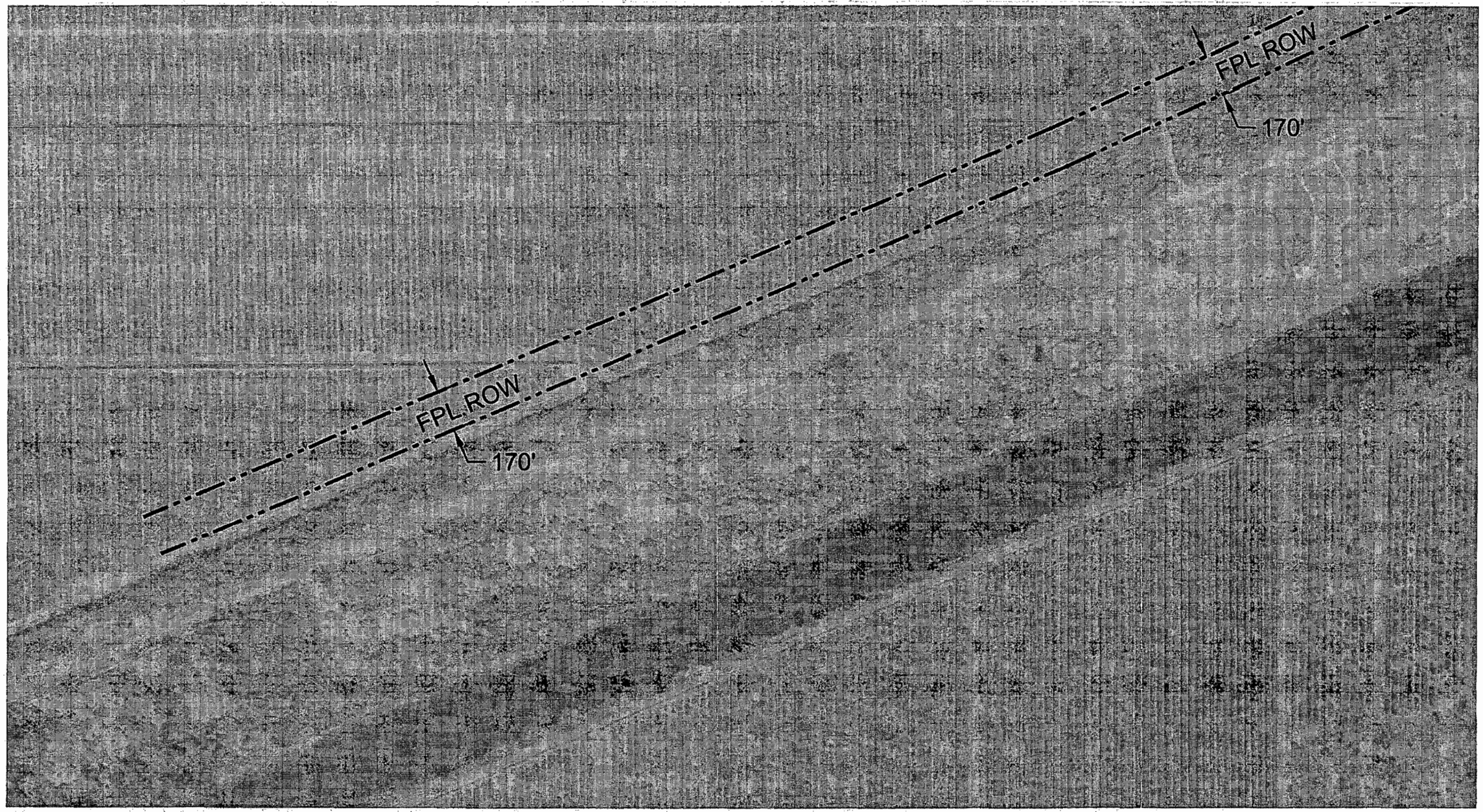
TITLE

AERIAL PHOTOGRAPHS (PAGE 21 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 83.dwg Jan 27, 2002 - 6:06pm



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

LEGEND

EXISTING ROW

0 400 800 1200 1600

SCALE 1"=400'

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	

FILE No. 92 (SHEET 22)

PROJECT No. 0137609-1502 REV. 0

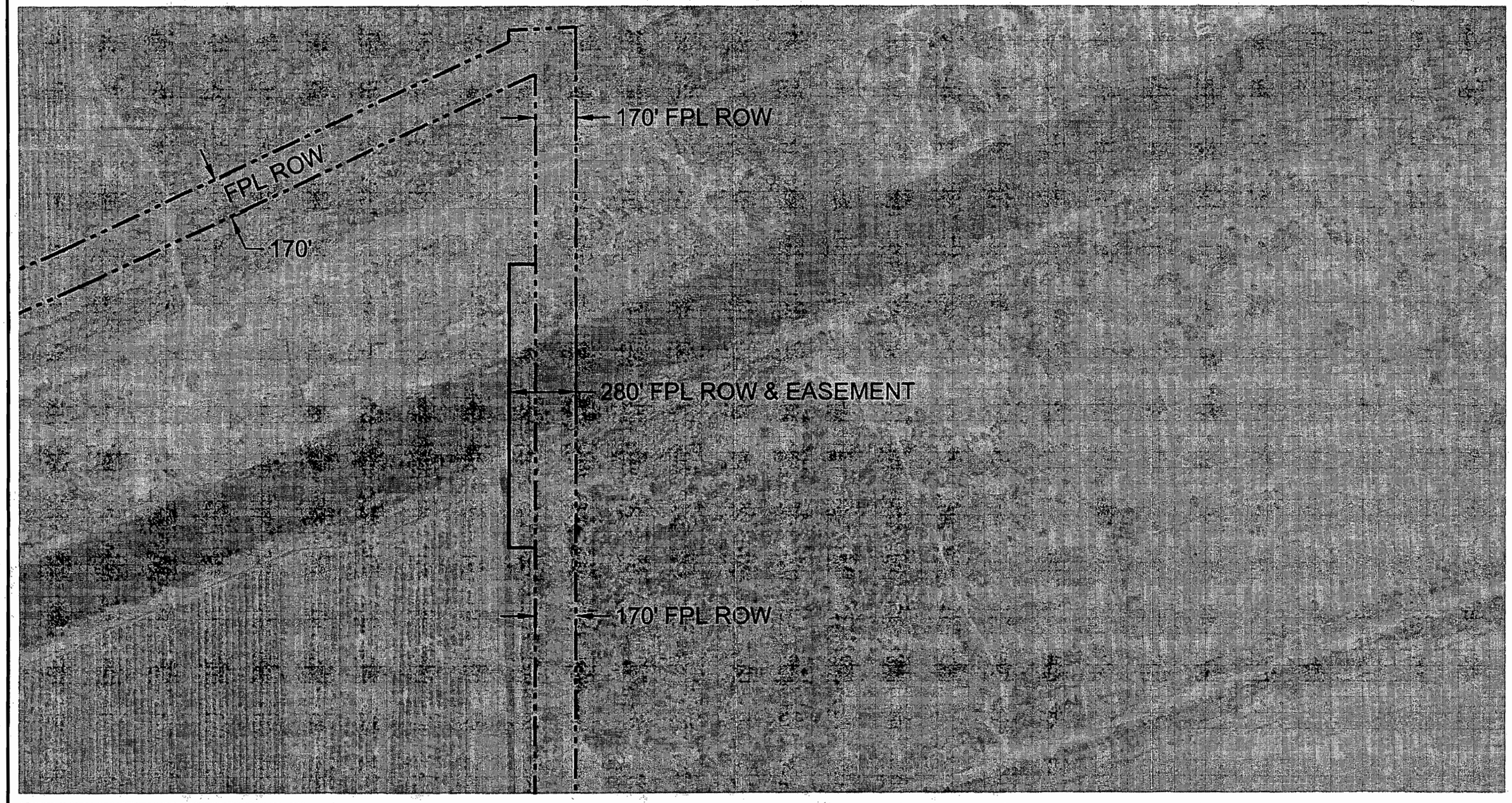
TITLE

AERIAL PHOTOGRAPHS (PAGE 22 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 92.dwg Jan 27, 2002 - 6:08pm



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

LEGEND

EXISTING ROW

PROPOSED BUMP OUT

0 400 800 1200 1600

SCALE: 1" = 400'

Golder Associates
Tampa, Florida

FILE No.	92 (SHEET 23)
PROJECT No.	0137609-1502
REV.	0
SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	

TITLE

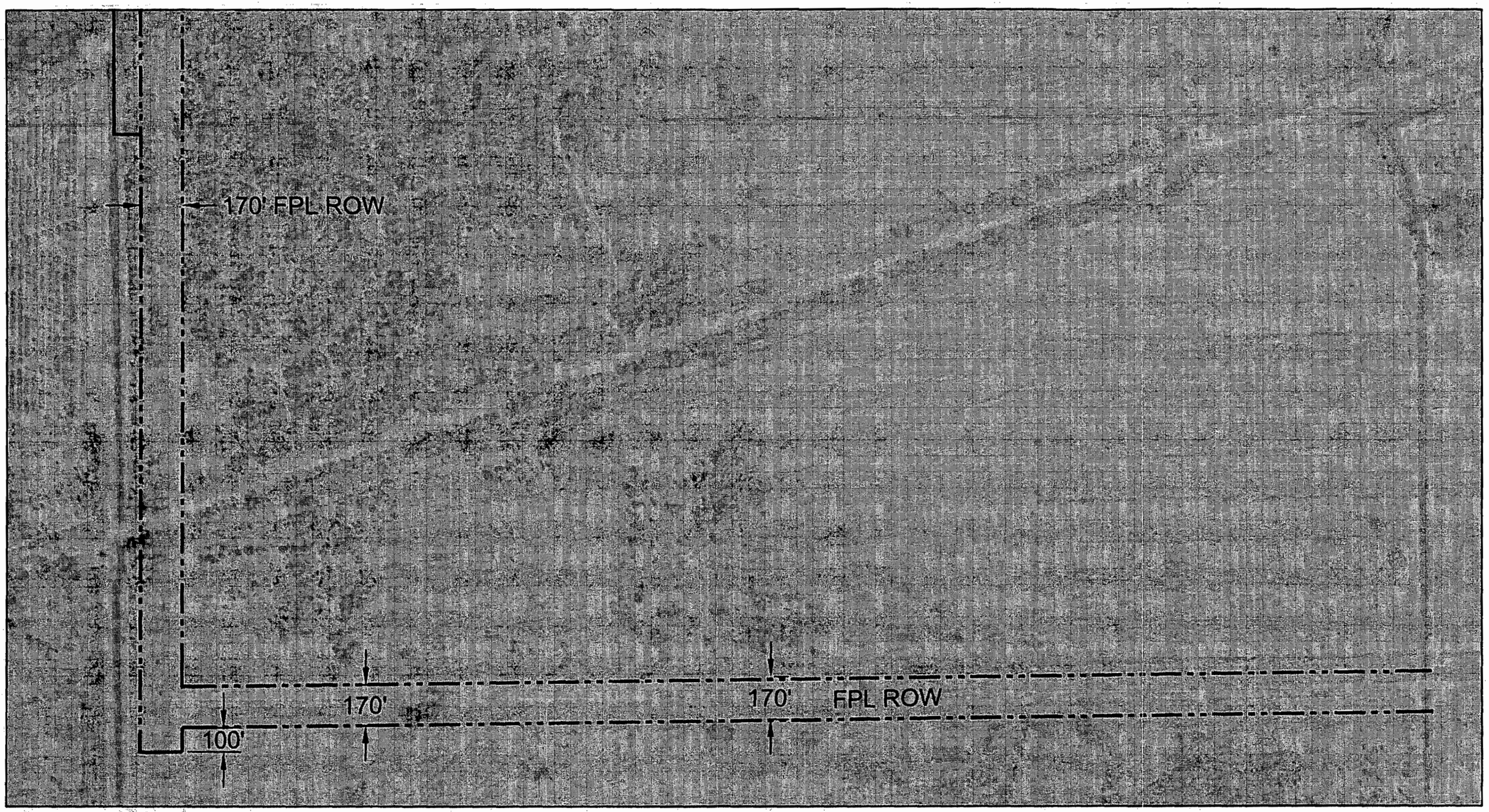
AERIAL PHOTOGRAPHS (PAGE 23 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 92.dwg Jan 27, 2002 - 6:17pm

BEST AVAILABLE COPY



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

LEGEND

EXISTING ROW

PROPOSED BUMP OUT

0 400 800 1200 1600

SCALE 1"=400'

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	
FILE No.	92 (SHEET 24)
PROJECT No.	0137609-1502
REV.	0

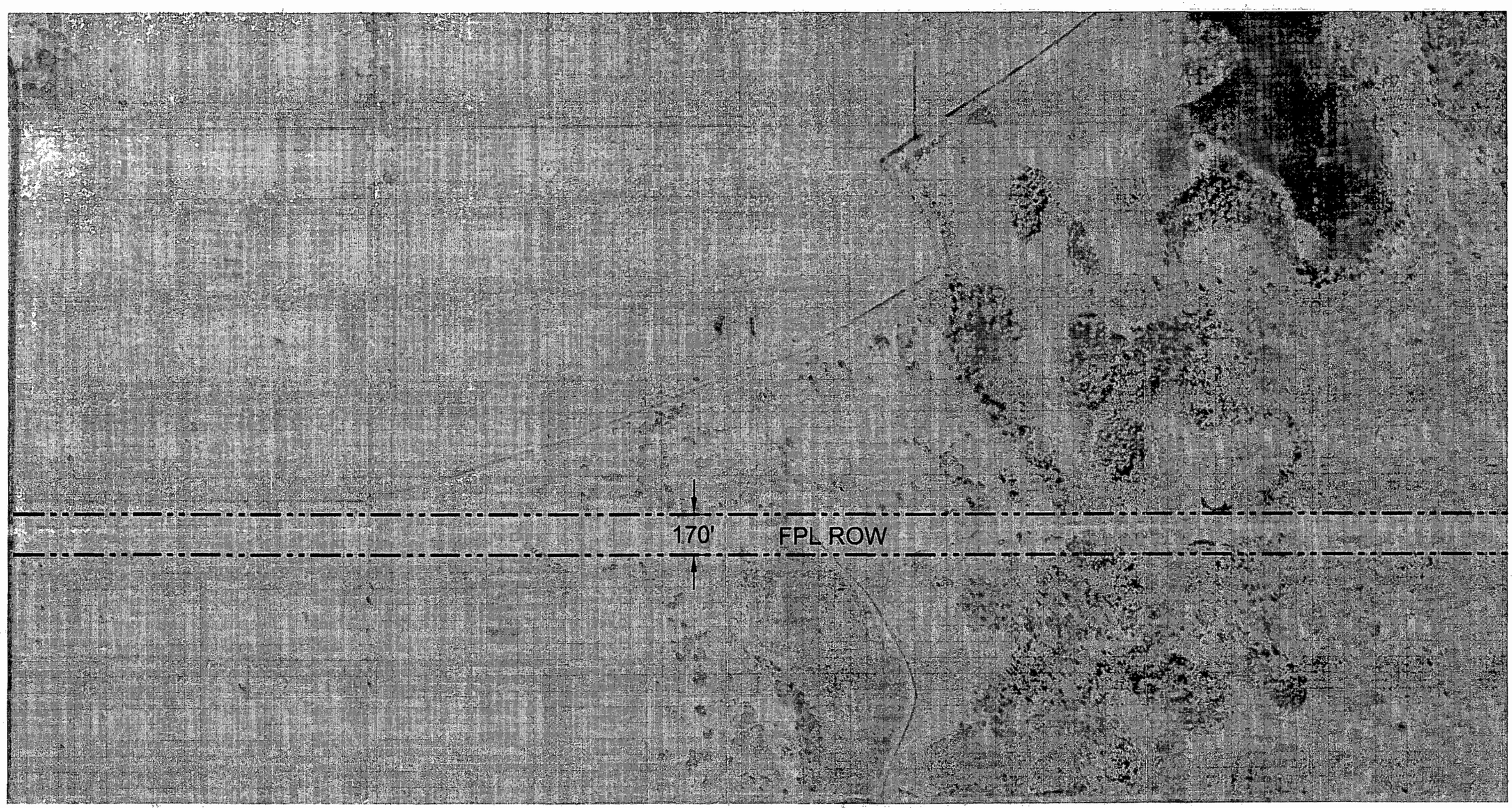
TITLE

AERIAL PHOTOGRAPHS (PAGE 24 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 92.dwg Jan 27, 2002 - 6:19pm



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

LEGEND

EXISTING ROW

0 400 800 1200 1600

SCALE 1"=400'

Golder Associates
Tampa, Florida

FILE No.	101 (SHEET 25)
PROJECT No.	0137609-1502
REV.	0
SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	

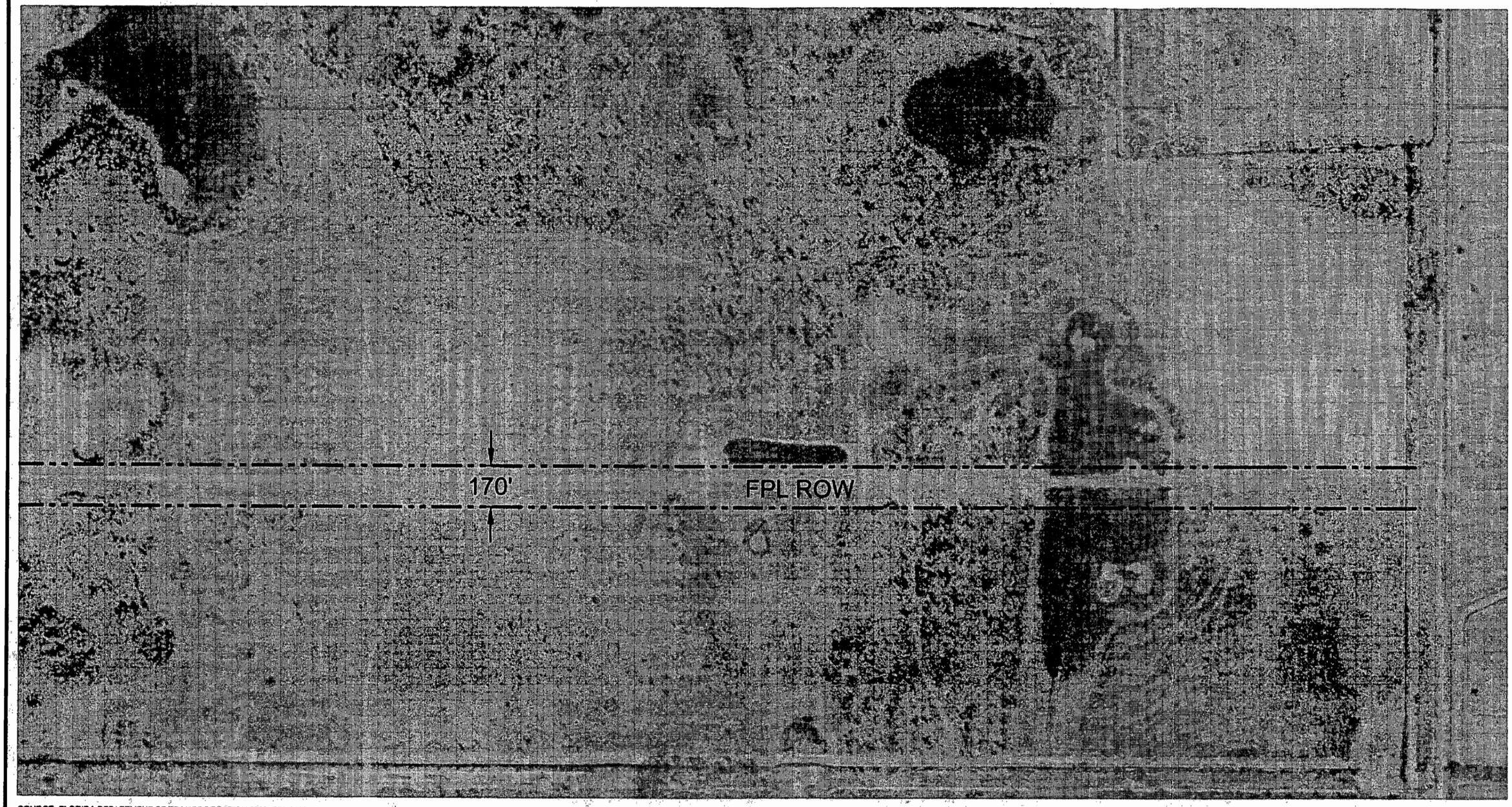
TITLE

AERIAL PHOTOGRAPHS (PAGE 25 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 101.dwg Jan 27, 2002 - 6:22pm



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

LEGEND

EXISTING ROW

0 400 800 1200 1600

SCALE 1" = 400'

Golder Associates
Tampa, Florida

FILE No.	101 (SHEET 26)
PROJECT No.	0137609-1502
REV.	0
SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	

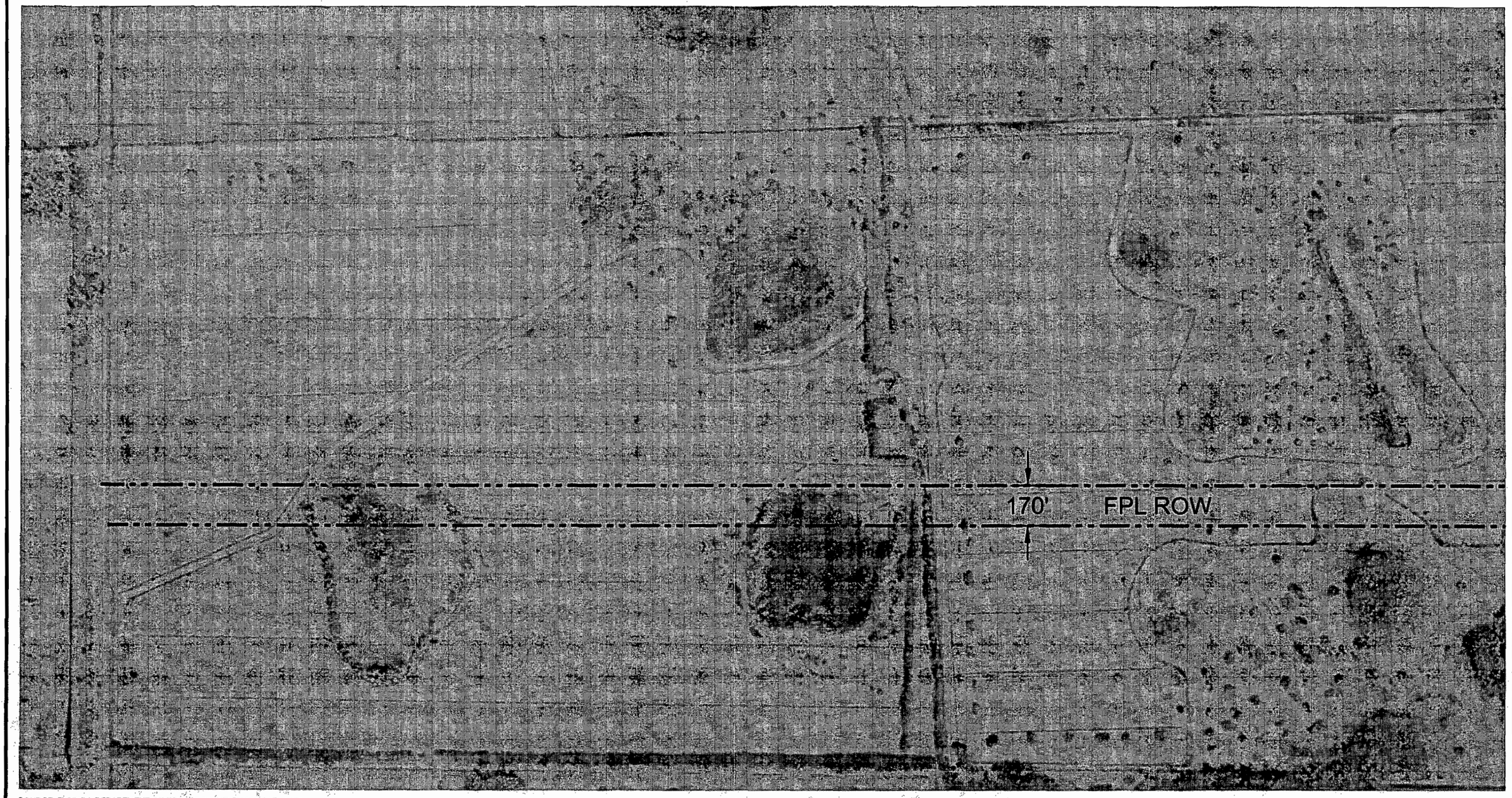
TITLE

AERIAL PHOTOGRAPHS (PAGE 26 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 101.dwg Jan 27, 2002 - 6:22pm



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

LEGEND

EXISTING ROW

0 400 800 1200 1600

SCALE 1"=400'

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	
FILE No.	112 (SHEET 27)
PROJECT No.	0137609-1502
REV.	0

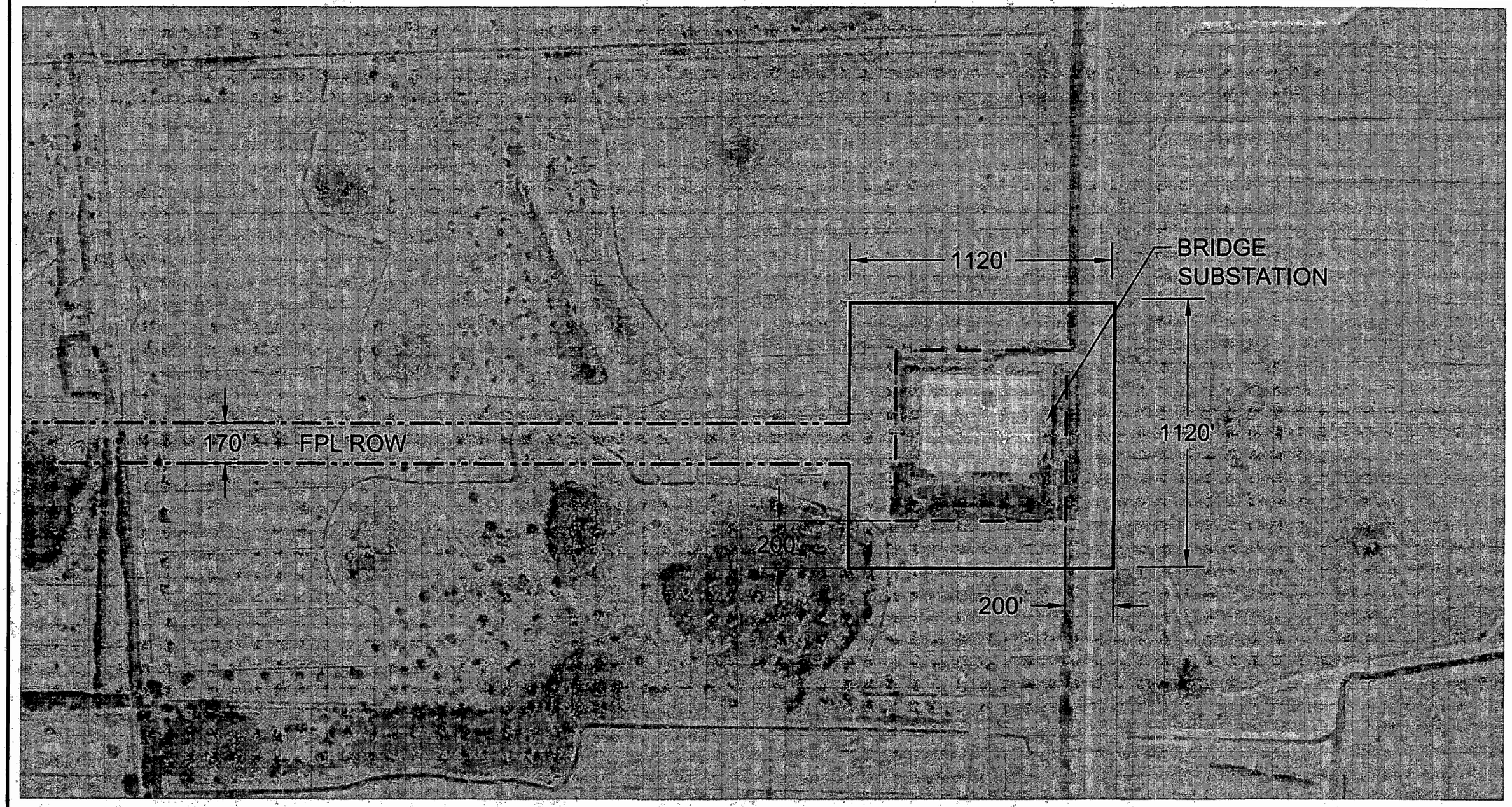
TITLE

AERIAL PHOTOGRAPHS (PAGE 27 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 112.dwg Jan 27, 2002 - 6:24pm



SOURCE: FLORIDA DEPARTMENT OF TRANSPORTATION 2000; FPL 2002.

LEGEND

EXISTING ROW

PROPOSED BUMP OUT

SUBSTATION BOUNDARY

0 400 800 1200 1600

SCALE 1"=400'

Golder Associates
Tampa, Florida

SCALE	1:400
DATE	1/27/02
DESIGN	LA
CADD	DM
CHECK	
REVIEW	
FILE No.	112 (SHEET 28)
PROJECT No.	0137609-1502
REV.	0

TITLE

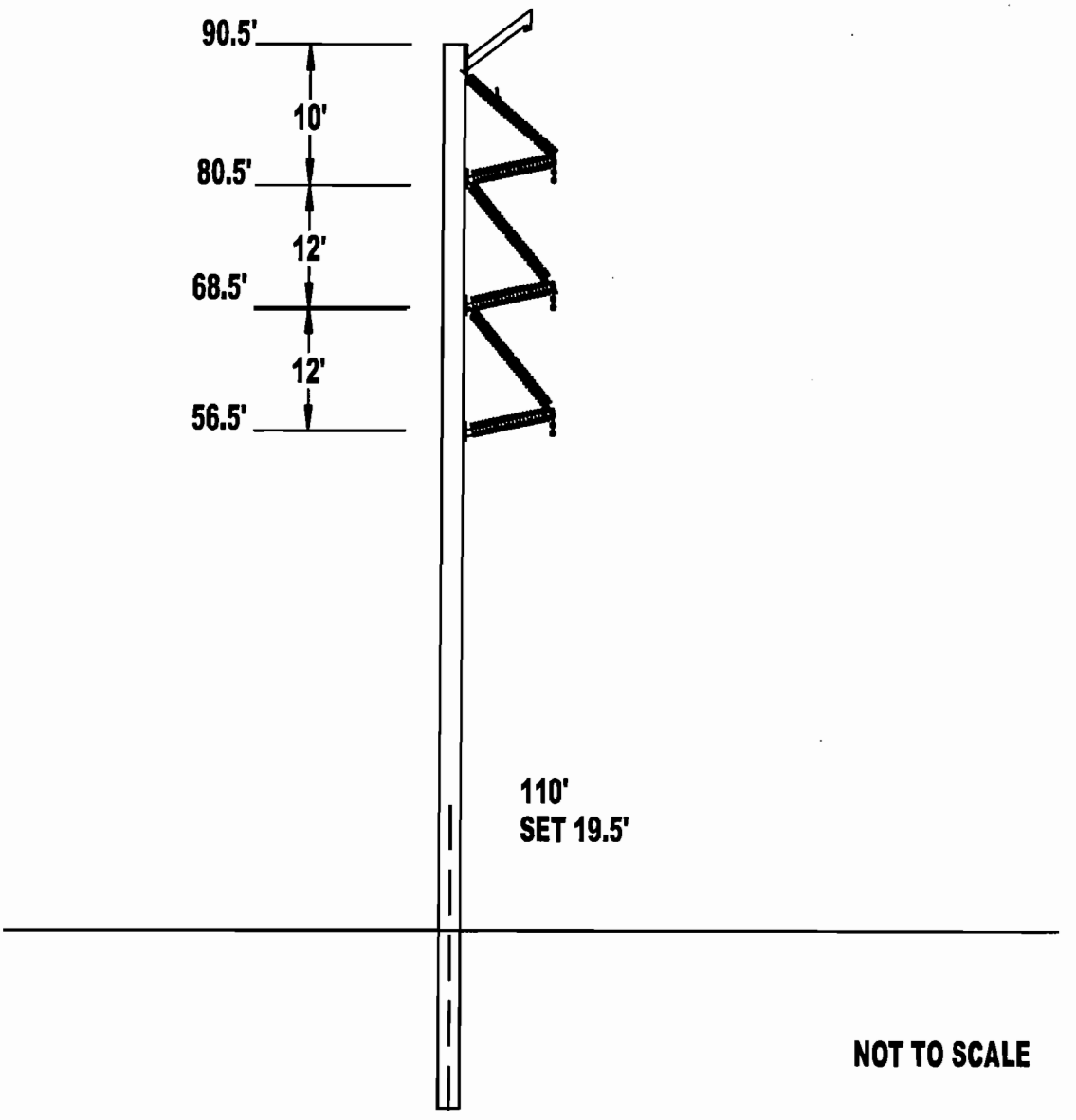
AERIAL PHOTOGRAPHS (PAGE 28 OF 28)

MARTIN UNIT 8

FIGURE 6.1-12

Drawing file: 112.dwg Jan 27, 2002 - 6:38pm

PROPOSED
INDIANTOWN-MARTIN #2
230 KV LINE



NOT TO SCALE

PROPOSED STRUCTURE
TYPICAL FOR
CROSS SECTIONS 1,2&3
LOOKING EAST

Golder Associates
Tampa, Florida

FILE No.	0137609-A034 FIG 6_1_13
PROJECT No.	0137609-1502
REV.	0

SCALE	NTS
DATE	01/27/02
DESIGN	BR
CADD	DM
CHECK	
REVIEW	

TITLE

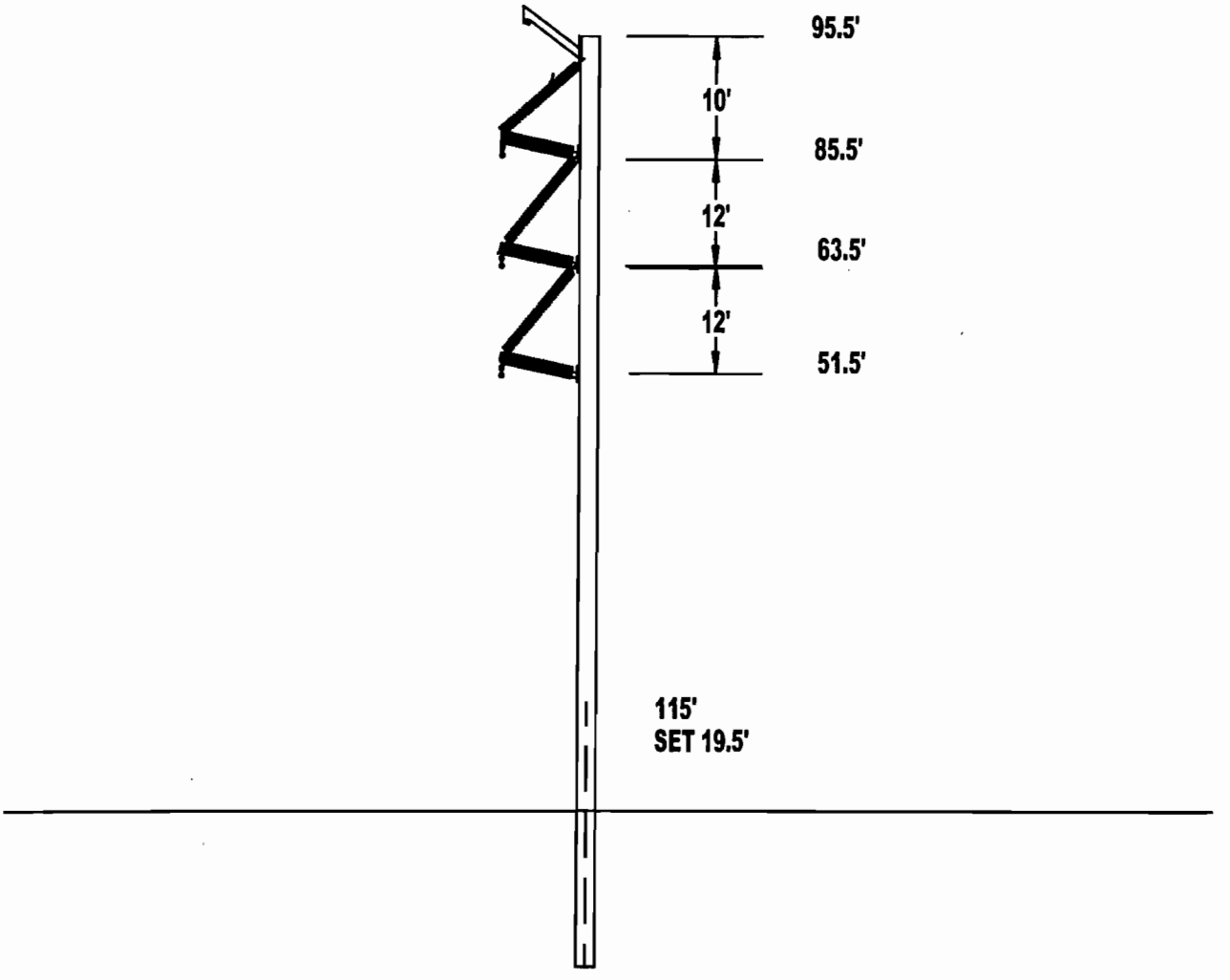
TYPICAL STRUCTURE INDIANTOWN-MARTIN #2 230 KV LINE CROSS SECTIONS 1,2&3

MARTIN UNIT 8

FIGURE 6.1-13

Drawing file: 0137609A034 FIG 6_1_13.dwg Jan 28, 2002 - 9:30am

PROPOSED
INDIANTOWN-MARTIN #2
230 KV LINE



PROPOSED STRUCTURE
TYPICAL FOR
CROSS SECTION 4
LOOKING EAST

NOT TO SCALE

Golder Associates
Tampa, Florida

FILE No.	0137609-A034 FIG 6_1_14
PROJECT No.	0137609-1502
REV.	0

SCALE	NTS
DATE	01/27/02
DESIGN	BR
CADD	DM
CHECK	
REVIEW	

TITLE

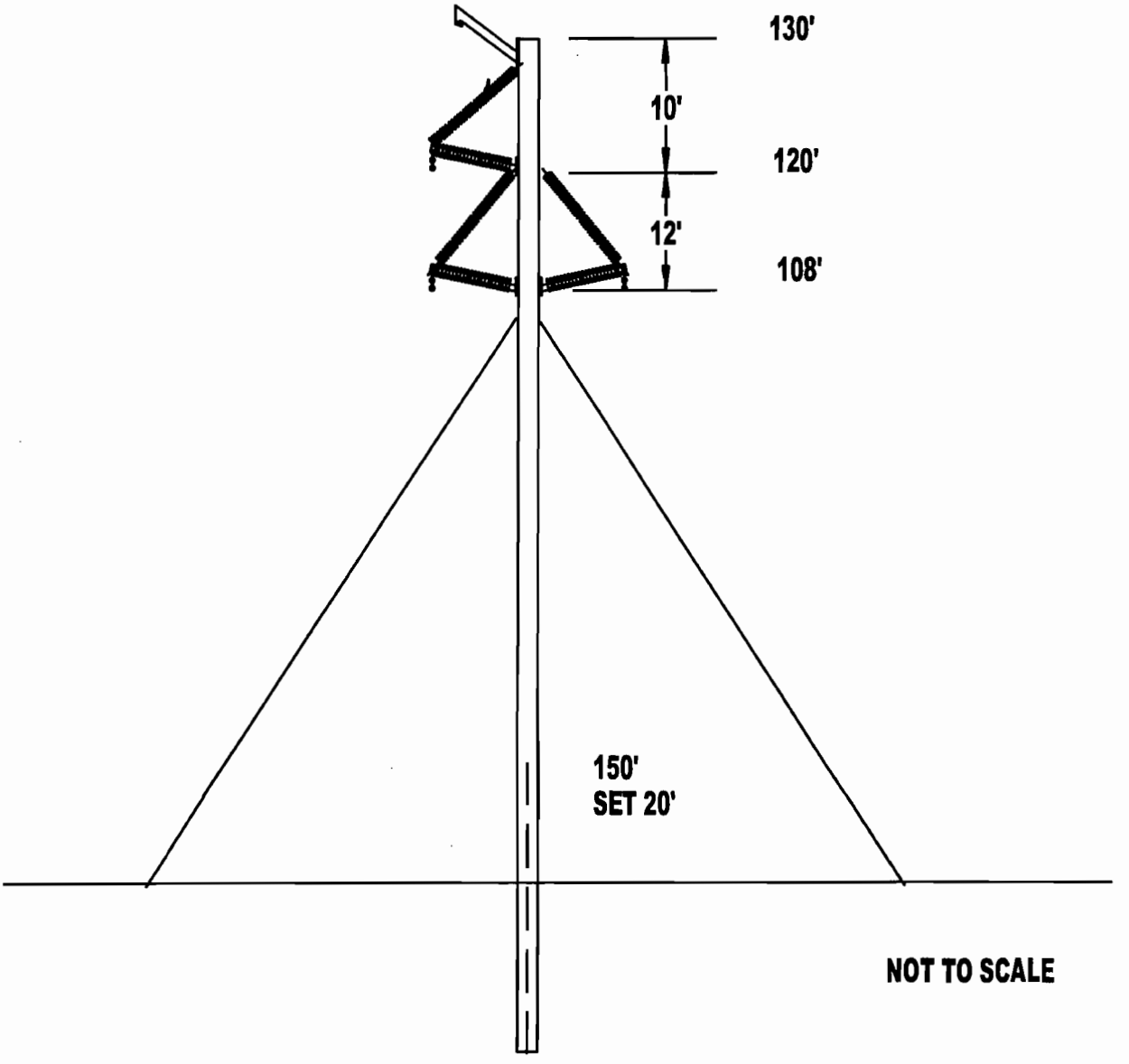
TYPICAL STRUCTURE INDIANTOWN-MARTIN #2 230 KV LINE CROSS SECTION 4

MARTIN UNIT 8

FIGURE **6.1-14**

Drawing file: 0137609A035 FIG 6_14.dwg Jan 28, 2002 - 9:29am

PROPOSED
INDIANTOWN-MARTIN #2
230 KV LINE



NOT TO SCALE

PROPOSED STRUCTURE
TYPICAL FOR
CROSS SECTION 5
OVER ST LUCIE CANAL
LOOKING NORTH

Golder Associates
Tampa, Florida

SCALE	NTS
DATE	01/27/02
DESIGN	BR
CADD	DM
CHECK	
REVIEW	

FILE No. 0137609-A036 FIG 6_1_3_3
PROJECT No. 0137609-1502 REV. 0

TITLE

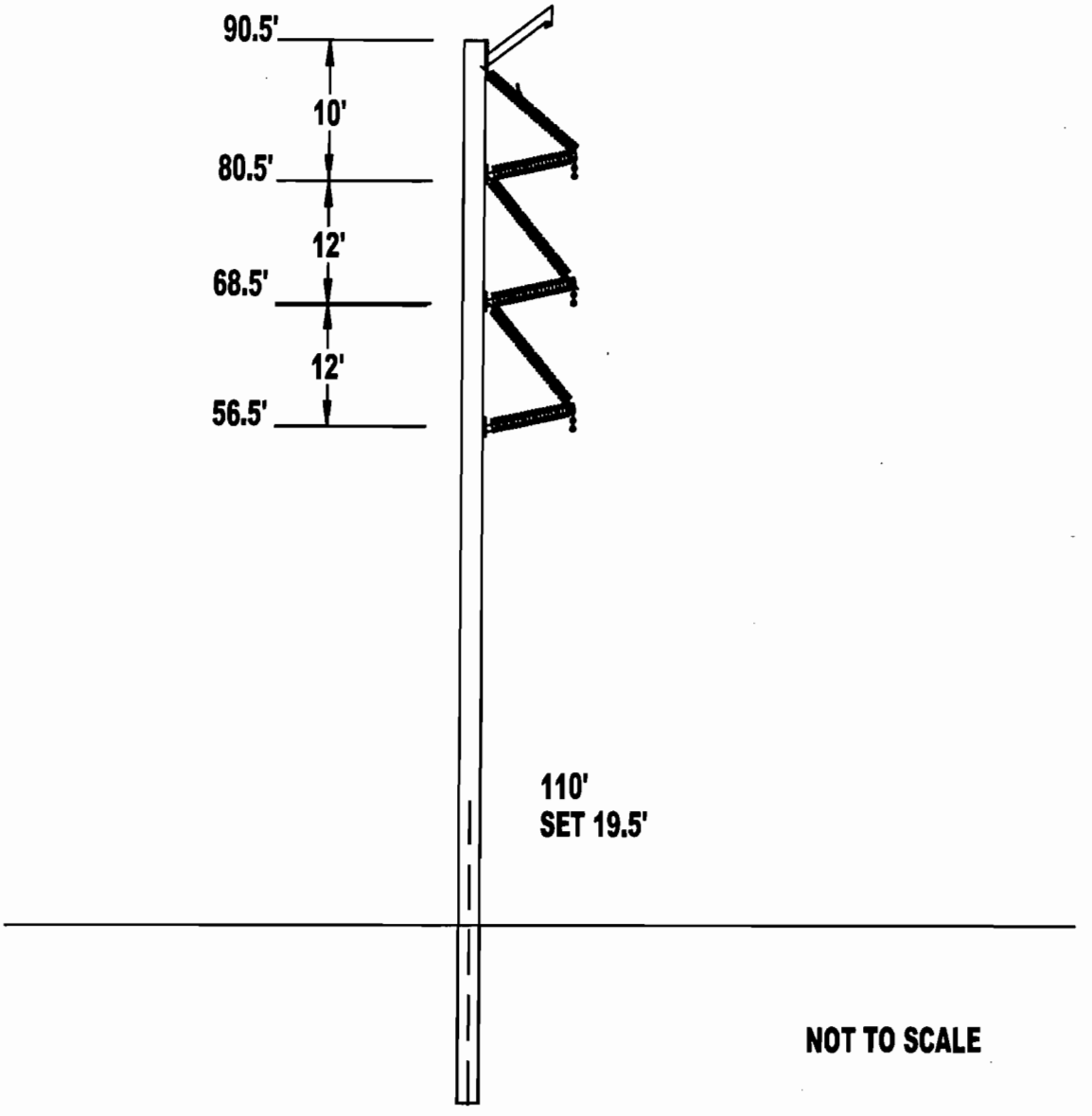
TYPICAL STRUCTURE INDIANTOWN-MARTIN #2 230 KV LINE CROSS SECTION 5

MARTIN UNIT 8

FIGURE 6.1-15

Drawing file: 0137609A036 FIG 6_1_15.dwg Jan 28, 2002 - 9:29am

PROPOSED
INDIANTOWN-MARTIN #2
230 KV LINE



NOT TO SCALE

PROPOSED STRUCTURE
TYPICAL FOR
CROSS SECTION 6
LOOKING EAST

Golder Associates
Tampa, Florida

FILE No.	0137609-A037 FIG 6_1_16
PROJECT No.	0137609-1502 REV. 0

SCALE	NTS
DATE	01/27/02
DESIGN	BR
CADD	DM
CHECK	
REVIEW	

TITLE

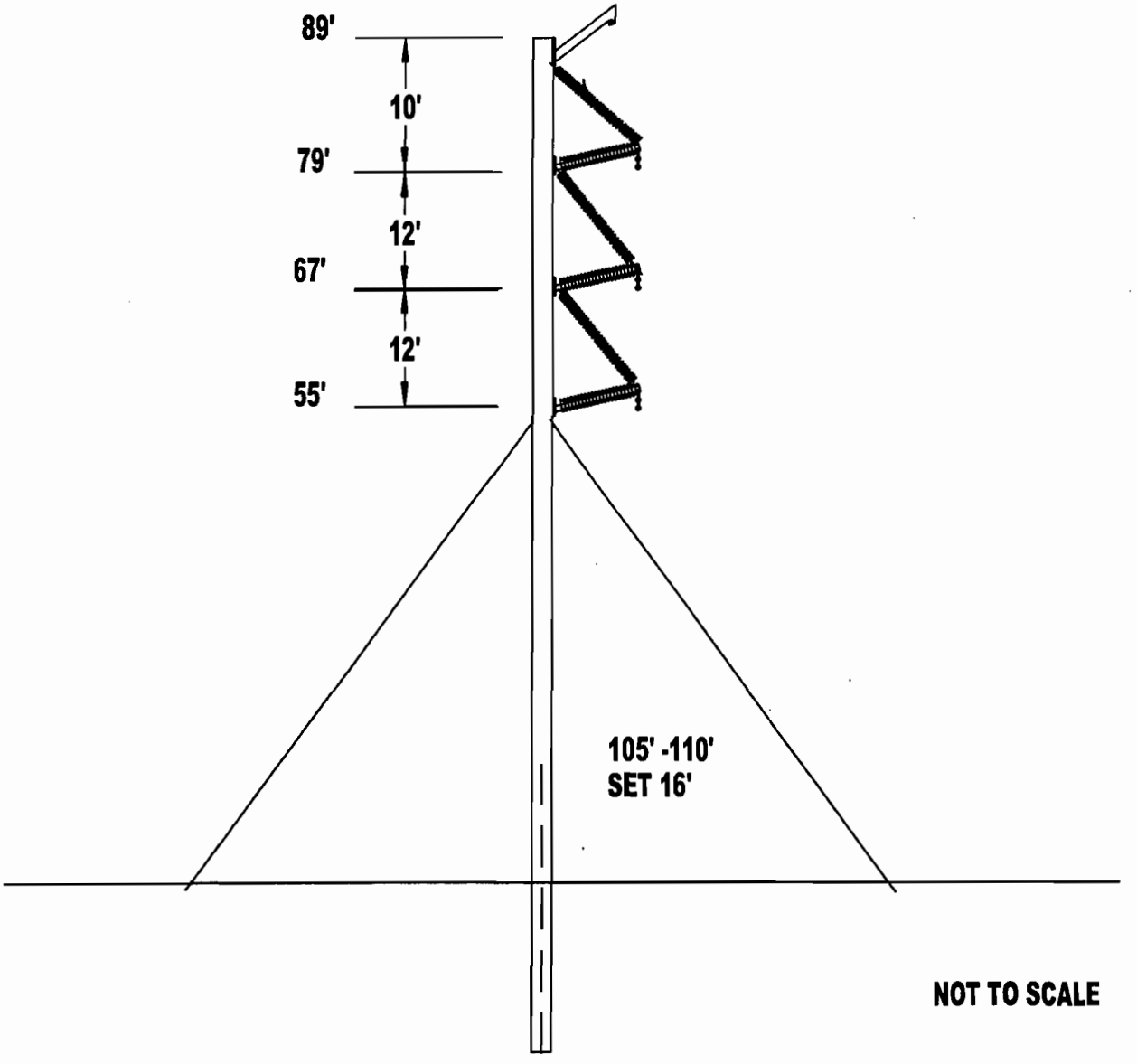
TYPICAL STRUCTURE INDIANTOWN-MARTIN #2 230 KV LINE CROSS SECTION 6

MARTIN UNIT 8

FIGURE 6.1-16

Drawing file: 0137609A037 FIG 6_1_16.dwg Jan 28, 2002 - 9:29am

PROPOSED
BRIDGE-INDIANTOWN#2
230 KV LINE



NOT TO SCALE

PROPOSED STRUCTURE
TYPICAL
LOOKING EAST OR SOUTH

Golder Associates
Tampa, Florida

SCALE	NTS
DATE	01/27/02
DESIGN	BR
CADD	DM
CHECK	
REVIEW	

TITLE

TYPICAL STRUCTURE
BRIDGE-INDIANTOWN #2 230 KV LINE
CROSS SECTION 1

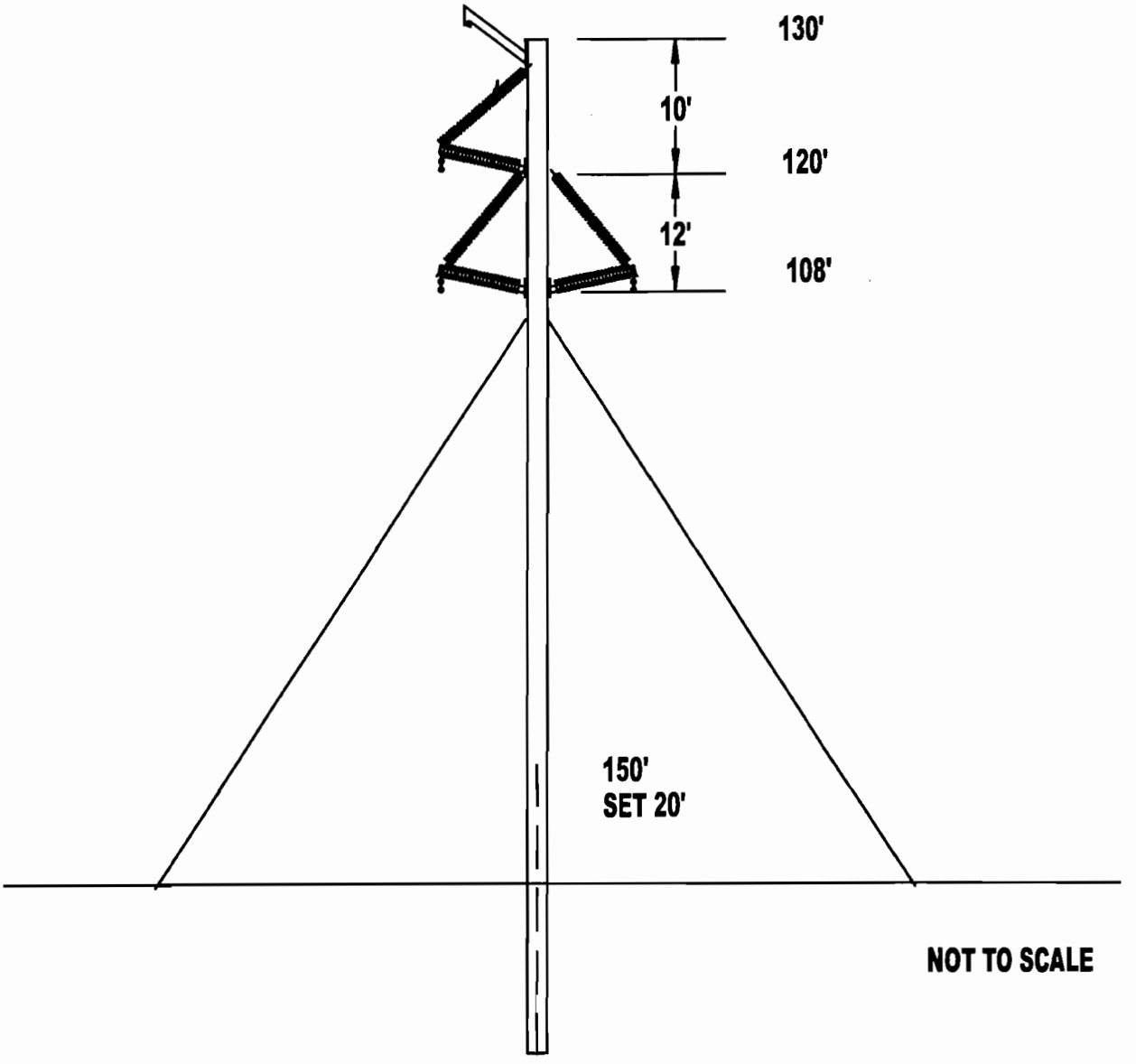
FILE No.	0137609-A038 FIG 6_1_17		
PROJECT No.	0137609-1502	REV	0

MARTIN UNIT 8

FIGURE **6.1-17**

Drawing file: 0137609A038 FIG 6_1_17.dwg Jan 28, 2002 - 9:29am

PROPOSED
BRIDGE-INDIANTOWN#2
230 KV LINE

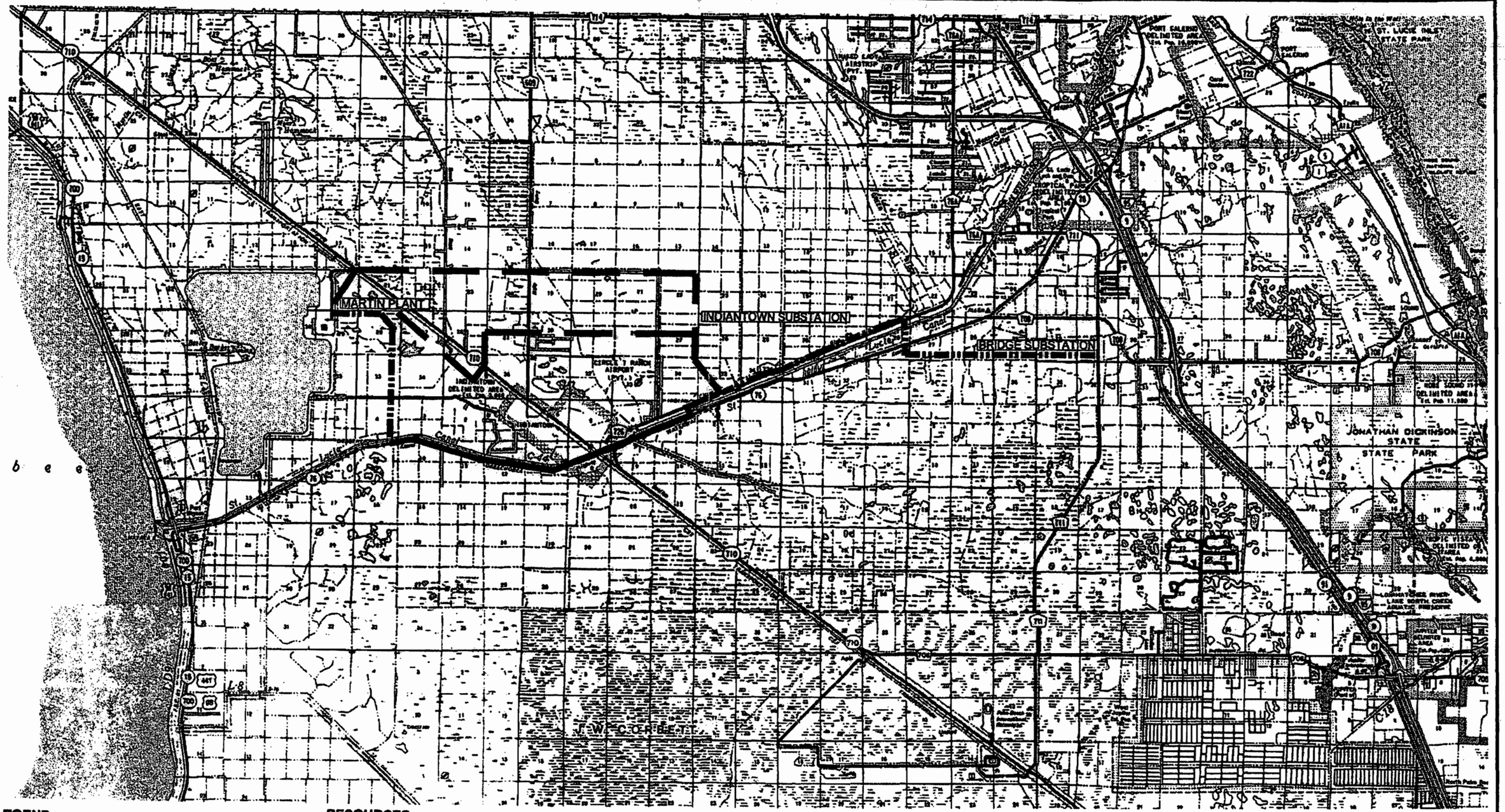


NOT TO SCALE

PROPOSED STRUCTURE
TYPICAL FOR
CROSS SECTION 2
OVER ST LUCIE CANAL
LOOKING SOUTH

Golder Associates Tampa, Florida	SCALE	NTS	TITLE: TYPICAL STRUCTURE BRIDGE-INDIANTOWN #2 230 KV LINE CROSS SECTION 2
	DATE	01/27/02	
	DESIGN	BR	
	CADD	DM	
FILE No. 0137609-A039 FIG 6_1_18	CHECK		
PROJECT No. 0137609-1502 REV. 0	REVIEW		MARTIN UNIT 8 — FIGURE 6.1-18

Drawing file: 0137609A039 FIG 6_1_18.dwg Jan 28, 2002 - 9:28am



LEGEND:

- PROJECT CORRIDOR (TO BE CERTIFIED)
- NEW 230 kv LINE ALONG EXISTING ROW (NOT TO BE CERTIFIED)
- ALTERNATIVE CORRIDOR

RESOURCES:

GENERAL HIGHWAY MAP, MARTIN COUNTY, FLORIDA, U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION, AUGUST 1985.

GENERAL HIGHWAY MAP, PALM BEACH COUNTY, FLORIDA, U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION, AUGUST 1975 (SHEETS 1 & 2).

CORRIDOR LOCATION AND LAYOUT FPL, 2001.

Golder Associates
Tampa, Florida

SCALE	1:126720
DATE	1/27/02
DESIGN	RAZ
CADD	DM
CHECK	
REVIEW	
FILE No.	0137609A013 FIG 6_1_19
PROJECT No.	0137609-1502
REV.	0

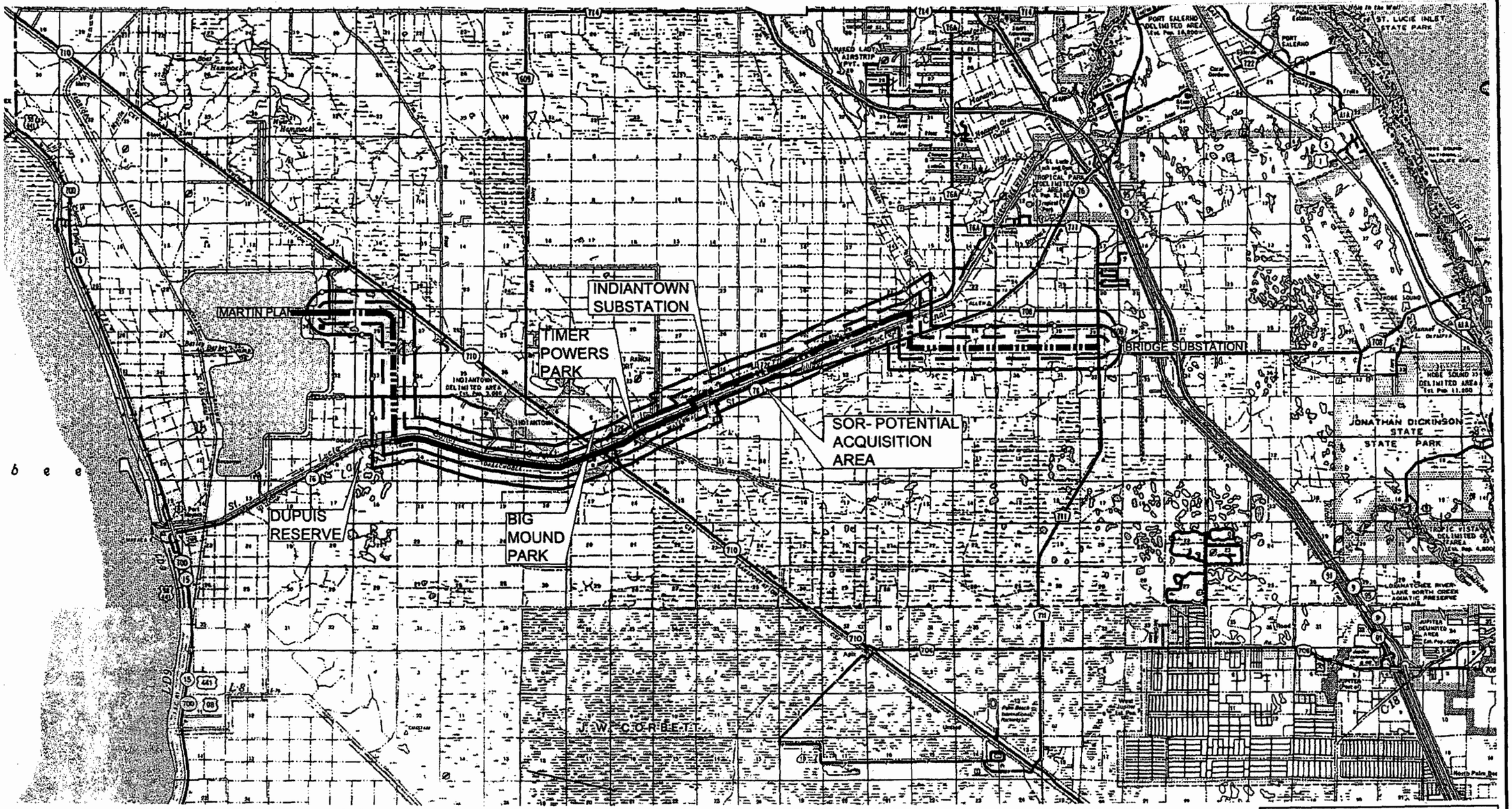
TITLE

ALTERNATIVE CORRIDOR LOCATION MAP

MARTIN UNIT 8

FIGURE 6.1-19

Drawing file: 0137609A013 FIG 6_1_19.dwg Jan 29, 2002 - 6:11am



LEGEND:

- PROJECT CORRIDOR (TO BE CERTIFIED)
- NEW 230 kv LINE ALONG EXISTING ROW (NOT TO BE CERTIFIED)
- 1/4 MILE BUFFER
- 1/2 MILE BUFFER

RESOURCES:

GENERAL HIGHWAY MAP, MARTIN COUNTY, FLORIDA, U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION, AUGUST 1985.

GENERAL HIGHWAY MAP, PALM BEACH COUNTY, FLORIDA, U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION, AUGUST 1975 (SHEETS 1 & 2).

CORRIDOR LOCATION AND LAYOUT FPL, 2001.

Golder Associates
Tampa, Florida

SCALE	1:126720
DATE	1/27/02
DESIGN	RAZ
CADD	DM
CHECK	
REVIEW	
FILE No.	0137609A025 FIG 6_1_20
PROJECT No.	0137609-1502 REV. 0

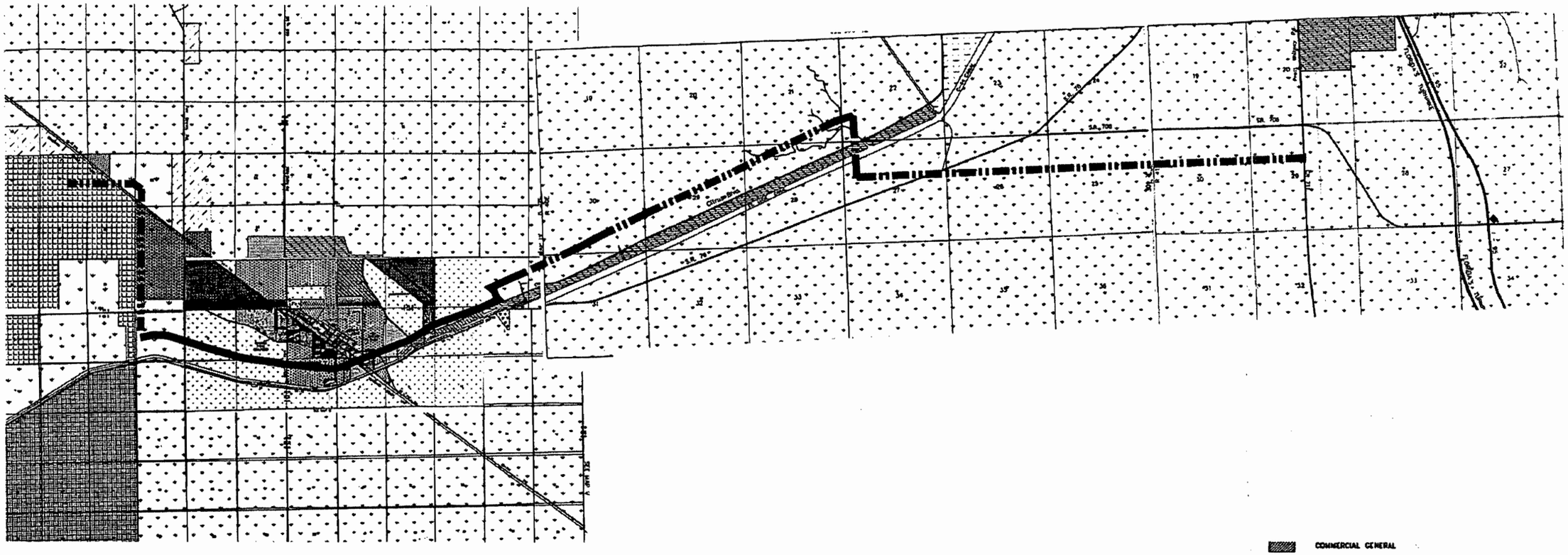
TITLE:

GOVERNMENTAL JURISDICTIONS WITHIN 1/4 AND 1/2 MILE AREA

MARTIN UNIT 8

FIGURE 6.1-20

Drawing file: 0137609A025 FIG 6_1_20.dwg Jan 28, 2002 - 9:23am



COMMERCIAL GENERAL
COMMERCIAL LIMITED
COMMERCIAL OFFICE RESIDENTIAL
COMMERCIAL WATERFRONT

INSTITUTIONAL

RECREATIONAL
PUBLIC CONSERVATION AREAS
GENERAL

INDUSTRIAL

AGRICULTURAL

AGRICULTURAL
AGRICULTURAL RANCHETTE

PUBLIC UTILITIES
MAJOR POWER GENERATION FACILITY

HISTORIC SITE

EXPRESSWAY ORIENTED TRANSIENT COMMERCIAL SERVICE CENTERES–SEE FUTURE LAND USE ELEMENT SECTION 4-4, POLICY M.L.E.(5)

LEGEND:

PROJECT CORRIDOR (TO BE CERTIFIED)

NEW 230 kv LINE ALONG EXISTING ROW (NOT TO BE CERTIFIED)

NOTE: THESE MAPS ARE FOR REFERENCE PURPOSES ONLY AND ARE NOT DRAWN TO EXACT SCALE. **CORRIDOR AND EXISTING ROW LOCATION FOR REFERENCE ONLY. NOT TO SCALE DO TO DIFFERENT BASE MAP SCALES.**

Golder Associates
Tampa, Florida

FILE No.	0137609A015 FIG 6_1_21
PROJECT No.	013-7609-1502 REV. 0

SCALE	NTS
DATE	1/27/02
DESIGN	RAZ
CADD	DM
CHECK	
REVIEW	

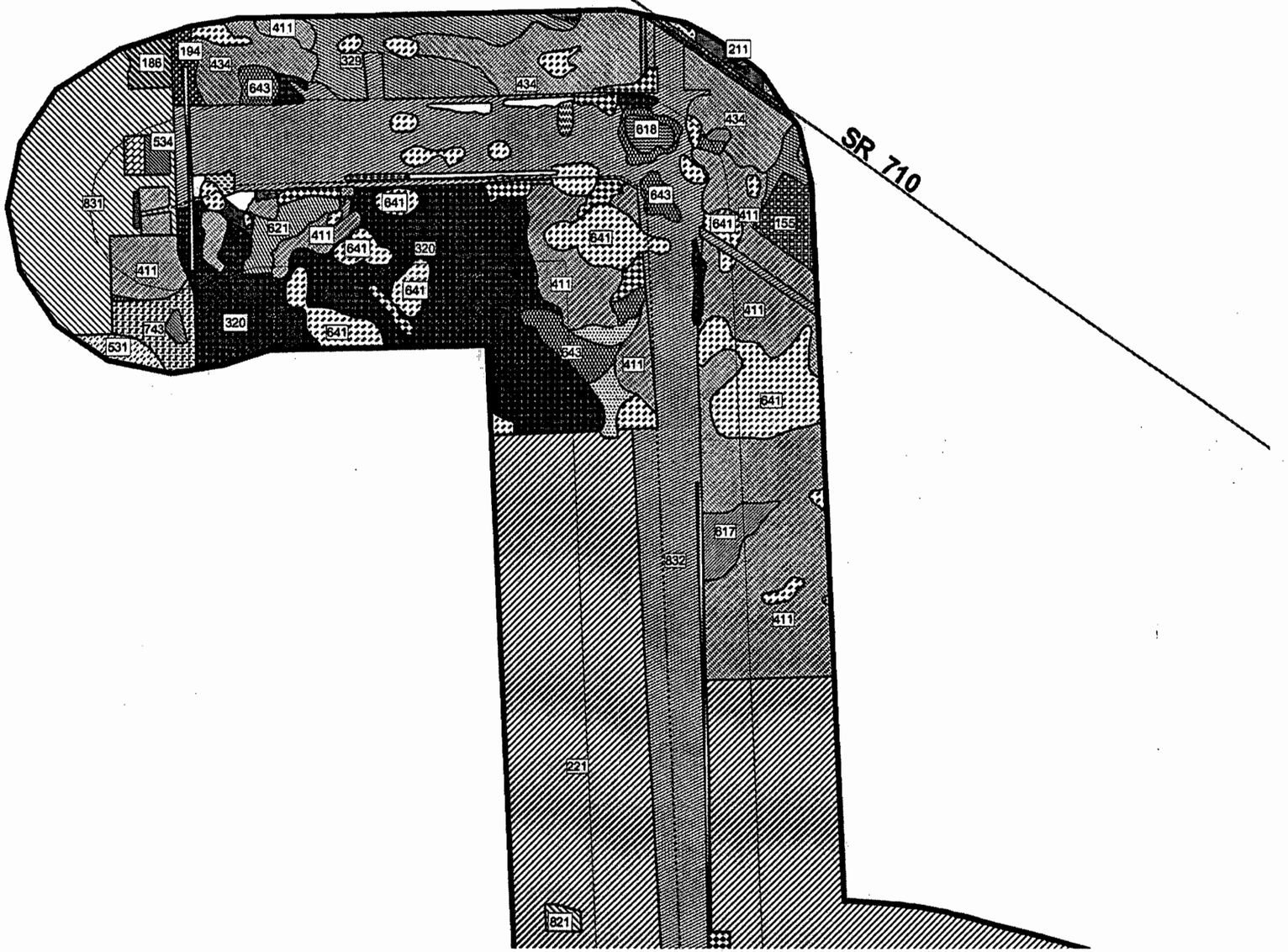
TITLE

FUTURE LAND USE PLAN CATEGORIES

MARTIN UNIT 8

FIGURE 6.1-21

Drawing file: 0137609A015 FIG 6_1_21.dwg Jan 28, 2002 - 9:34am



SR 710

N

LEGEND

- Martin Corridor
- Major Roads
- Quarter Mile Buffer
- Half Mile Buffer

FLUCFCS Name and Number

- Airports (811)
- Atlantic White Cedar (623)
- Australian Pine (437)
- Brazilian Pepper (422)
- Cabbage Palm (428)
- Canals and Locks (816)
- Citrus Groves (221)
- Commercial and Services (140)
- Community Recreational Facilities (186)
- Cypress (621)
- Cypress - Pine - Cabbage Palm (624)
- Electrical Power Facilities (831)
- Electrical Power Transmission Lines (832)
- Fallow Crop Land (261)
- Fixed Single Family Units (111)
- Food Processing (151)
- Freshwater Marshes (641)
- Hardwood Conifer Mixed (434)
- Herbaceous (310)
- Horse Farms (251)
- Improved Pastures (211)
- Inland Ponds and Sloughs (616)
- Live Oak (427)
- Marinas and Fish Camps (184)
- Mixed Wetland Hardwoods (617)
- Mobile Home Units (122)
- Open Land (190)
- Other Light Industrial (155)
- Other Open Land (194)
- Other Shrubs and Brush (329)
- Palmetto Prairies (321)
- Parks and Zoos (185)
- Pine Flatwoods (411)
- Railroad (812)
- Reservoirs larger than 10 acres - less than 100 acres (533)
- Reservoirs larger than 500 acres (531)
- Reservoirs less than 10 acres (534)
- Roads and Highways (814)
- Row Crops (214)
- Rural Land in Transition (741)
- Shrub and Brushland (320)
- Spoil Areas (743)
- Stadiums (187)
- Streams and Waterways (510)
- Temperate Hardwood (425)
- Transmission Towers (821)
- Transportation Facilities Under Construction (819)
- Tree Nurseries (241)
- Undeveloped Land within Urban Areas (191)
- Unimproved Pastures (212)
- Vegetated Non-Forested Wetlands (630)
- Wet Prairies (643)
- Wet Prairies - with Pine (6439)
- Wetland Shrub (631)
- Willow and Elderberry (618)
- Xeric Oak (421)

1000 0 1000 2000 Feet

REFERENCE

South Florida Water Management District Land Use/Cover,1994-95.
Datum: HPGN Projection: Albers.
Updated by Golder Associates January 2002.

PROJECT
MARTIN UNIT 8

TITLE
FLUCFCS for Transmission Line Corridor and Existing Right of Way

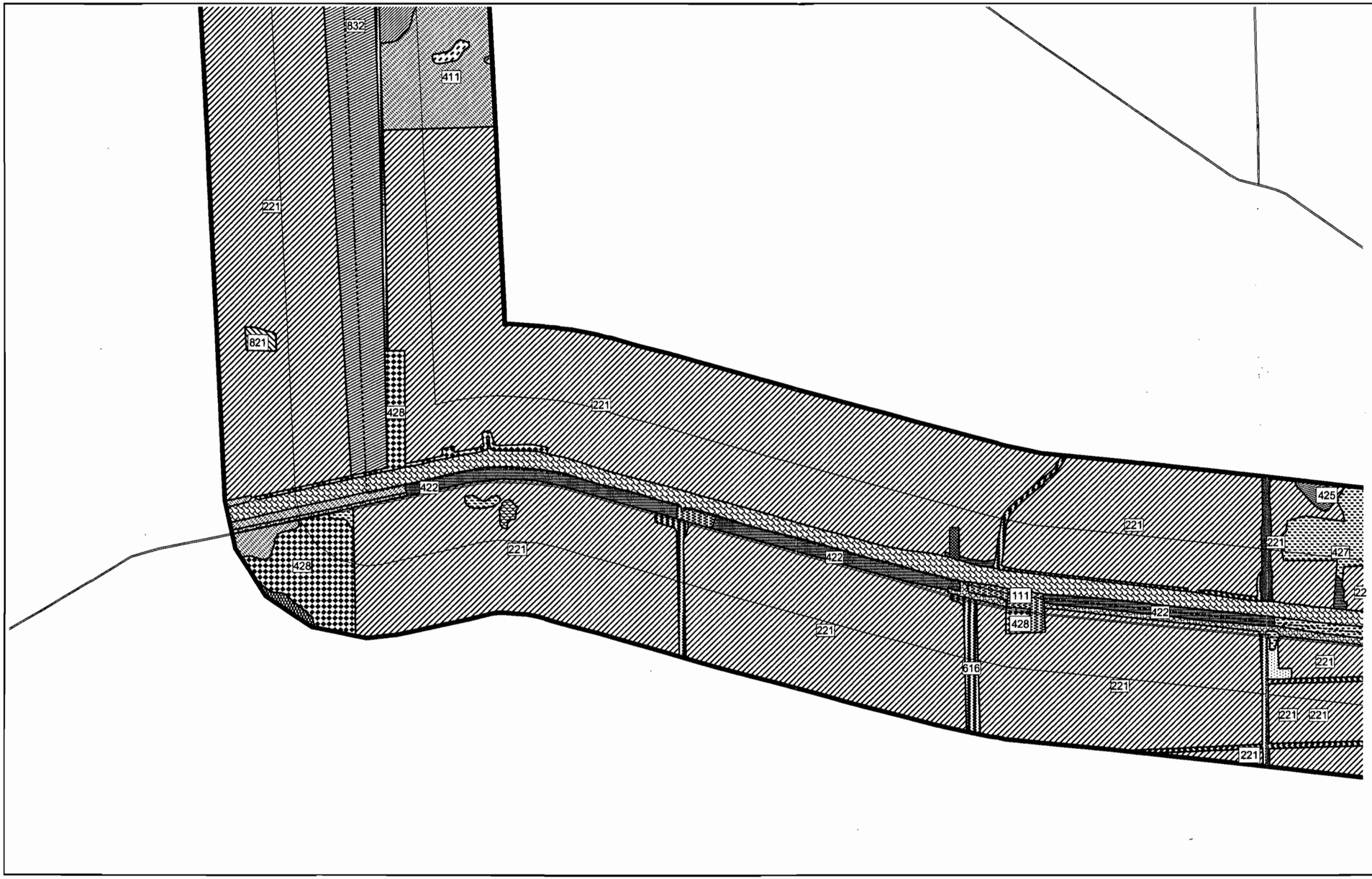
Sheet 1 of 6

Golder Associates

PROJECT No. 013-7609.1502			SCALE AS SHOWN	REV. 0
DESIGN	KBRAE	Jan. 2002		
GIS	JW	24 Jan. 2002		
CHECK	---	-- Jan. 2002		
REVIEW	---	-- Jan. 2002		

FIGURE 6.1-22

H:\GolderVol1\PROJECTS\2001proj\013-7609-1000 FPL Martin\Chapter 2 - Land Use\land use corridor updated.apr



N

LEGEND

- Martin Corridor
- Major Roads
- Quarter Mile Buffer
- Half Mile Buffer

FLUCFCS Name and Number

- Airports (611)
- Atlantic White Cedar (623)
- Australian Pine (437)
- Brazilian Pepper (422)
- Cabbage Palm (428)
- Canals and Locks (816)
- Citrus Groves (221)
- Commercial and Services (140)
- Community Recreational Facilities (186)
- Cypress (621)
- Cypress - Pine - Cabbage Palm (624)
- Electrical Power Facilities (831)
- Electrical Power Transmission Lines (832)
- Fallow Crop Land (261)
- Fixed Single Family Units (111)
- Food Processing (151)
- Freshwater Marshes (641)
- Hardwood Conifer Mixed (434)
- Herbaceous (310)
- Horse Farms (251)
- Improved Pastures (211)
- Inland Ponds and Sloughs (616)
- Live Oak (427)
- Marinas and Fish Camps (184)
- Mixed Wetland Hardwoods (617)
- Mobile Home Units (122)
- Open Land (190)
- Other Light Industrial (155)
- Other Open Land (194)
- Other Shrubs and Brush (329)
- Palmetto Prairies (321)
- Parks and Zoos (185)
- Pine Flatwoods (411)
- Railroad (812)
- Reservoirs larger than 10 acres - less than 100 acres (533)
- Reservoirs larger than 500 acres (531)
- Reservoirs less than 10 acres (534)
- Roads and Highways (814)
- Row Crops (214)
- Rural Land in Transition (741)
- Shrub and Brushland (320)
- Spoil Areas (743)
- Stadiums (187)
- Streams and Waterways (510)
- Temperate Hardwood (425)
- Transmission Towers (821)
- Transportation Facilities Under Construction (819)
- Tree Nurseries (241)
- Undeveloped Land within Urban Areas (191)
- Unimproved Pastures (212)
- Vegetated Non-Forested Wetlands (630)
- Wet Prairies (643)
- Wet Prairies - with Pine (6439)
- Wetland Shrub (631)
- Willow and Elderberry (618)
- Xeric Oak (421)

1000 0 1000 2000 Feet

REFERENCE

South Florida Water Management District Land Use/Cover,1994-95.
Datum: HPGN Projection: Albers.
Updated by Golder Associates January 2002.

PROJECT

MARTIN UNIT 8

TITLE

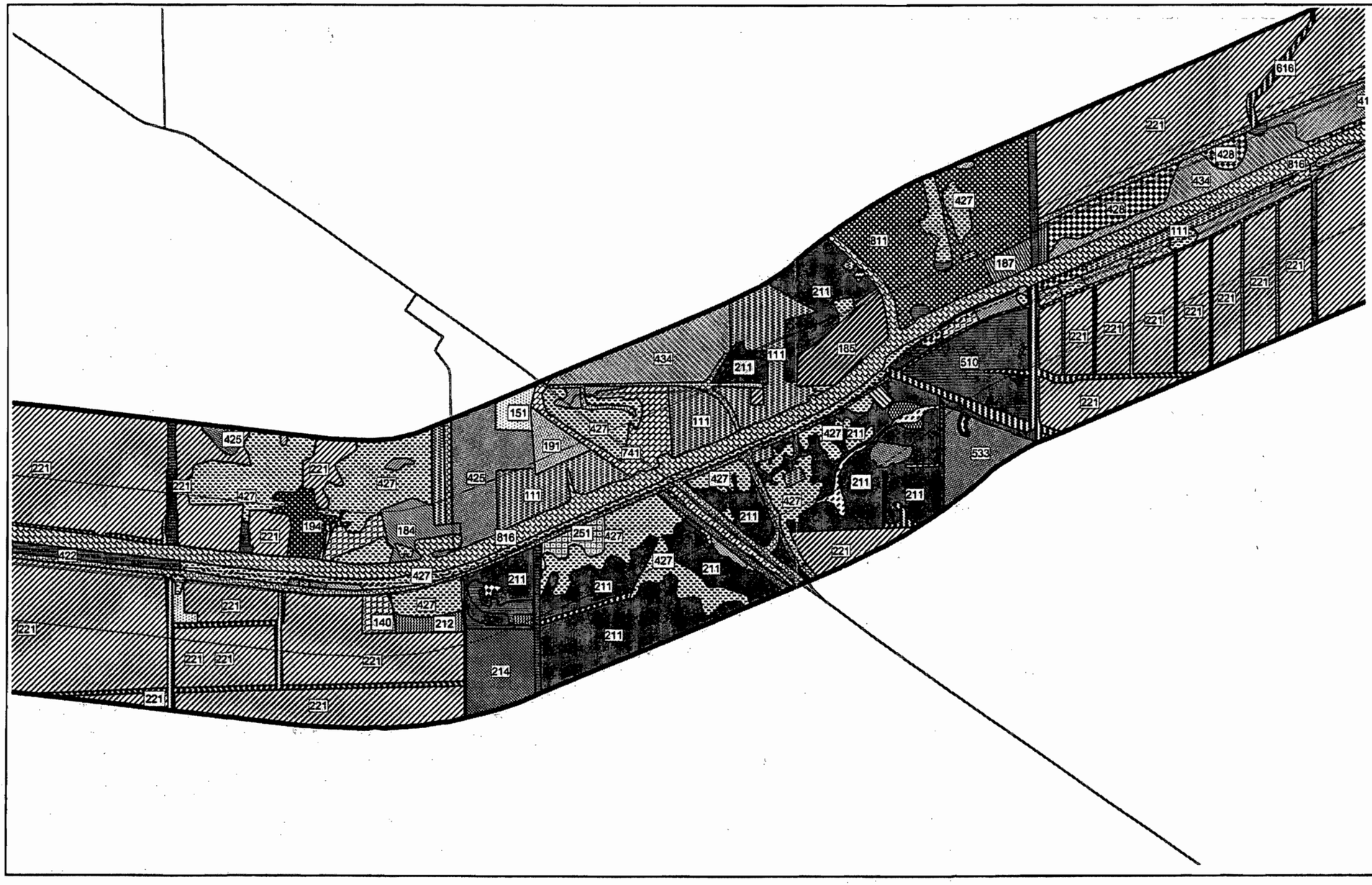
FLUCFCS for Transmission Line Corridor and Existing Right of Way

Sheet 2 of 6

Golder Associates

PROJECT No. 013-7609.1502			SCALE AS SHOWN	REV. 0
DESIGN	KB/RAZ	Jan. 2002	**FIGURE 6.1-22**	
GIS	JW	24 Jan. 2002		
CHECK	---	-- Jan. 2002		
REVIEW	---	-- Jan. 2002		

H:\Golder\Vol1\PROJECTS\2001proj\013-7609-1000 FPL Martin\Chapter 2 - Land Use\land use corridor updated.apr



N

LEGEND

- Martin Corridor
- Major Roads
- Quarter Mile Buffer
- Half Mile Buffer

FLUCFCS Name and Number

- Airports (811)
- Atlantic White Cedar (623)
- Australian Pine (437)
- Brazilian Pepper (422)
- Cabbage Palm (428)
- Canals and Locks (616)
- Citrus Groves (221)
- Commercial and Services (140)
- Community Recreational Facilities (186)
- Cypress (621)
- Cypress - Pine - Cabbage Palm (624)
- Electrical Power Facilities (831)
- Electrical Power Transmission Lines (832)
- Fallow Crop Land (261)
- Fixed Single Family Units (111)
- Food Processing (151)
- Freshwater Marshes (641)
- Hardwood Conifer Mixed (434)
- Herbaceous (310)
- Horse Farms (251)
- Improved Pastures (211)
- Inland Ponds and Sloughs (616)
- Live Oak (427)
- Marinas and Fish Camps (184)
- Mixed Wetland Hardwoods (617)
- Mobile Home Units (122)
- Open Land (190)
- Other Light Industrial (155)
- Other Open Land (194)
- Other Shrubs and Brush (329)
- Palmetto Prairies (321)
- Parks and Zoos (185)
- Pine Flatwoods (411)
- Railroad (812)
- Reservoirs larger than 10 acres - less than 100 acres (533)
- Reservoirs larger than 500 acres (531)
- Reservoirs less than 10 acres (534)
- Roads and Highways (814)
- Row Crops (214)
- Rural Land in Transition (741)
- Shrub and Brushland (320)
- Spoil Areas (743)
- Stadiums (187)
- Streams and Waterways (510)
- Temperate Hardwood (425)
- Transmission Towers (821)
- Transportation Facilities Under Construction (819)
- Tree Nurseries (241)
- Undeveloped Land within Urban Areas (191)
- Unimproved Pastures (212)
- Vegetated Non-Forested Wetlands (630)
- Wet Prairies (643)
- Wet Prairies - with Pine (6439)
- Wetland Shrub (631)
- Willow and Elderberry (618)
- Xeric Oak (421)

1000 0 1000 2000 Feet

REFERENCE

South Florida Water Management District Land Use/Cover,1994-95.
Datum: HPGN Projection: Albers.
Updated by Golder Associates January 2002.

PROJECT

MARTIN UNIT 8

TITLE

FLUCFCS for Transmission Line Corridor and Existing Right of Way

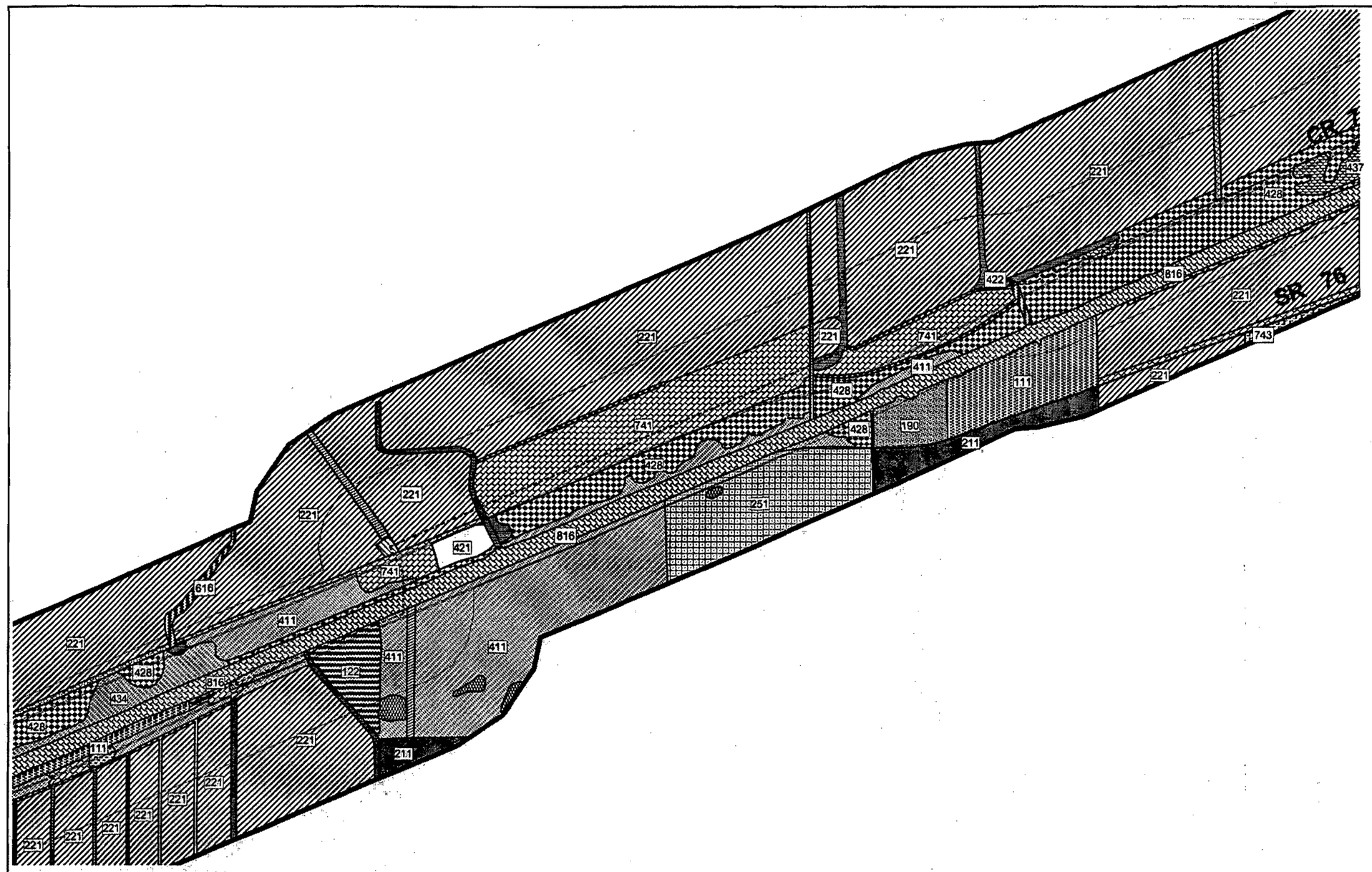
Sheet 3 of 6

Golder Associates

PROJECT No. 013-7609.1502			SCALE AS SHOWN	REV. 0
DESIGN	KMRAD	Jan. 2002		
GIS	JW	24 Jan. 2002		
CHECK	—	- Jan. 2002		
REVIEW	—	- Jan. 2002		

FIGURE 6.1-22

H:\GolderVol1\PROJECTS\2001.pro\013-7609-1000 FPL Martin\Chapter 2 - Land Use\land use corridor updated.apr



N

LEGEND

- Martin Corridor
- Major Roads
- Quarter Mile Buffer
- Half Mile Buffer

FLUCFCS Name and Number

- Airports (811)
- Atlantic White Cedar (623)
- Australian Pine (437)
- Brazilian Pepper (422)
- Cabbage Palm (428)
- Canals and Locks (816)
- Citrus Groves (221)
- Commercial and Services (140)
- Community Recreational Facilities (186)
- Cypress (621)
- Cypress - Pine - Cabbage Palm (624)
- Electrical Power Facilities (831)
- Electrical Power Transmission Lines (832)
- Fallow Crop Land (261)
- Fixed Single Family Units (111)
- Food Processing (151)
- Freshwater Marshes (641)
- Hardwood Conifer Mixed (434)
- Herbaceous (310)
- Horse Farms (251)
- Improved Pastures (211)
- Inland Ponds and Sloughs (616)
- Live Oak (427)
- Marinas and Fish Camps (184)
- Mixed Wetland Hardwoods (617)
- Mobile Home Units (122)
- Open Land (190)
- Other Light Industrial (155)
- Other Open Land (194)
- Other Shrubs and Brush (329)
- Palmetto Prairies (321)
- Parks and Zoos (185)
- Pine Flatwoods (411)
- Railroad (812)
- Reservoirs larger than 10 acres - less than 100 acres (533)
- Reservoirs larger than 500 acres (531)
- Reservoirs less than 10 acres (534)
- Roads and Highways (814)
- Row Crops (214)
- Rural Land in Transition (741)
- Shrub and Brushland (320)
- Spoil Areas (743)
- Stadiums (187)
- Streams and Waterways (510)
- Temperate Hardwood (425)
- Transmission Towers (821)
- Transportation Facilities Under Construction (819)
- Tree Nurseries (241)
- Undeveloped Land within Urban Areas (191)
- Unimproved Pastures (212)
- Vegetated Non-Forested Wetlands (630)
- Wet Prairies (643)
- Wet Prairies - with Pine (6439)
- Wetland Shrub (631)
- Willow and Elderberry (618)
- Xeric Oak (421)

1000 0 1000 2000 Feet

REFERENCE

South Florida Water Management District Land Use/Cover,1994-95.
Datum: HPGN Projection: Albers.
Updated by Golder Associates January 2002.

PROJECT

MARTIN UNIT 8

TITLE

FLUCFCS for Transmission Line Corridor and Existing Right of Way

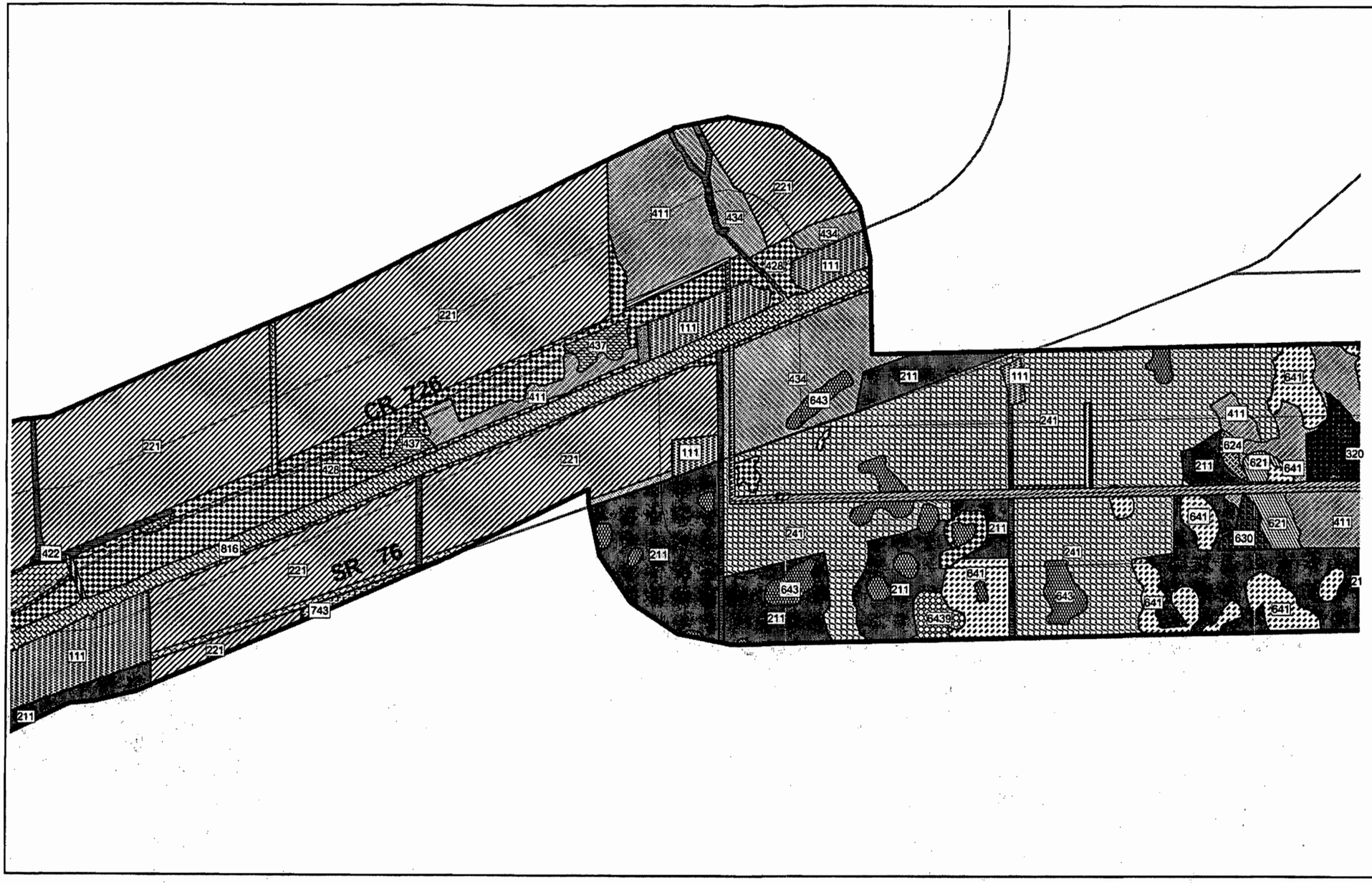
Sheet 4 of 6

Golder Associates

PROJECT No. 013-7609.1502			SCALE AS SHOWN	REV. 0
DESIGN	KMRAZ	Jan. 2002		
GIS	JW	24 Jan. 2002		
CHECK	---	-- Jan. 2002		
REVIEW	---	-- Jan. 2002		

FIGURE 6.1-22

H:\Golder\Vol1\PROJECTS\2001proj\013-7609-1000 FPL Martin\Chapter 2 - Land Use\land use corridor updated.apr



N

LEGEND

- Martin Corridor
- Major Roads
- Quarter Mile Buffer
- Half Mile Buffer

FLUCFCS Name and Number

- Airports (011)
- Atlantic White Cedar (623)
- Australian Pine (437)
- Brazilian Pepper (422)
- Cabbage Palm (428)
- Canals and Locks (816)
- Citrus Groves (221)
- Commercial and Services (140)
- Community Recreational Facilities (186)
- Cypress (621)
- Cypress - Pine - Cabbage Palm (624)
- Electrical Power Facilities (831)
- Electrical Power Transmission Lines (832)
- Fallow Crop Land (261)
- Fixed Single Family Units (111)
- Food Processing (151)
- Freshwater Marshes (641)
- Hardwood Conifer Mixed (434)
- Herbaceous (310)
- Horse Farms (251)
- Improved Pastures (211)
- Inland Ponds and Sloughs (616)
- Live Oak (427)
- Marinas and Fish Camps (184)
- Mixed Wetland Hardwoods (617)
- Mobile Home Units (122)
- Open Land (190)
- Other Light Industrial (155)
- Other Open Land (194)
- Other Shrubs and Brush (329)
- Palmetto Prairies (321)
- Parks and Zoos (188)
- Pine Flatwoods (411)
- Railroad (812)
- Reservoirs larger than 10 acres - less than 100 acres (533)
- Reservoirs larger than 500 acres (531)
- Reservoirs less than 10 acres (534)
- Roads and Highways (814)
- Row Crops (214)
- Rural Land in Transition (741)
- Shrub and Brushland (320)
- Spoil Areas (743)
- Stadiums (187)
- Streams and Waterways (510)
- Temperate Hardwood (425)
- Transmission Towers (821)
- Transportation Facilities Under Construction (619)
- Tree Nurseries (241)
- Undeveloped Land within Urban Areas (191)
- Unimproved Pastures (212)
- Vegetated Non-Forested Wetlands (630)
- Wet Prairies (643)
- Wet Prairies - with Pine (6439)
- Wetland Shrub (631)
- Willow and Elderberry (618)
- Xeric Oak (421)

1000 0 1000 2000 Feet

REFERENCE

South Florida Water Management District Land Use/Cover,1994-95.
Datum: HPGN Projection: Albers.
Updated by Golder Associates January 2002.

PROJECT

MARTIN UNIT 8

TITLE

FLUCFCS for Transmission Line Corridor and Existing Right of Way

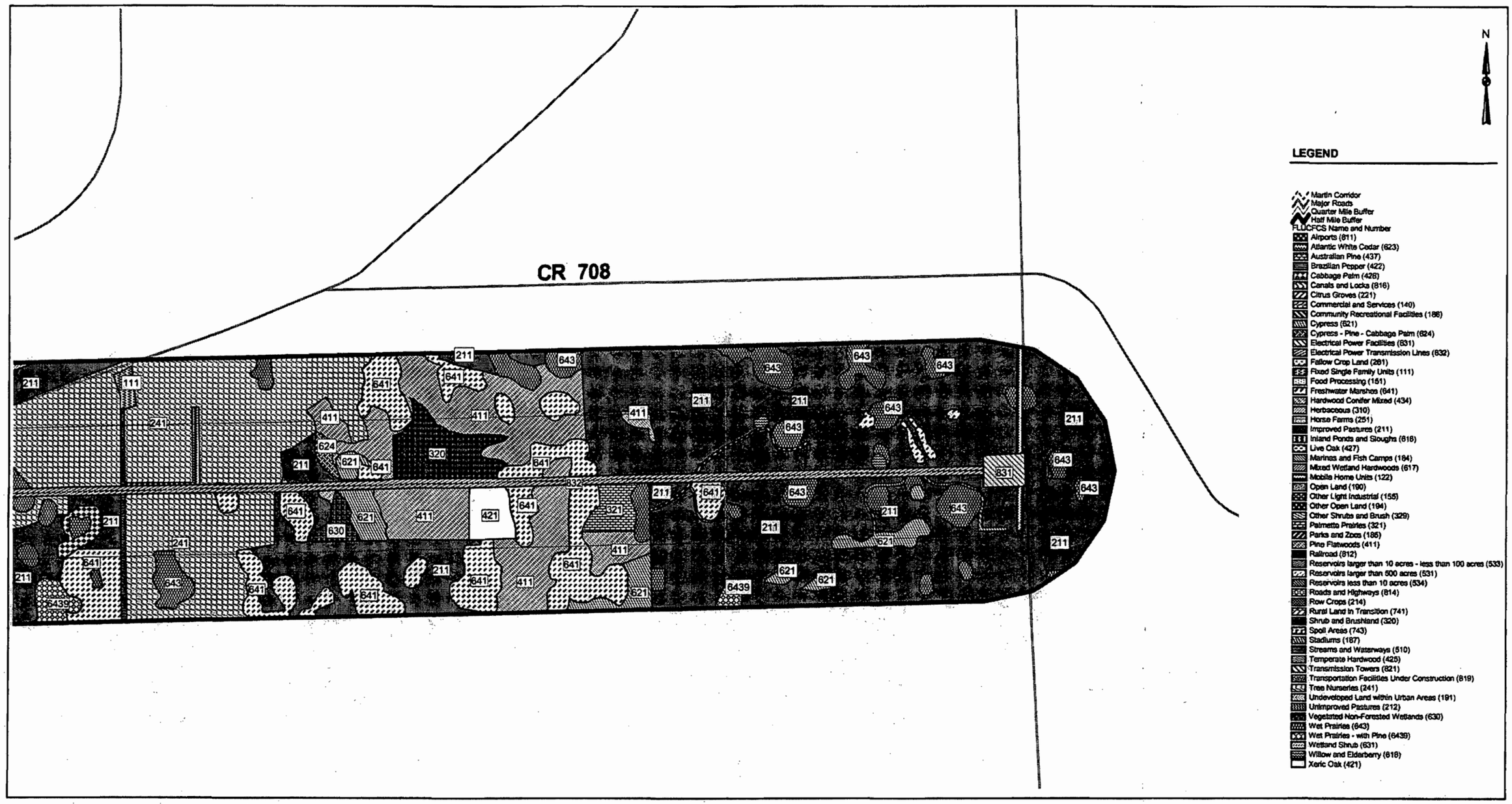
Sheet 5 of 6

Golder Associates

PROJECT No. 013-7609.1502			SCALE AS SHOWN	REV. 0
DESIGN	KBRAZ	Jan. 2002		
GIS	JW	24 Jan. 2002		
CHECK	---	- Jan. 2002		
REVIEW	---	- Jan. 2002		

FIGURE 6.1-22

H:\Golder\Vol1\PROJECTS\2001proj\013-7609-1000 FPL Martin\Chapter 2 - Land Use\land use corridor updated.apr



REFERENCE

South Florida Water Management District Land Use/Cover,1994-95.
Datum: HPGN Projection: Albers.
Updated by Golder Associates January 2002.

PROJECT
MARTIN UNIT 8

TITLE
FLUCFCS for Transmission Line Corridor and Existing Right of Way

Sheet 6 of 6

Golder Associates

PROJECT No. 013-7609.1502			SCALE AS SHOWN REV. 0
DESIGN	KS/RAZ	Jan. 2002	
GIS	JW	24 Jan. 2002	**FIGURE 6.1-22**
CHECK	—	– Jan. 2002	
REVIEW	—	– Jan. 2002	

H:\GdderVol1\PROJECTS\2001proj\013-7609-1000 FPL Martin\Chapter 2 - Land Use\land use corridor updated.apr

7.0 ECONOMIC AND SOCIAL EFFECTS OF PLANT CONSTRUCTION AND OPERATION

7.1 SOCIO-ECONOMIC BENEFITS

The purpose of this chapter is to:

- Identify the economic and social effects of construction and operation of the Project.
- Quantify the Project benefits and costs to the groups affected in the area surrounding the site as well as other people and businesses in Martin County and the State of Florida.

Socio-economic effects can be classified as either direct or indirect effects. Direct effects are those that are the direct result of the construction or operation of the Project. Indirect costs and benefits affect people and business interests in the vicinity of the Project who, because of their proximity to the site, may experience changes in their local environment, such as increased spending by the Project construction and operation personnel. Many of these effects are difficult to measure, and qualitative assumptions must be made to assess the relative values of expected costs and benefits.

This chapter is divided into two parts. Section 7.1 deals with socio-economic benefits and consists of an analysis of the plant construction and operational expenditures. Section 7.2 addresses temporary and long-term indirect costs involving the construction and operational personnel's use of private and public services in the vicinity of the site. All cost and benefit values are based on present (2001) dollar values.

7.1.1 DIRECT SOCIO-ECONOMIC BENEFITS

The Project is expected to benefit the economies of Martin County and surrounding communities. Direct benefits from the Project include employment opportunities created by the construction and operation of the Project. Construction of the Project is anticipated to begin in 2003 and conclude in 2005. The peak construction workforce is estimated to be about 575 people with an average construction workforce estimated at 250 employees over a 2-year period. Construction employment during 2004 will average about 300 workers and management staff. Employment opportunities will result from construction job opportunities as well as jobs indirectly generated through the purchase of goods and services in the area. Additionally, with the addition of approximately 12 full-time equivalent jobs for the operation of the Project, the labor demands associated with the operation of the Project will not create labor shortages. Due to the proximity of the Martin Plant site to large

labor markets in the South Florida metropolitan areas, the labor demand for both construction and operation is expected to be met by workers in these areas. Population and housing impacts from construction and operation will be minimal because little migration into the area is anticipated.

Sales and income tax benefits will accrue to the State of Florida as a result of the construction and operation of the Project. Local revenues will also be derived from property taxes paid on the property and the onsite facilities.

The construction cost for the Project will be about $460 million. The major cost associated with construction will be the major equipment (about $215 million), labor (about $75 million), and materials (about $110 million). The remaining cost is associated with engineering, licensing, contingencies, and other miscellaneous costs.

Estimated annual property tax revenues from the Project for Martin County government are $6.7 million in 2006. Based on the first 5 years of operation, the estimated tax payments to the State of Florida and Martin County will be:

- $900,000 in sales taxes will be paid to the State of Florida. These taxes will be placed in the State's general fund and will be available for any use deemed appropriate by the State, and
- $31.4 million will be collected for property taxes by Martin County for general government and public schools.

These figures are based on current tax rates for each taxing authority, as determined for the State of Florida and Martin County, based on an estimated property and facility value.

Direct economic benefits of construction of the Project will also result from the purchase of materials and equipment. About $15 to 20 million will be for materials and equipment purchased or leased within the state.

Among the primary direct benefits of the Project will be the increase in skilled job opportunities within the region associated with both plant construction and operation. Construction employment is expected to peak at approximately 574 workers. The total construction payroll for this facility is

estimated at $75 million, which will be paid over the 2-year construction period. The approximate type of workers over the two-year construction period is presented below:

Estimated Construction Workforce

Cost Component	Percent
Laborers	11.9
Carpenters	6.3
Operators	5.3
Ironworkers	3.7
Millwrights	10.0
Boilermakers	6.5
Pipefitters	19.5
Insulators	1.4
Electricians	21.7
Painters	0.9
Supervision	12.9
Total	100.0

Ongoing operation of the Project will employ approximately 12 people. Assuming average wages of $50,000 annually per person, the additional annual operational payroll will be approximately $600,000. Other fixed operational costs, excluding fuel costs, would be about $2,000,000, which would generally be expended in the area.

7.1.2 INDIRECT ECONOMIC BENEFITS

The purchase of goods and services to support the construction of the Project is anticipated to occur over a 2-year period beginning in 2003 and ending in 2005. It is expected that the majority of the $75 million in construction wages paid by for the Project will be spent within Martin County and the surrounding region. These wages will create additional demands for goods and services. As this money is spent, it will create a multiplier effect within the area, thereby generating additional jobs and earnings. These earnings are indirect or secondary benefits of the Project, which will be enjoyed by other companies whose payroll will increase from the construction of the Project. Materials such as concrete, stone, drainage piping, and other building materials are normally manufactured or produced in the region. Rental of construction equipment would also be obtained locally.

The direct wages from ongoing plant operations will also generate indirect economic benefits. The direct wages will be spent mostly within the region and will increase the demand for goods and services. Using a typical economic multiplier for this effect, wages paid direct to plant personnel will indirectly generate at least $500,000 annually in additional earnings (wages and benefits) in the region.

7.1.3 OTHER ECONOMIC BENEFITS

The major new maintenance cost of operating the Project is associated with fuel, water treatment chemicals, and ammonia. These costs not only include the cost of the commodity but the cost of transportation to the site. For example, natural gas will be transported to the site by a regional pipeline. In addition, the alternate fuel, light oil, and ammonia will be transported by truck to the site. Some of the payments for both the commodity and transportation will benefit the region through additional employment, taxes and materials.

7.1.4 RECREATIONAL AND ENVIRONMENTAL VALUES

Construction and operation of the Project will not impact the recreational value and visual qualities of the facilities in the vicinity of the Martin Plant site. Several recreational facilities are located within 5 miles of the Project area. Disturbance during construction of the planned facilities will be insignificant to non-existent since the recreational facilities are located outside of the area affected by facility construction and operation. Aesthetic and visual impact to nearby recreational facilities is expected to be minimal.

7.1.5 ONSITE ENHANCEMENTS

FPL desires to minimize the Project's impacts on the environment and the community. Accordingly, the Project design incorporates features that reduce the visual and other impacts to the local community. These major features include the low profile, noise attenuation, and air pollution control equipment. In addition, there are minimal transportation impacts to the local roadways during operation.

The use of these features and methods, combined with the location for the Project and associated facilities on the Martin Plant site, will assure minimal impacts to the community. For example, the location of the Project is well buffered from the borders of the site. The approximate distances to the

Martin Plant site boundary from the Project power block area are: 1.6 miles from the closest point on SR 710, 2.7 miles from the closest point on the St. Lucie Canal, 1.4 miles from the closet point in the Barley Barber Swamp, and 0.75 mile from the closest Martin Plant site property (toward the southeast). Both the location on the Martin Plant site and the design features for the Project will minimize the impacts to aesthetics, ambient noise levels and transportation.

7.1.6 OTHER ENVIRONMENTAL BENEFITS

The Project maximizes beneficial use of an existing power plant site. This minimizes the potential environmental impacts associated with the generation of electrical power through the use of existing facilities (i.e., developed site, access roads, substation and transmission lines, and rail facilities). This directly avoids impacts to wetlands or wildlife habitat.

7.1.7 SUMMARY OF BENEFITS

Impacts to the economy associated with construction and operation of the Project are expected to be positive. Labor demands associated with the construction and operation of the Project are not expected to create any labor shortages. Expenditures for field materials and consumption by newly hired workers will boost incomes in Martin and surrounding counties. Population and housing impacts associated with the Project will be slight due to minimal in-migration into the area.

Construction activities will increase tax revenues to the county and state governments due to sales and income taxes from the purchase of equipment and material to support construction activities. Once operational, county and state governments are expected to receive considerably more dollars in tax revenues than expenditures on public services due to the minimum requirements for public service facilities needed to support the additional units.

Although the local community may experience some temporary impacts during the peak construction periods, overall, socioeconomic impacts associated with the construction and operation of the Project and the Martin Plant will be favorable.

7.2 SOCIO-ECONOMIC COSTS

7.2.1 TEMPORARY EXTERNAL COSTS

Over 50,000 construction workers reside within the region, with the majority of these in Palm Beach, Broward and Dade Counties. Since ample labor supply exists within commuting distance, and since a labor surplus exists within the region, it is anticipated that many workers will be hired from within the region, with minimal relocation required. Consequently, construction should have no adverse effect on permanent housing.

As is typical with longer construction projects, some workers commuting from longer distances may choose to live in transient accommodations (motels, hotels) on a weekly basis, returning to their permanent homes and families on weekends. Transient accommodations are plentiful in the area.

Since workers will mostly be commuting and not relocating permanently into the region, it is not anticipated that construction will create any new or unusual impacts or demands on public facilities or services.

Temporary external costs include the generation of construction traffic and noise from delivery trucks each day. Construction will last approximately 2 years with a peak period of about 12 months from January 2004 through December 2004. The projected construction traffic is not predicted to have a significant impact to the level-of-service on SR 710.

7.2.2 LONG-TERM EXTERNAL COSTS

The Project's external cost impacts will be minimal and localized. The Project is located in the central portion of the Martin Plant site and over a mile from any public or private facilities used for recreational purposes. With the incorporation of environmental mitigation measures, the operation of the Project will not cause any impairment to recreational values, result in any deterioration of aesthetic and scenic values, or restrict access to areas of scenic values. The Project also will not displace persons from the land, cause loss of income, or result in any significant costs to local government.

Since the operational workforce is expected to be approximately 12 employees, and most are assumed to be residing within commuting distance to the plant, the Project's impacts to local services (e.g., schools, police) are expected to be minimal.

8.0 SITE AND DESIGN ALTERNATIVES

This optional chapter of the SCA is not being submitted as part of this application because it is not anticipated that an EIS under the National Environmental Policy Act (NEPA) would be required for the Martin Expansion Project.

9.0 COORDINATION

State, regional, and local governmental agencies were contacted by FPL representatives to inform these agencies about the Martin Expansion Project and to solicit input regarding the Project. The Agency staff contacted are listed below:

- Florida Department of Environmental Protection (Tallahassee)
  - Jonathan Alden, Esq.
  - Alan Bedwell
  - Scott Goorland, Esq.
  - Jeff Koerner
  - David Layne
  - Al Linero
  - Hamilton S. Oven
  - Steve Palmer
  - Howard Rhodes
  - Karen Skinner
- Florida Department of Environmental Protection (West Palm Beach)
  - Melissa Meeker
- Florida Department of Community Affairs
  - Paul Darst
- Florida Department of Transportation
  - Sandra Whitmire
- Florida Fish and Wildlife Conservation Commission
  - Doug Bailey
- South Florida Water Management District
  - Terry Bates
  - Steven Bell
  - Hugo Carter
  - Jim Golden
  - John Shaffer
- Treasure Coast Regional Planning Council
  - Peter Merritt
- Martin County
  - Harry King

REFERENCES

American National Standard Institute (ANSI) S1.26-1995 (R1999) *Method for the Calculation of Absorption of Sound by the Atmosphere.*

American National Standard Institute ANSI S12.9-1993 (Part 3) (1993 and Revised 1998) Quantities and Procedures for Description and Measurement of Environmental Sound - Part 3: Short-Term Measurements with an Observer Present.

Auer, A.H. 1978. *Correlation of Land Use and Cover With Meteorological Anomalies.* J. Applied Meteorology, Vol. 17.

Bolt Beranek and Newman (BBN). 1977. *Report No. 3321 "Power Plant Construction Noise Guide".*

Bowers, J.F., Bjorklund, J.R., and Cheney, C.S. 1979. *Industrial Source Complex (ISC) Dispersion Model User's Guide.* Vols. I and II, EPA-450/4-79-030 and 031. U.S. Environmental Protection Agency.

Briggs, G.A. 1969. *Plume Rise,* USAEC Critical Review Series, TID-25075, National Technical Information Service. Springfield, Virginia.

Briggs, G.A. 1971. *Some Recent Analyses of Plume Rise Observations. In:* Proceedings of the Second International Clean Air Congress. Academic Press, New York.

Briggs, G.A. 1972. *Discussion on Chimney Plumes in Neutral and Stable Surroundings.* Atmospheric Environment. 6:507-510.

Briggs, G.A. 1974. *Diffusion Estimation for Small Emissions. In:* ERL, ARL USAEC Report ATDL-106. U.S. Atomic Energy Commission, Oak Ridge, TN.

Briggs, G.A. 1975. *Plume Rise Predictions. In:* Lectures on Air Pollution and Environmental Impact Analysis. American Meteorological Society. Boston, Massachusetts.

Carlson, R.W. 1979. Reduction in the Photosynthetic rate of *Acer quercus* and *Fraxinus* species caused by sulphur dioxide and ozone. Environmental Pollution. 18:159-170.

DataKustik. 2000. *Cadna/A Computer Program for the Calculation and Assessment of Outdoor Noise Emissions.* DataKustik GmbH, Munich, Germany.

Electric Power Research Institute (EPRI). 1984. *User's Manual: Cooling-Tower-Plume Prediction Code.* EPRI CS-3403-CCM. Research Project 906-1. Prepared by Argonne National Laboratory.

FDOT. 1999. *Florida Land Use, Cover and Forms Classification System (FLUCFCS) Handbook.* Surveying and Mapping, Thematic Mapping Section, Florida department of Transportation (FDOT).

FNAI. 2001. Map of Threatened and Endangered Species in Proximity of Martin Unit 8 Project Area Florida Natural Area Inventory.

FPL. 1979. *Siting Study for Coal-Fired Power Plant.*

FPL. 1989. *Site Certification Application for Martin Coal Gasification Combined Cycle Project. Volume 1: Chapter 1, Need of Power and Chapter 2, Site and Vicinity Characteristics.*

FPL. 1989. *Site Certification Application for Martin Coal Gasification Combined Cycle Project. Volume 2: Chapter 3, Plant and Directly Associated Facilities, Chapter 4, Effects of Site*

Preparation and Project Associated Facilities Construction and Chapter 5, Effects of Project Operation.

FPL. 1989. *Site Certification Application for Martin Coal Gasification Combined Cycle Project. Volume 3: Chapter 6, Transmission Lines and Other Linear Facilities, Chapter 7, Economic and Social Effects of Project Construction and Operation, Chapter 8, Site and Design Alternatives and Chapter 9, Coordination.*

FPL. 1989. *Site Certification Application for Martin Coal Gasification Combined Cycle Project. Volume 4: Appendices, 10.1 Federal Permit Applications or Approvals.*

FPL. 1989. *Site Certification Application for Martin Coal Gasification Combined Cycle Project. Volume 5: Appendices, 10.2 Zoning Descriptions and 10.3 Land Use Descriptions*

FPL. 1989. *Site Certification Application for Martin Coal Gasification Combined Cycle Project. Volume 6: Appendices, 10.4 Existing State Permits and 10.5 Monitoring Programs and Data Collections/Analyses-10.5.1 Human Resources and 10.5.2 Cultural resources*

FPL. 1989. *Site Certification Application for Martin Coal Gasification Combined Cycle Project. Volume 7: Appendices, 10.5 Monitoring Programs and Data Collections/Analyses-10.5.3 Geology/Subsurface Hydrology and 10.5.4 Surface Water*

FPL. 1989. *Site Certification Application for Martin Coal Gasification Combined Cycle Project. Volume 8: Appendices, 10.4 Existing State Permits and 10.5 Monitoring Programs and Data Collections/Analyses-10.5.5 Ecology, 10.5.6 Meteorology/Air Quality, 10.5.7 Noise and 10.6 Need for Power*

FPL. 2001. *Ten Year Power Plant Site Plan 2001-2010.*

FSA. 2001. *Florida Statistical Abstract 2001.* Bureau of Economic and Business research, Warrington College of Business Administration, University of Florida.

Gale Research Company. 1980. *Climates of the States.* Book Tower, Detroit, Michigan 48226.

Gardner, D.E. and Graham, J.A. 1976. *Increased pulmonary disease mediated through altered bacterial defenses.* IN: Pulmonary macrophage and epithelial cells. R.P. Schneider, G.E. Doyle, and H.A. Ragan (Eds.). Proceedings of the Sixteenth Annual Hanford Biology Symposium, Richland, WA.

General Electric Company. 2001. Performance and Emissions Data Model PG7241(FA) Gas Turbine, Natural Gas and Distillate Oil.

Grattan, S.R., Maas, E.V., and Ogata, G. 1981. *Foliar Uptake and Injury from Saline Aerosol.* Journal of Environmental Quality. 10(3):406-409.

Harris, Cyril, editor, 1991. *Handbook of Acoustical Measurements and Noise Control, 3rd Edition.*

Hart, R., Webb, P.G., Biggs, R.H., and Portier, K.M. 1988. *The Use of Lichen Fumigation Studies to Evaluate The Effects of New Emission Sources on Class I Areas.* Journal of Air Pollution Control Association. 39:144-147.

Holzworth, G.C. 1972. *Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution Throughout the Contiguous United States.* Pub. No. AP-101. U.S. Environmental Protection Agency.

Horsman, D.C. and Wellburn, A.R. 1976. *Appendix II, Guide to Metabolic and Biochemical Effects of Air Pollutants in Higher Plants.* Editor T.A. Mansfield. Cambridge University Press, Cambridge, England.

Huber, A.H. 1977. *Incorporating Building/Terrain Wake Effects on Stack Effluents.* Preprint Volume for the Joint Conference on Applications of Air Pollution Meteorology. American Meteorological Society. Boston, Massachusetts.

Huber, A.H., and Snyder, W.H. 1976. *Building Wake Effects on Short Stack Effluents.* Preprint Volume for the Third Symposium on Atmospheric Diffusion and Air Quality. American Meteorological Society. Boston, Massachusetts.

Lichtler, W.F. 1960. *Geology and Ground-water Resources of Martin County, Florida.* Florida Geological Survey. Report of Investigations No. 23.

Malhotra, S.S., and Kahn, A.A. 1978. *Effect of Sulfur Dioxide Fumigation on Lipid Biosynthesis in Pine Needles.* Phytochemistry. 17:;241-244.

Mandoli, B.L. and P.S. Dubey. 1988. *The Industrial Emission and Plant Response at Pithampur (M.P.).* Int. J. Ecol. Environ. Sci. 14:75-79.

Martin County. 2000. Housing Inventory. Department of Growth Management

Martin County. 2000. Population Technical Bulletin. Department of Growth Management.

Martin County. 2001. Tax Rate Information

McLaughlin, S.B. and Lee, N.T. 1974. *Botanical studies in the vicinity of the Widows Creek Steam Plant.* Review of Air Pollution Effects Studies, 2952-1972, and Results of 1973 Surveys. Internal Report I-EB-74-1, TVA.

Mid-Valley, Inc. 1980. *Breach of Embankment, Martin Plant Cooling Reservoir.* (with assistance of the National Soil Services and Board of Consultants).

Mulchi, C.L. and Armbruster, J.A. 1981. *Response of Corn and Soybeans to Simulated Saline Aerosol Drift from Brackish Water Cooling-Towers.* Journal of Environmental Quality. 10(4):541-547.

Naik, R.M., Dhage, A.R., Munjal, S.V., Singh, P., Desai, B.B., Mehta, S.L. and Naik, M.S. 1992. *Differential Carbon Monoxide Sensitivity of Cytochrome c Oxidase in the Leaves of C3 and C4 Plants.* Plant Physiology 98:984-987.

National Oceanic and Atmospheric Administration (NOAA). 1978. Temperature Data for Belle Glade, Florida.

National Oceanic and Atmospheric Administration (NOAA). 1991. Stability Apply Distribution of Hourly Surface Observations, Palm Beach International Airport, 1987-1991.

National Oceanic and Atmospheric Administration (NOAA). 1991. Wind Distribution of Hourly Surface Observations, Palm Beach International Airport, 19987-1991.

National Oceanic and Atmospheric Administration (NOAA). 2001. Local Climatological Data, Annual Summary, Palm Beach International Airport.

Newman, J.R. 1981. *Effects of Air Pollution on Animals at Concentrations at or Below Ambient Air Standards.* Performed for Denver Air Quality Office, National Park Service, U.S. Department of the Interior. Denver, Colorado.

Newman, J.R. and R.K. Schreiber. 1988. *Air Pollution and Wildlife Toxicology.* Environmental Toxicology and Chemistry. 7:381-390.

NSS. 1972. *Martin Plant Soils Investigation.* National Soil Services, Inc. (NSS).

NSS. 1973. *Interim Report, Soils Investigation, Martin Plant Reservoir.* National Soil Services, Inc. (NSS).

NSS. 1974. *Soils Investigation, Martin Plant Cooling Reservoir, Volume III: Design Analysis and Recommendations, Embankment and Appurtenant Structures.* National Soil Services, Inc. (NSS).

Pasquill, F. 1976. *Atmospheric Dispersion Parameters in Gaussian Plume Modelings, Part II. Possible Requirements for Changes in the Turner Workbook Values.* U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA 600/4/76-030b.

Pollok, M., Hever, U., and Naik, M.S. 1989. *Inhibition of stomatal opening in sunflower leaves by carbon monoxide and reversal of inhibition by light.* Planta 178:223-230.

Schulman, L.L. and Scire, J.S. 1980. *Buoyant Line and Point Source (BLP) Dispersion Model User's Guide.* Document P-7304B. Environmental Research and Technology, Inc. Concord, Massachusetts.

SFWMD. 1994/95. Level II FLUCFCS, Geographic Maps for Martin County. South Florida Water Management District.

SFWMD. 1994/95. Level III FLUCFCS, Geographic Maps for Martin County. South Florida Water Management District.

SFWMD. 1999. Mean Discharges for St. Lucie Canal at Port Mayaca and Stuart Lock (1963-1999). South Florida Water Management District.

SFWMD. 1999. Precipitation (1936-1999) and Evaporation (1941-1954) Data for S308. South Florida Water Management District.

SFWMD. 2001. Water Use Permit Inventory. South Florida Water Management District.

SFWMD. 2002. Water Quality Data at S308, Port Mayaca (1996-2001). South Florida Water Management District

Smith, F.A. and Robinson, J.B. 1971. *Sodium and Potassium Influx into Citrus Leaf Slices,* Australian Journal of Biological Science. 24:861-871.

Stone and Webster Engineering Corporation. 1983. *Report on Shell Layer Ground-Water Chemistry, Martin Cooling Water Pond.*

Thom, H. 1963. *Tornado Probabilities.* Monthly Weather Review, Volume 91.

Townsend, A.M. 1980. Response of Selected Tree Species to Sodium-Chloride. Journal of the American Society for Horticultural Science. 105(6):878-883.

Treshow, M. and F.K. Anderson. 1989. *Plant Stress from Air Pollution.* John Wiley and Sons, New York.

Trzeciak, H.I., Kosmider, S., Kryk, K., and Kryk, A. 1977. *The Effects of Nitrogen Oxides and Their Neutralization Products With Ammonia on the Lung Phospholipids of Guinea Pigs.* Environ. Res. 14:87-91.

U.S. Census Bureau. March 2001

U.S. Environmental Protection Agency (EPA). 1971. *Noise for Construction Equipment and Operations, Building Equipment, and Home Appliances.* Prepared by Bolt, Beranek and Newman.

U.S. Environmental Protection Agency (EPA). 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare, With an Adequate Margin of Safety.*

U.S. Environmental Protection Agency (EPA). 1978. *Guidelines for Determining Best Available Control Technology (BACT).* Office of Air Quality Planning and Standards.

U.S. Environmental Protection Agency (EPA). 1980. *Prevention of Significant Deterioration Workshop Manual.*

U.S. Environmental Protection Agency (EPA). 1982. *Air Quality Criteria for Particulate Matter and Sulfur Oxides.* Vol. 3.

U.S. Environmental Protection Agency (EPA). 1985. *Stack Height Regulation.* Federal Register, Vol. 50, No. 130, July 8, 1985, p. 27892.

U.S. Environmental Protection Agency (EPA). 1987. *Ambient Monitoring Guidelines for Prevention of Significant Deterioration.* EPA Report No. EPA 450/4-87-007.

U.S. Environmental Protection Agency (EPA). 1990. *New Source Review Workshop Manual. Prevention of Significant Deterioration and Nonattainment Area Permitting.* Office of Air Quality and Standards. Draft. Research Triangle Park, NC. Oct. 1990.

U.S. Environmental Protection Agency (EPA). 1998. *User's Guide for the Industrial Source Complex (ISC3) Dispersion Models. Volume I - User Instructions.* Office of Air Quality Planning and Standards Emissions, Monitoring, and Analysis Division. Research Triangle Park, NC. Nov. 1998.

U.S. Environmental Protection Agency (EPA). 2000a. *Consideration of Collateral Environmental Impacts Associated with the Use of SCR at Dry Low NO_x Combined Cycle Natural Gas Turbines.* Issues by John Seitz, Director of the Office of Air Quality Planning and Standards.

U.S. Environmental Protection Agency (EPA). 2000b. *NO_x Control on Combined Cycle Turbines, Issues Regarding the Use of Selective Catalytic Reduction in Attainment Areas for Dry Low NO_x Natural Gas Combined Cycle Turbines.* Draft paper for public review. Aug. 4, 2000.

U.S. Forest Service (USFS). 2000. *Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Phase I Report.* USFS - Air Quality Program. National Park Service - Air Resources Division. U.S. Fish and Wildlife Service - Air Quality Branch.

United States. 1990 Census Lookup. February 2001.

United States. Bureau of Economic Analysis. Regional Accounts Data. March 2001.

United States. National Trust for Historic Preservation. February 2001

United States. Office of Labor Market Analysis & Information. March 2001.

Vatavuk, W.M. 1990. *Estimating Costs of Air Pollution Control.* Lewis Publishers. Chelsea, Michigan.

OBSCOL-AC

1

CR 714/MARTIN HWY

CR 609

CR 714

CR 15B

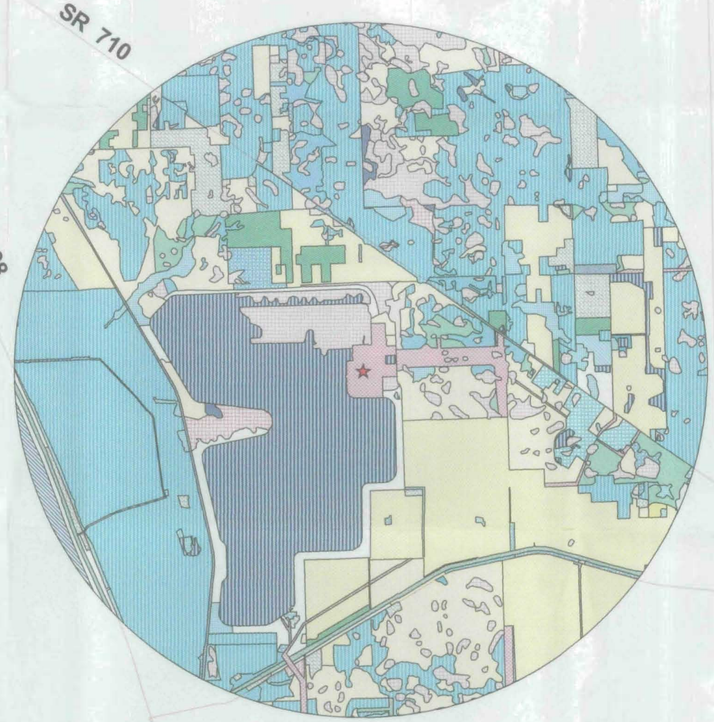
SR 710

CR 76A

US 98

CR 726

SR 76



LEGEND

- Project Area
- Major Roads
- 5 Mile Radius

Land Use 5 Mile Radius

- Commercial and Services (140)
- Cropland and Pastureland (210)
- Disturbed Lands (740)
- Herbaceous (310)
- Industrial (150)
- Lakes (520)
- Mixed Rangeland (330)
- Nurseries and Vineyards (240)
- Open Land (190)
- Other Open Lands <Rural> (260)
- Recreational (180)
- Reservoirs (530)
- Residential Low Density (110)
- Residential Medium Density (120)
- Shrub and Brushland (320)
- Specialty Farms (250)
- Streams and Waterways (510)
- Transportation (810)
- Tree Crops (220)
- Upland Coniferous Forests (410)
- Upland Hardwood Forests (420)
- Upland Hardwood Forests - Continued (430)
- Utilities (830)
- Vegetated Non-Forested Wetlands (640)
- Wetland Coniferous Forests (620)
- Wetland Forested Mixed (630)
- Wetland Hardwood Forests (610)

REFERENCE

Land Use Coverage Provided by SFWMD 1995

1 0 1 2 Miles

N

PROJECT

Martin Unit 8

TITLE

Land Use and Cover
Within 5 Mile Radius of Project Area

Golder Associates

			PROJECT No. 013-7609.1502	SCALE AS SHOWN	REV. 0
DESIGN	JW	23 Jan. 2002			
GIS	JW	23 Jan. 2002			
CHECK	RAZ	23 Jan. 2002			
REVIEW	KFK	23 Jan. 2002			

FIGURE 2.2-3

H:\Data\projects\013\7609\work\7609_009.tif\ MarchChapter 2 - Land Use\5 mile radius.apr (Layout: Overlay) 2-23-02 09:57:05

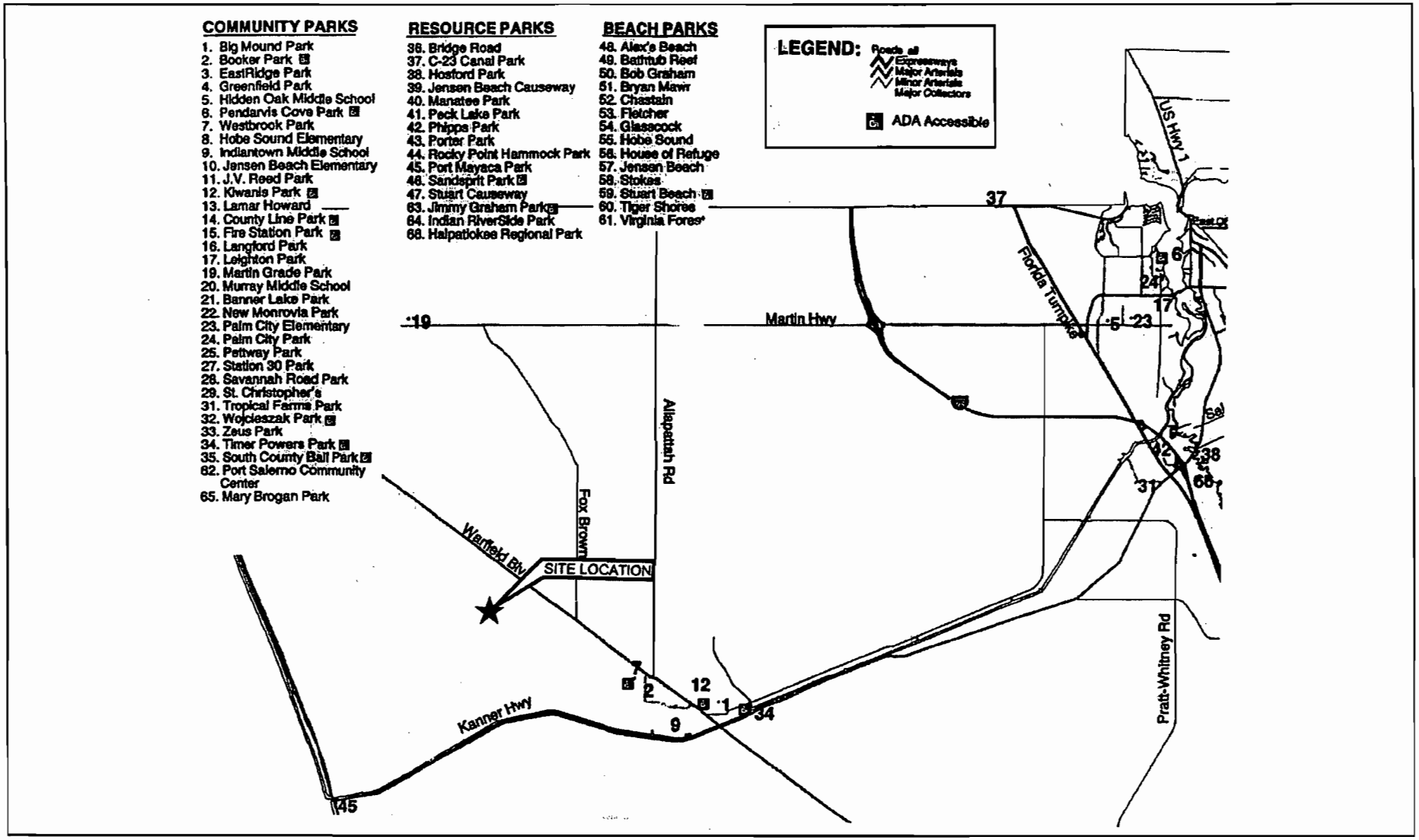


Figure 2.2-4. Martin County Parks and Facilities

Source: Martin County Parks and Recreation Department, March 2001; Golder, 2002.

FPL
Martin Unit 8

<table>
<tr><th>GEOLOGIC AGE</th><th>FORMATION/GROUP</th><th>AQUIFER</th></tr>
<tr><td>Post-Miocene</td><td>Pamlico Sand
Fort Thompson/Anastasia Fms
Caloosahatchee Marl</td><td rowspan="2">Surficial Aquifer
(90-200' thick)</td></tr>
<tr><td rowspan="2">Miocene</td><td>Tamiami Formation</td></tr>
<tr><td>Hawthorn Group < Peace River Fm. / Arcardia Fm.</td><td>Confining Layers
(350-600' thick)
Top of Floridan Aquifer System
(2800-3400' thick)</td></tr>
<tr><td>Oligocene</td><td>Suwannee Limestone</td><td rowspan="6">Producing Zone 1
- -
Semi-permeable zone
- -
Producing Zone 2
- -
Semi-permeable zone
- -
Producing Zones 3 and 4
- -</td></tr>
<tr><td rowspan="4">Eocene</td><td>Ocala Limestone</td></tr>
<tr><td>Avon Park Limestone</td></tr>
<tr><td>Lake City Limestone</td><td rowspan="2">Semi-permeable zone</td></tr>
<tr><td>Oldsmar Formation</td></tr>
<tr><td>Paleocene</td><td>Cedar Keys Formation</td><td>Boulder Zone
- -
Semi-permeable zone</td></tr>
</table>

Figure 2.3-1. Generalized Hydrostratigraphy of Martin County

Source: Site Certification Application for FPL Martin Coal Gasification/ Combined Cycle Project, 1989; Golder, 2002.

FPL
Martin Unit 8

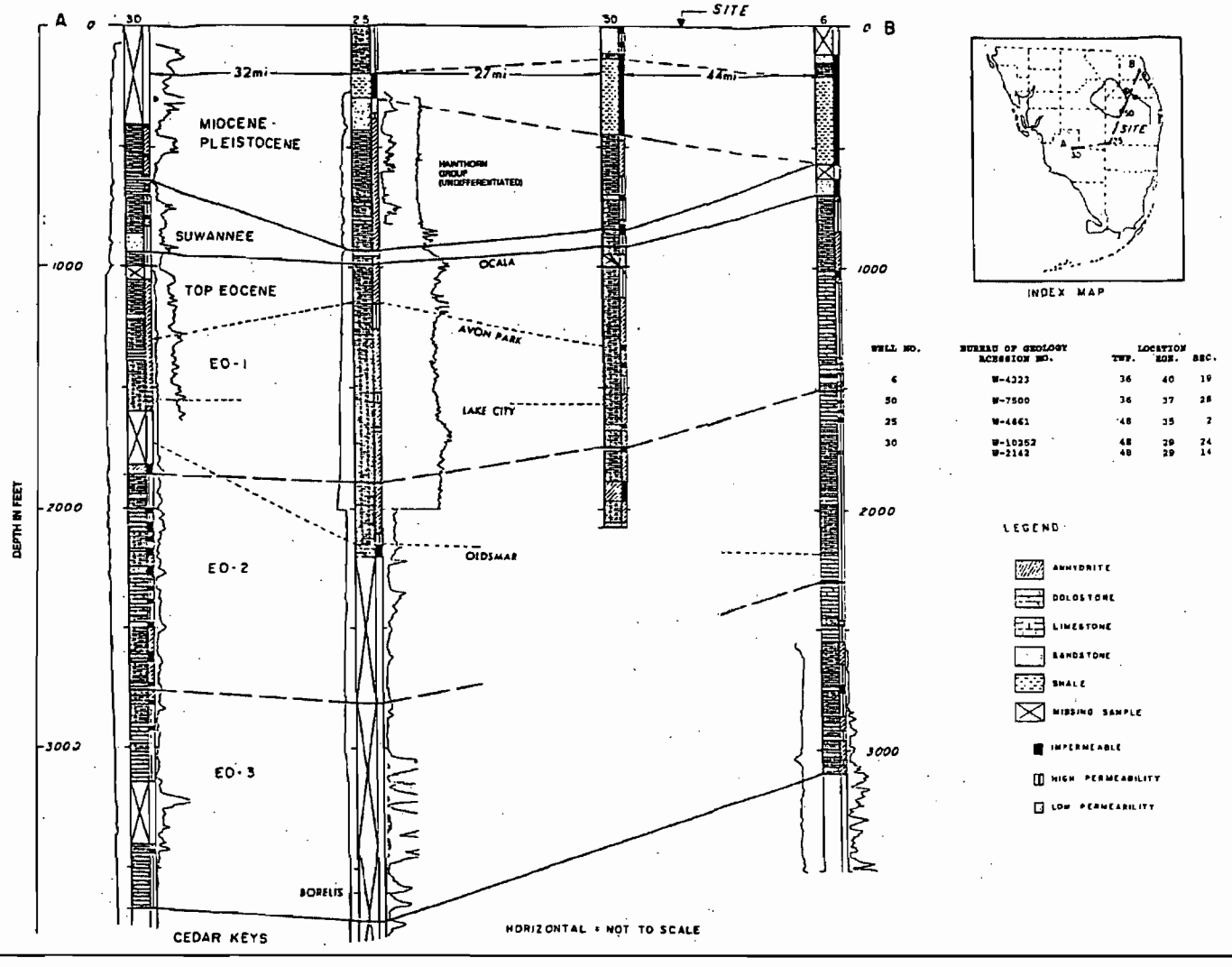
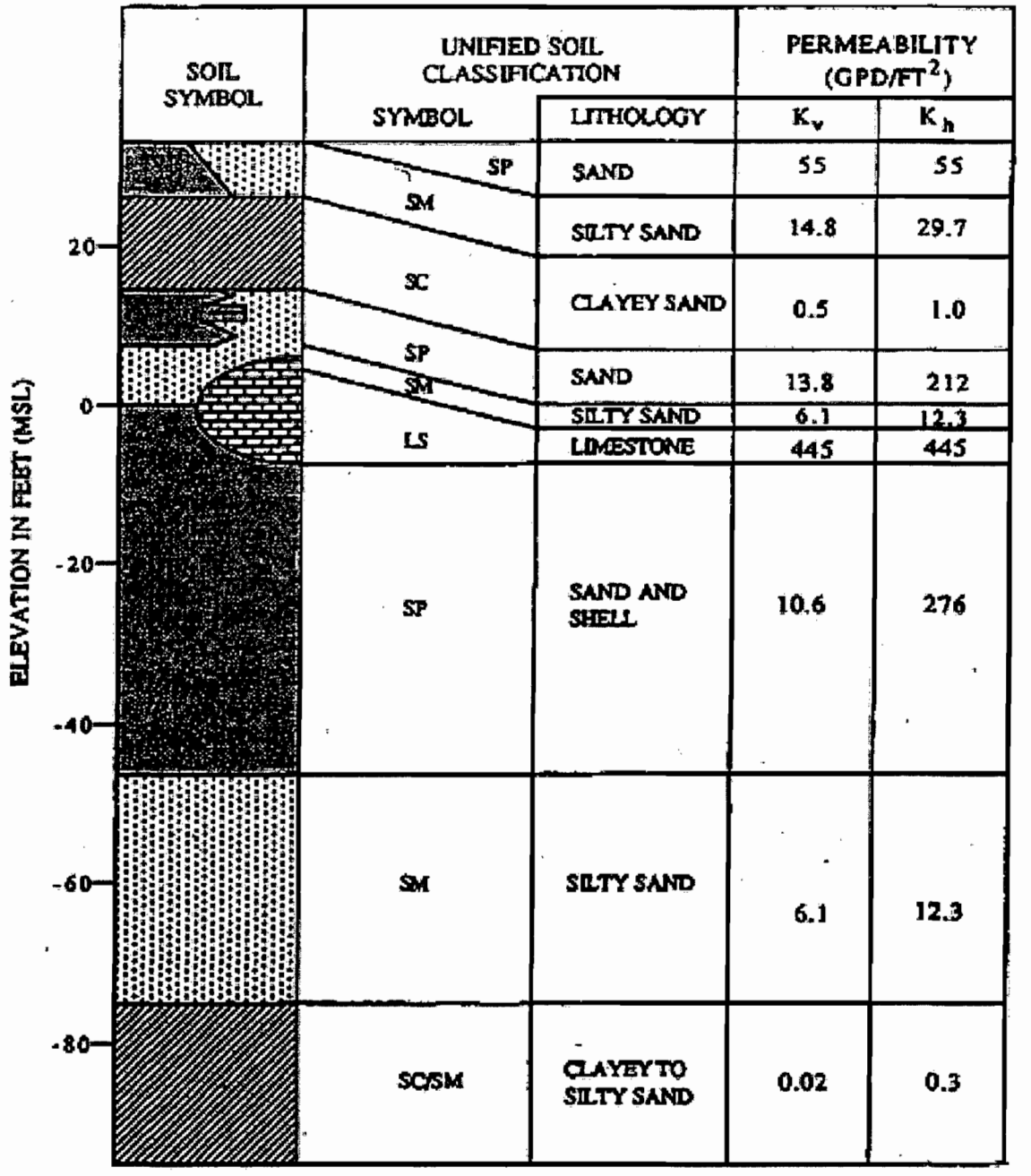


Figure 2.3-2. Regional Geologic Cross Section

Source: Modified after Puri and Winston, 1974; Site Certification Application for FPL Martin Coal Gasification/Combined Cycle Project, 1989; Golder, 2002.

FPL
Martin Unit 8



SOIL SYMBOL	UNIFIED SOIL CLASSIFICATION SYMBOL	LITHOLOGY	PERMEABILITY (GPD/FT^2) K_v	K_h
	SP	SAND	55	55
	SM	SILTY SAND	14.8	29.7
	SC	CLAYEY SAND	0.5	1.0
	SP	SAND	13.8	212
	SM	SILTY SAND	6.1	12.3
	LS	LIMESTONE	445	445
	SP	SAND AND SHELL	10.6	276
	SM	SILTY SAND	6.1	12.3
	SC/SM	CLAYEY TO SILTY SAND	0.02	0.3

K_v = VERTICAL PERMEABILITY

K_h = HORIZONTAL PERMEABILITY

Figure 2.3-3. Summary of the Hydrogeologic Regime

Source: Site Certification Application for FPL Martin Coal Gasification/ Combined Cycle Project, 1989; Golder, 2002.

FPL
Martin Unit 8

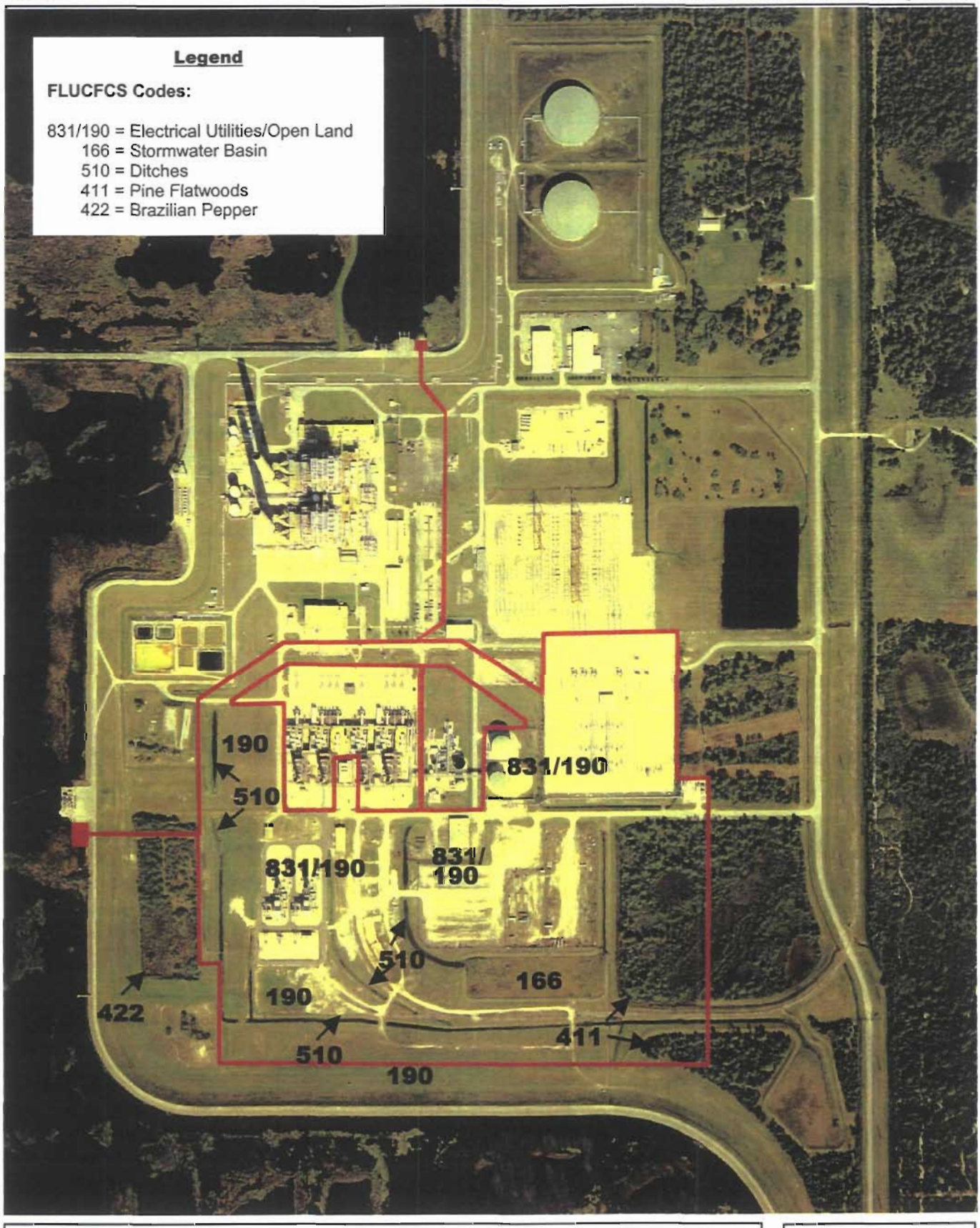


Figure 2.3-4. Vegetation/Land Use Map of the Project Area.

Source: SRM of Miami, Inc., 2001; Golder, 2002.

FPL
Martin Unit 8

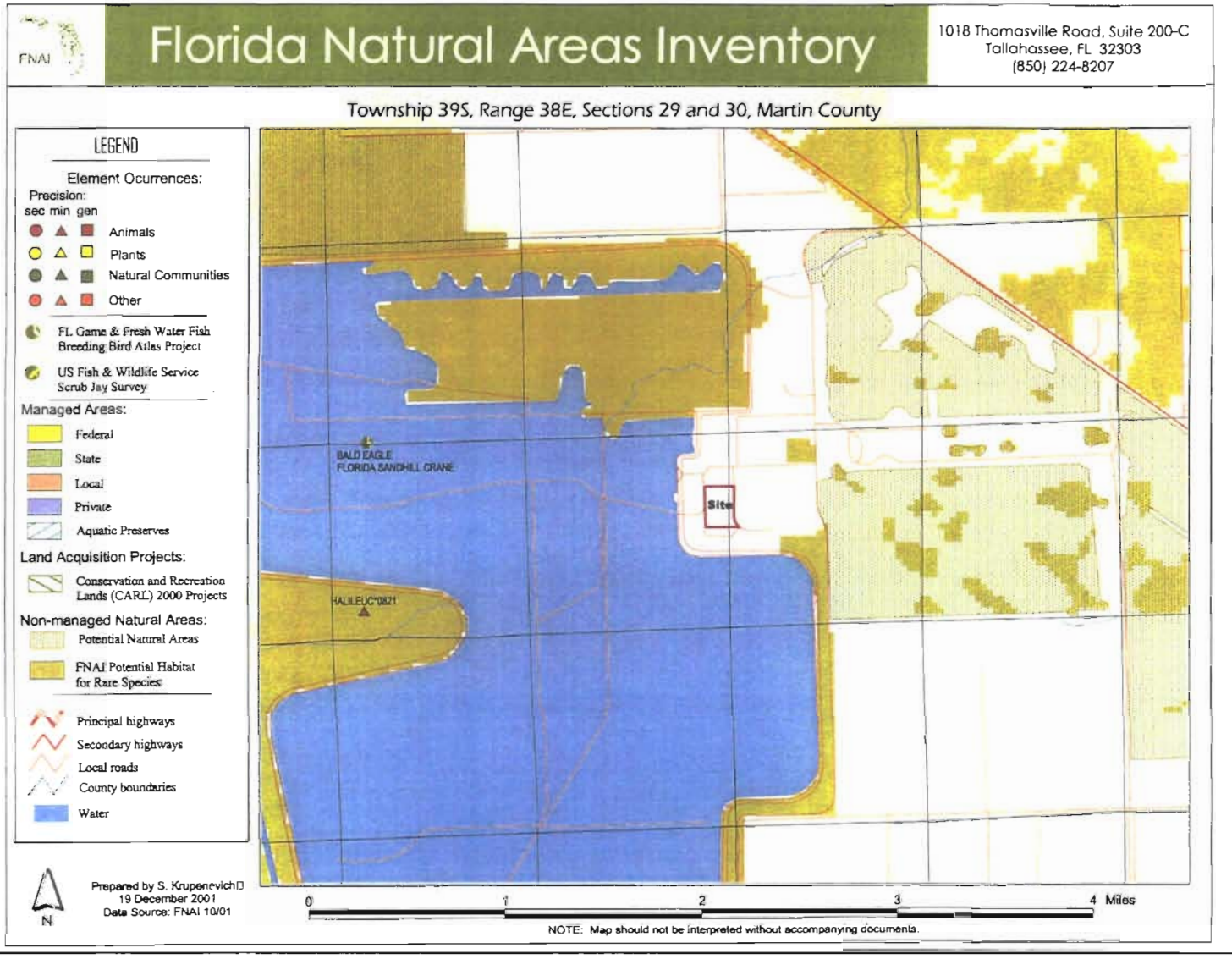
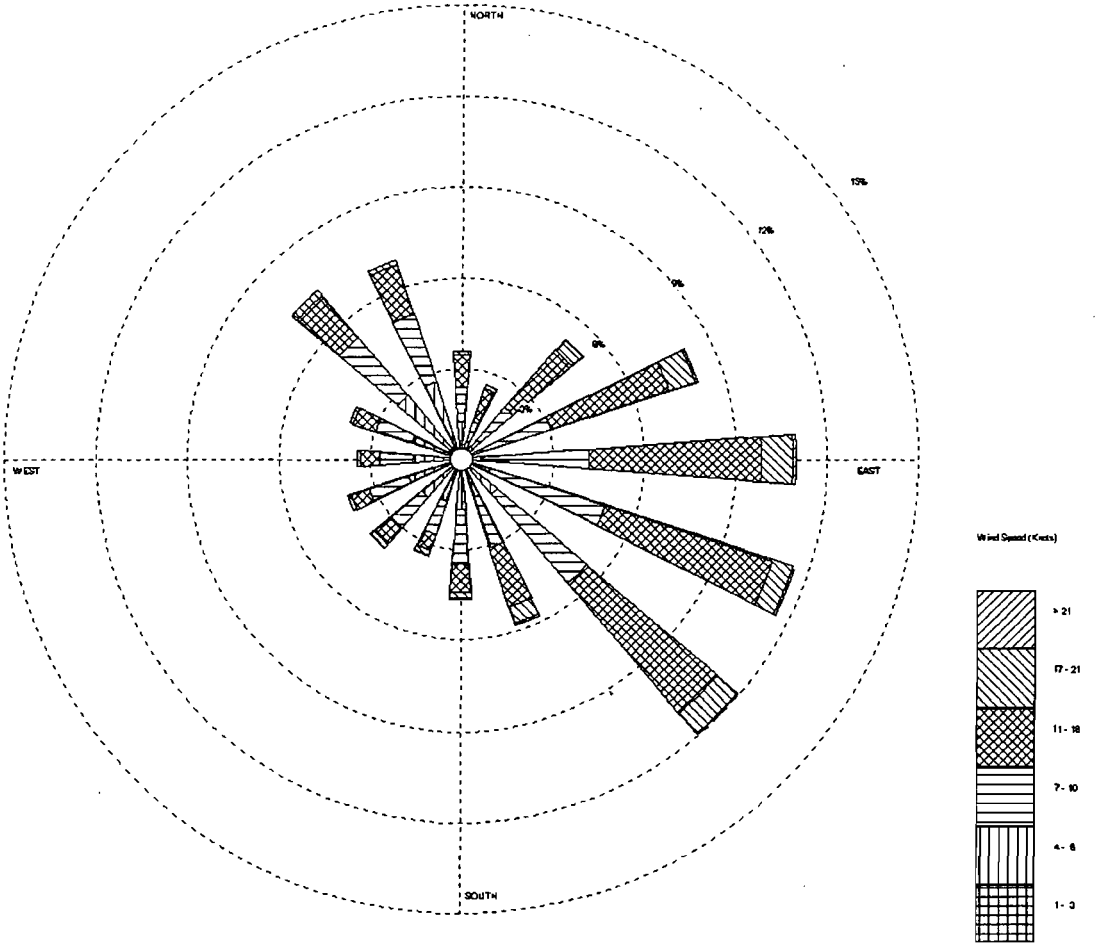


Figure 2.3-5. Florida Natural Areas Inventory

Source: FNAI, 2001; Golder, 2002.

FPL

Martin Unit 8



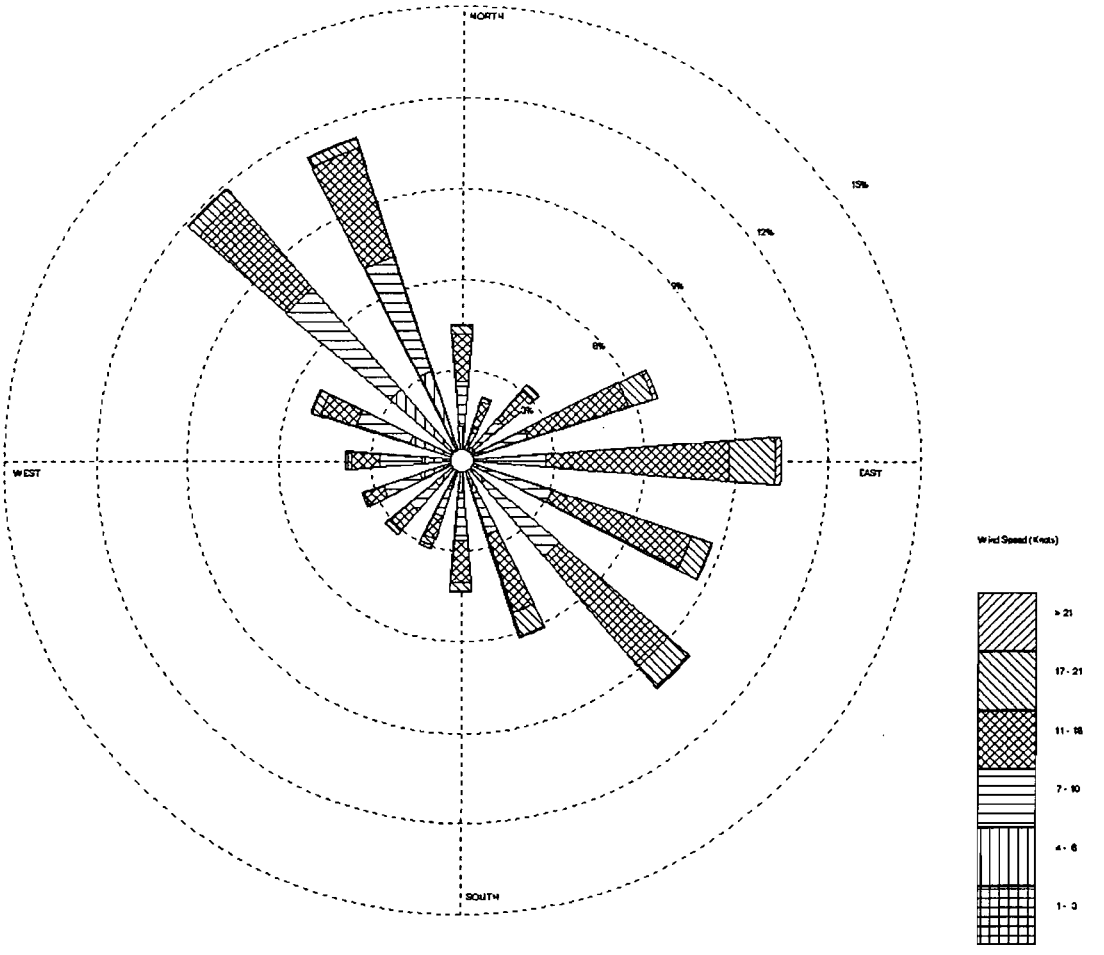
Station No. 12844

Average Wind Speed	10.0 Knots
Calm winds	2.69%

Figure 2.3-6. Annual Wind Rose for Palm Beach International Airport, Florida (1987 – 1991)

Source: National Climatic Data Center, 2001; Lakes Environmental Software WRPLOT View 3.05, Golder, 2002.

FPL
Martin Unit 8



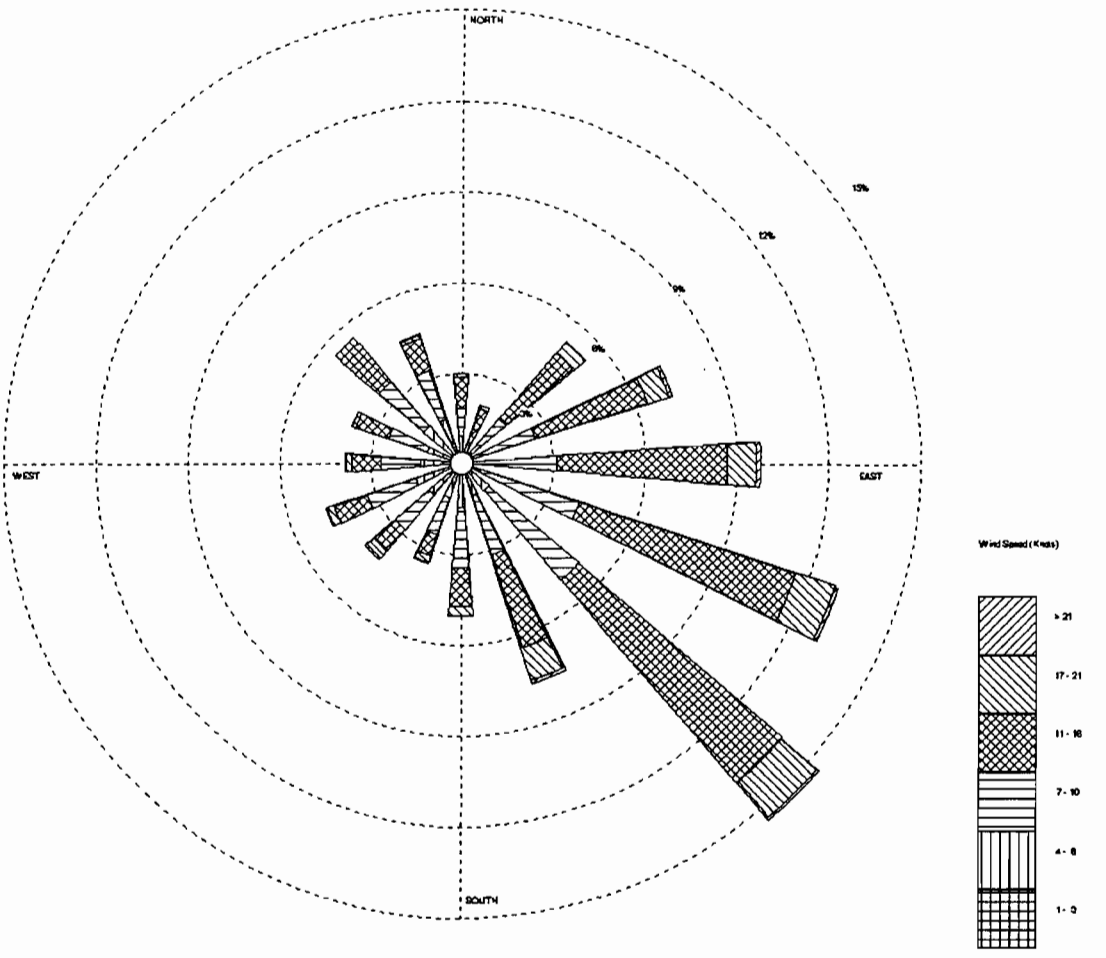
Station No. 12844

Average Wind Speed	10.5 Knots
Calm winds	1.86%

Figure 2.3-7. Winter Wind Rose for Palm Beach International Airport, Florida (December- February 1987 – 1991)

Source: National Climatic Data Center, 2001; Lakes Environmental Software WRPLOT View 3.05, Golder, 2002.

FPL
Martin Unit 8



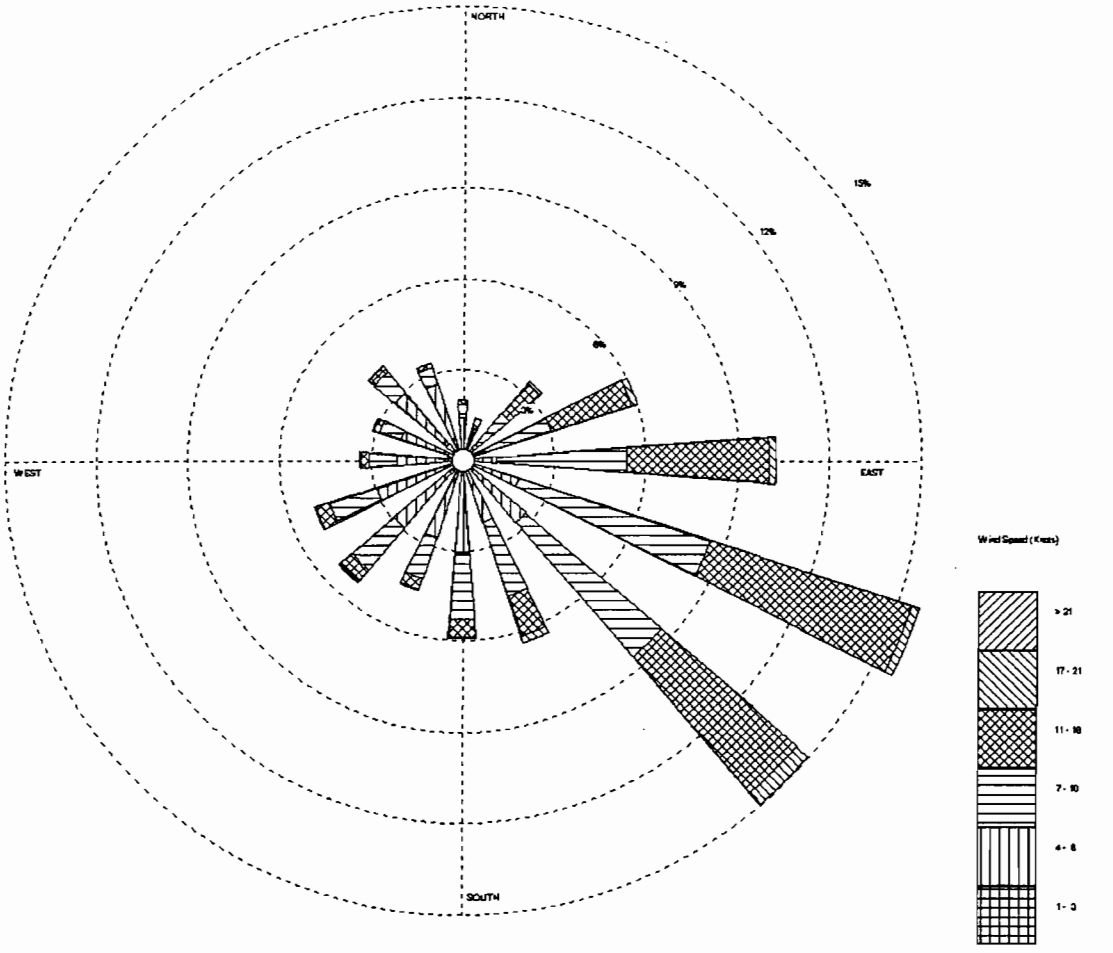
Station No. 12844

Average Wind Speed	10.9 Knots
Calm winds	1.49%

Figure 2.3-8. Spring Wind Rose for Palm Beach International Airport, Florida (March - May 1987 – 1991)

Source: National Climatic Data Center, 2001; Lakes Environmental Software WRPLOT View 3.05, Golder, 2002.

FPL
Martin Unit 8



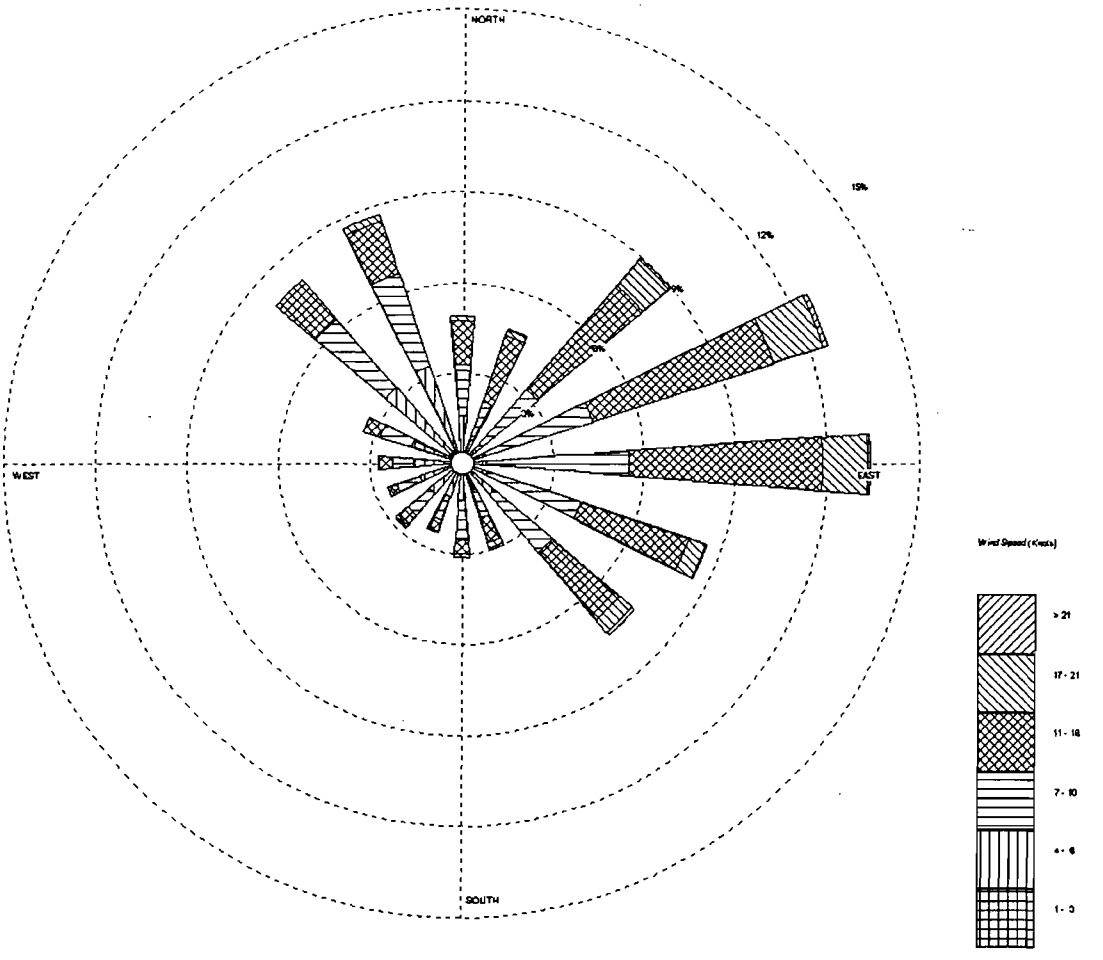
Station No. 12844

Average Wind Speed	8.53 Knots
Calm winds	4.84%

Figure 2.3-9. Summer Wind Rose for Palm Beach International Airport, Florida (June - August 1987 – 1991)

Source: National Climatic Data Center, 2001; Lakes Environmental Software WRPLOT View 3.05, Golder, 2002.

FPL
Martin Unit 8



Station No. 12844

Average Wind Speed	10.0 Knots
Calm winds	2.55%

Figure 2.3-10. Fall Wind Rose for Palm Beach International Airport, Florida (September - November 1987 – 1991)

Source: National Climatic Data Center, 2001; Lakes Environmental Software WRPLOT View 3.05, Golder, 2002.

FPL
Martin Unit 8

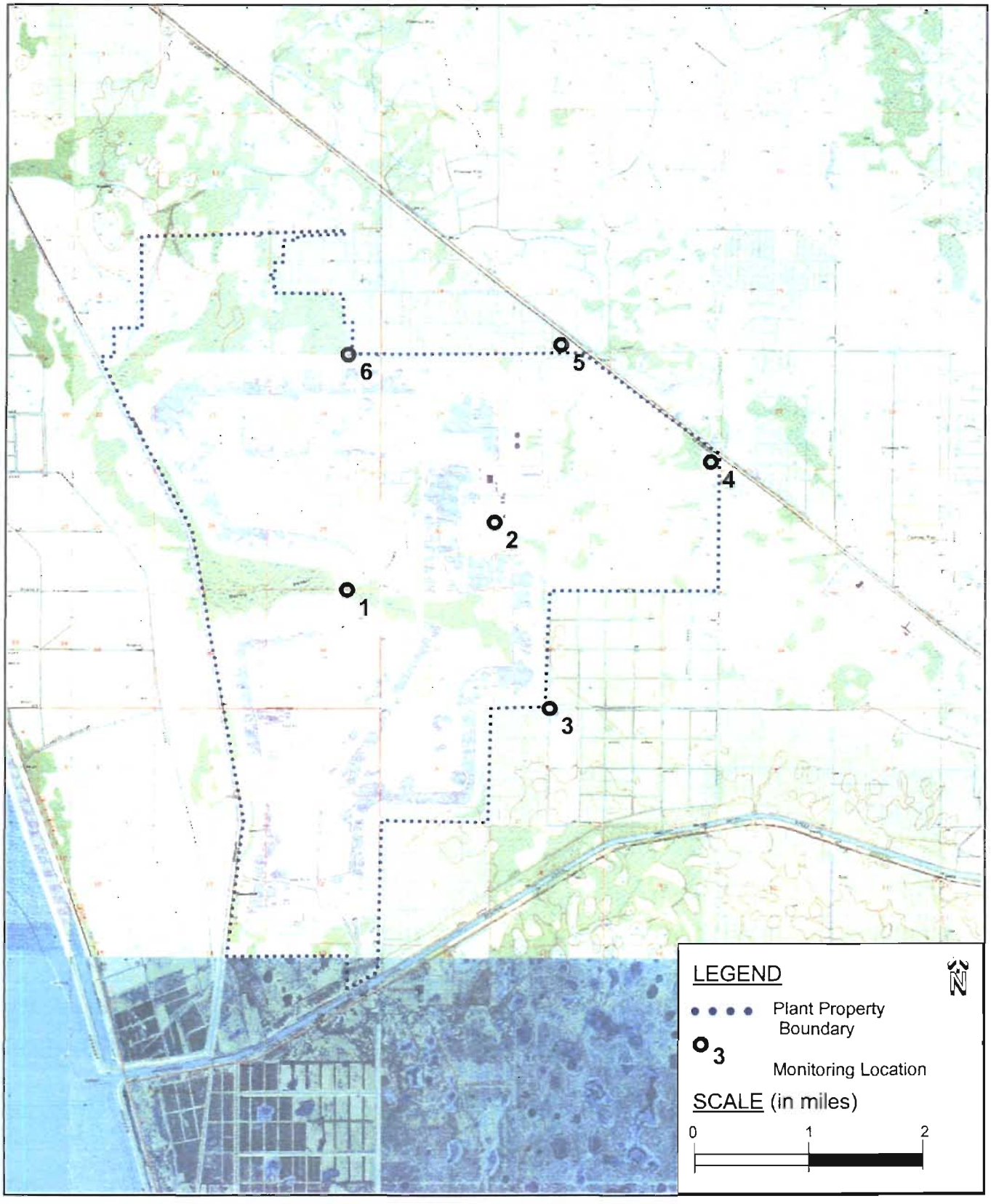
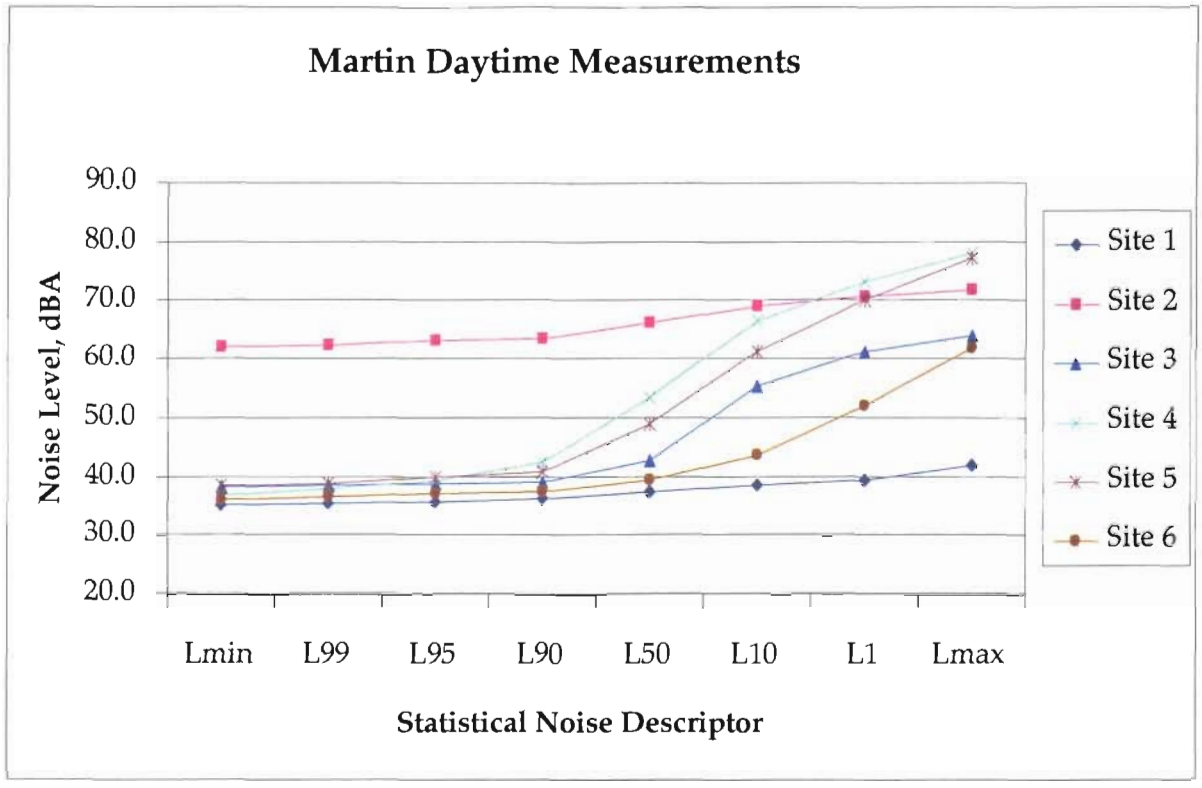


Figure 2.3-11. Noise Monitoring Sites

Source: DeLorme, 1999; Golder, 2002.

FPL

Martin Unit 8



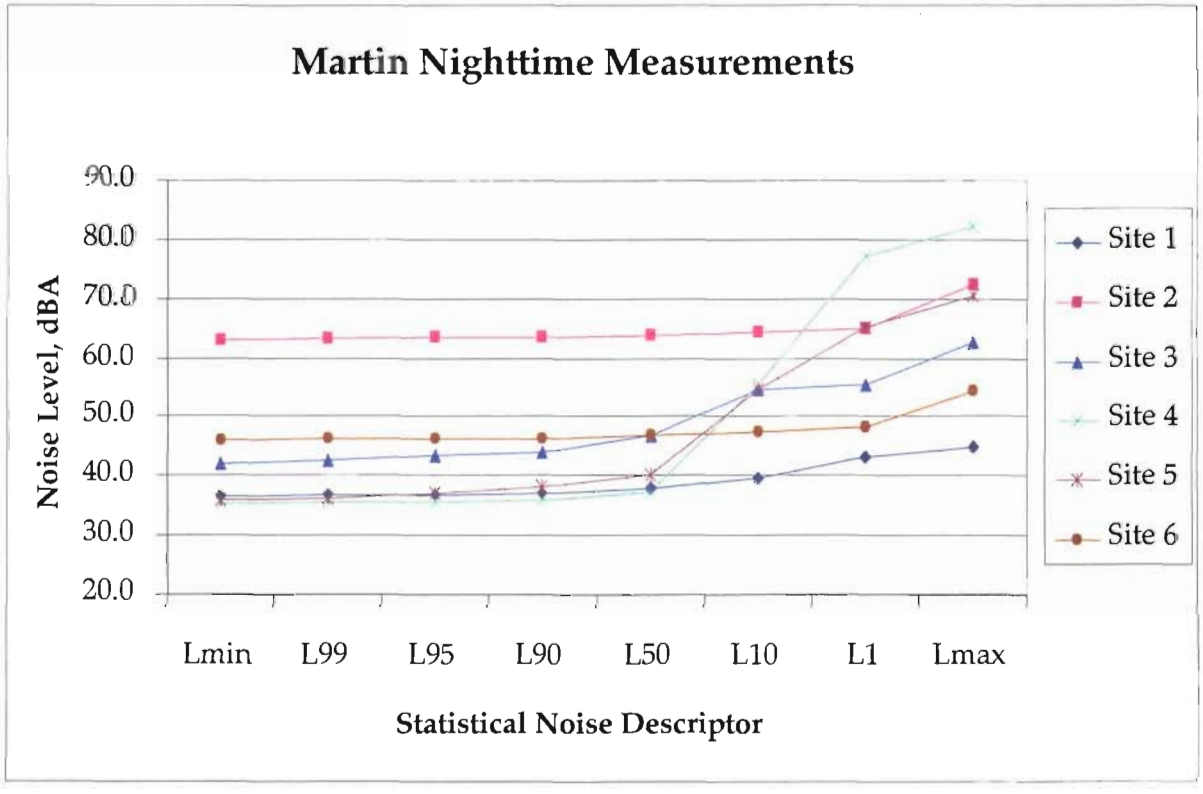


Figure 2.3-12. Observed Sound Pressure Levels for the Martin Plant Site

Source: Golder, 2002.

FPL

Martin Unit 8

3.0 THE PLANT AND DIRECTLY ASSOCIATED FACILITIES

3.1 BACKGROUND

This chapter provides a description of the Martin Expansion Project, including the overall site layout, key components of the facility and their operation, and proposed controls for air emissions and water discharges. Fuel specifications are provided for pipeline natural gas and light oil. Estimates of the expected character, quality, and quantity of discharges and emissions from the Project are provided.

The Martin Plant is an existing generating facility originally constructed in the mid to late 1970s, with the commercial in-service for Units 1 and 2 in December 1980 and June 1981, respectively. Unit 3 and Unit 4 were constructed in the early 1990s with commercial in-service of February and April 1994, respectively. The commercial in-service date for Units 8A and 8B was June 2001. The plant consists of the following units:

- Unit 1 – 800 MW (nominal capacity)
  - Steam electric generating unit firing residual oil and natural gas
- Unit 2 – 800 MW (nominal capacity)
  - Steam electric generating unit firing residual oil and natural gas
- Unit 3 - 500 MW (nominal capacity)
  - Combined cycle generating unit firing natural gas with light oil capability
- Unit 4 - 500 MW (nominal capacity)
  - Combined cycle generating unit firing natural gas with light oil capability
- Unit 8A – 170 MW (nominal capacity)
  - Simple cycle generating unit firing natural gas and light oil
- Unit 8B – 170 MW (nominal capacity)
  - Simple cycle generating unit firing natural gas and light oil

Location of the new combined cycle Unit 8 at the existing Martin Plant site, and selection of the combined cycle technology, will maximize the beneficial use of the site while minimizing environmental, land use, and cost impacts otherwise associated with development of a nominal 1,150-MW power plant. The Project will utilize a number of existing facilities, while increasing the generating capacity of the site without increasing the overall size of the site.

The Project involves converting the existing Units 8A and 8B CTs from simple cycle to combined cycle and the construction of two new CTs designated 8C and 8D. By utilizing the otherwise wasted heat from the CTs in four new HRSGs, the resulting combined cycle unit will be more efficient than the existing simple cycle CTs.

Unit 8 will consist of four nominal 170-MW GE "F" Class advanced CTs, with dry low nitrogen oxide (NO_x) combustors and four HRSG, which will utilize the waste heat from the CT to produce steam to be utilized in a new steam turbine generator. The configuration is referred to as 4 on 1 combined cycle unit. Unit 8 (Figure 3.1-1) will have a total nominal generating capacity of 1,150 MW (net) firing gas at an annual average ambient condition of 75 °F and 60-percent relative humidity. Duct burners are also proposed for each HRSG and are fired during peak demand periods to achieve the total nominal generating capacity. Duct firing will be limited to an equivalent of 2,880 hours per CT per year at the maximum firing rate.

Each CT unit will utilize inlet air evaporative cooling. Direct inlet fogging systems achieve adiabatic cooling using water to form fine droplets (fog). The fog droplets are produced by injection grids placed in the turbine inlet duct that use nozzles producing a fine spray. Because the continuous production of fine spray is essential to the process, demineralized water is utilized to avoid plugging due to scaling of the specially designed nozzles. The fog droplets (about 10 to 20 microns) extract the latent heat of vaporization from the gas stream when the water droplet is converted to gas. Heat is removed at a rate of 1,075 British thermal units per pound (Btu/lb) of water. The result of the fogging is a cooler more moisture-laden air stream. This allows additional power to be produced more efficiently. For the GE Frame 7FA CT, an 8°F average decrease in temperature would result in a 3.0 percent increase in power and an associated 1.2 percent decrease in heat rate. Thus, while power increases, the production of power is more efficient with concomitant lower emissions per MW-hr generated.

Each CT will also utilize power augmentation. Steam from the HRSG can be injected into the compressor discharge casing of each CT during periods of peak demand to increase net output with power augmentation and turbine inlet temperature of 95°F. Power augmentation will be limited to 400 hours per CT per year. Each CT will also be capable of operation in "peak" mode. In peak

mode, the firing temperature of the turbine is increased resulting in increased power. Power augmentation and peak mode together are referred to as higher power mode.

The CTs will use natural gas as the primary fuel with light oil used as an alternative fuel. The HRSG duct burners will fire natural gas only. Gas will be transported to the Project through existing or new pipeline, and light oil will be trucked to the site. When firing natural gas, NO_x emissions will be controlled using dry-low NO_x (DLN) combustion technology in simple cycle operation and DLN and selective catalytic reduction (SCR) in combined cycle operation. Demineralized water is utilized during firing of light oil to reduce the combustion temperature and the generation of NO_x emissions from the combustion turbine. Water injection and SCR will be used to reduce NO_x emissions during combined cycle operation when firing light oil.

Primary water uses for the Project will be for condenser cooling, combustion turbine inlet foggers, NO_x injection water, steam cycle makeup and service water.

Condenser cooling for the steam cycle portion of Unit 8 will be accomplished by the cooling pond or a cooling tower. Service and process water for the Project will come from the cooling pond. Make up to the pond will continue to come from the St. Lucie Canal.

Other onsite facilities to be constructed as part of the Project will include interconnections with existing infrastructure.

Air emissions control will consist of state-of-the-art dry low-NO_x combustors and SCR when firing natural gas. The dry low-NO_x combustor designed for the GE 7F CTs pre-mixes natural gas with air to achieve low NO_x emission levels. When firing light oil, demineralized water injection and SCR will be used to limit emissions. These design alternatives maximize control of air emissions while balancing economic, environmental, and energy impacts [see Section 3.4 for a description of the Control Technology and a summary of best available control technology (BACT)].

The facility has been designed to minimize direct discharge to surface waters. Non-contact stormwater runoff will be collected and routed to a stormwater detention pond, which has been designed to meet SFWMD requirements (see Section 3.8 and Appendix 10.6). All wastewaters,

including process water pretreatment backwash, plant and equipment drains, and neutralization unit effluent, will be treated as appropriate and recycled to the existing cooling pond.

The Project will connect to the existing onsite system substation via a new tie line. Additional bays will be added to the existing system substation to accommodate the new interconnection to FPL's electric transmission system.

3.2 SITE LAYOUT

The Project will be located south of the existing Units 3 and 4 on the existing 11,300-acre Martin Plant site. Figure 3.2-1 presents the boundary of the Project area, which comprises approximately 110 acres. Figure 3.2-2 presents an overall site arrangement. A profile of the facilities is shown in Figure 3.2-3. The new CTs and associated HRSGs will be located adjacent to existing simple cycle CTs (Units 8A and 8B). This area has already been affected by existing uses at the plant. Within the Project area, approximately 44 acres will be utilized for temporary and permanent facilities with 15.5 acres for the power plant and 28.4 acres for construction (laydown, parking, and construction trailers).

No additional point source water discharges will be associated with the Project. Site non-contact stormwater runoff will continue to be released to surface waters from the site runoff detention pond (see Figure 3.2-4). Such discharges will still be infrequent. Contact stormwater is treated and recycled to the cooling pond.

In combined cycle mode exhaust gases will be emitted from a stack associated with each HRSG unit. In simple cycle mode exhaust gases will be emitted from either a bypass stack associated with each CT (if constructed) or the HRSG stack (see Figure 3.2-3).

3.3 FUEL

The primary fuel used by the CTs and the HRSG duct firing will be natural gas, delivered to the plant by pipeline. Typical properties of pipeline-grade natural gas are shown in Table 3.3-1. The heat content is typically 20,835 Btu/lb [lower heating value (LHV)] with a sulfur content of 2 grains per 100 standard cubic feet (gr/100 scf) of gas.

Light oil may be used for an equivalent of 500 hours/year per CT at baseload conditions. Typical properties of light oil are shown in Table 3.3-2. The heat content is typically 18,367 Btu/lb (LHV) with a maximum sulfur content of 0.05 percent by weight.

No onsite storage will be provided for natural gas. Light oil will be stored in the existing 2 million gallon tank and in a 2-million-gallon tank authorized in the 1991 certification for Units 3 and 4 but not constructed. Construction of this new 2-million-gallon tank was also authorized by the air construction permit for Units 3 and 4.

The generating capacity of a combined cycle plant is affected by ambient temperature, with increased temperature resulting in less efficient electric production. Greater overall fuel consumption will occur at lower ambient temperatures. For the purpose of calculating maximum hourly fuel use quantities, the following operating conditions for the CTs were used:

1. 35°F dry-bulb turbine inlet temperature,
2. 60 percent relative humidity,
3. 45 feet above mean sea level (ft-msl)] elevation, and
4. 20,835 Btu/lb heating value (LHV) of natural gas and 18,367 Btu/lb heating value (LHV) for light oil.

At these conditions, the maximum heat input is 1,674 million (MM) Btu/hr (LHV) for each CT when firing natural gas (100-percent capacity, 35°F). The corresponding maximum fuel usage is about 80,300 pounds per hour (lb/hr) or about 1,857 million cubic feet per hour (MMcf/hr) of natural gas for each CT. Annual fuel usage at 59°F turbine inlet temperature would be 2,691 billion pounds per year (lb/yr) or 5.9 x 10^{10} cubic feet per year (yr^3) of natural gas for the Project. The duct burners associated with each HRSG will have a maximum firing rate of 550 MMBtu/hr high heating value (HHV) or 495.5 MMBtu/hr (LHV). The maximum annual fuel usage for the duct burners is based on 2,880 hours/year at this heat input. The maximum potential annual fuel usage for the duct burners is calculated to be 274 million lb/year or 6 billion scf/year. Light oil will be limited to 500 hours per year per CT at full load. This is equivalent to a maximum fuel use of about 13,900 gallons/hour/CT at 59°F turbine inlet and an annual usage of 27.9 million gallons for the four CTs. The existing CTs (Units 8A and 8B) are connected onsite with an existing 20-inch natural gas lateral constructed to the

site. Unit 8 will be connected to this lateral or to a new pipeline that may serve the site. Light oil will be delivered to the site by truck.

3.4 AIR EMISSIONS CONTROLS

3.4.1 AIR EMISSIONS TYPES AND SOURCES

Air pollutants will be emitted from the CT/HRSGs when firing natural gas and light oil.

Air emissions result from either the combustion process itself or impurities in the fuel. Table 3.4-1 presents the maximum estimated emission rates of regulated pollutants for each CT/HRSG stack. The maximum estimated emission rates were determined using the manufacturer's information for the equipment proposed for the Project. The design parameters were provided for operating loads of 100 percent (baseload), 75 percent, and 50 percent capacity and for ambient temperatures of 35°F, 59°F, 75°F, and 95°F. Annual emissions were based on emissions expected for baseload and ambient temperatures of 59°F. For the two new CTs, simple cycle operation was assumed for the first year of operation to be at baseload with 2,890 hours firing natural gas and 500 hours firing light oil. After the first year, simple cycle operation for the four CTs would not exceed an aggregate heat input equivalent of 4,000 hours with a maximum heat input equivalent of 2,000 hours of operation on light oil. To produce the maximum annual emissions when combined cycle operation begins, it is assumed Unit 8 would operate 1,000 hours/year in simple cycle mode and 7,760 hours/year in combined cycle mode. In combined cycle mode, the 7,760 hours firing natural gas included 2,880 hours with maximum duct firing of 550 MMBtu/hr and 400 hours power augmentation or peak firing with duct firing. The 1,000 hours of simple cycle operation assumed 500 hours of gas firing and 500 hours of oil firing. The potential emissions are based on the 59°F turbine inlet temperature at 100-percent load condition since it represents a conservative average when the annual average temperatures are slightly higher than 70°F. The air permit and PSD application (see Appendix 10.1.5) presents the basis for the emission rates and maximum annual emissions of regulated and nonregulated pollutants.

During combustion, two primary types of NO_x are formed: fuel NO_x and thermal NO_x. Fuel NO_x emissions are formed through the oxidation of a portion of the nitrogen contained in the fuel. Thermal NO_x emissions are generated through the oxidation of a portion of the nitrogen contained in the combustion air. NO_x formation can be limited by lowering combustion temperatures (through

water or steam injection) and/or staging combustion (a reducing atmosphere followed by an oxidizing atmosphere, known as dry NO_x control).

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

Emissions of NO_x for Martin Unit 8 are proposed at concentrations of 2.5 parts per million-dry conditions (ppmvd), corrected to 15 percent oxygen (O_2) when firing natural gas and 12 ppmvd corrected to 15 percent O_2 when firing light oil.

Emission rates for CO were established by the level of NO_x control, since dry low NO_x combustors will be used. Maximum CO emission rates for Unit 8 when firing natural gas would be 9 ppmvd at baseload operation, 24.5 ppmvd when duct firing, and 29.5 ppmvd when in power augmentation or peak mode. When firing light oil, the CO emissions would be 20 ppmvd at baseload operation.

Maximum SO_2 emission rates are dictated by the amount of sulfur in the fuel.

3.4.2 AIR EMISSION CONTROLS

The use of clean fuel, i.e. natural gas, and combustion controls will minimize air emissions and ensure compliance with applicable emission-limiting standards. Using clean fuels will minimize emissions of SO_2, PM/PM_{10}, and other fuel-bound contaminants. Combustion controls will minimize the formation of NO_x and the formation of CO and VOCs by combustor design. Further NO_x reduction will be achieved by SCR at the Martin site. The combination of these techniques are proposed for this Project and have been determined to be BACT on previous projects based on an evaluation of economic, energy, and environmental impacts. The following subsection presents a summary of the Air Pollution Control Technology and BACT analysis, which is presented in full in the Air/PSD permit application in Appendix 10.1.5.

3.4.3 CONTROL TECHNOLOGY DESCRIPTION AND BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

BACT review is required under FDEP rules and EPA regulations pertaining to PSD. Federal regulations are codified in 40 Code of Federal Regulations (CFR) Part 52.21, and FDEP has adopted PSD regulations in FAC 62-212.400. The BACT review is part of the evaluation of control technology under the Florida PSD rules. BACT is applicable to all pollutants for which PSD review is required and is pollutant-specific. It is an emission limitation that is based on the maximum degree of reduction for each regulated pollutant which is determined to be appropriate after taking into account energy, environmental, and economic impacts and other costs. BACT cannot be any less stringent than the federal New Source Performance Standards (NSPS) applicable to the source under evaluation.

The FDEP and EPA have established a policy for BACT review in which the most stringent control alternatives are evaluated first. The alternatives are either rejected based on technological, environmental, energy, or economic reasons or are proposed as BACT. This procedure is referred as the "top-down" approach. For the Project, BACT is applicable for emissions of particulate matter, sulfur dioxide, nitrogen oxides, carbon monoxide, volatile organic compounds and sulfuric acid mist.

The applicable NSPS for the Project are those promulgated by EPA for stationary gas turbines. These NSPS (40 CFR Part 60, Subpart GG) establish emission-limiting standards for NO_x and SO_2. The applicable NSPS are:

- NO_x 75 ppmvd corrected to 15 percent oxygen and heat rate plus adjustment to fuel-bound nitrogen
- SO_2 no more than 0.8 percent sulfur in the fuel

Appendix 10.1.5 of the Site Certification Application contains a complete PSD application. Section 3.0 presents the regulatory applicability for the Project. Section 4.0 of that application contains the BACT evaluation for this Project and addresses those pollutants for which BACT is applicable. It includes a discussion of the environmental, economic, and energy aspects of alternative control techniques and methods. The remainder of this section briefly describes those control technologies that are proposed for the Project. For further details, refer to Section 4.0 in Appendix 10.1.5.

3.4.3.1 Nitrogen Oxides

DLN combustor technology has recently been offered and installed by CT manufacturers to reduce NO_x emissions by inhibiting thermal NO_x formation through premixing fuel and air prior to combustion and providing pre-mix combustion to reduce flame temperatures. NO_x emissions of 9 ppmvd (corrected to 15-percent O_2) have been guaranteed by GE for new CTs firing natural gas and 42 ppmvd (corrected to 15-percent O_2) for light oil firing.

The NO_x emissions will be controlled using state-of-the-art DLN burners in the CTs when firing natural gas and water injection when firing light fuel oil. NO_x emissions will be further controlled by SCR systems when firing either natural gas or fuel oil. The dry low-NO_x combustors for the advanced machines typically have premixed fuel zones plus a standard diffusion flame pilot burner for startup. Low NO_x levels are achieved by introducing fuel primarily to the pre-mix zones and reducing the amount of fuel being combusted from the pilot nozzle. The SCR systems will be installed within the HRSGs with ammonia injected into the CT exhaust to reduce NO_x emissions. Ammonia will be stored in one 20,000-gallon tank. The SCR system is designed for approximately 73 percent reduction of flue gas NO_x emissions to 2.5 parts per million volume dry (ppmvd), corrected to 15 percent O_2 when firing natural gas and approximately 70 percent reduction to 12 ppmvd when firing fuel oil.

Selective catalytic reduction (SCR) is a post-combustion process where NO_x in the gas stream is reacted with ammonia in the presence of a catalyst to form nitrogen and water. The reaction occurs typically between 316 and 399 degrees Celsius (°C) (600 and 750°F), which limits SCR application to combined cycle units where such temperatures occur in the HRSG. Exhausts from simple cycle operation are in the range of 538°C (1,000°F), thus limiting SCR application for this mode of operation. SCR has been installed and operated on combined cycle facilities generally achieving 5 ppmvd (corrected to 15-percent O_2) or less while burning natural gas.

The recent permitting trend for combined cycle unit is the use of dry low-NO_x combustors and SCR. Based on the ability to control NO_x to low emission levels, an emission level of 2.5 ppmvd corrected to 15-percent oxygen is proposed for Unit 8 when firing natural gas and is equal to or lower than BACT determinations made in EPA Region IV.

3.4.3.2 Carbon Monoxide

The proposed BACT emission rates for CO are 9 ppmvd when firing natural gas and 20 ppmvd when firing light oil. The maximum emission rate proposed as BACT is 24.5 ppmvd when duct firing and 29.5 ppmvd for power augmentation or peak mode. The CTs would utilize advanced combustion technology and are consistent with those established as BACT.

3.4.3.3 Sulfur Oxides (SO_2 and H_2SO_4 Mist)

Post-combustion controls comprise various wet and dry flue gas desulfurization (FGD) processes. However, FGD alternatives are not feasible for use on CT facilities due to high-pressure drops across the control device. The only feasible control for combined cycle facilities are clean fuels, i.e., natural gas and very low-sulfur light oil. The light oil from both units will be limited to 0.05 percent. Additionally, sulfuric acid mist production will be limited by fuel selection as previously described.

3.4.3.4 Particulate Matter and Other Regulated Pollutants

Post-combustion alternatives such as baghouses, scrubbers, and electrostatic precipitators are not feasible due to the high pressure drops associated with the units and the small amount of PM reduction which would occur since the CT PM emissions are minimal (i.e., these emissions are already lower than most baghouses emit). Clean-burning fuels that have low PM and trace contaminant contents are being proposed as BACT.

Emissions of other pollutants are expected to be minimal and require no additional control technology. Therefore, analysis of alternative emission controls for these other pollutants is not necessary.

3.4.4 DESIGN DATA FOR CONTROL EQUIPMENT

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

3.4.5 DESIGN PHILOSOPHY

The Project minimizes air pollutant emissions by using the most efficient and pollutant-preventing generating technology. This concept has been incorporated with the selection of a combined cycle process utilizing advanced CTs. Combined cycle plants can be expected to achieve fuel conversion

rates on the order of 7,000 Btu/kilowatt hours (kWh), as opposed to values in the 9,000 to 10,000 Btu/kWh range for more conventional generating plants. This is an improvement of about 25 percent. Thus, by maximizing the megawatt output per unit of fuel consumed, the air pollutant emissions per megawatt output are minimized. The selection of the most efficient CTs (the advanced type) also minimizes emissions with respect to power output. Pollution prevention is incorporated in the design by the use of clean fuels and combustion technology. Natural gas and very low sulfur content light oil will be used. Moreover, advanced dry low-NO_x combustion technology will be used to minimize NO_x emissions while ensuring that CO and VOC emissions are within accepted limits. SCR will be installed to further reduce NO_x emissions. Taken together, the design of Project will incorporate features that will make the Project one of the most efficient and low polluting power plants in the State of Florida.

3.5 PLANT WATER USE

The source of water for Unit 8 will be the existing Martin cooling pond. Makeup to the pond is ultimately from Lake Okeechobee via the existing makeup water pumping station, which withdraws from the St. Lucie Canal. This water will be pumped into the existing cooling pond, from which it will subsequently be withdrawn for uses including condenser cooling, general plant service water, fire protection water, and demineralized water. The largest consumptive use will be to replace net evaporation from the cooling pond.

Process water uses will include demineralized water use in the combustion turbine inlet fogger system, NO_x injection system (for light oil firing), combustion turbine power augmentation, and HRSG steam cycle makeup; and general service water use for washdowns. Any small increase in potable water use resulting from Unit 8 is well within the existing permitted quantity.

Consumptive surface water use for the entire Martin Plant will not exceed the present permitted values (in acre-feet per year):

Average Annual Use	-	32,000
Maximum Annual Use	-	50,000

FPL has narrowed the a choice of a Circulating Water Heat Rejection System for Unit 8 to two Alternatives:

1. Addition of Unit 8 rejected heat to the existing cooling pond, or
2. Dissipation of Unit 8 rejected heat through the use of a closed-cycle wet mechanical-draft cooling tower.

The overall plant water management plan is presented schematically in Figure 3.5-1 for Alternative 1, and in Figure 3.5-2 for Alternative 2. The water quality of the source water is described in Section 2.3.4. The following sections (3.5.1 through 3.5.4) provide more detailed descriptions of plant water uses.

3.5.1 CIRCULATING WATER HEAT REJECTION SYSTEM

3.5.1.1 Alternative 1 – Cooling Pond

The quantities of heat rejected to the cooling pond, at 100 percent load, are estimated to be:

Units 1 & 2	8.2 Billion Btu per hour
Units 3 & 4	2.0 Billion Btu per hour
Unit 8	2.3 Billion Btu per hour

The Unit 8 circulating water system will entail expansion of the existing Unit 3 and 4 circulating water system structures and installation of circulating water pumps and underground piping. In addition to the condenser for the steam turbine, an auxiliary cooling water system for equipment cooling will be installed. This system will consist of water-to-water heat exchangers and will receive cooling water from the Unit 8 circulating water system.

Mathematical modeling of the thermal performance of the cooling pond was performed during the permitting of the CG/CC Project as described in the SCA for that project. That modeling predicted pond performance in response to a wide range of potential heat loadings. The conclusions from that modeling were applied to the heat loads expected for Alternative 1, based on expected operation of all the generating units. The result is the following quantities:

	Average Annual	Maximum Annual
Net Pond Evaporation	29,079 acre-feet	41,861 acre-feet
Process Use	2,050 acre-feet	3,251 acre-feet
Water Recycled to the Pond	-1,407 acre-feet	-3,488 acre-feet
Consumptive Use Makeup	29,722 acre-feet	42,503 acre-feet
Permitted Consumptive Use	32,000 acre-feet	50,000 acre-feet

3.5.1.2 Alternative 2 – Mechanical Draft Cooling Tower

Alternative 2 consists of constructing a wet mechanical draft cooling tower within the power block island to reject the Unit 8 heat load of 2.3 billion Btu/hour. Heat from Units 1 through 4 would still be rejected to the cooling pond. The Application of the thermal modeling applied to Alternative 2, based on expected operation of the units, results in the following quantities:

	Average Annual	Maximum Annual
Net Pond Evaporation	24,418 acre-feet	37,216 acre-feet
Cooling Tower Evaporation	5,512 acre-feet	5,991 acre-feet
Process Water Use	2,050 acre-feet	3,251 acre-feet
Water Recycled to the Pond	-2,786 acre-feet	-3,448 acre-feet
Consumptive Use Makeup	30,572 acre-feet	43,370 acre-feet
Permitted Consumptive Use	32,000 acre-feet	50,000 acre-feet

3.5.2 DOMESTIC/SANITARY WASTEWATER

Additional domestic/sanitary wastewater generated by Unit 8 will be handled by the existing system.

3.5.3 POTABLE WATER SYSTEMS

Potable water uses at Unit 8 will not cause the facility to exceed existing permitted values. Potable water use will be limited by using bottled water for drinking purposes and by use of portable safety shower/eyewash stations.

3.5.4 PROCESS WATER SYSTEMS

The existing reverse osmosis (RO)/mixed bed (MB) demineralizer system used for process water treatment may be upgraded for Unit 8; however, such an upgrade would not expand the area occupied by this equipment.

3.5.4.1 Demineralized Water

The second largest water use for the Project will be the production of demineralized water (i.e., conductivity < 0.1 μS/cm). Demineralized water is required for:

- Makeup to replace blowdown from the HRSG (necessary to maintain a low dissolved solids content in the HRSG);
- Makeup to replace miscellaneous steam losses in the steam cycle;
- Injection into the CTs for NO_x control;
- CT air inlet fogger cooling system feed; and
- CT power augmentation.

Raw water from the existing Martin cooling pond will be pretreated and used as service water. The service water system, among other uses, will feed the RO/MB train. The MBs will be periodically regenerated with solutions of sulfuric acid and sodium hydroxide. The resulting regenerant waste streams and the RO reject will be treated by existing plant systems for recycle to the cooling pond.

3.5.4.2 General Service Water

General service water uses, including seal water, cleaning and flushing water, and fire protection water, will be provided by the service water system.

3.6 CHEMICAL AND BIOCIDE WASTE

Unit 8 will utilize the upgraded process water treatment system and existing associated wastewater treatment systems. The only new wastewaters generated by Unit 8 will be HRSG blowdown and equipment area storm and wash waters. HRSG blowdown will be quenched with service water and recycled to the cooling pond. Equipment area storm and wash waters will be passed through an oil/water separator and then recycled to the cooling pond.

The principal uses of chemicals and biocides will be for steam cycle water quality control, chemical cleaning of the boiler and preboiler piping systems, and miscellaneous chemical drains.

3.6.1 COOLING SYSTEM WATER CHEMICAL TREATMENT

Intermittent shock chlorination or other oxidizing or nonoxidizing biocides will be used to prevent biofouling of the heat rejection system. A chlorine solution will be fed into the intake structure for the heat rejection system, as appropriate for the Project's configuration.

If a cooling tower is used, a scale inhibitor will be fed to the circulating water system to control the formation of calcium carbonate scales. These scales can adhere to heat transfer surfaces and impair cooling condenser performance. Sulfuric acid will be added to the circulating water system to reduce alkalinity in the circulating water makeup, thus reducing the likelihood of scale formation. In addition, a polymer may be added to the circulating water system to help hold suspended solids in suspension.

3.6.2 STEAM CYCLE WATER TREATMENT

The steam-condensate-feedwater cycle will be chemically treated to prevent corrosion or scaling of the condensate piping and the HRSG preboiler piping and boiler drums. The steam cycle water will be treated with an oxygen scavenger, such as hydrazine, for dissolved oxygen control and with ammonia or an amine for pH control. Sodium phosphate will be fed to the boiler for control of pH and hardness. Residual phosphate in the boiler will react with hardness to form a nonadherent precipitate that can be removed through boiler blowdown.

3.6.3 SANITARY WASTEWATER TREATMENT

No additional sanitary treatment systems or expansions will be required.

3.6.4 MAKEUP WATER DEMINERALIZATION

As discussed in Section 3.5.4, the makeup water to the steam cycle will be demineralized using the existing plant RO/MB type demineralizer train. The existing treatment equipment will be upgraded as necessary to reliably deliver the design flow rate. The resulting regenerant waste streams and the RO reject will be treated by existing plant systems for recycle to the cooling pond.

3.6.5 CHEMICAL CLEANING

The HRSG boiler and preboiler piping will be chemically cleaned initially during commissioning and also periodically during the life of the plant. The chemicals used will not be permanently stored onsite but will be delivered to the site by a licensed contractor at the time of the scheduled periodic cleanings. The chemical cleaning solutions to be used for acid and alkaline cleaning of the HRSG will be dependent on the HRSG manufacturer selected. The actual cleaning solutions used must be consistent with the HRSG manufacturer's recommendations. Chemicals typically used in HRSG and feed water pipe cleaning include the following:

1. Inhibited citric acid,
2. Aqueous ammonia,
3. Organic chelates, such as EDTA,
4. Disodium phosphate,
5. Trisodium phosphate,
6. Nonfoaming wetting agents, and
7. Foam inhibitors.

Wastewaters will consist of the cleaning solutions and material removed during the cleaning process. The chemical cleaning contractor will dispose of the chemical cleaning wastes offsite.

Since chemical cleaning is an infrequent maintenance operation, it does not contribute to the liquid wastes produced by the normal operation of the plant.

3.6.6 MISCELLANEOUS CHEMICAL DRAINS

Chemical wastewater can result from draining a chemical storage tank or from cleaning and maintenance operations such as washdown of chemical storage areas. Chemical wastes will be contained and either scavenged locally or routed to the existing neutralization system for treatment. Flows from the miscellaneous chemical drains will be intermittent and will not normally contribute to the wastewater flows. Periodic off-line washes of the combustion turbines using water or a detergent-water solution will also produce chemical wastes. These wastes are collected in a local sump and pumped out by a licensed contractor for offsite disposal or routed to the wastewater system.

3.7 SOLID AND HAZARDOUS WASTE

3.7.1 SOLID WASTE

Only small quantities of solid wastes will be generated by the Project since there will be no ash or FGD waste generated. Solid wastes will be limited to municipal solid waste and infrequent replacement of inlet air filters. Periodic replacement of demineralizer resins and RO membranes will be handled by the existing plant. All municipal solid wastes will be disposed of by an approved trash disposal contractor.

3.7.2 HAZARDOUS WASTE

Generation of hazardous waste at the facility will be limited to periodic chemical cleaning of the boilers (less than 100 kilograms (kg)/month) of spent solvents and other chemicals. These wastes will be collected onsite and disposed of by a licensed hazardous waste contractor. No hazardous waste will be stored onsite for more than 90 days before removal.

3.8 SITE DRAINAGE

3.8.1 EXISTING SITE DRAINAGE

The stormwater facilities to handle the flows from the area identified as the "New Power Block" associated with the Martin CG/CC Project were designed and constructed with Units 3 and 4. This area includes the Martin Unit 8 Project Area. Facilities constructed in the "New Power Block" include Units 3 and 4, placed into service in 1994, and Units 8A and 8B, placed into service in 2001.

At this time, the "New Power Block" area includes 73.5 acres of impervious surface, 142.3 acres of pervious surface, and 9.2 acres, which are non-contributory. The stormwater system design for the "New Power Block" provides 116.6 acres of impervious area, and 99.2 acres of pervious areas (see Figure 3.2-4). Topography of this area ranges between elevation 24 and 31 ft. Due to the relatively flat gradients and limited topographic relief in the area, storm water runoff has a low velocity. It drains into the East Perimeter Ditch (see Figure 3.8-1).

3.8.2 DESIGN CRITERIA AND APPLICABLE REGULATIONS

The surface water management system for the Project has been designed to meet the requirements of the South Florida Water Management District. The design rainfall event based on a 25-year 72-hour

storm is 9.51 inches. The basic design requirement is that the peak post-construction runoff flow rate resulting from the design storm should not exceed the pre-development peak flow rate.

The project drainage system of catch basins, pipes, channels and culverts will convey runoff to the existing site drainage system of channels and ponds. A conceptual stormwater management plan and pre-existing vs. post-construction flow rate calculations for the Project are presented in Appendix 10.6.

3.8.3 STORMWATER DETENTION POND

Non-contact surface runoff from the area disturbed for the project construction and operation of Unit 8 will be collected and routed to the two existing permanent ponds, historically known as Pond No. 1 and Pond No. 2. Existing drainage patterns will be maintained in order to ensure the proper function of the stormwater system. The stormwater management system has been previously designed for full site build-out.

3.8.4 CONSTRUCTION DRAINAGE

Existing temporary Construction Pond No. 3 will be utilized during construction of the Project to prevent sediment transmission offsite. This pond will be used to collect runoff and sediment until construction of the Unit 8 is complete.

Prior to beginning any earth disturbing activities, a silt fence will be installed along the perimeter of the project where runoff to offsite areas is expected. This silt fence will filter sediments from construction runoff. During construction, the extent of earth disturbances will be minimized as much as is practical. Areas outside of cut and fill operations will be protected against unnecessary equipment traffic. Aggregate-surfaced areas will be provided for roads, while limerock surfacing will be provided for laydown and parking areas.

Temporary erosion and sedimentation control measures will be designed to prevent sediment from being displaced and carried offsite by construction runoff. Silt fences as well as inlet and outlet protection will be used at catch basins and culverts to assist in sediment control. As necessary, sediment collected during construction will be removed and disposed of onsite. All temporary sediment and erosion control measures will be removed at the end of construction.

3.8.5 OPERATIONAL SITE DRAINAGE

Additional impervious surface in the Project area is shown on Figure 3.2-4.

Generally, the drainage in the area of the facility will be directed away from the structures and routed to the stormwater detention ponds 1 and 2. The CT/HRSG area will be graded with moderate slopes for effective drainage.

Site runoff will be conveyed to the stormwater detention pond through a drainage system of pipes, channels, and culverts (see Appendix 10.6).

3.8.6 PEAK RUNOFF FLOW RATES

Based on the analysis presented in Appendix 10.6, the peak runoff rate during the pre-construction phase (prior to construction of Units 3 and 4) was about 380 cfs. The post-development peak runoff flow rate will be about 303 cfs.

3.9 MATERIALS HANDLING

3.9.1 CONSTRUCTION MATERIALS AND EQUIPMENT

Construction materials and equipment will be delivered to the site by existing roads and railroads. The existing access road will be used during construction and operation of the Project.

Materials will be unloaded and moved around the site using portable cranes and trucks. Some of the heaviest items such as the new CTs, new steam turbines, electric generators, HRSGs, and transformers may require rail delivery as discussed in Section 3.9.3. Pollution control measures for the laydown areas will include runoff collection as described in Section 3.8. Main roads in the laydown areas will be surfaced with aggregate/limerock and treated with dust palliative to reduce dust. Water sprays will also be used, as required, to control dust due to traffic.

3.9.2 ROADS

Construction trucks will travel to the Martin Plant site via SR 710 and the existing site access road. This route was used during construction of the existing units, and continues in use for operational purposes.

3.9.3 RAILROAD

A railroad branch-line currently runs near the Project location on the site. Rail deliveries of construction materials and equipment for the facility will be off-loaded at a rail siding and transported by truck to the Project area. This line can accommodate the shipments required for the Project.

Table 3.3-1. Typical Natural Gas Composition

Composition	Mole %
Nitrogen (N_2)	0.27 - 0.45
Helium (He)	0.01
Carbon Dioxide (CO_2)	0.44 - 0.88
Methane (CH_4)	96 - 97.0
Ethane (C_2H_6)	1.8 - 2.6
Propane (C_3H_8)	0.16 - 0.29
Butane (C_4H_{10})	0.011 - 0.017
Pentanes (C_5H_{12})	0.007 - 0.03
Hexanes (C_6H_{14})	0.03
Heptanes (C_7H_{16})	0.01
Octanes (C_8H_{18})	0.0
Argon, Oxygen (Ar, O_2)	0.0
Sulfur (S)	2 grains per 100 scf
Water Vapor (H_2O)	0.6 lb/MMscf

Low Heating Value (LHV) - 20,835 Btu/lb; 950 Btu/cf

High Heating Value (HHV) - 23,127 Btu/lb; 1,055 Btu/cf

Note: scf = standard cubic feet

MM = million

Table 3.3-2. Typical Light Oil Composition

Elements	Maximum
Carbon Residue	0.35 % on 10% Bottoms
Water and Sediment	0.05 %
Ash	0.01 %
Vanadium	0.5 ppm
Sodium and potassium	0.5 ppm
Lead	1 ppm
Calcium	2 ppm
Sulfur	0.05 wt. %

Low Heating Value (LHV) - 18,367 Btu/lb; 129,900 Btu/gallon

High Heating Value (HHV) - 19,469 Btu/lb; 137,694 Btu/gallon

Note: ppm = parts per million

Table 3.4-1. Summary of Maximum Potential Annual Emissions for the FPL Martin Unit 8 Combined Cycle Project

Pollutant	Annual Emissions (tons/year)							PSD Significant Emission Rate (tons/year)
	Year 1[a]			Year 2 and Future[b]				
	4 CTs Simple Cycle	4 Natural Gas Fuel Heaters	TOTAL	4 CTs/HRSGs with Duct Burners	4 Natural Gas Fuel Heaters	Cooling Tower	TOTAL	
SO_2	155	0.35	156	280	0.27	NA	280	40
PM	69.0	0.38	69	254	0.29	67.9	322	25
PM_{10}	69.0	0.38	69	254	0.29	20.4	275	15
NO_x	658	6.2	664	678	4.7	NA	683	40
CO	224	4.7	228	822	3.6	NA	826	100
VOC (as methane)	23.1	0.27	23	110	0.20	NA	110	40
Sulfuric Acid Mist	15.5	NA	15.5	30.0	Neg	NA	30.0	7
Lead	0.025	NA	0.025	0.025	NA	NA	0.025	0.6

[a] Year 1 operated only in simple cycle mode for 4 CTs with 2,890 hours firing gas and 500 hours of oil (at 100 percent load).

[b] Year 2 and Future is based on: (1) combined cycle for 7,760 hours firing gas (with 2,880 hours duct firing and 400 hours power augmentation or peak firing with duct firing); (2) simple cycle operation for 500 hours on gas and 500 hours on oil.

Note: Refer to Appendix 10.1.5 for more detail.

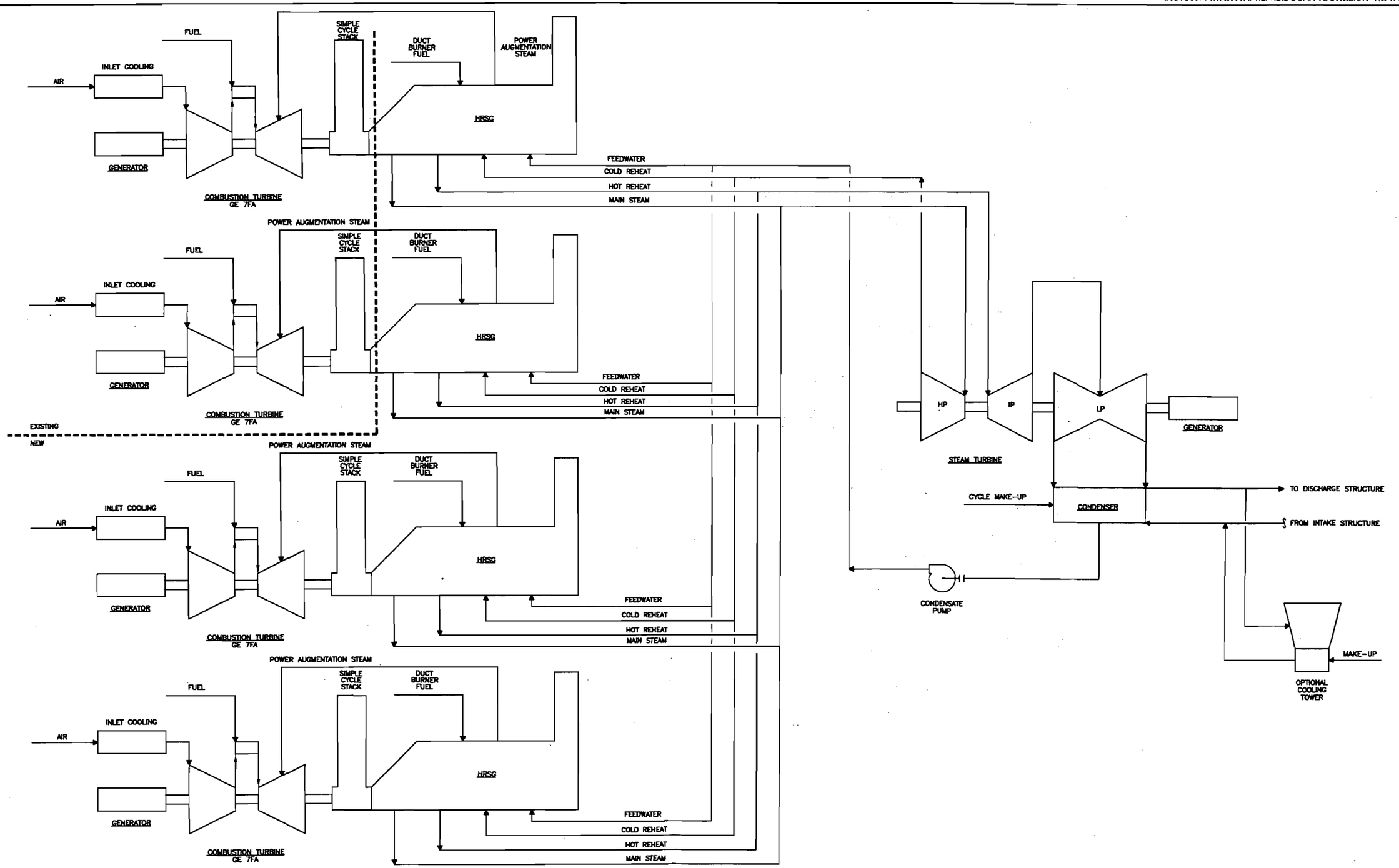


Figure 3.1-1. Combined Cycle Flow Schematic

Source: Black & Veatch, 2001; FPL, 2001; and Golder, 2001.

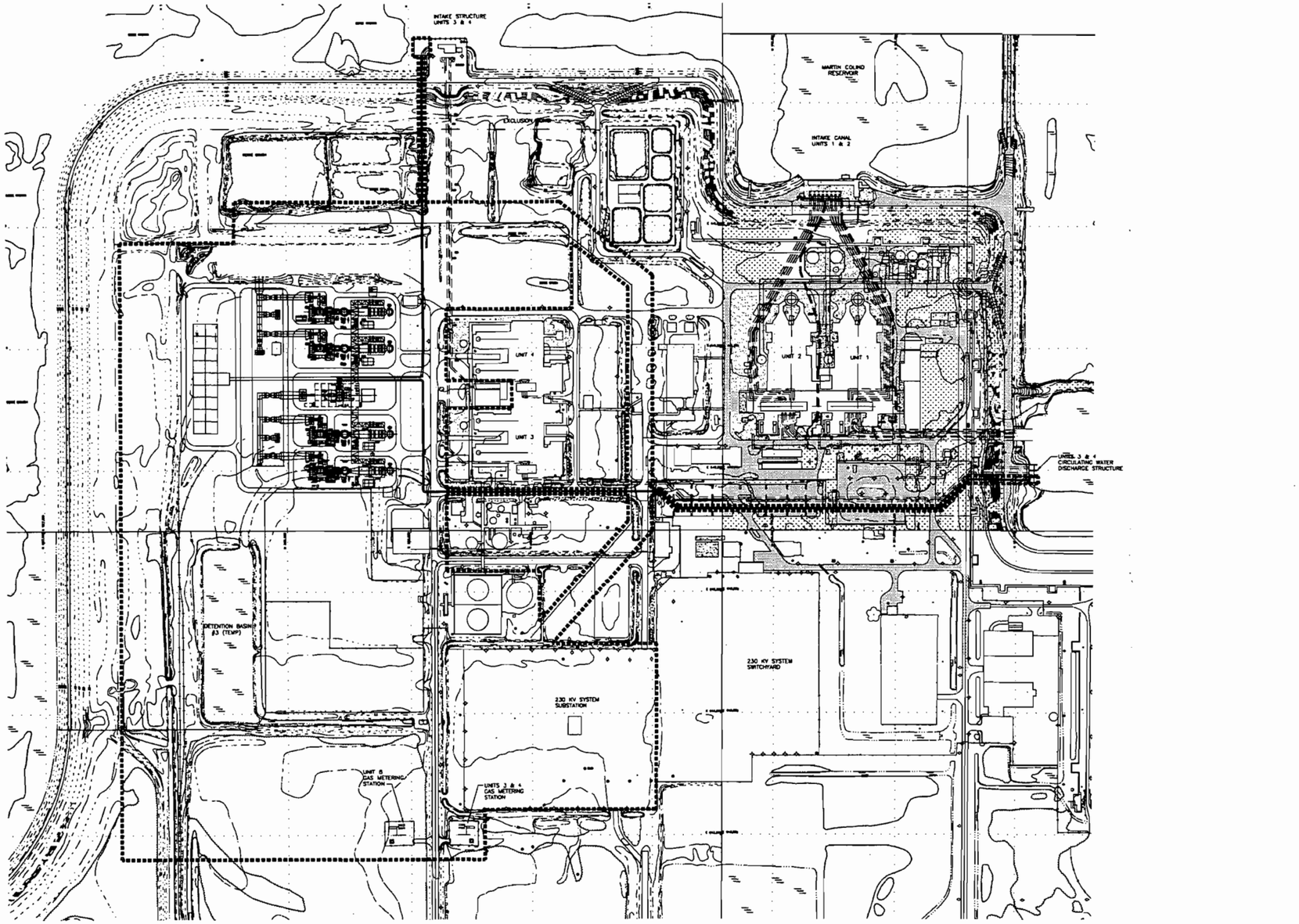


Figure 3.2-1. Project Area Boundary

Source: Black & Veatch, 2001; FPL, 2001; and Golder, 2001.

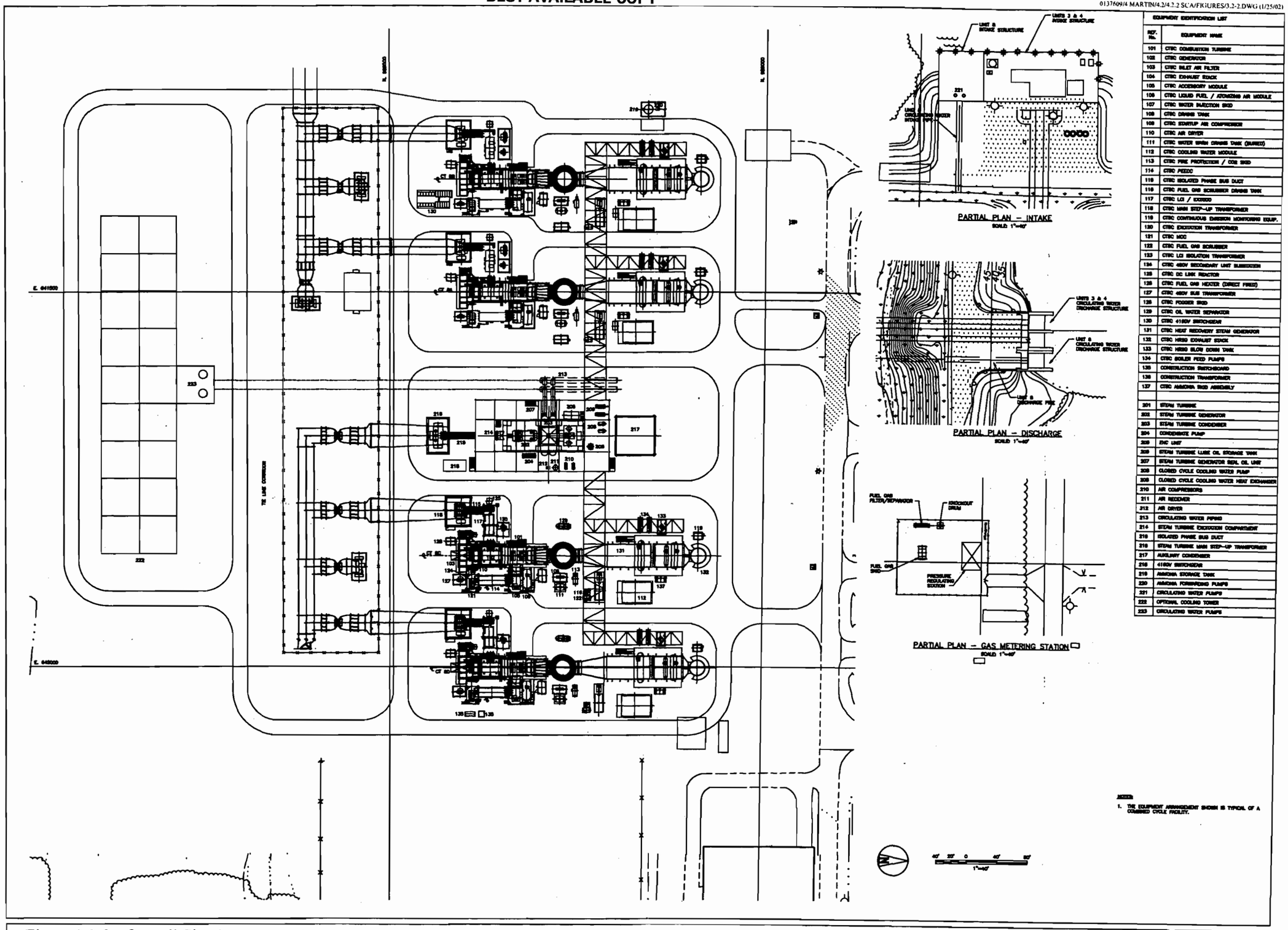


Figure 3.2-2. Overall Site Arrangement

Source: Black & Veatch, 2001; FPL, 2001; and Golder, 2001.

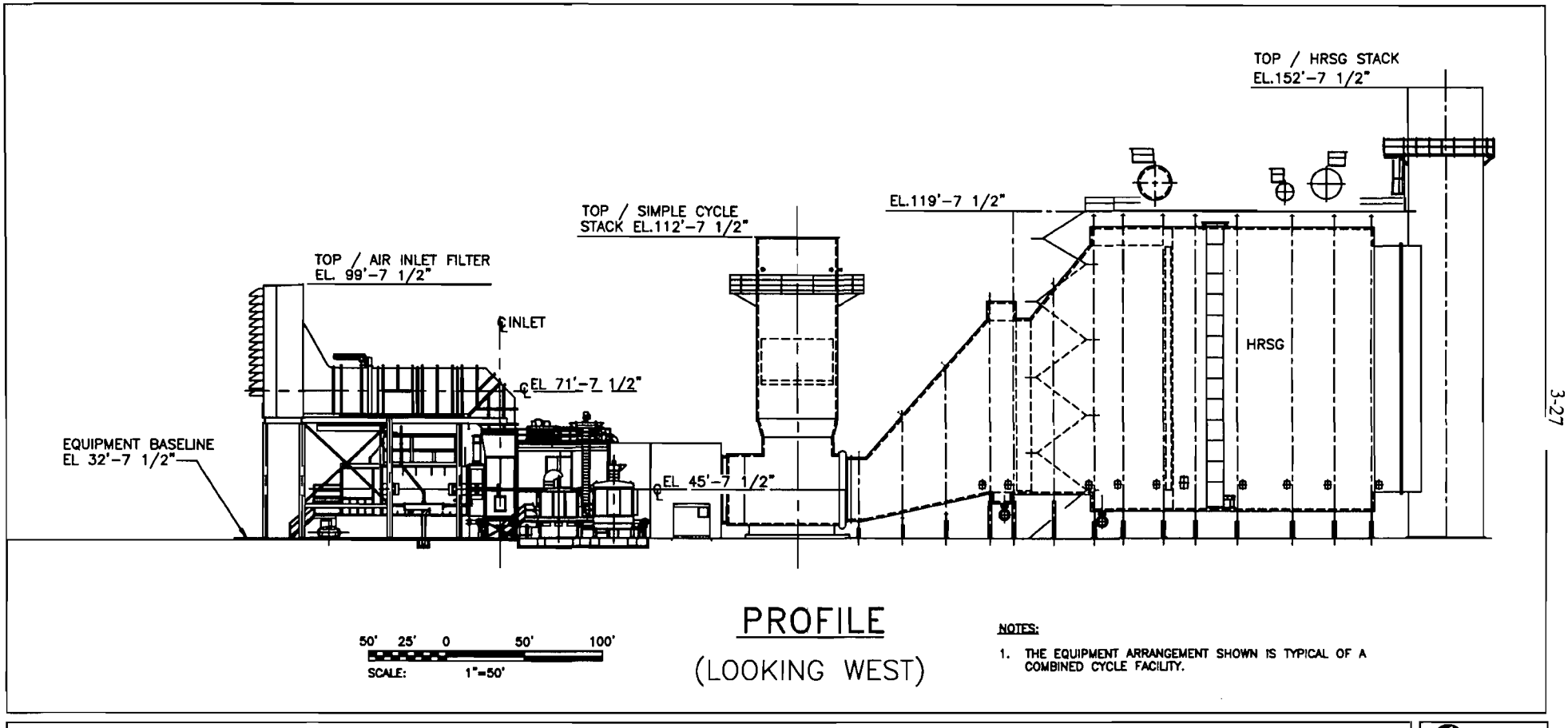
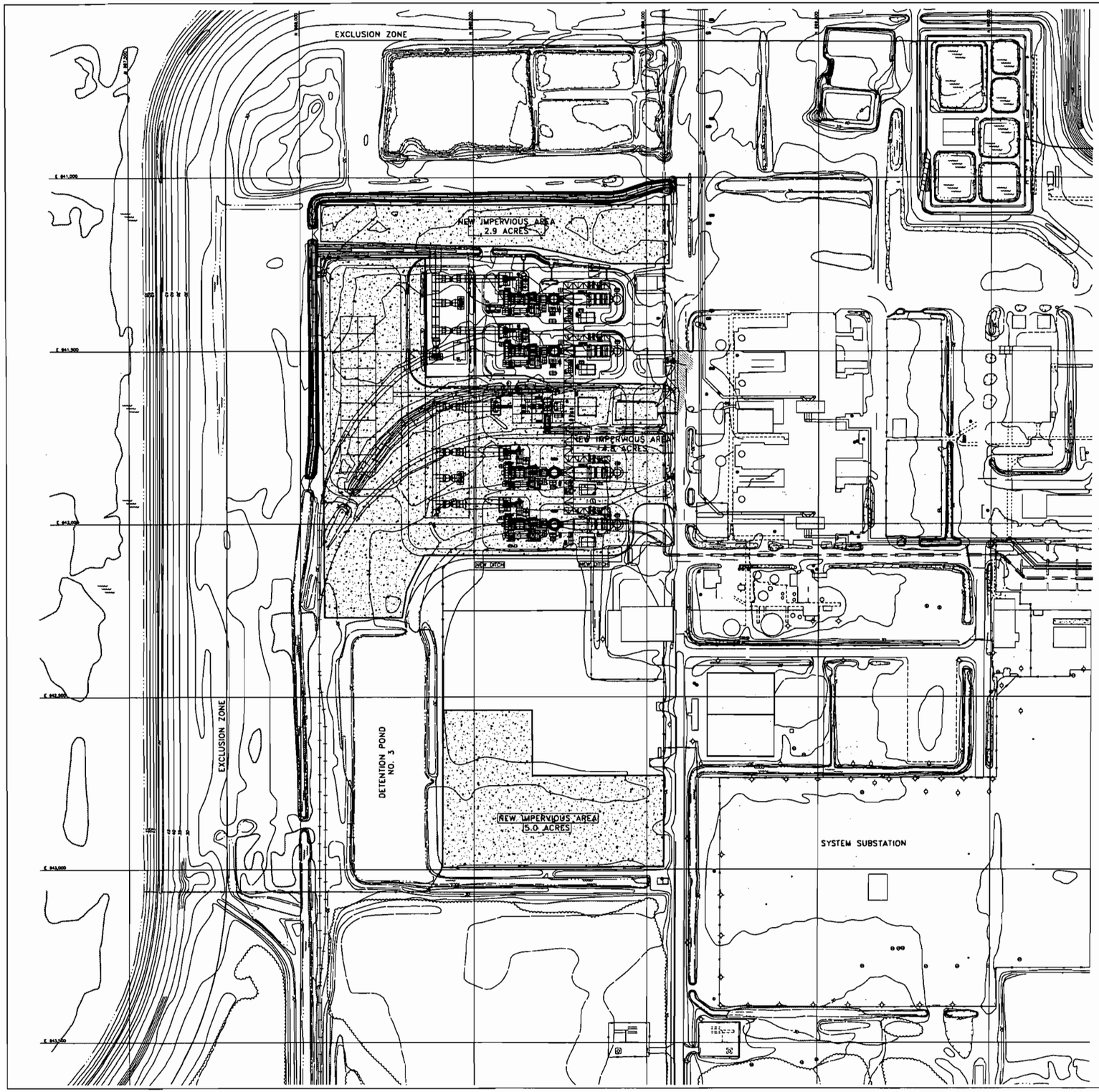


Figure 3.2-3. Profile of Combustion Turbine and heat Recovery Steam Generator

Source: Black & Veatch, 2001; FPL, 2001; and Golder, 2001.

FPL
Martin Unit 8



DRAINAGE TABLE			
	EXISTING	PROPOSED W/COMBINED CYCLE	AS PREVIOUSLY PERMITTED
IMPERVIOUS	73.5 AC	96.2 AC	116.6 AC
PERVIOUS	142.3 AC	119.6 AC	99.2 AC
TOTAL	215.8 AC	215.8 AC	215.8 AC
% IMPERVIOUS	34.06%	44.58%	54.03%

Figure 3.2-4. General Site Drainage Information

Source: Black & Veatch, 2001; FPL, 2001; and Golder, 2001.

FPL
Martin Unit 8

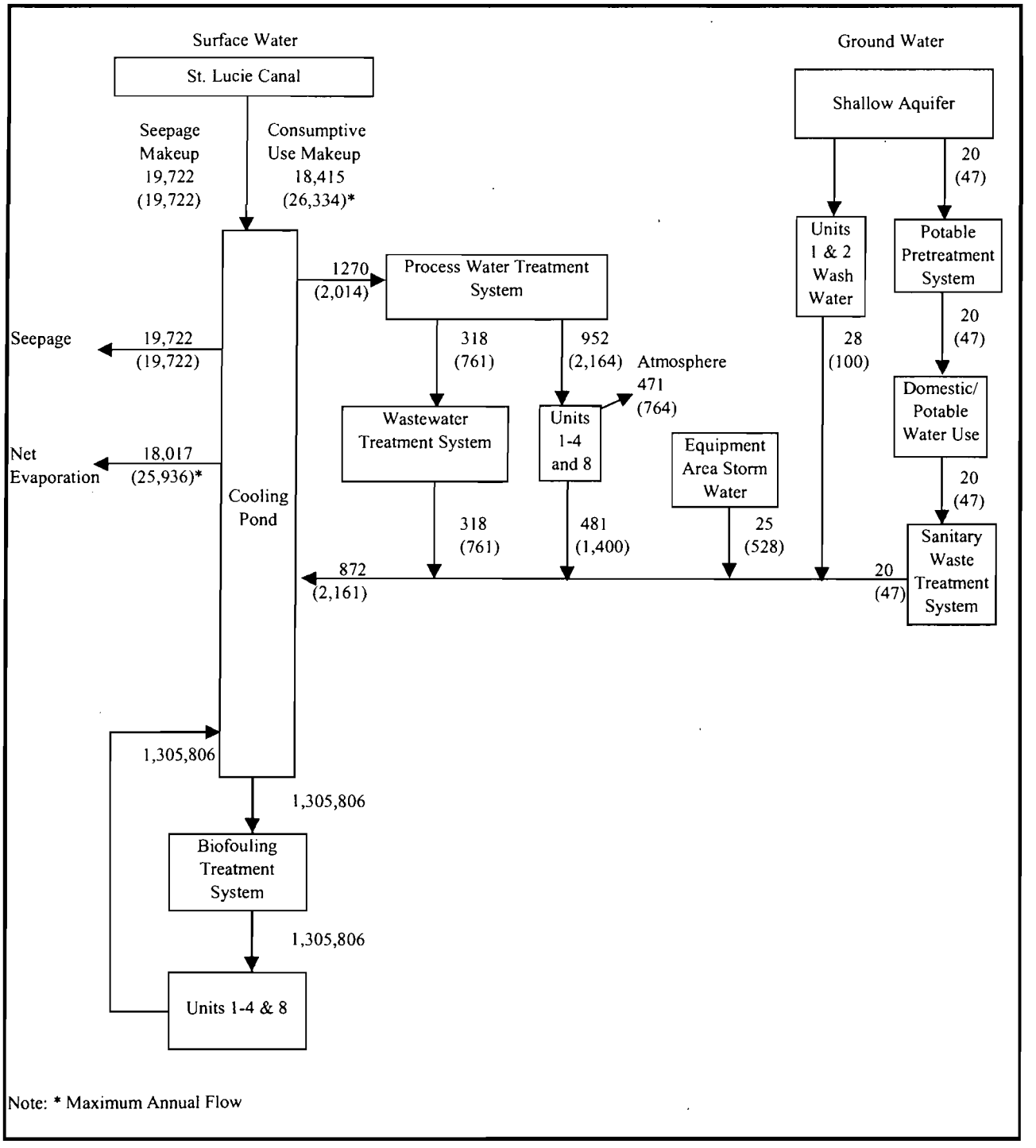
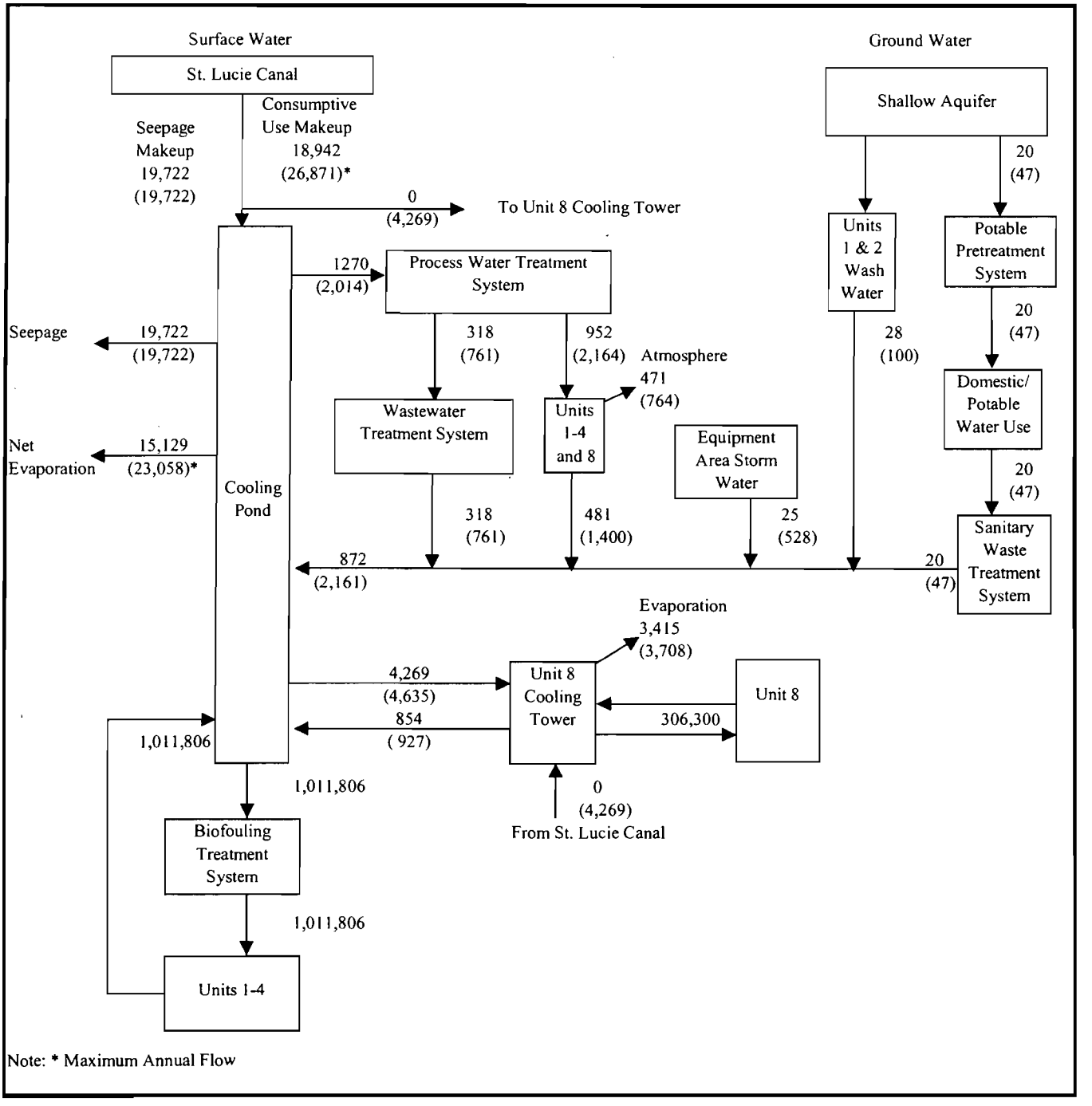


Figure 3.5-1. Alternative 1 -- Water Balance Without Cooling Tower

All Flows in gpm; Maximum Instantaneous Flows in Parentheses
Source: Black & Veatch, 2001; FPL, 2001; Foster Wheeler Environmental Corporation

FPL
Martin Unit 8



Note: * Maximum Annual Flow

Figure 3.5-2. Alternative 2 -- Water Balance With Cooling Tower

All Flows in gpm; Maximum Instantaneous Flows in Parentheses
Source: Black & Veatch, 2001; FPL, 2001; Foster Wheeler Environmental Corporation

FPL
Martin Unit 8

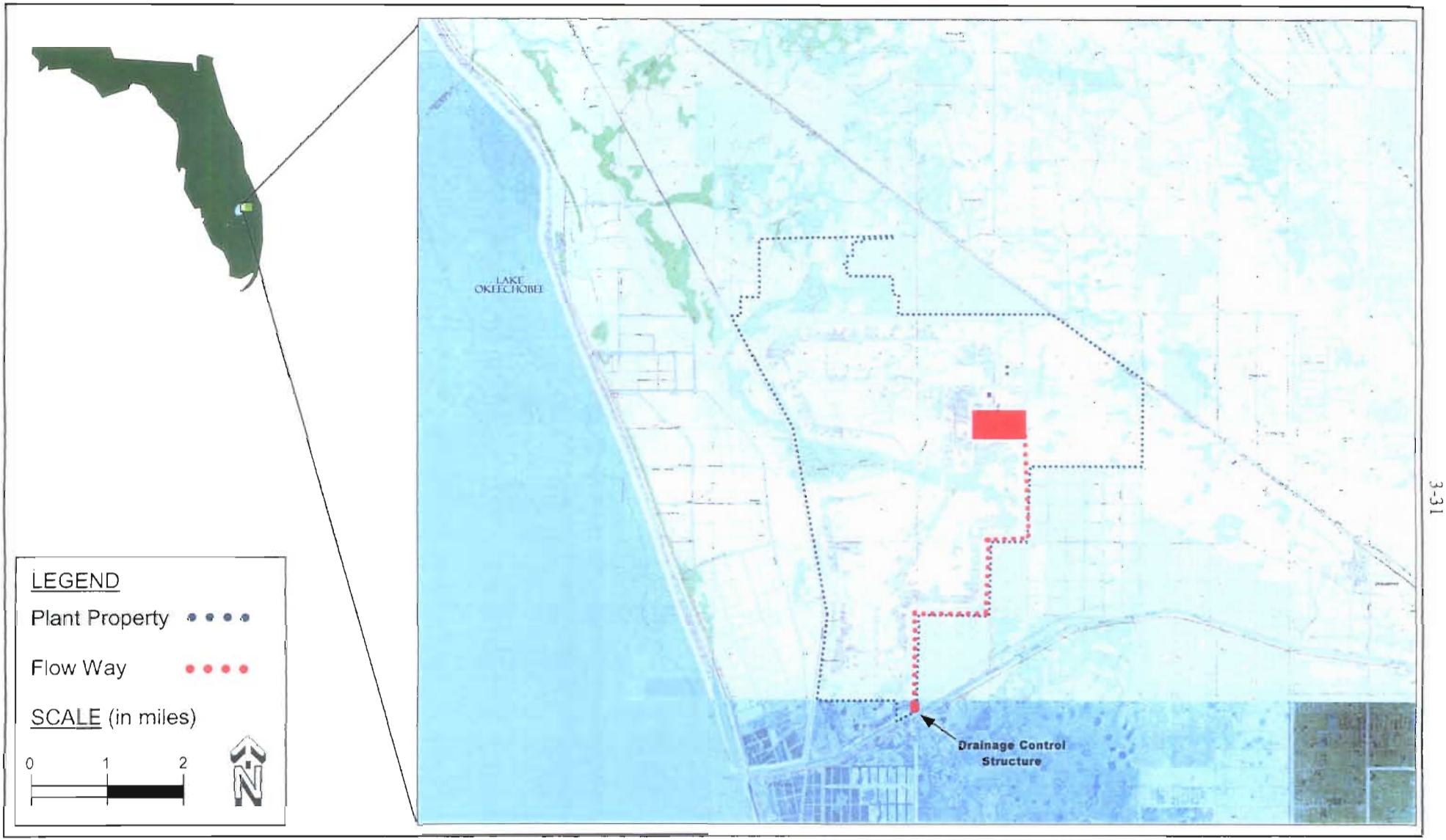


Figure 3.8-1. Existing Drainage for New Power Block Area Associated with Martin CG/CC Project
(Note: Proposed Project area is within the power block area for the CG/CC Project.)

Source: Consulting Engineer, Inc., 1990; Golder, 2002.

FPL

Martin Unit 8



Figure 3.8-2. Power Block Area for Martin CG/CC Project

Source: SRM of Miami, Inc., 2001; Golder, 2002.

FPL
Martin Unit 8

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

4.1 LAND IMPACTS

4.1.1 GENERAL CONSTRUCTION IMPACTS

The portions of the Martin Plant site that will be affected by the construction of the Project are shown in Figure 4.1-1. As described in Section 3.2, a total of about 44 acres within the 110-acre Project area will be utilized. The Unit 8 power block area will be located south of the existing Units 3 and 4, and occupy about 15.5 acres. Activities associated with construction will occupy 28.4 acres. This will include 14.7 acres for primary laydown and parking 11.6 acres for secondary laydown and 2.1 acres for management and contractor trailers. These areas have been previously disturbed by development/operation activities and will be cleared of any vegetation. Construction laydown and parking areas, which may be heavily traveled, will be stabilized with shell or rock. Other, more lightly traveled areas will be seeded with grass to prevent erosion. Stormwater facilities exist and occupy about 7 acres.

The areas occupied by the Project include the Unit 8 power block, which provides space for the four CTs (i.e., two existing and two new) and associated HRSGs, steam turbine generator, and collector yard (see Figure 4.1-1). Other facilities include the optional cooling tower, gas yard, and cooling system structures. These areas will require minimal clearing, because they have been previously cleared for existing power plant facilities. The other areas affected by facilities construction also require minimal clearing.

No explosives for blasting will be used during construction of the Project.

The impacts of creating material laydown areas will be minimal, temporary, and associated mainly with clearing, grubbing, and grading for proper drainage.

There will be no construction of new temporary or permanent roads that connect offsite, or new onsite railroads. The existing plant construction entrance is located on SR 710. Fugitive dust generation from traffic and/or excavations will be minimized through paving and/or the use of water sprinkling.

The existing grade ranges from 30 to 32 ft-msl. The power block area will be filled to approximately 32 ft-msl and graded.

Excavation of soils in the power block area will be required to provide support for the plant foundations, piping, electrical duct banks, trenches, and manholes. Pockets of material unsuitable for buildings or heavy equipment foundation may be found in this area. Removal of this material and the unavoidable removal of some adjacent material may be required. The removed material will be replaced, as necessary, by structural fill.

Foundations required to support heavy loads, such as building columns, CTs, and generators, will be either supported by spread foundations or pilings. In some instances, excavation could reach 25 ft-bls. In general, it is not anticipated that this excavation would be about 5 ft-bls.

Temporary dewatering will be required during construction of some foundations and facilities. The effluent from the dewatering operation will be routed to the cooling pond.

Dewatering will be accomplished by localized pumping of the shallow aquifer to reduce the water table. The dewatering system will be of the well-point type or other appropriate methods designed to control turbidity. Lowering the water table by pumping adjacent to the excavation allows the use of heavy equipment in formerly saturated excavations.

Location and structures that may require construction dewatering include:

1. Lift stations, underground pipes, trenches, duct banks, and manholes;
2. CT foundation;
3. HRSG foundation;
4. Steam turbine foundation; and
5. Cooling Water System (circulating water pipes, pumps, structures, etc.).

The duration of each dewatering task for these structures and facilities will generally be limited to 6 months. Based on the location of dewatering areas within the Project area, no offsite impacts to groundwater are anticipated (see Section 4.3). There will be no impacts to the underlying deeper aquifers because excavation and dewatering activities will be limited to the surficial aquifer system.

Once the detailed design is completed, a dewatering plan will be submitted prior to commencing dewatering activities.

Solid waste materials will be disposed of in accordance with applicable rules and regulations. Construction and demolition wastes, such as scrap wood and metal, will be transferred to a specified storage area on the site where they will be separated and stockpiled for salvage. General waste materials (i.e., typical of municipal solid wastes) will be collected in appropriate waste collection containers for disposal at an approved offsite location.

During construction, the construction labor force will use portable chemical toilets. All sanitary sewage will be pumped from the portable toilets as needed and transported to an approved disposal facility by a licensed contractor.

Potable water for consumption during construction will be obtained from the existing potable well or from bottle water.

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

Individual contractors will be responsible for handling any hazardous materials required to perform their tasks and any resulting hazardous wastes. This responsibility includes the proper transportation, storage, handling, and offsite disposal of such wastes.

Figure 4.1-2 presents the construction schedule for the Project. It is anticipated that onsite construction activities will begin by May 2003 and be complete in June 2005. Demobilization, site restoration, and clean-up will extend to November 2005. The simple cycle portions of Units 8C and 8D will be completed in June 2004. This will allow operation in simple cycle mode while construction is ongoing for the combined cycle portion of the Project. Each CT will be connected its associated HRSGs. Once all CT/HRSG connections are made, the steam turbine will undergo final commissioning for combined cycle operation. Figure 4.1-3 presents the estimated manpower curve

for the construction of the Project. The peak employment will be about 574 construction workers and management staff that will occur in April 2004. Construction employment will average about 400 workers from about January 2004 through December 2004.

4.1.2 ROADS

Construction traffic will use SR 710 and the main plant entrance, which is an asphalt-paved road. A separate construction driveway connected to the main plant entrance road will direct construction traffic to either the parking or laydown areas.

4.1.3 FLOOD ZONES

Based on the flood zones delineated by the Federal Emergency Management Agency (FEMA), the entire proposed construction area within the Project area is outside the 100-year flood zone. All proposed permanent facilities have been designed and located so that no adverse impacts on the 100-year flood elevations or flood flows are expected. The Project will not adversely impact adjacent surface water flood elevations or flows and will not cause any adverse flooding or related impacts to offsite property.

4.1.4 TOPOGRAPHY AND SOILS

Current topographic features at the project area of the Martin Plant site reflect past and present power-plant-related activities. The existing grade is approximately 30 to 32 ft-msl. Several areas will be excavated to remove material unsuitable for foundations. Approximately 2,000 yd^3 will be removed from the Unit 8 power block area, and the area will be filled with crushed limestone and rock to raise the elevation to approximately 32 ft-msl at the highest point.

No adverse impact is anticipated to soil stability or bearing strength because the power block foundation will be supported by concrete piles or spread footings; therefore, overall settling of the land area will be negligible. Slight settling may take place in areas of construction, but this will be moderate and localized in extent. It is not anticipated that sinkhole formation will be enhanced.

The areas affected by construction do not include any areas designated as Prime and Unique Farmland.

Most of the areas designated for construction facilities will generally not require filling. Those areas requiring fill will average about 2 ft of fill. This area is about 20,000 yd^3, and the fill will consist of clean rock or shell. Construction-related changes in site topography will not have any adverse effect on aesthetics or viewshed. Since the elevations after construction will be no more than about 30 ft-msl, no significant topographical changes will be observable from offsite locations.

Construction activities will alter runoff in several parts of the site; however, no adverse effects are anticipated from this alteration. In the vicinity of the Unit 8 power block, surface water runoff will be conveyed to existing ponds. Surface water runoff from the parking areas and secondary laydown areas will also be directed to an existing pond. These existing ponds can provide wet retention for all runoff from these areas (see Section 3.8 and Figure 3.2-4).

Groundwater levels will not be significantly affected by modifications to soil percolation from construction activities at the site due to the proximity of surface water and the interconnection between these surface water bodies and the surficial aquifer. Slight changes in percolation rates will have negligible impacts on water levels, because the surface infiltration affects only localized areas of the site.

4.2 IMPACT ON SURFACE WATER BODIES AND USES

4.2.1 IMPACT ASSESSMENT

The surface waters surrounding the Project area, which potentially could be affected by site preparation and construction activities, include the L-65 Canal and the St. Lucie Canal. There are also four onsite surface water bodies on the Martin Plant site: the cooling pond, the Barley Swamp wetland mitigation area, and the make-up (intake/discharge) canal. With the exception of the construction of the cooling water system structures in the cooling pond, no other construction activities will take place in the above-referenced water bodies. Figure 4.1-1 presents the land areas that will be impacted by construction. The focus of this impact evaluation is on potential discharges from these land areas to those surface water systems.

4.2.1.1 Surficial Hydrology—Physical and Chemical Impacts

The primary potential impacts from site preparation and construction are erosion and sedimentation due to earthmoving and material placement associated with site preparation and plant construction.

These impacts will be controlled and minimized through proper design and placement of runoff control features in accordance with SFWMD regulations described in Section 3.8. Specific regulatory criteria, design parameters, and construction-phase stormwater runoff management calculations are presented in Appendix 10.6. Runoff from the Project area not disturbed by construction activities will continue to be directed to the existing drainage systems.

Erosion will be controlled by compaction of soils, construction of ditches and embankments, maintenance of relatively flat grades, and other appropriate erosion control techniques. Sedimentation will be controlled during construction by use of sediment control basins and traps, filter berms, straw bales, and other applicable devices as appropriate.

Runoff from the construction laydown areas and parking will drain to retention swales. The evaporation/percolation pond and retention swales have sufficient detention storage to hold the entire storm volumes from the runoff created on these areas.

Based on the limited discharge quantity and treated nature of runoff to surface water bodies associated with construction activities, adverse impacts to surface waters are anticipated to be negligible.

Dewatering required for the construction of the cooling water structures in the cooling pond will be isolated with coffer dams. The dewatering releases will be routed back to the cooling pond. The water quality of the dewatering release will essentially be identical to the groundwater and water in the cooling pond.

Impacts from the use of chemicals for cleanup of spillage of chemicals or oil and grease will be mitigated thorough proper handling and disposal practices. Construction contractors will be required to implement practices (e.g., designating specific areas for fueling and maintenance) to minimize any spills. These areas will be located so that any spills, if they do occur, will not be adjacent to any surface waters. If any spills occur, immediate cleanup will be performed with ultimate disposal in an approved facility. When appropriate, such materials will be handled as described in FPL's existing Spill Prevention Control and Countermeasure (SPCC) plan and the Martin Plant hazardous waste management plan.

Following completion of construction, the non-paved areas will be replanted with appropriate ground cover.

4.2.1.2 Aquatic Systems

As described in Section 4.2.1.1, the potential for impacts to aquatic systems will be minimized through the use of appropriate construction techniques to control erosion, sedimentation, and surface runoff.

No construction is proposed in surface waters of the state.

Construction activities potentially could cause runoff containing high-suspended solids, to reach surface waters. To minimize possible impacts to surface waters and aquatic systems, sedimentation traps and other control measures will be used during the construction phase.

4.2.2 MEASURING AND MONITORING PROGRAMS

Release of treated stormwater associated with construction activities will be monitored as required under the applicable regulations.

4.3 GROUNDWATER IMPACTS

4.3.1 PHYSICAL AND CHEMICAL IMPACTS

Activities associated with site preparation and construction are not expected to produce any significant changes to groundwater quality, quantity, or levels in the site vicinity. Dewatering associated with construction will be confined to a localized area surrounding the dewatering site. The largest effective area to be dewatered at any given time will have a maximum effective radius of about 100 ft. The maximum period of dewatering will be 9 months or less. The water table in the Project area is about 5 ft-bls and the maximum expected dewatering depth is 25 ft. Based on four pump tests conducted at the site (Bechtel, 1989), the average transmissivity of the surficial aquifer is approximately 18,500 gpd/ft. The average storage coefficient, as reported by Lichter (1960), is 0.15. Using these values, the maximum dewatering rates are expected to be less than 500 gallons per minute (gpm). The radius of the 1-ft drawdown contour is calculated to be about 0.5 mile. Consequently, the zone of influence for the dewatering activities will be confined to the Martin Plant site. As a result, no impacts to offsite wells will occur from dewatering activities.

No adverse impacts to groundwater resources from dewatering activities are anticipated.

Construction workers will require an average of approximately 5,000 gpd of potable water, which will come from either the existing potable supply system or bottled water.

As discussed in Section 4.2.1.1, construction contractors will be required to implement practices to minimize spills. Maintenance and refueling will be performed only in designated areas. Any spills will be disposed of properly.

4.3.2 MEASURING AND MONITORING PROGRAM

During construction dewatering any applicable measuring and monitoring programs will be conducted.

4.4 ECOLOGICAL IMPACTS

4.4.1 IMPACT ASSESSMENT

4.4.1.1 Terrestrial Systems

The Project area comprises approximately 110 acres; within the Project area, the areas for Unit 8 including construction laydown and staging areas, will occupy on about 44 acres, which has been affected by previous activities at the Martin Plant site. The power block for Unit 8 will occupy open land and ditches associated with an abandoned railroad spur. Primary construction laydown and parking areas will be located within the graded, fenced limerock area between the switchyard and stormwater basin and a cleared, grassed area immediately west of the new power block. Secondary laydown areas include an open, grassed area to the northwest, the grassed area located to the north of the cooling pond berm, south of the proposed units, and cleared area to the west of the stormwater pond. Open land located to the east of the power block will be used for construction trailers. Much of these areas have been cleared and maintained as a result of previous activities. The construction activities in these areas will not cause significant adverse ecological impacts. These terrestrial systems are highly altered systems either maintained as grassy or cultivated areas.

These altered terrestrial systems (see Section 2.3.6, Pre-Existing Stress, Terrestrial Systems) do not contain unique wildlife species and are not considered important wildlife habitats because of their

disturbed nature. No significant adverse impacts to wildlife resources in the areas will occur as a result of construction in these areas.

The area designated for construction activities (see Figures 4.4-1 and 4.4-2) is dominated by Bahia grass and weedy species that have become established within the lawn. The grassed area is mowed periodically. This area also contains man-made ditches on the perimeter of the power block area connected to Detention Pond No. 3. When developed, some of these altered areas will be lost. Areas used for permanent facilities will be seeded after construction.

Construction activities will not hydrologically alter surface water flows to any offsite wetlands. Impacts due to erosion will not affect the St. Lucie Canal and any nearby wetlands because of implementation of runoff control measures proposed for the Project.

No significant impacts to federally or state listed terrestrial plants and animals are expected.

Fugitive dust generated by construction activities will be minimized through reasonable precautions. Any localized fugitive dust will not adversely affect the terrestrial systems surrounding the site.

Noise (including other human disturbance from construction activities) will not affect wildlife in the vicinity of the site. Presently, the site has noise associated with operation of the existing facility, and wildlife that occurs in the vicinity of the site is acclimated to such activities. No noise-sensitive wildlife is known to occur on site or in the vicinity of the site.

4.4.1.2 Aquatic Systems

Based on the limited areas affected by construction and the measures to mitigate impacts of runoff, impacts to aquatic ecological systems resulting from construction-phase activities are not anticipated. Erosion, sedimentation, and runoff control measures will mitigate the potential for water quality degradation; therefore, associated impacts to aquatic biological communities are not expected to be significant.

4.4.2 MEASURING AND MONITORING PROGRAMS

4.4.2.1 Terrestrial Systems

No monitoring programs will be undertaken because no important terrestrial systems will be affected by construction activities proposed for the site. Any wetland impacts, primarily to man-made ditches, have already been mitigated in conjunction with the initial phase of the Martin CG/CC Project. A 1,200 acre portion of the Martin Plan site, known as the Northwest Parcel, has been designated as a wetland mitigation site (Refer to Appendix 10.1.4).

4.4.2.2 Aquatic Systems

No fish or benthic invertebrates are expected to be affected by construction activities.

4.5 AIR IMPACTS

4.5.1 AIR EMISSIONS

Construction activities will result in the generation of fugitive PM emissions and vehicle exhaust emissions. Fugitive PM emissions will result primarily from land clearing and grubbing, ground excavation, grading, cut and fill operations, and vehicular travel over paved and unpaved roads. Vehicular traffic will include heavy-equipment traffic and traffic due to construction workers entering and leaving the Martin Plant site. Construction personnel and equipment will enter the site primarily over surfaced roadways. Exposed land areas may also generate fugitive dust due to wind erosion.

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

AAQS for PM_{10} have been promulgated by both EPA and FDEP.

During the construction period, the PM_{10} emissions are estimated to average about 8.3 TPY, 63.8 lb/day (5 days/week), or 6.4 lb/hr (10 hr/day).

An emission rate of 8.3 TPY of PM_{10} is less than the PSD significant emission rate of 15 TPY. As a result, the estimated fugitive emissions are not expected to significantly affect air quality outside the Martin Plant site boundary.

Emissions will also result from onsite construction equipment including cranes, trucks, compressors, etc., operating with diesel and gasoline engines. These equipment will produce emissions of CO, NO_x, VOC, PM and SO_2. Exhaust emissions were based on the following EPA emission factors (AP-42) for diesel engines. Based on these emission factors and number of vehicles, the CO, NO_x, VOC, PM, and SO_2 emissions are estimated to be 4.3, 19.8, 1.6, 1.4, and 1.3 TPY, respectively, over the 2-year construction period. These levels of emissions will not cause significant impacts to air quality in the vicinity of the Martin Plant site.

4.5.2 CONTROL MEASURES

A number of control measures will be implemented during the construction period in order to minimize air emissions and potential impacts. Clearing within the project area of the site will be kept to a minimum, thereby reducing air emissions due to wind erosion of exposed surfaces. After grading, the untravelled or lightly traveled areas will be either paved or vegetated to minimize fugitive PM and wind erosion. Heavily traveled unpaved construction laydown areas and unpaved roads will be stabilized with shell or rock. Fugitive dust from highly traveled areas will be controlled by watering on an as-needed basis. The plant entrance road is currently paved, which minimizes dust emissions from vehicles entering the Martin Plant site.

4.5.3 POTENTIAL IMPACTS

During the construction period, the two new CTs associated with the proposed Project, (i.e., 8C and 8D) will be available to operate in simple cycle mode while the combined cycle portion of the project is still under construction. Upon completion of construction, Unit 8 will operate in simple cycle or combined cycle modes.

For the first phase of construction, the maximum pollutant concentrations for the Unit 8 CTs operating in simple-cycle mode with bypass stacks are summarized in Tables 4.5-1 and 4.5-2 for the Class II and Class I areas, respectively. More detailed information is presented in Appendix 10.1.5.

These results show that, the maximum SO_2, NO_2, PM_{10}, and CO impacts predicted during the construction phase from the Project will ensure compliance with, and maintenance of, the AAQS.

4.6 IMPACT ON HUMAN POPULATIONS

4.6.1 TRANSPORTATION

Traffic impacts for the construction and operation of future electrical generating units at the FPL Martin Plant site were evaluated as part of the initial certification of the Martin CG/CC Project. These impacts were found to comply with applicable standards, including levels of service standards on local roadways. In connection with the construction of the Martin Units 3 and 4, FPL constructed roadway improvements at the Plant entrance, these improvements were implemented to accommodate additional traffic, especially for construction.

The following discussion is provided to describe the actual traffic associated with the construction of the Project. The Project traffic levels are well within the traffic levels assumed during the initial certification proceeding, including non-project background traffic levels. These previous analyses resulted in the conclusion that the construction of the Martin CG/CC Project, with the recommended turn lane improvements, would comply with applicable standards for traffic.

The highway network will be impacted during the construction phase by construction-related traffic. The Project is expected to take about 2 years to complete and have an average construction employment of about 250 construction workers and management staff. During the peak month of construction, 574 construction employees are expected to be onsite during weekdays. No weekend construction activities are currently planned. All construction employees will use the main plant entrance, which currently has a full access opening to SR 710. The left turn lane northbound on SR 710 was extended about 600 ft. The southbound access to SR 710 from the Plant entrance has a 1,000-ft-long acceleration lane.

A traffic analysis was performed to determine operating conditions for the peak month of construction activity with 62 percent of employees working the day shift. Information from the traffic counts on SR 710 taken for the Martin CG/CC Project was used. These traffic count data were adjusted for growth based on population increases in the Indiantown planning area (Martin County Growth Management Department, 2000).

The increased traffic generation potential of the project was determined using the current and project trip generation rates. Information gathered indicates 27 percent of the current site-generated traffic travels northwest of the plant and the remaining 73 percent of traffic travels southeast. The project-generated traffic was added to the estimated background traffic to determine total traffic.

Traffic analyses were conducted using the Highway Capacity Software (model), which is based on the Transportation Research Board's Highway Capacity Manual. This model was used to determine the level of service on SR 710 in 2004 and beyond. Morning and evening peak hour capacity analyses were performed. These analyses are in Appendix 10.7. The analyses indicated that with the peak Project construction traffic, SR 710 is projected to operate at Level of Service C or better both northwest and southeast of the plant entrance during both a.m. and p.m. peak hours in 2004 beyond. Based on this analysis, the traffic resulting from construction of the Project would not degrade traffic flow below established levels of service. No additional roadway improvements are required.

4.6.2 CONSTRUCTION NOISE IMPACTS

The impacts of noise on human populations are dependent upon the proximity of residences to construction activities and the type and extent of noise sources. The nearest residence (i.e., critical receptor) to the proposed facility construction area is located approximately 10,000 ft northwest of the power block for the Project.

Construction of the Project will require installation of foundations and erection of major components of the combined cycle unit such as the CTs, HRSG, steam turbines, and cooling system. The use of construction equipment, such as pile drivers, cranes, bulldozers, graders, front-end loaders, and air compressors will be required. These sources have maximum noise levels ranging from about 70 to 90 dBA (measured at a distance of 50 ft).

The evaluation of noise impacts from construction activities was performed using noise propagation computer programs to estimate noise levels (CadnaA). Noise source levels are entered as octave band sound power levels. Coordinates, either rectangular or polar, can be specified by the user. All noise sources are assumed to be point sources; line sources can be simulated by several point sources. Sound propagation is calculated by accounting for hemispherical spreading and three other

user-identified attenuation options: atmospheric attenuation, path-specific attenuation, and barrier attenuation. Atmospheric attenuation is calculated using the data specified by the American National Standard Institute Method for the Calculation of the Absorption of Sound by the Atmosphere (ANSI, 1999). Path specific attenuation can be specified to account for the effects of vegetation, foliage and wind shadow. Direction source characteristics and reflection can be simulated using path-specific attenuation. Attenuation due to barriers can be specified by giving the coordinates and height of the barrier. Barrier attenuation is calculated by assuming an infinitely long barrier perpendicular to the source-receptor path. Total and A-weighted SPLs (filtered to approximate human hearing) are calculated. Background noise levels can be incorporated into the program and are used to calculate overall SPLs.

The model was performed to predict the maximum noise levels produced by a combination of likely noise sources with and without background noise levels. A conservative estimate of the number and types of construction equipment was assumed to calculate construction noise levels.

Table 4.6-1 lists the major types of equipment expected to be used during the construction of the Project and their associated noise characteristics. For the purpose of the construction noise impact analyses, all of the equipment was conservatively assumed to be operating simultaneously at peak power. These heavy construction activities are expected to occur during the daytime hours. Most of the heavy construction activities will occur during the first 6 to 8 months of construction. Mechanical and electrical installation activities may occur at night; however, these activities have minimal noise levels and are much less than the existing plant.

The noise levels resulting from these combinations of equipment were input as multiple sources to the model. Octave bands were estimated from *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliance* (EPA, 1971). It is unlikely that all the equipment would be operating simultaneously and continuously, and, therefore, this impact assessment is conservative. Background SPL values were incorporated into the model to calculate impacts at the locations identified in Section 2.3.8. Only the atmospheric attenuation option was enabled during the noise modeling runs.

The construction noise impacts at the one onsite monitoring location in the Barley Barber Swamp and the four off-plant property monitoring locations are presented in Table 4.6-2. The L_{90} is used as background, construction equipment impact and the background with construction impacts are presented in the table. The Martin County noise control ordinance defines "ambient noise level"as the L_{90}, which is the A-weighted sound pressure level exceeded ninety percent of the time. This ambient noise level would be the background sound level from which a comparison to the Martin County noise ordinance would be made. The table also presents the maximum permissible sound levels for Martin County. As shown in Table 4.6-2, the estimated noise levels at the monitoring locations during the construction of the Project are predicted to be below the daytime noise requirements of 60 dBA for residential land uses and 70 dBA for agricultural. When the construction impacts are combined with the background concentration, the predicted impacts are all less than the Martin County noise control ordinance. The daytime construction-phase noise level predicted at the nearest residence is 44.3 dBA (Site 6 as identified in Section 2.3.8). Figure 4.6-1 presents isopleths of the sound levels predicted by the model during construction activities in the vicinity of the Project site. The model predictions are conservative and include only atmospheric attenuation. The actual or measured noise levels due to construction are expected to be lower than predicted.

4.6.3 CONSTRUCTION EMPLOYMENT

It is estimated that the workforce during the 24-month construction phase of the Project will average 250 persons, with a peak workforce of 574 persons (see Figure 4.1-3). A majority of these construction workers will be skilled tradesmen (cement masons, laborers, millwrights, iron workers, pipe fitters, carpenters, electricians, plumbers, etc.), although there will also be 30 management personnel. The average duration of any particular trade onsite during construction will be approximately 9 months. It is estimated that these workers will travel to the job site from outside the immediate area and from surrounding communities.

Traditional practice is that the construction workers will not bring their families with them if they seek temporary housing. Therefore, the local permanent population is not expected to increase significantly during the construction period, as a result of the Project. Since construction workers do not bring their families for short-term construction assignments, minimal impacts on local schools and other local infrastructure is expected.

Over 50,000 construction workers reside within the South Florida Region, with the majority of these in Palm Beach, Broward and Dade counties (FSA, 2001). Since a more-than-adequate labor supply exists within commuting distance, it is anticipated that most workers will be hired from within the region with minimal relocation required. Consequently, construction should have a small effect on permanent housing within the region or locally. As is typical with mid-term (1 to 2 years) construction projects, some workers commuting from longer distances may choose to reside in transient accommodations (hotels and motels), returning to their permanent homes and families on weekends or special occasions.

With the exception of the minor use of transient accommodations and related potable water and sanitary sewer services, no new impacts are expected on community services and facilities within the region as a result of the construction effort. Those workers hired from the area will have already established usage patterns and will probably continue to frequent the same facilities and establishments that they used prior to employment on this Project. Consequently, any new demands will be dispersed throughout the region and should not create any noticeable change in the availability of area community services and facilities due to the small number of potential employees that may relocate into the area.

4.7 IMPACTS ON LANDMARKS AND SENSITIVE AREAS

Construction-related impacts to landmarks and sensitive areas will be minor and will not result in any changes to accessibility. The closest landmarks and sensitive areas within the 5-mile of the Project (refer to Section 2.2.5) will not experience any changes in air quality, noise level, water quality, or visual characteristics perceptible to the users.

Occasional construction noise may be heard near the site during the construction term. The noise is anticipated to be infrequent and of short duration. Visual impacts will be minor since most of the construction activity and new structures will be near the existing facilities, which will serve as a visual shield, and the closest public viewpoint is more than a half-mile away.

No use-related impacts are anticipated at public recreational facilities since these areas are a considerable distance from the Project area.

4.8 IMPACT ON ARCHAEOLOGICAL AND HISTORIC SITES

The Florida Department of State, Division of Historical Resources has determined that no significant archaeological or historical sites are recorded, or likely to be present within the Project area. As a result, no construction impacts on historic properties listed, or eligible for listing in the *National Register of Historic Places,* or otherwise of historical or archaeological value, are anticipated.

4.9 SPECIAL FEATURES

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

The Project will utilize existing power generating units (Units 8A and 8B), which will not operate for a short time while they are being converted to combined cycle. Other facilities at the Martin Plant site, including Units 1 through 4, transmission systems and fuel delivery and storage facilities, will be unaffected by construction activities.

4.10 BENEFITS OF CONSTRUCTION

The construction phase of the Project will contribute both short- and long-term economic benefits to the surrounding region. Construction benefits will include construction employment that will average several hundred over the 2-year construction period (see Figure 4.1-3). Construction wages will increase the demand for goods and services in the region. Direct purchases of construction materials will have both direct and indirect economic benefits. This includes materials and services required as a direct result of construction activities. This includes construction materials (e.g., concrete and steel for foundations), rental equipment (e.g., construction cranes, pumps), food services and transportation services. These economic benefits are discussed in Chapter 7.0, Economic and Social Effects of Plant Construction and Operation.

4.11 VARIANCES

No variances from applicable standards due to the construction of the Project are being sought as part of this SCA.

Table 4.5-1. Summary of Maximum Pollutant Concentrations Predicted for the Project Operating in Simple Cycle Configuration

Pollutant	Averaging Time	Maximum Predicted Concentration ($\mu g/m^3$) [a]		EPA Class II Significant Impact Levels ($\mu g/m^3$)
		Simple Cycle Natural Gas [b]	Simple Cycle Fuel Oil [b]	
SO_2	Annual	0.01	0.07	1
	24-Hour	0.10	0.84	5
	3-Hour	0.43	4.23	25
PM_{10}	Annual	0.01	0.02	1
	24-Hour	0.13	0.23	5
NO_2	Annual	0.07	0.23	1
CO	8-Hour	1.08	1.42	500
	1-Hour	3.22	4.36	2,000

[a] Concentrations are based on highest concentrations predicted using five years of meteorological data from 1987 to 1991 of surface and upper air data from the National Weather Service station at Palm Beach International Airport.

[b] Operating scenarios included baseload (including high power mode when firing natural gas), 75-percent load, and 50-percent load at air inlet temperatures of 35, 59, and 95°F (80 °F for high power mode).

Table 4.5-2. Summary of Maximum Pollutant Concentrations Predicted for Simple Cycle Operation at the PSD Class I Area of the Everglades National Park Compared to the Proposed EPA Class I Significant Impact Levels

Pollutant	Averaging Time	Maximum Concentration ($\mu g/m^3$) [a]			Proposed EPA Class I Significant Impact Levels ($\mu g/m^3$)
		Natural Gas	Fuel Oil	Natural Gas/ Fuel Oil	
Simple-Cycle [b]					
SO_2	Annual	NM	NM	0.0013	0.1
	24-Hour	0.035	0.338	0.338	0.2
	3-Hour	0.074	0.716	0.716	1.0
NO_2	Annual	NM	NM	0.0017	0.1
PM_{10}	Annual	NM	NM	0.0018	0.2
	24-Hour	0.039	0.069	0.069	0.3

Note: NM = not modeled.

[a] Concentrations are highest predicted using CALPUFF model and 1990 CALMET wind field for south Florida.

[b] Concentrations predicted for simple cycle operation are based on the operating scenario with the maximum hourly emissions. For both natural gas- and oil-firing, maximum emissions are based on the combustion turbines operating for baseload conditions at an ambient temperature of 35°F.

For simple cycle operation and natural gas-firing, combustion turbines are assumed to operate at higher power mode.

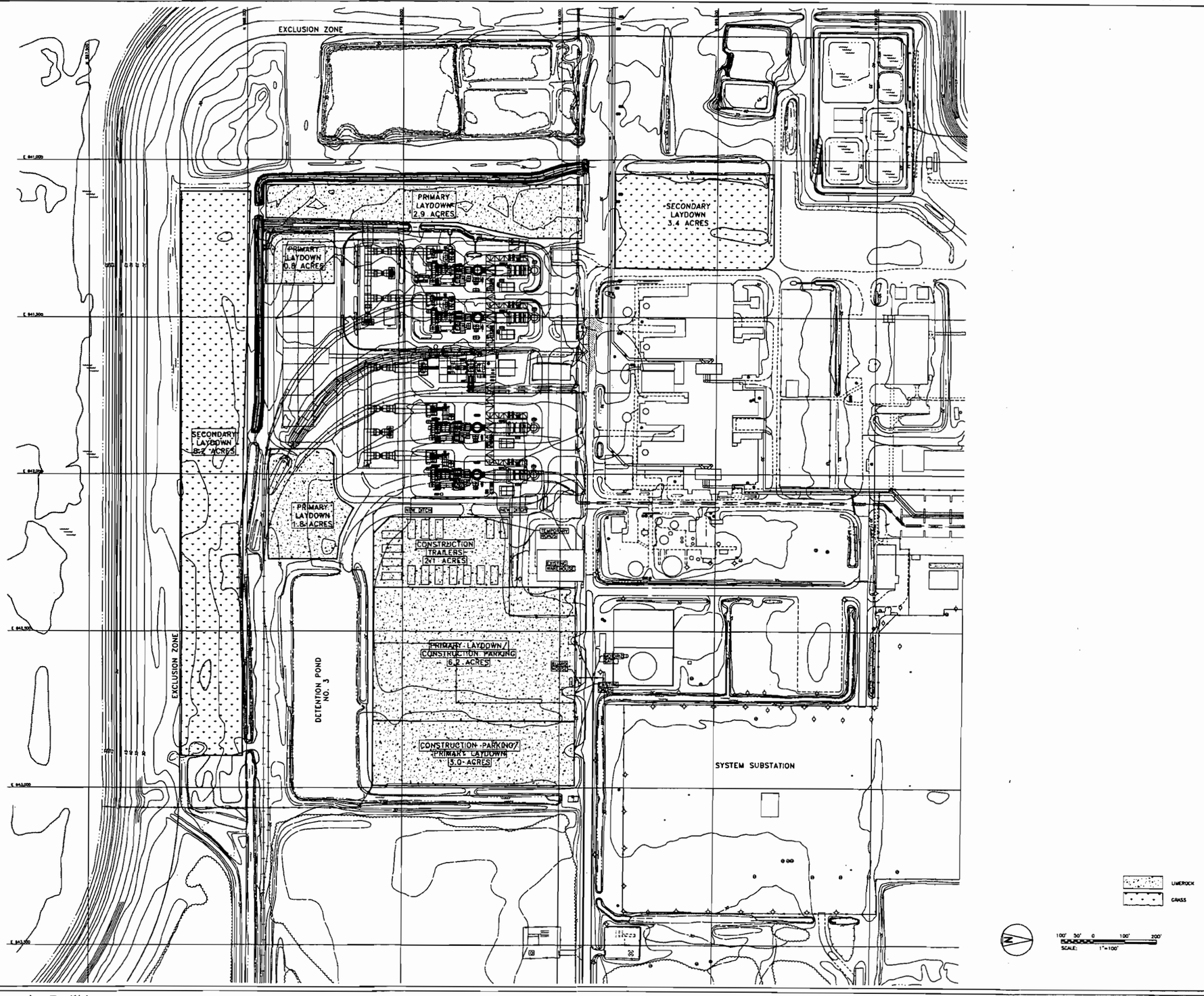


Figure 4.1-1. Martin Unit 8 Construction Facilities

Source: Block & Veatch, 2001; FPL, 2001; and Golder, 2001.

FPL
Martin Unit 8

BEST AVAILABLE COPY

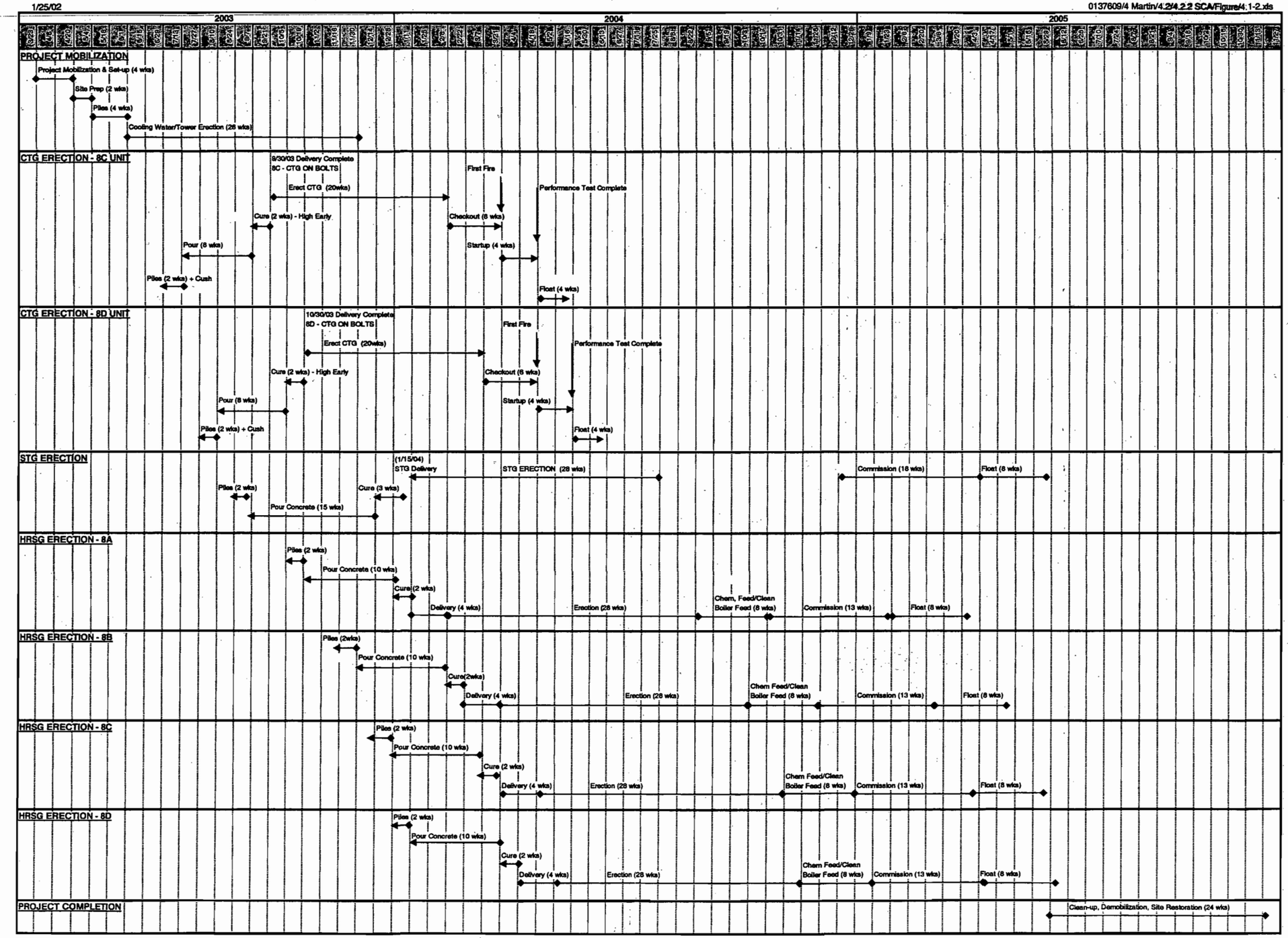


Figure 4.1-2. Construction Schedule

Source: Black & Veatch, 2001; FPL, 2001

FPL
Martin Unit 8

Table 4.6-1. Summary of Construction Noise Sources Associated with Heavy Construction Activities

Source	Equipment Location(s)[a]		Modeled Source Height[b] (m)	Sound Power Level (dB) for Octave Band Center Frequency (Hz)									Overall Sound Power Level	
	X (m)	Y (m)		31.5	63	125	250	500	1K	2K	4K	8K	(dB)	(dBA)
Front End Loader 1	-443.88	420.20	1.8	0.0	111.6	118.6	116.6	114.6	109.6	104.6	98.6	92.6	122.4	115.5
Truck 1	-464.46	420.20	1.8	0.0	0.0	118.6	116.1	113.1	109.6	106.1	102.1	0.0	121.7	115.3
Truck 2	-456.48	279.08	1.8	0.0	0.0	118.6	116.1	113.1	109.6	106.1	102.1	0.0	121.7	115.3
Front end Loader 2	-437.58	290.00	1.8	0.0	111.6	118.6	116.6	114.6	109.6	104.6	98.6	92.6	122.4	115.5
Bulldozer 1	-395.16	321.92	1.8	0.0	106.6	103.6	101.6	102.6	99.6	96.6	94.6	96.6	105.3	110.9
Bulldozer 2	-380.88	423.98	1.8	0.0	106.6	103.6	101.6	102.6	99.6	96.6	94.6	96.6	105.3	110.9
Crane 1	-360.72	358.88	1.8	0.0	111.6	118.6	116.6	114.6	109.6	104.6	98.6	92.6	122.4	115.5
Crane 2	-431.70	475.64	1.8	0.0	111.6	118.6	116.6	114.6	109.6	104.6	98.6	92.6	122.4	115.5
Welder 1	-382.98	509.24	1.8	0.0	102.6	110.6	105.6	98.6	98.6	93.6	88.6	84.6	103.6	112.7
Welder 2	-345.60	466.82	1.8	0.0	102.6	110.6	105.6	98.6	98.6	93.6	88.6	84.6	103.6	112.7
Welder 3	-400.62	382.82	1.8	0.0	102.6	110.6	105.6	98.6	98.6	93.6	88.6	84.6	103.6	112.7
Welder 4	-375.84	285.38	1.8	0.0	102.6	110.6	105.6	98.6	98.6	93.6	88.6	84.6	103.6	112.7
Pile Drivers (2)	[c]	[c]	4	130.6	131.6	126.6	115.6	118.6	121.6	123.6	116.6	109.6	135.5	127.5

[a] Construction noise source locations relative to the site coordinates.
[b] Source height used for modeling analysis only and does not necessarily represent the physical height of the source.
[c] Location X(m), Y(m) = -261.50, 830.23; 466.55, 301.07.



Table 4.6-2. Predicted Construction Noise Impacts for the Repowering of Martin Power Plant (in dBA)

Site No.	L_{90} Daytime Background Value[a]	Predicted Construction Impacts[b]		Martin County Standard (Daytime)
		Construction Only	Construction and Background	
1	36.2	42.2	43.2	c
3	39.0	39.7	42.4	70
4	42.3	37.6	43.6	60
5	40.6	43.0	48.0	60
6	37.3	39.5	41.5	60

[a] Major construction activities to occur during the daytime only (i.e., 7 a.m. to 10 p.m.).
[b] Includes background and predicted construction noise impacts.
[c] This monitoring site is located on the FPL Martin Plant site and the noise control ordinance is not applicable.

Note: Refer to Section 2.3.8 for information on the description and location of the noise monitoring site.

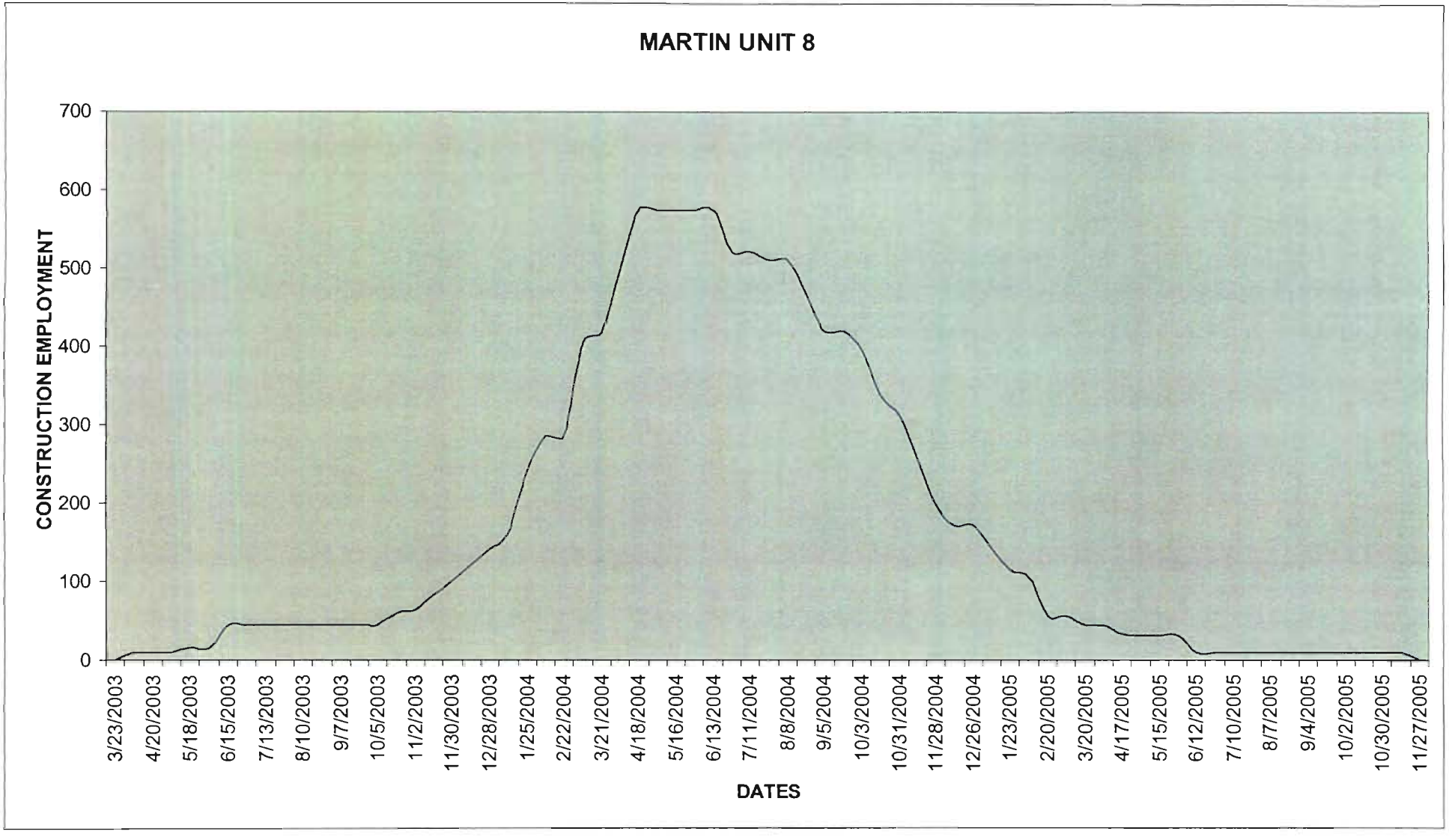


Figure 4.1-3. Construction Employment for Martin Unit 8

Source: Golder, 2002.

FPL
Martin Unit 8



Photo A. View from Southeast Looking North
(Unit 8B, Units 3 and 4, and Units 1 and 2; shown from right to left)



Photo B. View from Southeast Looking Northwest
(Unit 8A and 8B, Units 3 and 4, and Units 1 and 2; shown from right to left)

Figure 4.4-1. Martin Unit 8 Project Area, Views from Southeast

FPL
Martin Unit 8



Photo A. View of Northern Primary Laydown Area Looking North
(Units 1 and 2 shown in middle of picture)

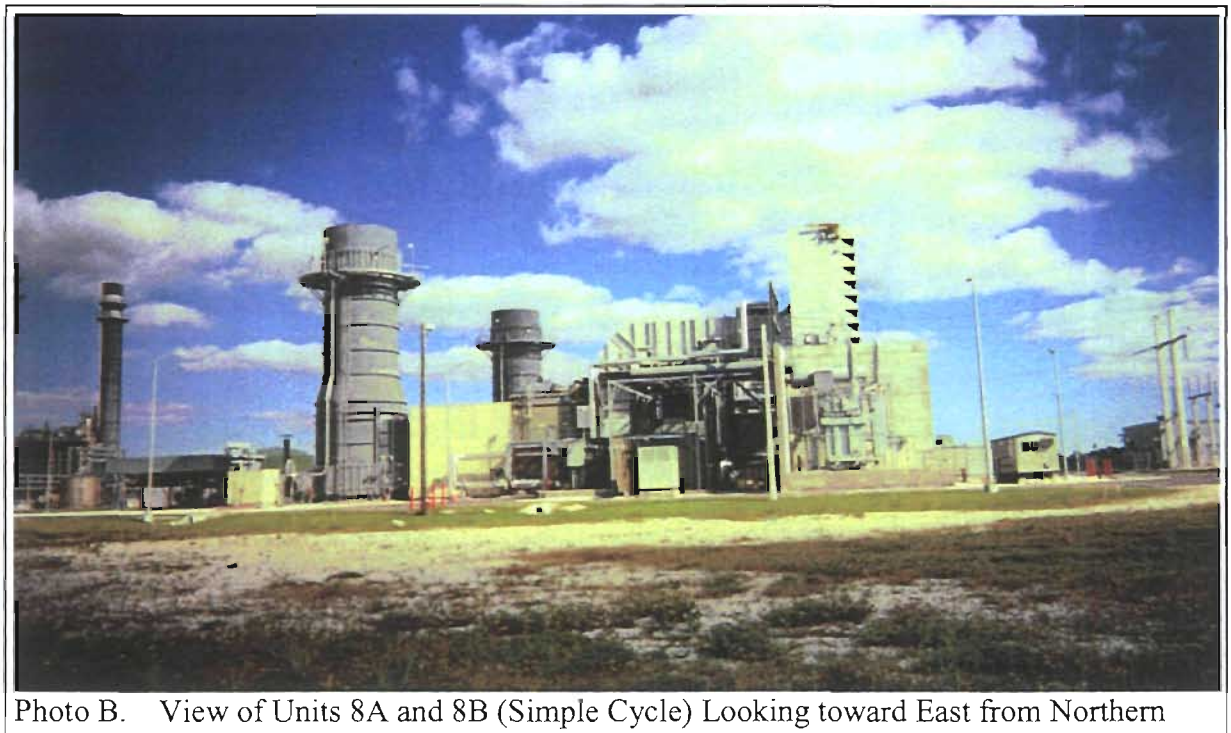


Photo B. View of Units 8A and 8B (Simple Cycle) Looking toward East from Northern Project Boundary

Figure 4.4-2. Martin Unit 8 Project Area, Views Looking North

FPL
Martin Unit 8

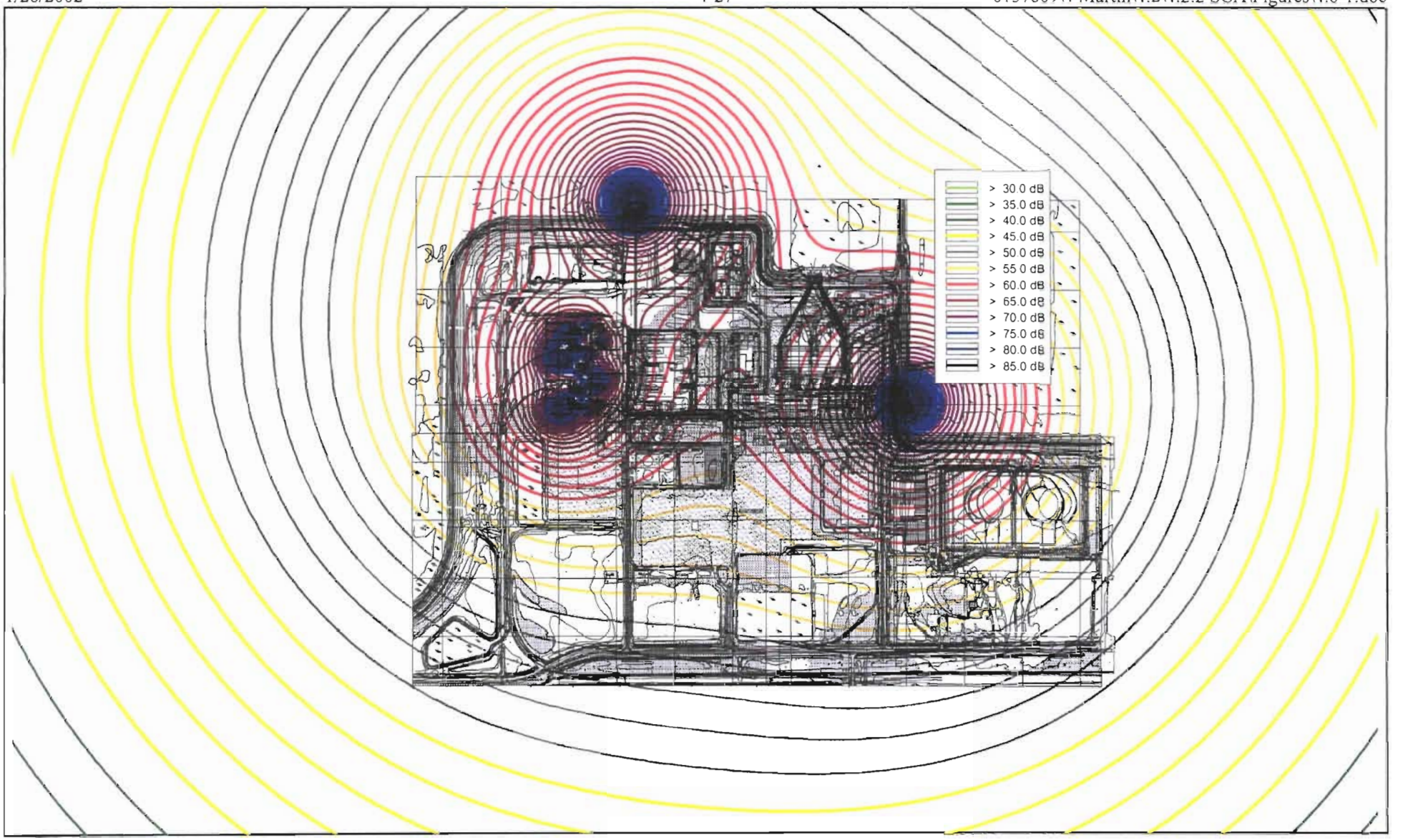


Figure 4.6-1. Maximum Predicted Sound Levels During Construction

Source: Golder, 2002.

FPL

Martin Unit 8

5.0 EFFECTS OF PLANT OPERATION - INTRODUCTION

As discussed in this chapter, operation of the Martin Unit 8, along with the existing power generating facilities at the Martin Plant, will comply with applicable regulatory standards. In general, impacts to the environment from operation of the existing facilities, and Martin Unit 8 are within those reviewed and accepted as part of the Martin CG/CC Project. The Project will not require an increase in the currently authorized withdrawal rates of water from the St. Lucie Canal or from groundwater sources. The infrequent planned and unplanned discharges from the existing cooling pond will continue to be in compliance with water quality standards. Maximum potential air emissions from the Martin Plant with Unit 8 added, will be less than the level associated with full buildout of the CG/CC Project. Utilization of the existing FPL Martin Plant site for this Project will result in lower overall environmental impacts than if the project were undertaken on a greenfield site.

5.1 EFFECTS OF THE OPERATION OF THE HEAT DISSIPATION SYSTEM

Heat is a necessary by-product of the generation of electricity. While significant portion of the thermal energy produced from the fuel is converted to electrical energy by the turbine generators and the steam generators, a portion is absorbed by cooling water flowing through the condenser heat exchangers. The heat from existing Units 1 through 4 is absorbed by the cooling water and is dissipated to the atmosphere as the water is circulated through the existing closed-cycle cooling pond. The heat removal rate from the cooling pond is a function of the local climatic conditions and the heat load applied to the pond.

The Martin Plant site has long been identified for additional generating capacity. Consequently, the existing cooling pond has been sized, constructed, and previously approved to handle the thermal load associated with additional generating capacity. With the addition of Martin Unit 8, the Plant will continue to be operated within the thermal limits and constraints that were previously reviewed and permitted.

Water withdrawals from the St. Lucie Canal for cooling pond evaporation and groundwater seepage will not exceed the previously approved average annual or maximum annual quantities. Minimum and maximum water levels within the cooling pond will remain within previously approved levels. Furthermore, maximum temperatures and chemical concentrations of pond discharges will not increase beyond the previously approved levels.

5.1.1 TEMPERATURE EFFECT ON RECEIVING BODY OF WATER

Surface water discharges from the cooling pond will occur only during spillway gate testing (conducted annually) and subsequent to extreme rainfall events (100-year, 24-hr or greater) to keep the pond within approved water levels. The spillway elevation is 37.5 ft-msl, and the maximum pond elevation is 35.58 ft-msl. The St. Lucie Canal, which is the receiving water body for a cooling pond spillway release, will not be affected by gate testing for the following reasons:

- The entire intake/discharge canal between the spillway and the St Lucie Canal serves as a mixing zone for any spillway release; and
- To limit the extent of the impact of the discharge, the intake pumps can be run during gate testing to return spillway releases to the cooling pond.

Table 5.1-1 shows the releases from the spillway since 1997. These spillway releases were associated with annual gate testing. No releases were made for the purpose of lowering the pond level subsequent to rainfall. The Project will not increase the likelihood of emergency releases. As can be seen from the table, annual releases have been small compared to the average daily flow within the St. Lucie Canal (less than 0.1 percent of the average daily flow).

In the event of a release subsequent to a significant rainfall event, cooling pond constituent concentrations and water temperatures would be reduced significantly by the rainfall, before any discharge. In addition, the flow in the St. Lucie Canal would likely be very high, providing significant and rapid dilution of the discharge.

Thus, there are presently no significant thermal impacts on the receiving water body from the operations of the existing plant, and no change is expected as a consequence of the Project.

5.1.2 EFFECTS ON AQUATIC LIFE

There are two conditions where discharges from the cooling pond will occur: (1) testing the spillway gate, and (2) during very intensive wet periods (i.e., major storms). Discharges under either of these conditions will not result in adverse thermal impacts to aquatic biota in the St. Lucie Canal.

Thermal shock occurs as a result of short-term increases or decreases in water temperature. Temperature increases are most likely to impact biota during the summer, when water temperatures

are highest and many organisms are living at temperatures approaching their upper tolerance limits. Normally, mobile aquatic organisms such as fish can avoid adverse thermal conditions. Sessile organisms such as benthic macroinvertebrates may be affected depending upon their tolerance.

The infrequent thermal discharge from the Martin Plant cooling pond after construction of the Project will not exceed 92°F at edge of the authorized mixing zone. The change in temperature in the St. Lucie Canal will not be greater than 5°F. Natural summer temperature fluctuations in the St. Lucie Canal are greater than 5°F. Therefore, no significant adverse impacts from discharges will occur. In the winter, natural temperature changes in the St. Lucie Canal can also fluctuate more than 5°F. Therefore, no significant adverse impacts from possible winter discharges will occur.

In summary, any thermal changes in the canal under worst-case conditions will continue to be localized to the immediate vicinity of the point of discharge. Thermal discharges will meet applicable limits, and there will be no significant adverse impacts to aquatic life in waters of the state as a result of the project.

5.1.3 BIOLOGICAL EFFECTS OF MODIFIED CIRCULATION

No detrimental effects on aquatic life in the waters of the state are expected to result from the Project. The existing intake/discharge structures along the St. Lucie Canal will continue to be utilized. Historically, operation of the pumphouse at the St. Lucie Canal has caused no notable entrainment or impingement incidents of biota at the intake structure. Since diversions for the Project will not exceed the allowable or designed pumping rates and these allowable rates have been previously evaluated, no adverse impacts to the aquatic communities from impingement and entrainment are anticipated (see Section 5.1.3 of the Site Certification for the Martin CG/CC Project).

Since diversions from the St. Lucie Canal for cooling pond makeup with the Project will be within the currently authorized maximum withdrawal for the Martin Plant and these withdrawals have been previously evaluated during the permitting of the existing plant facilities, no adverse impacts are anticipated as a result of water withdrawals.

5.1.4 EFFECTS OF OFFSTREAM COOLING

5.1.4.1 Cooling Pond

Under this option, the Project may rely on the existing cooling pond for condenser cooling water. Since the Plant started operation in 1980, there have been no reported fogging problems associated with the cooling pond. Because the cooling pond operating temperatures with Martin Unit 8 are expected to be similar to existing conditions, the Project is not expected to result in a significant increase in the amount of fog in the area.

5.1.4.2 Optional Cooling Tower

The potential impacts of the optional mechanical draft cooling tower were addressed by performing plume dispersion analyses that predicted impacts with respect to:

- Plume Length,
- Plume Height,
- Plume Shadowing,
- Plume Fogging,
- Plume Icing, and
- Salt [from total dissolved solids (TDS)] Deposition.

Assessments of maximum seasonal and annual cooling tower impacts of potential plume-induced visibility effects, fogging and icing, and deposition of drift were predicted with the cooling tower impact model (SACTI), which was developed through the Electric Power Research Institute (EPRI, 1984). Standard hourly meteorological data of surface weather observations and coincident twice-daily mixing height data are used in the analysis and processed with cooling tower data (e.g., tower size, height, latitude/longitude) by a preprocessor program. The output meteorological record is utilized by the SACTI model to predict the increase in annual frequencies of meteorological events due to a particular cooling tower's design and configuration. Icing and fogging frequencies at a particular location are based on the prediction of the cooling tower's visible plume length under various ambient meteorological conditions. The impacts of the visible plumes are evaluated in the model through use of physical plume dispersion in conjunction with an algorithm to take into account the thermodynamic interactions of the plume as well as any potential wake effects. The SACTI model can also determine the potential drift and deposition frequencies by wind direction and distance category from a cooling tower.

The general parameters used in the modeling are presented in Table 5.1-2. A distribution of the predicted drift droplet sizes for the cooling tower design is presented in Table 5.1-3. The drift emissions from the cooling tower were based on the maximum concentration of TDS in the circulating water. The maximum concentrations were based on a maximum of five cycles of concentration with representative inlet water quality. The maximum TDS was 5,000 ppm. The maximum is, therefore, a conservative estimate of deposition.

Hourly surface meteorological data and twice-daily mixing height data from the West Palm Beach International Airport for the years 1987 through 1991 were used. This 5-year record coincides with the meteorological data used for other air impact analyses. Long-term monthly clearness indices and daily solar insulation values were also used.

Annual and seasonal impacts were predicted. The seasonal results are for winter (December, January, and February), spring (March, April, and May), summer (June, July, and August), and fall (September, October, and November).

The SACTI model calculations utilized a polar coordinate receptor grid system centered on the tower. Receptors were placed surrounding the source at 22.5-degree intervals and at varying distance intervals. For the drift deposition and plume length computations, 100-m intervals out to 10,000 m were used; for plume fogging and icing computations, 100-m intervals out to 1,600 m were used; for plume height, 10-m intervals up to 1,000 m were used; and for plume shadowing, 200-m intervals out to 8,000 m were used.

To estimate potential impacts conservatively, it was assumed that the tower operated year-round without plume abatement. This would produce conservative estimates of plume length, fogging, icing, plume shadowing, and salt deposition.

Cooling Tower Visibility

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

The frequencies of visible plume length, height, and shadowing, and hours of fogging resulting from the mechanical draft cooling towers without plume abatement are summarized in Table 5.1-4 for each season and annually. The table presents results for various increasing distances from the towers. The results indicate that the predicted frequency of an elevated visible plume is about the same during the winter as in the summer.

A maximum plume length of 200 m or less is predicted to occur about 0.2 percent of the time during the winter and about 0.2 percent during the summer, with an annual frequency of about 1.2 percent. Plume lengths of 300 m and less are predicted to occur less than 0.2 percent of the time on an annual basis.

The frequency for the heights of visible plumes is shown in Table 5.1-4. About 3.6 percent of the time, plume heights during the winter are 30 m and less. Plume heights of 30 m and less occur about 6.8 percent of the time in the summer. Plume heights of 30 m and less were predicted to occur about 4.5 percent of the time on an annual basis. Plume heights of greater than 50 m (150 ft) were predicted to occur only about 0.6 percent of the time on an annual basis.

Plume shadowing was estimated to decrease significantly with increasing distance from the cooling tower. Beyond 600 m (1,970 ft) from the tower, the annual average number of hours of plume shadowing in any direction is estimated to be less than 17.5 hours per year. This distance is within the boundary of the Martin Plant site. Plume shadowing is the best indicator of a highly visible plume since it the indicator of a distinct shadow. As shown in the Table 5.1-4, this effect occurs primarily close to the cooling tower.

The nearest main road to the site is SR 710, which runs in an approximately northwest-southeast direction approximately 1.6 miles (2.6 km) to the east of the cooling tower center. Ground level fogging is on SR 710 not predicted to occur during plume fogging conditions. The total hours per year of induced fogging surrounding the cooling tower is estimated to be about 23.7 hours (100 m from the cooling tower), all on plant property.

Rime icing is not predicted to occur from cooling tower drift.

Cooling Tower Deposition

Potential impacts to vegetation and soil may result from deposition of drift from cooling tower drift. A majority of available research on the impacts of deposition from cooling towers is from the use of makeup water that contains appreciable quantities of salt [i.e., sodium (Na^+) and chloride (Cl^-)]. Several plant species are considered to have very low resistance to salt. These species are flowering dogwood (*Cornus florida*), American sycamore (*Platanus occidentalis*), sassafras (*Sassafras albidum*), and arrowwood (*Viburnum dentatum*). Several studies have been conducted with dogwood because it is a reliable bioindicator of salt damage. The leaf injury threshold of dogwood has been calculated to be 750 kilograms per square kilometer per month (kg/km^2-mo) (Curtis *et al.*, 1976), 517 kg/km^2-mo (Davis, 1979), and 375 kg/km^2-mo (Freudenthal and Beals, 1978). In addition to flowering dogwood, Townsend (1980) found that American sycamore was equally sensitive to sodium chloride. McCune *et al.* (1977) found that white ash was more susceptible than dogwood to saline cooling tower drift.

Environmental factors other than salt drift concentration can affect species response to cooling tower drift. Grattan *et al.* (1981) reported that a low relative humidity increased the tolerance of pepper, soybean, and tomato plants to Na^+ and Cl^- uptake. No injury symptoms were apparent on any species at any salt deposition level when relative humidity was maintained at approximately 70 percent; however, in the presence of dew or 100-percent relative humidity, plant injury was linearly related to the amount of salt deposition on leaves.

Temperature influences ion absorption rates, with absorption rates decreasing as temperature decreases (Smith and Robinson, 1971). Rainfall amounts also influence symptomatic response of plants to salt drift. Mulchi and Armbruster (1981) observed that above-normal amounts of rainfall

delayed the onset of foliar symptoms, whereas below normal amounts of rainfall tended to promote the onset of symptoms and to enhance the magnitude of symptom expression for both corn and soybeans.

Susceptibility to foliar injury from saline aerosols also varies with the developmental stage of the leaf. McCune *et al.* (1977) found that younger leaves of deciduous woody species were more sensitive to saline aerosols than older leaves, whereas year-old needles of conifers were more susceptible to saline aerosols. Grattan *et al.* (1981) reported that young tomato and pepper leaves (<3 cm in length) were more severely injured than older, fully developed leaves.

Predicted seasonal and annual deposition rates in kilograms per square kilometer per month (kg/km^2-mo) are summarized in Table 5.1-4. The area of maximum predicted deposition rates is anticipated within 100 m of the cooling towers. The majority of deposition will occur near the cooling pond, which has the same chemical constituents as the deposition particles. At 100 m from the towers, the annual rate of deposition is 120 kg/km^2-mo and the highest seasonal rate is about 180 kg/km^2-mo. Taking together the low deposition rates, area of deposition impact and quality of the drift particles, no effect to onsite vegetation from cooling tower drift is anticipated. No offsite impacts will occur.

Vegetation may be affected by absorbing salts that accumulate in the soil. Accumulation will occur if the annual deposition rate of salt exceeds the rate at which salt is leached from the soil by rainfall. However, it is difficult to predict which plant species would be most affected by soil salinity, as tolerance to salt spray does not necessarily parallel known plant tolerances to soil salinity, but is governed by the rate of foliar absorption (Grattan *et al.*, 1981). Given the low deposition rates and the type of compounds in the drift particles, impacts are not anticipated by accumulation in the soils.

5.1.5 MEASUREMENT PROGRAM

FPL has maintained water quality sampling program in the vicinity of the Martin Plant site, in accordance with the site certification and Plant's Industrial Wastewater Facility Permit. The required monitoring will continue.

Since no significant impacts to surface water quality is expect from the Project, no additional monitoring is proposed.

Because there are no significant adverse ecological impacts due to the proposed project's heat dissipation system, no biological monitoring is proposed.

5.2 EFFECTS OF CHEMICAL AND BIOCIDE DISCHARGES

In connection with the site certification of the Martin CG/CC Project, an initial screening of water quality constituents was performed to identify parameters, which could occur in the cooling pond at levels which exceed ground water quality standards. The analysis was based on the following conservative assumptions:

1. All chemical constituents were present in the dissolved state;
2. No removal processes occurred within the cooling pond; and
3. Concentrations within the seepage were identical to those within the cooling pond.

Table 5.2-1 reproduces those results for Phase I as described in the initial site certification, and using the same methodology, presents results from the same screening analysis for the two alternative heat dissipation systems described in Section 3.5. Based on these results, cooling pond constituent concentrations with the addition of the Project will be no higher than those previously presented for Phase I of the initial site certification. That analysis showed that, if seepage reached the St. Lucie Canal, it would not cause any exceedances of Class III surface water quality criteria.

Only one of the constituents is predicted to be in the cooling pond at a level above its respective groundwater quality criterion. That constituent is lead, in Alternative 2, which is predicted by the screening analysis to marginally exceed the criterion. During the initial site certification process, lead was also predicted during the screening analysis to slightly exceed the Class III surface water quality standard (at that time lead was not included on the primary drinking water constituent list), and further analysis was performed. That analysis indicated that sufficient lead would be removed from the pond water by being sorbed onto suspended sediments within the pond.

Subsequent to the initial site certification, FPL performed a physical simulation of the concentration effect of the cooling pond. This physical model was run for a 2-year period during which the cycles of concentration were established at 6.3 times relative to the St. Lucie Canal. With respect to lead, the results indicated that the initial SCA analysis overestimated the ambient lead concentrations in the St. Lucie Canal by a factor of more than 3 (.0054 vs. .0016 mg/L). If the ambient concentration

of lead in the makeup water is corrected to the concentration indicated by the physical model study, the resulting screening analysis value for lead in the cooling pond becomes 0.0061 mg/L, which is well below the criteria (.015 mg/L).

Thus, the conclusion is that the addition of the Project will not cause any of the constituent concentrations in the cooling pond to exceed applicable standards for either groundwater or surface water.

5.2.1 INDUSTRIAL WASTEWATER DISCHARGES

Treated industrial wastewater is recycled onsite by routing treated wastewater back to the cooling pond. Consequently, discharges of water from the cooling pond constitute the only discharge of industrial wastewater from the site to waters of the State. These discharges occur on an infrequent and limited basis. Three surface water discharges are covered by the existing NPDES permit. These include the discharge of cooling pond water during spillway gate testing, discharge of excess rainwater to keep the pond within acceptable water levels, and seepage discharge of the east drainage ditch which discharges to the intake/discharge canal. Each discharge is described further below.

5.2.1.1 Surface Water Discharges

Cooling pond water is discharged annually to test the spillway gates. This pre-planned discharge is sampled under the existing water quality monitoring program. Table 5.1-1 shows the releases from the spillway since 1997.

Cooling pond water also may be discharged if the cooling pond water level exceeds the limits set by the agreement with SFWMD. Discharge from the cooling pond in these circumstances would only occur after the influx of a large amount of rainfall. In fact no discharge has occurred. Furthermore, rainfall would dilute the cooling pond concentrations, as well as those of the receiving water body. Consequently, spillway discharges are not expected to impact water quality in the St. Lucie Canal and are not expected to cause exceedances of any water quality standards.

5.2.1.2 Groundwater Discharges

Groundwater discharges of industrial wastewater occur only through seepage from the cooling pond. Generally, pond seepage leaves the pond beneath its western and southern edges and moves toward

the L-65 and the St. Lucie Canals where it reenters the surface water regime. Given the proximity and the depths of the canals, a significant majority of the seepage will be intercepted. No significant impacts to groundwater quality are expected (see Section 5.2).

5.2.2 MEASUREMENT PROGRAMS

5.2.2.1 Surface Water

FPL's existing monitoring programs are adequate to ascertain compliance of surface water discharges with State of Florida surface water criteria. No additional monitoring is proposed.

5.2.2.2 Groundwater

As discussed in Subsection 5.2.1.2, groundwater discharges are predominately intercepted by the L-65 and the St. Lucie Canals. FPL's existing monitoring programs are adequate to ascertain compliance of surface water discharges with State of Florida surface water criteria. No additional monitoring is recommended.

5.3 IMPACTS ON WATER SUPPLIES

5.3.1 SURFACE WATER

As described in Section 2.3, most of the surface water used within 5 miles of the site is used for industrial purposes and agricultural irrigation. In general, impacts to surface water supplies are caused by withdrawals, point source discharges, and stormwater runoff.

The only withdrawal from surface water associated with the project will be the makeup water to the cooling pond, which is pumped from the St. Lucie Canal. Current authorized consumptive use for cooling pond makeup is 32,000 and 50,000 acre-feet per year, average annual and maximum annual, respectively. The makeup water needed for the Martin Unit 8 is predicted to be within the permitted consumptive use totals. Therefore, no impact is expected.

The cooling pond at the Martin Plant site has infrequent discharges to the St. Lucie Canal. As seen in Table 5.1-1, annual releases have been small compared to the average daily flow within the St. Lucie Canal (less than 0.1 percent of the June average daily flow). This discharge is not expected to have any significant impact on water supplies.

Surface water runoff from the Project is routed through detention basins, which are designed to comply with the performance requirements of the SFWMD; therefore, discharge from the detention basins is expected to meet state water quality standards. The existing stormwater ponds were previously designed and constructed to accommodate full plant buildout. Consequently, no impact on area water supplies from stormwater runoff is anticipated.

5.3.2 GROUNDWATER

The only groundwater impacts expected from the operation of this Project are associated with seepage from the cooling pond. Generally, seepage leaves the pond beneath its western and southern edges and moves toward the L-65 and the St. Lucie Canals, where it reenters the surface water regime. Given the proximity and the depths of the canals, a significant fraction of the seepage will be intercepted. Seepage from the north and east sides of the pond is captured by the toe ditch and pumped back to the pond. Table 5.2-1 shows projected water quality parameters for the cooling pond. The Project is expected to meet applicable groundwater standards.

5.3.3 DRINKING WATER

Seepage from the cooling pond is projected to impact water quality within the uppermost layers of the surficial aquifer. Eventually, the pond, in its normal operation, will double the concentrations of many constituents in its makeup water. The Project is expected to meet applicable groundwater standards. The only known potable water wells within 1 mile of the site are those operated by FPL. No appreciable impacts to other groundwater consumers have been identified.

5.3.4 RUNOFF AND LEACHATE

Operation of Unit 8 is not anticipated to generate leachate. The facility has been designed to minimize direct discharge to surface waters. All contact waters are routed through an oil/water separator and then discharged to the cooling pond. Non-contact stormwater runoff is collected and routed to an existing stormwater detention pond. The existing pond has been previously sized to accommodate storage/retention requirements associated with all three phases of the CG/CC Project. The stormwater system is designed to be adequate in routing the entire 25-year, 72-hour storm. Therefore, no significant impacts to water supplies are expected due to runoff or leachate.

5.4 IMPACTS FROM DISPOSAL OF BYPRODUCTS AND SOLID AND HAZARDOUS WASTES

5.4.1 SOLID WASTE

As explained in Section 3.7.2, all solid wastes generated during plant operations will be disposed of in offsite licensed landfills or by other approved methods. The operation of Unit 8 will generate minor amounts of solid wastes (e.g., used turbine inlet filters), and the number of plant employees will increase only slightly. Therefore, there will be no adverse impacts resulting from solid waste generated by the project.

5.4.2 HAZARDOUS WASTE

The types of hazardous wastes currently generated at the Martin Plant are not anticipated to change as a result of operation of Unit 8. FPL instituted an aggressive pollution prevention and waste minimization program at the Martin Plant in 1993. This program has resulted in a reduction of hazardous waste quantities so that the Martin Plant could qualify as a small quantity generator. Historical volumes of hazardous waste generated at the site on an annual basis include:

- Paint Solids--approximately 1 drum,
- Solvent Liquids--approximately 2 drums,
- Laboratory Waste Liquids--approximately 3 drums, and
- Parts Cleaner--approximately 1,687 kg.

FPL has a contract with Chemical Waste Management to transport and dispose of hazardous waste at licensed facilities in a manner that complies with environmental regulations. Therefore, no impacts are anticipated from hazardous wastes generated at the Martin Plant.

5.5 SANITARY AND OTHER WASTE DISCHARGES

No additional sanitary facilities are proposed as part of this expansion. The existing sanitary waste system consists of an equalization tank, an aeration tank, a clarifier, and an aerobic digester. Digested sludge is hauled offsite. Treated wastewater is returned to the cooling pond for reuse. The existing system is sufficient to accommodate the slight increase in staffing expected with the addition of Unit 8.

5.6 AIR QUALITY IMPACTS

5.6.1 IMPACT ASSESSMENT

5.6.1.1 Regulatory Applicability

Analyses were performed to estimate the potential air quality impacts of pollutant emissions from the Project. These analyses are discussed in detail in the PSD Permit Application contained in Appendix 10.1.5. The technical information and analysis required by the federal and state PSD regulations are contained in the PSD application document. Although the PSD application document is an appendix to the SCA, it has been prepared as a stand-alone PSD application to allow FDEP, EPA, and other involved agencies to readily review the Project's air emissions and impacts. The following sections present a summary of the air modeling approach used and air quality impacts obtained. These results demonstrate that the proposed project will comply with all AAQS and PSD Class II and I increments.

Under federal and State of Florida PSD review requirements, all major new or modified sources of air pollutants regulated under the Clean Air Act (CAA) must be reviewed and a pre-construction permit issued. EPA has approved Florida's State Implementation Plan (SIP), which contains PSD regulations; therefore, PSD approval authority has been granted to FDEP. The EPA has promulgated PSD regulations under 40 CFR Part 52.21 and implemented through delegation to the FDEP. Florida's PSD regulations are codified in Florida Rule 62-212.400, F.A.C.

A "major facility" is defined as any one of 28 named source categories that have the potential to emit 100 TPY or more or any other stationary facility that has the potential to emit 250 TPY or more of any pollutant regulated under the CAA. A "major modification" is defined under PSD regulations as a change at an existing major facility that increases emissions by greater than significant amounts. "Potential to emit" means the capability, at maximum design capacity, to emit a pollutant after the application of control equipment. Once a new source is determined to be a "major modification" for a particular pollutant, any pollutant emitted in amounts greater than the PSD significant emission rates is subject to PSD review.

The existing Martin Plant is classified as a major source because it is one of the named source categories and has the potential to emit more than 100 TPY of at least one regulated pollutant. The

Project is a proposed major modification to an existing major source since Unit 8's emissions are greater than the PSD significant emission rates for several regulated pollutants.

Annual emissions for the Project are presented in Table 5.6-1 and are compared to the PSD significant emission net increase thresholds. Based on the proposed emissions for the Project, PSD review is required for each of the following regulated pollutants:

- Particulate matter (PM) as total suspended particulate matter (TSP),
- Particulate matter with aerodynamic diameter of 10 microns or less (PM_{10}),
- Sulfur dioxide (SO_2),
- Nitrogen dioxide (NO_2),
- Carbon monoxide (CO),
- Volatile organic compounds (VOCs), and
- Sulfuric acid mist.

Martin County has been designated as an attainment area for all criteria pollutants [i.e., ozone (O_3), PM_{10}, SO_2, CO, and NO_2] and is classified as a PSD Class II area for PM_{10}, SO_2, and NO_2.

PSD review is used to determine whether significant air quality deterioration will result from new or modified facilities. The following analysis related to PSD are required for each pollutant emitted in significant amounts:

- Control technology review,
- Source impact analysis,
- Air quality analysis (monitoring),
- Source information, and
- Additional impact analyses.

The control technology review requirements of the federal and state PSD regulations require that all applicable federal and state emission-limiting standards be met, and that Best Available Control Technology (BACT) be applied to control emissions from the source. The BACT requirements are intended to ensure that the control systems incorporated in the design of a proposed facility reflect the latest in control technologies used in a particular industry and take into consideration existing and future air quality in the vicinity of the proposed facility. BACT must, as a minimum, demonstrate

compliance with NSPS) for a source (if applicable). An evaluation of the air pollution control techniques and systems, including a cost-benefit analysis of alternative control technologies capable of achieving a higher degree of emission reduction than the proposed control technology, is required. The cost-benefit analysis requires the documentation of the materials, energy, and economic penalties associated with the proposed and alternative control systems, as well as the environmental benefits derived from these systems. A decision on BACT is to be based on balancing environmental benefits with energy, economic, and other impacts.

A source impact analysis must be performed for criteria pollutants to address compliance with AAQS and PSD Class II and I increments. These analyses may be limited to the new source if the net increases in impacts as a result of the new source are below significant impact levels. The significant impact levels are threshold levels that are used to determine the level of air impact analyses needed for the project. If the new source's impacts are predicted to be less than significant, then the source's impacts are assumed not to have a significant adverse affect on air quality and additional modeling with other sources is not required. However, if the source's impacts are predicted to be greater than the significant impact levels, additional modeling with other sources is required to demonstrate compliance ambient.

An air quality monitoring analysis must be performed that contains an analysis of continuous ambient air quality data in the area affected by the proposed major stationary facility. Existing data from the vicinity of the proposed source may be used if the data meet certain quality assurance requirements; otherwise, additional data may need to be gathered. The regulations also include an exemption that excludes or limits the pollutants for which an air quality analysis must be conducted if the air quality impacts for the proposed source are predicted to be less than the *de minimis* levels.

Source information must be provided to adequately describe the proposed project. The general type of information required for this Project is presented in Appendix 10.1.5.

Additional analyses of the proposed source's impacts on soils, vegetation, and visibility, especially as they affect PSD Class I areas, must be performed. Air quality impacts as a result of general commercial, residential, industrial, and other growth associated with the source also must be addressed.

The following sections describe the methods and assumptions used to determine the air quality impacts due to the Project and provide a summary of the maximum air quality impacts associated with operation of Unit 8.

5.6.1.2 Analysis Approach and Assumptions

General Modeling Approach

The air quality modeling approach for the Project followed EPA and FDEP modeling guidelines for determining compliance with AAQS and PSD increments. In general, when model predictions are used to determine compliance with AAQS and PSD increments, current policies stipulate that the highest annual average and highest, second-highest (HSH) short-term (i.e., 24 hours or less) concentrations are to be compared to the applicable standard when a 5-year period of meteorological data is used. The HSH concentration is calculated for a receptor field by:

1. Eliminating the highest concentration predicted at each receptor,
2. Identifying the second-highest concentration at each receptor, and
3. Selecting the highest concentration among these second-highest concentrations.

This approach is consistent with the air quality standards, which permit a short-term average concentration to be exceeded once per year at each receptor. Because Unit 8's maximum impacts are predicted to be less than the significant impact levels, only the highest concentrations due to Unit 8's emissions were evaluated

To predict the maximum annual and short-term concentrations for the proposed Project, the modeling approach was divided into screening and refined phases. Concentrations are predicted for the screening phase using a coarse receptor grid and a 5-year meteorological data record. If the highest concentration is predicted at a receptor that lies in an area where the receptor spacing is more than 100 m, then a refined analysis is performed in that area using a receptor grid of greater resolution. Modeling refinements are performed using a receptor spacing of 100 m or less with a receptor grid centered on the screening receptor at which the maximum concentration was predicted. The air dispersion model is then executed with the refined grid for the entire year of meteorology during which the screening concentration occurred.

This approach was used to ensure that valid highest concentrations were obtained. Descriptions of the emission inventory and receptor grids used in the screening and refined phases of the analysis are presented in the following sections with detailed discussions given in the PSD Permit Application, Appendix 10.1.5.

Air Quality Models

The selection of an air quality model to calculate air quality impacts for this Project was based on the models' ability to simulate impacts in areas surrounding the Martin Plant site as well as at the PSD Class I area of the Everglades NP, located about 144 km from the site. Two air quality dispersion models were selected and used in these analyses to address air quality impacts for the project. These models were the:

- Industrial Source Complex Short Term (ISCST3) dispersion model, and
- California Puff model (CALPUFF).

The ISCST3, Version 00101, dispersion model (EPA, 2000) was used to evaluate the maximum pollutant impacts due to the Project in nearby areas surrounding the Project Site. The ISCST3 model is applicable for estimating the air quality impacts in areas that are within 50 km from a source. This model is maintained by the EPA on its Internet website, Support Center for Regulatory Air Models (SCRAM), within the Technical Transfer Network (TTN).

The ISCST3 model is designed to calculate hourly concentrations based on hourly meteorological data (i.e., wind direction, wind speed, atmospheric stability, ambient temperature, and mixing heights). The ISCST3 model is applicable to sources located in either flat or rolling terrain where terrain heights do not exceed stack heights. These areas are referred to as simple terrain. The model can also be applied in areas where the terrain exceeds the stack heights. These areas are referred to as complex terrain.

The Martin Plant site is about 32 feet above mean sea level (ft-msl). Around the immediate vicinity of the site, the terrain is flat to gently rolling with elevations that range within about 10 to 20 ft of the site elevation. Due to the minimal amount of terrain elevation differences in the Project's vicinity, receptor elevations were not included in the analysis. As a result, the simple terrain option was used

for the air modeling analysis, which assumes that all receptors are at the same elevation as the stack base elevations for the Unit 8's stacks.

At distances beyond 50 km from a source, the CALPUFF model, Version 5.4 (EPA, 2000), is recommended for use by the EPA and the Federal Land Manager (FLM). The CALPUFF model is a long-range transport model applicable for estimating the air quality impacts in areas that are more than 50 km from a source. The CALPUFF model is maintained by the EPA on the SCRAM internet website. The methods and assumptions used in the CALPUFF model are based on the latest recommendations for modeling analysis as presented in the following reports:

- Interagency Workgroup on Air Quality Models (IWAQM), *Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts* (EPA, 1998); and
- *Federal Land Manager's Air Quality Relative Values Workgroup (FLAG) Phase I Report* (December, 2000).

In addition, updates to the modeling methods and assumptions were followed based on discussions with the FLM.

The CALPUFF model was used to perform a significant impact analysis for the Project at the PSD Class I area of Everglades National Park (NP) and to assess the Project's impact on regional haze and total nitrogen and sulfur deposition levels.

For modeling analyses that will undergo regulatory review, such as PSD permit applications, the following model features are recommended by EPA for rural mode and are referred to as the regulatory default options in the ISCST3 model and, where applicable, the CALPUFF model:

1. Final plume rise at all receptor locations,
2. Stack-tip downwash,
3. Buoyancy-induced dispersion,
4. Default wind speed profile coefficients for rural mode,
5. Default vertical potential temperature gradients, and
6. Calm wind processing.

In this analysis, the EPA regulatory default options were used to address maximum impacts.

Meteorological Data

Meteorological data used in the ISCST3 model to determine air quality impacts consisted of a concurrent 5-year period of hourly surface weather observations and twice-daily upper air soundings from the NWS office located at the PBI. The 5-year period of meteorological data was from 1987 through 1991. The NWS office at the airport is located approximately 45 km southeast of the site and is the closest primary weather station to the study area considered to have meteorological data representative of the project site. These meteorological data have been approved by the FDEP and used for numerous air modeling studies submitted as part of air construction permits approved for sources located in Palm Beach County.

CALMET, the meteorological preprocessor to CALPUFF, was used to develop a 3-dimensional wind field necessary to perform the air modeling analysis to evaluate pollutant impacts at the PSD Class I area. The modeling domain covered an area over south Florida that consisted of a rectangular 3-dimensional grid that extended from approximately 79.0 to 83.5 degrees longitude and from 23.75 to 28.0 degrees latitude. The modeling domain includes the following meteorological and land use parameters:

- Surface weather data,
- Upper air data,
- A 1-degree land use data,
- A 1-degree Digital Elevation Model (DEM) terrain data,
- Mesoscale Model - Generation 4 (MM4) data (for initializing the wind field), and
- Hourly precipitation data.

These data were obtained and processed for the calendar year 1990, the year for which MM4 data are available on CD. The CALMET wind field and the CALPUFF model options used were consistent with the suggestions of the FLMs. Meteorological data used with the CALPUFF model consist of a CALMET-developed wind field covering south Florida.

Emission Inventory

Emission rates for regulated pollutants and stack and operating parameters for the Unit 8 CTs and duct burners were developed for combined- and simple-cycle configurations from design data supplied by equipment vendors for the Project. The emission and stack operating parameters were

developed for use in the air modeling analysis for three operating loads and 35°F, 59°F, and 95°F ambient temperatures for the four CTs firing natural gas and light oil. Additional operating cases were also considered that included power augmentation and high-power mode for the CTs firing natural gas. In an effort to obtain the maximum air quality impacts for a range of possible operating conditions, the air modeling used a range of emission rates and stack parameter data to predict air quality impacts.

A total of 42 modeling scenarios were considered for simple-cycle and combined cycle configuration with the CTs operating over a range of operating loads (100, 75 and 50 percent), turbine inlet air temperature (35, 59 and 95°F), fuels (gas and light oil), and operating conditioning (high power mode and duct firing).

These modeling scenarios encompass the operating conditions that will produce the maximum emissions on a short-term basis (i.e., 100-percent load at 35°F) and the minimum plume rise (i.e., 50-percent load at 95°F).

The stack, operating, and emission data used in the air dispersion modeling are presented in Appendix 10.1.5

Receptor Locations

To determine the maximum impact for all pollutants and averaging times in the Project's vicinity, concentrations were predicted at receptors located in a detailed polar receptor grid centered on the modeling origin. This grid was comprised of 180 radials, spaced at 2-degree intervals along each radial. Receptors were located at the following distances from the origin:

- Every 100 m out to 3 km;
- Every 250 m from 3 to 7 km;
- Every 500 m from 7 to 10 km; and
- Every 5,000 m from 10 to 30 km.

Cartesian receptors were placed every 50 m along the plant boundary.

To determine the 24-hour average SO_2 significant impact area for the Project, a second receptor grid was developed using a polar receptor grid centered on the modeling origin. This grid was comprised of 180 radials, with receptors spaced at 2-degree intervals along each radial. Receptors were located every 1,000 m out to a distance of 15 km from the modeling origin. Additionally, 657 Cartesian receptors, spaced at 50 m, were used to predict impacts along the plant boundary.

For each pollutant and averaging time, modeling refinements were performed, as needed, by employing a Cartesian receptor grid with a maximum spacing of 100 m centered on the receptor and for the year during which the maximum impact from the Project was predicted.

For the PSD Class I analysis, the maximum concentrations were predicted at 126 receptors surrounding the PSD Class I area of the Everglades NP. These receptors have been provided by the FDEP for use on previous applications.

5.6.1.3 Model Results

The maximum pollutant concentrations predicted for Unit 8 operating in simple cycle and combined cycle configurations for natural gas- and light oil-firing are given in Table 5.6-2. The modeling results indicated that maximum concentrations due to the Project are predicted to be less than the significant impact levels for all pollutants except SO_2 for the 24-hour averaging period when the CTs are firing fuel oil. The significant impact area for the project's SO_2 concentrations extends out approximately 9 km from the Project. As a result, additional modeling analyses were performed to address compliance with the 24-hour average SO_2 AAQS and PSD Class II increments.

The modeling analysis results for the Project at the Everglades NP are summarized in Table 5.6-3. When firing natural gas, the primary fuel, the maximum SO_2, PM_{10}, and NO_2 pollutant concentrations are predicted to be well below the EPA proposed PSD Class I significant impact levels. When firing fuel oil, the maximum 24-hour average SO_2 concentrations were also predicted to be below the EPA proposed PSD Class I significant impact levels for all pollutants, except SO_2 for the 24-hour average period with the CTs firing light oil. Therefore, a more detailed analysis for determining compliance with the 24-hour average SO_2 PSD Class I increment was performed.

The maximum PM_{10}, SO_2, NO_2, and CO impacts due to the Project operating in simple cycle and combined cycle configurations are also predicted to be below the *de minimis* monitoring levels. Because the proposed source will not have predicted impacts greater than *de minimis* levels, preconstruction monitoring data are not required to be submitted as part of the PSD review.

In the case of O_3, the Project's VOC emissions are greater than the monitoring emission level of 100 TPY. Therefore, pre-construction ambient monitoring analyses for O_3 (based on VOC emissions) are required to be submitted as part of the application. It should be noted that Martin County and adjacent counties are classified as attainment for O_3. Although there are no O_3 monitors located in Martin County, O_3 concentrations are measured at Fort Pierce in St. Lucie County (AIRS No. 12-111-0012), located approximately 50 km to the northeast of the Project. Since O_3 is a regional pollutant, O_3 monitoring data collected in St. Lucie County are considered to be representative of O_3 concentrations for the region and can be used to satisfy this requirement for the project. This station is operated by the FDEP and measures concentrations according to EPA procedures. As indicated by monitoring data collected over the last 4 years, the highest O_3 concentrations measured at this monitoring station have complied with the O_3 AAQS. These O_3 monitoring data are presented as part of this application to satisfy the preconstruction monitoring requirement for the Project.

Summaries of the maximum 24-hour average SO_2 concentrations predicted for the Project and other SO_2 emissions sources for comparison to the AAQS, PSD Class II increment, and PSD Class I increment are provided in Table 5.6-4.

The maximum HSH 24-hour average SO_2 concentration for estimating total air quality impacts is predicted to be 109 micrograms per cubic meter ($\mu g/m^3$), which is well below the Florida AAQS of 260 $\mu g/m^3$. This total air quality concentration includes a non-modeled 24-hour average background SO_2 concentration of 34 $\mu g/m^3$ based on the highest 24-hour average concentration measured in the region over the last several years.

The maximum HSH 24-hour average SO_2 concentration for estimating PSD Class II increment consumption is predicted to be 41.4 $\mu g/m^3$, which is below the allowable PSD Class II increments of 91 $\mu g/m^3$.

The maximum HSH 24-hour average SO_2 concentration for estimating PSD Class I increment consumption is predicted to be 3.5 $\mu g/m^3$, which is below the allowable PSD Class I increments of 5 $\mu g/m^3$.

The maximum impacts predicted for the Project, by itself and together with other emission sources, demonstrate compliance with, the AAQS and PSD Class II and I increments.

5.6.1.4 Additional Impact Analysis

Impacts Due To Direct Growth

The Project is being constructed to meet FPL and its customers need for capacity in future years. FPL is obligated to provide reliable and adequate electric service to meet its customers demand. Additional growth as a direct result of the additional electric power provided by the Project is not expected.

Construction of the Project will occur over a 24-month period requiring an average of approximately 250 workers during that time. It is anticipated that many of these construction personnel will be drawn from outside the Project area and will commute to the job site.

The Project will employ a total of 12 operational workers at project build-out. The operational workforce will also include annual contracted maintenance workers to be hired for periodic routine services. It is expected that most of these workers will be contracted from outside the region. The workforce needed to operate the Project represents a small fraction of the population already present in the immediate area. Therefore, while there would be a very slight increase in vehicular traffic in the area, the effect on air quality levels would be minimal.

There are also expected to be no air quality impacts due to associated industrial/commercial growth given the Project's location on the existing Martin Plant site. The existing commercial infrastructure should be more than adequate to provide any support services that the Project might require.

Impacts on Soils, Vegetation, Wildlife, and Visibility

The potential effects of the Project on soils, vegetation, wildlife, and visibility in the local vicinity of the Martin Plant Site and at the PSD Class I area of the Everglades NP are also not expected to be

significant. Certain air pollutants in acute concentrations or chronic exposures can impact soils, vegetation, and wildlife. Based on available literature, soils impacts can result from SO_2 and NO_2 deposition creating an acidic reaction or lowering of soil pH. Vegetation is sometimes affected by acute exposures to high concentrations of pollutants often resulting in foliar damage. Lower dose exposure over longer periods of time or chronic exposure can often affect physiological processes within plants causing internal and external damage.

Based on an evaluation of the literature for effects from SO_2, acid rain (sulfuric acid mist), NO_2, CO, and combinations of these pollutants, emissions from the Project will not result in impacts that cause harm to soils and vegetation. Maximum concentrations of SO_2, PM_{10}, NO_2, and CO in the vicinity of the Martin Plant site are predicted to be lower than the EPA Class II significant impact levels for all pollutants, except SO_2 for the 24-hour averaging time when the CTs are firing fuel oil. When modeled with other sources, the maximum SO_2 concentrations are predicted to be less than the AAQS and PSD Class II increments. Since the Project's impacts are predicted to be less than the significant impact levels and AAQS that are designed to protect the public welfare, including effects on soils and vegetation, no detrimental effects on soils or vegetation should occur in this area.

Maximum concentrations of SO_2, PM_{10}, and NO_2 at the PSD Class I area of the Everglades NP are predicted to be lower than the EPA Class I significant impact levels, except SO_2 for the 24-hour averaging SO_2 concentration when the CTs are firing fuel oil. When Unit 8 is modeled with other increment consuming sources, the maximum SO_2 concentrations are predicted to be less than the PSD Class I increments. Since the Project's impacts are predicted to be less than the significant impact levels (PM_{10} and NO_2) and PSD Class I increments (SO_2) no detrimental effects on soils or vegetation should occur in this area.

The major air quality risk to wildlife in the United States is from continuous exposure to pollutants above the National AAQS. This occurs in non-attainment areas, none of which are located in Florida. Risks to wildlife also may occur for wildlife living in the vicinity of an emission source that experiences frequent upsets or episodic conditions resulting from malfunctioning equipment, unique meteorological conditions, or startup operations. Under these conditions, chronic effects (e.g., particulate contamination) and acute effects (e.g., injury to health) have been observed. For impacts on wildlife, the lowest threshold values of SO_2, NO_2, and particulates that are reported to cause

physiological changes are up to orders of magnitude larger than maximum concentrations predicted to result from operation of Unit 8. As a result, no effects on wildlife due to SO_2, NO_2, and particulate impacts from the Project are expected.

No visibility impairment is expected from the Project in the immediate vicinity of the plant site or at the PSD Class I area at the Everglades NP due to the type and quantities of emissions proposed for the Project sources. Opacity levels from the combustion exhausts from the Project will be low and are typically at or approaching zero. Emissions of PM_{10} and SO_2 will also be low due to the primary use of low-sulfur content natural gas, the cleanest fuel commercially available. While the Project will emit NO_x and VOC, the potential to impair visibility at the local level, or to cause regional haze at the PSD Class I area, should be relatively low, given the very low expected emissions. As a result, the Project will not adversely affect visual qualities in the area.

5.6.2 MONITORING PROGRAMS

5.6.2.1 Ambient Air Quality Monitoring

Pre- and post-construction ambient air quality monitoring is not anticipated to be required for this Project since the air quality analyses demonstrate that the Project's impacts are less than the *de minimis* monitoring thresholds or that ambient monitoring data representative of the Project site are measured in the region. Air quality concentrations at and in the region of the Martin Plant comply and are anticipated to continue to comply with all applicable ambient standards.

5.6.2.2 Air Emissions Monitoring

The Project will be subject to the applicable NSPS for the CTs (40 CFR Part 60, Subpart GG) and the duct burners (40 CFR Part 60, Subpart Db) and acid rain program (40 CFR 75). Continuous monitoring will be conducted for the Project CTs as required by Subpart GG. Monitoring of fuel sulfur and nitrogen content will also be performed pursuant to Subpart GG, 60.334(b). Initial performance testing of the CTs for SO_2 and NO_x emissions will be conducted as required by Subpart GG, 60.335.

Continuous emission monitoring (CEM) for SO_2 and NO_x is required for gas- and oil-fired affected units in accordance with the provisions of 40 CFR 75. SO_2 emissions may be determined using procedures established in Appendix D, 40 CFR Part 75. CO_2 emissions must also be determined

either through CEM (e.g., as a diluent for NO_x monitoring) or calculation. Alternate procedures, test methods, and quality assurance/quality control (QA/QC) procedures for CEM are specified (Part 75 Appendices A through I). The CEM requirements, including QA/QC procedures are, in general, more stringent than those specified in the NSPS for Subpart GG. New units are required to meet the requirements not later than 90 days after the unit commences commercial operation. The Project will be required to either install CEMs for NO_x or to meet the Part 75 requirements.

Initial and periodic compliance testing of pollutants emitted by the Project will be conducted pursuant to the FDEP requirements as specified in the FDEP Air Constructional PSD Permit in accordance with Section 62-297.401, F.A.C.

5.7 NOISE

5.7.1 IMPACTS TO ADJACENT PROPERTIES

5.7.1.1 Existing and Proposed Noise Sources

The proposed noise sources and their octave band and overall sound power level, without and with the optional 18-cell cooling towers, are listed in Tables 5.7-1 and 5.7-2, respectively. Noise levels of the existing Martin Power Plant sources were measured using the procedures described in Section 2.3.8.2 during the baseline noise measurement portion of the impact evaluation.

The existing power plant (Units 1 and 2, and Combined Cycle Units 3 and 4) will continue to operate and emit noise after the Project is complete. Additionally, new equipment will be added in association with the Project, which will also emit noise. These new noise sources include the inlet air filters of the gas turbines, the gas turbines, the HRSGs and their stacks, and the power transformers, as well as the optional cooling tower. The inlet air system will include silencers. Unlike the existing steam generators, the HRSGs do not have ID fans that generate noise; the CT and steam noise will be reduced through the HRSG's thermal insulation.

5.7.1.2 Noise Impact Methodology

Sound propagation involves three principal components: a noise source, a person or a group of people, and the transmission path. While two of these components, the noise source and the transmission path, are easily quantified (i.e., direct measurements or through predictive calculations), the effects of noise to humans is the most difficult to determine due to the varying responses of

humans to the same or similar noise patterns. The perception of sound (noise) by humans is very subjective, and just like odors and taste, is very difficult to predict a response from one individual to another.

The impact evaluation of the proposed Project was performed using CADNA A, an environmental noise propagation computer program that was developed to assist with noise propagation calculations for major noise sources and projects. Noise sources are entered as octave band sound power levels, L_w. Locations of the noise sources, buildings, and receptors are input directly on the base map and can be edited throughout the modeling process. All noise sources are assumed to be a point, line, area or vertical area source, and can be specified by the user. Sound propagation is calculated by accounting for hemispherical spreading and three other user-identified attenuation options: atmospheric attenuation, path-specific attenuation, and barrier attenuation. Atmospheric attenuation is calculated using the data specified by the Calculation of the Absorption of Sound by the Atmosphere (ANSI, 1999). Path-specific attenuation can be specified to account for the effects of vegetation, foliage, and wind shadow. Directional source characteristics and reflection can be simulated using path-specific attenuation. Barrier attenuation is calculated by assuming an infinitely long barrier perpendicular to the source-receptor path. Total and A-weighted SPLs are calculated. The sound power levels for the various major noise sources of the Project are provided in Appendix A. These sources include the CT air inlets, CT exhaust ducts, the HRSGs, and stack and power transformers, as well as the optional cooling towers.

The noise impact modeling was performed to predict the maximum noise levels produced by the proposed and existing noise sources with background noise levels. Atmospheric and ground attenuation were assumed for all sites. The source data used in the analysis are contained in Tables 5.7-1 and 5.7-2 (without and with an 18-cell cooling tower). Background L_{90} levels measured during the baseline noise study were included in the predicted maximum SPLs calculated for each critical receptor (i.e., residential, agricultural, commercial, etc.).

The critical receptors selected for the analysis consisted of five residential and agricultural land use areas, plus one onsite (industrial) monitoring location where ambient noise measurements were taken (refer to Section 2.3.8). The residential area closest to the facility is Site 5. Since there are no federal or state noise standards applicable to the Project, the applicable maximum noise level for this

area is promulgated by Martin County Noise Ordinance. Martin County ordinance limit sound levels to 60 and 55 A-weighted decibels (dBA), daytime and nighttime, respectively, for residential land uses for daytime and nighttime, respectively. The ordinance defines an ambient noise as L_{90} (refer to Section 2.3.8).

5.7.1.3 Results

Comparison to Martin County Noise Standards

The noise impact modeling was performed to predict the maximum noise levels produced by the proposed and existing noise sources without the background noise levels. Background noise levels measured at each receptor were combined with the modeling results. Atmospheric attenuation was assumed for all sites.

Tables 5.7-3 and 5.7-4 present the observed and predicted noise levels at 5 of the monitoring locations. Table 5.7-3 presents the results without the cooling tower, and Table 5.7-4 presents the results with the cooling tower. The observed background noise levels include the operation of existing Units 1, 2, 3, and 4 and are the L_{90} noise levels. The Martin County noise control ordinances defines "ambient noise level" as the L_{90}, which is the a-weighted sound pressure level exceeded ninety percent of the time. This ambient noise level would be the background sound level from which a comparison to the Martin County noise ordinance would be made.

The nearest residential receptors are the residences to the north of the project (refer to Section 2.3.8). The predicted noise level impacts at these receptors, due to the project only, are less than 36 dBA for Unit 8 without the cooling tower (Table 5.7-3). Indeed, the predicted noise levels from Unit 8 at these two residential receptors (Sites 5 and 6) are 34.6 and 33.2 dBA, respectively. With the cooling tower, the predicted noise levels for Unit 8 increase by less than 2 dBA with all values less than 47 dBA.

Table 5.7-3 and 5.7-4 present the predicted noise levels with the L_{90} sound levels measured during the monitoring. As shown in these tables, the noise generated by operation along with the "ambient noise level" as defined by the county ordinance is well below the maximum permissible noise levels.

The predicted nighttime impacts for Unit 8 when combined with the observed background concentration, are less than the Martin County noise control ordinance. The predicted noise impacts for Martin Unit 8 with the optional cooling tower and including the background noise levels at off-site monitoring locations were virtually the same as the predicted noise levels without a cooling tower.

The noise modeling results indicate that the operation of Unit 8 would not result in sound levels in excess of the Martin County noise control ordinance.

Figures 5.7-1 and 5.7-2 illustrate the sound level isopleths, with and without the cooling towers, developed from the results of the noise model.

Intermittent Noise Sources

Intermittent noise sources during routine startup, testing and maintenance, and emergency conditions will include steam venting. Such activities would not normally occur simultaneously and would last for a short duration. The noise impacts of these conditions would not be expected to exceed the Martin noise control ordinance.

5.8 CHANGES TO NON-AQUATIC SPECIES POPULATION

5.8.1 IMPACTS

5.8.1.1 Flora

Potential impacts to onsite and regional vegetation due to plant operation are limited since either the existing cooling pond or cooling tower will be used for condenser cooling, and construction activities will occur on previously impacted and cleared land. Any potential impacts to non-aquatic species will be due to plant construction rather than plant operation and, therefore, are discussed in Section 4.2. Those impacts are primarily associated with clearing of grassed areas, which can be used as foraging by bird species.

5.8.1.2 Fauna

The existing cooling pond is used for foraging by birds, mammals, reptiles, and amphibians. No adverse impacts will occur to fauna utilizing the cooling pond as a result of the proposed project.

As mentioned in Sections 2.3.6 and 4.4, the construction area has been severely altered by development and maintenance of the existing power plant. Thus, the wildlife species present in the area are generally those that tolerate human proximity. No populations of recreational or commercially important species will be significantly affected by operation of the proposed project.

5.8.2 MONITORING

Because no significant impacts to non-aquatic species populations are anticipated, no monitoring program is proposed.

5.9 OTHER PLANT OPERATION EFFECTS

5.9.1 OPERATIONS TRAFFIC

Traffic impacts for the construction and operation of future electrical generating units at the FPL Martin Plant site were evaluated as part of the initial certification of the Martin CG/CC Project. These impacts were found to comply with applicable standards, including levels of service standards on local roadways. FPL has implemented roadway improvements at the Manatee Plant entrance at SR 710, including an extended left-hand turn lane and a southbound acceleration lane.

The following discussion is provided to describe the actual traffic associated with the operation of the Project. The Project traffic levels are well within the traffic levels assumed during the initial certification proceeding, including non-project background traffic levels. These previous analyses resulted in the conclusion that the construction and operation of the Martin CG/CC Project would comply with applicable standards for traffic.

Traffic associated with the operation of the power plant represents a long-term impact to Martin County roadways. Traffic impacts will be directly related to the number of employees and to new truck traffic to be generated during operation. Only 12 new jobs are expected as a result of the project. Truck traffic will consist of deliveries of ammonia and light oil, and intermittent deliveries of miscellaneous plant components required for maintenance. Ammonia is required for the SCR system. A maximum of about 60 trucks per year, or a little over one truck per week are needed, if the units operate at 100-percent capacity factor all year long. Light oil requirements will be met with intermittent deliveries for the two 2-million gallon storage tanks. These tanks have the capacity for about 80 hours of operation use. As oil is depleted from the tanks, it will be replaced by truck

delivery based on the need to continue to fire light oil. Operation on light oil will be limited on Unit 8 to a maximum heat input equivalent of 500 hours per year at full load. If this maximum amount of oil were burned throughout the year, about 10 trucks per day would be required. The traffic resulting from operation of Unit 8 would not degrade traffic volumes below established levels of service. No additional roadway improvements are required to accommodate the traffic impacts from operation of the Martin Unit 8.

5.10 ARCHAEOLOGICAL SITES

Plant operation will have no effect on archaeological resources. No significant or potentially significant archaeological properties are located within the areas that would be affected by normal plant operation.

In the event that post-construction activities result in the discovery of archaeological materials, activities that have the potential to disturb those materials will be halted until an evaluation of their potential significance is made by a professional archaeologist. If the materials are believed to be significant, the State Historic Preservation Officer (SHPO) will be consulted to identify appropriate measures.

5.11 RESOURCES COMMITTED

The major irreversible and irretrievable commitments of national, state, and local resources due to the Martin Unit 8 are the use of land, the consumptive use of water, natural gas, light oil, ammonia and PSD increment.

Of the total Martin Plant site (11,300 acres), the Project will affect less than 50 acres. In contrast to a new generating facility constructed on a greenfield site, the Project will be significantly more effective in the use of land per megawatt generated. The land areas to be used for the project have been used previously for power plant operation.

The consumption of water by the proposed project will be for the operation of the cooling pond or cooling tower (optional), the pollution control equipment (NO_x control), other process water requirements, and potable water. No additional surface water allocation or groundwater allocation above that currently approved will be required for the Project.

The converted units will consume PSD increment for several pollutants (NO_x, PM_{10}, and SO_2). However, the increment consumption is very low compared to the PSD Class I and Class II increments.

Natural gas and distillate oil will be consumed during the operation of the Project. The amounts are described in Chapter 3.0, Section 3.4. This is an irreversible and irretrievable commitment of a national energy resource for the production of electricity for the State of Florida.

Less than one-half million gallons of ammonia annually will be required for the operation of the Project's SCR systems. While ammonia will be consumed, emissions of nitrogen oxides will be substantially reduced (about 70 percent) as a result.

Given the low environmental impacts of the project and the use of an existing plant site for the Project, Martin Unit 8 will effectively utilize state and local resources. Benefits of the project are presented in Section 7.1.

5.12 VARIANCES

No variances are being requested as part of this application

Table 5.1-1. Spillway Releases Between January 1997 and December 2000

Date	Volume (acre-ft)
June 15, 1997	0.1
September 15, 1998	0.08
June 15, 1999	0.07
June 15, 2000	0.06

Table 5.1-2. Performance and Emission Information for Martin Unit 8 Optional Cooling Tower

Parameter	Martin Unit 8 4 x 1 Typical
Physical Data	
Number of Cells	18
Deck Dimensions, ft	
Length	486
Width	108
Height	40
Stack Dimensions	
Height, ft	45
Stack Top Effective Inner Diameter, per cell, ft	38
Effective Diameter, all cells, ft	161.2
Performance Data	
Discharge Velocity, ft/min	1,222
Circulating Water Flow Rate (CWFR), gal/min	310,000
Design hot water temperature, °F	104
Design cold water temperature, °F	90
Heat Rejected, million Btu/hr	2,600
Design Air Flow Rate per cell, acfm	1,386,055
Liquid/ Gas (Air Flow) (L/G) Ratio	1.400
Hours of operation	8,760
Based on "Calculation of Realistic PM_{10} Emissions from Cooling Towers"	
Emission Data	
Drift Rate[a] (DR), percent	0.002
Total Dissolved Solids (TDS) Concentration [b] ,maximum ppm	5,000
Solution Drift [c] (SD), lb/hr	3,102
PM Drift [d,e] , lb/hr	15.51
tons/year	67.9
PM_{10} Drift	
PM_{10} Portion (percent) of PM Drift	30
PM_{10} Emissions, lb/hr	4.65
tons/year	20.4

[a] Drift rate is the percent of circulating water.

[b] TDS based on 5 cycle of concentration.
(See paper titled "Calculation of Realistic PM_{10} Emissions from Cooling Towers" presented in Appendx 10.1.5.)

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

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

[e] See paper titled "Calculating Realistic PM_{10} Emissions from Cooling Towers" presented in Appendix 10.1.5.

Source: FPL, 2001; Golder 2002.

Table 5.1-3. Particle Size Distribution of Drift of Martin Unit 8 Options Cooling Tower

Particle Size (microns)	Individual Mass Fraction (percent)	Cumlative Mass Fraction
2.6	0.20%	0.20%
3.9	0.03%	0.23%
5.3	0.29%	0.51%
6.6	1.30%	1.81%
7.9	3.88%	5.69%
9.2	15.65%	21.34%
11.8	28.46%	49.80%
14.5	20.70%	70.50%
17.1	11.51%	82.01%
19.7	5.99%	88.00%
23.7	3.02%	91.02%
27.6	1.44%	92.46%
31.6	1.62%	94.08%
35.5	0.60%	94.68%
39.4	1.60%	96.28%
46	0.72%	97.00%
52.6	1.33%	98.33%
59.2	0.73%	99.06%
78.9	0.93%	99.99%

Based on "Calculation of Realistic PM_{10} Emissions from Cooling Towers" presented in Appendix 10.1.5.

Table 5.1-4 Predicted Plume Characteristics and Drift Deposition from Optional Mechanical Draft Cooling Tower

	Distance from Tower (meters)	Winter		Spring		Summer		Fall		Annual	
		For Sector	For All Sectors	For Sector	For All Sectors	For Sector	For All Sectors	For Sector	For All Sectors	For Sector	For All Sectors
		Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum
Plume Length	100	13.3	87.7	13.2	93.6	15.6	95.2	17.1	93.8	14.1	92.60
(Units = Percent)	200	0.2	1.9	0.2	1.1	0.2	0.5	0.2	1.2	0.4	1.2
	300	0.1	0.4	0.1	0.2	0	0	0.1	0.2	0.1	0.2
		Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum
Plume Height	10	13.3	87.7	13.2	93.6	15.6	95.2	17.1	93.8	14.1	92.6
(Units = Percent)	30	1.2	3.6	0.7	2.9	2	6.8	0.9	4.9	1.0	4.5
	50	0.2	0.9	0.1	0.6	0.1	0.3	0.1	0.6	0.1	0.6
		Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average
Plume Shadowing	200	361.1	147.3	377.4	117.6	383.3	103.2	270.1	115.4	975.7	483.6
(Units = Hours)	400	24.7	4	44.3	10.1	112.8	17.6	42.8	11	163.8	42.7
	600	2.4	0.4	9.4	2.9	74.8	10.3	27.4	3.9	88.7	17.5
		Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum
Plume Fogging	100	0.9	2	5	10.3	1.9	3.5	3.8	7.9	6.5	23.7
(Units = Hours)	200	1	1.2	5.1	7.3	2	2.4	4	4.8	5.5	15.7
	300	0.2	0.2	1.1	1.4	0.4	0.4	0.9	0.9	11	2.9
		Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum	Maximum	Sum
Rime Icing	100	0	0	0	0	0	0	0	0	0	0
(Units = Hours)	200	0	0	0	0	0	0	0	0	0	0.0
	300	0	0	0	0	0	0	0	0	0	0
		Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
Deposition	100	148.9	0	62.17	0	180.1	0	255.8	0	119.8	0
(Units = kg/km^2/month)	200	0	0	0	0	0.0	0	0	0	0	0
	300	0	0	0	0	0.0	0	0	0	0	0

Table 5.6-1. Maximum Emissions Due to the Proposed Project Compared to the PSD Significant Emission Rates

Pollutant	Pollutant Emissions (TPY)		PSD Review
	Potential Emissions from Proposed Project[a]	Significant Emission Rate	
Sulfur Dioxide	280	40	Yes
Particulate Matter [PM(TSP)]	322	25	Yes
Particulate Matter (PM_{10})	275	15	Yes
Nitrogen Dioxide	683	40	Yes
Carbon Monoxide	826	100	Yes
Volatile Organic Compounds	110	40	Yes
Lead	0.025	0.6	No
Sulfuric Acid Mist	30.0	7	Yes
Total Fluorides	NEG	3	No
Total Reduced Sulfur	NEG	10	No
Reduced Sulfur Compounds	NEG	10	No
Hydrogen Sulfide	NEG	10	No
Mercury	$2.3x10^{-3}$	0.1	No

Note: NEG = Negligible.

[a] Based on emissions from operating at base load at 59°F:

1. Combined Cycle
   - 100-percent load, natural gas – 4,480 hours
   - 100-percent load with duct burners, natural gas – 2,880 hours
   - 100-percent load with duct burners and power augmentation – 400 hours
2. Simple Cycle
   - 100-percent load, natural gas – 500 hours
   - 100-percent load, oil firing – 500 hours

Includes four natural gas heaters and cooling tower

Table 5.6-2. Summary of Maximum Pollutant Concentrations Predicted for the Project, Compared to the EPA Class II Significant Impact Levels

Pollutant	Averaging Time	Maximum Predicted Concentration (ug/m^3) Simple Cycle Natural Gas	Simple Cycle Fuel Oil	Combined Cycle Natural Gas	Combined Cycle Fuel Oil	EPA Class II Significant Impact Levels (ug/m^3)
CTs Only						
SO_2	Annual	0.01	0.07	0.13	0.62	1
	24-Hour	0.10	0.84	1.78	8.64	5
	3-Hour	0.43	4.23	3.86	17.5	25
PM_{10}	Annual	0.01	0.02	0.20	0.29	1
	24-Hour	0.13	0.23	2.50	4.01	5
NO_2	Annual	0.07	0.23	0.34	0.56	1
CO	8-Hour	1.08	1.42	16.2	8.49	500
	1-Hour	3.22	4.36	38.9	19.9	2,000
CTs and Cooling Tower						
PM_{10}	Annual	NM	NM	NM	0.34	1
	24-Hour	NM	NM	NM	4.37	5

Note: NM = not modeled.

Table 5.6-3. Summary of Maximum Pollutant Concentrations Predicted for the Project at the PSD Class I Area of the Everglades NP Compared to the Proposed EPA Class I Significant Impact Levels

Pollutant	Averaging Time	Maximum Concentration ($\mu g/m^3$) [a]			Proposed EPA Class I Significant Impact Levels ($\mu g/m^3$)
		Natural Gas	Fuel Oil	Natural Gas/ Fuel Oil	
Combined-Cycle [b]					
SO_2	Annual [c]	NM	NM	0.0013	0.1
	24-Hour	0.052	0.388	0.388	0.2
	3-Hour	0.110	0.803	0.803	1.0
NO_2	Annual [c]	NM	NM	0.0017	0.1
PM_{10}	Annual [c]	NM	NM	0.0018	0.2
	24-Hour	0.086	0.174	0.174	0.3
Simple-Cycle [b]					
SO_2	Annual [c]	NM	NM	0.0013	0.1
	24-Hour	0.035	0.338	0.338	0.2
	3-Hour	0.074	0.716	0.716	1.0
NO_2	Annual [c]	NM	NM	0.0017	0.1
PM_{10}	Annual [c]	NM	NM	0.0018	0.2
	24-Hour	0.039	0.069	0.069	0.3

Note: NM = not modeled

[a] Concentrations are highest predicted using CALPUFF model and 1990 CALMET wind field for south Florida.

[b] Concentrations predicted for combined- and simple cycle operation are based on the operating scenario with the maximum hourly emissions. For both natural gas- and oil-firing, maximum emissions are based on the combustion turbines operating for baseload conditions at an ambient temperature of 35°F.

Table 5.6-4. Maximum Predicted SO_2 Impacts for Comparison to AAQS, PSD Class II Increment, and PSD Class I Increment

Rank and Averaging Time	Maximum Concentration ($\mu g/m^3$) [a]	AAQS ($\mu g/m^3$)	PSD Class II Increment ($\mu g/m^3$)	PSD Class I Increment ($\mu g/m^3$)
AAQS				
HSH 24-Hour [b]	109	260	NA	NA
PSD Class II Increment				
HSH 24-Hour	41.4	NA	91	NA
PSD Class I Increment				
HSH 24-Hour	3.5	NA	NA	5

Note: HSH = Highest, Second-Highest
NA= Not applicable

[a] Based on the CTs operating in combined cycle configuration and firing distillate fuel oil.

[b] Total air quality concentrations based on the modeled source impacts added to a non-modeled background concentration derived from monitoring data:

Modeled source impacts	75 $\mu g/m^3$
Non-modeled background	34 $\mu g/m^3$

Table 5.7-1. Summary of Noise Source Data Used in the Operational Impact Analysis for the Martin Power Project

Power Block Sources	Source Location[a]		Source Height[b] (m)	Sound Power Level (dB) for Octave Band Center Frequency (Hz)									Overall Sound Power Level	
	X (m)	Y (m)		31.5	63	125	250	500	1K	2K	4K	8K	(dB)	(dBA)
8A HRSG North[c]	-357.93	498.39	2.0	121.0	126.0	123.0	115.0	100.0	98.0	91.0	73.0	68.0	128.8	110.6
8A HRSG South[c]	-357.93	488.33	2.0	121.0	126.0	123.0	115.0	100.0	98.0	91.0	73.0	68.0	128.8	110.6
8A HRSG North[c]	-356.87	453.94	2.0	121.0	126.0	123.0	115.0	100.0	98.0	91.0	73.0	68.0	128.8	110.6
8B HRSG South[c]	-359.52	442.82	2.0	121.0	126.0	123.0	115.0	100.0	98.0	91.0	73.0	68.0	128.8	110.6
8C HRSG North[c]	-357.93	345.98	2.0	121.0	126.0	123.0	115.0	100.0	98.0	91.0	73.0	68.0	128.8	110.6
8C HRSG South[c]	-358.99	335.40	2.0	121.0	126.0	123.0	115.0	100.0	98.0	91.0	73.0	68.0	128.8	110.6
8D HRSG North[c]	-356.87	301.01	2.0	121.0	126.0	123.0	115.0	100.0	98.0	91.0	73.0	68.0	128.8	110.6
8D HRSG South[c]	-358.99	290.42	2.0	121.0	126.0	123.0	115.0	100.0	98.0	91.0	73.0	68.0	128.8	110.6
8A Air Inlet[c]	-430.42	493.09	2.0	102.0	106.0	99.0	94.0	86.0	78.0	74.0	82.0	77.0	108.2	90.7
8B Air Inlet[c]	-430.95	448.64	2.0	102.0	106.0	99.0	94.0	86.0	78.0	74.0	82.0	77.0	108.2	90.7
8C Air Inlet[c]	-432.01	341.22	2.0	102.0	106.0	99.0	94.0	86.0	78.0	74.0	82.0	77.0	108.2	90.7
8D Air Inlet[c]	-431.48	294.13	2.0	102.0	106.0	99.0	94.0	86.0	78.0	74.0	82.0	77.0	108.2	90.7
8A Exhaust Duct North[c]	-399.73	499.44	2.0	110.0	109.0	103.0	97.0	92.0	85.0	83.0	79.0	74.0	113.2	94.5
8A Exhaust Duct South[c]	-400.26	488.33	2.0	110.0	109.0	103.0	97.0	92.0	85.0	83.0	79.0	74.0	113.2	94.5
8B Exhaust Duct North[c]	-397.09	453.41	2.0	110.0	109.0	103.0	97.0	92.0	85.0	83.0	79.0	74.0	113.2	94.5
8B Exhaust Duct South[c]	-398.67	442.82	2.0	110.0	109.0	103.0	97.0	92.0	85.0	83.0	79.0	74.0	113.2	94.5
8C Exhaust Duct North[c]	-401.32	347.04	2.0	110.0	109.0	103.0	97.0	92.0	85.0	83.0	79.0	74.0	113.2	94.5
8C Exhaust Duct South[c]	-401.85	334.87	2.0	110.0	109.0	103.0	97.0	92.0	85.0	83.0	79.0	74.0	113.2	94.5



Table 5.7-1. Summary of Noise Source Data Used in the Operational Impact Analysis for the Martin Power Project

Power Block Sources	Source Location[a]		Source Height[b] (m)	Sound Power Level (dB) for Octave Band Center Frequency (Hz)									Overall Sound Power Level	
	X (m)	Y (m)		31.5	63	125	250	500	1K	2K	4K	8K	(dB)	(dBA)
8D Exhaust Duct North[c]	-398.67	300.48	2.0	110.0	109.0	103.0	97.0	92.0	85.0	83.0	79.0	74.0	113.2	94.5
8D Exhaust Duct South[c]	-398.67	290.95	2.0	110.0	109.0	103.0	97.0	92.0	85.0	83.0	79.0	74.0	113.2	94.5
8A CT Transformer	-428.75	511.22	2.0	80.3	86.3	88.3	83.3	83.3	77.3	72.3	67.3	60.3	92.3	83.7
8B CT Transformer	-428.08	465.21	2.0	80.3	86.3	88.3	83.3	83.3	77.3	72.3	67.3	60.3	92.3	83.7
8C CT Transformer	-428.75	358.21	2.0	80.3	86.3	88.3	83.3	83.3	77.3	72.3	67.3	60.3	92.3	83.7
8D CT Transformer	-428.08	312.54	2.0	80.3	86.3	88.3	83.3	83.3	77.3	72.3	67.3	60.3	92.3	83.7
8A HRSG Stack	-330.41	493.55	30.0	111.7	117.7	115.7	107.7	97.7	90.7	81.7	60.7	45.7	120.7	103.6
8B HRSG Stack	-330.44	447.55	30.0	111.7	117.7	115.7	107.7	97.7	90.7	81.7	60.7	45.7	120.7	103.6
8C HRSG Stack	-329.91	340.12	30.0	111.7	117.7	115.7	107.7	97.7	90.7	81.7	60.7	45.7	120.7	103.6
8D HRSG Stack	-330.07	294.54	30.0	111.7	117.7	115.7	107.7	97.7	90.7	81.7	60.7	45.7	120.7	103.6
Unit 8 STG Transformer	-438.08	398.88	2.0	80.1	86.1	88.1	83.1	83.1	77.1	72.1	67.1	60.1	92.1	83.5
Unit 8 Steam Turbine	-396.63	405.70	10	0	69.2	73.0	79.1	89.5	85.9	82.2	78.1	72.9	92.1	90.6
Boiler Feed Pumps	[d]	[d]	1	109.0	106.0	103.0	102.0	103.0	102.0	103.0	95.0	83.0	113.3	107.7

[a] Power block source locations relative to the stack location.
[b] Source height used for modeling analysis only and does not necessarily represent the physical height of the source.
[c] Line source (remainder are point sources).
[d] Located at HRSG.

Table 5.7-2. Summary of Noise Source Data Used in the Operational Impact Analysis for the Martin Power Project with Cooling Towers

Power Block Sources	Source Location[a]		Source Height[b] (m)	Sound Power Level (dB) for Octave Band Center Frequency (Hz)									Overall Sound Power Level	
	X (m)	Y (m)		31.5	63	125	250	500	1K	2K	4K	8K	(dB)	(dBA)
8A HRSG North	-357.93	498.39	2.0	121.0	126.0	123.0	115.0	100.0	98.0	91.0	73.0	68.0	128.8	110.6
8A HRSG South	-357.93	488.33	2.0	121.0	126.0	123.0	115.0	100.0	98.0	91.0	73.0	68.0	128.8	110.6
8A HRSG North	-356.87	453.94	2.0	121.0	126.0	123.0	115.0	100.0	98.0	91.0	73.0	68.0	128.8	110.6
8B HRSG South	-359.52	442.82	2.0	121.0	126.0	123.0	115.0	100.0	98.0	91.0	73.0	68.0	128.8	110.6
8C HRSG North	-357.93	345.98	2.0	121.0	126.0	123.0	115.0	100.0	98.0	91.0	73.0	68.0	128.8	110.6
8C HRSG South	-358.99	335.40	2.0	121.0	126.0	123.0	115.0	100.0	98.0	91.0	73.0	68.0	128.8	110.6
8D HRSG North	-356.87	301.01	2.0	121.0	126.0	123.0	115.0	100.0	98.0	91.0	73.0	68.0	128.8	110.6
8D HRSG South	-358.99	290.42	2.0	121.0	126.0	123.0	115.0	100.0	98.0	91.0	73.0	68.0	128.8	110.6
8A Air Inlet	-430.42	493.09	2.0	102.0	106.0	99.0	94.0	86.0	78.0	74.0	82.0	77.0	108.2	90.7
8B Air Inlet	-430.95	448.64	2.0	102.0	106.0	99.0	94.0	86.0	78.0	74.0	82.0	77.0	108.2	90.7
8C Air Inlet	-432.01	341.22	2.0	102.0	106.0	99.0	94.0	86.0	78.0	74.0	82.0	77.0	108.2	90.7
8D Air Inlet	-431.48	294.13	2.0	102.0	106.0	99.0	94.0	86.0	78.0	74.0	82.0	77.0	108.2	90.7
8A Exhaust Duct North	-399.73	499.44	2.0	110.0	109.0	103.0	97.0	92.0	85.0	83.0	79.0	74.0	113.2	94.5
8A Exhaust Duct South	-400.26	488.33	2.0	110.0	109.0	103.0	97.0	92.0	85.0	83.0	79.0	74.0	113.2	94.5
8B Exhaust Duct North	-397.09	453.41	2.0	110.0	109.0	103.0	97.0	92.0	85.0	83.0	79.0	74.0	113.2	94.5
8B Exhaust Duct South	-398.67	442.82	2.0	110.0	109.0	103.0	97.0	92.0	85.0	83.0	79.0	74.0	113.2	94.5
8C Exhaust Duct North	-401.32	347.04	2.0	110.0	109.0	103.0	97.0	92.0	85.0	83.0	79.0	74.0	113.2	94.5

Table 5.7-2. Summary of Noise Source Data Used in the Operational Impact Analysis for the Martin Power Project with Cooling Towers

Power Block Sources	Source Location[a]		Source Height[b] (m)	Sound Power Level (dB) for Octave Band Center Frequency (Hz)									Overall Sound Power Level	
	X (m)	Y (m)		31.5	63	125	250	500	1K	2K	4K	8K	(dB)	(dBA)
8C Exhaust Duct South	-401.85	334.87	2.0	110.0	109.0	103.0	97.0	92.0	85.0	83.0	79.0	74.0	113.2	94.5
8D Exhaust Duct North	-398.67	300.48	2.0	110.0	109.0	103.0	97.0	92.0	85.0	83.0	79.0	74.0	113.2	94.5
8D Exhaust Duct South	-398.67	290.95	2.0	110.0	109.0	103.0	97.0	92.0	85.0	83.0	79.0	74.0	113.2	94.5
8A CT Transformer	-428.75	511.22	2.0	80.3	86.3	88.3	83.3	83.3	77.3	72.3	67.3	60.3	92.3	83.7
8B CT Transformer	-428.08	465.21	2.0	80.3	86.3	88.3	83.3	83.3	77.3	72.3	67.3	60.3	92.3	83.7
8C CT Transformer	-428.75	358.21	2.0	80.3	86.3	88.3	83.3	83.3	77.3	72.3	67.3	60.3	92.3	83.7
8D CT Transformer	-428.08	312.54	2.0	80.3	86.3	88.3	83.3	83.3	77.3	72.3	67.3	60.3	92.3	83.7
8A HRSG Stack	-330.41	493.55	30.0	111.7	117.7	115.7	107.7	97.7	90.7	81.7	60.7	45.7	120.7	103.6
8B HRSG Stack	-330.44	447.55	30.0	111.7	117.7	115.7	107.7	97.7	90.7	81.7	60.7	45.7	120.7	103.6
8C HRSG Stack	-329.91	340.12	30.0	111.7	117.7	115.7	107.7	97.7	90.7	81.7	60.7	45.7	120.7	103.6
8D HRSG Stack	-330.07	294.54	30.0	111.7	117.7	115.7	107.7	97.7	90.7	81.7	60.7	45.7	120.7	103.6
Unit 8 STG Transformer	-438.08	398.88	2.0	80.1	86.1	88.1	83.1	83.1	77.1	72.1	67.1	60.1	92.1	83.5
Unit 8 Steam Turbine	-396.63	405.70	10	0	69.2	73.0	79.1	89.5	85.9	82.2	78.1	72.9	92.1	90.6
Boiler Feed Pumps	[d]	[d]	1	109.0	106.0	103.0	102.0	103.0	102.0	103.0	95.0	83.0	113.3	107.7
Cooling Towers West Side	--	--	15.0	118.0	119.1	118.3	114.8	111.5	109.7	106.0	106.5	105.3	124.4	115.5
Cooling Towers East Side	--	--	15.0	118.0	119.1	118.3	114.8	111.5	109.7	106.0	106.5	105.3	124.4	115.5

[a] Power block source locations relative to the stack location.
[b] Source height used for modeling analysis only and does not necessarily represent the physical height of the source.
[c] Line source (remainder are point sources) .
[d] Located at HRSG.

Table 5.7-3. Observed and Predicted Sound Levels for the Martin Unit 8 Combined Cycle Project During Operations (without Cooling Tower)

Monitoring Site Number	Observed L_{90} Background		Predicted Impacts			Martin County Maximum Permissible Sound Levels (a)
			Unit 8 Only	Unit 8 and Background		
Daytime:						
1	36.2		46.5	46.9		See Note b
3	39.0		46.4	47.1		70.0
4	42.3	(c)	43.6	46.0	(c)	60.0
5	40.6	(c)	45.8	46.9	(c)	60.0
6	37.3		44.3	45.1		60.0
Nighttime:						
1	36.9		46.5	47.0		See Note b
3	44.0		46.4	48.4		65.0
4	35.9	(c)	43.6	44.3	(c)	55.0
5	38.2	(c)	45.8	46.5	(c)	55.0
6	46.3		44.3	48.4		55.0

Notes:
(a) as measured across the real property boundary
(b) this monitoring site is located on the FPL Martin Plant site
(c) these noise levels are primarily a result of traffic on SR 710 and insect noise
Refer to Section 2.3.8 for information on the description and location of monitoring sites.

Table 5.7-4. Observed and Predicted Sound Levels for the Martin Unit 8 Combined Cycle Project During Operations (with Cooling Tower)

Monitoring Site Number	Observed L_{eq} Background		Predicted Impacts			Martin County Maximum Permissible Sound Levels (a)
			Unit 8 Only	Unit 8 and Background		
Daytime:						
1	36.2		46.5	46.9		See Note b
3	39.0		46.4	47.1		70.0
4	42.3	(c)	43.5	46.0	(c)	60.0
5	40.6	(c)	45.8	46.9	(c)	60.0
6	37.3		44.3	45.1		60.0
Nighttime:						
1	36.9		46.5	47.0		See Note b
3	44.0		46.4	48.4		65.0
4	35.9	(c)	43.5	44.2	(c)	55.0
5	38.2	(c)	45.8	46.5	(c)	55.0
6	46.3		44.3	48.4		55.0

Notes:
(a) as measured across the real property boundary
(b) this monitoring site is located on the FPL Martin Plant site
(c) these noise levels are primarily a result of traffic on SR 710 and insect noise
Refer to Section 2.3.8 for information on the description and location of monitoring sites.

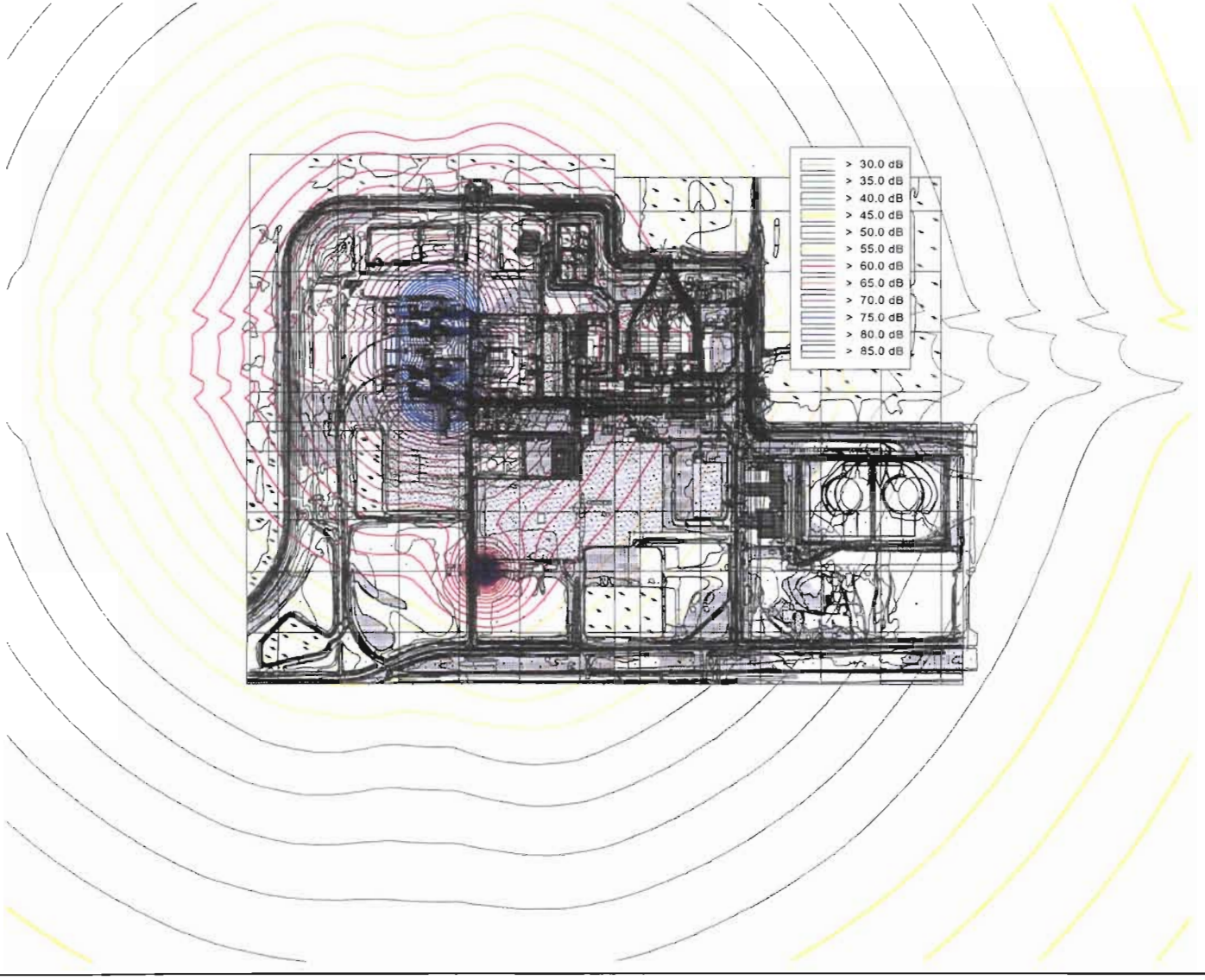


Figure 5.7-1
Sound Level Isopleths, Without the Cooling Towers
Martin Power Plant, Unit 8 SCA

Source: Golder, 2001.

FPL
Martin Unit 8

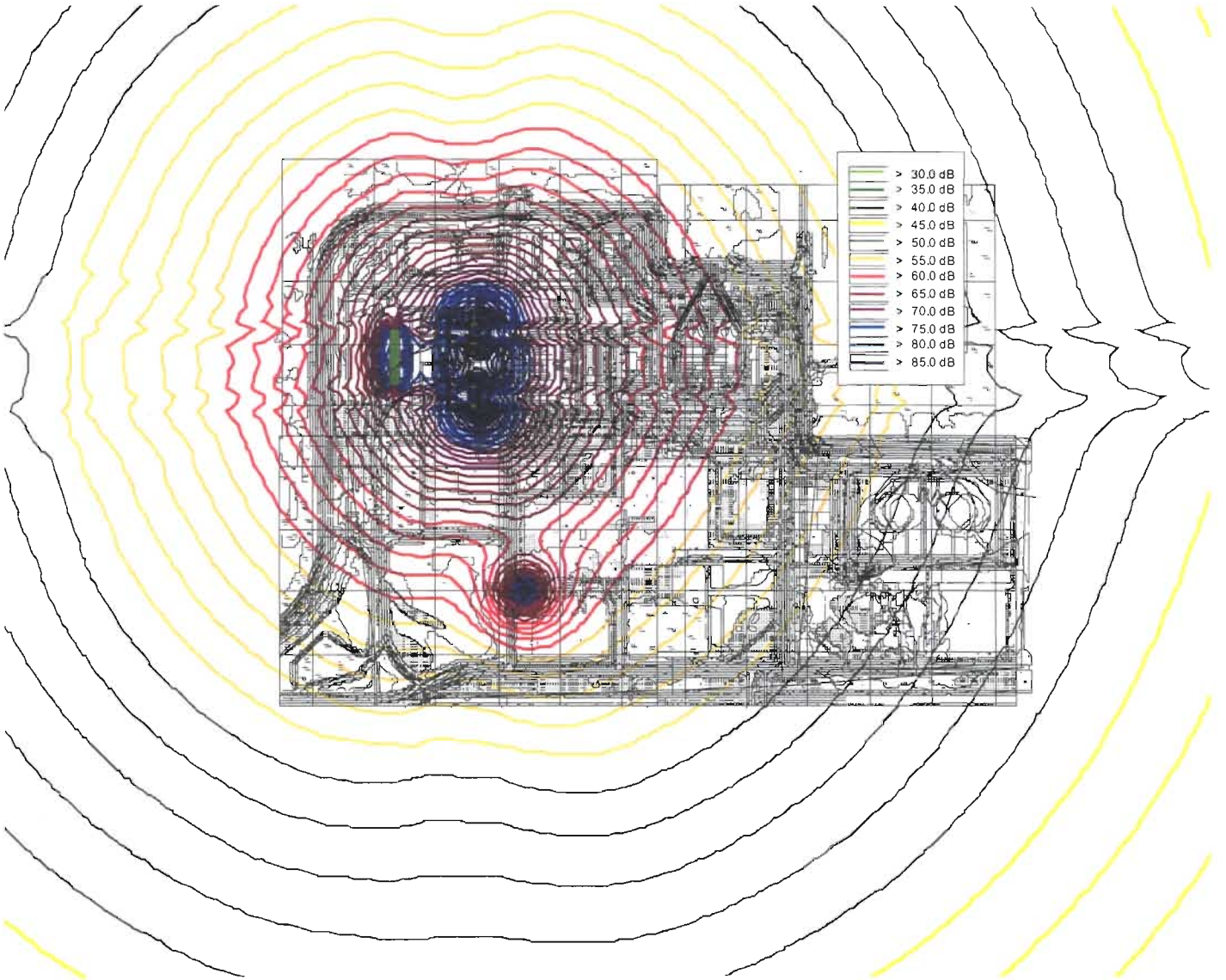


Figure 5.7-2
Sound Level Isopleths, With the Cooling Towers
Martin Power Plant, Unit 8 SCA

Source: Golder, 2001.

FPL
Martin Unit 8

6.0 TRANSMISSION LINES

6.1 PROJECT INTRODUCTION

Martin Unit 8 Combined Cycle Project (Project) will connect to the existing transmission network at the Martin system substation within the previously certified site. Two new transmission lines will need to be constructed, the Indiantown-Martin #2 230 kV line and the Bridge-Indiantown #2 230 kV line (Figures 6.1-1, 6.1-2) to integrate the new generation into the transmission network, that is, to meet the single contingency planning criterion adopted by the National Electric Reliability Council (NERC) when the Project generation is routed on the transmission network to serve FPL's native load. The Indiantown-Martin #2 line will be constructed on the east side of the plant to electrically connect the Martin Plant to the Indiantown substation. The Bridge-Indiantown #2 line will connect the Indiantown substation with a line to the east, to Bridge substation. Figures 6.1-3 through 6.1-10 show profiles of both the existing and the proposed structures. While FPL is seeking certification only for the portion of the Indiantown-Martin #2 transmission line that will be constructed on entirely new transmission line ROW (ROW) in this application as an associated facility (as shown on Figure 6.1-2), information regarding the location, construction and operation of the entire Indiantown-Martin #2 and Bridge-Indiantown #2 230 kV transmission lines is presented here for informational purposes. The other portions of these lines will be permitted separately, as necessary. Upon completion of construction and satisfaction of any post-construction requirements, FPL requests that the transmission line within the new ROW be released from certification under the PPSA.

FPL is proposing to use or parallel existing ROWs and/or collocate with existing transmission and distribution lines for a significant length of these two transmission line projects. The Indiantown-Martin #2 line will be constructed adjacent to and within the existing ROW of FPL 230 kV and 500 kV transmission lines from Martin Plant east and south to State Road (SR) 76, a distance of approximately 4.5 miles, and then will continue east along SR 76 and CR 726 (Citrus Boulevard), within a new transmission line corridor, a distance of approximately 8.5 miles to Indiantown substation. Within this corridor, FPL proposes to acquire easements for final ROW (typically up to 25 feet in width) adjacent to SR 76 and CR 726.

The Bridge-Indiantown #2 line will be constructed entirely within existing FPL transmission line ROW, a distance of 10.0 miles, with the possible exception of anchor structures and in the immediate

vicinity of the Bridge substation. The anchor structures, if needed, are proposed to be located adjacent to the existing ROW and would support the transmission line structures used to cross the St. Lucie Canal. The expansion of FPL's property interests in the immediate vicinity of the Bridge substation may be required to facilitate entry of the Bridge-Indiantown #2 transmission line to the substation facilities.

The width of the existing ROW between Martin Plant and SR 76 is typically 700 feet. The width of the corridor along SR 76 and CR 726 varies, and the final ROW will typically be less than 25 feet in width. The width of the existing ROW between Indiantown substation and Bridge substation is 170 feet.

When the Project is completed, the construction of these additional transmission lines will integrate the increased capacity at the Martin Plant with the load centers in the region. Without the new transmission lines, loadflow studies have identified thermal overloads and voltage problems due to single-contingency outages of the 230 kV lines serving the Martin, St. Lucie and Palm Beach County areas. Required information regarding need for the proposed transmission lines will be included in the Need Determination Application when filed with the FPSC. No new offsite substations or substation expansions are proposed to be certified as a part of the Project.

6.1.1 CORRIDOR LOCATION AND LAYOUT

The location of existing transmission lines in the vicinity of the proposed Indiantown-Martin #2 230 kV line are shown on FPL drawing E-98113, sheets 14-16 (Appendix 10.8). The location of existing transmission lines in the vicinity of the proposed Bridge-Indiantown #2 230 kV line are shown on FPL drawing E-77624, sheets 4-9 (Appendix 10.8). Figure 6.1-11 shows all existing transmission lines within 5 miles of the Martin Plant.

The proposed Indiantown-Martin # 2 line will be located almost entirely on existing FPL-owned property or land for which FPL has obtained transmission line easements from Martin Plant to SR 76. From the Martin Plant east, the existing transmission line routes to be used for Indiantown-Martin #2 extends to the east approximately 1.5 miles. These transmission line routes contain both existing 500 kV and 230 kV transmission lines. The new line will be constructed south of the existing 230 kV lines within the Martin Plant property. As the proposed line turns to the south, headed

toward SR 76, it will cross under the existing 500 kV lines and continue south, east of the existing 500 kV lines, in existing transmission line ROW approximately 3 miles, crossing the St. Lucie Canal, to SR 76. For this entire distance, from the Martin Plant to SR 76, the new transmission line will be within FPL's existing transmission line ROW, with the possible exception of the area adjacent to West Farm Road and approximately 1 mile north of the St. Lucie Canal where the ROW may need to be expanded (approximately 800 feet in length by 200 feet in width) to accommodate the new transmission line. In this area, most of the existing 700-foot ROW is occupied by the three existing 500 kV lines that run north-south, and the Levee-Midway 500 kV line that runs east-west, where a special configuration was used to avoid one 500 kV line from crossing another.

Along SR 76, the line is proposed to run east, along the south side of the road ROW, to a point approximately 2 miles east of SR 710, where it will turn north, crossing the St. Lucie Canal, to CR 726, then run east, along the north side of the road ROW, to Indiantown substation. FPL proposes to acquire new transmission line easements for the final ROW within the corridor from SR 76 to Indiantown substation.

The proposed Bridge-Indiantown #2 line will be located entirely on existing FPL transmission line easements, with the possible exception of anchor structures and in the immediately vicinity of the Bridge substation. The anchor structures, if needed, are proposed to be located within existing Florida Department of Transportation (FDOT) drainage easements or private property and would support the transmission line structures used to cross the St. Lucie Canal. The expansion of FPL's property interests in the immediate vicinity of the Bridge substation may be required to facilitate entry of the Bridge-Indiantown #2 transmission line into the substation. From Indiantown substation, the proposed line route runs east, approximately 4.9 miles, parallel to and north of CR 726, then south approximately 0.8 miles, crossing the St. Lucie Canal and SR 76, then east, approximately 4.3 miles, to Bridge substation, located just west of CR 711.

6.1.2 TRANSMISSION LINE AND ROAD DESIGN CHARACTERISTICS

The Indiantown-Martin #2 line will be constructed typically using single-circuit, unguyed concrete poles that are directly embedded into the ground. The typical structures are shown in Figures 6.1-13, 6.1-14, and 6.1-16. The Bridge-Indiantown #2 line will be constructed using single circuit, guyed concrete poles that are directly embedded into the ground. The typical structures are shown in

Figures 6.1-17 and 6.1-18. Where either of the two transmission lines turns large angles or cross the St. Lucie Canal, the single-pole structure will require guys and anchors (Figure 6.1-15).

The transmission lines will be framed typically in a vertical configuration, as shown in Figures 6.1-13, 6.1-14, 6.1-16, and 6.1-17. An exception to this will be the likely use of triangular (or delta) framing at the St. Lucie Canal crossings for the two lines, as shown in Figures 6.1-15 and 6.1-18. The conductor for both lines will be 2-795 kcmil (bundled) aluminum conductor, steel-reinforced alumoweld core (ACSR/AW) on both lines. The maximum current rating (MCR) for each line will be 2,640 amperes. The MCR is the nominal value that would be expected to cause the conductor to reach its design temperature limit of 100°C.

On the Indiantown-Martin #2 line, between Martin Plant and SR 76, span lengths will typically range from 600 to 700 ft. to coincide with one-half the span lengths on the adjacent 500 kV transmission lines within the FPL ROW. Where the line is paralleling SR 76, span lengths will range from 250 to 500 ft. to allow for existing distribution circuits to be underbuilt on the transmission poles. Along CR 726, the span lengths are expected to be 500 to 700 ft.

Span lengths for the Bridge-Indiantown #2 line will typically range from 500 to 730 ft. to match the existing span lengths of the adjacent 230 kV line within the FPL ROW.

Transmission line clearances will vary along the length of the line and will comply with the National Electrical Safety Code (NESC) as required by Florida Public Service Commission (FPSC) regulations. Where required clearances of regulatory agencies [i.e., US Army Corps of Engineers (USACE), US Coast Guard (USCG), South Florida Water Management District (SFWMD), etc.] exceed those required by the NESC, the greater clearances shall apply.

Where available, existing roads and pads will be used for access and construction to the greatest extent practical. Improvements may be made to the existing roads or pads, depending on the existing conditions of these facilities.

6.1.3 COST PROJECTIONS

The estimated costs provided below are for ROW acquisition and construction of the proposed 230 kV transmission lines.

Indiantown-Martin #2 230 kV line $7,650,000

Indiantown-Martin #2 230 kV line Cost per Mile: $7,650,000/13.0 miles = $588,461/mile

Bridge-Indiantown #2 230 kV line $5,800,000

Bridge-Indiantown #2 230 kV line Cost per Mile: $5,800,000/10.0 miles = $580,000/mile

For both projects, labor is estimated to account for approximately 47% of the construction cost while materials represent approximately 53% of the cost of construction.

6.1.4 CORRIDOR SELECTION

In making its corridor selection for the proposed transmission lines, FPL initially explored the utilization of existing transmission line ROWs in the Project area as its primary option. FPL determined that it will be able to utilize existing transmission line ROW between the Bridge substation and the Indiantown substation for the construction of the entire length of the proposed Bridge-Indiantown #2 line. (As noted previously, anchor easements may be required outside of the limits of the existing ROW at the proposed crossing structure locations at the St. Lucie Canal and in the immediate vicinity of the Bridge substation.)

FPL also analyzed utilizing existing transmission line ROWs for the proposed Indiantown-Martin #2 line. There is an existing 230 kV transmission line ROW between Indiantown and Martin containing two single-pole lines (Figure 6.1-19) that was initially considered for the route of the new line. Several criteria made utilization of this route undesirable. The proposed new line could not be accommodated on this existing ROW due to lack of sufficient available space. A plan to rebuild one of the existing single-pole lines in this ROW to double circuit construction to try to address the ROW sufficiency issue was deemed to have low feasibility and cost effectiveness because of access concerns and the unacceptable requirement for extended, continuous line outages on lines connected to the Martin Plant to allow construction of the new circuit. A variation of this option would be to build a new pole line on new easements adjacent to the existing ROW. The width of these additional easements required, and the impact to some of the underlying and adjacent land uses (where

cultivated in citrus) and land cover along this route would be greater than on FPL's preferred route (described below). The feasibility of acquisition of additional required ROW, particularly in the vicinity of Florida Steel and the Indiantown cogeneration plant was also assessed to be quite low due to the apparent unavailability of adequate land.

Another route explored utilizes existing transmission line ROW from Indiantown substation going north (Figure 6.1-19), and then turns west following the projection of Minute Maid Road across SR 710 into the Martin Plant site. Since the majority of this route would result in the creation of a new ROW, the easement requirements along this route would be even greater than those described above for the construction alternative of the expansion of the existing ROW. Although the anticipated impacts to citrus lands are less on this route than the route alternative adjacent to existing ROW above (in large part accomplished by siting the ROW adjacent to grove roads), west of CR 609, this route leaves citrus lands. This route would cross or be located adjacent to a large number of smaller landowners, and would require greater clearing and potential wetlands impacts to provide required access along the line route.

The preferred route identified by FPL for the Indiantown-Martin #2 line utilizes 500 kV transmission line ROW from Martin Plant east and south to SR 76 (Figure 6.1-19). The remainder of the line route follows SR 76 ROW and CR 726 ROW to Indiantown substation. Although not within existing transmission line ROW in this area, the route selection nevertheless demonstrates good land use practice. This route allows for collocation of the transmission line with other significant linear facilities, such as FDOT/County roads, FPL overhead distribution lines, and other utilities. The area adjacent to the FDOT and County roads where the transmission line will be constructed is primarily an undeveloped strip where utility pole lines are common and routinely constructed. Finally, easement requirements for line routes adjacent to public ROWs are substantially less than those on "cross country" routes, and in some cases where public ROW width and setback to the roads is sufficient, it may be possible to construct the transmission line if necessary with the acquisition of no additional adjacent private property easements.

6.1.5 SOCIOPOLITICAL ENVIRONMENT OF THE PROPOSED TRANSMISSION LINES

6.1.5.1 GOVERNMENTAL JURISDICTIONs

The corridor proposed for certification and the other transmission lines to be constructed in FPL ROWs are located within unincorporated Martin County. There are no incorporated towns or cities within five miles of either the ROWs or proposed corridor. The nearest incorporated municipality is Stuart which is approximately eight miles from the Bridge substation. The local, regional, state, or federal areas listed in Section 2.2.1 of the FDEP Instruction Guide and located within one-half mile of the proposed corridor or the existing ROWs include:

- DuPuis Reserve
- Save Our Rivers Potential Acquisition Area
- Timer Powers Community Park, and
- Big Mound Community Park

Figure 6.1-20 depicts the general location of these areas that are within 0.5 mile of the corridor.

6.1.5.2 Zoning and Land Use Plans

Martin County has adopted the Comprehensive Growth Management Plan in order to meet the requirements of the Local Government Comprehensive Planning and Land Development Regulation Act, Chapter 163, Part II, Florida Statutes and of Chapter 9J-5, Florida Administrative Code (F.A.C.). Figure 6.1-21 depicts the entire length of both the Indiantown-Martin # 2 and the Bridge-Indiantown #2 transmission lines in relation to the Martin County Future Land Use Map.

The proposed Indiantown-Martin #2 transmission line originates at the existing Martin Plant site. At this location, the proposed ROW is designated as Public Utility. According to the current Martin County Comprehensive Plan (2001), land uses in this category are identified as major public power generation sites and related facilities. Major public power generation facilities are those owned by utilities which are regulated by the Public Service Commission and which own and operate public utility electrical distribution systems. This designation is required for all public power generation sites of ten acres or more in size that contribute electricity to the power grid in Martin County. Such land uses are subject to the same location and compatibility considerations required by the

"Industrial" category. Currently, the only such designated area within the county is the FPL Martin Plant site, cooling reservoir, and transmission lines exiting the site to the south.

As the transmission line ROW extends to the south, it is located adjacent to land designated Agricultural and Industrial. Where the proposed corridor begins, as the route turns to the east along SR 76, it occupies land designated Agricultural except for the southwest corner of the corridor, which is designated Public Conservation Areas and is within FPL's existing transmission line ROW. The corridor and adjacent land is designated Agricultural to and beyond the Indiantown substation to the Bridge substation except for several areas. The mobile home park southwest of the Indiantown substation and the land between SR 76 and the SR 710/SR 76 intersection is designated Mobile Home Density. The strip of land between the St. Lucie Canal, SR 76 and CR 726 is designated Rural Density. A small portion if the corridor southwest of Indiantown is designated Estate Density. A review of existing transmission lines in Martin County indicates those existing facilities are located in most Martin County future land use categories, including those within which the new transmission lines are proposed to be located.

Martin County adopted Ordinance Number 293, on April 29, 1986 that enacted new zoning district regulations (Chapter 35, Article III, "Category B" district regulations/Chapter 33). This ordinance is still in effect. This ordinance established zoning districts that include: Agricultural, Rural, Residential, Commercial, Industrial, Institutional, and Planned Unit Development. The Martin County Development Code, Appendix A defines Utilities as "a use of land customary and necessary to the maintenance and operation of essential public services, such as electricity and gas transmission systems; water and wastewater systems; communication; and similar services and facilities". Permitted uses are identified in the Permitted Use Schedule, Section 3.5 E. Utilities are listed as a permitted use in all zoning districts except Public Conservation and Public Airport Facilities.

Along the proposed transmission line route, from the Martin Plant to the Indiantown substation, the vast majority of the land is zoned Agriculture. Where the proposed corridor passes south of Indiantown there are a variety of industrial, commercial and residential districts north of the St. Lucie Canal, but within the corridor, the zoning remains predominantly Agriculture with a few parcels zoned for residential use. These are few in number and scattered along the corridor. From Indiantown to the Bridge substation the route is once again predominantly zoned Agriculture.

However, there is a section of land that is designated as Interim Zoning. The entire route from the Martin Plant to the Bridge substation does not enter nor is it adjoining either of the above zoning districts that give exception to utilities as a permitted use.

6.1.5.3 Easements, title, agency works

An easement or other approval may be necessary for the aerial crossing of lands under the jurisdiction of the Board of Trustees of the Internal Improvement Trust Fund (TIITF) associated with the St. Lucie Canal within the proposed corridor. Approvals from the SFWMD and a permit from the USACE and USCG may also be required to cross the St. Lucie Canal. Coordination with agencies referenced above is underway.

The proposed corridor and existing ROWs for both transmission lines cross SR 76 (total of three crossings). Crossing this highway would require approval from FDOT, as would the erection of any poles within FDOT ROW. Martin County will also require permits or approvals to cross county-maintained roads, such as CR 726 (Citrus Boulevard).

All crossings of state roads will conform to the specifications contained in the FDOT Utility Accommodation Guide. Notification and coordination are usually sufficient when crossing facilities owned by other utilities. These utilities may include telephone, cable TV, gas, potable water, and sanitary sewer lines located primarily in state or county road ROWs.

6.1.5.4 Vicinity Scenic, Cultural and Natural Landmarks

Governmental jurisdictions along the existing ROWs and proposed corridor, listed in Section 2.2.1 of the FDEP SCA Guidelines, are depicted on Figure 6.1-20. The Dupes Reserve is located within one-quarter mile of the proposed transmission line ROW just south of the St. Lucie Canal and SR 76 in southwestern Martin County and northwestern Palm Beach County. It is designated as a Save Our Rivers Land Management Area of the SFWMD. The Florida Fish and Wildlife Conservation Commission (MWC) are responsible for wildlife management and regulating public hunting. Hiking, horseback riding and camping are allowed in designated areas. When the DuPuis Reserve was established, the northeast corner of the Reserve overlapped the existing FPL transmission line ROW in the area. The proposed transmission line will not occupy any of the areas preserved for the recreational activities mentioned above. The location where the proposed transmission line turning

structure is anticipated to be constructed is occupied by citrus grove and is within FPL's existing ROW.

An extended portion of the proposed Pal Mar Management Area has been designated by the SFWMD as a "Save Our Rivers Potential Acquisition Area". The area within one-quarter mile of the proposed ROW is located southeast of the Indiantown substation on the southern side of the St. Lucie Canal and SR 76 and is currently privately owned.

Timer Powers Community Park is located south of Citrus Boulevard east of Indiantown along the northern side of the St. Lucie Canal. This park is open to the public and includes such amenities as nature trails, restrooms, boat ramp, fishing access, horseshoes, picnic sites, and an equestrian arena. The site is also handicap accessible (Martin County Parks & Recreation Department 2001).

Big Mound Park is located approximately 0.5 miles north of the proposed corridor east of Indiantown. Athletic fields are the primary use of the park.

Neither the Management Area nor the Community Parks are within the proposed corridor or existing ROWs.

6.1.5.5 Archaeological and Historic Sites

The Florida Department of State, Division of Historical Resources (DHR) was contacted to obtain data on known cultural resources in the vicinity of the transmission lines and to investigate the potential for currently undiscovered significant cultural resources in that same area. The DHR was also asked to determine if a pedestrian survey of the transmission line routes would be needed to ensure that no currently undiscovered archeologically or historically significant resources are located in those areas. DHR's response has not yet been received.

The proposed transmission lines will be located in or immediately adjacent to existing transmission lines and other linear facility ROWs with minimal undisturbed lands proposed to be disturbed. Archeological or historic resources located in the area to be traversed by the new transmission lines would have already been discovered or affected by previous activity. With this in mind, the probability of work on the new transmission lines uncovering such resources is very small.

6.1.6 BIO-PHYSICAL ENVIRONMENT OF THE TRANSMISSION LINE ROWS

6.1.6.1 Land Use/Vegetation

The proposed Indiantown-Martin # 2 transmission line exits the Martin Plant vicinity to the east with existing transmission lines and traverses an undeveloped area of active cattle pasture, pine flatwoods, palmetto prairie, cabbage palms, live oaks, and isolated freshwater marshes. The existing transmission lines and proposed new line then turns south into an area occupied by citrus groves. Citrus is the predominant land use along the transmission line ROW and to the east and west until the ROW crosses the St. Lucie Canal.

The corridor to be certified begins where the proposed transmission line route turns east and parallels the St. Lucie Canal and SR 76 to the Indiantown substation. The banks of the St. Lucie Canal are vegetated with a mixture of Brazilian pepper *(Schinus terebinthifolius)*, cabbage palm (*Sabal palmetto*), live oak (*Quercus virginiana*), and slash pine (*Pinus elliotii*). Land use patterns adjacent to the corridor in the segment from the point where the transmission line route turns east and parallels the St. Lucie Canal and SR 76 to a point east of the Indiantown Airport are primarily citrus groves, pastures, undeveloped land, scattered residences and commercial businesses along the highway, and utility and transportation (highway and railroad) uses. Several small low-density residential areas are located north of the St. Lucie Canal as well as a marina. The community of Indiantown is located approximately one mile north of the corridor along SR 710. Between the Indiantown Airport and the Indiantown substation, land use is predominantly citrus grove, undeveloped land, the canal and roads.

The proposed corridor turns northeast of Indiantown Airport in an area vegetated with cabbage palms and saw palmetto, crosses the canal and parallels CR 726 into the Indiantown substation. This area is characterized as predominantly citrus grove with undeveloped areas supporting cabbage palm, oak, pine, and Brazilian pepper. The proposed transmission line will tie into the Indiantown substation.

Beyond the Indiantown substation, the Bridge-Indiantown #2 transmission line will continue to the east within an existing transmission line ROW, and parallel to the St. Lucie Canal, SR 76 and CR 726. The Bridge-Indiantown #2 route continues east and then turns south through an area of Brazilian pepper, cabbage palms, and oaks. It crosses the St. Lucie Canal adjacent to an area with citrus grove and hardwood/conifer mixed forest. It then continues to the east within an existing transmission line ROW. With the exception of a few homes located along the two highways, the

land use of the easternmost segment of the route is agriculture, primarily cattle pasture and tree nurseries.

Figure 6.1-22 depicts land use and land cover along the entire route of the proposed corridor and the proposed transmission lines to be constructed in existing ROW, using the Florida Land Use and Cover Forms Classification System (FDOT, 1999). Existing land use/land cover maps prepared by FDEP were acquired and updated after ground truthing in January 2002. Land use is mapped at Level II or Level III and land cover is mapped at Level III. Each vegetative community is described in more detail in Section 6.1.7.3. Dominant plant species observed in each community are listed in Table 6.1-1.

6.1.6.2 Affected Waters and Wetlands

The only significant surface water body to be crossed by the proposed Indiantown-Martin #2 and Bridge-Indiantown #2 lines is the St. Lucie Canal (twice and once, respectively). No transmission line structures are to be placed in the canal. Other surface water features in the transmission line ROWs include drainage ditches, freshwater marshes, wet prairies, and cypress domes. Drainage ditches typically occur on the borders and between the rows of citrus groves, associated with road ROWs, along the perimeter of pastures, and surrounding wetlands within pastures. Large drainage ditches or canals interconnect with the St. Lucie Canal. Additional details on these water bodies and wetlands are provided in the following section. No natural named water bodies will be affected.

6.1.6.3 Ecology

Species–Environmental Relationships

Terrestrial and Wetland Ecosystems–Flora

Mixed Wetland Hardwoods (FLUCFCS Code 617)

A small amount of the area surrounding the existing ROW and proposed corridor is classified as mixed wetland hardwoods. These areas are vegetated with a canopy including red maple (*Acer rubrum*) and blackgum (*Nyssa sylvatica*), shrubs including coastal plain willow (*Salix caroliniana*) and buttonbush (*Cephalanthus occidentalis*), and a groundcover layer of emergent wetland species. Commonly observed emergent species include pickerelweed (*Pontederia cordata*), sawgrass (*Cladium jamaicense*), soft rush (*Juncus effusus*), and cattail (*Typha latifolia*). These areas are typically located in depressional areas within surrounding upland pine/oak/cabbage palm forests.

Citrus Groves (FLUCFCS Code 221)

The majority of the native vegetative communities within and surrounding the proposed transmission lines, including the area within and around the proposed corridor, have been cleared and replaced with citrus groves. The groves typically are surrounded by a system of drainage ditches and are actively managed to discourage the establishment of native species through the application of herbicides. While the interior of the groves do not support significant amounts of native vegetation, the drainage ditches are often vegetated with species including pickerelweed, cattail, water primrose (*Ludwigia* sp.), spatterdock (*Nuphar luteum*), smartweed (*Polygonum* sp.), coastal plain willow, and Brazilian pepper.

Tree Nurseries (FLUCFCS Code 220)

Tree nurseries occupy a relatively small area adjacent to the proposed route near the Bridge substation. Primary tree crops found in these nurseries include various palms and oaks in containers. Little understory exists because these areas are mowed on a regular basis. Ground cover consists mainly of mixed grasses. These tree nurseries are unnatural communities providing little cover or foraging habitat for most wildlife.

Improved and Unimproved Pastures (FLUCFCS Codes 211 and 212)

Improved pastures occupy a notable amount of area near the Martin Plant and the Bridge substation. There is little canopy and understory vegetation in these pastures, with the exception of occasional cabbage palms, Brazilian pepper, and live oaks. The ground cover is composed mostly of Bahia grass (*Paspalum notatum*). Unimproved pastures are similar to improved pastures, but are typically not actively maintained and include greater coverage of shrubs and native groundcover species. These improved and unimproved pastures are unnatural communities providing little cover or foraging habitat for most wildlife.

Pine Flatwoods (FLUCFCS Code 411)

Upland pine flatwoods occur near the Martin Plant and along the north bank of the St. Lucie Canal. Canopy vegetation is dominated by slash pine with scattered live oak and cabbage palm. The understory contains mostly saw palmetto (*Serenoa repens*), gallberry (*Ilex glabra*), wax myrtle (*Myrica cerifera*), and young pines. The ground cover is fairly sparse, consisting mostly of wiregrass

(*Aristida beyrichiana*) and scattered herbaceous vegetation. These pine flatwoods provide important cover and foraging habitat for wildlife.

Live Oak (FLUCFCS 427)

Areas dominated by live oaks occur within and adjacent to pastures along the proposed corridor and existing ROWs. Additional linear parcels of live oaks are found alongside ditches and canals. Live oaks provide forage for wildlife as well as habitat for epiphytic species, including listed species of bromeliads. No listed bromeliads were observed within the live oak communities in the proposed corridor and existing ROWs.

Mixed Pine-Oak Forest (FLUCFCS Code 434)

The majority of the forested areas within and surrounding the proposed route consists of mixed slash pine and live oak upland hardwood forests. Along with slash pine and live oak, other common canopy species include cabbage palm and laurel oak (*Quercus laurifolia*). Common shrub species include wax myrtle and Brazilian pepper, while the understory contains saw palmetto, wiregrass, and scattered herbaceous vegetation. These communities are somewhat overgrown due to the absence of natural fires. As a result, they are not in optimal condition, but still provide important cover and foraging habitat for some wildlife.

Cabbage Palm (FLUCFCS Code 428)

Upland cabbage palm forests are found adjacent to the proposed routes on sandy soils. Common associates include Brazilian pepper, saw palmetto, and wax myrtle. A small parcel of wet cabbage palm forest is located near the Martin Plant, to the south of the proposed corridor. The relatively sparse understory in this area includes wetland species such as Virginia chain fern (*Woodwardia virginica*) netted chain fern (*Woodwardia areolata*), and soft rush. Cabbage palm forests often support epiphytic species such as the commonly observed golden polypody (*Phlebodium aureum*), but are not considered valuable cover and foraging habitat for wildlife.

Brazilian Pepper (FLUCFCS 422)

Areas dominated by Brazilian pepper typically are disturbed sites adjacent to citrus groves, roadsides, and along the St. Lucie Canal. Brazilian pepper is an invasive exotic species that quickly becomes established in disturbed areas and often forms dense monocultures, completely shading out

any herbaceous groundcover species. These areas are poor habitat for wildlife and exhibit low species diversity.

Cabbage Palm-Brazilian Pepper (FLUCFCS Code 428/422)

Mixed Pine/Oak-Cabbage Palm Forest (FLUCFCS Code 434/428)

Pine Flatwoods-Cabbage Palm-Brazilian Pepper Forest (FLUCFCS Code 411/428/422)

Mixed Pine-Oak-Cabbage Palm-Brazilian Pepper Forest (FLUCFCS Code 434/428/422)

These classifications are utilized when the mixture of dominant species does not correspond to an existing FLUCFCS code designation. These areas are common along the St. Lucie Canal, where pine flatwoods and cabbage palm forests intergrade with oak hammocks and Brazilian pepper has become established, but is not dominant.

Cypress (FLUCFCS Code 621)

Two areas of cypress wetlands are found adjacent to the proposed transmission line ROWs. One cypress dome is located near the Martin Plant, to the south of the existing ROW, while additional domes are found near the terminus of the proposed Bridge-Indiantown #2 ROW within improved pastures. These areas are dominated by a canopy of cypress (*Taxodium distichum*), with additional wetland trees including blackgum and red maple. Herbaceous species include pickerelweed, Virginia chain fern, netted chain fern, smartweed, lizard's tail (*Saururus cernuus*), soft rush (*Juncus effusus*), sedges (*Cyperus* sp.), and spikerush (*Eleocharis* sp.). Areas of freshwater marsh are often located adjacent to the cypress domes, vegetated with emergent herbaceous species.

Cypress-Pine-Cabbage Palm (FLUCFCS Code 624)

This community is found along the transition between upland pine and cabbage palm forests and cypress domes. The species composition is similar to that described above for cypress communities, with the addition of pine and cabbage palm in the canopy.

Freshwater Marshes (FLUCFCS Code 641)

Freshwater marshes occur periodically in the proposed corridor and existing ROWs, especially within the improved pastures. These are typically isolated wetlands associated with sloughs, ditches, and small ponds. Additional small areas of freshwater marsh occasionally surround existing transmission line poles, formed during the construction of the pole pads. Freshwater marshes are

dominated by herbaceous vegetation, consisting of pickerelweed, cattail, water primrose, smartweed, sawgrass, spikerush (*Eleocharis* sp.), and soft rush (*Juncus effusus*). Freshwater marshes provide important foraging habitat for wading birds, feeding upon invertebrates and small fishes.

Terrestrial and Wetland Ecosystems–Fauna

The wildlife habitat in the area of the proposed corridor and existing transmission line ROWs has been altered significantly from its natural state for citrus, pastureland, roadways, tree nurseries, and residential use. In addition, the widespread occurrence of Brazilian pepper reduces the quantity and quality of native habitat. However, many wildlife species were observed utilizing the area within and adjacent to the proposed corridor and existing ROWs for foraging and cover. A brief discussion of habitat quality and wildlife species observed is presented in the following text. Wildlife species observed refers to those species whose utilization of a particular habitat was determined by actual site, sound, tracks, scat, burrows or other signs. These observations were made during site reconnaissance activities conducted January 15 through 18, 2002, and are summarized in Table 6.1-2.

Mixed Wetland Hardwoods (FLUCFCS Code 617)

Only limited amounts of mixed wetland hardwoods are located within the proposed routes and surrounding area. Species observed in these habitats include red shouldered hawk (*Buteo lineatus*), blue jay (*Cyanocitta cristata*), and mockingbirds (*Mimus polyglottis*). Other species likely to occur in these habitats include a variety of reptiles, including water moccasin (*Agkistrodon piscivorus*), banded water snake (*Nerodia fasciata*), Southern leopard frog (*Rana utricularia*), and Southern cricket frog (*Acris gryllus*). Mixed wetland hardwoods also provide food and cover for raccoons (*Procyon lotor*), and the perimeter of these areas are often utilized by feral hogs (*Sus scrofa*).

Citrus Groves (FLUCFCS Code 221)

Citrus groves provide little habitat for wildlife, evidenced by the infrequent observation of species utilizing the groves along the proposed transmission line routes. Only limited numbers of common bird species were observed, including mockingbirds, blue jays, and crows (*Corvus brachyrynchos*). An individual American alligator was observed on the bank of a perimeter ditch surrounding a citrus grove.

Tree Nurseries (FLUCFCS Code 220)

Tree nurseries are located near the Bridge substation adjacent to improved pastures. These tree nurseries are unnatural communities providing little cover or foraging habitat for most wildlife. No wildlife species were observed within the tree nursery areas, although common bird species are likely, including mockingbirds, blue jays, crows, and killdeer (*Charadrius vociferus*).

Improved and Unimproved Pastures (FLUCFCS Codes 211 and 212)

Improved and unimproved pastures are unnatural communities providing little cover or foraging habitat for most wildlife. Wildlife species observed in the improved pastures include the southeastern American kestrel (*Falco sparverius paulus*), Florida sandhill crane (*Grus canadensis pratensis*), cattle egret (*Bubulcus ibis*), red-shouldered hawk, mockingbird, blue jay, killdeer, and European starling (*Sturnus vulgaris*). Signs of feral hogs were also observed.

Pine Flatwoods (FLUCFCS Code 411)

Pine flatwoods provide important cover and foraging habitat for wildlife. A variety of birds, mammals, and reptiles utilize pine flatwoods. Wildlife species observed in these areas of the proposed routes include red-shouldered hawk, red-bellied woodpecker (*Melenerpes caroliniana*), armadillo (*Dasypus novemcinctus*), and turkey (*Meleagris gallopavo*). A roadkill bobcat (*Lynx rufus*) was observed near a pine flatwoods habitat, and signs of deer (*Odocoileus virginianus*) and feral hog are common.

Live Oak (FLUCFCS 427)

While no wildlife species were observed within the live oak habitats within and surrounding the proposed routes, species expected to utilize live oak habitat include deer, turkey, gray squirrel (*Sciurus carolinensis*), armadillo, opossum (*Didelphis virginianus*), raccoon, and common birds such as blue jays, mockingbirds, and woodpeckers.

Mixed Pine-Oak Forest (FLUCFCS Code 434)

Much of the upland forest surrounding the proposed routes is vegetated with a mixture of slash pine, live oak, and laurel oak. Species observed in these habitats were limited to red-shouldered hawk, southeastern American kestrel, and blue jay. Wildlife expected to occur in mixed pine-oak forests include those listed above in association with pine flatwoods and live oak communities.

Cabbage Palm (FLUCFCS Code 428)

No wildlife species were observed within cabbage palm areas within and adjacent to the proposed routes. However, it is expected that common bird species would utilize these areas for feeding and cover.

Brazilian Pepper (FLUCFCS 422)

These areas are poor habitat for wildlife and exhibit low species diversity. Only common bird species were observed utilizing Brazilian pepper habitat, including mockingbirds and blue jays.

Cypress (FLUCFCS Code 621)

Cypress domes provide important feeding and nesting habitat for a variety of wildlife species. Species observed within cypress domes along the existing transmission line ROWs include wood stork (*Mycteria americana*), red-shouldered hawk, white ibis, raccoon, feral hog, and deer.

Cypress-Pine-Cabbage Palm (FLUCFCS Code 624)

A small area of intermixed cypress, pine, and cabbage palm is located near the Martin Plant. No wildlife species were observed within this area, although signs of feral hog and deer usage were apparent.

Freshwater Marshes (FLUCFCS Code 641)

The majority of wildlife observations within the proposed corridor and existing transmission line ROWs occurred at freshwater marshes. These habitats are important resources for wading birds, which depend on shallow aquatic areas to feed upon small fishes and aquatic invertebrates. Freshwater marshes occur within the pastures along the proposed corridor and existing transmission line ROWs, and are utilized by a variety of bird species, including great egret (*Ardea alba*), great blue heron (Ardea herodias), little blue heron (*Egretta caerulea*), snowy egret (*Egretta thula*), Florida sandhill crane, white ibis (*Eudocimus albus*), glossy ibis (*Plegadis falcinellus*), cattle egret, and wood stork (*Mycteria americana*). Signs of feral hog activity were apparent along the edges of some marshes.

Listed Species–Flora and Fauna

Listed Species refers to those plant and animal species that are designated by FFWCC and/or US Fish and Wildlife Service (USFWS) as threatened, endangered, or of special concern. Listed species were observed during site reconnaissance activities conducted January 15 through 18, 2002. Observed locations of these species are depicted on Figure 6.1-22 and are discussed in the following text. Table 6.1-3 itemizes these and any additional listed plant and animal species that could potentially occur in proximity to the proposed corridor and existing transmission line ROWs. The Florida Natural Areas Inventory has been consulted to identify any records of listed species within and surrounding the proposed corridor and existing transmission line ROWs. The results of their database search will be provided upon receipt.

Flora

No listed plant species were observed along the proposed corridor and existing transmission line ROWs during site reconnaissance activities. It is likely that listed species of bromeliads would be present within live oak and cabbage palm communities, although none were observed. Two species commonly attached to live oaks include the listed reflexed wild pine (*Tillandsia balbisiana*) and giant wild pine (*Tillandsia utriculata*). These species are listed in the state of Florida due to the presence of a non-native weevil, *Metamasius callizona*, whose larvae tunnel through the stems of bromeliads, killing the plant.

Fauna

Several listed species of birds and one reptile were observed along the proposed routes. These include the wood stork, southeastern American kestrel, Florida sandhill crane, white ibis, American alligator, little blue heron, and snowy egret. These species are described below:

Wood Stork (Mycteria americana)–E

The wood stork is listed as endangered by both FFWCC and USFWS. Suitable feeding habitat (e.g., wetland areas) is present within the proposed routes, and the wood stork's preferred nesting habitat is cypress wetlands, which also occur in the vicinity of the existing transmission line ROWs. Wood storks were observed feeding in freshwater marshes and cypress areas along the proposed routes.

Southeastern American Kestrel *(Falco sparverius paulus)–T*

The Southeastern American kestrel is listed as threatened by FFWCC and is under review for listing by USFWS. Two subspecies of kestrels occur in Florida. Eastern American kestrel is a winter resident only, while the Southeastern American kestrel is a year-round resident occupying upland and wetland habitats. Kestrels were observed above the pasturelands along the proposed routes, flying towards mixed pine and oak habitats.

Florida Sandhill Crane *(Grus canadensis pratensis)–T*

The Florida sandhill crane is listed as threatened by FFWCC, but is not federally listed by the USFWS. The Florida sandhill crane prefers wetlands and dry prairies and often utilizes pastures. Sandhill cranes were observed within pasturelands along the proposed routes.

White Ibis (*Eudocimus alba*)–SSC

The white ibis is listed as a species of special concern by the FFWCC, but is not federally listed by the USFWS. White ibis were the most commonly observed wading bird along the proposed routes, feeding in freshwater marsh habitats.

American alligator (Alligator mississippiensis)-SSC

The American alligator is listed a species of special concern by the FFWCC, and is federally listed by the USFWS as threatened due to similarity of appearance with the endangered American crocodile (*Crocodylus acutus*). One individual alligator was observed basking on the banks of a canal surrounding a citrus grove adjacent to the proposed corridor. It is likely that additional alligators use the St. Lucie Canal and numerous ditches found along the perimeter of citrus groves.

Little Blue Heron *(Egretta caerulea)–SSC*

The little blue heron is listed as a species of special concern by the FFWCC, but is not listed federally. Little blue herons were observed feeding in freshwater marshes within pastures along the existing transmission lines.

Snowy Egret *(Egretta thula)–SSC*

The snowy egret is listed as a species of special concern by the FFWCC, but is not listed by the USFWS. A few snowy egrets were observed feeding on the edge of freshwater marshes within pastures along the existing transmission lines.

Aquatic Systems

The only significant aquatic system along the proposed routes is the St. Lucie Canal, which is an artificial waterbody created for navigational purposes and is periodically dredged. The majority of the native vegetation along the banks of the canal has been cleared for citrus, pasture, roadways, and residential areas. The St. Lucie Canal in the vicinity of the proposed corridor and existing transmission line ROWs is described in Section 2.3.6.1.

Pre-Existing Stresses

Terrestrial and Wetland Systems

Pre-existing stresses to the terrestrial and wetland systems in the area of the proposed routes are due primarily to the conversion of natural lands to citrus, pastureland, tree nurseries, and residential areas. These conversions of natural lands reduce the quality of the natural wildlife habitat.

Aquatic Systems

Pre-existing stresses to the major aquatic systems along the proposed routes are due in large part to the large-scale dredging of the St. Lucie Canal for navigation.

Measurement Programs

Terrestrial and Wetland Systems

Site reconnaissance activities were conducted January 15 through 18, 2002, to determine existing terrestrial and wetland conditions along the proposed routes. Vegetative community boundaries, estimated jurisdictional wetland boundaries, and wildlife observations were identified on aerial maps.

Aquatic Ecology

No impact to the aquatic ecology of the St. Lucie Canal is anticipated, as no transmission line structures are to be located within the canal.

6.1.6.4 Other Environmental Features

The St. Lucie Canal is under the jurisdiction of the USACE and is a navigation route from the west coast of Florida to the east coast via Lake Okeechobee. Vessels routinely use this route for transit. Coordination with the USACE and the USCG will occur in order to determine appropriate clearance requirements along each portion of the St. Lucie Canal that is crossed by the proposed corridor and existing transmission line ROWs.

6.1.7 EFFECTS OF ROW PREPARATION AND TRANSMISSION LINE CONSTRUCTION

6.1.7.1 Construction Techniques

ROW Clearing

Most of the existing ROWs have been cleared, and only minimal clearing will be required for the proposed new structures and conductor clearances. Where clearing is required, all tree growth within the area between the structures and lying within 10 ft of either side of the outside conductors will be cleared. All brush and growth whose mature height could exceed 14 ft in height will be cleared in this area. Depending on the density of trees to be cut, and the restrictions of clearing in wetlands, the machinery required for clearing will include bulldozers, shearing machinery, and chainsaws. A minimal amount of mowing may be required for installation of the anchors. The construction and maintenance of the proposed transmission lines will comply with the terms and conditions of the *DEP General Permit for the Construction and Maintenance of Electric Power Lines by Electric Utilities,* Rule 62-341.620, F.A.C. to the greatest extent practical. It is therefore unnecessary to complete the Environmental Resource Permit application form for inclusion in this filing at this time. Turbidity screens and erosion control devices will be used, where required, to minimize impacts to wetlands and water bodies.

Road and Pad Construction

Most of the roads and pads within the existing ROWs have been constructed and typical maintenance may be required. Improvements and/or expansions of these pads may be required for the new structures. All road and pad construction for the proposed transmission lines will also comply with the terms and conditions of the *DEP General Permit for the Construction and Maintenance of Electric Power Lines by Electric Utilities* to the greatest extent practical. Turbidity screens and erosion control devices will be used, where required, to minimize impacts to wetlands and water bodies.

Line Construction

To install the transmission line structures, a digger truck will auger a hole approximately 20-ft deep, and the concrete single pole will be embedded directly into the hole. The structures will be framed and erected using cranes and other support-type vehicles. Once the structures are set, various wire-pulling equipment will be used to install the conductors and the overhead ground wire. Support vehicles may include a bulldozer, trailers, and light trucks. Construction will be planned to minimize disturbance of the natural ground cover. The use of construction mats and low-pressure vehicles, where appropriate, will minimize the potential for erosion. Turbidity screens and erosion control devices will be used, where required, to minimize impacts to wetlands and water bodies.

6.1.7.2 Impacts on Waterbodies and Uses

There is one aerial crossing of the St. Lucie Canal within the transmission line corridor for which FPL is requesting certification. Two additional aerial crossings of the canal occur along the remainder of the two proposed transmission lines. The aerial crossings of the St. Lucie Canal proposed for the two transmission lines will require permits from the USACE and the USCG and, for the non-certified crossings, approval from SFWMD. All special conditions of the permits issued by these agencies will be complied with. No structures will be located within the canal at any of the three aerial crossings, therefore no impacts to the St. Lucie Canal are expected.

During the ROW clearing, road and pad construction, and line construction, any unavoidable impacts to wetlands will be reviewed under the ACOE and FDEP's Environmental Resource Permitting process or, for the certified corridor segment, under the post-certification review process. Mitigation requirements will be fulfilled through purchase of mitigation credits from a qualified wetland mitigation bank, or through the preservation, enhancement, or creation of wetland habitat.

6.1.7.3 Solid Wastes

Solid waste generated by the proposed clearing of the transmission line ROWs is anticipated to be minimal since most of the ROW has already been cleared for the existing transmission lines. Solid waste generated will typically consist of vegetation and construction debris. Where practical, timber may be sold and the remaining vegetation can be mulched or chipped for spreading onsite or elsewhere. Disposing of mulch in canals/swales adjacent to the ROW for these projects will not be conducted. Vegetation and combustible material may be burned onsite in a manner consistent with

applicable state and local fire-related regulations. All noncombustible solid wastes will be collected and removed for offsite disposal at a permitted disposal facility. No disposal of debris by burial on the ROW shall be permitted on this project.

6.1.7.4 Changes to Vegetation, Wildlife, and Aquatic Life

Permanent changes to the vegetation, wildlife, and aquatic systems in the proposed corridor and existing transmission line ROWs are expected to be minimal and very localized. Vegetation will be impacted in the immediate area of the transmission line support structures, which require clearing of approximately 200 ft^2 each to facilitate construction of the support pads. The majority of these structures will be located within previously cleared areas located along the existing ROWs, and therefore will not result in any significant changes to native vegetation and wildlife.

A limited number of structures may result in unavoidable impacts to freshwater marsh or wet prairie wetlands. In these cases, less than one-third acre of fill per structure may be required to facilitate construction. Any dredge and fill activities in wetlands will be permitted and mitigated in accordance with the ACOE and FDEP's Environmental Resource Permitting process or, for the certified portion of the Indiantown-Martin #2 transmission line, the post-certification review process. Silt screen placement during construction activities will minimize the potential for any eroded materials entering the surrounding aquatic or wetland systems.

The proposed transmission line routes cross the St. Lucie Canal three times. No structures will be placed within the canal, therefore no impacts to aquatic biota is expected. As the banks of the canal are disturbed along much of the proposed routes, no significant loss of riparian vegetation is anticipated. As with wetland systems, turbidity screens and erosion control devices will be used where necessary to minimize impacts to the St. Lucie Canal.

No impacts to threatened and endangered species are expected. Listed species observed along the proposed routes are limited to mobile avian species that may relocate to similar habitat during construction activities. No permanent loss of habitat for threatened and endangered species is anticipated, with the exception of the small amount (approximately 1/3-acre) of fill required for each structure located within wetlands. Large areas of freshwater marsh are located adjacent to the proposed routes, which may provide refuge during construction.

The movement of migratory birds should not be impeded due to the placement of the proposed transmission lines. The majority of the new lines will be located immediately adjacent to the transmission lines already in place along the existing ROWs. To reduce the risk of accidental bird strikes, marker balls may be hung along the transmission line conductors at the St. Lucie Canal crossing points. As a result, there should not be a significant increase in bird strikes.

6.1.7.5 Impact on Human Populations

Construction of the transmission lines will consist of a series of tasks performed by specialized crews. During the construction period, a particular crew's total time at any given location will be relatively brief, only several weeks. Use of construction equipment may result in temporary noise impacts only to residences and businesses in proximity to the construction. These impacts will be brief and intermittently spaced due to the nature of transmission line construction and equipment use. Construction will be scheduled during daylight hours as much as possible to minimize disturbance. Clearing and road construction are expected to be minimal because the ROWs for these transmission lines follow existing transmission lines and/or paved roads. Where the ROWs coincide with or cross roads, the construction contractor will follow FDOT guidelines for flagging and use of barriers for traffic control, where needed.

Because of the temporary nature of the construction process and the relatively short duration of each phase of construction at any given location, impacts experienced by individuals residing or working near the transmission lines should be minor.

6.1.7.6 Impact on Regional Scenic, Cultural and Natural Landmarks

No significant impacts to regional scenic, cultural, and natural landmarks is anticipated from the construction of the proposed 230 kV transmission lines. The portion of the existing ROW within which the Indiantown-Martin #2 transmission line will be located just after it crosses SR 76 to the south overlaps into the northernmost corner of the DuPuis Reserve. This portion of the Reserve is not actively used for the any of the purposes identified in Section 6.1.6.4 as it is in active citrus production.

Recreational activities associated with Big Mound Park and Timer Powers Community Park near Indiantown will not be affected by the construction of the transmission lines. Big Mound Community Park is located 0.5 miles from the corridor and the anticipated alignment of the proposed transmission line in the vicinity of Timer Powers Community Park is south of the Timer Powers Community Park. Due to this alignment, the proposed ROW will be removed from the Park by two ROWs associated with the St. Lucie Canal and SR 76. Existing tree lines south of SR 76 will screen most of the proposed structures from view at the Park. Where the tree line does not exist, an existing communication structure will be present and visible between the Park and the proposed structures, thereby reducing further reducing the view of the proposed structures from the Park. The potential Pal Mar Management Area extension is located South of St. Lucie Canal while the Bridge-Indiantown #2 ROW in this vicinity is located north of the Canal.

6.1.7.7 Impact on Archaeological and Historical Sites

The probability of impacts to archaeological and historical resources is considered very low due to the following reasons.

- The proposed transmission lines parallel existing transmission line ROWs or other linear facilities and traverse very little undisturbed land,
- The area in and around the proposed transmission line routes is largely disturbed by previous clearing,
- Structure placement will be located adjacent to existing structures to the greatest extent practical, and
- There are no National Register sites or Historic Districts within, adjacent to, or in close proximity to the routes.

The DHR has been contacted to confirm the lack of known resources in the existing ROWs and proposed corridor to be certified, identify any potential areas of unknown resources, and determine if a pedestrian survey with subsurface testing is required. A copy of the DHR's response will be forwarded to FDEP.

If the DHR determines that a pedestrian survey is necessary, then FPL will have the appropriate surveys conducted and submit a completed report to the DHR for review before construction initiation. During construction, FPL will abide by established protocols that require construction to

cease upon discovery of any artifacts until the artifacts are investigated and either determined to be insignificant or the site where the artifacts are discovered is mitigated.

6.1.8 POST-CONSTRUCTION IMPACTS AND EFFECTS OF MAINTENANCE

6.1.8.1 Maintenance Techniques

FPL will inspect the poles, line conductors, insulators, access areas, and vegetation to ensure the safe operation of the line. The inspections will consist of ground patrols (truck) and/or aerial (airplane/helicopter) patrols. Transmission lines normally require minimal maintenance; however, lines will be inspected on a regular basis for problems caused by weather, vandalism, etc. FPL manages the ROW with a variety of methods including trimming, mowing and the use of approved herbicides, targeting species that are incompatible with the safe operation and maintenance of the transmission system. This allows a broad diversity of vegetation growth, which enhances wildlife use potential. Fire may be used as a management tool provided state and local regulations are followed.

6.1.8.2 Multiple Uses

Current uses of the transmission line ROWs include horse and cattle grazing and citrus groves. These types of uses are anticipated to continue in the transmission line ROWs.

6.1.8.3 Changes in Species Populations

As the current uses along the proposed corridor are not expected to change, no significant changes in species populations are expected upon completion of construction. Post-construction maintenance will involve clearing of vegetation within the ROW, and will avoid unnecessary damage to vegetation in environmentally sensitive areas. Therefore, no changes to available wildlife habitat are expected, and no changes in species populations will occur as a result of maintenance activities.

6.1.8.4 Effects of Public Access

Access to the proposed transmission lines will occur via existing gates that are locked and provide access only to FPL, its contractors, and leaseholders, as well as the property owner. No increased access or any public access is planned or anticipated when construction is complete. No limitation of presently publicly accessible areas is anticipated.

6.1.9 OTHER POST-CONSTRUCTION EFFECTS

6.1.9.1 Electric and Magnetic Field Effects

The strength of the magnetic field under a transmission line is primarily a function of the amount of current carried by the line and the height of the conductors above ground. The electric field is primarily a function of the voltage impressed on the line and the height of the conductors above ground.

The electric and magnetic fields produced by the existing and proposed transmission lines were calculated in accordance with the requirements of Rule 62-814.460, F.A.C. and the fields associated with the new transmission lines comply with the standards set forth in Rule 62-814.450, F.A.C. The normal load is the quantity of power necessary to meet the day-to-day system requirements. Although the requirements vary throughout the day, the value used in the calculations is the maximum for this condition. Load conditions greater than normal occur only when there are emergency outages in the transmission system or extreme temperatures. These conditions are temporary, and the system will return to normal when the emergency is corrected or weather conditions normalize. The maximum electric and magnetic fields expected to be produced by the proposed transmission lines under maximum operating conditions are presented in Table 6.1-4. These fields comply with FDEP Rule requirements for the two new 230 kV lines.

6.1.9.2 Audible Noise

The audible noise associated with a transmission line is generated by either corona from the conductors or from gap-type discharges. Under wet conditions, higher noise levels are experienced than would occur under dry conditions. However, the background noise from inclement weather has the effect of masking transmission line noise. During fair weather and under normal operating conditions, the audible noise levels calculated for the proposed transmission line design will be less than the ambient noise levels at the edge of the ROW.

6.1.9.3 Radio and Television Interference

No interference is expected to occur for frequency-modulated (FM) radio or facilities using FM communication systems. Most amplitude-modulated (AM) radio broadcasting stations in the area are not expected to experience any interference from the proposed transmission lines. The audio portion

of a TV signal is frequency modulated; therefore, no interference with the audio signal should occur as a result of the proposed transmission lines.

6.2 ASSOCIATED LINEAR FACILITIES

There are no rail lines, pipelines, or other non-transmission linear facilities associated with the Martin Expansion Project.

Table 6.1-1. Plant Species Associated with the Dominant Vegetative Communities of the Proposed Corridor and Existing Transmission Line ROW (Page 1 of 3)

Scientific Name	Common Name	Forested Wetlands	Freshwater Marsh/ Wet Prairie	Citrus Groves	Pastures	Pine Flatwoods	Live Oak	Mixed Pine and Hardwoods	Cabbage Palm/ Brazilian Pepper
Trees									
Acer rubrum	Red Maple	X							
Citrus sp.	Citrus			X					
Melaleuca quinquenervia	Melaleuca								
Persea borbonia	Red Bay					X			
Pinus elliotii	Slash Pine	X			X	X			
Quercus laurifolia	Laurel Oak				X	X		X	
Quercus virginiana	Live Oak				X	X	X	X	
Sabal palmetto	Cabbage Palm	X			X	X	X	X	X
Salix caroliniana	Coastal Plain Willow	X	X						
Taxodium distichum	Cypress	X							
Nyssa sylvatica	Blackgum	X							
Persea palustris	Swamp Bay	X							
Magnolia virginiana	Sweet Bay	X							
Shrubs and Vines									
Ampelopsis arborea	Pepper Vine	X			X	X		X	X
Baccharis halimifolia	Groundsel Tree	X	X		X			X	
Cephalanthus occidentalis	Buttonbush	X	X						
Ilex glabra	Gallberry	X				X			
Lyonia lucida	Fetterbush								
Myrica cerifera	Wax Myrtle	X		X	X	X	X		
Sambucus canadensis	Elderberry		X		X				
Schinus terebinthfolius	Brazilian Pepper	X	X		X	X		X	X
Serenoa repens	Saw Palmetto	X			X	X	X	X	X
Smilax sp.	Catbrier	X				X	X	X	
Toxicodendron radicans	Poison Ivy	X				X		X	X
Vaccinium myrsinites	Shiny Blueberry					X	X		
Vitis rotundifolia	Muscadine	X				X	X	X	X

Table 6.1-1. Plant Species Associated with the Dominant Vegetative Communities of the Proposed Corridor and Existing Transmission Line ROW (Page 2 of 3)

Scientific Name	Common Name	Forested Wetlands	Freshwater Marsh/ Wet Prairie	Citrus Groves	Pastures	Pine Flatwoods	Live Oak	Mixed Pine and Hardwoods	Cabbage Palm/ Brazilian Pepper
Herbaceous Species									
Ambrosia artemisiifolia	Ragweed			X	X				X
Andropogon glomeratus	Broomsedge		X						
Andropogon virginicus	Broomsedge				X	X	X	X	
Aristida beyrichiana	Wiregrass					X		X	
Bidens alba	Beggar-Tick		X		X				X
Blechnum serrulatum	Swamp Fern	X							
Centella asiatica	Coinwort	X	X						
Cladium jamaicence	Sawgrass	X			X				
Colocasia esculanta	Wild Taro								
Commelina difussa	Dayflower								
Cyperus sp.	Sedge								
Dichromena sp.	White top				X				
Eleocharis sp.	Spikerush								
Eupatorium capillifolium	Dogfennel								
Fimbrystulus castanea	Fringe Rush								
Hydrocotyle umbellata	Coin Wort	X	X				X		
Hypericum tetrapetalum	St. John's Wort		X						
Juncus effusus	Soft Rush	X							
Ludwigia octavalvis	Water Primrose	X	X						
Ludwigia peruviana	Water Primrose	X	X		X				
Lycopus rubellus	Water Hoarhound		X						
Panicum hemitomon	Maidencane		X						
Parthenocissus quinquefolia	Virginia Creeper					X	X	X	X
Paspalum notatum	Bahia Grass				X				
Phlebodium aureum	Golden Polypody						X	X	X
Setaria magna	Giant Foxtail Grass	X							X
Phyla nodifera	Iron Weed				X				
Phytolacca americana	Pokeweed				X				X

Table 6.1-1. Plant Species Associated with the Dominant Vegetative Communities of the Proposed Corridor and Existing Transmission Line ROW (Page 3 of 3)

Scientific Name	Common Name	Forested Wetlands	Freshwater Marsh/ Wet Prairie	Citrus Groves	Pastures	Pine Flatwoods	Live Oak	Mixed Pine and Hardwoods	Cabbage Palm/ Brazilian Pepper
Herbaceous Species (continued)									
Pluchea sp.	Marsh Fleabane		X						
Polygonum sp.	Smartweed	X	X						
Polypodium polypodiodes	Resurrection Fern						X	X	
Pontederia cordata	Pickerelweed	X	X						
Rhynchospora sp.	Beakrush		X						
Spartina bakeri	Sand Cordgrass		X						
Sphagnum	Sphagnum moss	X							
Tillandsia usneoides	Spanish moss						X	X	
Typha latifolia	Cattail	X	X		X				
Urena lobata	Caesar Weed				X				X
Woodwardia areolata	Netted Chain Fern	X							
Woodwardia virginica	Virginia Chain Fern	X	X						
Saururus cernuus	Lizard's Tail	X	X						
Nuphar luteum	Spatterdock		X						

Table 6.1-2. Wildlife Species Observed Along the Proposed Corridor and Existing Transmission Line ROW (Page 1 of 2)

Scientific Name	Common Name	Forested Wetlands	Freshwater Marsh/ Wet Prairie	Citrus Groves	Pastures	Pine Flatwoods	Live Oak	Mixed Pine and Hardwoods	Cabbage Palm/ Brazilian Pepper
Reptiles									
Alligator mississippiensis	American Alligator			X					
Coluber constrictor	Black Racer				X				
Birds									
Ardea herodias	Great Blue Heron	X	X						
Bubulcus ibis	Cattle Egret		X	X	X				
Buteo lineatus	Red-shouldered Hawk	X			X	X		X	
Casmerodius albus	Great Egret	X	X						
Cathartes atratus	Black Vulture				X				
Charadrius vociferus	Killdeer			X	X				
Columbina passerina	Common Ground Dove			X	X				X
Corvus brachyrhynchos	American Crow	X		X	X				X
Cyanocitta cristata	Blue Jay	X			X		X	X	X
Egretta caerulea	Little Blue Heron		X						
Egretta thula	Snowy Egret		X						
Eudocimus albus	White Ibis	X	X						
Falco sparverius paulus	Southeastern American Kestrel				X			X	
Grus canadensis pratens	Florida Sandhill Crane		X		X				
Meleagris gallopavo	Turkey					X	X	X	
Melenerpes caroliniana	Red-bellied Woodpecker				X	X	X	X	
Mimus polyglottos	Northern Mockingbird			X	X	X	X		X
Mycteria americana	Wood Stork	X	X						
Plegadis falcinellus	Glossy Ibis	X	X						
Sturnus vulgaris	European Starling			X	X				X
Zenaida macroura	Mourning Dove			X	X				X

Table 6.1-2. Wildlife Species Observed Along the Proposed Corridor and Existing Transmission Line ROW (Page 2 of 2)

Scientific Name	Common Name	Forested Wetlands	Freshwater Marsh/ Wet Prairie	Citrus Groves	Pastures	Pine Flatwoods	Live Oak	Mixed Pine and Hardwoods	Cabbage Palm/ Brazilian Pepper
Mammals									
Dasypus novemcinctus	Nine-banded Armadillo					X	X	X	X
Didelphis marsupialis	Opossum					X			X
Lynx rufus	Bobcat					X			
Odocoileus virginianus	White-tailed Deer	X				X			X
Procyon lotor	Racoon	X	X	X		X			
Sciurus carolinensis	Eastern Gray Squirrel					X			X
Sus scrofa	Feral Hog	X	X		X	X			

Table 6.1-3. Listed Flora and Fauna Occurring Along the Proposed Corridor and the Existing Transmission Line ROW

Scientific Name	Common Name	Status (T, E, SSC) Federal	Status (T, E, SSC) State	Observed? (Yes/No)	Probability of Occurrence High	Probability of Occurrence Moderate	Probability of Occurrence Low
Reptiles							
Alligator mississippiensis	American alligator	T(S/A)	SSC	Yes	X		
Drymarchon corais couperi	eastern indigo snake	T	T	No		X	
Gopherus polyphemus	gopher tortoise	N	SSC	No		X	
Birds							
Ajaia ajaja	roseate spoonbill	N	SSC	No			X
Aphelocoma coerulescens	Florida scrub-jay	T	T	No			X
Aramus guarauna	limpkin	N	SSC	No		X	
Caracara plancus	crested caracara	T	T	No	X		
Egretta caerulea	little blue heron	N	SSC	Yes	X		
Egretta thula	snowy egret	N	SSC	Yes	X		
Egretta tricolor	tricolored heron	N	SSC	No	X		
Eudocimus albus	white ibis	N	SSC	Yes	X		
Falco peregrinus	peregrine falcon	E	E	No		X	
Falco sparverius paulus	southeastern American kestrel	N	T	Yes	X		
Grus canadensis pratensis	Florida sandhill crane	N	T	Yes	X		
Haliaeetus leucocephalus	bald eagle	T	T	No	X		
Mycteria americana	wood stork	E	E	Yes	X		
Picoides borealis	red-cockaded woodpecker	E	T	No			X
Rostrhamus sociabilis plumbeus	snail kite	E	E	No			X
Speotyto cunicularia floridana	Florida burrowing owl	N	SSC	No			X
Mammals							
Felis concolor coryi	Florida panther	E	E	No			X
Podomys floridanus	Florida mouse	N	SSC	No		X	
Sciurus niger shermani	Sherman's fox squirrel	N	SSC	No		X	
Trichechus manatus	Manatee	E	E	No			X

Table 6.1-3. Listed Flora and Fauna Occurring Along the Proposed Corridor and the Existing Transmission Line ROW (Page 2 of 2)

Scientific Name	Common Name	Status (T, E, SSC) Federal	State	Observed (Yes/No)	Probability of Occurrence High	Moderate	Low
Plants							
Asclepias curtissii	Curtiss' milkweed	N	E	No		X	
Asimina tetramera	four-petal pawpaw	E	E	No			X
Chamaesyce cumulicola	sand-dune spurge	N	E	No			X
Cheiroglossa palmata	hand fern	N	E	No			X
Conradina grandiflora	large-flowered rosemary	N	E	No			X
Ctenitis sloanei	Florida tree fern	N	E	No			X
Encyclia boothiana var erythronioides	dollar orchid	N	E	No			X
Epidendrum nocturnum	night-scented orchid	N	E	No			X
Eugenia confusa	tropical ironwood	N	E	No			X
Glandularia maritima	coastal vervain	N	E	No			X
Jacquemontia reclinata	beach jacquemontia	E	E	No			X
Lantana depressa var floridana	Atlantic Coast Florida lantana	N	E	No			X
Lechea cernua	nodding pinweed	N	T	No			X
Lechea divaricata	pine pinweed	N	E	No		X	
Linum carteri var smallii	Carter's large-flowered flax	N	E	No			X
Okenia hypogaea	burrowing four-o'clock	N	E	No			X
Oncidium bahamense	dancing-lady orchid	N	E	No			X
Peperomia humilis	terrestrial peperomia	N	E	No			X
Peperomia obtusifolia	blunt-leaved peperomia	N	E	No			X
Polygala smallii	tiny polygala	E	E	No		X	
Pteroglossaspis ecristata	wild coco	N	T	No			X
Spiranthes polyantha	green ladies'-tresses	N	E	No		X	
Tillandsia flexuosa	banded wild-pine	N	E	No		X	
Vanilla mexicana	scentless vanilla	N	E	No			X
Zephyranthes simpsonii	rain lily	N	T	No			X

E = Endangered
T = Threatened
SSC = Species of Special Concern

Table 6.1-4. Maximum Electric and Magnetic Fields Expected to be Produced by the Transmission Lines

Transmission line/Cross section	Electric Field (kV/m)		Magnetic field (mG)
	Maximum	Edge of ROW	Edge of ROW
Indiantown-Martin#2 cross section 1	* 11.0	0.2	** 135.4
Indiantown-Martin#2 cross section 2	* 10.7	*2.9	** 195.3
Indiantown-Martin#2 cross section 3	8.9	*2.9	**173.7
Indiantown-Martin #2 cross section 3a			
West side	8.9	2.9	175.0
East side	8.9	0.7	147.0
Indiantown-Martin#2 cross section 4	1.7	1.3	117.3
Indiantown-Martin#2 cross section 5	1.6	1.5	124.8
Indiantown-Martin#2 cross section 6	5.1	0.2	81.4
Bridge-Indiantown#2 cross section 1	4.3	1.3	144.7
Bridge-Indiantown #2 cross section 2	4.3	1.3	130.0

EMF limits for transmission lines constructed after March 21, 1989

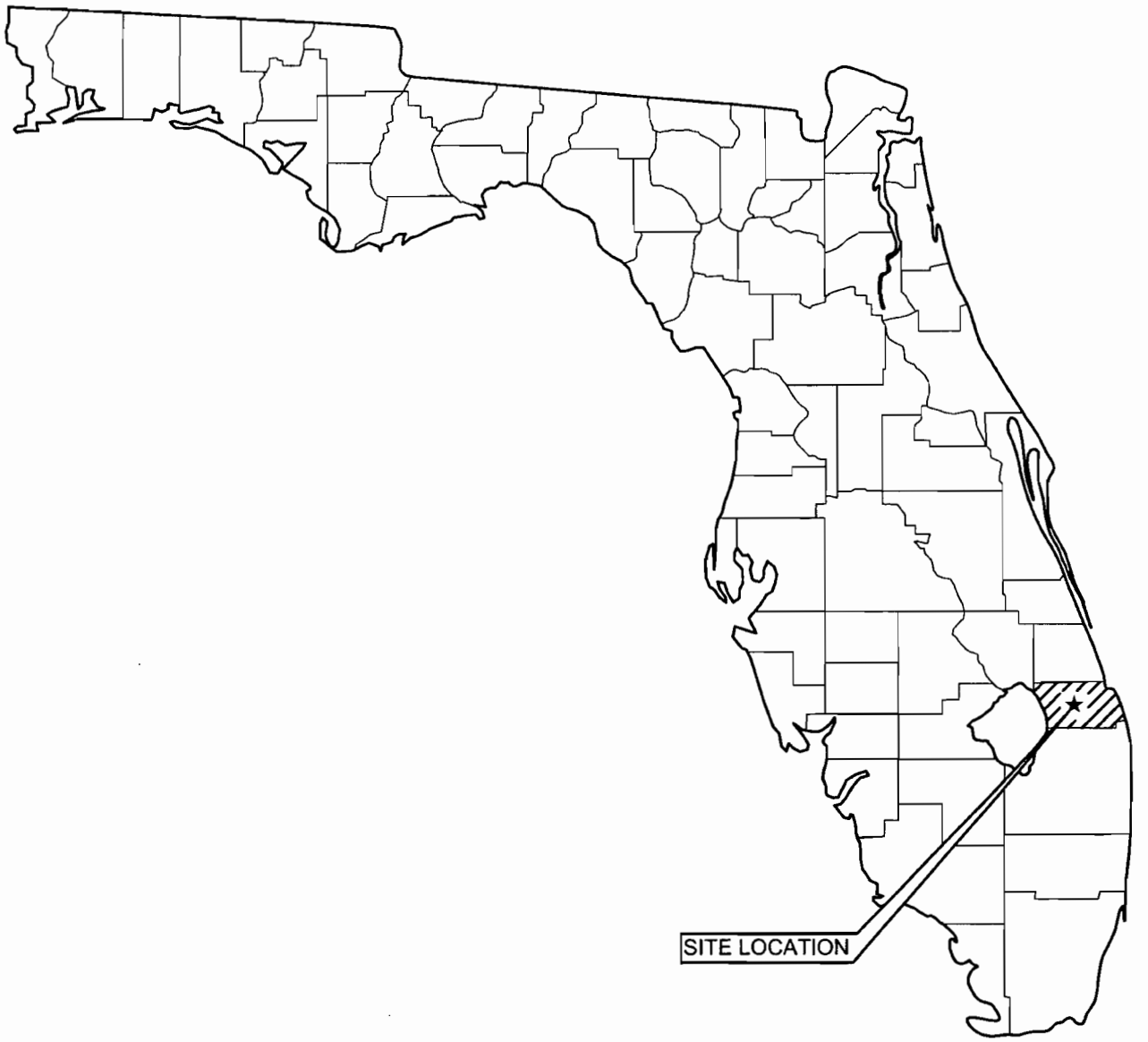
Electric Field at Edge of ROW	2.0 kV/m
Electric Field within ROW	8.0 kV/m
Magnetic Field at Edge of ROW	150 mG/250 mG

These field levels predate the adoption of the standard in sec. 62-814.450, F.A.C.
The maximum electric fields and the electric field of the edge of the ROW are not increased by the construction of the Indiantown-Martin #2 230 kV line, and are attributable to the presence of the three adjacent existing 500 kV lines. Cross sections 1 and 2 are on FPL Martin Plant property.

Pursuant to Rule 62-814.450(3)(d)(e)(f), F.A.C.,the maximum magnetic field at the edge of the ROW is 150 mG for 230 kV transmission lines, and 250 mG for specified existing ROWs, including the Andytown-Martin ROW, on which a portion of the proposed Indiantown-Martin #2 transmission line will be constructed.

Note: kV/m = kilovolts per meter.
mG = milligauss.

Source: *EzEMF software program* developed though Florida Coordinating Group (FCG) and accepted by the Florida Department of Environmental Protection (FDEP).



Golder Associates
Tampa, Florida

FILE No.	0137609A011 FIG 6_1_1
PROJECT No.	013-7609-1502
REV.	0

SCALE	NTS
DATE	1/27/02
DESIGN	RAZ
CADD	DM
CHECK	
REVIEW	

TITLE

GENERAL LOCATION MAP

MARTIN UNIT 8

FIGURE 6.1-1

Drawing file: 0137609A011 FIG 6_1_1.dwg Jan 27, 2002 - 11:24am