TAMPA ELECTRIC COMPANY

POLK POWER STATION
Polk County, Florida

SITE CERTIFICATION APPLICATION

VOLUME 3

TAMPA ELECTRIC
A TECO ENERGY COMPANY

July 1992

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LIST OF ACRONYMS

7Q10	7-day, 10-year flow rate
AADT	average annual daily trips
AAQS	ambient air quality standard
ACSR	aluminum conductor steel reinforced
Agrico	Agrico Chemical Company
AM	amplitude modulation
A/RR	Agricultural/Residential Rural
ASTM	American Society for Testing and Materials
BACT	best available control technology
BEBR	Bureau of Economic and Business Research
BLIS	BACT/LAER information system
BOCC	Board of County Commissioners
BOD	biochemical oxygen demand
Btu	British thermal unit
Btu/ft^3	British thermal units per cubic foot
Btu/gal	British thermal units per gallon
Btu/lb	British thermal units per pound
°C	degree Celsius
$CaCO_3$	calcium carbonate
CC	combined cycle
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CFRPC	Central Florida Regional Planning Council
cfs	cubic foot per second
CG	coal gasification
CGCU	cold gas cleanup
CITES	Convention on International Trade in Endangered Species
cm	centimeter
cm/sec	centimeter per second

CO	carbon monoxide
CO_2	carbon dioxide
COD	chemical oxygen demand
COS	carbonyl sulfide
CPT	cone penetration test
CR	County Road
CS_2	carbon disulfide
CSM	cubic foot per second per square mile
CT	combustion turbine
CUP	Conditional Use Permit
CWA	Clean Water Act
°	degree
d	Shannon Weaver diversity index
dBA	A-weighted decibel
dbh	diameter at breast height
DO	dissolved oxygen
DOE	U.S. Department of Energy
DSM	demand-side management
ECT	Environmental Consulting & Technology, Inc.
EEI	Edison Electric Institute
EIS	environmental impact statement
EIV	Volume of Environmental Information
EMF	electromagnetic field
EMS	emergency medical services
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
°F	degree Fahrenheit
F.A.C.	Florida Administrative Code
FCC	Federal Communications Commission

FCG	Florida Electric Power Coordinating Group
FCREPA	Florida Committee on Rare and Endangered Plants and Animals
FDACS	Florida Department of Agriculture and Consumer Services
FDCA	Florida Department of Community Affairs
FDER	Florida Department of Environmental Regulation
FDER/PSES	FDER Point Source Evaluation Section
FDHR	Florida Division of Historical Resources
FDLES	Florida Department of Labor and Employment Security
FDNR	Florida Department of Natural Resources
FDOT	Florida Department of Transportation
FEECA	Florida Energy Efficiency and Conservation Act
FEMA	Federal Emergency Management Agency
FEPPSA	Florida Electrical Power Plant Siting Act
FGD	flue gas desulfurization
FGFWFC	Florida Game and Fresh Water Fish Commission
FGS	Florida Geological Survey
FGT	Florida Gas Transmission Company
FLUCCS	Florida Land Use and Cover Classification System
FLUCFS	FDOT Land Use, Cover, and Forms Classification System
FM	frequency modulation
FNAI	Florida Natural Areas Inventory
FPC	Florida Power Corporation
FPSC	Florida Public Service Commission
FR	Federal Register
F.S.	Florida Statutes
FSRI	Florida Sinkhole Research Institute
ft	foot
ft bls	foot below land surface
ft/day	foot per day

LIST OF ACRONYMS
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ft^2/day	square foot per day
ft^3/day	cubic foot per day
ft^3/day/ft^3	cubic foot per day per cubic foot
ft/ft	foot per foot
ft^3/hr	cubic foot per hour
ft-msl	foot above mean sea level
ft-NGVD	foot national geodetic vertical datum
FTE	full-time equivalent
GE	General Electric Company
GEESI	General Electric Environmental Systems, Inc.
gpd	gallon per day
gpm	gallon per minute
gpm/ft	gallon per minute per foot
gpm/ft^2	gallon per minute per square foot
gr/scf	grains per standard cubic foot
gr/100 scf	grains per 100 standard cubic feet
H_2S	hydrogen sulfide
H_2SO_4	sulfuric acid
HGCU	hot gas cleanup
HHV	higher heating value
HRSG	heat recovery steam generator
HUD	Housing Urban Development
IGCC	integrated coal gasification combined cycle
IWTP	industrial wastewater treatment plant
kg	kilogram
km	kilometer
kV	kilovolt
kV/m	kilovolt per meter
kw	kilowatt

kwh	kilowatt hour
LAER	lowest achievable emission rate
lb/day	pound per day
lb/ft^3	pound per cubic foot
lb/hr	pound per hour
lb/MMBtu	pound per million British thermal units
L_{dn}	day-night sound level
L_{eq}	equivalent noise level
$L_{eq}(24)$	equivalent sound level for 24-hour periods
LHV	lower heating value
LOLP	loss of load probability
LOS	level of service
LRU	logical reclamation unit
m	meter
m^2	square meter
MCR	maximum current rating
mG	milligauss
mg/L	milligram per liter
MGD	million gallons per day
mi^2	square mile
mL	milliliter
mph	miles per hour
MVA	megavolt amperes
MW	megawatt
NAS	National Audubon Society
NEPA	National Environmental Policy Act of 1969
NESC	National Electrical Safety Code
NESHAPS	National Emission Standard for Hazardous Air Pollutants
NGVD	National Geodetic Vertical Datum

NH_3	ammonia
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NSCR	non-selective catalytic reduction
NSPS	new source performance standards
NSR	New Source Review
NTU	nephelometric turbidity unit
NWS	National Weather Service
O_3	ozone
OAQPS	Office of Air Quality Planning and Standards
organisms/m^2	organisms per square meter
PCB	polychlorinated biphenyl
pCi/L	picoCurie per liter
persons/mi_2	persons per square mile
PHX	primary heat exchanger
PM	particulate matter
PM_{10}	particulate matter less than or equal to 10 micrometers aerodynamic diameter
POS	plan of study
POTW	publicly owned treatment works
ppb	part per billion
ppm	part per million
ppmv	part per million volumetric
ppmvd	dry volume parts per million
PRECO	Peace River Electric Cooperative
PSD	prevention of significant deterioration
psia	pound per square inch absolute
psig	pound per square inch gauge

Pt-Co	platinum-cobalt
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
R-1	Residence
RC	Rural Conservation
RCC	Rural-Cluster Center
R.O.	reverse osmosis
RCRA	Resource Conservation and Recovery Act
RMD	Rural Mixed-Use Development
rpm	revolutions per minute
RRD	Rural Residential
RV	recreational vehicle
SARA	Superfund Amendment and Reauthorization Act
SCA	Site Certification Application
scf	standard cubic foot
SCR	selective catalytic reduction
SCS	Soil Conservation Services
SF-1M	Single Family-Mixed
SIC	Standard Industrial Classification
SMSA	Standard Metropolitan Statistical Area
SNCR	selective non-catalytic reduction
SO_2	sulfur dioxide
SO_3	sulfur trioxide
SOP	standard operating procedure
SPCC	Spill Prevention, Control, and Countermeasure
SPT	standard penetration test
SR	State Road
ST	steam turbine
stpd	short-tons per day

SUS	Saybolt Universal seconds
SWFWMD	Southwest Florida Water Management District
TCLP	toxicity characteristic leaching procedure
TDS	total dissolved solids
Texaco	Texaco, Inc.
tpd	ton per day
tpy	ton per year
TSP	total suspended particulate
TSS	total suspended solids
UE&C	United Engineers & Constructors
μg/L	microgram per liter
$\mu g/m^3$	microgram per cubic meter
μmhos/cm	micromhos per centimeter
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
VOC	volatile organic compound
WUP	water use permit

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6.0 TRANSMISSION LINES AND OTHER LINEAR FACILITIES

6.1 TRANSMISSION LINES

6.1.1 PROJECT INTRODUCTION

Four 230-kV transmission circuits are needed to connect the proposed Polk Power Station to the Tampa Electric Company and Florida transmission grid systems to supply projected power needs starting in 1995. The determination of need for the Polk Power Station and associated facilities is discussed in Section 1.3 of this document. Future generating capacity additions may require additional transmission circuits. Such circuits will be addressed in appropriate future SCA-related documents.

For the planned project operations, two transmission line corridors are currently proposed in order to connect the Polk Power Station to the regional power grid. These corridors, containing two circuits each, will connect the onsite substation at the Polk Power Station to the existing Tampa Electric Company Mines-Pebbledale 230-kV transmission line located to the north of the Polk Power Station site at a point west of the unincorporated community of Bradley Junction, and to the existing Tampa Electric Company Hardee-Pebbledale 230-kV transmission line located to the east of the Polk Power Station site. The existing Hardee-Pebbledale 230-kV transmission line right-of-way is located within the Polk Power Station site boundaries along its northeastern perimeter on the west side of Fort Green Road. The locations of these two existing transmission lines and the two proposed corridors relative to the Polk Power Station site are shown in Figure 6.1.1-1 at a scale of 1:126,720.

Only one of the two proposed transmission line corridors traverses offsite. This offsite transmission line corridor will be referred to as the northern corridor. The other or eastern corridor connecting to the Hardee-Pebbledale 230-kV transmission line is completely within the boundaries of the Polk Power Station site. In addition, a small portion of the northern corridor connecting to the Mines-Pebbledale 230-kV transmission line is also located within the Polk Power Station site boundaries. Therefore, the descriptions of the existing environment and potential effects of the

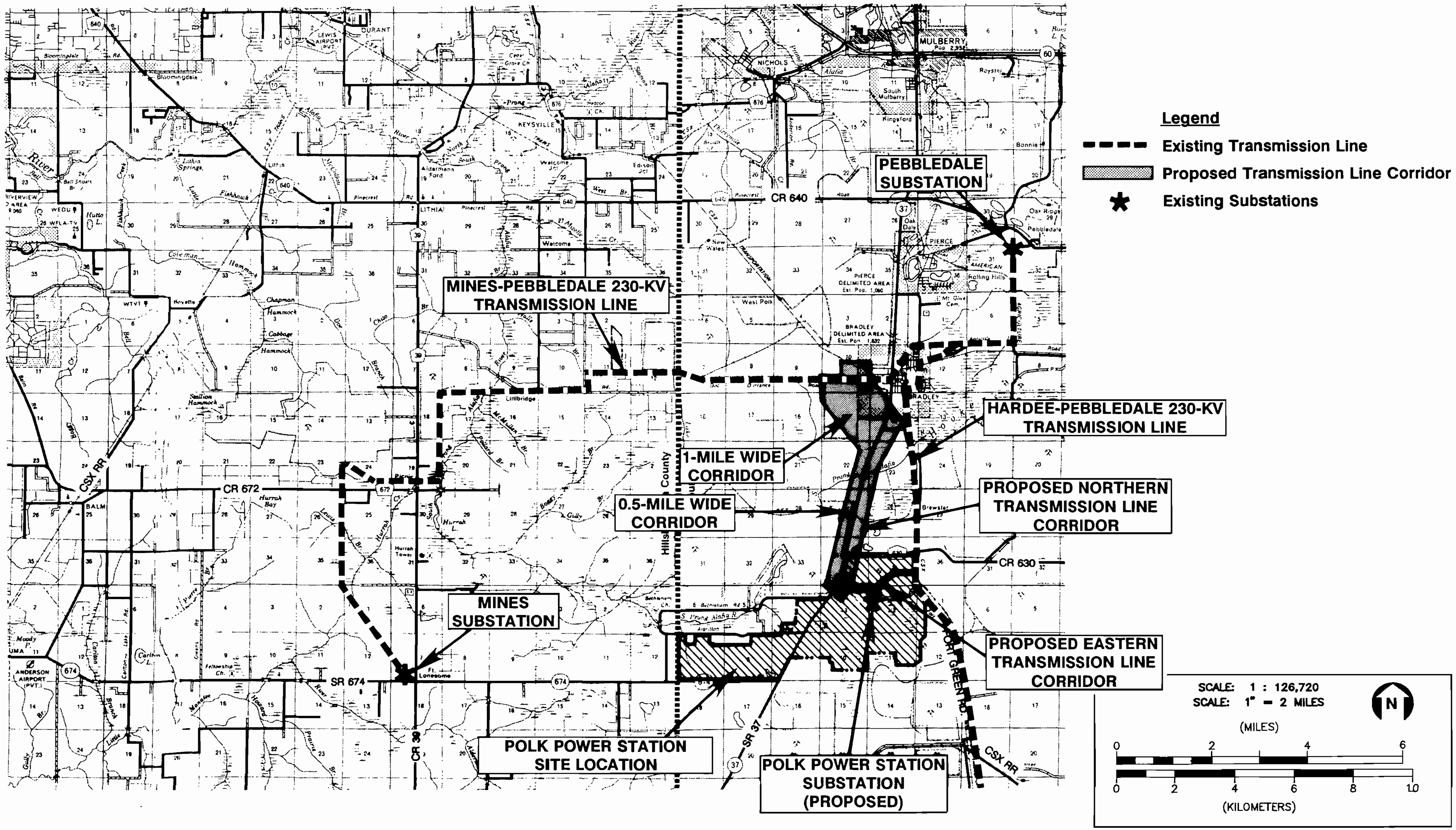

FIGURE 6.1.1-1.

EXISTING AND PROPOSED ELECTRIC TRANSMISSION LINES

Source: ECT, 1992.

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proposed transmission line corridors in the following sections primarily focus on the portion of the northern corridor which is located outside of the Polk Power Station site boundaries. Descriptions of the existing environment for the eastern corridor and onsite northern corridor segment were provided previously in Chapter 2.0 of this SCA. In addition to evaluating socio-political and bio-physical characteristics for the proposed corridor, FDER application guidelines [FDER Form 17-1.211(1), F.A.C.] also require analysis of an area extending 0.5 mile from the edge of the corridor. This additional area will be referred to as the adjacent 0.5-mile wide study area.

6.1.2 CORRIDOR LOCATION AND LAYOUT

The proposed northern transmission corridor connecting Polk Power Station to the existing Mines-Pebbledale 230-kV transmission line will run west from the onsite substation to SR 37 (see Figure 6.1.2-1). This portion of the corridor will be 400 ft wide and is located entirely within the Polk Power Station site boundaries (see Figure 2.1.0-1). The proposed centerline of the corridor will turn north at SR 37 at a point approximately 1,500 ft north of Bethlehem Road. The proposed corridor will traverse north along SR 37, and then turn northwest at a point south of Bradley Junction in order to connect to the existing circuit while avoiding this community. The corridor width along SR 37 is 0.5 mile and is increased to 1 mile southwest of Bradley Junction to allow flexibility in routing the line around mined areas and phosphate clay settling ponds, and to avoid the existing community. The total length of this transmission line corridor is approximately 5.2 miles, including approximately 0.75 mile on the Polk Power Station site.

The proposed eastern corridor connecting the Polk Power Station site to the existing Hardee-Pebbledale 230-kV transmission line will be 400 ft wide and is completely contained within the Polk Power Station site boundaries (see Figure 2.1.0-1). This corridor proceeds in a general northeastern direction from the onsite substation across old mined, unreclaimed lands to the existing transmission line. The proposed centerline of this corridor will interconnect with the existing Hardee-Pebbledale 230-kV transmission line at a point approximately 1,400 ft south of the intersection of CR 630 and Fort Green Road. The existing Hardee-Pebbledale 230-kV circuit traverses along the west side of Fort Green Road at this point within the Polk Power Station site boundaries. This eastern corridor is approximately 1 mile long.

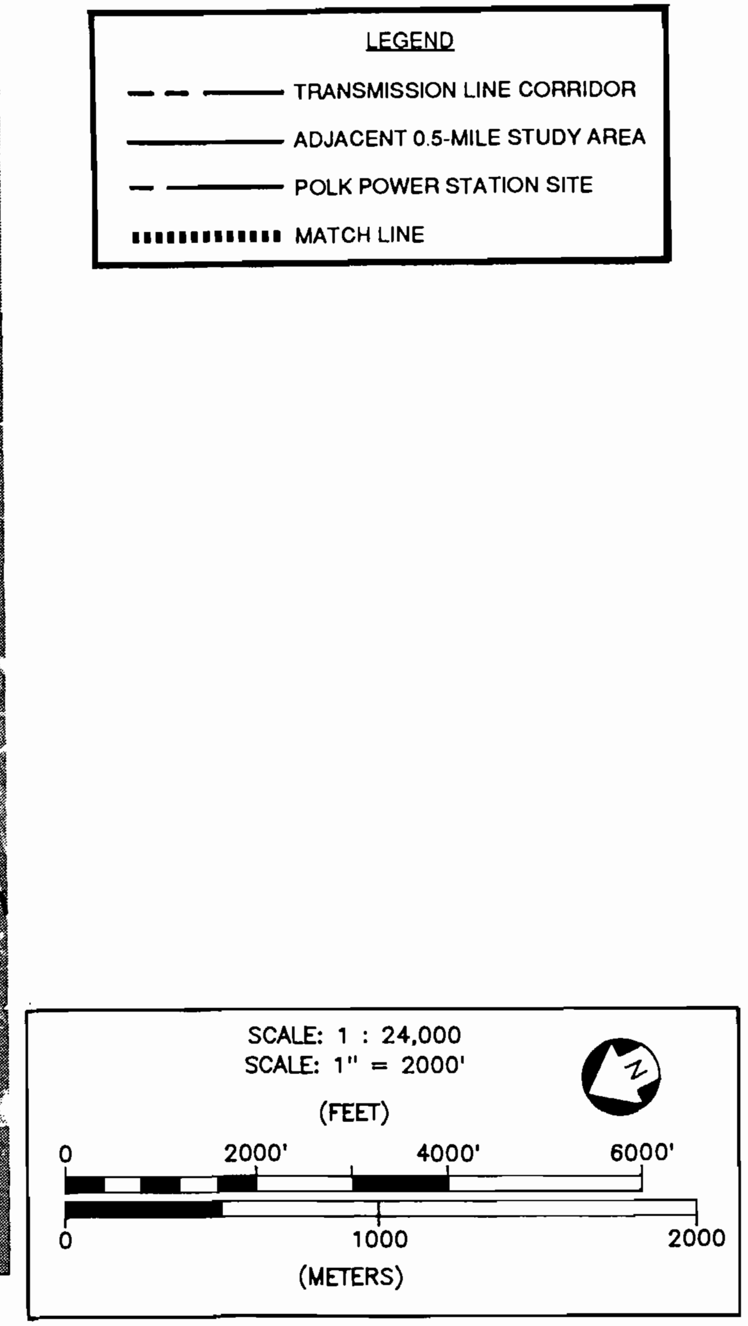

FIGURE 6.1.2-1.

NORTHERN TRANSMISSION LINE CORRIDOR AND ADJACENT STUDY AREA (PAGE 1 OF 2)

Sources: SRMC, 1992; ECT, 1992.

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FIGURE 6.1.2-1.

NORTHERN TRANSMISSION LINE CORRIDOR AND ADJACENT STUDY AREA (PAGE 2 OF 2)

Sources: SRMC, 1992; ECT, 1992.

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6.1.3 TRANSMISSION LINE AND ROAD DESIGN CHARACTERISTICS

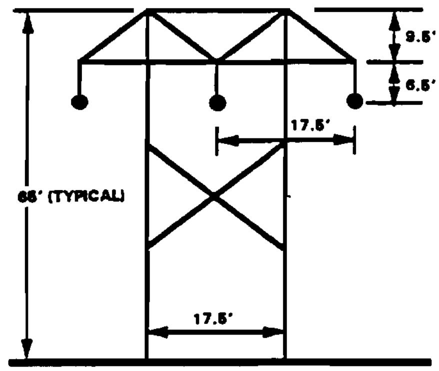
The transmission circuits will undergo a transmission line design process that includes considerations for the cost of construction and future maintenance and aesthetic compatibility. The transmission lines may be constructed using H-frame or single-pole structures. The poles may be of wood, steel, or concrete. Typical configurations to be used on H-frame and single-pole structures are shown on Figure 6.1.3-1. Unguyed structures will be used where the lines turn shallow angles. Guys and anchors will be used where the lines turn sharp angles. Depending on structure type used, the right-of-way will generally be a maximum of 150 ft wide for the northern corridor. The right-of-way for the onsite eastern corridor is generally considered to be 400 ft wide.

The design voltage of the proposed lines will be nominally 230 kV with a maximum current rating (MCR) of 1,880 amperes and a maximum continuous capacity of 749 megavolt-amperes (MVA). The MCR is the nominal capacity that would be expected to result in the conductor reaching its design temperature limit of 100°C (212°F).

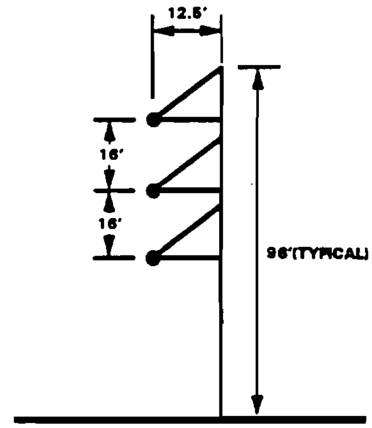
Final conductor selection has not been completed. The optimum conductor will be determined based on an analysis of economics and performance considerations. A typical conductor for this type of construction is a 1,590 aluminum conductor steel reinforced (ACSR) unit with a nominal operating voltage of 230,000 volts. The overhead ground wire may contain fiber optic communications circuits or may be a stranded steel or aluminum cable.

Conductor profiles for H-frame and single-pole configurations are presented in Figures 6.1.3-2 and 6.1.3-3, respectively.

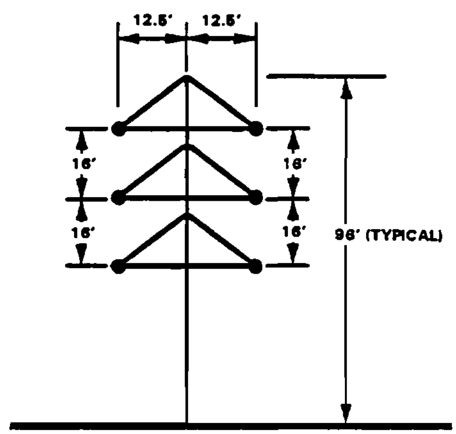
Span lengths between structures will average between 500 to 700 ft. Individual span lengths will be determined by the topography of the route and width of the right-of-way. The entire line will meet National Electrical Safety Code (NESC) standards for



STRUCTURE TYPE 1
H-FRAME



STRUCTURE TYPE 2
SINGLE POLE - VERTICAL



STRUCTURE TYPE 3
SINGLE POLE - VERTICAL
230 DOUBLE CIRCUIT

NOT TO SCALE

FIGURE 6.1.3-1.

POLK POWER STATION
TRANSMISSION STRUCTURES
Source: Tampa Electric Company, 1992.

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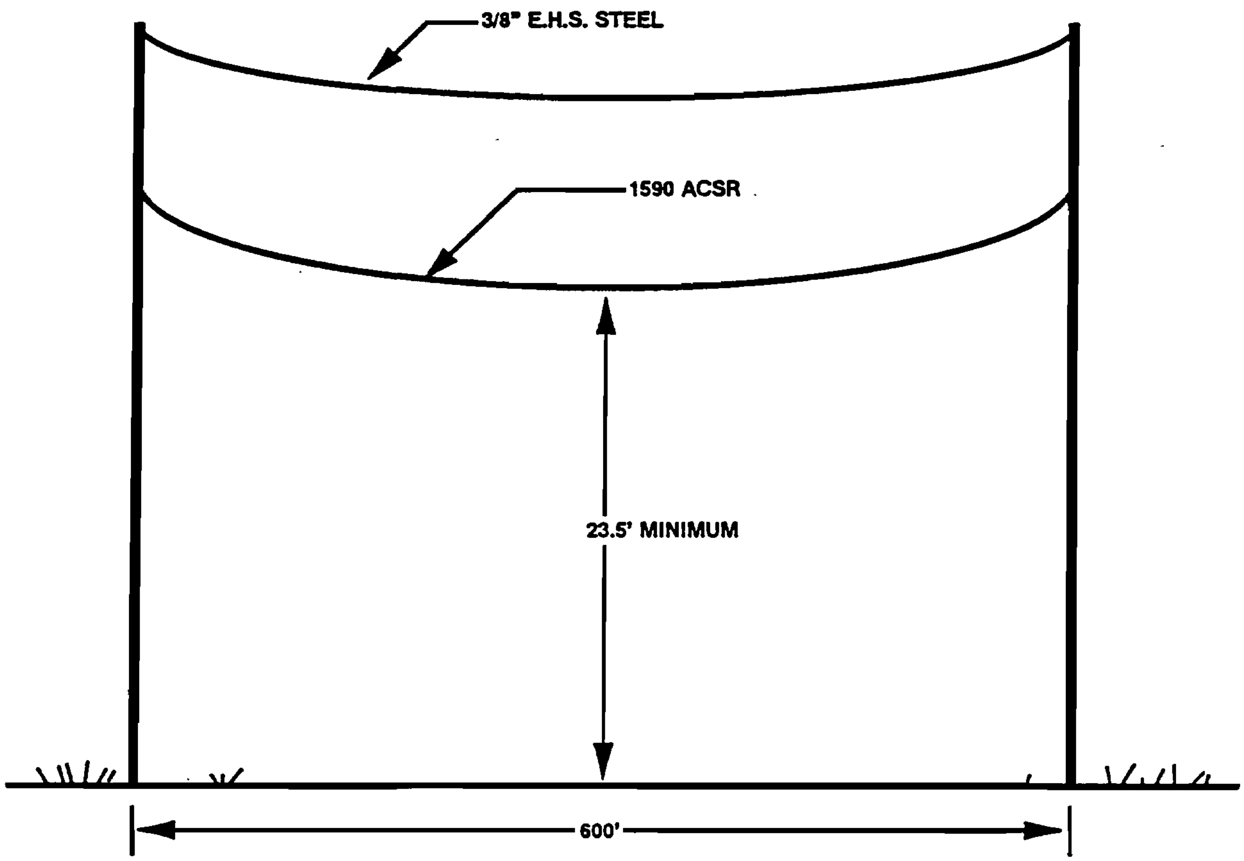

1590 ACSR (LAPWING)
600' RULING SPAN

NOT TO SCALE

FIGURE 6.1.3-2.

CONDUCTOR PROFILE FOR H-FRAME CONSTRUCTION

Source: Tampa Electric Company, 1992.

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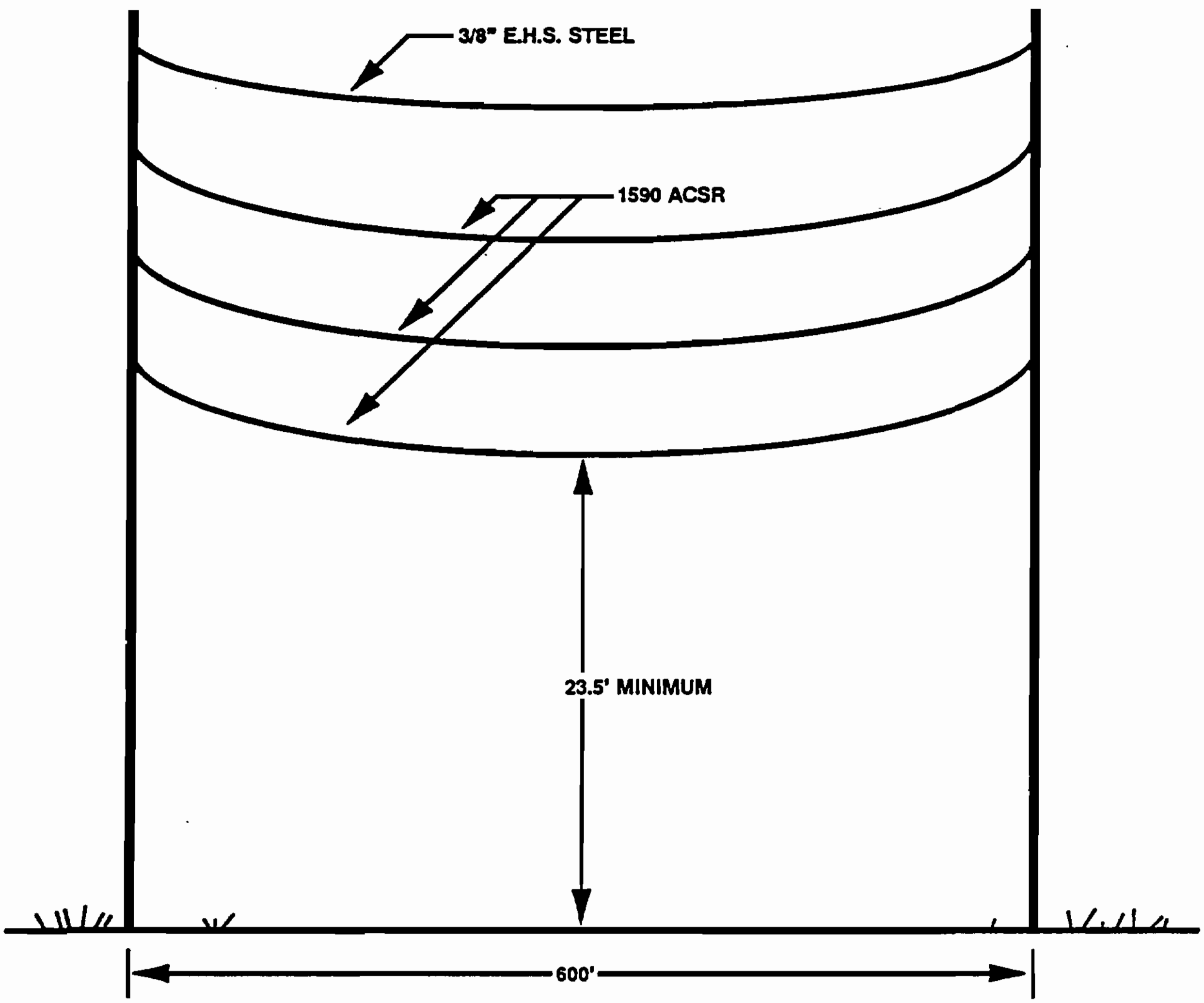

1590 ACSR (LAPWING)
600' RULING SPAN

NOT TO SCALE

FIGURE 6.1.3-3.

CONDUCTOR PROFILE FOR SINGLE POLE CONSTRUCTION
Source: Tampa Electric Company, 1992.

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clearance to ground and obstructions. Additionally, the minimum clearance from any energized conductor to ground will be 23.5 ft, which exceeds NESC standards by 1 ft.

Existing roadways (i.e., SR 37) will be used for access to the offsite portions of the northern transmission line wherever possible. If adequate road access does not exist for the onsite or offsite corridors, new roads will be constructed which will typically be unpaved and have a prepared driving area width of 16 to 20 ft.

Structure pads will typically be constructed adjacent to the access roads. The pads may be up to approximately 150 ft in width with the length varying as a function of the distance between the structure and the access road.

6.1.4 COST PROJECTIONS

Approximate costs for the transmission lines are presented in Table 6.1.4-1. The actual cost of the transmission lines may vary depending on the final right-of-way and structure location, structure configuration, cost of right-of-way acquisition, and other site-specific conditions.

Table 6.1.4-1. Cost Projections for the Transmission Lines for the Polk Power Station Project in 1992 Dollars

Corridor	Approximate Length (miles)	Estimated Right-of-Way Cost* ($)	Total Right-of-Way Preparation Cost ($)	Line Construction Cost ($)	Total Cost ($)
Northern	5.2	500,000	300,000	2,088,000	2,888,000
Eastern	1.0	0	20,000	633,000	653,000

*Right-of-way costs include only the offsite segment of the northern corridor.

Source: Tampa Electric Company, 1992.

6.1.5 CORRIDOR SELECTION

Corridor selection was dictated on the basis of selecting corridors that could connect the Polk Power Station to the existing transmission grid while minimizing land use and environmental impacts. In this case, the Polk Power Station is situated where long transmission lines were not necessary to interconnect with the existing grid. The station will be linked to the existing Tampa Electric Company Hardee-Pebbledale 230-kV line which traverses the east edge of the property. Therefore, this eastern corridor consists of a link across the northeastern portion of the plant site property to this existing line. Criteria used for its location included avoiding onsite physical and ecological constraints (e.g., old sand tailings mounds and lakes), while at the same time, complementing the proposed site layout.

The other transmission link is to the existing Tampa Electric Company Mines-Pebbledale 230-kV line to the north of the Polk Power Station, approximately 5 miles away. Corridor selection for this short link was based on avoiding the physical constraints (i.e., mining and phosphate clay settling ponds) and the populated area of Bradley Junction. Since SR 37 offered an obvious route through the phosphate mining-related activities to the Bradley Junction area, it was selected as the centerline for the northern corridor. Flexibility on right-of-way location was provided by making the corridor 0.5-mile wide. To avoid developed areas around the southwest portion of Bradley Junction and a large, reclaimed lake in the area, the corridor was widened to 1 mile as it turns northwest from SR 37. Immediately west of Bradley Junction, the corridor connects to the Mines-Pebbledale line, which runs east to west in this area.

6.1.6 SOCIO-POLITICAL ENVIRONMENT OF THE CORRIDOR AREA

6.1.6.1 Governmental Jurisdictions

Both proposed transmission line corridors, onsite and offsite, are completely contained within unincorporated Polk County and do not cross any incorporated municipal boundaries. Neither proposed transmission line corridor crosses any federal, state, regional, or local lands utilized for recreation or conservation.

6.1.6.2 Zoning and Land Use Plans

The proposed northern transmission line corridor primarily crosses disturbed lands currently or previously utilized for phosphate mining. Approximately 13 homes are located within the northern corridor along its length off the Polk Power Station site. An abandoned commercial structure is located approximately 0.5 mile north of CR 630 east of SR 37. No schools or other sensitive institutional uses or structures are contained within this corridor. Since this corridor will be collocated along existing linear facilities, will avoid populated areas, and will traverse existing mined lands, the proposed transmission line is not expected to have significant impacts on adjacent areas and land uses.

The proposed onsite eastern transmission line corridor traverses primarily lands that were previously mined for phosphate ore. Therefore, no residential, commercial, or institutional structures are located within this corridor. Again, this onsite corridor will have no impact on land uses in the area.

The development of the transmission lines associated with the Polk Power Station are currently permitted uses according to the Polk County Comprehensive Plan and Zoning Ordinance. According to Policy 2.125-D1(b) of the Comprehensive Plan, electric transmission lines are permitted as specialized uses in all future land use categories, in conjunction with the county approval of the CUP for the Certified Electric-Power Generating Facilities. Electric transmission lines are defined as Class I Essential Services according to the Polk County Zoning Ordinance. Class I Essential Services are permitted uses in all zoning districts.

As shown in Figure 6.1.6-1, the proposed northern transmission line corridor mainly crosses lands within the PM future land use category, with a small area of Agricultural/Residential Rural (A/RR) located approximately 1 mile south of Bradley Junction. Within the 0.5-mile of the corridor, the Rural-Cluster Center (RCC) future land use category is also encountered, corresponding to the unincorporated community of Bradley Junction. Permitted uses within these future land use categories are shown in Table 6.1.6-1.

As shown in Figure 6.1.6-2, the vast majority of lands within the northern transmission line corridor are zoned Rural Conservation (RC). The RC district was established to provide for low density residential development, agricultural and open space, and recreational uses. At the corridor's widest point (1 mile) southwest of Bradley Junction, the corridor crosses lands zoned Residence (R-1). This district was established to allow for the exclusive development of large homes or large lots, more commonly known as the ranchette concept of residential development. The northern transmission line corridor also crosses a small triangular tract of land zoned Single Family-Mixed (SF-1M) along the western edge of SR 37 approximately 1.5 miles south of Bradley Junction. The SF-1M district was established to provide for a mix of mobile homes and conventionally constructed homes in a low density setting.

The proposed northern transmission line corridor also crosses a small tract of commercially zoned land. A commercial tract within the proposed northern transmission line corridor located along the eastern edge of SR 37 and situated slightly more than 0.5 mile north of CR 630 is zoned C-3. The C-3 district allows for commercial development. The parcel zoned as C-3 located within the corridor corresponds to an abandoned gasoline service station.

Within the adjacent 0.5-mile wide study area, the following zoning districts are encountered: RC, R-1, R-3, SF-1M, and C-3. Of these districts, the only one not previously discussed relative to the transmission line corridor is the R-3 district. Located in portions of unincorporated Bradley Junction, this R-3 district is similar

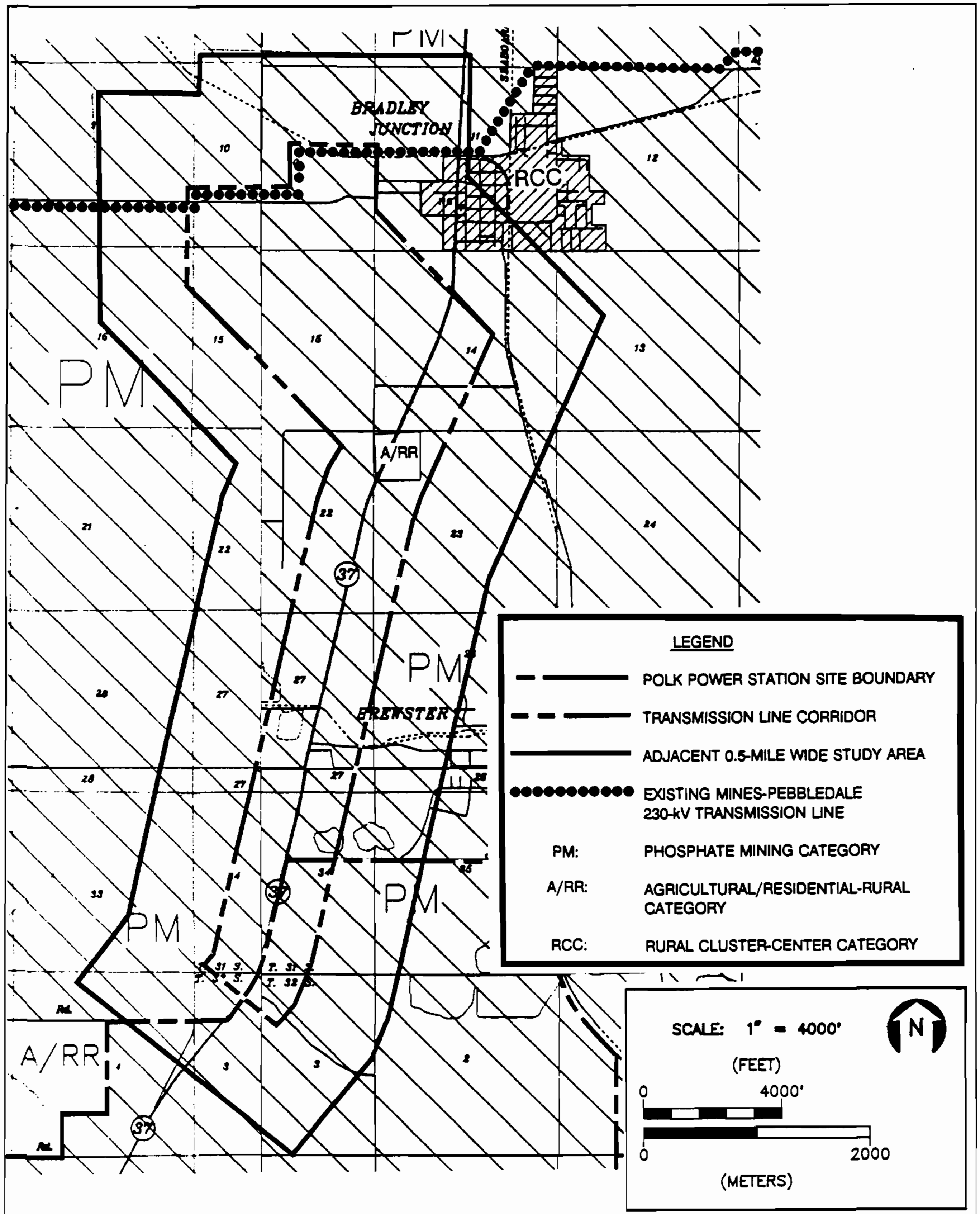

FIGURE 6.1.6-1.
FUTURE LAND USE CATEGORIES WITHIN 0.5 MILE OF THE PROPOSED NORTHERN TRANSMISSION LINE CORRIDOR
Sources: Polk County, 1991; ECT, 1992.

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Table 6.1.6-1. Future Land Use Categories and Zoning Districts within 0.5 Mile of the Proposed Transmission Line Corridor

Designation	Permitted Uses
Future Land Use Categories	
PM	PHOSPHATE MINING--Phosphate mining and allied industries, land reclamation, agriculture, Certified Electric-Power Generating Facilities and ancillary facilities, Non-certified Electric-Power Generating Facilities and ancillary facilities, commercial hazardous waste treatment facilities, and other land uses with conditional approval that are compatible with phosphate extraction and processing
A/RR	AGRICULTURAL/RURAL RESIDENTIAL--Single-family homes at a density of one dwelling unit per 5 acres, associated farm labor residential uses, utility structures, and permitted uses within Rural Residential Development (RRD) and Rural Mixed-Use Development (RMD) categories
RCC	RURAL-CLUSTER CENTER--Single-family homes at or less than a density of two dwelling units per acre, commercial uses compatible with rural population needs for retail and personal services, non-residential uses concentrated at the center of the cluster (i.e., grocery, pharmacy, medical offices) based on location and minimum population support criteria
Zoning Districts	
RC	RURAL CONSERVATION--Class III Agricultural Uses, parks and open space, nature preserves and wildlife refuges, single-family detached dwellings, foster homes, home occupations, Class I and II Essential Services, off-premises signs, other uses similar to or customarily accessory to those described
R-3	RESIDENCE--Residential dwellings not to exceed two stories, foster homes, customary accessory structures, parks and playgrounds, Class I and II Agricultural Uses, Class I and II Essential Services, home occupation

Table 6.1.6-1. Future Land Use Categories and Zoning Districts within 0.5 Mile of the Proposed Transmission Line Corridor (Continued, Page 2 of 2)

Designation	Permitted Uses
R-1	RESIDENCE--Single-family detached dwellings, foster homes, customary accessory structures, public parks and playgrounds, Class I and II Agricultural Services, Class I and II Essential Services
SF-1M	SINGLE FAMILY-MIXED--Single-family detached dwellings, foster homes, customary accessory structures, parks and playgrounds, Class I Agricultural Uses, Class I and II Essential Services
C-3	REGIONAL COMMERCIAL--Retail establishments, personal service establishments, offices, clinics, Class I and II Agricultural Uses, Class I and II Essential Services, financial institutions, light repair services, daycare centers, multi-family structures, restaurants, transient lodging places, business services, enclosed storage and warehousing, health and service establishments, amusement and recreational services, cultural activities, radio and television stations, kennels, off-premises signs

Note: Permitted uses are summarized. Some uses require conformance with other applicable regulations.

Sources: Polk County, 1991, 1983.
ECT, 1992.

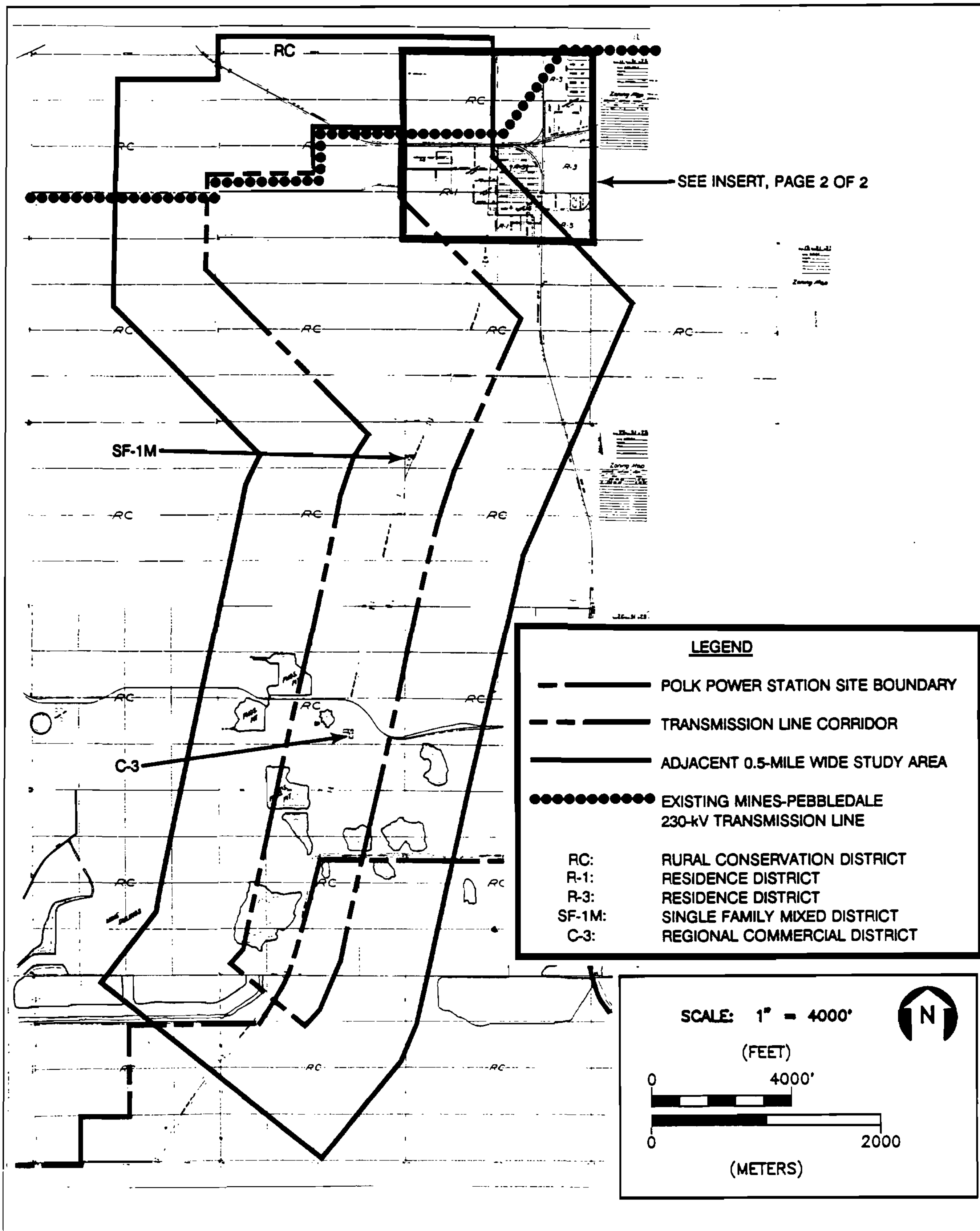

FIGURE 6.1.6-2.
ZONING DISTRICTS WITHIN 0.5 MILE OF THE PROPOSED NORTHERN TRANSMISSION LINE CORRIDOR (PAGE 1 OF 2)
Sources: Polk County, 1991; ECT, 1992.

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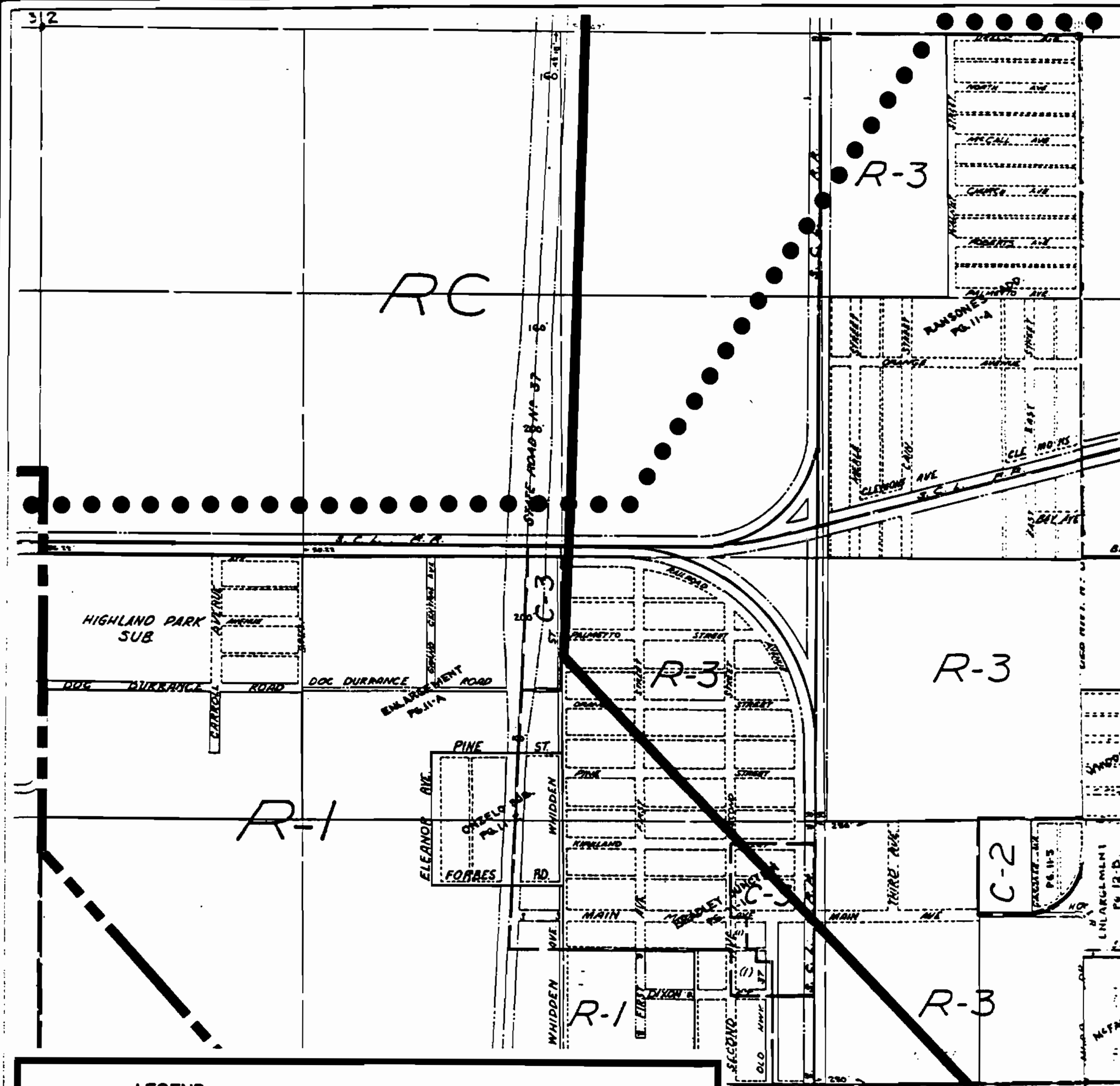

LEGEND

(dashed line)	TRANSMISSION LINE CORRIDOR
(solid line)	ADJACENT 0.5-MILE WIDE STUDY AREA
(dotted line)	EXISTING MINES-PEBBLEDALE 230-kV TRANSMISSION LINE
RC:	RURAL CONSERVATION DISTRICT
R-1:	RESIDENCE DISTRICT
R-3:	RESIDENCE DISTRICT
C-2:	MULTI-NEIGHBORHOOD COMMERCIAL DISTRICT
C-3:	REGIONAL COMMERCIAL DISTRICT

SCALE: 1" = 800'

(FEET) 0 800'

0 400 (METERS)

N

FIGURE 6.1.6-2.
ZONING DISTRICTS WITHIN 0.5 MILE RADIUS OF THE PROPOSED NORTHERN TRANSMISSION LINE CORRIDOR (PAGE 2 OF 2)
Sources: Polk County, 1991; ECT, 1992.

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to the R-1 district except that it also allows residences of all building types (i.e., mobile homes and single-family) of up to two stories in height, and also allows home occupations. A description of permitted uses in all of these zoning districts is shown in Table 6.1.6-1.

The proposed onsite eastern transmission line corridor and segment of the northern corridor within the Polk Power Station site boundaries have a PM future land use designation and are zoned RC. Future land use and zoning district designations within the Polk Power Station site were previously discussed in Section 2.2.2.

6.1.6.3 Easements, Titles, and Agency Works

Easements and approvals are normally required for crossing agency-owned lands, easements, or Works of the District (i.e., SWFWMD). Table 6.1.6-2 lists those approvals which may normally be required for the northern corridor.

6.1.6.4 Vicinity Scenic, Cultural, and Natural Landmarks

The two proposed transmission line corridors do not contain areas with scenic and cultural resources or natural landmarks.

6.1.6.5 Archaeological and Historic Sites

A cultural resource assessment has not been conducted at this time for the portion of the proposed northern transmission line corridor outside of the Polk Power Station site. However, once the alignment is finalized, a centerline right-of-way survey will be conducted prior to right-of-way preparation, clearing, and transmission line construction. Based on the previous use of most of these lands for phosphate mining, significant archaeological finds are not expected to be encountered.

A cultural resource assessment for the proposed onsite eastern transmission line corridor and onsite portion of the northern corridor was conducted as part of the assessment for the entire Polk Power Station site. This assessment found no significant sites or resources eligible for listing on the National Register of Historic

Table 6.1.6-2. Easement, Title, and/or Crossing Approval Normally Required for Transmission Line Construction

Facility	Corridor	Agency	Approval
SR 37	Northern	FDOT	Utility permit
CR 630	Northern	Polk County	Utility permit
Doc Durrance Road	Northern	Polk County	Utility permit
South Prong Alafia River	Northern	SWFWMD	Work of the District permit

Source: ECT, 1992.

Places, and a low probability exists of discovering any unrecorded sites. The findings of this assessment were reviewed and approved by the FDHR (see Appendix 11.5).

6.1.7 BIOPHYSICAL ENVIRONMENT OF THE CORRIDOR AREA

6.1.7.1 Land Use/Vegetation

The existing land use (FLUCCS Category II) and vegetation cover (FLUCCS Category III) for the offsite portions of the northern corridor and within 0.5 mile of the edges of the corridor were identified and mapped using information from USGS 1:24,000 topographic quadrangle maps, 1992 Land Use and Land Cover Maps prepared by SWFWMD, and 1-inch = 400-ft prints of aerial photographs taken in March 1992. Information gathered from these sources was substantiated through field studies and helicopter flyovers. Land use and vegetation are shown in Figure 6.1.7-1. Current aerial photographs (March 1992) of the northern corridor area at a scale of 1:24,000 are shown in Figure 6.1.2-1. A current aerial photograph for the onsite eastern corridor area is shown in Figure 2.1.0-1 and at a more detailed scale (i.e., 1 inch equals 1,000 ft) in Appendix 11.16.

Since a portion of the northern and all of the eastern transmission line corridors fall entirely within the boundaries of the Polk Power Station site proper, existing land use and cover characteristics mapped according to FLUCCS for these onsite areas were previously discussed in Sections 2.2.3.2 and 2.3.5.

Land Use

As shown on Figure 6.1.7-1 and as previously described, the majority of the lands within the proposed offsite transmission line corridor and 0.5-mile wide adjacent study area fall within the extractive (750) designation, associated with phosphate mining. These extractive areas include mined areas, spoil banks, sand tailing areas, clay settling ponds, and reclaimed areas. Some of the reclaimed areas designated as 750 by SWFWMD in actuality are currently improved pasture.

The SWFWMD data show no residential or commercial development within the proposed transmission line corridor. However, it is known that 13 residences are contained in the approximately 5.2-mile corridor, as based on review of aerial photographs and field evaluations. These residences are found in scattered locations

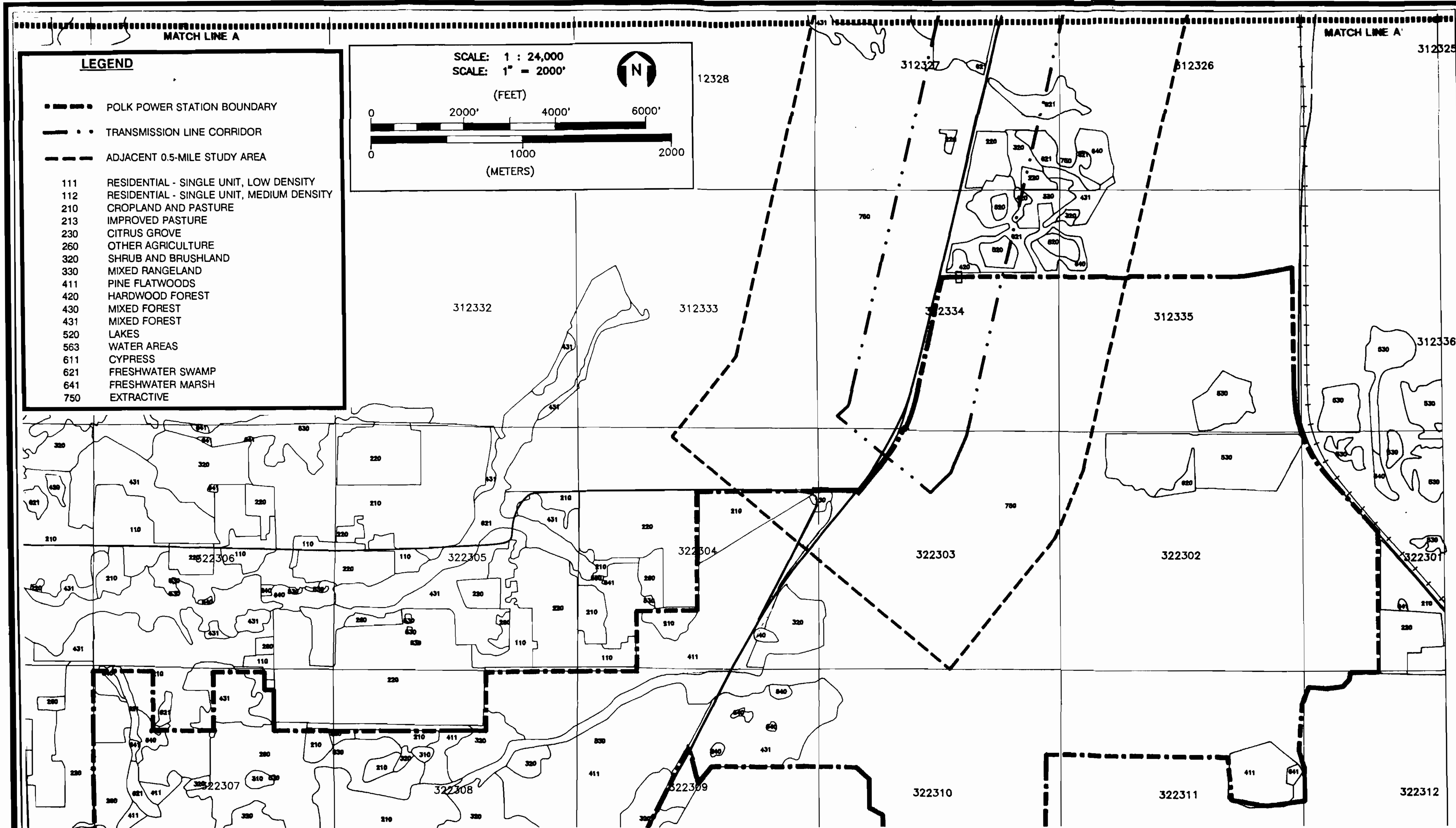

FIGURE 6.1.7-1.

LAND USE AND LAND COVER WITHIN 0.5-MILE RADIUS OF THE PROPOSED TRANSMISSION LINE CORRIDOR (PAGE 1 OF 2)

Sources: SWFWMD, 1991; ECT, 1992.

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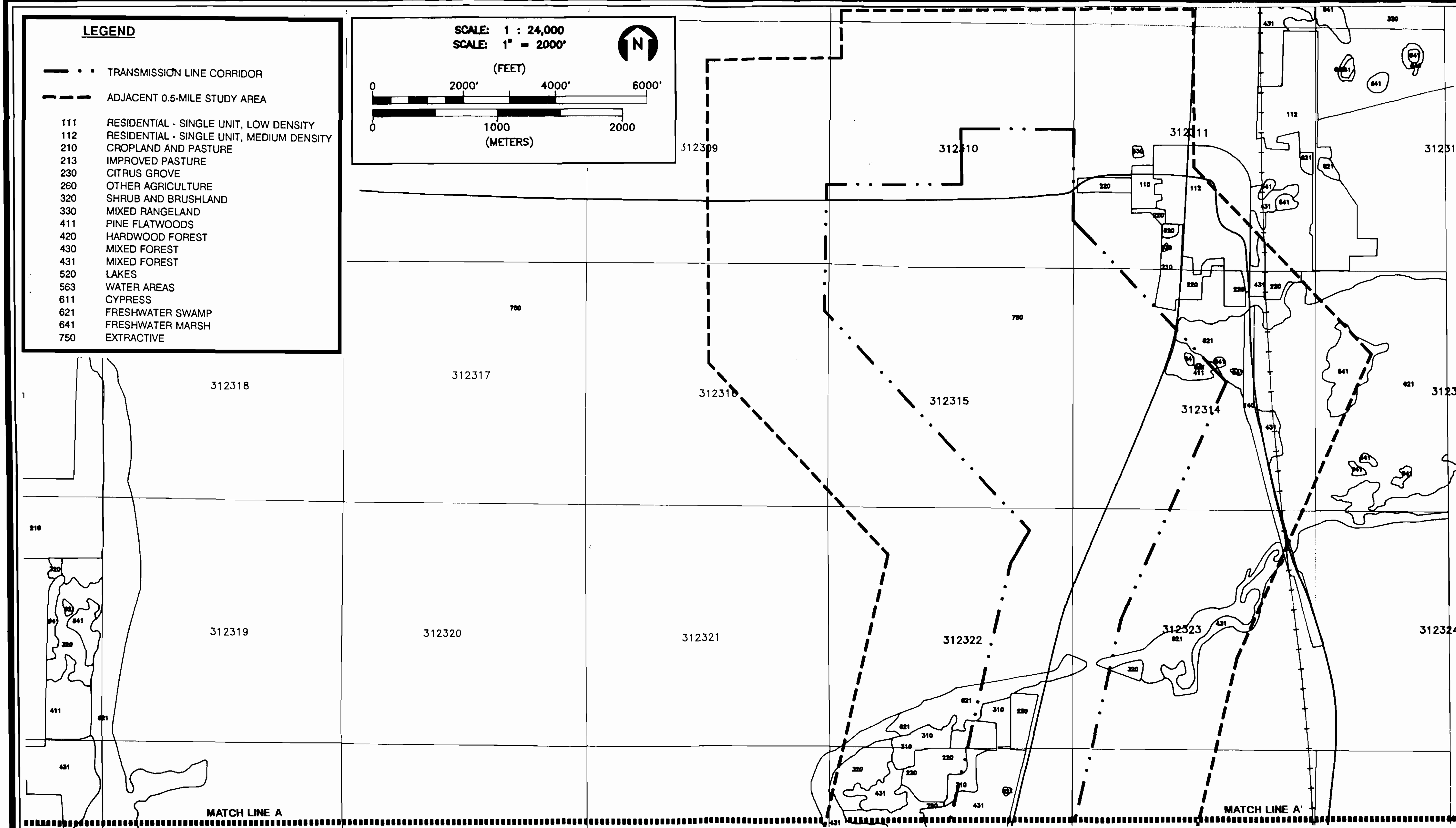

FIGURE 6.1.7-1.

LAND USE AND LAND COVER WITHIN 0.5-MILE RADIUS OF THE PROPOSED TRANSMISSION LINE CORRIDOR (PAGE 2 OF 2)

Sources: SWFWMD, 1991; ECT, 1992.

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along SR 37 and include single-family homes and mobile homes. Many of these homes appear to be associated with agricultural uses along SR 37. An abandoned commercial use, an old gas station, is not indicated on SWFWMD maps, but is located within the corridor, slightly more than 0.5 mile north of CR 630 on the eastern edge of SR 37. No schools or sensitive uses are contained within the proposed northern transmission line corridor.

Within the 0.5-mile wide adjacent study area, the only areas of urban (i.e., residential, commercial, and institutional) development are located in Bradley Junction. SWFWMD data identified the general Bradley Junction area as 111, low-density residential (less than two dwelling units per acre) and 112, medium-density residential (two to six dwelling units per acre). However, while Bradley Junction is predominantly a residential area, a few scattered commercial uses (i.e., convenience stores and gas stations), a few institutional uses (i.e., churches and a post office), and a park (Bradley Junction Recreational Park), which are not indicated on SWFWMD maps are also located within this unincorporated community. No schools or sensitive uses are contained within the 0.5-mile wide adjacent study area.

Agricultural lands are also found in scattered locations within the proposed transmission line corridor and the 0.5-mile wide adjacent study area. These areas are mapped as 230, citrus groves; 210/213, cropland and pastureland/improved pasture; and 260, other agriculture. As previously discussed, more areas of improved pasture are located within the corridor and adjacent study area than indicated on SWFWMD maps, which correspond to reclaimed phosphate mining lands. It is likely that these reclaimed areas were not separately mapped by SWFWMD because they were considered an extractive (750) land use.

Land cover types within the proposed transmission line corridor and 0.5-mile wide adjacent study area include the following: 320, shrub and brushland; 330, mixed rangeland; 411, pine flatwoods; 430/431, mixed forest; 520, lakes; 563, other water areas; 611, cypress; 621, freshwater swamp; and 641, freshwater marsh.

The vegetation associated with these land cover types and agricultural/mining uses are described in the following paragraphs.

Vegetation

Since the eastern corridor and a portion of the northern corridor lie completely within the boundaries of the Polk Power Station site, the vegetation types traversed by this corridor area were described in Section 2.3.5.

The northern corridor connects the Polk Power Station to the existing Mines-Pebbledale 230-kV transmission line via a 5.2-mile long corridor situated primarily north of the Polk Power Station along SR 37, to a location south of Bradley Junction at which point it turns northwest and intersects the existing transmission line. The vegetation encompassed within the offsite portion of this corridor and in the area extending 0.5 mile from either edge of the corridor is primarily ruderal vegetation typical of areas altered by mining. Small areas of remnant, relatively natural communities are included within and adjacent to the northern corridor. For convenience, the plant communities encountered within and adjacent to the northern corridor are grouped under the broad characterization of uplands and wetlands. Within each are several distinct community types (designated using FLUCCS, 1976) which are described in the following paragraphs. Scientific names are provided in Appendix 11.10. The location and extent of these plant communities are illustrated on Figure 6.1.7-1.

Uplands--Upland communities within and along the northern corridor include pine flatwoods (411), mixed forest (430/431), hardwood forest (420), shrub and brushland (320), mixed rangeland (330), cropland and pastureland/improved pasture (210/213), citrus groves (230), and upland vegetation on phosphate mined lands (750).

Pine flatwoods is the dominant plant community type within Florida. These open woodlands occupy flat terrain overlying sandy soils which often exhibit a hardpan layer. Within the study area, the flatwoods are dominated by slash pine in the overstory (less commonly, longleaf pine) and a shrub-dominated stratum consisting primarily of saw palmetto, gallberry, and small oaks. Herbs are present in open spaces between clumps of saw palmetto. Conspicuous herbs include wiregrass, dichanthelium grass, bushy goldenrod, wild sensitive plant, elephant's foot, and rabbit's tobacco.

Mixed forest includes forest areas with a significant conifer and hardwood component. These communities often represent a late seral stage from pine flatwoods to oak hammock; floristically, mixed forests contain elements typical of both pine flatwoods and oak hammocks.

The hardwood forest type is often referred to as *oak hammock*. Structurally, this community usually exhibits three strata with a dense canopy, a sparse shrub stratum, and a mosaic herb layer. The canopy is usually dense and dominated by live oak, laurel oak, cabbage palm, and occasionally slash pine. Shrubs typically include saw palmetto, wax myrtle, groundsel bush, and beautyberry. Herbs include dichanthelium grass, coinwort, marsh pennywort, dayflower, and galingales.

After a native forest has been cleared and subsequent land uses abandoned (especially improved pasture), a community type dominated by shrubs and a variety of weedy forbs develops. Depending upon the percentage of land area covered by shrub/brush and/or open grassland, the community can be designated as either shrub and brushland or mixed rangeland. Common species include wax myrtle, shiny sumac, laurel oak, beardgrass, goldenrod, blackberries, bracken fern, Caesar's weed, dog fennel, smutgrass, bahia grass, and beggar's-ticks.

Improved pasture exists on areas formerly supporting pine flatwoods, mixed forest, or hardwood forest, or on reclaimed and mined land. These areas have been cleared of native vegetation and planted with introduced grasses, especially bahia grass. In the absence of maintenance or cattle grazing, these areas become dominated by old field vegetation such as dog fennel, beardgrass, and various legumes.

Citrus groves are cultivated on lands cleared of native upland vegetation or on reclaimed mined lands. Most groves are planted for orange (231) or grapefruit production (232).

The upland vegetation-mineral extraction designation encompasses ruderal vegetation characteristic of phosphate mine spoil piles, clay settling ponds, perimeter dikes, etc. The vegetation is usually dominated by shrubs and herbs except on older unreclaimed lands where trees dominate. Tree species include laurel oak, live oak, black cherry, sweet gum, slash pine, and water oak. Common shrubs and herbs include Brazilian pepper, groundsel bush, wax myrtle, beggar's-ticks, beardgrass, smutgrass, Bermuda grass, musky mint, dog fennel, goldenrod, natal grass, rattleboxes, Vasey grass, marsh fleabane, and milkpea.

Wetlands--Wetland communities associated with the northern transmission corridor include freshwater marsh (641), freshwater swamp (621), cypress (611), lakes (520), and other water areas (563) such as mine pit lakes, cattle ponds, and other created water bodies.

The freshwater marsh designation encompasses all treeless wetlands dominated by emergent herbaceous vegetation that flood seasonally. The marshes within and adjacent to the corridor are located in basically circular depressions within upland habitats. Zonation is often apparent, and distinct vegetation zones form in response to elevation, degree of inundation, and organic content of the soil. In some areas, shrubs have become established possibly due to drainage alterations or lack of fire.

Typical marsh species are St. John's wort, sand cordgrass, maidencane, beak rushes, beardgrasses, galingales, rushes, yellow-eyed grasses, milkworts, meadow-beauties, bog-buttons, pickerelweed, and arrowhead.

Freshwater swamps, dominated by a mixture of hardwood trees, occur along the South Prong Alafia River intersecting the corridor north of the power plant site. In addition, shrub swamp associations occur at edges of mine pit lakes, within clay settling areas, and within marsh areas which have been altered or which have not experienced periodic fires.

Typically within the mixed hardwood swamp, the canopy is dense and dominated by water-tolerant hardwoods with some cypress. The tree species composition varies according to hydroperiod, soil characteristics, and the nature of the drainage basin. The following tree species are representative of the floodplain swamps traversed by the corridor: red maple, laurel oak, pop ash, blackgum, sweetgum, and bald cypress. When the canopy is dominated by either bald or pond cypress, the wetland can be characterized as a cypress strand or dome depending upon the forest profile, canopy dominance, hydroperiod, and other factors. Often a sub-canopy composed of dahoon holly, swamp redbay, pop ash, loblolly bay, and sweet bay is discernible. Common shrubs include buttonbush, highbush blueberry, wax myrtle, elderberry, and primrose willow. Common herbs observed are beak rushes, galingales, dichanthelium grasses, cinnamon fern, royal fern, thelypteris, Virginia chain fern, coinwort, water hoarhound, panic grasses, maidencane, and pickerelweed. Vines are a conspicuous element of the flora. Southern fox grape, catbriers, peppervine, Virginia creeper, and poison ivy are common vines.

Shrub swamps are usually typified by the predominance of willow and/or red maple in the canopy. Shrubs, herbs, and vines are similar to those described for the floodplain of the South Prong Alafia River.

The lakes and other water areas category encompasses all open water bodies created through activities associated with phosphate mining or agriculture (cattle ponds). The littoral vegetation zone is comprised of emergent freshwater marsh or swamp species as listed previously. In addition, floating-leaved or submerged aquatic plants are typical. These include water hyacinth, water lettuce, hydrilla, fragrant white water lily, spatterdock, and Scirpus cubensis.

6.1.7.2 Affected Waters and Wetlands

Affected waters and wetlands crossed by the northern corridor include phosphate reclaimed lakes, clay settling ponds, small ditches and canals (primarily along SR 37), and a crossing of the South Prong Alafia River. The South Prong Alafia River crossing is unavoidable; however, depending on final right-of-way location, the other water crossings may be avoided. Since the eastern corridor occurs on the Polk Power Station, those affected waters are discussed in Section 2.3.4 of this application.

6.1.7.3 Ecology

An area that included the northern and eastern corridor and 0.5 mile beyond either edge of the corridors was evaluated for the potential presence of plant and animal species that are officially designated as endangered, threatened, species of special concern, rare, commercially exploited, or under review for listing by one or more of the following agencies/organizations: USFWS, FGFWFC, FDACS, FCREPA, and FNAI, and may reasonably be expected to occur in the corridor study areas.

The selection criteria which determined the specific species to be discussed in this section of the application included their known or expected occurrence in the corridor study area as inhabitants or residents, migrants, or transients; potential for impacts due to right-of-way clearing, construction, and maintenance of the transmission line; or other agency concerns such as the presence of ecologically unique or valuable habitats.

Table 2.3.6-6 in Section 2.3.6 of this application lists important plant and animal species known to occur or for which appropriate habitat exists in the study area or immediate environs.

The probability for occurrence for these organisms in the corridor was based on known locations for such species (e.g., eagle nests, wading bird colonies, etc.), direct field observations, recent and historical reports of occurrence in the literature, and the presence of suitable habitat as shown on land use and land cover maps and recent aerial photographs.

Plant Species

Of the 18 species of plants listed in Table 2.3.6-6, 10 are known to occur on the plant site which encompasses the onsite eastern corridor and a segment of the northern corridor. Several of the plant species listed in Table 2.3.6-6 undoubtedly occur within or 0.5 mile on either side of the offsite portions of the northern corridor, especially within the floodplain of the South Prong Alafia River north of the plant site. These plants are dahoon holly, cinnamon fern, royal fern, golden polypody, wild azalea, bluestem, Aspidium fern, red-needle leaf, shoestring fern, and netted chain fern. Two other species, prickly pear and wild coco, are often common on reclaimed mined lands or improved pasture, both abundant vegetation types within the northern corridor study area.

In addition to the plants listed on Table 2.3.6-6, one additional species was evaluated as having the potential to occur within or adjacent to the northern corridor; namely, needle palm (Rhapidophyllum hystrix). This unique palm is spottily distributed in central and northern Florida and is currently listed as commercially exploited by FDACS. Although rare in the State of Florida, this palm is locally abundant within suitable habitat areas. Though known to occur within the South Prong Alafia River system in Polk County, it has not been recorded or found within the northern corridor study area.

Animal Species

Any of the wildlife species depicted in Table 2.3.6-6 have the same potential for occurrence in the corridors as previously described in Section 2.3.6 of this application. No individual nesting or unique habitats for any of these species were observed in the northern corridor. It is unlikely that the northern corridor contains any habitat solely depended upon by one of these species.

6.1.7.4 Other Environmental Features

Relevant environmental information regarding the biological and water resources within and near the transmission line corridors is presented in the preceding subsections. No other significant environmental features have been identified within or adjacent to these corridors.

6.1.8 EFFECTS OF RIGHT-OF-WAY PREPARATION AND TRANSMISSION LINE CONSTRUCTION

6.1.8.1 Construction Techniques

Right-of-Way Clearing

All trees, stumps, and brush in the right-of-way will be cleared. Trees beyond the boundary of the right-of-way may be trimmed or cut with the owner's consent if it is determined that the trees present a hazard. Equipment used may include bulldozers, shearing machines, chainsaws, or other heavy or light equipment. Burning may be used to eliminate slash from the right-of-way. All burning will be conducted in accordance with local burning ordinances.

If forested wetlands are crossed, clearing will be done by hand or low pressure ground shear machines to reduce damage to ground cover and hydrology.

Road and Pad Construction

Access roads will be required in areas where the final transmission line rights-of-way do not follow or are not adjacent to existing roads. The overall objective of the access roads will be to provide efficient and safe ingress and egress to the transmission line structures while minimizing environmental impact and cost. These access roads will be required for construction and maintenance of the transmission line facilities.

The use of fill will be minimized in the construction of access roads, and wherever possible, roads will be constructed by blading natural soil from both sides of the intended road. Where fill is required, it will be trucked in and spread, compacted, and shaped to the desired elevation. Access roads will be constructed to have a maximum surface width of 16 to 20 ft. Dump trucks may be used for hauling, and bulldozers and graders may be used for spreading and compacting. A typical cross section for the access road is presented in Figure 6.1.8-1.

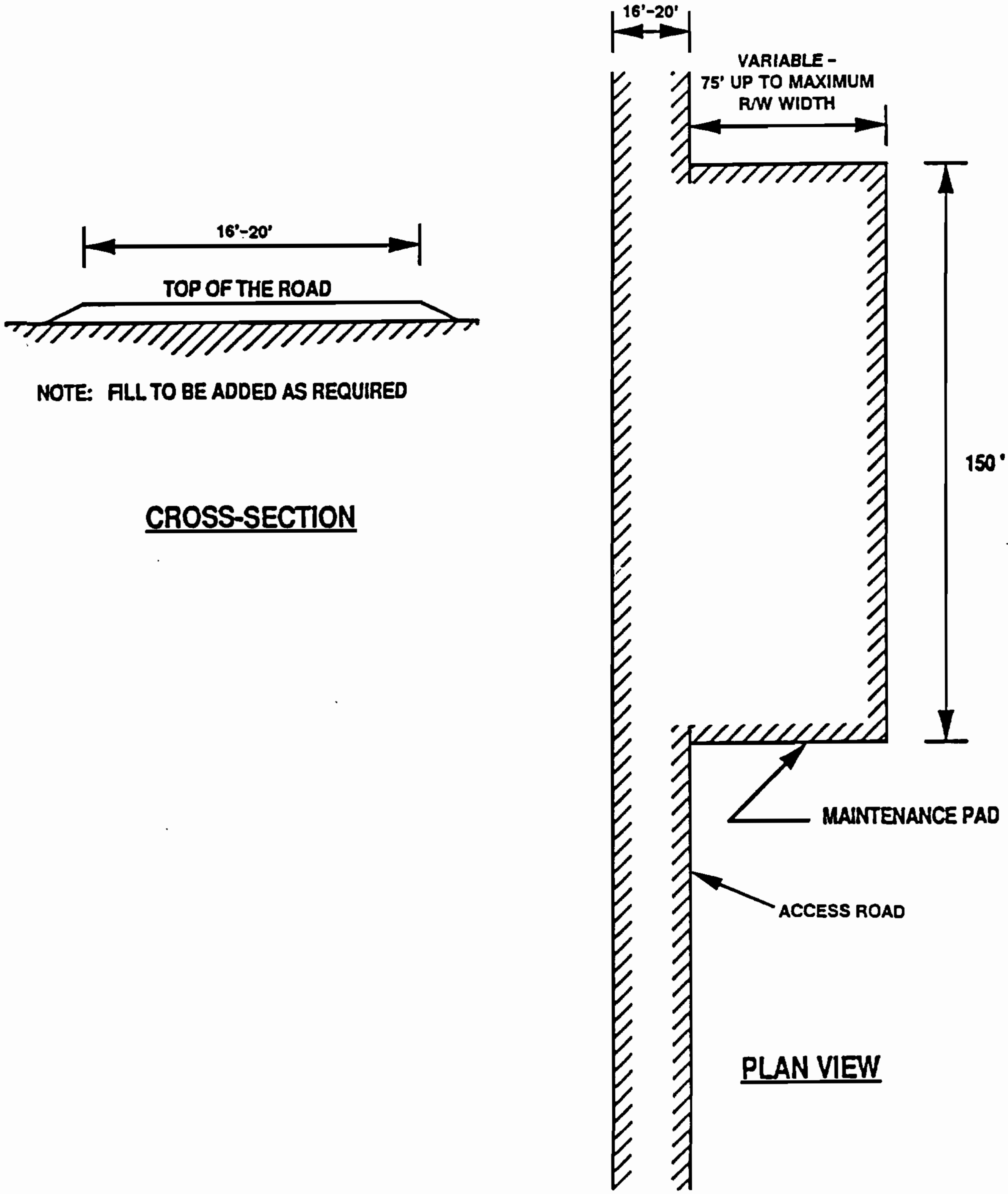

FIGURE 6.1.8-1.

POLK POWER STATION TYPICAL ACCESS ROAD PLAN AND CROSS-SECTION FOR ASSOCIATED TRANSMISSION LINES

Source: Tampa Electric Company, 1992.

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Line Construction

Multiple structure configurations and construction materials will be used throughout the length of the transmission lines from the Polk Power Station to the end points. The type of structure used in any particular area will be a function of the characteristics of the right-of-way and surrounding areas. Proposed structures that may be used for this project are depicted in Figure 6.1.3-1.

Currently, seven different scenarios are being considered for the two proposed corridors. On the northern corridor, a 69-kV transmission line is located along SR 37. Scenario 1 for the northern corridor involves placing the 230-kV line adjacent to the existing 69-kV line. Scenario 2 would involve locating the 230-kV line across SR 37 from the 69-kV line. Since there are two possible combinations of circuit phasing on the 69-kV line, Scenario 2A represents one phase combination and Scenario 2B represents the other. Scenario 3 would involve placing the 230-kV line completely away from SR 37 and the 69-kV line. All four scenarios currently involve use of single-pole structures.

For the eastern corridor, Scenario 1 would involve two H-frame structures on a 400-ft wide right-of-way. Scenario 2 would use two single-pole structures, and Scenario 3 would involve one single-pole structure, all on a 400-ft wide right-of-way.

H-frame construction involves directly imbedding the poles into native soil and attaching cross bracing after imbedment. Suspension insulators are then attached to the cross bracing to support the phase conductors to be pulled. H-frame construction is typically used for tangent (straight line) construction.

Where the right-of-way allows, three pole structures will be used for line angle construction. This type of construction involves directly imbedding the structures and guying to meet strength requirements. Once the poles and guy wires are installed, suspension insulators are attached to the structures to support the phase conductors.

Single-pole construction will be used where right-of-way or other constraints limit the use of H-frame construction. Single-pole structures are anticipated to be used in areas where the width of the right-of-way prohibits the use of an H-frame structure, and in areas where visual impacts are significant. Single-pole structures may be directly imbedded with native soil, crushed rock, or concrete backfill. Single-pole structures can be used for line angles and can be designed to be self-supporting, but may also use guys to support angle loads.

Structures will be framed and erected using cranes and other support vehicles. Overhead ground wires and conductors will be installed by various wire-pulling equipment. Vehicles used to support line construction may include bulldozers, tractors, and other heavy or light vehicles.

Foundations for structures may be either native soil, crushed rock, or concrete backfill. In addition, poured concrete foundations may be used where an extra strong foundation is required. With native soil or crushed rock backfill, a hole is augered and the pole is inserted into the hole. The backfill material is then compacted around the pole up to the surrounding ground level. In the case of poured concrete foundations, the required concrete foundation is poured and the pole is set into the concrete.

Erosion Control

Disturbance to natural vegetation will be kept to a minimum to reduce the potential for erosion. Where necessary, erosion control measures such as staked hay bales or fabric fences will be used to eliminate erosion during construction. After construction, areas susceptible to high erosion potential may be reseeded. Routine maintenance of the right-of-way will be designed to minimize ground cover disturbance, and therefore reduce the potential for erosion.

6.1.8.2 Impacts on Water Bodies and Uses

Tampa Electric Company will provide detailed information to the regulatory agencies on any dredging or filling that may be required after the plant and associated transmission corridors are certified and the final right-of-way and structure locations have been determined. If water bodies are impacted, culverts will be installed as needed to maintain flow. It is anticipated that the possible use of SR 37 for access will minimize need for new access road construction and fill.

The crossing of the South Prong Alafia River is unavoidable, but the potential impacts can be minimized by crossing along-side the existing SR 37 crossing. The wetland is only about 200 ft wide here and has been cleared for SR 37. No structures or fill will be placed in the water.

If fill is required in any water crossings, use of filtration devices such as fabric fences or staked straw bales will be used to maintain water quality.

No bridges will be required for any water crossings so no restrictions to navigation will occur. Adequate clearances will be provided in the transmission design so as not to impede any boat traffic at any water crossings.

6.1.8.3 Solid Wastes

Solid waste generated from right-of-way preparation and line construction typically consists of trash and cleared vegetation. Any combustible trash and cleared vegetation will be burned onsite in accordance with any applicable burning ordinances. If or when burning is not allowed, material will be hauled off and disposed of in a locally approved landfill.

6.1.8.4 Changes to Vegetation, Wildlife, and Aquatic Life

Impacts on terrestrial and aquatic systems and species associated with transmission line right-of-way preparation and construction depend primarily on the location of the selected right-of-way within the designated corridors and, to a lesser degree, on clearing and construction techniques. Right-of-way preparation and line construction will result in no significant changes to terrestrial and aquatic communities or to components thereof, because the corridor is centered along SR 37 and its existing right-of-way for much of its 5.2-mile length. The only significant area crossed by the corridor within this segment is the South Prong Alafia River. However, the floodplain has already been altered due to road construction, as well as by mining activities north and south of the river.

For the remainder of its length, the corridor turns northwest from SR 37 south of Bradley Junction in order to connect to the existing Mines-Pebbledale 230-kV transmission line. Along this segment, virtually all natural communities have been altered by phosphate mining activities.

Since the majority of the natural communities which occurred within the corridor and the immediate adjacent areas have been altered by mining or road construction, it is not anticipated that transmission line construction or maintenance will have any significant impact on vegetation, wildlife or aquatic life. An evaluation of potential impacts on terrestrial and aquatic vegetation and wildlife components is presented in the following paragraphs.

Vegetation

As discussed, the majority of the proposed northern 230-kV transmission line corridor will traverse existing road right-of-way or lands altered by mining. Because the existing rights-of-way are already cleared and maintained, other areas cleared by construction associated with the 230-kV transmission line should not pose any additional adverse changes to vegetation, except for the permanent alterations associated with structure installation.

A permanent alteration of limited areas of upland and wetland communities will result from right-of-way clearing and access road (where needed) and structure pad construction. Such alterations to the vegetation occur principally along the sections of proposed right-of-way which are forested. In areas where the proposed right-of-way traverses forested communities such as pine flatwoods and mixed hardwood swamp, right-of-way preparation and line construction will require the cutting of trees and the subsequent maintenance of the right-of-way to a low-growing, early successional system. Adjoining tracts of woodlands will remain intact and provide habitat for forest species. In addition, adjacent communities should not be affected by structure pad and road construction since erosion control measures and proper culverting will be used.

Construction practices in wetlands will retain the vegetative root mat in the right-of-way, thereby minimizing impacts to wetland areas which are not filled for road or structure pad construction. Impacts to wetlands will vary depending on the wetland system through which the transmission line is routed. The shift in wetland composition will vary with the type of the original overstory, and soil and drainage alterations resulting from construction activities. Outside of areas where filling is necessary for roads or structure pads, small freshwater marsh/wet prairie systems crossed by the transmission line will not be affected by construction activities since no clearing will be required, and proper culverting will maintain the existing hydroperiod.

Wildlife

Specific impacts to terrestrial and aquatic animals due to transmission line construction vary by species and depend primarily on the extent of habitat alteration and continued availability of such habitat after construction. No federally-designated Critical Habitat is crossed by the corridor, and no terrestrial or aquatic habitats critical to the continued regional presence of important species will be affected.

Individual small burrowing mammals (e.g., rodents) or amphibians and reptiles may be lost during right-of-way clearing. Such individual losses, however, will not affect local or regional populations. No losses of medium-sized or large mammals, birds, or other mobile species (e.g., indigo snakes) due to direct impacts or habitat alterations are expected because of the mobility of these animals. Therefore, it is not expected that local or regional populations of game species, species of commercial importance, or threatened or endangered species occurring or potentially occurring within the right-of-way area will be adversely impacted.

No significant impacts to the resident birds or migratory species are expected since the preferred corridor does not include major staging, breeding, or wintering areas for migratory species (e.g., waterfowl, shorebirds, passerines). Local disturbance or displacement of wildlife due to construction noise will be minor and short term since construction activities in any one location will be intermittent and are not expected to last more than a few weeks. Also, the location of the preferred corridor along SR 37 and through land transformed by mining and associated activities will further limit the potential for wildlife disturbance since individuals in local areas will already be habituated to traffic noise.

Aquatic Life

Impacts on aquatic systems and species are expected to be minor or insignificant since the proposed transmission line structures will avoid or span potential ecologically valuable aquatic habitats such as lakes, rivers, and streams. Although the construction of the transmission line may involve installation of culverts and placement of fill resulting in temporary increases in turbidity and silt deposition, such impacts will be local and temporary and are not expected to adversely affect aquatic resources. Appropriate mitigative measures such as staked hay bales and silt curtains will minimize or eliminate siltation resulting from stormwater runoff. Transmission line and access road construction in wetland areas will use methods such as proper culverting and erosion control as necessary to minimize any significant disruption to the aquatic ecosystem or resultant changes in species composition. The only major aquatic system is the South Prong Alafia River. As previously discussed, this crossing is already impacted by SR 37 and if possible, this line will be located alongside the road to minimize impacts to the system.

6.1.8.5 Impact on Human Populations

The corridor route was selected based in part on the ability to minimize potential impacts to human populations. For the most part, the corridor avoids residences and the populated areas of Bradley Junction.

For those residents near the actual right-of-way, construction impacts should be minor and temporary. Typically transmission construction is a phased activity, consisting of such phases as right-of-way preparation, foundation placement, pole erection, conductor stringing, and right-of-way restoration. Each of these activities is short in duration.

Minor inconveniences such as noise, dust, and increased traffic will be short-term and localized. Activities will typically be scheduled for daylight hours to further minimize potential impacts to residents.

6.1.8.6 Impact on Regional Scenic, Cultural, and Natural Landmarks

Since there are no regional scenic, cultural, and natural landmarks located within or adjacent to the proposed corridor, the construction of the transmission line will have no impact on such resources.

6.1.8.7 Impact on Archaeological/Historic Sites

A cultural resource assessment for the Polk Power Station site was conducted and yielded no known sites listed or eligible for listing on the National Register of Historic Places. A low probability exists for finding any such sites along the transmission corridor.

Since the corridor area is highly disturbed due to phosphate mining activity, the potential for adverse impacts to historic and archaeological resources is expected to be minimal due to right-of-way clearing and transmission construction. A cultural resource assessment will be conducted once a final right-of-way has been selected.

If potential sites are identified or if such sites are discovered during construction activities, FDHR will be notified regarding appropriate mitigation measures.

6.1.9 POST-CONSTRUCTION IMPACTS AND EFFECTS OF TRANSMISSION LINE MAINTENANCE

6.1.9.1 Maintenance Techniques

Transmission Line Maintenance

The transmission line rights-of-way will be patrolled and inspected regularly to identify structures in need of repair. Occasional maintenance will be required on the transmission structures. Insulators will be replaced when damaged, as will supporting clamps and braces. Wood transmission poles are expected to be replaced on the average of every 15 years. Where steel or concrete poles are used, there will be minimum pole maintenance needed. The expected life of these poles is in excess of 30 years. The maintenance of the transmission line is expected to have a minimum impact on the surrounding area.

Right-of-Way Maintenance

Mechanical mowing and herbicides will be used to keep the right-of-way clear of unwanted vegetation. Herbicide chemicals will be used only as needed for maintenance purposes. All herbicide application will be conducted in a manner consistent with applicable federal, state, and local regulations and will be carried out by licensed personnel.

No burning is anticipated to be needed for the maintenance of the right-of-way.

6.1.9.2 Multiple Uses

Various activities including citrus farming, grazing, and agriculture are typically allowed within the right-of-way as long as these activities do not interfere with the full use of the right-of-way as required to operate and maintain a transmission line. Specific uses within the right-of-way will be addressed individually with affected parties. Multiple use of the right-of-way may be restricted in certain areas, but in general, compatible multiple uses will be allowed.

6.1.9.3 Changes in Species Populations

The status and potential occurrence of important species in and along the corridors was discussed in Section 6.1.7.3. The absence of significant impacts to important species is not coincidental as efforts were made during the corridor selection to avoid potentially sensitive habitats as much as possible. The avoidance of ecologically unique or valuable habitats was achieved primarily through collocation with SR 37 and/or crossing of lands which have been previously altered in conjunction with mining.

Changes in local species populations are not expected as a result of transmission line presence and maintenance. Displacement of individuals from the immediate right-of-way areas which may occur during construction activities are temporary. These displaced species are expected to re-inhabit the right-of-way areas. Habitat use will decline during actual construction due to noise and physical activity. Such avoidance behavior will enable wildlife to escape direct impacts from construction activities, although some losses of individual vertebrates (e.g., rodents, amphibians) may occur during right-of-way clearing. No animal or plant species populations are expected to be permanently displaced out of the project area from either construction or maintenance of the transmission line.

Due to necessary maintenance practices in the right-of-way within forested areas, a decrease in structural diversity will occur in areas formerly forested (i.e., permanent loss of a tree canopy layer). Concomitantly, an increase in species diversity is probable as additional shrubs and herbs will colonize the right-of-way in response to increased sunlight and decreased competition due to canopy removal. Since much of the corridor areas are either collocated with SR 37 or traverse previously disturbed lands (mined areas), clearing of canopy vegetation will be minimal. In those portions of the corridors where clearing is necessary, only a relatively narrow strip of canopy will be lost. In these areas, clearing of overstory vegetation and subsequent maintenance requirements will not result in the loss of entire tracts or significant portions of regional wildlife habitat types. In nonforested systems, such as marshes and shrub swamps, clearing or alteration may not be necessary. In many instances, these community types can be spanned, thereby eliminating the need to affect structural characteristics.

6.1.9.4 Effects of Public Access

It is Tampa Electric Company's policy to install locked gates at all points where the transmission line access road intersects previously fenced property. Therefore, with the exception of Tampa Electric Company's personnel performing routine maintenance, no increased vehicle access is anticipated. Since no significant increase in human traffic into formerly inaccessible habitats will result, there will be no subsequent increased disturbance to wildlife.

6.1.10 ELECTRIC AND MAGNETIC FIELDS AND OTHER POST-CONSTRUCTION EFFECTS

6.1.10.1 Electric and Magnetic Field Values

Electric fields associated with transmission lines are a function of voltage on the line and conductor height. Magnetic fields are a function of the current carried by the line and conductor height. Electric and magnetic fields (EMF), therefore, vary along a transmission right-of-way.

The proposed transmission lines will comply with Florida's EMF rule (Chapter 17-274, F.A.C.), which basically requires 230 kV lines to not exceed 2.0 kilovolts per meter (kV/m) for electric fields and 150 milligauss (mG) for magnetic fields at the edge of the right-of-way. The electric field will also not exceed 8 kV/m anywhere on the right-of-way. The calculated maximum EMF values for the proposed lines are shown in Table 6.1.10-1. The estimates are based on a model (Bonneville Power Administration Corona and Field Effects Program) and show calculated estimates for the MCR. Figures 6.1.10-1 through 6.1.10-14 depict the horizontal profile for EMF for the seven potential configurations.

6.1.10.2 Corona Effects

The intense electric field at the surface of transmission line conductors can under some conditions result in localized ionization of the air near the conductors. This phenomena is called corona. Corona activity at the surface of transmission line conductors produces low levels of acoustic and radio-frequency electric energy which under some conditions can result in audible noise and radio or television interference.

Audible Noise

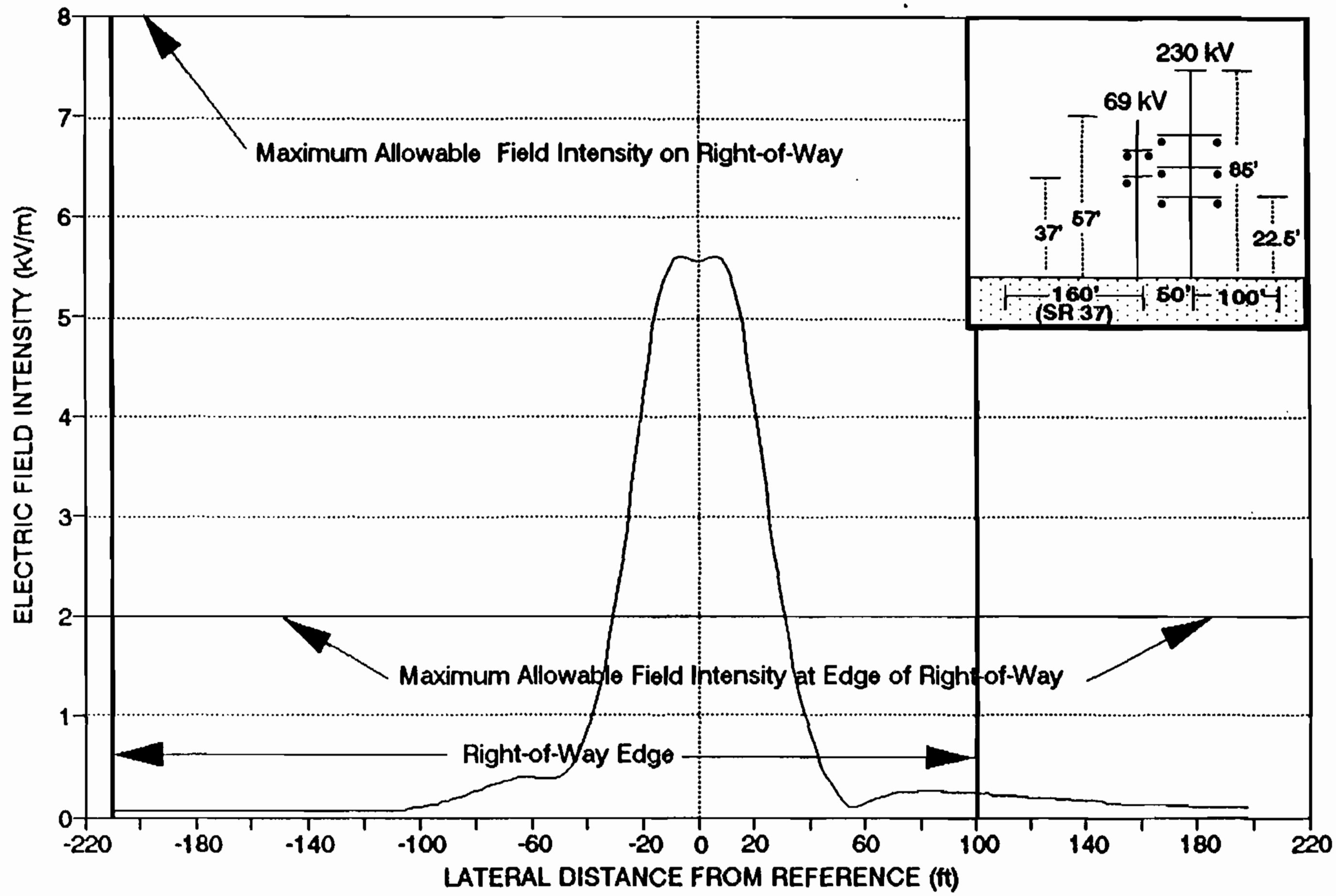
The primary cause of audible noise on high voltage transmission lines is corona resulting from water droplets on the conductors. As a result, rainy weather conditions produce the highest noise level. The background noise of the falling rain tends to mask the transmission line noise to some extent. Gap-type discharges on hardware or scintillations on dirty or salt-contaminated insulators can also lead to audible noise in certain situations but are not anticipated to be significant noise sources on the

Table 6.1.10-1. Calculated Maximum EMF for the Polk Power Station 230-kV Transmission Lines

Configuration*	Electric Field (kV/m)† On Right-of-Way	Electric Field (kV/m)† Edge of Right-of-Way	Magnetic Field (mG)** On Right-of-Way	Magnetic Field (mG)** Edge of Right-of-Way
Northern Corridor††				
Single-pole, vertical (1)	5.59	0.24	428.15	61.28
Single-pole, vertical (2A)	5.59	0.28	439.21	65.87
Single-pole, vertical (2B)	5.59	0.26	438.85	67.27
Single-pole, vertical (3)	5.59	0.26	437.78	104.08
Eastern Corridor				
H-frame, horizontal (1)	4.42	1.36	561.85	141.00
Two single-poles, vertical (2)	4.32	0.21	355.72	129.68
Single-pole, vertical (3)	3.62	0.33	411.90	74.25

*Northern or eastern corridor scenarios described in Section 6.1.8.1 and illustrated in Figures 6.1.10-1 through 6.1.10-14.
†Electric field values based on 242-kV operating voltage.
**Magnetic field values based on MCR for the line (1,880 amperes, 749 MVA).
††The onsite east-west portion of the northern corridor will use configurations described for the eastern corridor.

Sources: Tampa Electric Company, 1992.
ECT, 1992.



NOTE: MODELED VALUES; ACTUAL VALUES ARE LIKELY TO BE LOWER

FIGURE 6.1.10-1.

LATERAL (MID-SPAN) PROFILE OF ELECTRIC FIELD AT MAXIMUM OPERATING VOLTAGE--NORTHERN CORRIDOR, SCENARIO 1

Sources: Tampa Electric Company, 1992. ECT, 1992.

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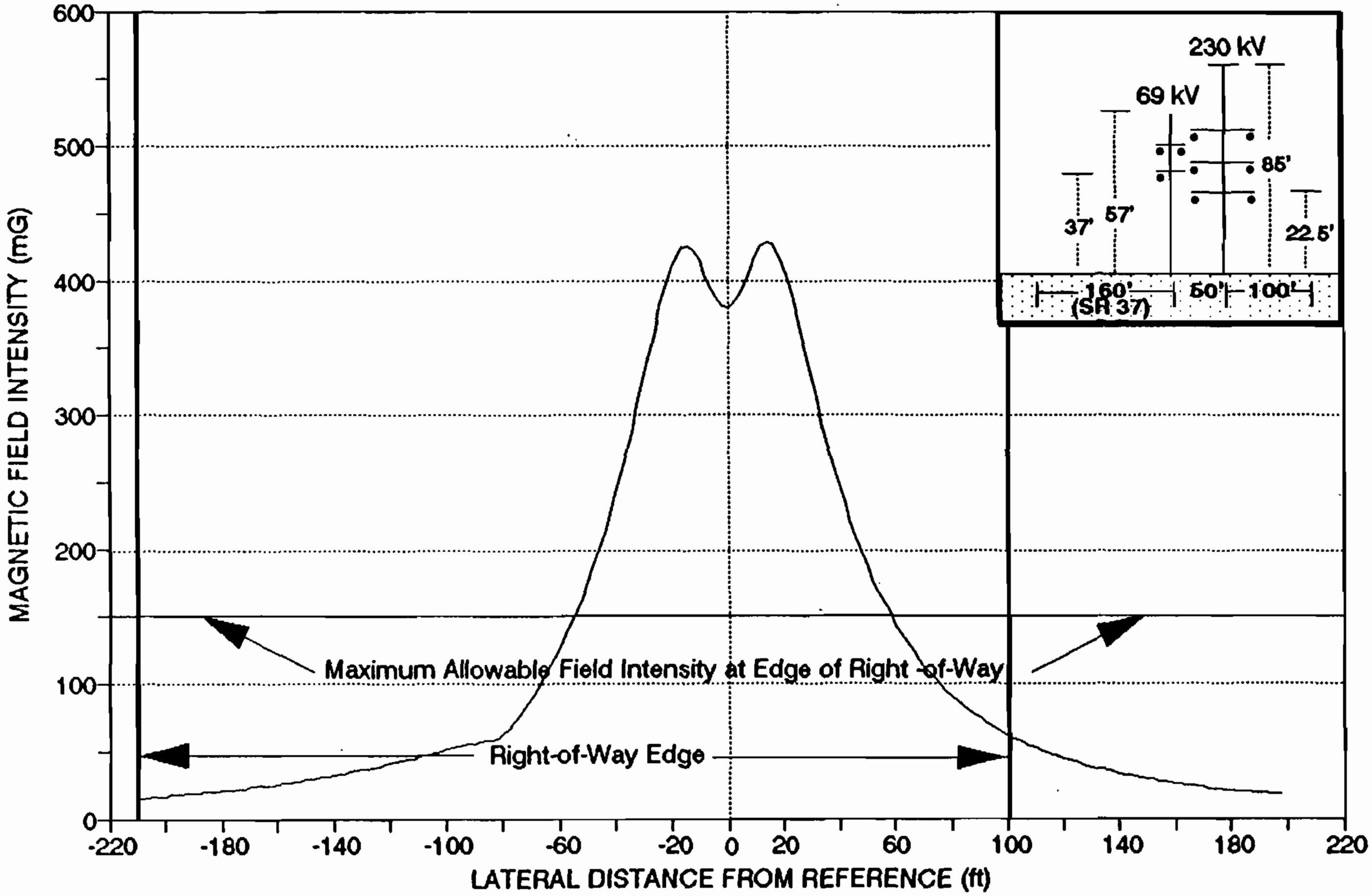

NOTE: MODELED VALUES; ACTUAL VALUES ARE LIKELY TO BE LOWER

FIGURE 6.1.10-2.

LATERAL (MID-SPAN) PROFILE OF MAGNETIC FIELD AT MAXIMUM CURRENT RATING--NORTHERN CORRIDOR, SCENARIO 1

Sources: Tampa Electric Company, 1992. ECT, 1992.

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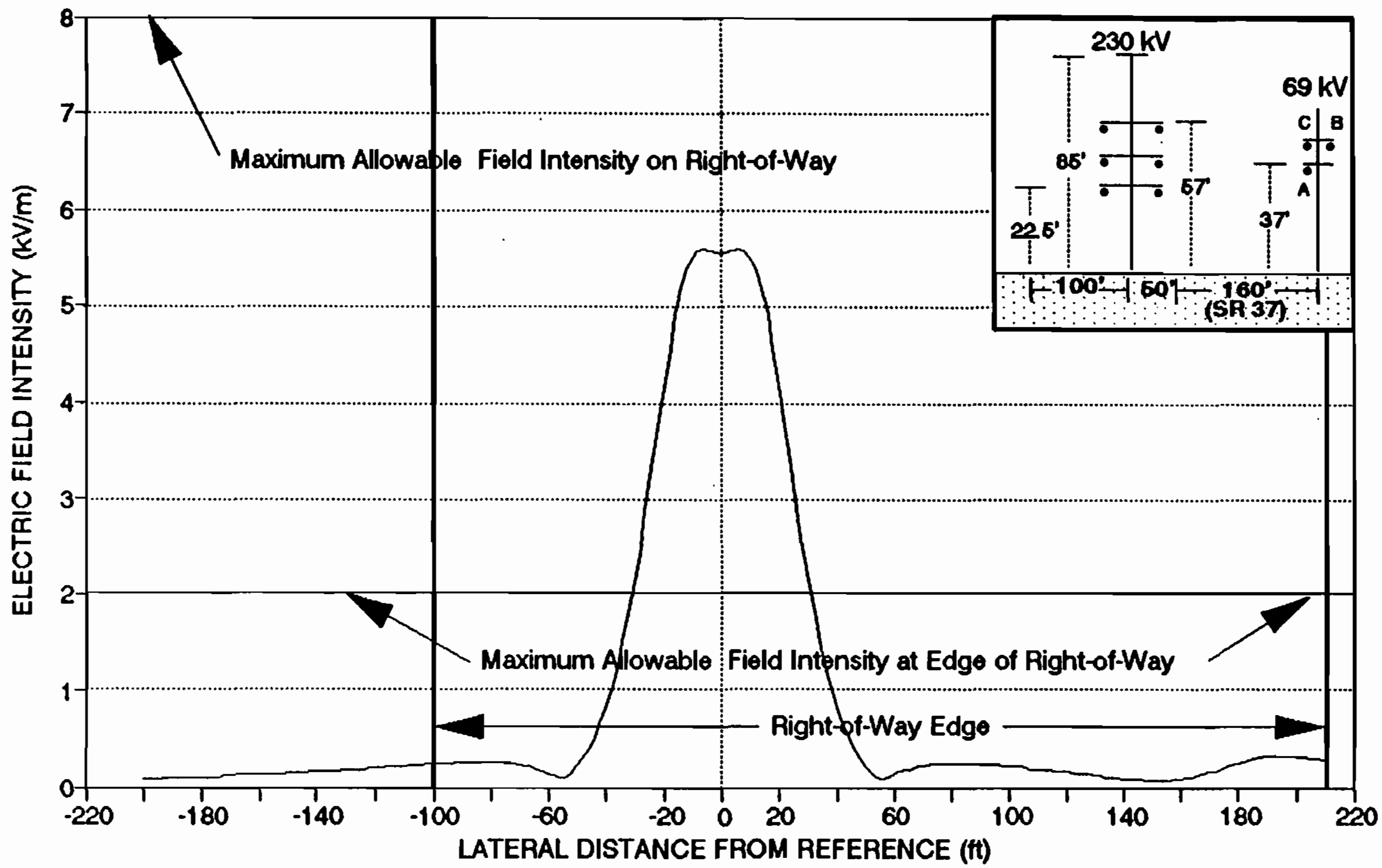

NOTE: MODELED VALUES; ACTUAL VALUES ARE LIKELY TO BE LOWER

FIGURE 6.1.10-3.

LATERAL (MID-SPAN) PROFILE OF ELECTRIC FIELD AT MAXIMUM OPERATING VOLTAGE--NORTHERN CORRIDOR, SCENARIO 2 A

Sources: Tampa Electric Company, 1992. ECT, 1992.

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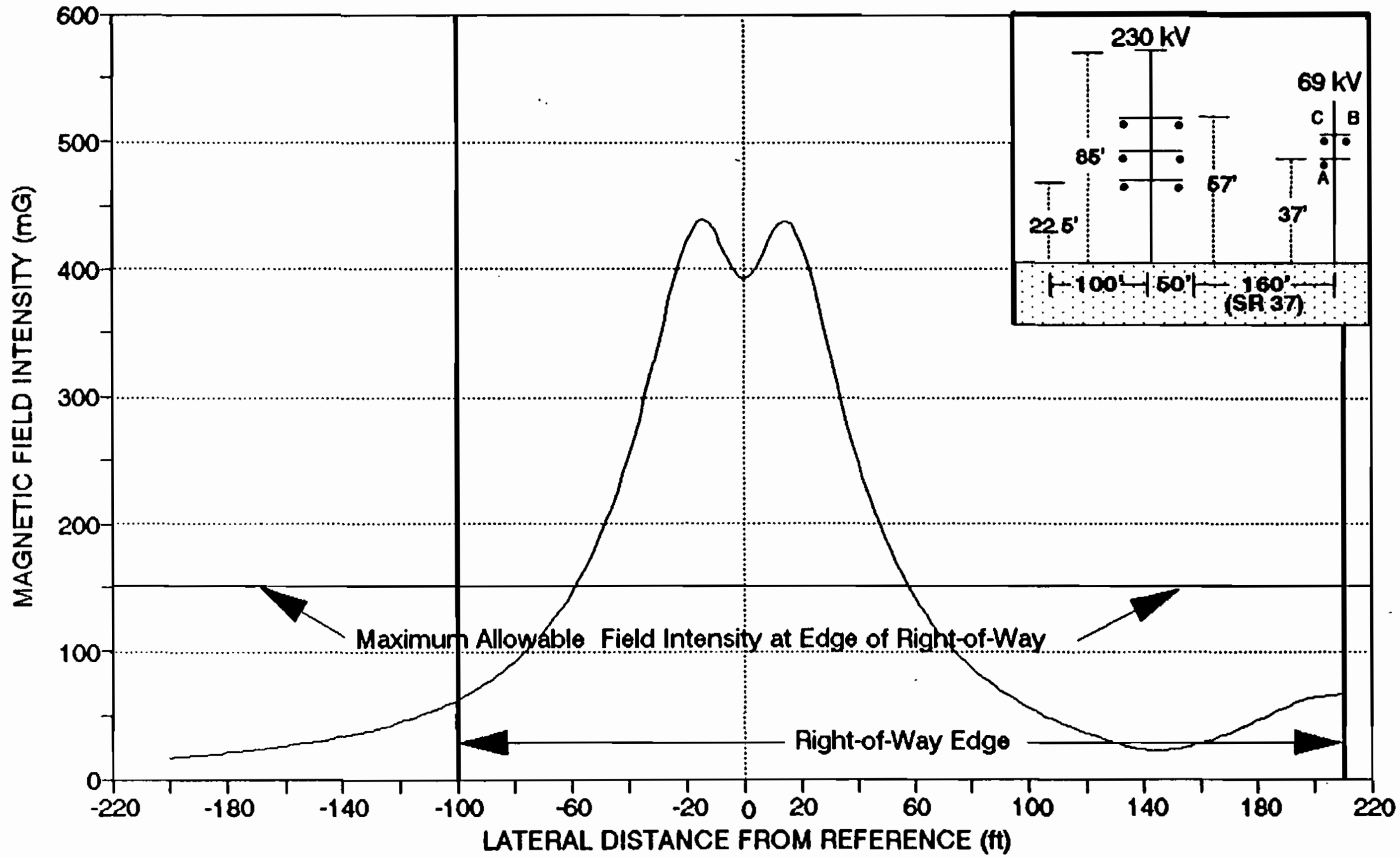

NOTE: MODELED VALUES; ACTUAL VALUES ARE LIKELY TO BE LOWER

FIGURE 6.1.10-4.

LATERAL (MID-SPAN) PROFILE OF MAGNETIC FIELD AT MAXIMUM CURRENT RATING--
NORTHERN CORRIDOR, SCENARIO 2A

Sources: Tampa Electric Company, 1992. ECT, 1992.

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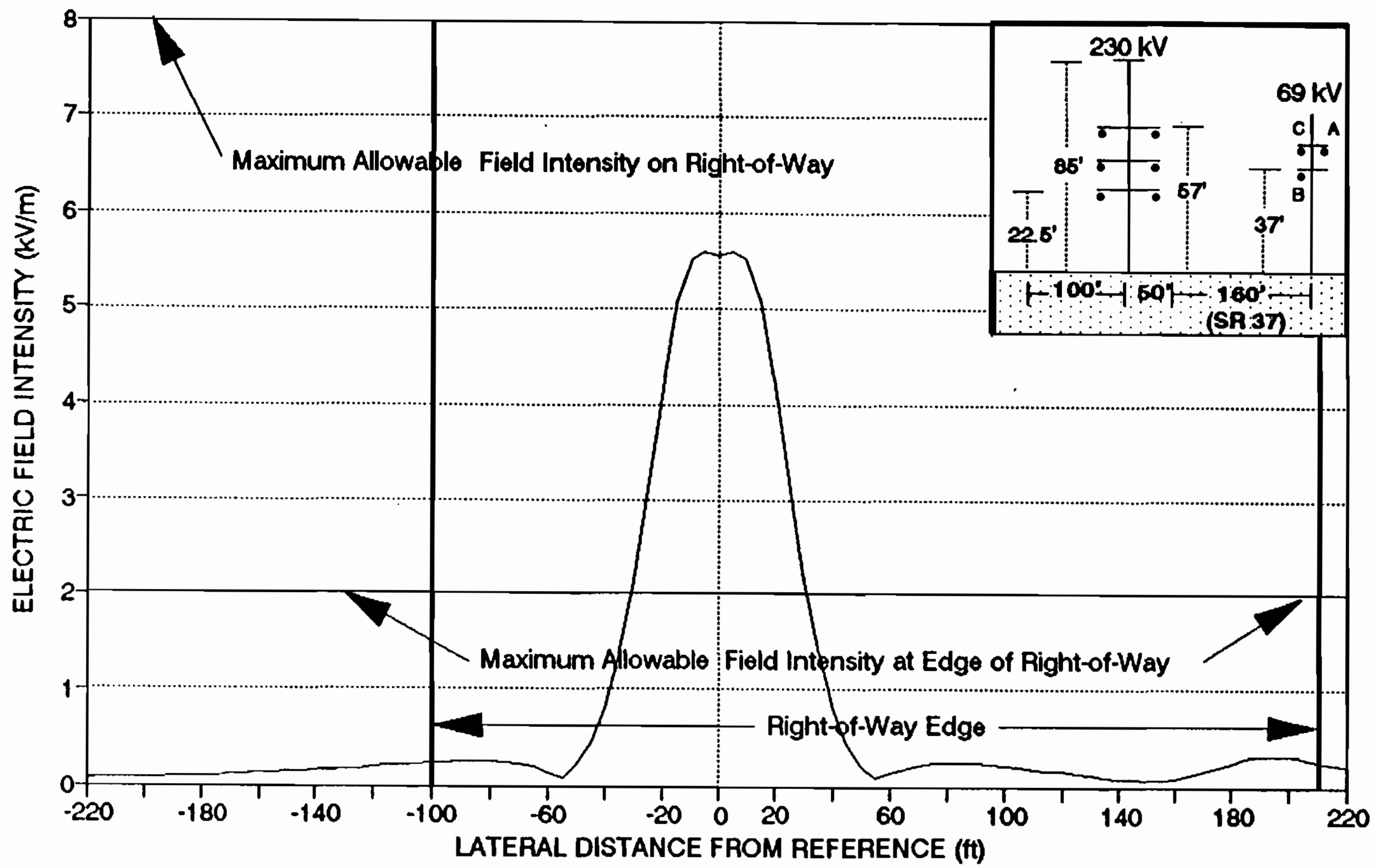

NOTE: MODELED VALUES; ACTUAL VALUES ARE LIKELY TO BE LOWER

FIGURE 6.1.10-5.

LATERAL (MID-SPAN) PROFILE OF ELECTRIC FIELD AT MAXIMUM OPERATING VOLTAGE--NORTHERN CORRIDOR, SCENARIO 2B

Sources: Tampa Electric Company, 1992. ECT, 1992.

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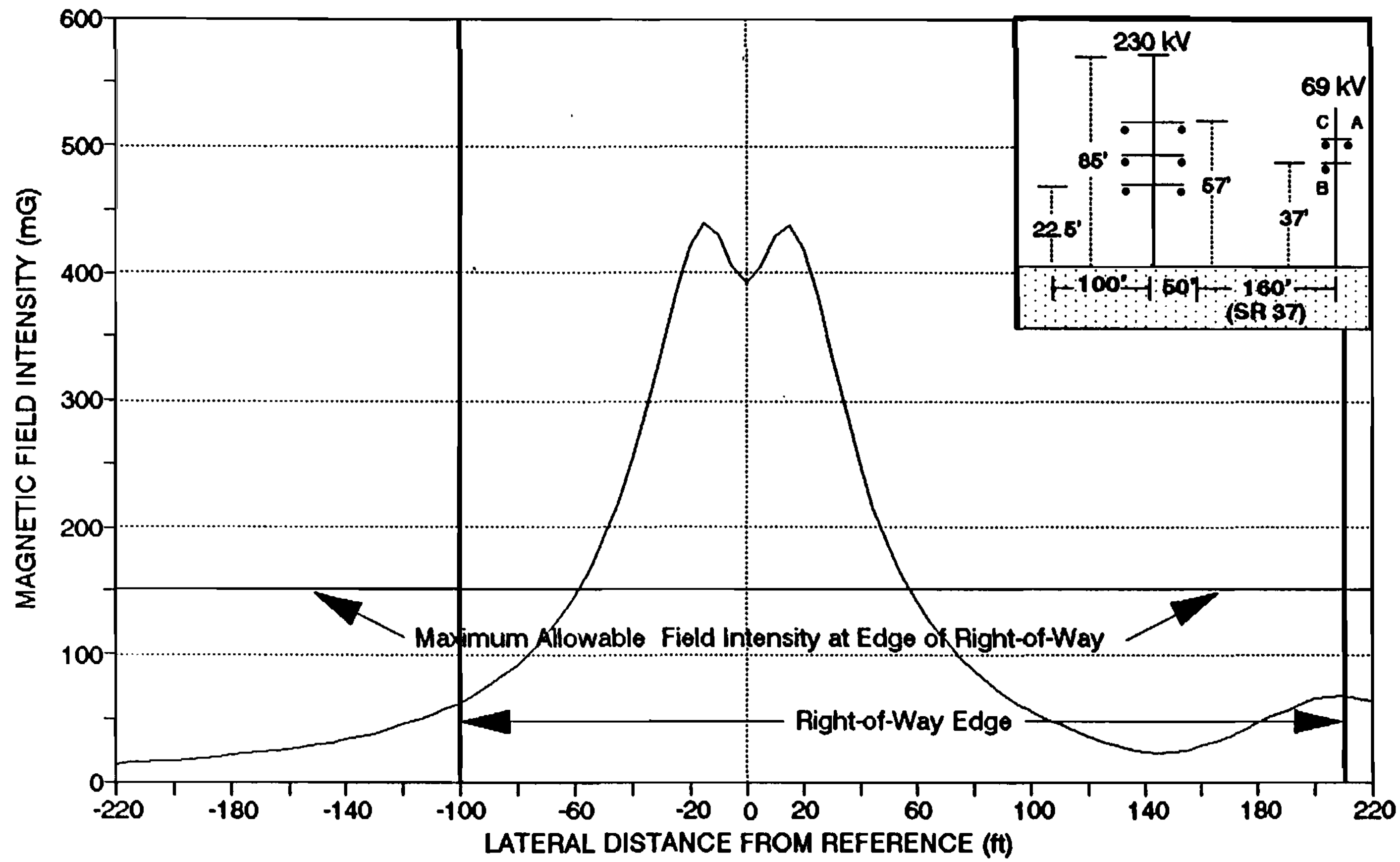

NOTE: MODELED VALUES; ACTUAL VALUES ARE LIKELY TO BE LOWER

FIGURE 6.1.10-6.

LATERAL (MID-SPAN) PROFILE OF ELECTRIC FIELD AT MAXIMUM CURRENT RATING--
NORTHERN CORRIDOR, SCENARIO 2B

Sources: Tampa Electric Company, 1992. ECT, 1992.

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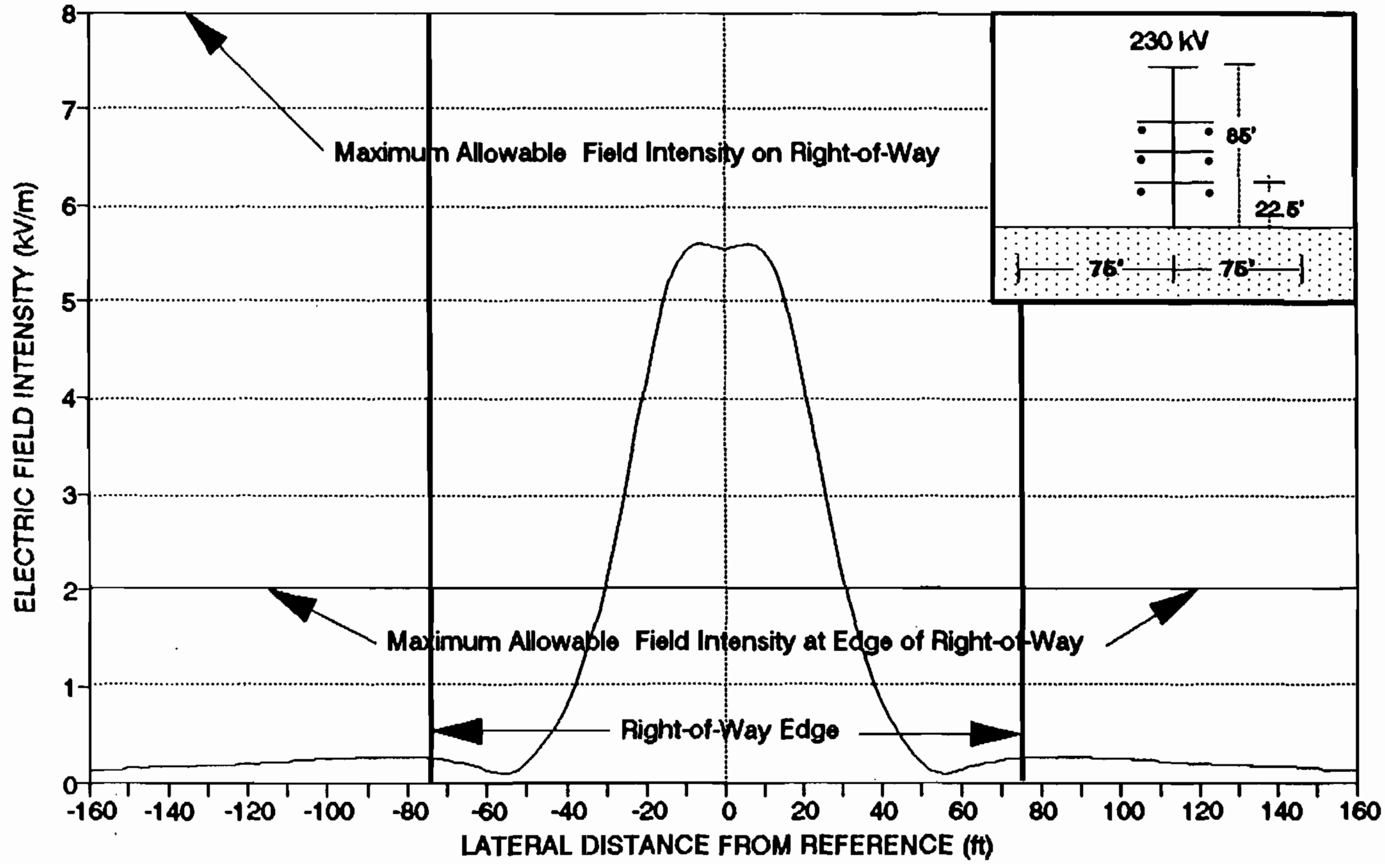

NOTE: MODELED VALUES; ACTUAL VALUES ARE LIKELY TO BE LOWER

FIGURE 6.1.10-7.

LATERAL (MID-SPAN) PROFILE OF ELECTRIC FIELD AT MAXIMUM OPERATING VOLTAGE--NORTHERN CORRIDOR, SCENARIO 3

Sources: Tampa Electric Company, 1992. ECT, 1992.

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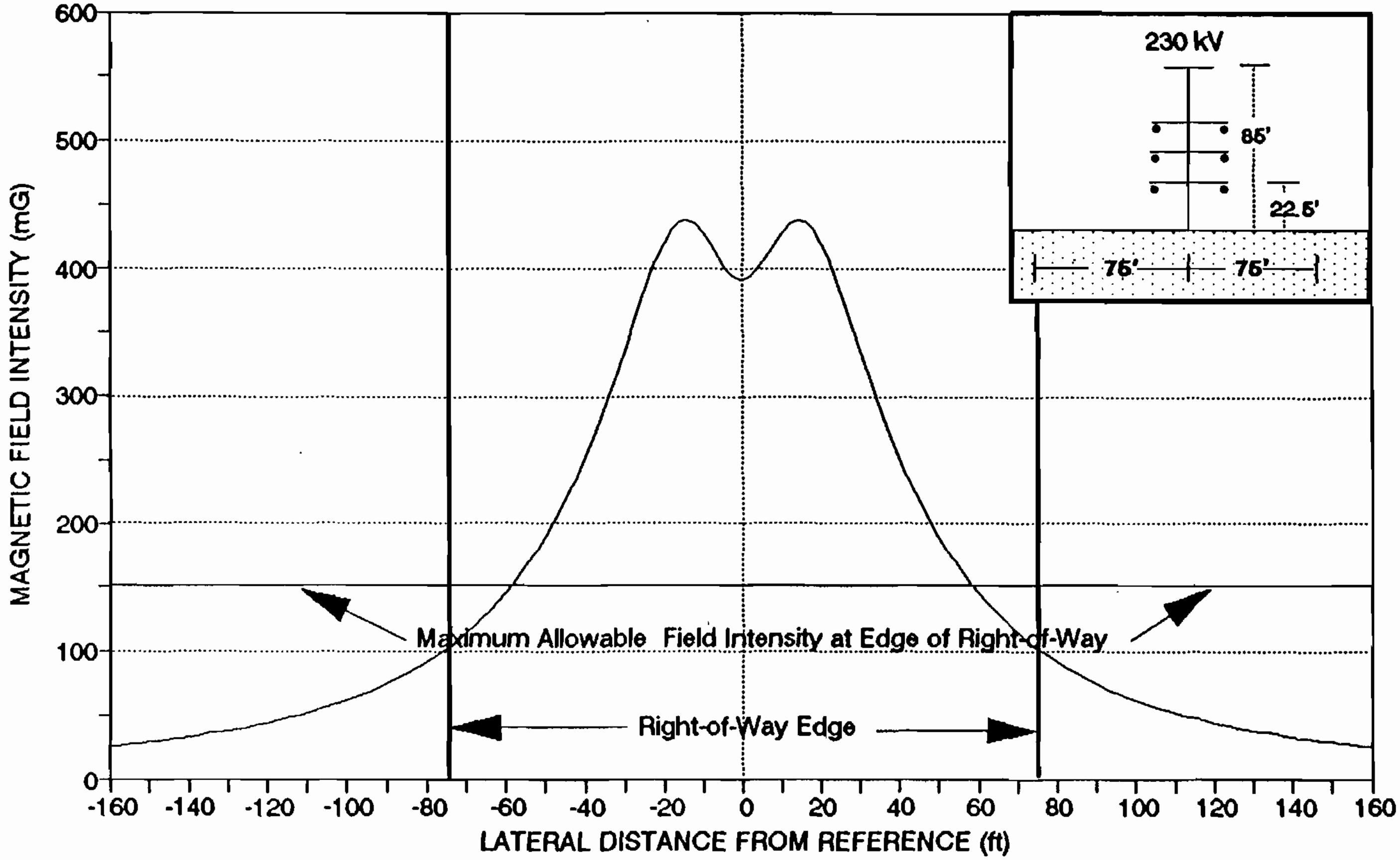

NOTE: MODELED VALUES; ACTUAL VALUES ARE LIKELY TO BE LOWER

FIGURE 6.1.10-8.

LATERAL (MID-SPAN) PROFILE OF MAGNETIC FIELD AT MAXIMUM CURRENT RATING--
NORTHERN CORRIDOR, SCENARIO 3

Sources: Tampa Electric Company, 1992. ECT, 1992.

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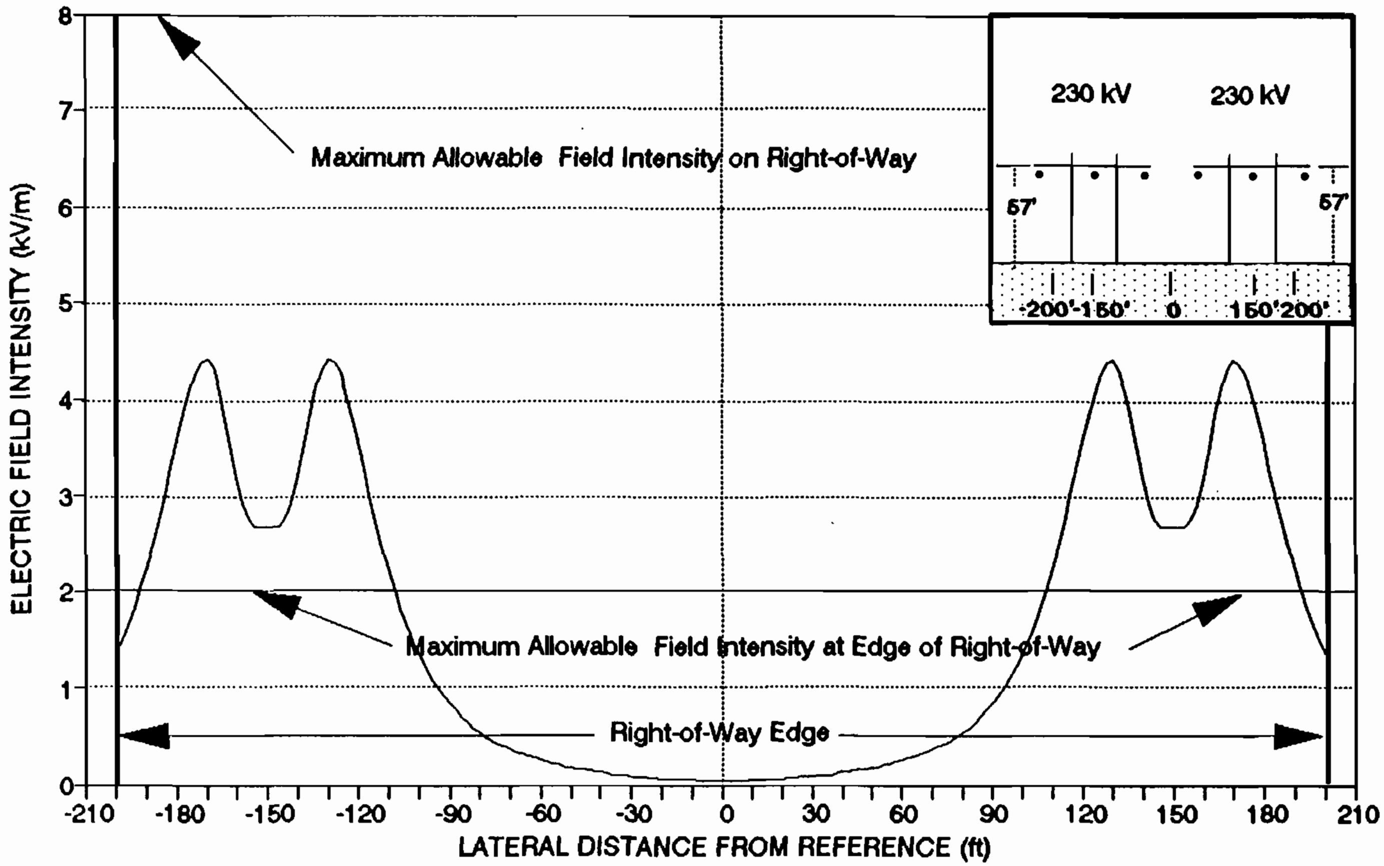

NOTE: MODELED VALUES; ACTUAL VALUES ARE LIKELY TO BE LOWER

FIGURE 6.1.10-9.

LATERAL (MID-SPAN) PROFILE OF ELECTRIC FIELD AT MAXIMUM OPERATING VOLTAGE--EASTERN CORRIDOR, SCENARIO 1

Sources: Tampa Electric Company, 1992. ECT, 1992.

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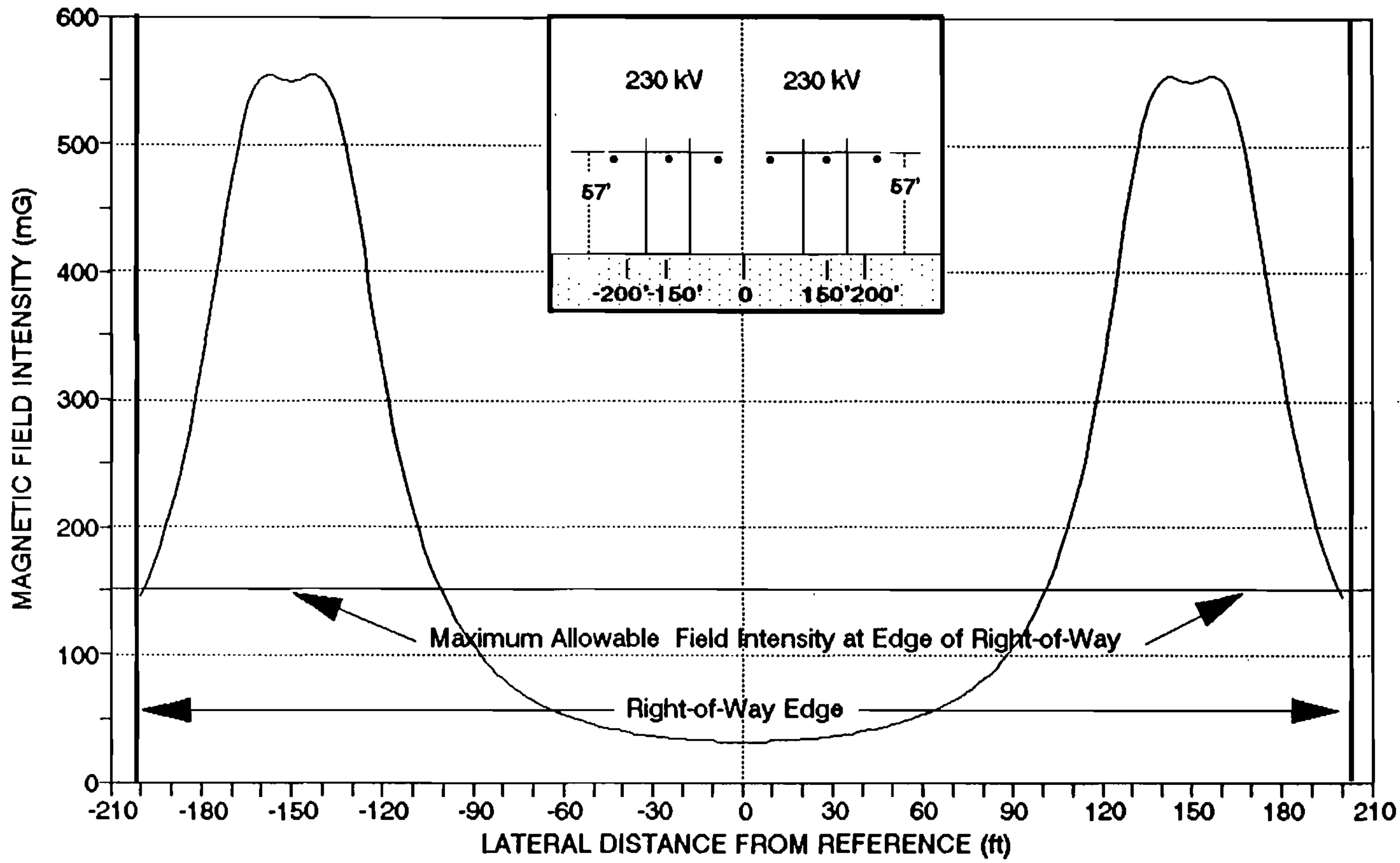

NOTE: MODELED VALUES; ACTUAL VALUES ARE LIKELY TO BE LOWER

FIGURE 6.1.10-10.

LATERAL (MID-SPAN) PROFILE OF MAGNETIC FIELD AT MAXIMUM CURRENT RATING--EASTERN CORRIDOR, SCENARIO 1

Sources: Tampa Electric Company, 1992. ECT, 1992.

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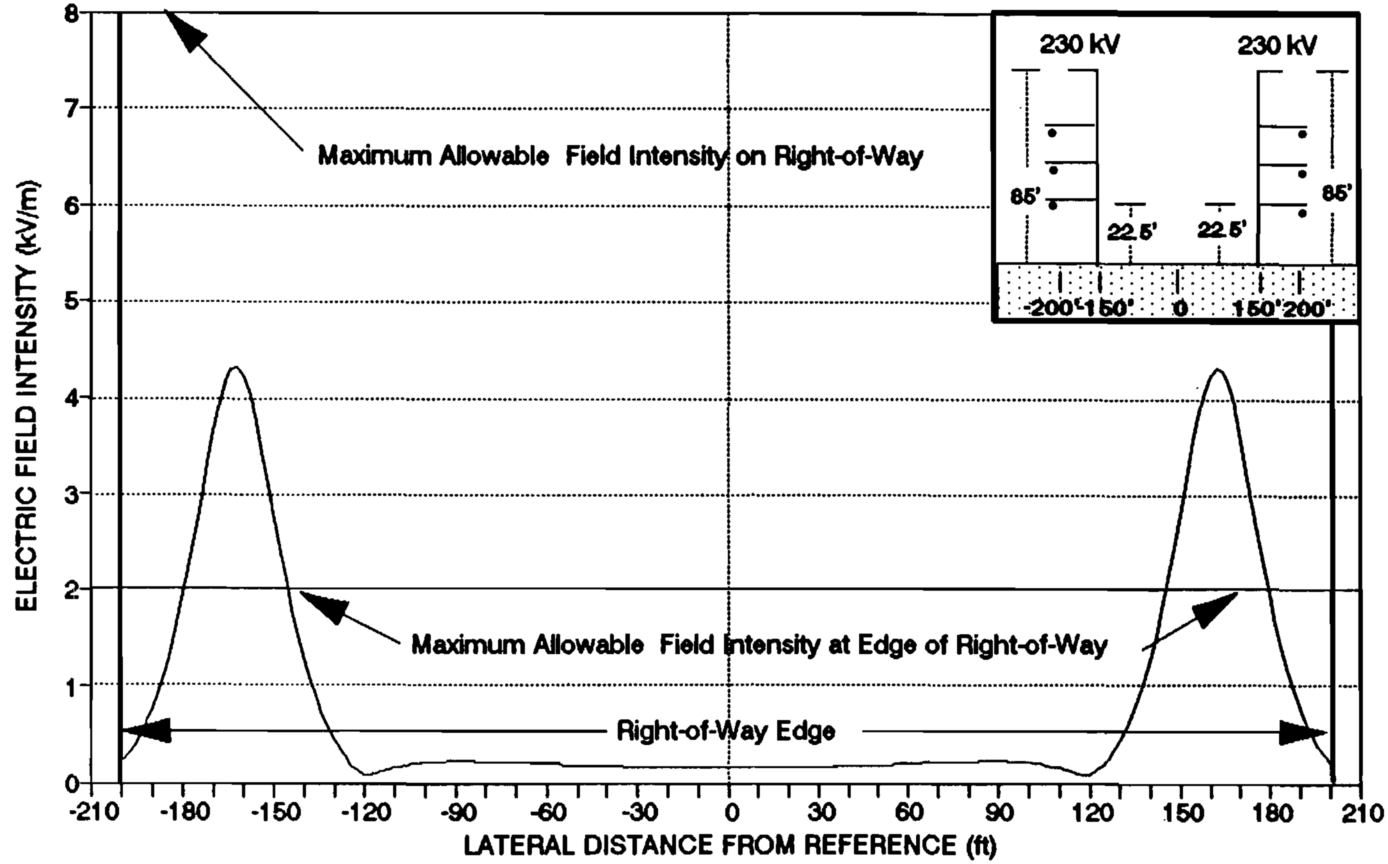

NOTE: MODELED VALUES; ACTUAL VALUES ARE LIKELY TO BE LOWER

FIGURE 6.1.10-11.

LATERAL (MID-SPAN) PROFILE OF ELECTRIC FIELD AT MAXIMUM OPERATING VOLTAGE--
EASTERN CORRIDOR, SCENARIO 2

Sources: Tampa Electric Company, 1992. ECT, 1992.

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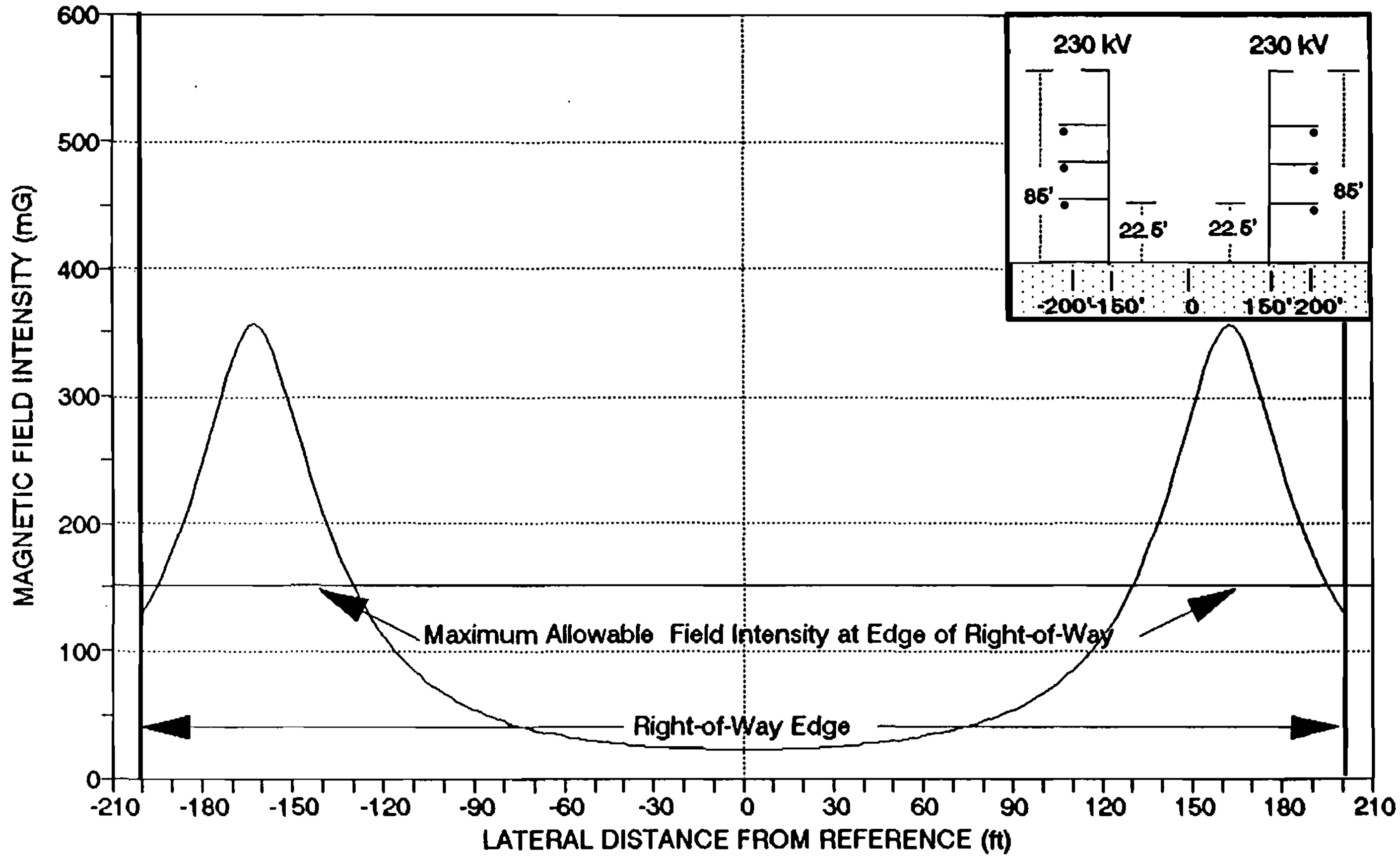

NOTE: MODELED VALUES; ACTUAL VALUES ARE LIKELY TO BE LOWER

FIGURE 6.1.10-12.

LATERAL (MID-SPAN) PROFILE OF MAGNETIC FIELD AT MAXIMUM CURRENT RATING-- EASTERN CORRIDOR, SCENARIO 2

Sources: Tampa Electric Company, 1992. ECT, 1992.

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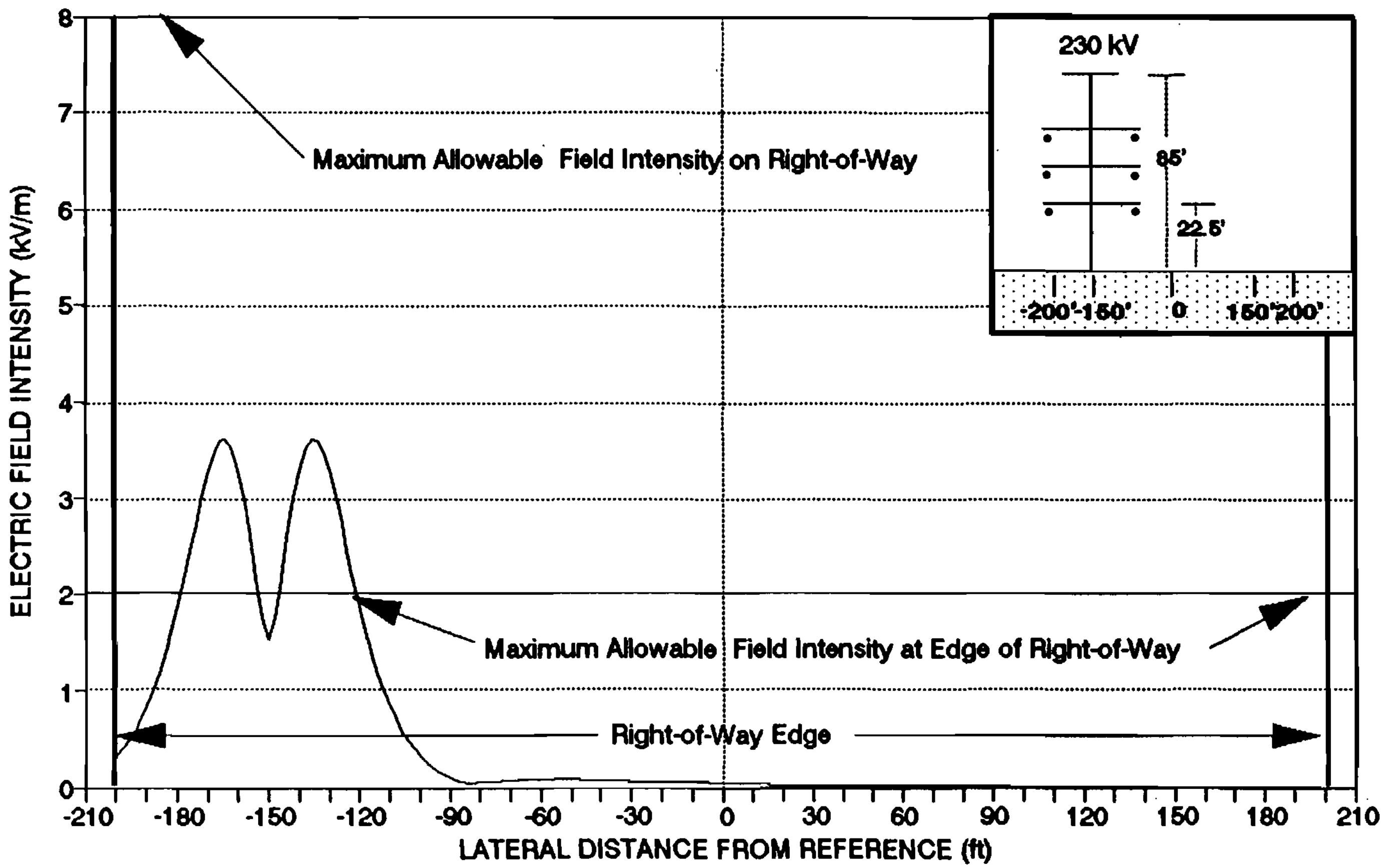

NOTE: MODELED VALUES; ACTUAL VALUES ARE LIKELY TO BE LOWER

FIGURE 6.1.10-13.

LATERAL (MID-SPAN) PROFILE OF ELECTRIC FIELD AT MAXIMUM OPERATING VOLTAGE--EASTERN CORRIDOR, SCENARIO 3

Sources: Tampa Electric Company, 1992. ECT, 1992.

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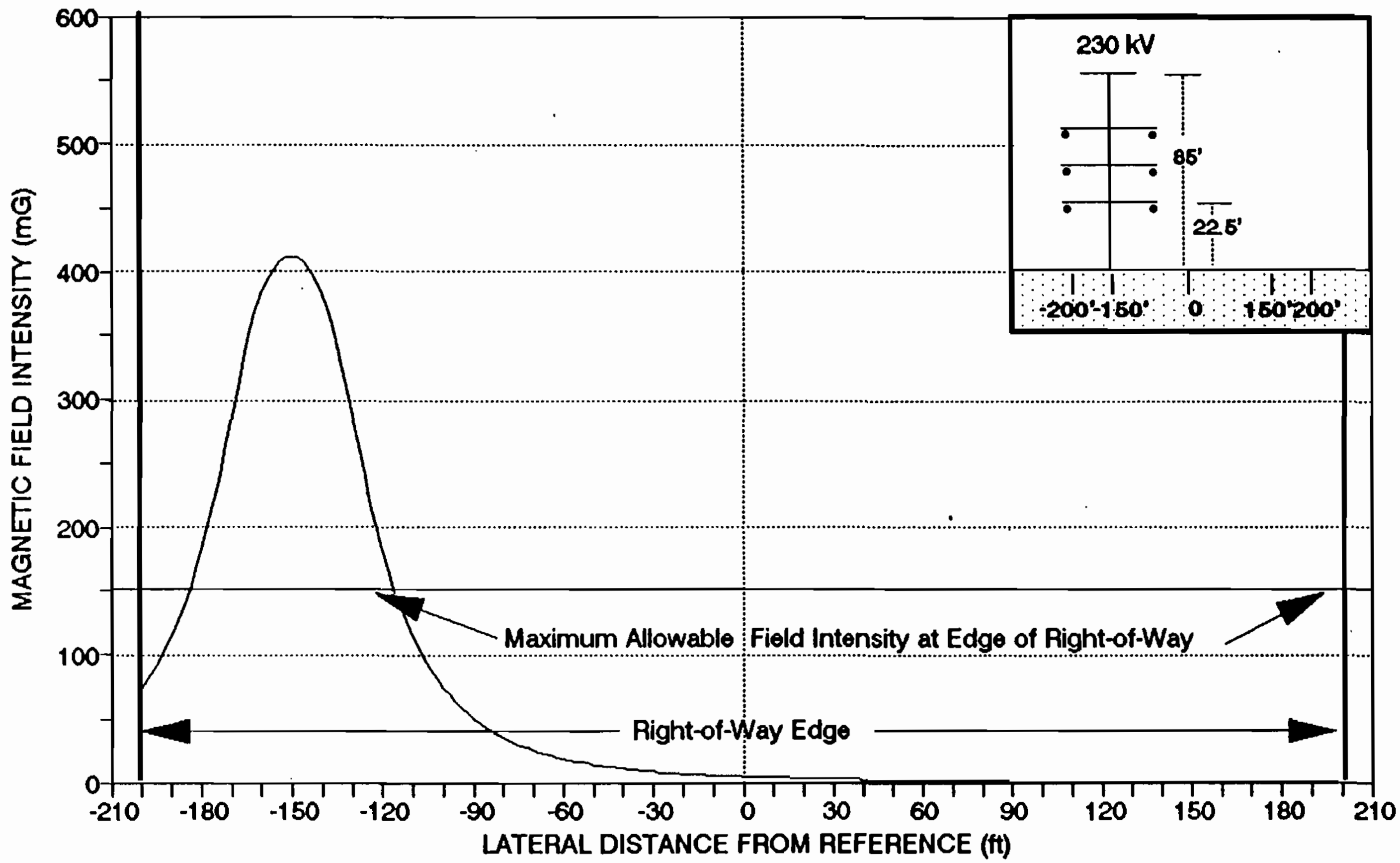

NOTE: MODELED VALUES; ACTUAL VALUES ARE LIKELY TO BE LOWER

FIGURE 6.1.10-14.

LATERAL (MID-SPAN) PROFILE OF MAGNETIC FIELD AT MAXIMUM CURRENT RATING--EASTERN CORRIDOR, SCENARIO 3

Sources: Tampa Electric Company, 1992. ECT, 1992.

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230-kV transmission lines associated with the Polk Power Station. This is because the proposed lines will use noise-free hardware and the frequent heavy rain in central Florida will keep the insulators free of dirt and salt contamination.

During fair weather conditions, when the conductors are dry, the audible noise levels produced by the 230-kV transmission lines associated with the Polk Power Station will be less than normal outdoor ambient noise levels. Dry conditions occur more than 90 percent of the time in the central Florida area.

Transmission line audible noise will increase when rain or very dense fog deposits water droplets on the transmission line conductors. This will occur less than 10 percent of the time. During these wet conditions, the median A-weighted sound pressure level of the line proposed for the offsite northern corridor will be 41.3 dBA or less at the edge of the right-of-way. The median wet-weather A-weighted sound pressure level for the transmission line proposed for the onsite eastern corridor will be 44.9 dBA or less at the edge of the right-of-way. The primary reason for the higher sound level at the edge of the right-of-way in the eastern corridor is the shorter distance from the transmission line to the right-of-way edge in the eastern corridor compared to that proposed for the northern corridor. These noise levels are comparable to the median sound pressure level of rainfall in open fields and on trees and shrubs (42 and 46 dBA, respectively) and are below the levels identified by the EPA as requisite to protect public health and welfare (EPA, 1974). There are no local noise ordinances in effect within the area traversed by the proposed corridors with which the proposed transmission lines must comply.

Radio and Television Interference

Electrical noise in the radio-frequency range can be produced by corona on transmission line conductors or by gap discharges on transmission line hardware. Corona noise is most significant in the lower frequencies such as those used for amplitude modulation (AM) radio broadcast. Noise from gap discharges, on the other hand, extends to very high frequencies and is often a source of interference with television broadcast reception. Since the 230-kV transmission lines associated with the Polk Power Station will be constructed with noise-free hardware, gap discharges are not anticipated to occur. Should a gap discharge develop on a damaged, defective, or improperly installed piece of hardware and lead to interference, it will be located and repaired or replaced. Therefore, the following analysis focuses on interference from corona on the transmission line conductors.

Communications systems making use of frequency modulation (FM) such as FM radio broadcast and business and public service communications are not affected by transmission line noise. Systems using AM such as AM radio and the video (picture) portion of the television broadcasts are sometimes affected if the broadcast signal strength is weak, the noise level is high, or both.

AM radio stations providing broadcast signals sufficiently strong to be free of naturally occurring atmospheric interference (static) at least 90 percent of the time are classified as providing Type A signal service by the Federal Communications Commission (FCC). Stations with Type A signal service will not experience objectionable interference from the proposed Polk Power Station transmission lines during fair weather if the radio receiver is outside the right-of-way.

Weaker AM radio stations which are likely to experience naturally occurring atmospheric interference 10 to 50 percent of the time are defined as Type B signal service. Weak stations minimally meeting the Type B criterion could experience noticeable interference from transmission line corona during fair weather at locations on private land within approximately 13 ft of the right-of-way or on the portion of the SR 37 right-of-way within 38 ft of the boundary adjoining the transmission line right-of-way for the transmission line proposed for the northern corridor. For the transmission lines proposed for the eastern corridor, fair weather interference with weak Type B AM radio signals is possible within 48 ft of the right-of-way, but since the adjoining property is entirely power station property, there will be no opportunities for interference.

During rainy weather, naturally occurring radio interference from atmospheric electricity (static) increases significantly causing interference with all but the stronger local AM radio stations. Consequently, interference from transmission line corona during rain is not a significant concern.

Grade A television signal strengths have been defined by the FCC as those capable of providing acceptable reception at 70 percent of the receiver locations more than 90 percent of the time. The proposed transmission line will not cause interference with any Grade A television station under any weather condition regardless of antenna location outside the right-of-way.

Grade B television signals generally provide acceptable reception at 50 percent of the receiver locations 90 percent of the time. The proposed transmission line will not interfere with the reception of Grade B signals at locations outside the right-of-way during dry weather. However, during heavy rain, there is a potential for interference with the weaker stations minimally meeting the Grade B criterion and operating on Channels 2 through 6 within as much as 110 ft of the right-of-way of the transmission lines proposed for the northern corridor or as much as 155 ft from the right-of-way of the proposed eastern corridor transmission lines. Grade B stations operating on Channels 7 and above will receive no interference during rain.

Although this analysis indicates the possibility of interference with some Grade B television stations during rain, the probability of such interference is low because it requires the simultaneous occurrence of several rare events. There will not be interference unless there is heavy rain falling, the station is a minimal Grade B station operating on Channel 2 through 6, and the antenna is in near proximity to the line and oriented in such a way that it collects the maximum amount of radio-frequency noise from the transmission lines. If television interference is found to occur, it is usually corrected by reorienting or relocating the antenna, installing a more directional antenna, or installing an antenna rotor.

The proposed transmission line will not interfere with cable television, satellite television, or normal or cellular telephone reception.

6.2 NATURAL GAS PIPELINE

Natural gas will be used as the primary fuel for the stand-alone CT and CC units planned for the Polk Power Station. Natural gas will be delivered to the site via a pipeline from either the existing or future natural gas transmission system in the region. FGT has existing gas transmission pipelines in the vicinity and crossing the western tract of the site. FGT is also currently proposing certain additions to and expansions of its system in the site vicinity such as a new metering station at the intersection of SR 37 and CR 630 within the Polk Power Station site and a new pipeline between its St. Petersburg and Sarasota laterals, which would be located primarily along CR 39 in Hillsborough County, approximately 5.5 miles to the west of the site. Other natural gas transmission companies are also considering developing new systems in the region.

At the current time, Tampa Electric Company is evaluating the various alternatives to supply natural gas to the Polk Power Station. Therefore, specific interconnection points to the existing and planned future gas transmission system in the site area and, in turn, the pipeline route or alternative routes to the Polk Power Station site have not been determined at this time. Once the proposed pipeline route has been determined, Tampa Electric Company will submit appropriate supplemental application and supporting information to the SCA for the Polk Power Station for agency review and approval of the proposed natural gas pipeline corridor from the transmission system to the site.

6.3 FUEL OIL PIPELINE

No. 2 fuel oil will be used as the fuel for the advanced CT unit during its first year of operation, prior to conversion to the IGCC unit. After conversion, the advanced CT unit will use syngas as its primary fuel with fuel oil as a backup. Based on current fuel cost considerations, Tampa Electric Company anticipates that fuel oil will also serve primarily as a backup fuel for the future stand-alone CT and CC units. It is anticipated that initially fuel oil will be delivered by tanker truck or rail car.

GATX Terminal Corporation is currently proposing to construct a new fuel oil pipeline in the site region. The proposed pipeline would parallel Fort Green Road and the CSX Railroad located adjacent to the eastern boundary of the Polk Power Station site. When constructed, fuel oil could be delivered to the site via a pipeline from the proposed GATX pipeline to the onsite fuel oil storage tanks. The corridor for this supply pipeline would be located within the boundaries of the Polk Power Station site and, therefore, would not affect offsite land uses or resources.

Tampa Electric Company will submit appropriate supplemental application and supporting information to the SCA for the Polk Power Station for agency review and approval prior to construction of the onsite pipeline to supply fuel oil to the site. Whether the pipeline is constructed or not, Tampa Electric Company will maintain the capability to deliver fuel oil to the site by truck and rail throughout the life of the project operations.

6.4 RAILROAD SPUR

Railroad access to the Polk Power Station will be provided by construction of a rail spur from the existing CSX Railroad line which runs along the east side of Fort Green Road adjacent to the eastern boundary of the site. This rail spur will be used for delivery of coal, fuel oil, and certain equipment and materials to the site. The spur will also be used to transport process by-products (i.e., slag, sulfur, and H_2SO_4) from the site.

Except for a short segment (i.e., approximately 200 ft) of the rail spur to cross Fort Green Road, the spur and associated material loading and unloading facilities will be located within the boundaries of the Polk Power Station site. Therefore, any offsite impacts associated with the construction and operation of this rail spur will be insignificant. Descriptions of the environmental characteristics on the site (e.g., land use, vegetation, and wildlife) along the onsite route for the rail spur were provided previously in appropriate sections of Chapter 2.0.

REFERENCES

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. EPA/550-9-74-004.

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ECONOMIC AND SOCIAL EFFECTS OF PLANT CONSTRUCTION AND OPERATION

7.1 SOCIO-ECONOMIC BENEFITS

The primary benefit to the region as a result of the Polk Power Station project will be the provision of a new, clean, and reliable energy source provided to the public by Tampa Electric Company. The Polk Power Station will also provide other benefits to Polk County, the region, and the State of Florida in terms of employment, tax revenues, and a productive use for a site with limited development potential.

7.1.1 TAX REVENUES

The construction and operation of the Polk Power Station will create both direct and indirect tax benefits. Local revenues will be generated from property taxes levied on the plant site and facilities, and along areas where the offsite transmission line and future natural gas pipeline will be sited. Property taxes will be primarily generated as a revenue source for Polk County. Table 7.1.1-1 provides the estimated ad valorem taxes to be generated by the Polk Power Station each year from 1996 through full build-out in 2010. As shown in this table, the total ad valorem taxes, for both realty and tangible personal property, will range from almost $2 million in 1996 to approximately $19.7 million in 2011. Ad valorem taxes will continue to be generated by the Polk Power Station beyond 2011 on an annual basis throughout the projected life of the facilities.

The construction of the Polk Power Station will also generate significant revenues for the state through the state sales tax. The sales tax revenues generated from the construction of the IGCC unit are estimated to be approximately $2 million and sales tax revenues for each of the remaining units are estimated to be approximately $100,000.

Table 7.1.1-1. Estimate of Ad Valorem Taxes for Realty and Tangible Personal Property Generated by the Polk Power Station Project, 1996 through 2011

Tax Year	Estimated Tangible Personal Property ($)	Estimated Realty ($)	Estimated Net Taxes* ($)
1996	1,731,700	200,600	1,932,300
1997	7,396,200	206,600	7,602,800
1998	7,297,500	212,800	7,510,300
1999	7,186,100	228,000	7,414,100
2000	7,851,100	234,800	8,085,900
2001	8,554,600	241,800	8,796,400
2002	10,250,600	258,700	10,509,300
2003	11,025,500	266,400	11,291,900
2004	13,980,600	274,400	14,255,000
2005	14,817,800	282,700	15,100,500
2006	15,700,200	291,100	15,991,300
2007	16,630,400	299,900	16,930,300
2008	17,610,400	308,900	17,919,300
2009	17,073,600	318,100	17,391,700
2010	18,184,300	327,700	18,512,000
2011	19,357,400	337,500	19,694,900
TOTAL	**194,648,000**	**4,290,000**	**198,938,000**

Note: Assumed actual 1991 millages and increased 3 percent per year.

*Net taxes implies a reduction for an early payment discount has been taken.

Source: Tampa Electric Company, 1992.

Indirect economic benefits such as increased levels of spending in the area of the Polk Power Station, in Polk County, and in the region by both the construction and operational workforce will also benefit the state and local tax revenues and economies. Since the projected workforce will primarily commute from existing residences with few relocations, project-associated increases in spending are expected to benefit the local and regional economies, while not creating new demands on public services and facilities.

7.1.2 EMPLOYMENT

Additional employment for the area surrounding the Polk Power Station is another main socio-economic benefit projected to result from the construction and operation of the Polk Power Station. As previously described in Section 2.2.7, both Polk and Hardee Counties suffer from high unemployment. While the employment opportunities created by the Polk Power Station will not completely solve local unemployment problems, the project will assist in lowering the unemployment rate.

7.1.2.1 Construction Workforce

During the initial construction phase, an average of 400 workers will be employed for a 27-month construction period, with a 9-month peak of 600 construction workers. An average of 15 to 40 workers will be employed during other construction phases of the project.

As shown in Table 7.1.2-1, more than $39 million in construction payroll wages will be generated from the initiation of construction to project build-out in 2010. Since approximately 60 percent of the construction workforce is anticipated to be drawn from Polk County, this equates to more than $23.5 million in construction wages generated within Polk County. These payroll estimates are conservative as an average monthly construction wage of $2,700 is held constant in 1992 dollars, and does not include any potential increase in wages due to overtime work. The monthly wage figure was based on those specialized trades associated with power plant construction, and the regional economy.

Another economic benefit resulting from the construction of the Polk Power Station will be local subcontractors hired, which should be viewed as a separate benefit relative to the percentage of the workforce projected to be drawn from Polk County. It is forecasted that 5 percent of the workforce will consist of Polk County local subcontractors, with 10 percent regional subcontractors. It is also estimated that the value of these local and regional contracts will represent 40 percent of the entire construction workforce contract value since these contracts will probably involve

Table 7.1.2-1. Annual Construction Workforce Payroll to Build-Out in 2010 (1992 dollars)

Year	Total Nominal Station Capacity (MW)	Construction Personnel Average	Construction Personnel Peak	Construction Wages* Average ($)	Construction Wages* Additional During Peak ($)	Total ($)
1994	0	400	400	8,640,000	0	8,640,000
1995	150	400	600	12,960,000	4,860,000	17,820,000
1996	260	400	400	7,560,000	0	7,560,000
1998	260	15	20	243,000	40,500	283,500
1999	335	15	20	243,000	40,500	283,500
2000	410	15	20	243,000	40,500	283,500
2001	480	40	60	972,000	54,000	1,026,000
2002	555	40	60	1,296,000	270,000	1,566,000
2003	775	40	40	108,000	0	108,000
2005	775	15	20	243,000	40,500	283,500
2006	850	15	20	243,000	40,500	283,500
2007	925	15	20	243,000	40,500	283,500
2008	1,000	15	20	243,000	40,500	283,500
2009	1,075	15	20	243,000	40,500	283,500
2010	1,150	15	20	243,000	40,500	283,500
TOTAL				**33,723,000**	**5,548,500**	**39,271,500**

* Average wage of $2,700 per month plus benefits; overtime wages not included.

Sources: UE&C, 1992.
ECT, 1992.

some of the more significant activities (e.g., earth-moving for site development/ reclamation).

7.1.2.2 Operational Workforce

The Polk Power Station will also employ an estimated 210 operational workers at project build-out. The operational workforce will also include annual contracted maintenance workers to be hired for periodic routine services ranging from 6 persons in 1997 to 100 at build-out in 2010. The total combined annual operational payroll is presented in Table 7.1.2-2, and is estimated in 1992 dollars to be cumulatively more than $109 million from 1995 to 2010. The yearly annual totals range from $1.75 million in 1995 to almost $10 million in 2010. Since 60 percent of the operational workforce and 50 percent of the maintenance workforce are expected to be drawn from Polk County, a total of more than $5.7 million in payroll is expected to be generated within Polk County in 2010, at a cumulative total of more than $63 million from 1995 to 2010 for the Polk County economy. The annual wage figures represent the expected 1992 salary average for Tampa Electric Company power plant employees and maintenance workers.

Tampa Electric Company actively maintains affirmative action hiring practices, and will continue to comply with all applicable local, state, and federal affirmative action and equal employment laws.

Table 7.1.2-2. Annual Operational Workforce Payroll to Build-Out in 2010 (1992 dollars)

Year	Total Nominal Station Capacity (MW)	Total Personnel Opera-tional	Total Personnel Main-tenance	Wages ($) Opera-tional*	Wages ($) Main-tenance†	Total ($)
1995	150	50	0	1,750,000	0	1,750,000
1996	260	130	0	4,550,000	0	4,550,000
1997	260	130	6	4,550,000	156,000	4,706,000
1998	260	130	66	4,550,000	1,716,000	6,266,000
1999	335	140	0	4,900,000	0	4,900,000
2000	410	147	75	5,145,000	1,950,000	7,095,000
2001	480	162	5	5,670,000	130,000	5,800,000
2002	555	167	80	5,845,000	2,080,000	7,925,000
2003	775	182	21	6,370,000	546,000	6,916,000
2004	775	182	95	6,370,000	2,470,000	8,840,000
2005	775	182	17	6,370,000	442,000	6,812,000
2006	850	187	94	6,545,000	2,444,000	8,989,000
2007	925	192	26	6,720,000	676,000	7,396,000
2008	1,000	197	89	6,895,000	2,314,000	9,209,000
2009	1,075	202	39	7,070,000	1,014,000	8,084,000
2010	1,150	210	100	7,350,000	2,600,000	9,950,000
TOTAL				**90,650,000**	**18,538,000**	**109,188,000**

*Average annual wage of $35,000 plus benefits.
†Average annual wage of $26,000 plus benefits.

Sources: UE&C, 1992. ECT, 1992.

7.1.3 BY-PRODUCT SALES

Sulfur, H_2SO_4, and slag will be produced as saleable by-products of the gasification process. Elemental sulfur and H_2SO_4 are produced in the syngas sulfur removal processes, and have commercial value, particularly for the chemical fertilizer industry in central Florida. The slag by-product has commercial applications such as sand-blasting material, and as an aggregate in cement, road construction, and other building materials. These by-products will be transported offsite to buyers by truck and rail.

Revenues from the sale of these by-products will provide benefits to Tampa Electric Company and its Customers by offsetting some costs of the project operations and electricity. For example, assuming that 50 percent of the sulfur in the coal is recovered as elemental sulfur and 50 percent as H_2SO_4, annual sales of sulfur would generate approximately $1.1 million in revenues and H_2SO_4 annual sales would generate approximately $3.4 million in revenues. Slag sales are estimated to generate approximately $200,000 in annual revenues.

7.1.4 ENHANCEMENT OF RECREATIONAL OR ENVIRONMENTAL VALUES

The construction and operation of the Polk Power Station will efficiently use reclaimed phosphate mining lands. This use of mined land will enhance land conservation by combining multiple industrial uses on one parcel of land.

In addition, Tampa Electric Company plans to reclaim the western portion of the site to a natural habitat system of wetlands and uplands after current phosphate mining activities are completed. These reclaimed lands will create a significant wildlife habitat resource in southwestern Polk County. The planned, controlled, natural wildlife habitat area will provide enhanced environmental qualities to the adjacent properties compared to other permitted uses within the zoning district.

7.1.5 CREATION OR IMPROVEMENT OF LOCAL TRANSPORTATION FACILITIES

The transportation analysis conducted for the project (see Appendix 11.6), showed that adjacent roadway links and intersections will operate at an acceptable LOS in their current geometries with existing traffic and the projected traffic associated with the construction and operation of the Polk Power Station.

The planned points of ingress and egress for the Polk Power Station site will be designed in accordance with applicable FDOT and Polk County requirements to provide adequate and safe access to the site, and to ensure that the traffic operations and flows on the existing roadway network in the site area meet an acceptable LOS. Specific roadway improvements required to maintain an acceptable LOS on public roads will be provided, as appropriate, at the facility access roads. Schematic plans for roadway improvements at the driveway entrances are shown for the main project entrance and Bethlehem Road entrance are shown on Figures 4.1.2-1 and 4.1.2-2, respectively.

An additional transportation benefit proposed for the Polk Power Station will be the encouragement of the use of transportation demand management techniques for both the construction and operational workforce, to reduce potential traffic impacts. For the construction workforce, a bulletin board will be placed onsite for purposes of placing car-pooling advertisements and all onsite contractors will be informed that this service is available. These contractors will be requested to inform their employees of the availability of this service. For the operational workforce, bulletin boards will also be used onsite and at Tampa Electric Company office locations for placing car-pooling advertisements, and through the availability of placing car-pooling advertisements in the Tampa Electric Company newsletter sent to all Tampa Electric Company employees.

7.2 SOCIO-ECONOMIC COSTS

7.2.1 TEMPORARY EXTERNAL COSTS

According to FDLES, more than 35,000 construction workers reside in Polk, Hillsborough, Hardee, and Manatee Counties. Based on the availability of this workforce and the location of the Polk Power Station site, construction workers are expected to commute, with only minimal, temporary relocations anticipated. Tampa Electric Company will encourage transportation demand management techniques to reduce the potential traffic impacts associated with the construction workforce. As previously discussed, these techniques will include the installation of a bulletin board onsite that may be used by construction personnel for placing car-pooling advertisements, and by informing all onsite contractors that this service is available and requesting that these contractors inform their employees that this service is available. Because the majority of construction workers are anticipated to commute from their existing residences, no significant impacts to housing or public services and facilities are expected.

For the few construction workers who may decide to drive to the area in an recreational vehicle (RV) and stay at campgrounds during weekdays, sufficient RV sites exist to support this additional minimal demand. Because the majority of the construction workforce will commute, the few workers choosing to use an RV are not expected to create significant additional demands on local RV facilities. A small number of construction workers may be recruited from outside the four-county region; however, with a Polk County rental housing vacancy rate in 1990 of 12.6 percent (BEBR, 1991), this small number of workers is expected to be readily absorbed by the available rental housing stock in Polk County.

As previously discussed in Section 4.6.6 and as documented in the transportation analysis (Appendix 11.6), temporary traffic congestion may occur at certain intersections during morning and evening hours when construction workers are arriving at or departing from the Polk Power Station site. Acceleration, deceleration, and turn lanes, as appropriate, will be constructed at plant access roads to maintain acceptable LOS standards on existing roadways at these intersections.

Residences in the vicinity of the Polk Power Station are not expected to be negatively impacted by onsite construction activities. The site is in an area predominantly used for phosphate mining, and the nearest residence is more than 1 mile from the proposed power block and fuel storage areas. After the initial site development/ reclamation activities, vegetative buffers will be provided along SR 37 and Fort Green Road. The site area west of SR 37 will be enhanced and is ultimately expected to function as a wildlife habitat/corridor area. Based on distances to homes and vegetative buffers to residences near the Polk Power Station, most onsite construction activities will not be visible from residences in the area or potential viewsheds along public roadways.

7.2.2 LONG-TERM EXTERNAL COSTS

The operational impacts resulting from the Polk Power Station are expected to be minimal and localized. The Polk Power Station is not located on or near public or private recreational facilities, and therefore, will not cause a loss of access, impair recreational values, or cause a deterioration of aesthetic or scenic values. The development of the Polk Power Station at this mined-out site will also not displace persons from the land, cause a loss of income, or result in significant costs to local governments.

7.2.2.1 Aesthetics

The project will be located along SR 37, approximately 4.4 miles south of the unincorporated community of Bradley Junction. The tallest structures will be associated with gasification facilities and certain exhaust stacks which range from 150 to 250 ft in height. Other plant operational buildings are expected to be three stories or less in height.

As previously discussed, the Polk Power Station site is proposed to be located in an area predominantly used for phosphate mining. As a predominantly disturbed area, areas in the immediate vicinity of the Polk Power Station have little aesthetic or visual value. The power block and fuel storage areas will also be located more than 1 mile to the nearest residence. Development proposed west of SR 37 will include a series of wetlands and uplands, and will evolve into a significant habitat area. This area west of SR 37 is expected to be an area of a positive visual and aesthetic character for views from adjacent homes along Bethlehem and Albritton Roads to the north of the area and from public viewsheds along SR 37 and SR 674.

Only the tallest structures (e.g., certain coal gasification facilities and exhaust stacks) will be potentially visible from public roadways or offsite properties. These structures will be located approximately 0.5 mile from the nearest roadway or public viewshed, SR 37, and vegetative buffers will be provided along SR 37 and other potential public viewpoints. Based on setback distances and proposed vegetative buffering and currently disturbed character of adjacent lands, the Polk Power Station is not expected to create significant visual impacts to the immediate area. The Polk Power Station will not be located on or near areas of scenic, historic, cultural, natural, or archaeological value, and will consequently have no visual impacts to such areas.

7.2.2.2 Land Use

The development of the Polk Power Station will use primarily mined-out land, and will cause no hardship associated with the conversion of land use. The utilization of these lands will reclaim lands into a productive use without displacing populations or causing a loss of value to the region. The development of the Polk Power Station will not displace or impact any recreational or other public lands. Based on previous mining uses, vegetative buffers, and setback distances, the development of the Polk Power Station is not expected to cause detrimental impacts to real estate values in areas surrounding the site.

7.2.2.3 Public Services

Most of the Polk Power Station operational workforce is expected to be recruited from the regional workforce, with minimal relocations. Because this population is currently served by existing public services and facilities in place relative to their residences, no significant impacts to housing, transportation facilities, or public facilities and services (i.e., schools, hospitals, police, and fire protection) are anticipated (see Section 5.9).

REFERENCES

Bureau of Economic and Business Research (BEBR). 1991. 1991 Statistical Florida Abstract. College of Business Administration, University of Florida, University Press of Florida.

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CHAPTER 8.0
SITE AND PLANT DESIGN ALTERNATIVES

As discussed in Section 1.2, Tampa Electric Company's proposed Polk Power Station project will involve several federal agency approvals and actions which are considered to be major federal actions that may significantly affect the quality of the human environment. Such federal actions are subject to NEPA and CEQ regulations promulgated to implement the provisions of NEPA and to establish uniform procedures that must be followed by all federal agencies to comply with NEPA. DOE has determined that its action to provide Tampa Electric Company with partial funding for the proposed IGCC power plant under the Clean Coal Technology Demonstration program is a major action subject to NEPA regulations. It is also anticipated that EPA will determine that its proposed action to issue a NPDES permit for certain water discharges from the proposed Polk Power Station is a major action subject to NEPA requirements. To fulfill their responsibilities under NEPA and CEQ regulations, DOE and EPA are required to prepare an EIS for the proposed Polk Power Station project. DOE will be the lead federal agency for preparation of the EIS while EPA and other affected federal agencies (e.g., USACE and USFWS) will participate in the EIS preparation as a cooperating agencies.

Under NEPA regulations, DOE and EPA are required in preparing the EIS to identify and assess all reasonable alternatives to the proposed project which could avoid or minimize potentially adverse effects on the quality of the human environment. The potential alternatives in addition to the proposed project to be considered by these agencies in the EIS include:

- Available regulatory alternatives;
- Alternatives to constructing new generating facilities;
- Alternative generation technologies;
- Alternative sites for the proposed facilities;
- Alternative facility designs, processes, and systems; and
- The no-action alternative.

In light of the alternative analyses required by DOE and EPA, this chapter of the SCA identifies the potential alternatives which were initially considered by Tampa Electric Company for the proposed Polk Power Station project. Discussions are also provided regarding Tampa Electric Company's evaluation of potential alternatives to determine if the alternative was considered a reasonable alternative compared to the proposed project. In these evaluations by Tampa Electric Company, an alternative must have met the following criteria to be considered as a reasonable alternative:

- Provide some environmental advantage to lessen, minimize, or avoid potentially adverse effects compared to the proposed project;
- Meet Tampa Electric Company's need to provide reliable, additional electric generating capacity to its Customers in the 1995 to 2010 timeframe;
- Be technically feasible and implementable within the required timeframe; and
- Be relatively more cost-effective compared to the proposed project.

In addition to these overall criteria, the evaluation of alternatives considered the objectives of the DOE Clean Coal Technology Demonstration program to support the construction and operation of facilities to demonstrate technologies which use coal for electric generation in an environmentally acceptable, more cost-effective manner and are ready to be potentially proven at the demonstration level for commercial operation. These criteria are consistent with those to be used by DOE and EPA in assessing alternatives to the proposed Polk Power Station project for the EIS in compliance with NEPA-related regulations and requirements.

As stated in the FDER Instruction Guide for Certification Applications, this chapter is not required under the FEPPSA for a complete SCA. The applicant has the option to complete this chapter to support the analyses of alternatives by federal agencies under NEPA. Also, the FDER instruction guide provides a suggested format for this chapter. Tampa Electric Company has opted to complete this chapter.

However, the FDER suggested format for presenting information has been somewhat modified and expanded to address additional alternatives which are expected to be considered by DOE and EPA and to make the format more consistent with the specific designs, systems, and requirements of the proposed Polk Power Station project.

8.1 ALTERNATIVE SITES

As required by Section 186, F.S., and implementing regulations in Chapter 22E-2, F.A.C., Tampa Electric Company identified the need for new electric generating capacity in the company's Ten-Year Site Plan for Electrical Generating Facilities and Associated Transmission Lines, January 1992 to December 2001. The proposed Polk Power Station site was also identified in the Ten-Year Site Plan as well as several alternative sites. Tampa Electric Company conducted a Power Plant Site Selection Assessment program in 1989 and 1990 which resulted in the identification of the proposed Polk Power Station site. The following provides summary descriptions of the methodologies, criteria, and analyses conducted in this program which were presented in the final Power Plant Site Selection Assessment Report (ECT, 1990).

8.1.1 INTRODUCTION

Tampa Electric Company conducted a Power Plant Site Selection Assessment program to identify a suitable site for constructing and operating future power plant facilities. The power plant facilities considered during the site assessment were a 440-MW CC plant and a coal-fueled 500-MW baseload plant as well as associated facilities. An integral aspect of this site selection program by Tampa Electric Company was the formation and participation of a Siting Task Force. The Siting Task Force was formed in response to community concerns regarding the placement of additional power plant facilities at a coastal site on Tampa Bay which was identified as a suitable site for such facilities in previous site selection studies by Tampa Electric Company. The Siting Task Force was comprised of 17 private citizens from environmental groups, businesses, and universities in the Tampa Electric Company service area and throughout Florida. Tampa Electric Company's objective in forming and committing to the Siting Task Force participation in the siting program was to ensure that local and statewide public issues and concerns relative to new power plant development were adequately and accurately considered in the process of selecting a site for the new power plants. The Siting Task Force provided inputs, guidance, and recommendations to Tampa Electric Company throughout the power plant site selection process. The Task Force members met monthly from September 1989 through September 1990 to review and guide the progress of the siting program. A listing of the Siting Task Force members and a brief description of their backgrounds at the time of the site assessment program are provided in Appendix 11.15.

8.1.2 OVERALL PROGRAM APPROACH

The overall goal of the Tampa Electric Company Power Plant Site Selection Assessment program was to select a site or sites which were considered the most suitable for developing the needed electric generating facilities to meet Tampa Electric Company's future power supply demands. The first step in the program involved the detailed review and concurrence by the Siting Task Force that Tampa Electric Company needed the new facilities to meet future Customer electricity demands. During this review, the Task Force considered Tampa Electric Company's programs to encourage energy conservation, demand management, and cogeneration to reduce future electricity demands. Input was obtained from a representative of the FPSC, which is responsible for regulating public utilities in Florida to ensure that Customers are provided with economical and reliable electric service, as well as responsible for approving the need for construction of new facilities.

In order to be located in proximity to its Customers, Tampa Electric Company preferred that the new generating facilities be located within a six-county area which included its service territory and adjacent areas--Hillsborough, Pinellas, Pasco, Manatee, Polk, and Hardee Counties. Tampa Electric Company's service areas and the six-county study region are presented in Figure 8.1.2-1. Ideally, Tampa Electric Company and the Siting Task Force concurred that the two power plant facilities (i.e., CC and baseload facilities) should be located at one contiguous area; however, the siting program also evaluated the option of locating the CC and baseload power plants on separate sites.

The suitability or acceptability of potential sites for power plant development involves a combination of environmental, social, engineering, and economic/cost factors. Usually, any potential site will have certain advantages and disadvantages in relation to these factors (i.e., no site is probably perfect considering all siting factors). Therefore, the power plant site selection process involved systematic analyses and comparisons to evaluate the advantages and disadvantages of various areas in an attempt to locate potential sites which have the most suitable or

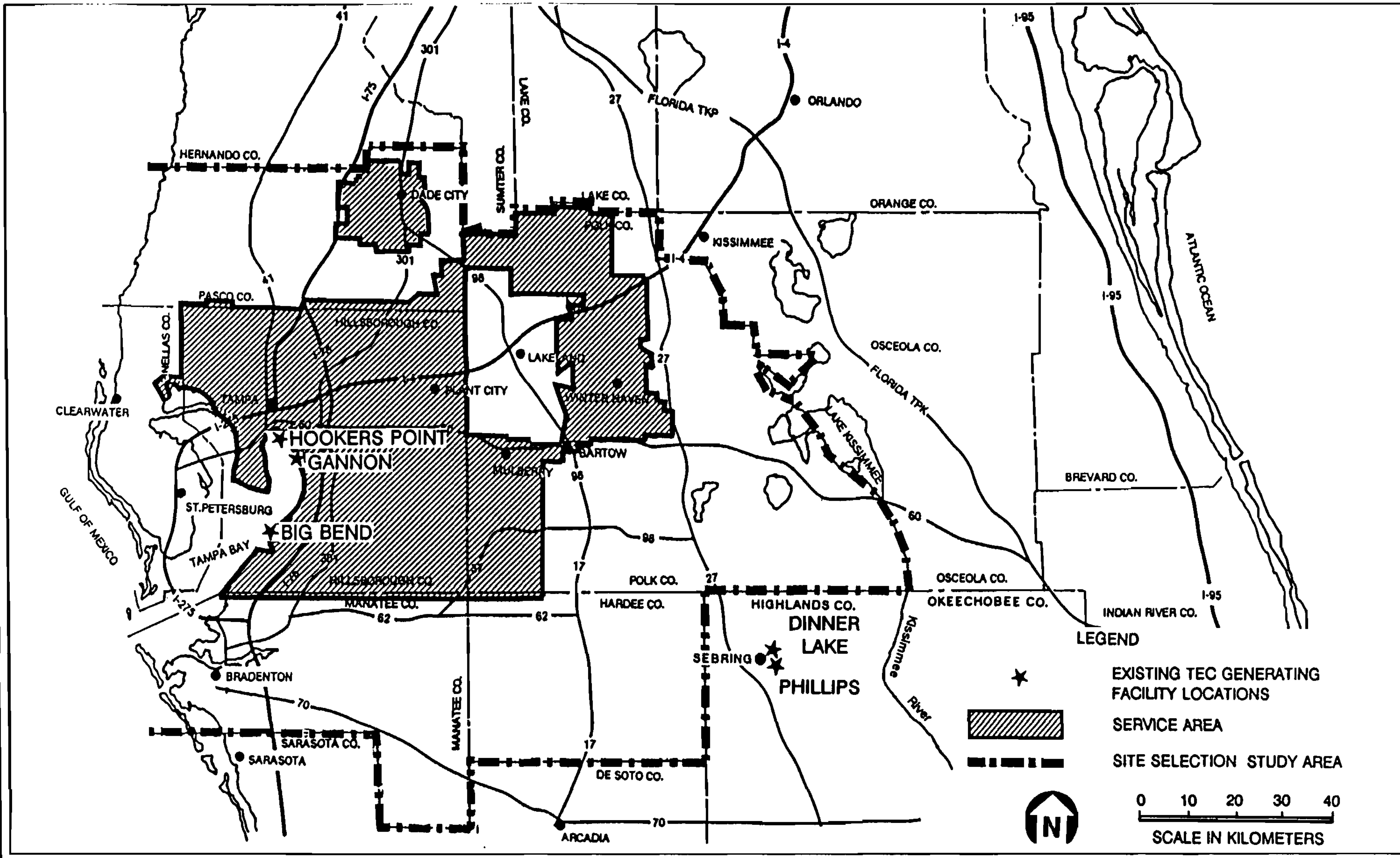

FIGURE 8.1.2-1.

TAMPA ELECTRIC COMPANY SERVICE AREA AND EXISTING GENERATING FACILITY LOCATIONS AND SITE SELECTION STUDY AREA

Sources: Tampa Electric Company, 1989. ECT, 1992.

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acceptable balance of trade-offs among the environmental, social, and engineering/ economic siting factors.

The overall approach for the Tampa Electric Company Site Selection Assessment was based on a comprehensive, structured methodology which effectively integrated the multidisciplinary environmental and engineering/economic siting factors in the evaluation of potential areas for siting the new power plants. In addition, since the ultimate goal of the program was to identify sites which can be licensed or approved for power plant construction and operation, the program approach was designed to address and comply with applicable federal, state, and local regulatory requirements for siting new power plant facilities. The most comprehensive of these requirements at the federal and state regulatory agency levels are NEPA and FEPPSA, which is administered by FDER.

The Tampa Electric Company Power Plant Site Selection Assessment was structured into three major, sequential phases:

- Phase I--Regional Screening,
- Phase II--Intermediate Screening, and
- Phase III--Detailed Analyses.

The primary objective of each phase was to identify those areas within the six-county study region which were considered relatively more suitable for power plant development. As the siting process progressed through each phase, the number of potential siting areas under consideration was reduced and the level of detail involved in the environmental and engineering/economic evaluations of the remaining areas increased. The Siting Task Force actively participated throughout the siting process. The Task Force reviewed and provided inputs on the criteria and methods used for the evaluations and on the results of each phase. Figure 8.1.2-2 shows the general work flow of the site selection program and the key points of review and inputs from the Siting Task Force. The following summarizes the results of each phase of the

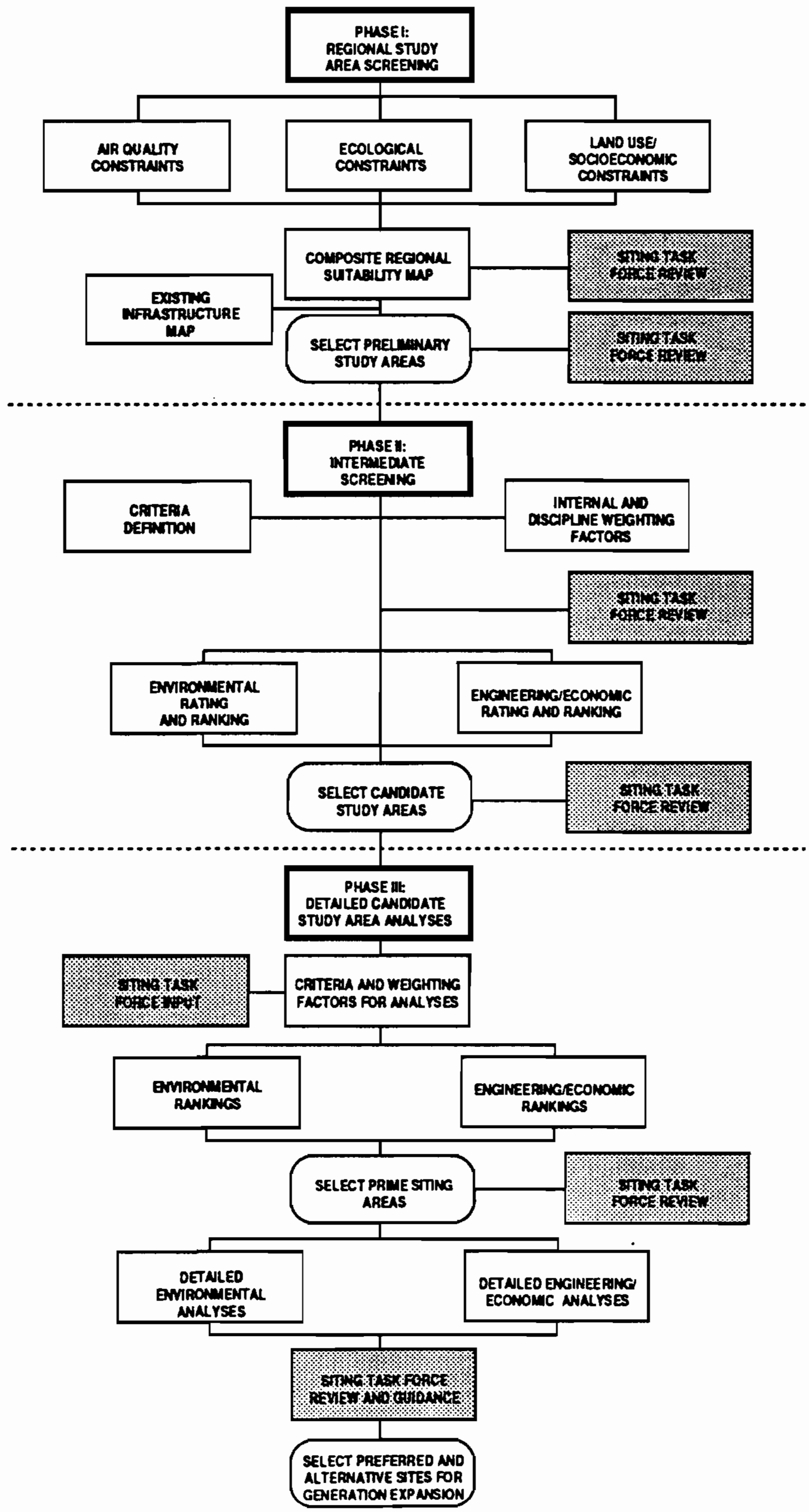

FIGURE 8.1.2-2.

GENERALIZED WORK FLOW DIAGRAM FROM TAMPA ELECTRIC COMPANY SITE SELECTION ASSESSMENT PROGRAM

Sources: Tampa Electric Company, 1989. ECT, 1992.

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siting program and the Siting Task Force recommendations on the preferred sites for Tampa Electric Company's future generation expansion.

8.1.3 PHASE I--REGIONAL SCREENING

Regional screening involved an evaluation of the six-county study region based on various environmental criteria or constraints to power plant development. Based on this evaluation, the entire study area was screened and mapped into two ratings of potential suitability for power plant development: *potentially favorable* and *potentially restricted*. The two suitability ratings were defined as follows:

1. Potentially Favorable--Areas that generally meet all requirements for siting the power plant facilities, i.e., areas where land use/socioeconomic, ecological systems, and air quality characteristics are expected to only minimally affect, or be affected by, power plant siting; and
2. Potentially Restricted--Areas where regulatory requirements or technological limitations would probably preclude the power plant siting: (a) without major modifications in standard plant design, (b) without significant mitigative actions, or (c) within a reasonable timeframe.

The specific environmental criteria or constraints used for the regional screening are listed in Table 8.1.3-1.

As shown in the table, the regional screening criteria were grouped into three environmental discipline categories: air quality, ecological systems, and land use/socioeconomics. In general, the regional screening criteria for the ecological systems and land use/socioeconomic disciplines were designed to avoid (i.e., rate as potentially restricted) areas which contained environmentally sensitive lands such as major wetlands; aquatic preserves; national and state forests, preserves, parks, and wildlife refuges; and other government-controlled lands as well as areas which were currently in or planned for intensive land uses such as cities, towns, communities, residential and commercial areas, and other urban and suburban land uses. The air quality discipline criteria were designed to avoid areas with restrictive regulations to maintain high air quality conditions and areas with existing air quality problems or in the immediate vicinity of major existing air emission sources.

Table 8.1.3-1. Favorability Specifications for Regional Screening Criteria

Potentially Favorable	Potentially Restricted
Air Quality	
All other areas	Areas (other than nonattainment areas) within 5 km of ambient monitors showing maximum SO_2 or NO_x levels higher than 50 percent of AAQS
	Areas designated as particulate matter nonattainment areas
	Areas within 2.5 to 5 km of existing or proposed sources with SO_2 emissions of at least 5,000 tpy
Ecological Systems	
All other areas	Major wetlands as delineated on USFWS National Wetland Inventory maps
Land Use/Socioeconomics	
All other areas	Aquatic preserves Areas of critical state concern Urban and suburban lands Non-industrial Developments of Regional Impact National and state forests Water conservation areas Indian reservations Military reserves National and state preserves National wildlife refuges Conservation and Recreation Lands Hillsborough County Environmental Lands Acquisition and Protection Program lands Save Our Rivers lands Save Our Coasts lands Outstanding Florida Waters National and state parks and recreation areas Watershed protection overlay district

Source: ECT, 1992.

The lands associated with the criteria for each discipline were mapped within the six-county study region and were rated as potentially restricted for power plant development. All areas outside of these lands were rated as potentially favorable for each environmental discipline. The three discipline-specific maps were then composited by overlay mapping techniques to develop a composite regional screening map of the study region. For the composite map, areas within the region were considered as potentially restricted if the area was rated as potentially restricted for any one criterion in the discipline maps. Figure 8.1.3-1 presents the composite map resulting from the Phase I--Regional Screening based on the environmental discipline criteria.

The next step in the Phase I--Regional Screening was the identification and mapping of existing and planned infrastructure systems which may be needed to support Tampa Electric Company's planned facilities. These systems included arterial highways, active and abandoned railroads, natural gas and oil pipelines, and electric transmission lines with a capacity of 230 kV or larger. The suitability of potential siting areas for the planned power plant development would be enhanced (i.e., less potential environmental impacts and lower costs) by locating adjacent to or near existing infrastructure systems since the need to construct new support facilities would be reduced.

Based on the composite screening map, all areas rated as potentially favorable or where no constraints had been identified were considered as potentially suitable for siting the planned power plant facilities. These areas were examined to delineate broad areas called preliminary study areas, which were further evaluated in Phase II of the siting program. In general, the preliminary study areas varied in size and configuration, depending on the size and shape of the potentially favorable areas and, to the extent possible, were located in the vicinity of the existing infrastructure systems. Also, to the extent possible, the configuration of the preliminary study areas attempted to avoid crossing significant natural or man-made physical barriers and to include lands with relatively homogeneous environmental conditions.

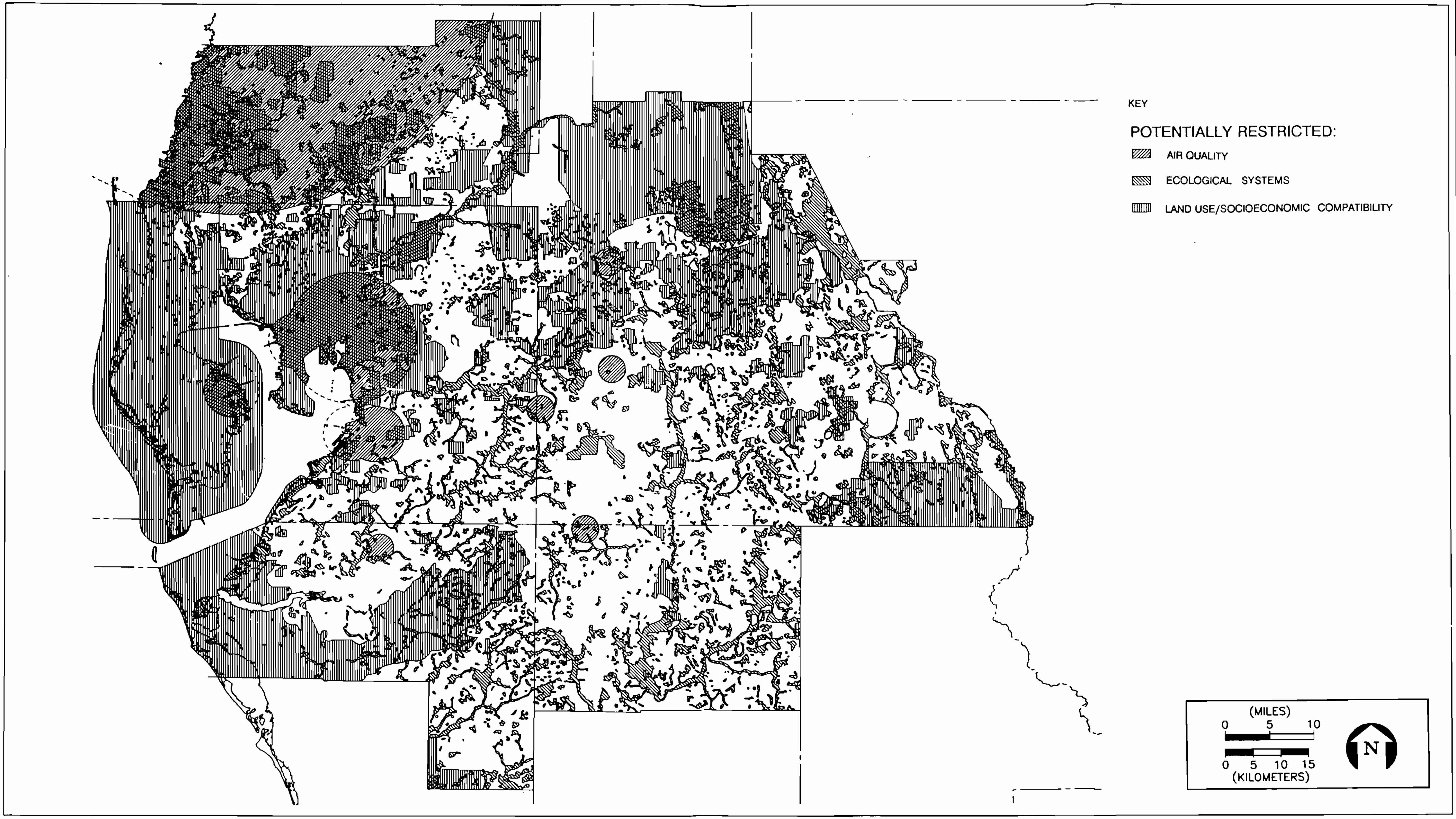

FIGURE 8.1.3-1.

REGIONAL SCREENING RESULTS: COMPOSITE MAP

Source: ECT et al., 1990.

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Figure 8.1.3-2 shows the general location of the preliminary study areas identified during the regional screening process. As shown on this figure, preliminary study areas were identified for each of the power plant development options: 34 areas for CC only, 23 areas for CC or baseload, and 21 areas for both CC and baseload plants on one site.

Many of the preliminary study areas were the same for each of the three development options; however, the number of areas decreased as the proposed level or intensity of power plant development and associated potential environmental impacts increased. Of the three options, the CC power plant development option was considered to have the lowest level of potential environmental impacts (e.g., least land area requirements, cooling water makeup needs, and air emissions) while the CC and baseload option was considered to have the highest level of potential impacts. For those areas identified as capable of developing either a CC or baseload plant but not both plants, the baseload power plant was considered to have a higher level of potential impacts than if a CC plant was developed on the same study area. Therefore, for the CC or baseload development option, the analyses in Phase II and Phase III of the site selection study were based on the development of a baseload power plant.

The Siting Task Force reviewed the designations of preliminary study areas and recommended that the designated areas be further evaluated in Phase II of the Site Selection Assessment as potential locations for Tampa Electric Company's planned power plants.

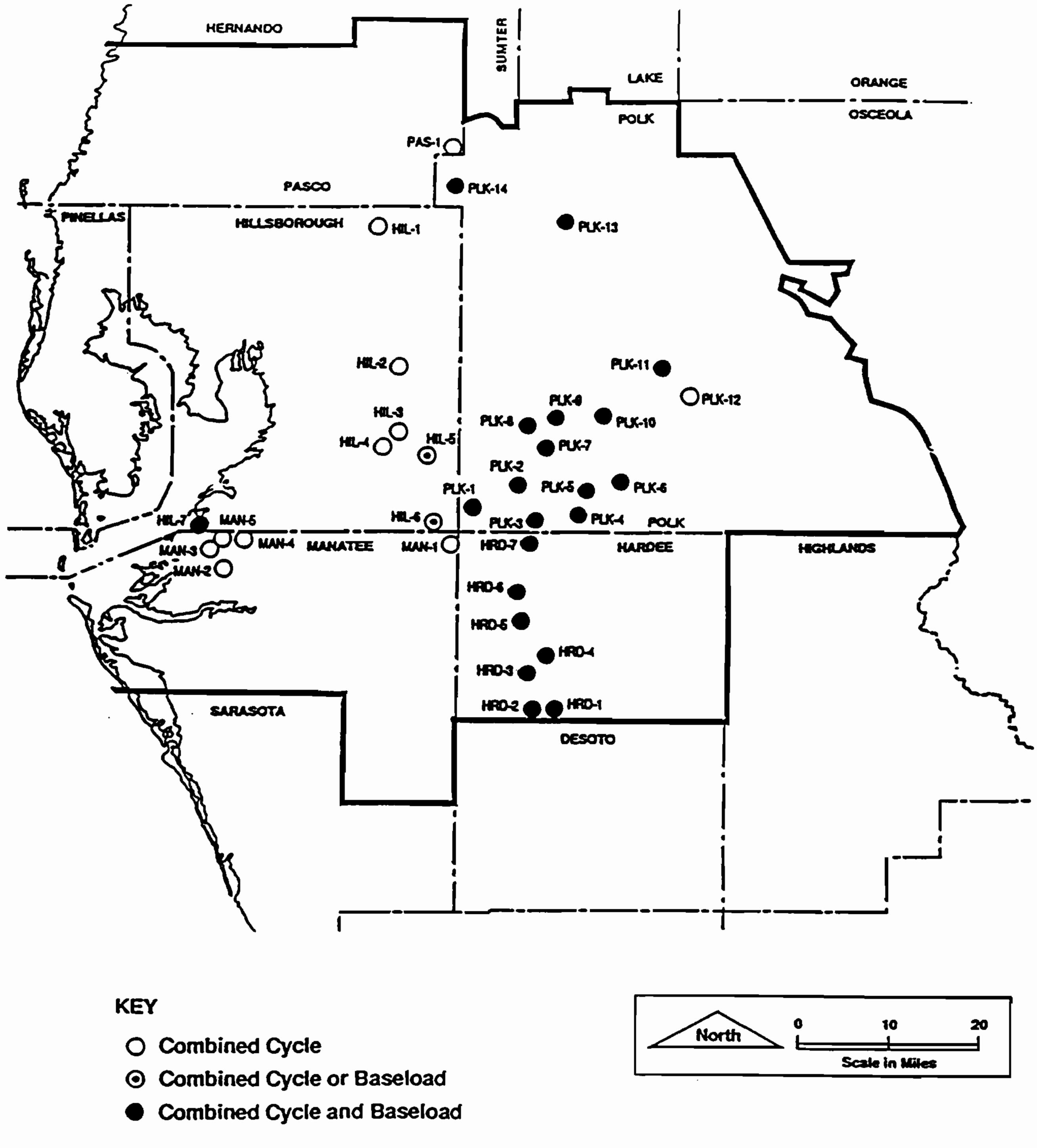

FIGURE 8.1.3-2.

GENERAL LOCATION OF PRELIMINARY STUDY AREAS

Source: ECT, 1992.

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8.1.4 PHASE II--INTERMEDIATE SCREENING

The overall objective of intermediate screening was to evaluate the preliminary study areas, based on environmental and engineering/economic criteria, and select a reasonable number of study areas for detailed, site-specific analyses in Phase III. This objective was accomplished using a three-step process. First, the preliminary study areas identified from Phase I activities were examined to identify the potential, conceptual development plan for each area. The conceptual plan identified the potential cooling water system (i.e., cooling towers, reservoirs, or once through); the potential source(s) of cooling water makeup and discharge; the potential fuel delivery system (i.e., pipelines, trucking, railroad, and/or barge); and potential electrical transmission system. The conceptual plans served as the basis for evaluating the relative environmental and engineering/economic suitability of the preliminary study areas for each of the three power plant development options.

Second, the preliminary study areas were evaluated based on specific environmental and engineering/economic criteria. The environmental criteria considered the specific differences in site and facility requirements for the power plant development options. The preliminary study areas were evaluated and rated using an established five-level rating scale for each criterion in the following major environmental categories:

1. Air quality,
2. Water resources/area suitability,
3. Ecological systems, and
4. Land use/socioeconomics.

8.1.4.1 Environmental Evaluations

Environmental Criteria

The following presents descriptions of the environmental criteria and rating specifications (i.e., scale of 1 to 5 with 5 denoting most suitable for power plant siting) used in this step of the intermediate evaluations.

Air Quality Evaluation

The intermediate air quality evaluation was designed as a further examination of potentially the most constraining permitting requirements. The following were identified as the most constraining requirements that would have to be satisfied during permit review:

1. Demonstrating that no AAQS would be threatened, and
2. Demonstrating that PSD Class II increments would not be exceeded.

Each of the preliminary study areas considered in the intermediate screening evaluation phase was studied with respect to these criteria. Areas judged to be constrained by one or both of the criteria were rated lower. The evaluation considered only the most restrictive pollutant, which was identified as SO_2. The following subsections present a more detailed definition of the criteria, the rating specifications that were applied, and the results.

<u>Ambient Air Quality Standards</u>--During the permitting process, dispersion modeling would have to be performed to demonstrate that emissions from the proposed facility, along with emissions from existing facilities, would not pose threats to the federal and state AAQS. The AAQS for SO_2 would be the most limiting standard.

A study area's proximity to existing major sources of SO_2 could make locating the proposed facility difficult. Therefore, this criterion was defined by the distance-weighted totals of SO_2 emissions from existing sources within a 50-km radius of each site. Existing sources were identified from the state-wide emissions inventory obtained from FDER. Large sources closer to an area were weighted higher since their emissions would cause higher modeled concentrations at the site. The 50-km limit was imposed because FDER normally would not require modeling to include sources located more than 50 km away.

Although the highest distance-weighted SO_2 emissions total might be considered to have the lowest rating, the rating specifications given below reflect other considerations. Based on inputs from the Siting Task Force, study areas rated the highest were those with intermediate-level emissions totals. These areas would be already impacted, but not to a point that would be considered prohibitive. The study areas rated lowest were those impacted to the smallest degree, reflecting the Siting Task Force's guidance to site the proposed facilities in areas already impacted.

The preliminary study areas were rated on a scale of 1 to 5 (5 denoting the most suitable for plant siting) based on the following definitions, consistent with the reasoning given earlier. Ratings were assigned based on SO_2 emission totals, all expressed in distance-weighted tons per year (tpy).

Rating	Specification
5	Between 50,000 and 125,000 tpy of SO_2
4	Between 125,000 and 250,000 tpy of SO_2
3	Greater than 250,000 tpy of SO_2
2	Between 25,000 and 50,000 tpy of SO_2
1	Less than 25,000 tpy of SO_2

PSD Class II Increments--As stated previously, dispersion modeling would have to demonstrate compliance with the PSD regulations pertaining to allowable Class II increments.

Proximity to existing PSD sources of SO_2 could constrain a proposed new plant by consuming the available PSD increment. Therefore, this criterion was defined by the distance-weighted total of SO_2 emissions from existing large PSD sources within 50 km of a siting area. As for AAQS, the areas rated highest were those with intermediate-level emissions totals.

The preliminary study areas were rated on a scale of 1 to 5 (5 denoting the most suitable for plant siting) based on the following definitions. Ratings were assigned based on increment-consuming SO_2 emission totals (all distance-weighted tpy).

Rating	Specification
5	Between 20,000 and 50,000 tpy of SO_2
4	Between 50,000 and 100,000 tpy of SO_2
3	Greater than 100,000 tpy of SO_2
2	Between 10,000 and 20,000 tpy of SO_2
1	Less than 10,000 tpy of SO_2

Ecological Systems Evaluation

The impacts on ecological systems from development of the proposed facility were assessed. This evaluation included:

1. The potential impacts associated with the construction phase (i.e. impacts from loss of habitat); and
2. The potential impacts within or outside preliminary study area boundaries (e.g., impacts on species or communities) resulting from emissions or discharges associated with facility operation.

On the basis of the sensitivities of the ecological systems at the preliminary study areas, the areas were rated on a scale of 1 to 5, with 5 denoting the most suitable area for the facility. This evaluation considered the diversity of area systems, habitat function, and protected species.

Diversity of Area Systems--The evaluation of impacts within a particular preliminary study area resulting from plant construction and operation required the consideration of the diversity of the area systems. As the number of different vegetative communities of a particular area increases, so does the potential for a greater number of species, the presence of rare, threatened, and endangered species, and the complexity of interrelationships among area systems.

The preliminary study areas were rated on a scale of 1 to 5 (5 denoting the most suitable for plant siting) based on the following definitions:

Rating	Specification
5	The area contains essentially a single habitat or land form. These areas were generally either mined for phosphate or contained monocultures, such as citrus grove. Siting of the facility would result in negligible reduction of area system diversity.
4	The area contained a large percentage of a single system, but also contains small percentages of one or two additional systems. These areas were generally agricultural land containing some isolated wetlands and or stream headwater wetlands. Siting of the facility would result in minor impacts to area system diversity, and could be avoided and/or mitigated with facility site planning.
3	The area contained a moderate diversity of systems including several wetland and upland communities, and was generally contained within a single drainage basin. A relatively large percentage of the area contained palmetto prairie and improved pasture. Although siting of the facility may have moderate impact on area system diversity, it could be avoided and/or mitigated by facility site planning.
2	The area contained a moderate diversity of systems, including several different wetland and upland communities, and was contained in more than one drainage basin. A relatively large percentage of the area could contain palmetto prairie, but contained little improved pasture. Although siting of the facility may result in moderately severe impacts on area system diversity, it could be avoided and/or mitigated by facility site planning.
1	The area contained a high diversity of systems, including several different wetland and upland communities, and was contained in several different drainage basins. No single community type occupied a significantly large percentage of the area and onsite systems were highly interconnected. Siting of the facility would have severe impacts on site system diversity and could not be avoided or mitigated.

Habitat Function--The evaluation of impacts to a particular area resulting from site development and plant operation requires consideration of the site habitat function. Habitat function included: (1) maintenance of surface water quality and quantity; (2) groundwater recharge; (3) maintenance of population gene pools; (4) breeding, spawning, nursery, and forage areas; and (5) maintenance of rare, threatened, and endangered species populations.

On the basis of habitat function, the preliminary study areas were rated on a scale from 1 to 5 (5 denoting the most favorable for plant siting) based on the following definitions:

Rating	Specification
5	The natural habitat function was completely or nearly completely lost, primarily due to land alterations. Siting of the facility would have negligible impact on site habitat function.
4	The natural habitat function had been severely altered. A small percentage of habitat remained which provided natural function. Siting of the facility would have minor impact on natural habitat function, and could be avoided and/or mitigated by facility site planning.
3	The natural habitat function had been moderately altered. A relatively large percentage of habitat remained functional. Siting of the facility could have a moderate impact on habitat function, but could be avoided and/or mitigated by facility site planning.
2	The natural habitat function remained largely intact, and only minor alterations in habitat function had occurred. Siting of the facility could have moderately severe impacts to natural habitat function, but could be avoided and/or mitigated by facility site planning.
1	The natural habitat function remained intact; no alterations to habitat function had occurred. Siting of the facility could have severe impacts to habitat function which cannot be avoided or mitigated.

Protected Species--The evaluation of impacts to a particular area resulting from site development and plant operation must consider rare, threatened, and endangered species. The preservation of these species is required under Florida and federal law. The presence of endangered species could stop development of a particular site. The characteristics that define the sensitivity of rare, threatened, and endangered species to siting the facility include the potential presence or known presence of these species on or adjacent to the site, the degree to which they use onsite systems, and the uniqueness of those systems that provide required habitat.

On the basis of these species, preliminary study areas were rated on a scale of 1 to 5 (5 denoting the most suitable for plant siting) based on the following definitions:

Rating	Specification
5	Rare, threatened, or endangered species were potentially present within the area, but anticipated impacts of site development and operation would be negligible.
4	Rare, threatened, or endangered species potentially utilize the area, but anticipated impacts of site development and operation would be minor. Impacts could be avoided and/or mitigated by facility site planning.
3	The area was potentially suitable for rare, threatened, or endangered species. Anticipated impacts of site development would be moderate, but could be avoided and/or mitigated by facility site planning.
2	The area was potentially suitable for these species and contains habitats that were not endangered but were required for certain endangered and threatened species. These species are known to or likely to occur in or utilize the siting area. Anticipated impacts of the site development would be moderately severe, but could be avoided and/or mitigated by facility site planning.
1	The area was potentially suitable for these species and contains habitats that were both endangered and required for certain endangered or threatened species. These species are known to or likely to occur in or utilize the siting area. Anticipated impacts of site development and operation would be severe, and could not be avoided or mitigated.

Water Resources/Area Suitability Evaluation

Water makeup and discharge considerations and area suitability were evaluated for the three different power plant development options: CC, CC or baseload, and CC and baseload. Because each option involves different makeup water and wastewater discharge volumes, separate evaluations were considered necessary during intermediate screening. The individual criterion definitions and rating specifications are presented in the following.

<u>Cooling Water Makeup Advantages</u>--During intermediate screening, the preliminary study areas were examined to determine whether any areas had distinct advantages over other areas with respect to water availability. All areas appeared to have sufficient water available to meet the cooling water makeup requirements for the three development options.

The water makeup criterion actually consisted of five identifiable advantages. For the evaluation, these advantages were posed as yes-or-no questions, with any positive answer resulting in a point being awarded to a preliminary study area. The higher the score, with 5 being the highest score, the more advantages a particular study area had over other areas. The following questions, or advantages, comprised the water makeup criterion:

1. Is the 5-ft drawdown radius wholly within the delineated boundary of the study area?
2. If groundwater is the only viable source of water, is this area *not* designated a Water Use Caution Area by SWFWMD?
3. Is there an alternative surface water source of sufficient size available within 1 mile?
4. Is the proposed makeup water currently considered non-potable (i.e., average total dissolved solids concentration >500 mg/L)?
5. Based on the May 1987 and 1989 Florida aquifer potentiometric maps, is the site in a non-major stress area?

Cooling Water Discharge Advantages--Discharge considerations are as important as makeup water considerations. The water discharge criterion actually consisted of four identifiable advantages; a dummy variable with a score of 1 was added to ensure that the highest possible score for this criterion matched the high score for the water makeup criterion. Again, the advantages were posed as yes-or-no questions, with any positive answer resulting in a point being awarded to a preliminary study area. The higher the score, with 5 being the highest score, the more advantages a particular study area had over other areas. The following questions, or advantages, comprised the water discharge criterion:

1. *Dummy* variable with a score of 1 awarded to each study area.
2. Is the potential surface receiving water designated as Class III, IV, or V?
3. Does current or past phosphate activity provide a receptor for discharge either as phosphate plant process water or ponds?
4. Is the study area located in a drainage basin that is isolated from Outstanding Florida Waters and Aquatic Preserves?
5. Is the potential receiving water considered nonpotable?

Area Suitability Advantages--Finally, each study area was evaluated with respect to area suitability. The purpose of this evaluation was to determine if any study area had distinct advantages over other areas because the area was less subject to flooding or sinkhole formation, or the potential for contaminating the Floridan aquifer was less.

The area suitability criterion actually consisted of three identifiable advantages; two dummy variables, each with a score of 1, were added to ensure that the highest possible score for this criterion matched the high score for the other two criteria. The advantages were posed as yes-or-no questions, with any positive answer resulting in a point being awarded to a preliminary study area. The higher the score, with 5 being the highest score, the more advantages a particular study area had over other areas. The following questions, or advantages, comprised the area suitability criterion:

1. Are there sufficient contiguous acres located above the 100-year flood zone (acreage including cooling reservoir)?
2. Dummy variable with a score of 1 awarded to each study area.
3. Is this area designated A or B with respect to sinkhole formation?
4. Dummy variable with 1 awarded to each study area.
5. Is this an area of either very low recharge or discharge with respect to the Floridan aquifer?

Land Use/Socioeconomic Evaluation

Each preliminary study area was evaluated with respect to five land use/socioeconomic rating criteria. These criteria, which included existing and planned land use patterns, historical/archaeological resources, community impact, and agricultural impact, provided an overall preliminary evaluation of how potential power plant development would impact human/cultural resources within and in proximity to the preliminary study areas.

Existing Land Use Patterns--The existing land uses of each preliminary study area and its immediate surroundings were examined. Each study area was rated according to the degree of compatibility between power plant development and various adjacent land uses. The term land use encompasses a myriad of interests, with no clearly defined boundaries that distinguish it from other social, economic, or environmental variables. This land use compatibility analysis focused on land use patterns including the type and intensity of human activities existing on a particular parcel of land.

Specific land uses treated in this criterion were residences, commercial and industrial businesses, recreational facilities, and public and quasi-public facilities. Specifically excluded land uses were historical/ archaeological and agricultural resources which were treated as separate criteria in this analysis.

The preliminary study areas were rated on a scale of 1 to 5 (5 denoting the most suitable for plant siting) based on the following definitions:

Rating	Specification
5	Usage of the preliminary study area for a power plant would be compatible with the existing land use patterns in the vicinity of the area.
4	Usage of the preliminary study area for a power plant would generally be compatible with the existing land use patterns in the vicinity of the area, with only minor mitigative design measures required.
3	Usage of the preliminary study area for a power plant would conflict with some part of the existing land use patterns in the vicinity of the area; however, the conflict could be mitigated by design changes.
2	Usage of the preliminary study area for a power plant would be incompatible with existing land use patterns in the vicinity of the area, and mitigative design measures would generally not be feasible.
1	Usage of the preliminary study area for a power plant would be incompatible with existing land use patterns in the vicinity of the area that are not likely to change within an acceptable timeframe, and mitigative design measures would not be feasible.

Planned Land Use Patterns--Planned land use patterns and regulatory constraints were assessed by examining future land use maps, comprehensive plans, and selected development regulations.

The Local Government Comprehensive Planning and Land Development Regulation Act of 1985, Section 163.3167, F.S., requires each incorporated municipality and county to adopt and amend comprehensive plans, or elements or portions of the plans, to guide their future growth and development. Each comprehensive plan should be adopted by the local governmental entity and submitted to FDCA for review and approval. These plans must then be updated periodically, usually every 5 years thereafter. In addition, the Growth Management Act requires that all county and municipality plans be consistent with the State Comprehensive Plan and their respective regional policy plan.

The preliminary study areas were rated on a scale of 1 to 5 (5 denoting the most suitable for plant siting) based on the following definitions:

Rating	Specification
5	Usage of the preliminary study area for a power plant would be compatible with planned land use patterns of the area and land use policies of the local, regional, and state comprehensive plans.
4	Usage of the preliminary study area for a power plant would generally be compatible with the planned land use patterns of the area and land use policies of the local, regional, and state comprehensive plans.
3	Usage of the preliminary study area for a power plant would conflict with some part of the planned land use patterns or certain land use policies of the local, regional, and state comprehensive plans.
2	Usage of the preliminary study area for a power plant would be incompatible with planned land use patterns or land use policies of the local, regional, and state comprehensive plans.
1	Usage of the preliminary study area for a power plant would be incompatible with future land use patterns and land use policies of the local, regional, and state comprehensive plans.

Archaeological/Historical Resources--This analysis involved determining the probability of finding significant prehistoric and historic resources. The locations of archaeological or historical resources are a function of previous natural resource patterns. Literature surveys and record checks are important data sources on these resources. The discovery of an archaeological/historical resource on a tract of land is not in itself undesirable. The information obtained from a resource through survey and excavation is often of more value than the artifacts themselves. Therefore, if artifacts are found, the suitability of the site for the proposed project is not necessarily affected, depending on the significance of the find and on the project's impact on the find.

In determining the impact of power plant construction and operation on archaeological/historical resources, a review of the preliminary study area was made to: (1) identify areas which have been previously disturbed to the extent that any potential archaeological/historical resource was likely destroyed, and (2) determine the probability of archaeological/historical resources onsite due to the presence or absence of natural features which typically indicate the presence of cultural resources.

It is recognized that unforeseen discoveries of significant archaeological or historical resources may occur in any area during a later intensive survey; however, the most reliable data currently available were used for this analysis.

The preliminary study areas were rated on a scale of 1 to 5 (5 denoting the most suitable for plant siting) based on the following definitions:

Rating	Specification
5	Significant historical or archaeological resources are not likely within the preliminary study area due to previous disturbance to the area and the absence of natural features which typically indicate the enhanced probability of cultural resources.
4	Significant historical or archaeological resources are not likely within the preliminary study area due to previous disturbance to the area or the absence of natural features which typically indicate the enhanced probability of cultural resources.
3	Significant historical or archaeological resources may be likely to occur within the preliminary study area due to natural features which typically indicate the enhanced probability of cultural resources.
2	Significant historical or archaeological resources are likely to occur within the preliminary study area due to natural features which typically indicate the enhanced probability of cultural resources.

1 Significant historical or archaeological resources are very likely to occur within the preliminary study area due to natural features which typically indicate the enhanced probability of cultural resources.

Community Impact--Many elements of a community are direct functions of the proximity of population concentrations. Thus, in determining the level of community impact that might be associated with each preliminary study area, two elements were considered:

1. The population levels of urban areas within a 50-mile radius of the preliminary study area; and
2. The presence of existing communities in the proximity (within 2 miles) of the preliminary study area.

It was first assumed that the presence of larger established cities within reasonable daily commuting distance would minimize the community impact of power plant construction and operation. The work force associated with the project would then account for only a small share of each local community's population and, therefore, would conceptually have less impact. Moreover, a large share of the workforce could be drawn from current residents of the communities without adversely impacting the local labor market or necessitating immigration of workers. In a situation in which the communities within reasonable commuting distance are quite small, the incoming-worker households would lead to a larger relative increase in community residents. This increase would be reflected in a comparable increase in the demand for local goods and services, a demand that may not be met adequately by the local communities.

In contrast, general land use compatibility principles suggest the location of large electric power plants in areas where present and projected population densities are low. The location of a power plant in proximity to existing small communities, defined as a 2-mile radius from the preliminary study area, would potentially result in impacts on these communities. Not only would workers desire to reside there, but congestion, commercial activity, and the demand for public services would accelerate.

Therefore, the optimal situation would be a complete absence of communities within the immediate radius of the preliminary study area. The closer to a study area the existing communities occur, the more the study area's desirability diminishes.

The preliminary study areas were rated on a scale of 1 to 5 (5 denoting the most suitable for plant siting) based on the following definitions:

Rating		Specification
5	(a)	Area was within a 1-hour commute to cities whose cumulative population was greater than 250,000, and
	(b)	There were no communities within 2 miles of the area.
4	(a)	Area was within a 1-hour commute to cities whose cumulative population was greater than 250,000, and
	(b)	There were one or two communities within 2 miles of the area.
3	(a)	Area was within a 1-hour commute to cities whose cumulative population was greater than 250,000, and
	(b)	There were three or more communities within 2 miles of the area.
2	(a)	Area was within a 1-hour commute to cities whose cumulative population was less than 250,000, and
	(b)	There were one or two communities within 2 miles or the area.
1	(a)	Area was within a 1-hour commute to cities with a total population less than 250,000, and
	(b)	Area was within or contiguous to existing communities.

Agricultural Impact--Agriculture is considered Florida's second largest revenue generator, accounting for $4.6 billion throughout the state in 1987. In addition, federal, state, regional, and local policies have been established for the conservation of agricultural land. Power plant development, like any land-intensive industrial or urban activity, competes with the agricultural interests in the state. Impacts are considered more significant to the citrus industry and row crops (higher capital yields per acre) than field crops or improved pasture (lower capital yields per acre). Since prime and unique farmland soils are based upon the presence of certain high-capital yield crops, or the potential of a soil to support such crops, the agricultural impact criterion rating specifications were based upon the extent of these soils, if any, within the preliminary study areas.

The preliminary study areas were rated on a scale of 1 to 5 (5 denoting the most suitable for plant siting) based on the following definitions:

Rating	Specification
5	Prime and unique farmland soils are not present in the preliminary study area.
4	Prime and unique farmland soils account for less than 10 percent of the preliminary study area.
3	Prime and unique farmland soils account for 10 to 33 percent of the preliminary study area.
2	Prime and unique farmland soils account for 34 to 66 percent of the preliminary study area.
1	Prime and unique farmland soils account for 67 to 100 percent of the preliminary study area.

Weighting Factors

Within the environmental evaluation process, two types of weighting factors were developed and used to reflect the relative importance of the criteria and environmental disciplines in determining the overall siting suitability of the preliminary study areas. The first were called internal weighting factors which indicated the relative importance of the criteria or associated environmental impacts within each of the four major disciplines. The second were called discipline weighting factors which reflected the relative importance of the four major environmental disciplines to each other in evaluating the siting suitability of the preliminary study areas. The internal weighting factors for the various criteria are shown in Table 8.1.4-1. These factors ranged from 5 to 1, with 5 indicating the highest level of importance of a criterion

Table 8.1.4-1. Phase II--Intermediate Screening Criteria and Internal Weighting Factors

Discipline	Criteria	Internal Weighting Factor
Air quality	AAQS	4
	PSD Class II increments	3 or 4*
Ecological resources	Diversity of area systems	4
	Value of habitat function	4
	Impact on protected species	5
Water resources/ area suitability	Advantages for cooling water makeup	5
	Advantages for cooling water discharge	5
	Area suitability advantages	3
Land use/socio-economics	Compatibility with existing land use patterns	5
	Compatibility with planned land use patterns	5
	Impact on archaeological/historical resources	3
	Community impact	4
	Agricultural impact	1

* An internal weighting factor of 3 was used for the CC and CC or baseload development options and a factor of 4 was used for the CC and baseload option.

Source: ECT *et al.*, 1990.

within the environmental discipline. The internal weighting factors were initially developed by the multidisciplinary technical project team. The factors were then reviewed by the Siting Task Force and revised, as necessary, prior to use in developing the environmental ratings of the preliminary study areas.

The discipline weighting factors were developed by the Siting Task Force using a pairwise comparison technique. In developing these factors, each Task Force member completed a pairwise comparison matrix within which the member rated the relative importance of the disciplines to power plant siting. The four disciplines were compared two at a time and assigned a score of 1.0 if the discipline was considered more important than the other, a score of 0.0 if the discipline was less important, and a score of 0.5 if the Task Force member felt that the disciplines were of equal importance in evaluating the suitability of potential power plant sites. The average scores of the Task Force member evaluations were used as the discipline weighting factors. Based on these results, water resources/area suitability and ecological systems, both with average scores of 2.92, were considered to be relatively more important than the other two disciplines; the average air quality score was 2.15; and land use/socioeconomics had the lowest score with an average of 2.00.

Results of Environmental Evaluations

Using these weighting factors, the discipline ratings were composited into an overall environmental ranking of the preliminary study areas. Table 8.1.4-2 presents the overall results of the environmental ratings and rankings of the preliminary study areas for the full development option (i.e., CC and baseload units). In this table, a higher weighted score indicates that the study area is considered more suitable environmentally for power plant development. Based on these rankings, preliminary study areas PLK-7, PLK-2, PLK-3, and PLK-1 were considered as the most suitable areas.

At the recommendation of the Siting Task Force, several sensitivity analyses were conducted on the environmental rankings to determine the effect of the weighting

Table 8.1.4-2. Summary of Phase II Environmental Ratings and Rankings for the CC and Baseload Development Option

	Air (2.15)			Ecology (2.92)				Water Resources (2.92)				Land Use/Socioeconomics (2.00)							
Study Area	Existing SO_2 Emiss. (4) +	Existing PSD SO_2 Sources (4) =	Wght Avg. (8)	System Diversity (4) +	Habitat Functn (4) +	Protctd Species (5) =	Wght Avg. (13)	Water Makeup Consid. (5) +	Discharge Consid. (5) +	Area Suitability (3) =	Wght Avg. (13)	Exist. Land Use (5) +	Planned Land Use (5) +	Cult. Res. (3) +	Commnty Impact (4) +	Agric. Impact (1) =	Wght Avg. (18)	Total Weight Score	Rank
PLK-7	5	5	10.75	5	5	5	14.60	3	4	3	9.88	5	5	5	5	5	10.00	45.23	1
PLK-2	4	5	9.68	4	4	4	11.68	3	4	4	10.56	5	5	5	5	5	10.00	41.91	2
PLK-3	4	5	9.68	4	4	4	11.68	3	4	4	10.56	5	5	4	5	4	9.56	41.47	3
PLK-1	4	5	9.68	4	4	4	11.68	3	4	3	9.88	5	5	6	5	6	9.56	40.79	4
PLK-8	4	5	9.68	4	4	4	11.68	3	4	3	9.88	5	4	5	4	5	9.00	40.24	5
PLK-9	2	5	7.53	4	5	4	12.58	3	4	4	10.56	5	5	5	4	5	9.56	40.22	6
PLK-10	2	5	7.53	4	5	4	12.58	3	4	4	10.56	5	5	5	4	4	9.44	40.10	7
PLK-5	2	5	7.53	4	4	4	11.68	3	4	4	10.56	5	5	4	4	5	9.22	38.98	8
PLK-4	2	5	7.53	4	4	4	11.68	3	4	4	10.56	4	4	4	4	3	7.89	37.65	9
PLK-6	2	2	4.30	4	4	4	11.68	3	4	4	10.56	4	4	4	4	3	7.89	34.43	10
HIL-7	4	2	6.45	3	3	2	7.64	4	3	5	11.23	5	4	4	4	3	8.44	33.76	11
HRD-7	2	2	4.30	4	4	4	11.68	3	3	4	9.43	4	5	4	3	3	8.00	33.41	12
PLK-14	5	3	7.53	3	2	3	7.86	3	3	3	8.76	5	5	4	4	5	9.22	33.37	13
PLK-13	2	2	4.30	4	4	3	10.56	3	4	3	9.88	4	4	5	3	5	8.00	32.74	14
PLK-11	2	2	4.30	4	4	4	11.68	2	3	2	6.96	5	5	4	4	5	9.22	32.17	15
HRD-5	2	2	4.30	3	3	3	8.76	3	3	4	9.43	5	5	4	4	5	9.22	31.72	16
HRD-4	2	1	3.23	3	3	3	8.76	3	3	5	10.11	5	5	4	4	3	9.00	31.09	17
HRD-3	2	1	3.23	3	3	3	8.76	3	3	4	9.43	5	5	5	4	4	9.44	30.86	18
HRD-6	2	2	4.30	2	3	2	6.74	3	3	4	9.43	5	5	4	5	5	9.67	30.14	19
HRD-1	1	1	2.15	3	3	3	8.76	2	3	5	8.98	4	4	4	4	3	7.89	27.78	20.5
HRD-2	1	1	2.15	4	3	3	9.66	1	3	5	7.86	4	4	4	4	5	8.11	27.78	20.5

Source: ECT *et al.*, 1990.

factors on the overall rankings of the areas. The results of these analyses indicated that the discipline and internal criteria weighting factors did not have significant effects on the overall environmental rankings of the preliminary study areas.

8.1.4.2 Engineering/Economic Evaluations

In conjunction with the environmental evaluations of the preliminary study areas, an engineering/economic evaluation of each area was conducted. The engineering/economic evaluation focused on the relative present worth cost differentials in developing the areas for the planned power plant facilities. The major siting area requirements which affect the relative costs of developing the areas are:

- Site access (i.e., road and railroad),
- Electrical transmission system,
- Cooling water system, and
- Fuel delivery.

The present worth costs for developing each of the preliminary study areas were estimated relative to these potential major improvements. The costing information was considered rather conceptual at this stage, but was of sufficient detail to allow for relative cost comparisons among the areas. The preliminary study areas were then ranked based on these development cost estimates using the study area with the lowest cost as the base case for ranking purposes.

Table 8.1.4-3 shows the results of the engineering/economic evaluations of the preliminary study areas for the full development option. The initial estimated costs for all preliminary study areas for freshwater cooling towers using groundwater as the water source were less than cooling reservoirs; therefore, the costs for freshwater towers as the cooling system were used in developing the total cost estimates for the areas, except for HIL-7. As indicated in the tables for HIL-7, the total costs were calculated based on the use of either saltwater cooling towers or once through saltwater cooling since this study area was near enough to Tampa Bay to use saltwater versus freshwater from wells as a source of water for cooling purposes.

Table 8.1.4-3. Present Worth Cost Estimates for Preliminary Study Areas for the CC and Baseload Development Option (in millions of 1990 dollars)

Preliminary Study Area	Road Access	Rail Access	Transmission Lines/ Substations	Cooling Towers	Natural Gas Pipeline	Fuel Oil Pipeline	Coal Handling Facilities	Coal Delivery*	Total
HIL-7[1]	0.285	0.401	6.517	85.250	16.705	0.456	71.416	0.000	181.030
HIL-7[2]	0.285	0.401	6.517	125.929	16.705	0.456	71.416	0.000	221.709
PLK-11	0.285	0.401	4.139	65.258	8.270	4.708	108.616	44.500	236.177
PLK-13	0.570	2.003	11.226	67.045	0.662	1.975	108.616	44.500	236.597
PLK-8	0.285	0.401	0.690	66.366	9.923	6.227	108.616	44.500	237.008
PLK-9	0.285	0.401	0.690	67.697	9.262	5.620	108.616	44.500	237.071
PLK-14	1.142	0.801	11.092	65.660	2.812	4.101	108.616	44.500	238.724
PLK-7	0.285	0.401	2.760	65.923	11.743	7.139	108.616	44.500	241.367
PLK-2	0.285	0.401	1.380	68.584	13.231	6.987	108.616	44.500	243.984
PLK-3	1.993	1.202	2.760	65.923	14.389	10.328	108.616	44.500	249.711
PLK-10	0.854	7.362	9.659	65.479	8.766	5.164	108.616	44.500	250.400
PLK-1	0.285	0.801	9.315	66.366	13.231	8.354	108.616	44.500	251.468
PLK-4	0.854	0.401	8.969	66.810	13.066	9.113	108.616	44.500	252.329
PLK-5	0.570	0.401	13.798	66.810	11.743	7.898	108.616	44.500	254.336
HRD-7	1.424	2.003	9.030	66.366	15.878	11.695	108.616	44.500	259.512
HRD-5	0.285	0.401	3.953	69.206	18.524	14.125	108.616	44.500	259.610
HRD-6	2.563	0.801	3.953	69.471	17.531	13.214	108.616	44.500	260.649
HRD-4	0.854	1.202	5.185	66.366	19.516	15.037	108.616	44.500	261.276
HRD-3	0.570	0.801	5.493	69.206	20.178	15.644	108.616	44.500	265.008
PLK-6	0.285	8.313	18.628	65.923	12.570	8.658	108.616	44.500	267.493
HRD-1	0.854	0.801	9.190	66.810	22.163	17.467	108.616	44.500	270.401
HRD-2	0.854	0.801	8.573	69.915	22.163	17.467	108.616	44.500	272.889

Note: Assumes the use of freshwater cooling towers, except:
[1]Saltwater cooling towers, and
[2]Once-through cooling.

*Represents differential cost for rail delivery of coal from a terminal on Tampa Bay relative to the HIL-7 study area.

Source: ECT, 1990.

Also, the total estimated costs include the costs for both the natural gas and fuel oil pipelines since both of these fuels are desired for a CC plant to maintain flexibility in fuels.

As shown in Table 8.1.4-3, the HIL-7 preliminary study area had the lowest estimated costs for the power plant development primarily due to the lower coal handling and delivery costs associated with this study area. The estimated costs for HIL-7 were approximately $55.1 million to $14.5 million less than the next most cost-effective study area depending on the cooling system used.

8.1.4.3 Composite Results of Intermediate Screening

In the final step of Phase II, the environmental and engineering/economic rankings of the preliminary study areas were combined to provide decision-making tools to identify the areas which were relatively the more suitable for power plant development. The rankings were combined and displayed using both numerical indexing and graphical, frontier mapping techniques. A final weighting factor was used in the Phase II evaluations in developing the composite environmental and engineering/economic indexed rankings.

The frontier mapping method involved plotting the environmental rating scores for the preliminary study areas versus the relative cost savings for each area. The relative cost savings were computed by subtracting the estimated present worth costs for areas from the present worth cost for the area with the highest costs. Thus, the figures plotted on the frontier map represent the estimated cost savings relative to the study area with the highest costs. Based on the frontier maps, the more suitable study areas with a combination of the highest environmental scores and greatest relative cost savings would be plotted in the upper-right portion of the map, while less suitable study areas would be plotted in the lower-left portion of the map.

For the indexing method, the environmental rating scores and estimated present worth costs for the preliminary study areas were converted to figures indexed on a possible 0 to 100 scale and then added together to develop a composite environmental and economic score. The conversion of the environmental scores was accomplished by setting the highest environmental score for the study areas at 100 and then calculating the indexed scores for the remaining study areas using a technique which maintained the relative differences in the base scores to the highest score. To index the cost figures, the lowest cost was set at 100 and again the costs for the other study areas were converted to indexed costs which maintained the relative differences of the study area costs to the lowest cost.

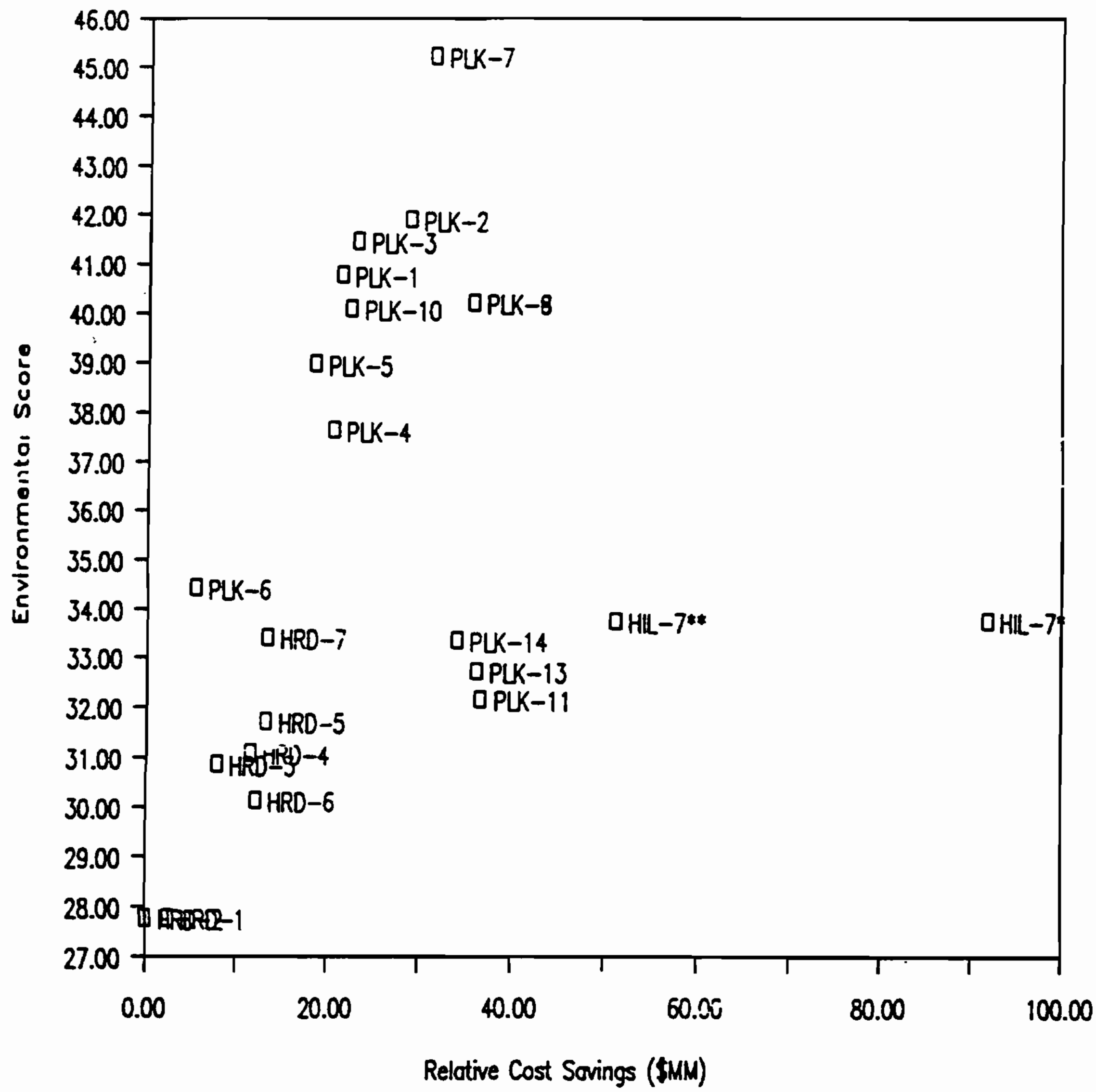
When combining the environmental and engineering/economic indexed rankings at this phase of a typical siting study, the relative importance of each type of ranking to the overall suitability of the area can vary from a weighting factor of 3 to 1 in favor of the environmental ranking to an equivalent weighting factor of 1 to 1 for the environmental and engineering/economic rankings. The Siting Task Force recommended the use of a mid-range 2 to 1 weighting in favor of the environmental rankings for the indexed composite rankings.

Figures 8.1.4-1 and 8.1.4-2 present the frontier maps for the CC and baseload development option, including and excluding the HIL-7 study area, respectively, and Table 8.1.4-4 presents the indexing method results.

8.1.4.4 Selection of Candidate Study Areas

As stated previously, the results of the frontier mapping and composite indexed scores served as tools for the Siting Task Force in selecting the candidate study areas for further evaluation. The Task Force members reviewed these results and considered several other factors in selecting the candidate study areas. These other factors included:

- Current information on the availability of land for Tampa Electric Company's use within the preliminary study areas,
- Desire to maintain some geographical diversity in the locations of the remaining study areas, and



Note: Assumes the use of freshwater cooling towers, except:
HIL-7*–Saltwater Cooling Towers
HIL-7**–Once Through Cooling

FIGURE 8.1.4-1.

PHASE II FRONTIER MAPPING RESULTS FOR THE CC AND BASELOAD DEVELOPMENT OPTION

Source: ECT, 1990.

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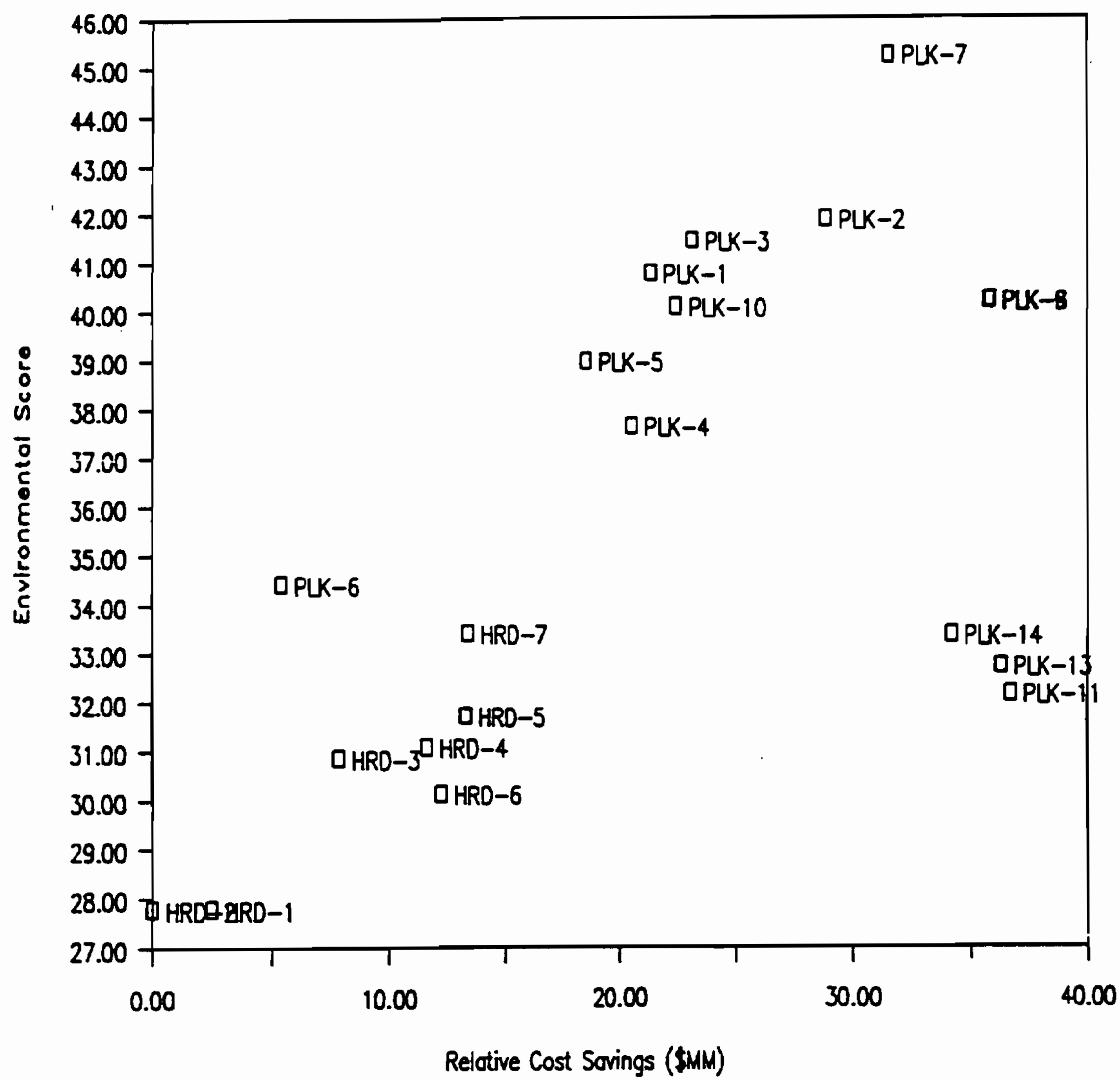

Note: Assumes the use of freshwater cooling towers.

FIGURE 8.1.4-2.

PHASE II FRONTIER MAPPING RESULTS FOR THE CC AND BASELOAD DEVELOPMENT OPTION, EXCLUDING HIL-7 STUDY AREA

Source: ECT, 1990.

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Table 8.1.4-4. Indexed Composite Rating Results for the CC and Baseload Development Option

Study Area	Environmental Base Score	Cost* CC Baseload FWT	Indexed Environmental Score	Indexed Cost	Comparison (1:1)	Comparison (2:1)	Rank (1:1)	Rank (2:1)
PLK-7	45.23	241.367	100.00	76.75	176.75	276.75	1	1
PLK-2	41.91	243.984	92.66	75.74	168.41	261.07	3	2
PLK-3	41.47	249.711	91.68	73.53	165.22	256.90	6	3
PLK-8	40.24	237.008	88.96	78.43	167.39	256.36	4	4
PLK-9	40.22	237.071	88.91	78.41	167.32	256.23	5	5
PLK-1	40.79	251.468	90.19	72.86	163.05	253.24	7	6
PLK-10	40.10	250.400	88.67	73.27	161.94	250.61	8	7
HIL-7[1]	33.76	181.030	74.65	100.00	174.65	249.29	2	8
PLK-5	38.98	254.336	86.19	71.75	157.94	244.13	10	9
PLK-4	37.65	252.329	83.24	72.53	155.77	239.01	11	10
HIL-7[2]	33.76	221.709	74.65	84.32	158.97	233.62	9	11
PLK-14	33.37	238.724	73.78	77.77	151.54	225.32	12	12
PLK-13	32.74	236.597	72.39	78.59	150.97	223.36	13	13
PLK-11	32.17	236.177	71.11	78.75	149.86	220.98	14	14
PLK-6	34.43	267.493	76.11	66.68	142.80	218.91	16	15
HRD-7	33.41	259.512	73.88	69.76	143.63	217.51	15	16
HRD-5	31.72	259.610	70.12	69.72	139.84	209.96	17	17
HRD-4	31.09	261.276	68.74	69.08	137.82	206.57	18	18
HRD-3	30.86	265.008	68.24	67.64	135.88	204.11	20	19
HRD-6	30.14	260.649	66.63	69.32	135.95	202.59	19	20
HRD-1	27.78	270.401	61.43	65.56	126.99	188.42	21	21
HRD-2	27.78	272.889	61.42	64.60	126.03	187.45	22	22

Note: Assumes the use of freshwater cooling towers, except:
[1] Saltwater cooling towers, and
[2] Once-through cooling.
FWT = freshwater cooling tower.
* Shown in millions of 1990 dollars and assumes the use of freshwater cooling towers, except as noted.

Source: ECT, 1990.

- Desire to carry forward only one area where study areas were in close proximity and had similar environmental characteristics.

Therefore, based on the evaluation results and these other considerations, the Siting Task Force selected the candidate study areas shown in Figure 8.1.4-3 for more detailed analyses in Phase III of the siting program. Ten areas were selected for the CC and baseload development option, 11 areas for the baseload (or CC) option, and 15 areas for the CC only option. Also, as shown in the figure, ten of the areas were similar for the three development options.

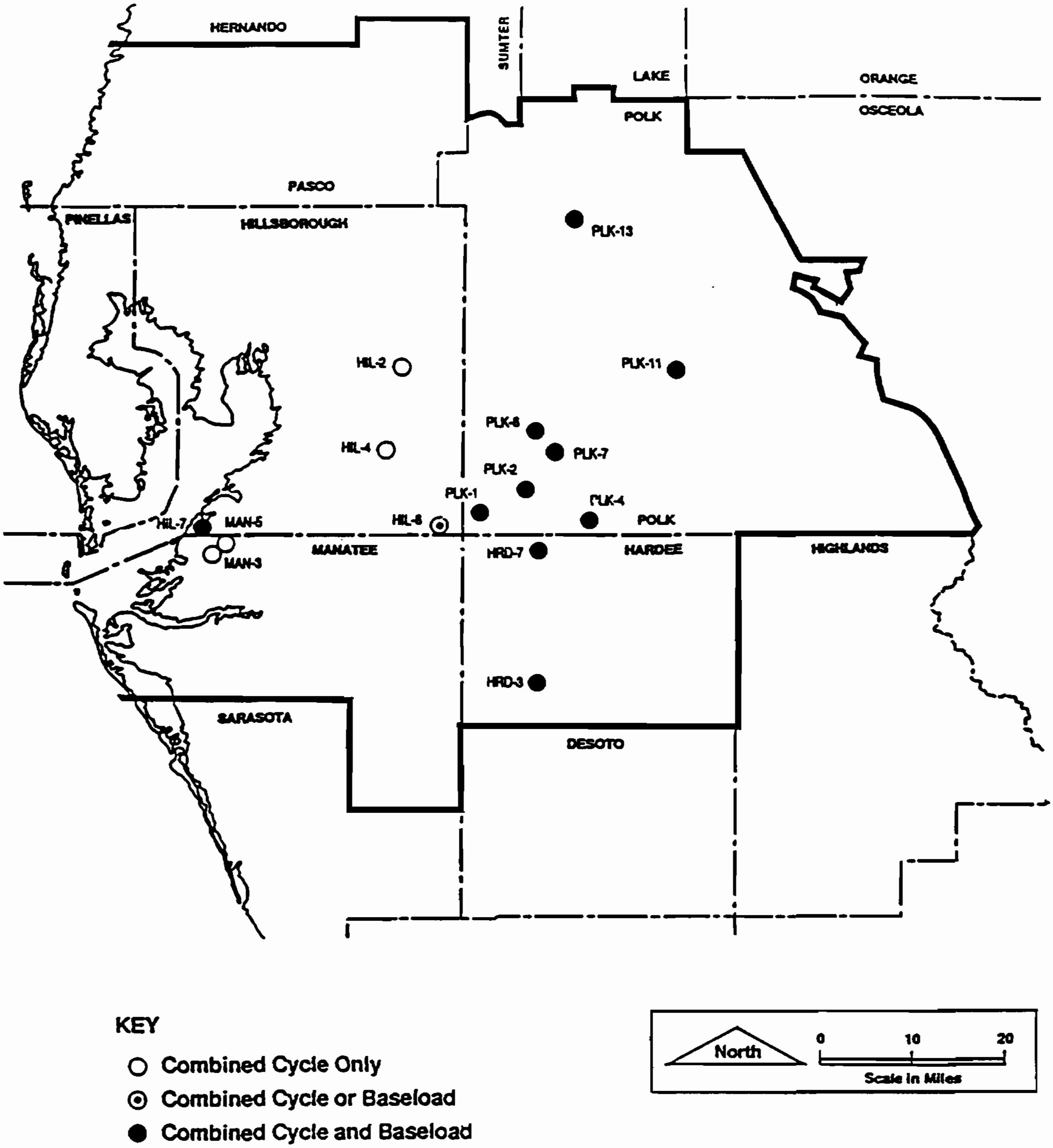

FIGURE 8.1.4-3.

GENERAL LOCATIONS OF CANDIDATE STUDY AREAS

Source: ECT, 1990.

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8.1.5 PHASE III--DETAILED ANALYSES

The overall objective of the detailed analyses was to select the preferred site(s) for Tampa Electric Company's future generation expansion from the areas remaining after the Phase II evaluations. The Phase III Detailed Analyses were performed in the following five steps:

1. Develop the environmental and engineering/economic criteria used to rate the suitability of the candidate study areas based on inputs from the Siting Task Force;
2. Evaluate, rate, and rank the candidate study areas based on the environmental and engineering/economic criteria and weighting factors to select the prime siting areas which were considered most suitable for power plant siting;
3. Perform detailed environmental and engineering/economic analyses of the advantages, disadvantages, and trade-offs associated with each prime siting area;
4. Conduct a future scenario evaluation of the prime siting areas; and
5. Recommend the overall preferred site(s) for Tampa Electric Company's future generation expansion needs based on guidance from the Siting Task Force.

8.1.5.1 Environmental Analyses of Candidate Study Areas

In the first step, a listing of concerns or issues associated with power plant development on the candidate study areas was developed. These concerns and issues were translated into environmental criteria which were used to evaluate the areas and discriminate among the study areas according to their advantages and disadvantages. The Siting Task Force reviewed and modified, as necessary, the environmental criteria to determine the final listing of criteria which best reflected their concerns and the issues associated with power plant development in the study region. Once the criteria were finalized, weighting factors which represented the relative importance of each criterion in power plant siting were developed and also approved by the Siting Task Force.

The environmental evaluation was performed using the pairwise comparison technique. The technique involves comparing the study areas, two at a time, with respect to each criterion. For each pair of study areas, judgements were made as to whether one area was clearly better than the other area or if the study areas were roughly equivalent with regard to each criterion. When one study area was clearly better or more suitable for the criterion, it was given a score of 1.0 and the other area was given a score of zero. Where the two study areas were judged equivalent for a specific criterion, both areas were given a score of 0.5. The study area scores from each major environmental discipline area were tabulated using the weighting factors and the weighted scores of all disciplines were combined to obtain an overall environmental score for each candidate study area.

The following subsections present the criteria definitions and results of the environmental analyses of the candidate study areas in the four major environmental discipline areas: air quality, ecological systems, water resources/area suitability, and land use/socioeconomics.

Air Quality Analyses

Air quality criteria were developed to allow a more detailed evaluation of the candidate study areas. These criteria were:

1. Maximum SO_2 impacts of existing sources,
2. Maximum total SO_2 impacts, and
3. PSD Class I impacts.

As in previous phases, SO_2 was considered to be the most limiting pollutant. Hence, SO_2 was the focus of the three criteria. For the first criterion listed previously, modeling studies were conducted to determine the highest SO_2 impacts to occur in the immediate vicinity of each area. Areas where these impacts were between 25 and 75 percent of standards were rated higher than areas with impacts either less than 25 percent or greater than 75 percent of the standards. Again, the intent was to rate lower areas either with high existing air quality impacts or with minimal existing impacts, while areas with a middle range of air quality impacts were rated the most suitable for power plant development.

For the second criterion, modeling studies were completed to project the maximum total impacts of the proposed facilities plus the existing facilities. The modeling studies examined the immediate vicinity of the study area and in the vicinity of other nearby sources. Study areas where total impacts were less than 75 percent of the standards were rated higher than those that had at least some impacts greater than the standards. The latter were considered to have the potential to be constrained due to air quality impacts.

The final criterion considered potential impacts at the Chassahowitzka PSD Class I area. The proposed CC and baseload plants at each study area were modeled to determine the potential impacts. Those areas more than approximately 100 km away from the Class I area were rated highest, since review of Class I impacts would probably not be required at that distance. Rated next highest were areas where all maximum SO_2 impacts were less than 75 percent of the standards. Areas where some impacts were greater than 75 percent of the standards were rated the lowest.

<u>Ecological Systems Analyses</u>

Ecological evaluations were based on a comparative assessment of the ecological resources on and adjacent to each of the candidate study areas. Each of the siting areas was compared with regard to system diversity, habitat function, and rare, threatened and endangered species. Evaluations took into consideration the overall ecological value of a study area, and the potential impacts of a power plant on that value. Also considered were the relative positions of communities within site boundaries and the potential for mitigation by avoidance of communities of higher ecological value.

In the system diversity evaluation, each study area was compared for the quantity and quality of upland and wetland habitats onsite and adjacent to site boundaries. Areas were compared with respect to row crops, pasture, old fields, citrus groves, sod farms, pine-palmetto flatwoods, palmetto range, scrubby flatwoods, hardwood hammocks, mined areas, herbaceous marsh, and forested wetlands. Wetlands were also evaluated as to whether they were isolated or connected with waters of the state.

The evaluation of habitat function of each study area compared the areas with respect to the value and importance of habitats and ecological systems. Considered in this evaluation was whether the study areas contained stream headwaters, discharged to Outstanding Florida Waters, contained critical habitat for rare, threatened, or endangered species, contained any unique systems, provided important fish nursery or spawning habitat, provided wildlife corridors, provided important wildlife feeding areas, or contained rookeries. Also evaluated were the regional and local significance of aquatic systems and whether the study area habitats were an integral part of a larger interconnected system of high value.

The candidate study areas were compared with each other for the potential impacts of development on rare, threatened, and endangered species. The known or potential occurrence of species of concern was evaluated for each area.

Evaluations of candidate study areas were primarily based on aerial surveys, site drive-bys, aerial photographs, and USGS quad maps. Information on species of concern was obtained from FNAI, FGFWFC, and various environmental impact statements for the phosphate industry.

<u>Water Resources and Area Suitability Analyses</u>

Phase III water resources (water makeup and discharge considerations) and area suitability criteria were similar to the Phase II criteria. Some of the evaluation questions, however, were modified slightly to reflect the changes in the configurations of the individual study areas, to incorporate more data as they became available, and to respond to specific requests of the Siting Task Force. These evaluation criteria are discussed in the following paragraphs.

The purpose of the Phase III analyses was to further differentiate the remaining study areas using additional information and more detailed evaluation techniques.

Water makeup and discharge considerations and area suitability were again evaluated for three different power plant development options since each option involves different makeup water and wastewater discharge volumes.

The water makeup, water discharge, and area suitability criteria once again consisted of identifiable advantages posed as a series of yes-or-no questions. Again, any positive answer resulted in a point being awarded to a candidate study area. The higher the score, the more advantages a particular site had over other sites. Unlike Phase II, however, the questions were not limited to five.

Cooling Water Makeup Advantages

The following questions, or advantages, comprised the Phase III water makeup criterion:

1. Is the 5-ft drawdown radius wholly within the delineated study area boundary?
2. If groundwater is the only viable source of water, is this area a non-Water Use Caution Area according to SWFWMD?
3. Is there an alternative surface water source of sufficient size available within 3 miles?
4. Is the proposed makeup water currently considered non-potable (i.e., average total dissolved solids concentration >500 mg/L)?
5. Are major municipal wellfields located at least 5 miles from the geographic center of the site?
6. Based on the May 1987 and 1989 Florida aquifer potentiometric maps, is the site in a non-major stress area?

Cooling Water Discharge Advantages

The water discharge criterion consisted of five identifiable advantages. Again, the advantages were posed as yes-or-no questions, with any positive answer resulting in a point being awarded to a candidate study area. The following questions, or advantages, comprised the water discharge criterion:

1. According to FDER's Water Quality Index, are all potential receiving waters within 3 miles of the study area considered good or fair?
2. Is the potential surface receiving water designated as Class III, IV, or V?
3. Does current or past phosphate activity provide a receptor for discharge either as phosphate plant process water or ponds?
4. Is the study area located in a drainage basin that is isolated from Outstanding Florida Waters and aquatic preserves?
5. Is the potential receiving water considered nonpotable?

Area Suitability Advantages

Finally, each study area was evaluated with respect to area suitability. The purpose of this evaluation was to determine if any study area had distinct advantages over other areas because the area was less subject to flooding or sinkhole formation, or the potential for contaminating the Floridan aquifer was less.

The area suitability criterion actually consisted of four identifiable advantages. The advantages were posed as yes-or-no questions, with any positive answer resulting in a point being awarded to a candidate study area. The higher the score, the more advantages a particular study area had over other areas. The following questions, or advantages, comprised the area suitability criterion:

1. Are there sufficient contiguous acres located above the 100-year flood zone (acreage including cooling reservoir)?
2. According to SWFWMD, is the DRASTIC pollution potential less than 100 for the Floridan aquifer?
3. Is this area designated A or B with respect to sinkhole formation?

4. Is this an area of either very low recharge or discharge with respect to the Floridan aquifer?

<u>Land Use/Socioeconomic Analyses</u>

The land use/socioeconomic analyses consisted of rating the candidate study areas against three criteria. These criteria included existing land use compatibility, consistency with land use plans and zoning ordinances, and presence of landmarks/designated areas. These areas serve as the primary focus for land use/socioeconomic issues related to power plant licensing in the state of Florida.

Existing Land Use Compatibility

Under the existing land use compatibility criteria, each candidate study area was examined in relationship to existing land use patterns. Compatibility was assessed based upon the type of land use within and adjacent to a candidate study area, the quality/character of the land use, and its location relative to the candidate study area boundary. The presence of infrastructure in proximity to the candidate study area and recent/projected land use trends were also evaluated.

Consistency with Land Use Plans and Zoning Ordinances

Consistency evaluations were performed by identifying the future land use category/categories and zoning for each candidate study area. A review of the appropriate comprehensive plan land use element and zoning ordinance was conducted to determine whether the candidate study area was consistent with land use plans and zoning ordinances (i.e., does the area have appropriate land use and zoning designations or would a land use plan amendment or rezoning be required).

Landmarks/Designated Areas

Each candidate study area was also reviewed for their location with respect to landmarks and designated areas as defined in FEPPSA guidelines. Each candidate study area was evaluated against the number, location, and type of landmarks/designated areas within one mile of the candidate study area boundary. The type of land-mark/designated area was an important consideration since many landmarks/designated areas were established to protect natural and/or cultural resources.

Results of Phase III Environmental Ratings

Table 8.1.5-1 presents the overall results of the environmental ratings of the candidate study areas for the CC and baseload power plant development options. The total environmental scores for the areas were calculated based on the results of the pairwise comparisons for the areas and using the internal criteria and discipline weighting factors. As shown in these tables, the PLK-1, PLK-2, PLK-4, and PLK-7 study areas rated as the most suitable areas for the proposed power plants. Also, the HIL-7 study area had the fifth highest environmental score for the full development options.

Similar to the Phase II evaluations, several sensitivity analyses were conducted for the environmental ratings of the candidate study areas to determine the effect of the internal criteria and discipline weighting factors on the overall environmental scores. This analysis showed that the four Polk County study areas, which rated the highest according to the weighted scores, remained as the highest rated four areas after eliminating the effects of the weighting factors although the order of the areas changed. Also, based on the results of eliminating the effects of the weighting factors, the HIL-7 study area had the fifth highest environmental rating score for all three of the development options.

8.1.5.2 Engineering/Economic Evaluation of Candidate Study Areas

Concurrent with the environmental evaluation, an engineering/economic evaluation of the candidate study areas was conducted. This evaluation used the same present worth costing factors as were used in Phase II. The estimated present worth costs were refined compared to the Phase II figures to reflect more site-specific information regarding the power plant location within the study area. Again, these estimated costs involved those components of a power plant for which costs vary primarily based on the geographic location of the facilities, including road and rail access,

Table 8.1.5-1. Phase III Environmental Ratings Results for the Candidate Study Areas for the CC and Baseload Development Option

Study Area	Air (2.15)				Ecology (2.92)				Water Resources (2.92)				Land Use/Socioeconomics (2.00)				Total Weight Score
	Existing SO_2 Impacts (4)	Total SO_2 Impacts (5)	PSD Class I Impacts (4)	Wght Avg. (13)	System Diversity (4)	Habitat Functn (4)	Protctd Species (5)	Wght Avg. (13)	Water Makeup Consid. (5)	Discharge Consid. (3)	Area Suitability (1)	Wght Avg. (9)	Exist. Land Use (5)	Land Use Plan/ Zoning (4)	Landmrk Designed Areas (3)	Wght Avg. (12)	
PLK-1	8.0	7.5	6.0	15.46	6.0	6.5	7.0	19.09	6.5	8.5	3.0	19.79	8.0	6.5	8.0	15.00	69.35
PLK-7	8.0	2.0	6.0	10.92	6.0	10.0	10.0	25.61	6.5	8.5	3.0	19.79	8.0	6.5	4.0	13.00	69.31
PLK-2	8.0	3.0	6.0	11.74	6.0	7.0	6.5	18.98	6.5	8.5	7.5	21.25	8.0	6.5	8.0	15.00	66.97
PLK-4	3.0	7.5	6.0	12.16	6.0	6.5	7.0	19.09	6.5	8.5	7.5	21.25	7.0	6.5	8.0	14.17	66.67
HIL-7	8.0	9.0	6.0	16.70	6.0	2.0	2.0	9.43	10.0	4.0	7.5	22.55	8.0	9.5	1.0	13.50	62.19
HRD-7	3.0	4.0	6.0	9.26	6.0	6.5	6.5	18.53	6.5	4.0	7.5	16.87	4.5	3.5	8.0	10.08	54.75
PLK-8	8.0	1.0	6.0	10.09	6.0	6.5	7.0	19.09	6.5	4.0	3.0	15.41	2.5	9.5	2.5	9.67	54.26
HRD-3	3.0	10.0	6.0	14.22	1.0	2.0	2.0	4.94	2.0	4.0	7.5	9.57	4.5	3.5	8.0	10.08	38.82
PLK-11	3.0	6.0	6.0	10.92	6.0	6.0	5.0	16.40	2.0	1.0	1.0	4.54	2.5	1.5	5.0	5.58	37.44
PLK-13	3.0	5.0	1.0	6.78	6.0	2.0	2.0	9.43	2.0	4.0	7.5	9.57	2.0	1.5	2.5	3.92	29.70

Source: ECT *et al.*, 1990.

transmission line and substation requirements, cooling system needs, and fuel delivery facilities. The estimated present worth costs for these components were summed to obtain a total cost for each candidate study area for each development option. Table 8.1.5-2 shows the estimates for the candidate study areas for the full development option. Based on these evaluations, HIL-7 was the most cost-effective study area for the CC and baseload power plants.

8.1.5.3 Composite Environmental and Economic Ratings

Similar to the Phase II evaluations, the environmental ratings of the candidate study areas and the engineering/economic evaluations were combined using two methods, frontier mapping and indexed scores and costs. The indexed environmental scores and costs were again composited on both a 2:1 ratio of the environmental versus cost figures and a 1:1 ratio. The results of these compositing methods provided evaluation tools for the Siting Task Force in determining the prime siting areas for further analysis in Phase III.

Figures 8.1.5-1 and 8.1.5-2 present the results of the frontier mapping for the CC and baseload development option, including and excluding the HIL-7 study area, respectively. As in the baseload option, HIL-7 was the most cost-effective study area, while the PLK-1, PLK-2, PLK-4, and PLK-7 study areas were the more environmentally suitable areas. These five study areas also were rated the highest based on the indexed evaluation results shown in Table 8.1.5-3 for the CC and baseload development option.

8.1.5.4 Prime Siting Area Selection

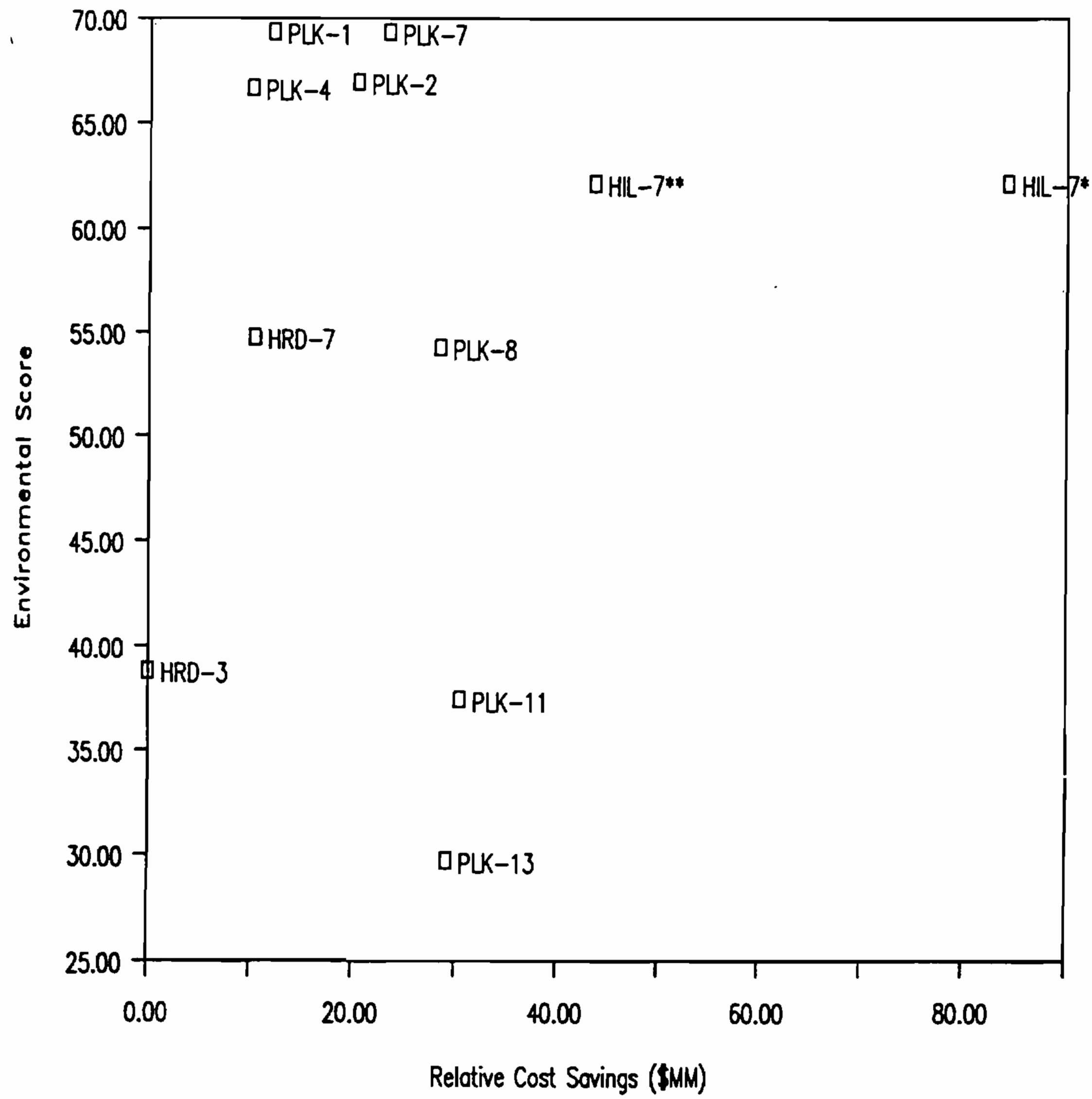
Based on the results of the composite environmental and economic evaluations, the Siting Task Force selected five of the study areas as prime siting areas for further evaluation in the next step of Phase III. Four of these areas were located in southwestern Polk County, PLK-1, PLK-2, PLK-4, and PLK-7, and one area was located in the extreme southwestern corner of Hillsborough County and the northwestern

Table 8.1.5-2. Present Worth Cost Estimates for the Candidate Study Areas for the CC and Baseload Development Option (in millions of 1990 dollars)

Preliminary Study Area	Road Access	Rail Access	Transmission Lines/ Substations	Cooling Towers	Natural Gas Pipeline	Fuel Oil Pipeline	Coal Handling Facilities	Coal Delivery	Total
HIL-7 [1]	0.285	0.355	6.311	85.250	16.705	0.456	71.416	0.000	180.778
HIL-7 [2]	0.285	0.355	6.311	125.929	16.705	0.456	71.416	0.000	221.457
PLK-11	0.285	0.801	2.334	65.120	8.270	4.708	108.616	44.500	234.634
PLK-13	0.285	1.603	11.248	67.045	0.662	1.975	108.616	44.500	235.934
PLK-8	0.285	0.401	0.345	66.366	9.923	6.227	108.616	44.500	236.663
PLK-7	0.142	0.200	3.450	65.923	11.743	7.139	108.616	44.500	241.713
PLK-2	0.57	0.200	2.070	68.584	13.231	6.987	108.616	44.500	244.758
PLK-1	0.285	0.801	10.842	66.366	13.231	8.354	108.616	44.500	252.995
HRD-1	0.57	2.003	4.249	67.253	15.878	11.695	108.616	44.500	254.764
PLK-4	0.854	0.401	11.729	66.810	13.066	9.113	108.616	44.500	255.089
HRD-3	0.285	0.819	7.342	67.697	20.178	15.644	108.616	44.500	265.081

Note: Assumes the use of freshwater cooling towers, except:
[1] Saltwater cooling towers, and
[2] Once-through cooling.

Source: ECT, 1990.



Note: Assumes the use of freshwater cooling towers, except:
HIL-7*–Saltwater Cooling Towers
HIL-7**–Once Through Cooling

FIGURE 8.1.5-1.

PHASE III FRONTIER MAPPING RESULTS FOR THE CC AND BASELOAD DEVELOPMENT OPTION
Source: ECT, 1990.

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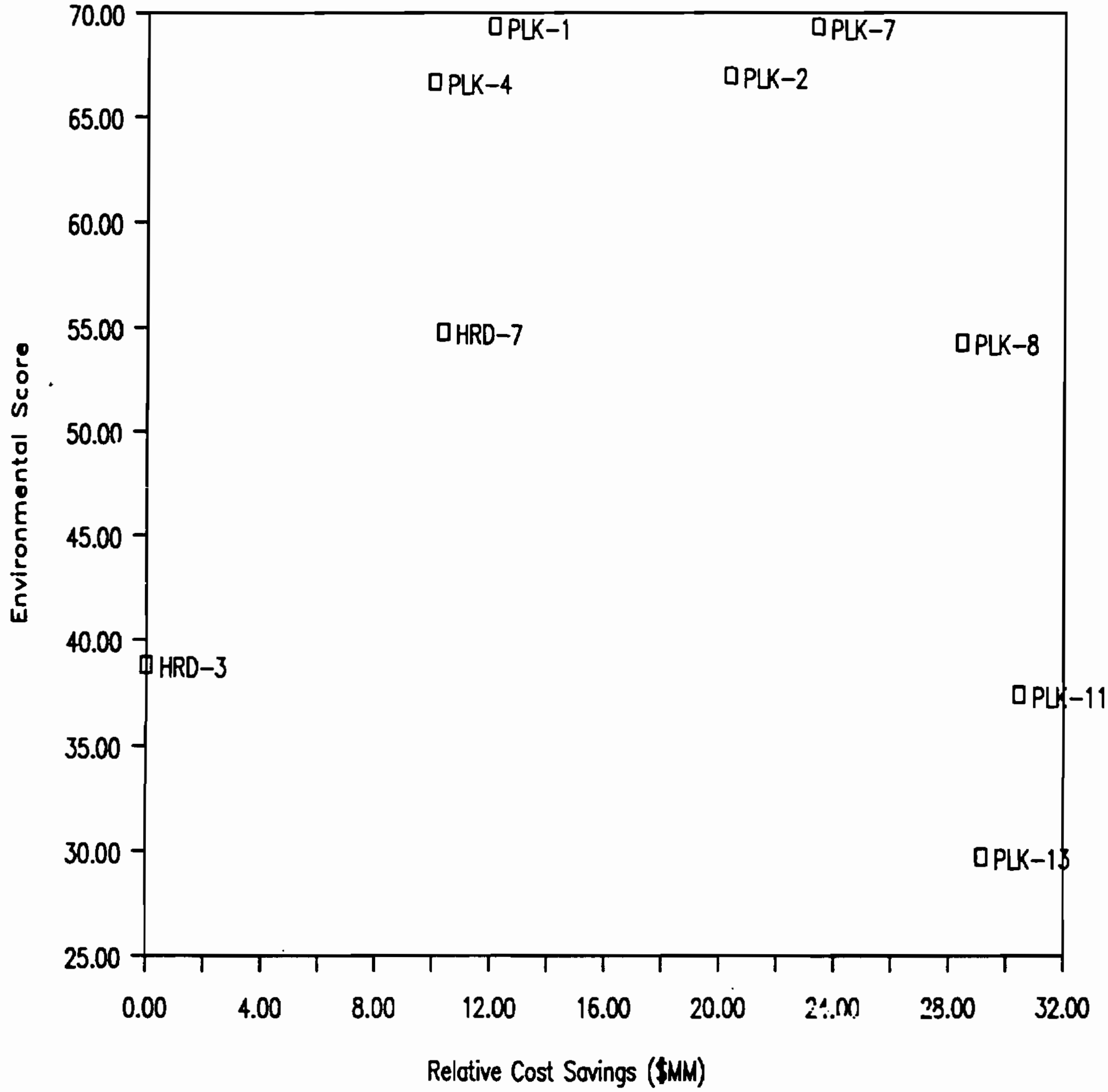

Note: Assumes the use of freshwater cooling towers.

FIGURE 8.1.5-2.

PHASE III FRONTIER MAPPING RESULTS FOR THE CC AND BASELOAD DEVELOPMENT OPTIONS, EXCLUDING HIL-7 STUDY AREA

Source: ECT, 1990.

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Table 8.1.5-3. Phase III Indexed Composite Evaluation Results for the CC and Baseload Development Option

Study Area	Environmental Base Score	Cost* CC Baseload FWT	Indexed Environmental Score	Indexed Cost	Comparison (1:1)	Comparison (2:1)	Rank (1:1)	Rank (2:1)
HIL-7[1]	62.19	108.778	89.68	100.00	279.35	189.68	1	1
PLK-7	69.31	241.713	99.94	77.01	276.90	176.96	2	2
HIL-7[2]	62.19	221.457	89.68	84.65	264.01	174.33	6	3
PLK-1	69.35	252.995	100.00	72.76	272.76	172.76	3	4
PLK-2	66.97	244.758	96.57	75.86	269.00	172.43	4	5
PLK-4	66.67	255.089	96.14	71.97	264.24	168.10	5	6
PLK-8	54.26	236.663	78.24	78.92	235.40	157.16	7	7
HRD-7	54.75	254.764	78.95	72.09	229.98	151.04	8	8
PLK-11	37.44	234.634	53.99	79.68	187.66	133.67	9	9
HRD-3	38.82	265.081	55.98	68.20	180.15	124.17	10	10
PLK-13	29.70	235.934	42.83	79.19	164.85	122.02	11	11

Note: Assumes the use of freshwater cooling towers, except:
[1] Saltwater cooling towers, and
[2] Once-through cooling.
FWT = freshwater cooling tower.

* Shown in millions of 1990 dollars and assumes use of freshwater cooling towers, except as noted.

Source: ECT, 1990.

corner of Manatee County, HIL-7. Figure 8.1.5-3 shows the general location of the five prime siting areas.

At this time in the siting process, another area in southwestern Polk County was brought to the attention of the Siting Task Force as a potential power plant site by the phosphate mining company that owned the site. This area had just recently been considered available for power plant use due to changes in the company's mining plans. The area was designated as PLK-A and its general location is shown on Figure 8.1.5-3. After review by the technical siting consultants and the Siting Task Force, the environmental characteristics of PLK-A were considered to be similar to the previously selected prime siting areas in southwestern Polk County. Also, the engineering/economic features of PLK-A were similar to the PLK-1 and PLK-2 siting areas due to its proximity to these areas. Based on these reviews and findings, the Siting Task Force recommended the inclusion of the PLK-A area as a prime siting area for further evaluation. All of the six prime siting areas appeared to be capable of supporting the full CC and baseload power plant development option. Therefore, the Siting Task Force recommended that the further evaluations of these areas be based on locating both the CC and baseload plants at one site.

8.1.5.5 Site-Specific Environmental Evaluations of Prime Siting Areas

In the next step of Phase III, the prime siting areas were subjected to detailed, site-specific environmental evaluations. The environmental evaluations highlighted the advantages, disadvantages, and trade-offs associated with power plant development on each prime siting area. The analyses clearly identified the potential impacts, positive and adverse, which were expected from the development as well as potential measures to mitigate adverse impacts.

Tables 8.1.5-4 through 8.1.5-9 provide summaries of the environmental advantages and disadvantages associated with power plant development on the six prime siting areas. The detailed analyses of the issues and these summaries provided the key

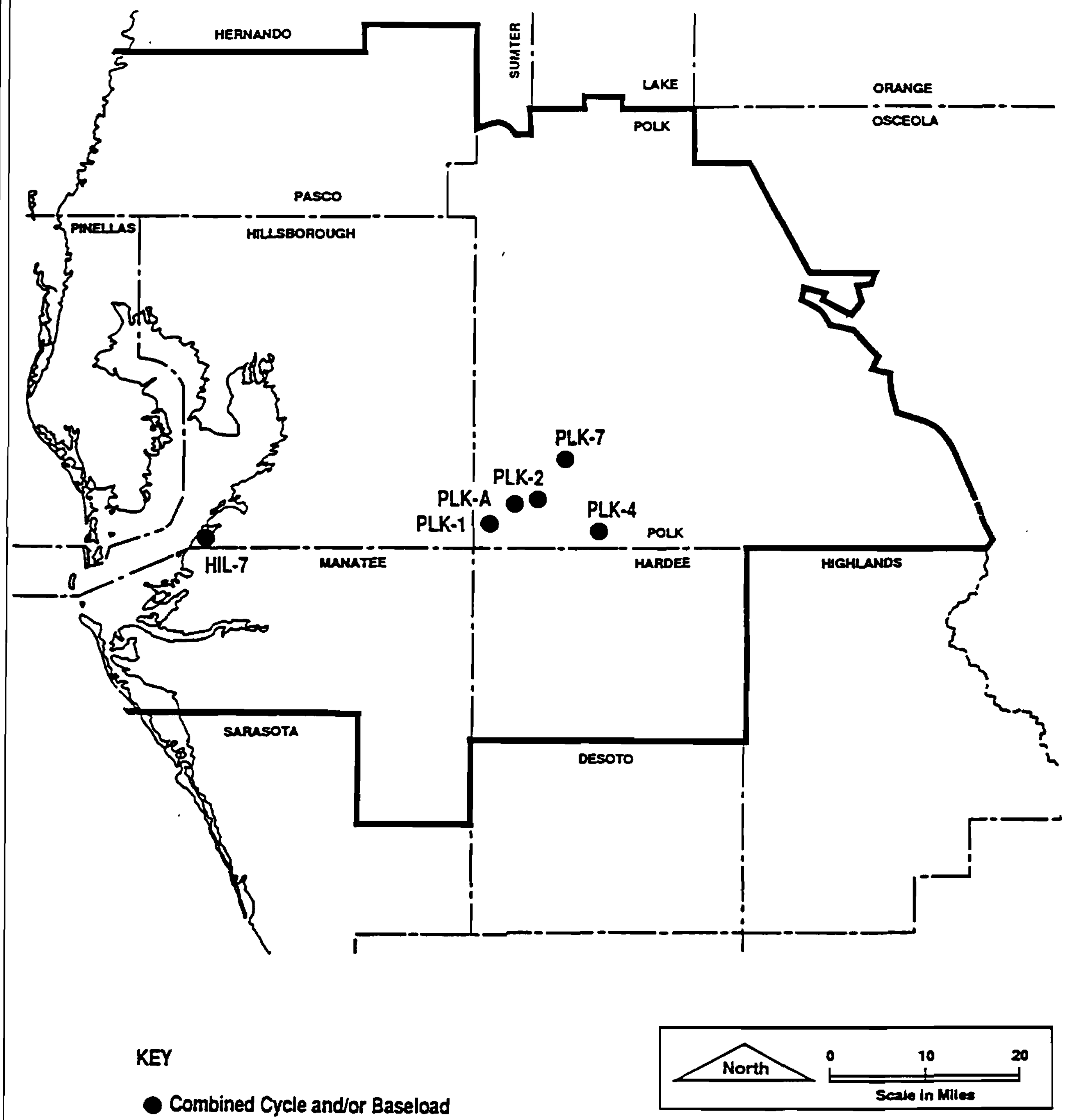

FIGURE 8.1.5-3.

GENERAL LOCATION OF PRIME SITING AREAS

Source: ECT, 1990.

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Table 8.1.5-4. Summary of Air Issues

Advantages	Disadvantages
	AAQS
• All six appear to be permittable • PLK-1 has most available AAQS margins	• AAQS margins are very slim for PLK-2, PLK-7, and HIL-7 due to existing sources • PLK-4 and PLK-7 have the most restrictive AAQS margins in the site vicinity with mitigative action by an existing source required for PLK-4
	PSD Increments
• All six sites appear to be permittable • HIL-7 has least restrictive PSD increment constraints due to greater distances to other PSD sources than PLK sites	• PSD margins are slim, but adequate for PLK-1 and PLK-4 • PLK sites have higher potential to interact with other PSD sources
	O_3 Nonattainment
• PLK-2, PLK-A, PLK-4, and PLK-7 farthest from Hillsborough County O_3 nonattainment area	• A portion of HIL-7 is within O_3 nonattainment area • PLK-1 is adjacent to nonattainment area

Source: ECT, 1990.

Table 8.1.5-5. Summary of Ecological Issues: PLK Sites

Advantages	Disadvantages
Habitat Systems	
• Areas have been previously impacted by phosphate operations • Clay settling ponds provide aquatic habitats which would be lost by reclamation if not used for cooling reservoirs • In-ground pond at PLK-A would provide most conducive edge characteristic • Minimal wetlands in areas to be impacted	• Use of remaining unmined uplands which may be refuges for animals to escape mining • Use would require modification of FDNR reclamation plans, including possible offsite mitigation • Re-disturbance of areas already reclaimed as uplands or wetlands
Threatened/Endangered Species	
• Most suitable habitats previously disturbed	• Presence of eagle's nest near PLK-2 and PLK-A
Aquatic Systems	
• Cooling reservoirs provide suitable habitat for fish and bird feeding	• Offsite discharges to small creeks may cause water quality and hydroperiod concerns

Source: ECT, 1990.

Table 8.1.5-6. Summary of Ecological Issues: HIL-7 Site

Advantages	Disadvantages
Habitat Systems	
• Plant site on agricultural areas and previously disturbed areas	• Proximity to sensitive wetland, mangrove areas • Need upland buffer and positive controls to avoid potential water quality impacts on adjacent areas
Threatened/Endangered Species	
• Immediate plant site area does not contain suitable habitat	• Several species potentially present in surrounding area • Potential for eagle to rebuild nest east of plant site
Aquatic Systems	
• Velocity of 0.5 ft per second or less recommended by EPA to minimize impingement of fishes • Locations of intake/discharge to minimize aquatic impacts	• Proximity to aquatic preserves and Piney Point Creek • Potential impacts from entrainment/impingement and discharge may be a concern • National Estuary Program may impose additional development constraints

Source: ECT, 1990.

Table 8.1.5-7. Summary of Water Issues: PLK Sites

Advantages	Disadvantages
Water Use	
• All sites have sufficient groundwater for makeup/process-SWFWMD • Opportunity to replace existing water use rather than new use as phosphate moves out of area • PLK-1 has least drawdown impact • PLK sites not located in water use caution area	• Involves use of potable quality groundwater • PLK-1 is adjacent to water use caution area--SWFWMD • PLK-4 and PLK-7 have largest off-site water use competition • PLK-7 has greatest drawdown impact • Cooling reservoirs cannot be used at PLK-4
Cooling/Water Discharge	
• Potential to use clay settling areas or mine cuts for cooling reservoirs • Cooling reservoirs probably have lower discharges than towers • In-ground, mine cut ponds (PLK-A and part PLK-7) have less discharges than clay settling ponds (PLK-1 and PLK-2)	• Discharges to small creeks will require variances to meet state water quality standards • Berms for clay settling ponds may require rebuilding and heightening in accordance with Chapter 17-9 to minimize safety concerns (PLK-1 involves most reconstruction) • Use of clay settling areas may involve clay re-suspension questions • PLK-4 may have largest discharge volume since cooling towers must be used
Groundwater Quality	
• No existing groundwater quality problems evident at PLK-1, PLK-2, PLK-A, and PLK-4	• Potential for existing groundwater quality problems at PLK-7 due to presence of industrial operations and gypsum stack

Source: ECT, 1990.

Table 8.1.5-8. Summary of Water Issues: HIL-7 Site

Advantages	Disadvantages
Water Use	
• Use of non-potable, saltwater for cooling • Existing, permitted groundwater uses sufficient for process water needs • Intake located in disturbed Port Manatee area	• Potential impingement/entrainment concerns • Located within Water Use Caution Area--SWFWMD • Potential saltwater intrusion concerns
Cooling/Water Discharge	
• Use of cooling towers reduces make-up water needs to 4 percent of once-through needs and for discharge to 2 percent of once-through needs which significantly lessen impingement/entrainment and discharge concerns • Thermal plume and water quality of discharge will require less than 5-acre mixing zone • Design of intake velocity at 0.5-ft per second should minimize impacts on juvenile fishes • Discharge point in proximity of dredge disposal area should minimize impacts to seagrasses and benthic communities	• Proximity to aquatic preserves, Outstanding Florida Waters, and Class II waters represents potential concerns • Designation of Tampa Bay in National Estuary Program may create additional concerns • Potential plume impacts need to be addressed
Water Quality	
• Not in area of recharge to Floridan aquifer	• Need to design controls to avoid potential leachate impacts to sensitive wetland areas

Source: ECT, 1990.

Table 8.1.5-9. Summary of Land Use/Socioeconomic Issues

Advantages	Disadvantages
Land Use	
• Existing onsite land use relatively compatible on all sites--mining, industrial, agricultural, vacant • Future land use designation on all PLK sites is mining • Future land use designation on HIL-7 is EGPF and industrial-heavy	• Tampa Bay Regional Planning Council does not support EPGF designation for HIL-7 site
Proximity to Communities	
• All sites relatively remote in relation to communities and residential uses	• Trailer park located to the east of HIL-7 site
Nearby Designated Areas	
• No designated areas in vicinity of PLK-1, PLK-2, PLK-A, and PLK-4 sires	• PLK-7 adjacent to IMC Wildlife Management Area • HIL-7 has several nearby areas--ELAPP/CARL lands and aquatic preserves

Note: EPGF = Electrical Power Generating Facility.
ELAPP/CARL = Environmental Land Acquisition and Protection Program/Conservation and Recreation Lands.

Source: ECT, 1990.

information used by the Siting Task Force to determine the preferred sites for further evaluation.

The results of these detailed environmental evaluations were reviewed and discussed with the Siting Task Force. The Task Force provided additional inputs regarding the concerns and the issues associated with power plant development on each of the prime siting areas. Also, the Task Force members conducted flyovers and ground reconnaissance surveys of the siting areas to ensure the evaluations accurately reflected the environmental advantages and disadvantages and potential impacts for each siting area.

8.1.5.6 Engineering/Economic Evaluation of Prime Siting Areas

Engineering/economic evaluations were conducted for the six prime siting areas. These evaluations used the present worth costing factors similar to those used for the evaluations in Phase II and earlier in Phase III. However, several of the resulting cost estimates were revised based on the conceptual facility layouts for the siting areas. With these layouts, more detailed estimates were developed particularly regarding the piping distances for recirculating, makeup, and discharge waters for the cooling systems. Also, based on the facility layout, additional present worth costs were developed for site preparation activities such as the construction of cooling reservoir berms and filling and piling for foundations. For the HIL-7 siting area, the coal delivery cost estimates were revised to reflect the specific length of conveyors needed to transport coal from the port to the baseload plant site.

Table 8.1.5-10 presents the results of the present worth cost evaluations for developing the CC and baseload plants at the prime siting areas under the assumption that cooling towers would be used at all the sites. Table 8.1.5-11 presents the present worth cost estimates for the siting areas under the assumption that cooling reservoirs would be used, to the extent possible, at the siting area. As shown in these tables, the HIL-7 siting area was estimated to be the most cost effective area, followed by the PLK-2 and PLK-A areas depending on the cooling system assumptions.

Table 8.1.5-10. Present Worth Estimates for Prime Siting Areas Using Cooling Towers (in millions of 1990 dollars)

Prime Siting Area	Road Access	Rail Access	Transmission Lines/ Substations	Cooling System*	Natural Gas Pipeline	Fuel Oil Pipeline	Coal Handling Facilities	Coal Delivery	Additional Foundation Costs	Total
HIL-7	0.853	0.932	6.246	85.594	16.705	0.161	71.416	12.569	4.715	199.191
PLK-2	0.683	0.861	3.004	69.152	13.231	6.987	108.616	44.500	2.860	249.894
PLK-A	0.587	1.114	1.485	71.744	12.579	6.379	108.616	44.500	3.897	250.901
PLK-7	0.766	1.363	5.882	72.038	11.743	7.138	108.616	44.500	2.860	254.906
PLK-1	0.107	0.943	8.279	71.870	13.231	8.354	108.616	44.500	4.164	260.064
PLK-4	0.107	0.331	9.801	70.366	13.066	9.113	108.616	44.500	9.937	265.837

*Cooling system assumptions: PLK-1, PLK-2, PLK-A, PLK-4, and PLK-7 = freshwater towers; HIL-7 = saltwater towers.

Source: ECT, 1990.

Table 8.1.5-11. Present Worth Cost Estimates for Prime Siting Areas Using Cooling Reservoirs Where Possible (in millions of 1990 dollars)

Prime Siting Area	Road Access	Rail Access	Transmission Lines/ Substations	Cooling System*	Natural Gas Pipeline	Fuel Oil Pipeline	Coal Handling Facilities	Coal Delivery	Additional Foundation Costs	Total
HIL-7	0.853	0.932	6.246	85.594	16.705	0.161	71.416	12.569	4.715	199.191
PLK-A	0.587	1.114	1.485	60.978	12.579	6.379	108.616	44.500	3.897	240.135
PLK-2	0.683	0.861	3.004	80.042	13.231	6.987	108.616	44.500	2.860	260.784
PLK-4	0.107	0.331	9.801	70.366	13.066	9.113	108.616	44.500	9.937	265.837
PLK-7	0.766	1.363	5.882	84.160	11.743	7.138	108.616	44.500	2.860	267.028
PLK-1	0.107	0.943	8.279	115.503	13.231	8.354	108.616	44.500	4.164	303.697

* Cooling system assumptions: All sites cooling reservoirs, except PLK A = ponds and 220-MW CC freshwater towers; PLK-4 = freshwater towers; and HIL-7 = saltwater towers.

Source: ECT, 1990.

8.1.5.7 Future Scenario Analyses

A power plant site selection study is based on available physical, ecological, sociological, and economic information; is reviewed within the context of the existing regulatory framework; and is conducted within a specific timeframe. Based on these qualifications and limitations, the overall environmental and engineering/economic suitability of alternative sites for power plant development was evaluated and recommendations were developed as to the more suitable or preferred sites. However, future events may affect the overall suitability of certain siting areas. Such future events could include such factors as:

1. Changes in the existing applicable regulatory requirements;
2. Changes in the environmental characteristics and sensitive resources of potential siting areas over time or discovered through more site-specific data collections;
3. Changes in the technologies or engineering design of power plants which change the expected environmental impacts or economics of the facilities; and
4. Changes in the interests or attitudes of regulatory agencies, environmental groups, business community, or the general public relative to the important criteria affecting siting area suitability.

Any of these future events could affect the relative suitability of the siting areas evaluated in the site selection process. Also, and perhaps more importantly, such events could cause long delays in the environmental permitting of the recommended siting area or even result in the denial of the required permits and licenses for a particular siting area. Therefore, as part of the Tampa Electric Company site selection study, a future scenario analysis was conducted to evaluate the potential effect of possible future events or changes on the overall suitability of the six prime siting areas for the planned power plant development.

Table 8.1.5-12 provides a summary of the results of the future scenario analyses. These results were reviewed and considered by the Siting Task Force as part of their

Table 8.1.5-12. Summary of the Future Scenario Analyses

Event	Potential Effect on Site Suitability
• High population growth and/or continuing drought conditions cause SWFWMD to expand Water Use Caution Areas or implement other restrictions on potable, groundwater uses in the future	• If one or both plants have not been licensed, it may be extremely difficult to obtain permit for new water use, especially at any of the PLK sites because of freshwater cooling needs at these sites
• Expansion of aquatic preserve areas or Class II waters in the vicinity of Port Manatee	• Licensing of HIL-7 may be more difficult
• More restrictive requirements in using Tampa Bay waters due to Federal (NEP) or state (SWIM) programs	• Uncertain, but licensing of HIL-7 probably more difficult
• Peace River or certain tributaries designated as Outstanding Florida Waters	• Permitting of water discharges to an Outstanding Florida Water would be extremely difficult
• Another large power plant or SO_2 source located in the southwest Polk County area	• It may be difficult or impossible to license one or both of the proposed Tampa Electric Company power plants due to the existing marginal PSD increments available in the area
• Passage of the Clean Air Act with SO_2 reduction and O_3 nonattainment area buffer requirements	• Proposed SO_2 reductions could expand the slim AAQS margins at HIL-7 and thus, lessen potential permitting concerns at HIL-7; however, proposed 25-mile buffers for O_3 nonattainment area may require offsets at HIL-7 and the PLK sites which may be difficult to obtain

Source: ECT, 1990.

decision-making process in determining the preferred siting areas for Tampa Electric Company's future power plant development plans.

8.1.5.8 Selection of Preferred Site and Alternative Sites

The Siting Task Force reviewed the results of the detailed analysis of environmental advantages and disadvantages of the six prime siting areas, the engineering/economic evaluations, and the future scenario analyses in developing their recommendations to Tampa Electric Company regarding the preferred sites for construction and operation of the power plant facilities. Based on these reviews, the Siting Task Force determined that the PLK-4, PLK-7, and HIL-7 areas, while highly suitable for power plant development, were relatively not as suitable as the PLK-1, PLK-2, and PLK-A prime siting areas. During the evaluation process, the task force did not identify any factors or *fatal flaws* which would preclude power plant development on the three prime siting areas determined to be less suitable for power plant development.

The primary concerns associated with the PLK-4 siting area involved potential air quality and groundwater impacts and limitations on the cooling water system alternatives. Also, the use of the PLK-4 area would involve collocating the power plants with ongoing phosphate processing operations. Although the siting area contains several large clay settling areas, these areas could not be used for power plant cooling reservoir purposes. Thus, relative to the other Polk County siting areas, the use of cooling towers was considered to be the only cooling system alternative for the PLK-4 area. For the PLK-7 siting area, the primary concerns relative to the other areas were associated with the potential for existing groundwater quality problems at the site since the proposed location of the planned power plant facilities would be at the same location as the existing phosphate processing and shipping facilities on the siting area.

The primary concerns of the Siting Task Force associated with the HIL-7 siting area involved the potential impacts of the power plants on the fishery resources and other ecological systems of Tampa Bay and the Cockroach Bay area, and on the natural resource, aesthetic qualities of the area due to changes in land uses in the area. The planned power plant facilities could be designed to avoid or minimize potential impacts to the sensitive resources of Tampa Bay and Cockroach Bay areas; however, some level of impact may occur. The Siting Task Force determined that the potential for impacts to the sensitive ecological systems of Tampa Bay and nearby estuarine systems made the HIL-7 siting area relatively less suitable than certain other prime siting areas.

Based on these considerations, the Siting Task Force recommended the PLK-1, PLK-2, and PLK-A siting areas in southwestern Polk County as the preferred sites for locating the planned power plant facilities (see Figure 8.1.5-4). Each of these sites had certain environmental and engineering/economic advantages and disadvantages; however, the overall suitability of the sites for power plant development was considered to be relatively equivalent. Thus, the Siting Task Force recommended that Tampa Electric Company pursue site acquisition and environmental licensing efforts for any of the preferred sites, PLK-1, PLK-2, and PLK-A, in order to meet its future generating capacity expansion needs. Tampa Electric Company concurred with the resulting recommendations and guidance from the Siting Task Force and selected PLK-A as the proposed site for the power plant facilities. The PLK-1 and PLK-2 sites were designated as alternative sites.

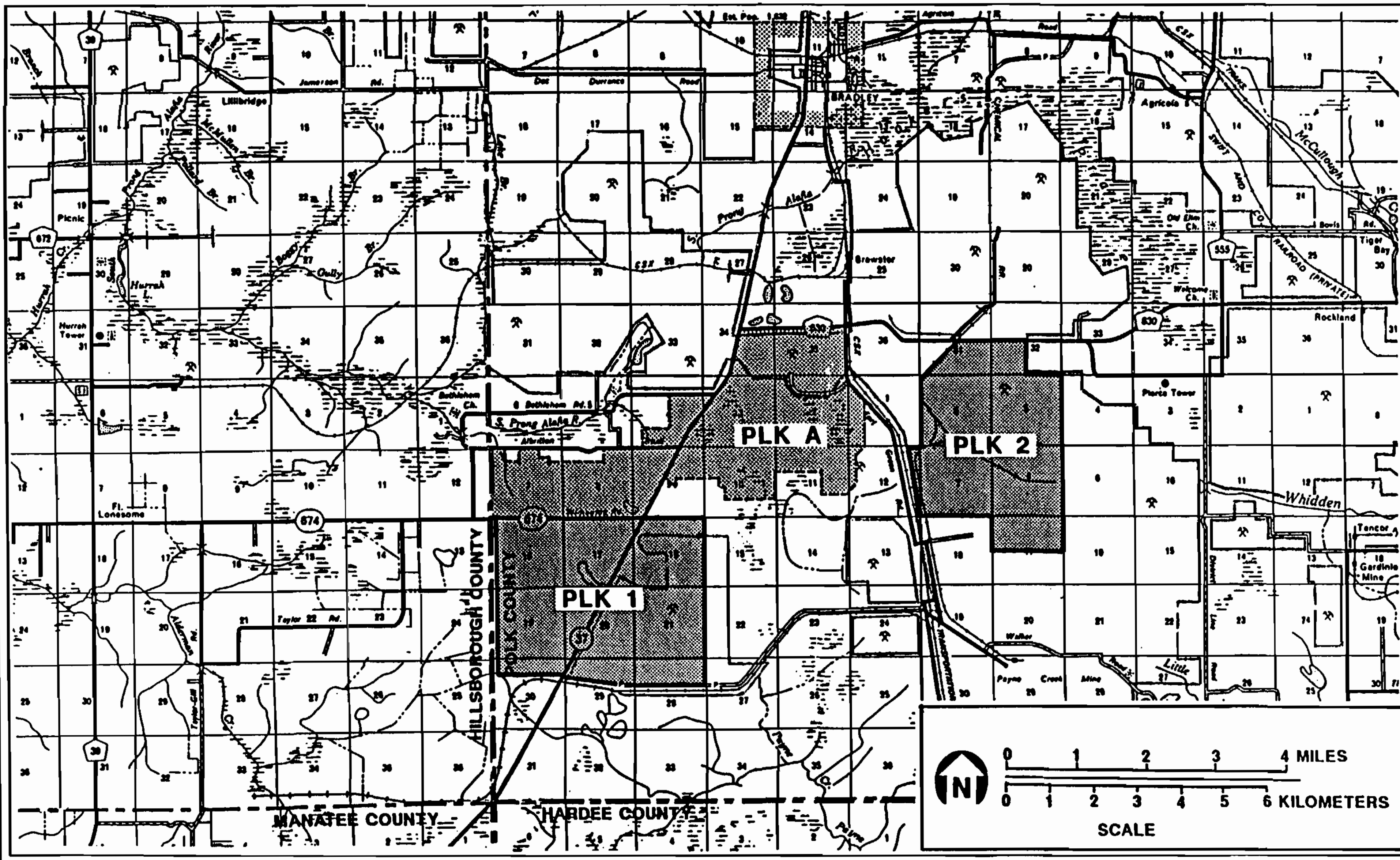

FIGURE 8.1.5-4.

POLK POWER STATION SITE (PLK-A) AND ALTERNATIVE SITES (PLK-1 AND PLK-2)

Sources: FDOT. ECT, 1992.

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POLK POWER STATION

8.1.6 PROPOSED AND ALTERNATIVE SITES

8.1.6.1 Proposed Polk Power Station Site

Within the Power Plant Site Assessment program, the proposed Polk Power Station site was termed the PLK-A site. As with all three of the alternative sites, the proposed PLK-A site has been significantly impacted by previous and ongoing phosphate mining activities in southwest Polk County. However, the proposed site was considered by Tampa Electric Company to have certain environmental, engineering, and economic advantages compared to the other two sites recommended by the Siting Task Force. These advantages primarily involve the ability to locate the power block facilities on unmined lands, the ability to construct the cooling reservoir principally as a below-grade facility, and the ability to create an environmentally enhanced wildlife management/corridor area.

The location of the main power block and other major facilities on unmined lands lessens the engineering and related cost requirements for constructing the foundations for these facilities.

The construction of the cooling reservoir within an area which was previously mined and currently consists of a series of water-filled mine cuts and spoil piles creates the opportunity to construct the required cooling reservoir as a primarily below-grade facility. This proposed construction technique significantly lessens the requirements for groundwater withdrawals and water use to provide the heat dissipation cooling requirements for the proposed project and the required land area size of the cooling reservoir. The proposed primarily below-grade cooling reservoir also lessens the potential for berm failures and maintenance costs versus an above-grade reservoir.

Since the majority of the proposed site has been or will be mined and has not been reclaimed, Tampa Electric Company has the opportunity to reclaim the mined lands to conditions which will enhance environmental resources in southwest Polk County while meeting the needs of the proposed Polk Power Station project. According to the proposed project plans, the approximately 1,511-acre portion of the site to the west of SR 37 will be reclaimed as an integrated series of forested and non-forested wetlands and uplands. Tampa Electric Company's proposed reclamation plans for this area will create a significantly enhanced environmentally diverse habitat compared to conditions which existed prior to mining. With Tampa Electric Company's proposed project, this area will serve as a significant wildlife habitat/ corridor between the headwater areas of the Payne Creek and Little Manatee River and the South Prong Alafia River system.

Based on these environmental, operational, and economic advantages, the proposed Polk Power Station site was considered the only reasonable site alternative for the proposed project.

8.1.6.2 Alternative Sites

In addition to the proposed Polk Power Station site, PLK-A, the Siting Task Force recommended two other preferred sites in southwest Polk County as potential locations for the proposed power plant facilities. These potential alternative sites were known as the PLK-1 and PLK-2 sites. The locations of these alternative sites relative to the proposed site are shown in Figure 8.1.5-4

Alternative PLK-1 Site

The PLK-1 site is located to the south of the proposed Polk Power Station site and SR 674. The site is bordered on the west by the Hillsborough County line and on the south by the access road and railroad to the Agrico Fort Green Mine phosphate processing plant. SR 37 bisects the site, running in a southwest to northeast direction. In general, the PLK-1 site consists of mined-out lands with the portion of the site to the west of SR 37 reclaimed with sand tailings and currently consists of pasture and citrus grove land uses. An unmined segment of the headwater area of Payne Creek also runs through this western portion of the PLK-1 site. The portion of the PLK-1 site to the east of SR 37 consists of active and inactive clay settling ponds. Several of the inactive ponds are currently under dewatering and reclamation.

Conceptually, use of the alternative PLK-1 site for the proposed project would involve locating the main power plant facilities to the west of SR 37 and potentially constructing a cooling reservoir in the clay settling areas to the east of SR 37. Unlike the proposed site which has not been reclaimed, the construction of these facilities on the PLK-1 site would involve re-disturbing lands which have already been or are currently being reclaimed. Construction of the cooling reservoir in the clay settling areas would require re-construction of earthen berms in the areas which are currently under reclamation. The cooling reservoir would be located entirely above-grade since the clay settling areas have been filled to more than 30 ft above pre-mining elevations. The above-grade cooling reservoir would require significantly more groundwater well withdrawals to provide cooling water makeup than the below-grade reservoir at the proposed site since there will be no surficial groundwater seepage into the reservoir. Also, the operation of the reservoir would require careful control and maintenance in order to avoid re-suspending the clays in the recirculating water system. Based on these considerations, the PLK-1 site offered no environmental nor economic advantages and some disadvantages compared to the proposed site and was not considered a reasonable alternative for further analysis.

<u>Alternative PLK-2 Site</u>

As shown in Figure 8.1.5-4, the alternative PLK-2 site is located to the east of the proposed Polk Power Station site. The PLK-2 site is bordered on the north by CR 630 and on the east by Fort Green Road and the CSX Railroad line. The northern area of the site contains an approximately 500-acre clay settling pond which has recently been retired from use and is currently undergoing the long dewatering process for reclamation. The southern area of the site contains an approximately 575-acre clay settling pond which is currently in use and will not be inactivated until the late 1990s. The area of the PLK-2 site between the two clay settling ponds consists primarily of unmined land which has been covered by waste sand tailings to a height of more than 20 ft above pre-mining elevations.

Conceptually, use of the alternative PLK-2 site for the proposed project would probably involve locating the main power plant facilities on the unmined, central portion of the site. The significant volume of sand tailings currently on this area would need to be removed in order to provide stable land for the facilities. The two clay settling ponds would be developed as cooling reservoirs. Again, these cooling reservoirs would be located significantly above pre-mining elevations and would require significantly more groundwater well withdrawals to provide makeup water compared to the planned below-grade reservoir at the proposed site. Other environmental issues such as potential air quality and ecological impacts were considered relatively similar compared to the proposed site. Based on these considerations, the alternative PLK-2 site offered no environmental advantages relative to the proposed Polk Power Station site and was not considered a reasonable alternative for further analysis.

8.2 ALTERNATIVE MEANS OF SATISFYING THE NEED FOR THE PROJECT

As discussed in Section 1.3, the FPSC has the statutory responsibility for determining and approving the need for construction of new power plants in Florida. According to Section 403.519, F.S., the FPSC must consider four specific items in determining the need for a new power plant:

- Need for electric system reliability and integrity,
- Need for adequate electricity at a reasonable cost,
- Cost-effectiveness of the proposed power plant versus available alternatives, and
- Conservation measures which might mitigate the need for the proposed power plant.

The FPSC must evaluate these specific items in relation not only to the system needs of the applicant proposing the new power plant, but also to the power supply and Customer needs of peninsular Florida. The FPSC evaluation must also consider compliance of the proposed project with the mandates of FEECA to ensure the most cost effective use of natural gas and oil. Other key considerations in the FPSC decision-making process are the identification and evaluation of reasonable alternatives to the construction of the proposed power plant while maintaining electric system reliability and minimizing the cost of electric power to Customers. The alternatives considered by the FPSC include available means to mitigate or avoid the need to construct a new power plant such as conservation, load management, and power purchases from other generators, as well as alternative generation technologies and fuels, to ensure that the proposed project represents the most cost-effective means of supplying reliable electric power.

Again, as discussed in Section 1.3, Tampa Electric Company provided the FPSC with all information required to support the petition to determine the need for the proposed IGCC project, Polk Unit 1, as well as information documenting its additional, future generating capacity needs planned for the Polk Power Station project. The information included the results of Tampa Electric Company's long-range power resources planning effort; evaluations of available conservation, load management, and power purchase programs to avoid constructing new generating facilities; and evaluations of alternative generation technologies to supply the needed electric power. The FPSC approved the need for the IGCC unit, Polk Unit 1, and issued a need determination order on March 2, 1992 (see Appendix 11.14).

Summaries of the supporting information submitted to the FPSC which evaluated alternatives considered by Tampa Electric Company to meet its power supply needs are provided in the following sections. It should be noted that some of the numerical estimates and projections presented in the Tampa Electric Company need determination petition and supporting studies may vary from figures presented elsewhere in this SCA and other documents since such projections are continually under revision and updating as part of the company's ongoing power resource planning process.

8.2.1 NEED FOR ADDITIONAL POWER SUPPLY

Based on its long-range power resource planning process, Tampa Electric Company has determined the need for additional resources of approximately 800 MW beginning in 1995 through the year 2001 and approximately 1,300 MW from 2002 through 2010. Thus, over the future 15-year period, the company will need a total of approximately 2,100 MW in additional resources to meet its Customer needs. The need for these additional resources is primarily based on the projected continued growth of population and resulting electricity demands in the Tampa Electric Company service area.

Based on this forecasted growth in demand, Tampa Electric Company will not meet its dual system reliability criteria in this future timeframe without the additional resources. These reliability criteria are a minimum 20-percent winter generation reserve margin and an assisted LOLP of less than 0.1 day per year. These criteria are considered to be reasonably adequate by the FPSC for the Tampa Electric Company system. The following sections present the alternatives available and considered by Tampa Electric Company to meet these additional approximately 2,100 MW in resources required to meet its Customer future power demands.

8.2.2 ALTERNATIVES TO CONSTRUCTING NEW GENERATING FACILITIES

To avoid or minimize the potential environmental effects and costs of constructing new power plants, Tampa Electric Company considered and evaluated a variety of alternatives to avoid constructing all or a portion of the proposed Polk Power Station project. The evaluations of non-construction alternatives considered both demand and supply side alternatives including:

- Conservation,
- Load management,
- Interruptible load,
- Qualifying cogeneration power purchases, and
- Other purchased power.

Tampa Electric Company's analyses show that the most cost-effective implementation of all of these non-construction alternatives will reduce the amount of needed resources by approximately 1,000 MW or by almost 50 percent compared to its total future needs in the 1995 through 2010 timeframe. In its need determination proceedings, the FPSC concluded that Tampa Electric Company had considered and implemented all reasonably available conservation and other non-generating alternatives to avoid construction of new generating facilities (i.e., Polk Unit 1) in the 1995 to 1996 timeframe.

Tampa Electric Company's projected resource needs beyond 1996 also consider and include the implementation of available non-construction alternatives to avoid and/or delay constructing new generating facilities. Again, these non-construction alternatives include conservation, load management, and purchased power from cogenerators and other utilities. These non-construction alternatives will reduce the company's future power supply needs by almost 50 percent. Therefore, based on these evaluations, construction of Tampa Electric Company's proposed Polk Power Station project is needed to reliably meet future energy demands in addition to the implementation of available non-construction alternatives.

8.2.3 ALTERNATIVE GENERATION TECHNOLOGIES

An integral step in Tampa Electric Company's power resource planning process is the identification and consideration of alternative generation technologies which could be constructed to meet future Customer demands. The objective of the alternative generation technology study is to identify the most reliable, feasible, environmentally acceptable, and cost-effective generating facilities for consideration in a comprehensive power resource plan.

The alternative technology study conducted by Tampa Electric Company involved a systematic review and assessment of a wide variety of conventional and nonconventional energy generation technologies. Initially, 46 technologies were identified for evaluation. These alternative technologies were screened in a two-step process: preliminary and economic screening analyses. In step one, a preliminary screening analysis was conducted to eliminate those technologies which could not be utilized because regional geography/weather is not suitable for a technology, costs were higher when compared to similar type technology alternatives, proven demonstration of the technology has not been performed, public opposition to technology exists, and/or questions exist regarding the technology safety. Table 8.2.3-1 lists each technology assessed and some of the technology assumptions, and also contains reasons why various technologies were eliminated from further consideration as a result of the preliminary screening analysis.

The technologies that passed the preliminary screening were:

- Conventional PC with FGD,
- Advanced PC with FGD,
- Atmospheric fluidized bed,
- IGCC,
- CT,
- CT with steam injection,
- CC,
- Phosphoric acid fuel cell,

Table 8.2.3-1. Alternative Technology Preliminary Screening Analysis

Technology	Plant Size (MW)	Total Plant Cost (91 $/kw)	Average Annual Heat Rate (Btu/kwh)	Commercial Availability	Technology Development	Retain for Economic Screening
Pulverized coal-wet limestone FGD						
Subcritical	300	1,533	10,044	1989	Mature	Better economics exist for similar unit types
Subcritical	500	1,274	9,829	1989	Mature	Yes
Supercritical	300	1,517	9,644	1989	Mature	Yes
Pulverized coal-spray dryer FGD						
Subcritical	300	1,438	10,370	1989	Mature	Better economics exist for similar unit types
Pulverized coal-regenerable FGD						
Subcritical	300	1,756	10,183	1989	Mature	Better economics exist for similar unit types
Pulverized coal (SOAPP)						
Subcritical advanced FGD	300	1,575	9,080	1989	Demonstration	Yes
Atmospheric fluidized bed						
Bubbling bed	200	1,757	9,960	1994	Demonstration	Better economics exist for similar unit types
Circulating bed	200	1,644	10,058	1994	Demonstration	Better economics exist for similar unit types
Pressurized fluidized bed						
CC	340	1,545	8,980	1996	Pilot	Yes
Pressurized fluidized bed turbo-charged boiler						
Circulating bed	250	1,610	9,703	1996	Laboratory	Technical development only laboratory

Table 8.2.3-1. Alternative Technology Preliminary Screening Analysis (Continued, Page 2 of 4)

Technology	Plant Size (MW)	Total Plant Cost (91 $/kw)	Average Annual Heat Rate (Btu/kwh)	Commercial Availability	Technology Development	Retain for Economic Screening
Bubbling bed	250	1,500	10,278	1996	Laboratory	Technical development only laboratory
IGCC	200	1,933	9,320	1994	Demonstration	Yes
	400	1,597	9,220	1994	Demonstration	Yes
Non-integrated gasification combined cycle						
Gasification onsite	200	1,933	9,600	1994	Demonstration	Technical development only laboratory
	400	1,694	9,510	1994	Demonstration	Technical development only laboratory
Gasification offsite	400	1,905	9,625	1994	Demonstration	Technical development only laboratory
CT-natural gas/distillate fuel						
Conventional	80	433	14,020	1989	Mature	Yes
Advanced	140	418	13,210	1991	Demonstration	To reduce analysis time, only the conventional CT was evaluated
CT-steam injection						
Steam injected	150	941	9,425	1989	Demonstration	Yes
CT-CC-natural gas/distillate fuel						
Conventional	120	595	8,055	1989	Mature	Yes
Advanced	210	561	7,580	1991	Demonstration	To reduce analysis time, only the conventional CC was evaluated
Fuel cells-phosphoric acid						
Centralized	100	1,172	8,549	1998	Pilot	Yes

Table 8.2.3-1. Alternative Technology Preliminary Screening Analysis (Continued, Page 3 of 4)

Technology	Plant Size (MW)	Total Plant Cost (91 $/kw)	Average Annual Heat Rate (Btu/kwh)	Commercial Availability	Technology Development	Retain for Economic Screening
Geothermal						
Binary	54	1,917	29,000	1992	Demonstration	Not feasible for Florida
Dry steam	113	1,065	21,868	1989	Mature	Not feasible for Florida
Solar parabolic through gas hybrid	80	3,016	24,391	1989	Mature	Yes
Solar photovoltaic-central station						
Flat plate	99	2,630	22,765	1995	Pilot	Yes
Wind turbines-high production volume	75	1,101	0	1990	Mature	Not feasible for Florida
Municipal solid waste-mass burn and refuse derived fuel (RDF)						
Mass burn	40	4,741	17,040	1989	Mature	Yes
RDF	24	4,985	15,450	1989	Mature	Yes
Nuclear-advanced light water reactor (evolutionary)	1,200	1,470	10,530	2000	Pilot	Commercial availability after 1999
Nuclear-advanced light water reactor (passive safety)	600	1,667	10,530	2002	Pilot	Commercial availability after 1999
Nuclear-light metal/high temperature gas cooled	1,350	1,947	9,000	2006	Pilot	Commercial availability after 1999

Table 8.2.3-1. Alternative Technology Preliminary Screening Analysis (Continued, Page 4 of 4)

Technology	Plant Size (MW)	Total Plant Cost (91 $/kw)	Average Annual Heat Rate (Btu/kwh)	Commercial Availability	Technology Development	Retain for Economic Screening
Advanced battery energy storage						
3-Hour	20	474	11,400	1997	Pilot	High scale production of batteries were not considered realistic to meet Tampa Electric Company's early peaking needs
5-Hour	20	614	11,000	1997	Pilot	High scale production of batteries were not considered realistic to meet Tampa Electric Company's early peaking needs
Lead acid battery energy storage						
3-Hour	20	707	13,500	1989	Mature	High scale production of batteries were not considered realistic to meet Tampa Electric Company's early peaking needs
5-Hour	20	948	13,100	1992	Mature	High scale production of batteries were not considered realistic to meet Tampa Electric Company's early peaking needs
Pumped hydro energy storage						
Conventional	1,050	918	13,600	1989	Mature	Limited feasibility for Florida
Compressed air energy storage						
Rock	110	574	11,640	1993	Demonstration	Not feasible for Florida
Salt	110	447	11,640	1991	Demonstration	Not feasible for Florida
Aquifer	110	438	11,640	1992	Demonstration	Not feasible for Florida

Note: All data developed from the September 1989 EPRI TAG.

Source: Tampa Electric Company, 1991.

- Solar thermal, and
- Photovoltaic solar cell.

In step two of the screening analysis, the economics of the ten technologies which survived the preliminary screening were compared against each other. The comparisons were made within similar service duty classes with all baseload technologies compared against each other as were all peaking and intermediate technologies. These economic screening curves reflected the levelized annual/lifecycle cost of various technologies at different capacity factors. Figures 8.2.3-1 through 8.2.3-3 represent the screening curves for baseload, intermediate load, and peaking load technologies, respectively. The baseload technologies were evaluated from 50- to 100-percent, the intermediate technologies were evaluated from 15- to 50-percent, and the peaking technologies from 0- to 15-percent capacity factors. The technologies which were selected for the economic optimization analysis were:

Baseload Technologies

- Conventional PC with FGD, and
- IGCC,

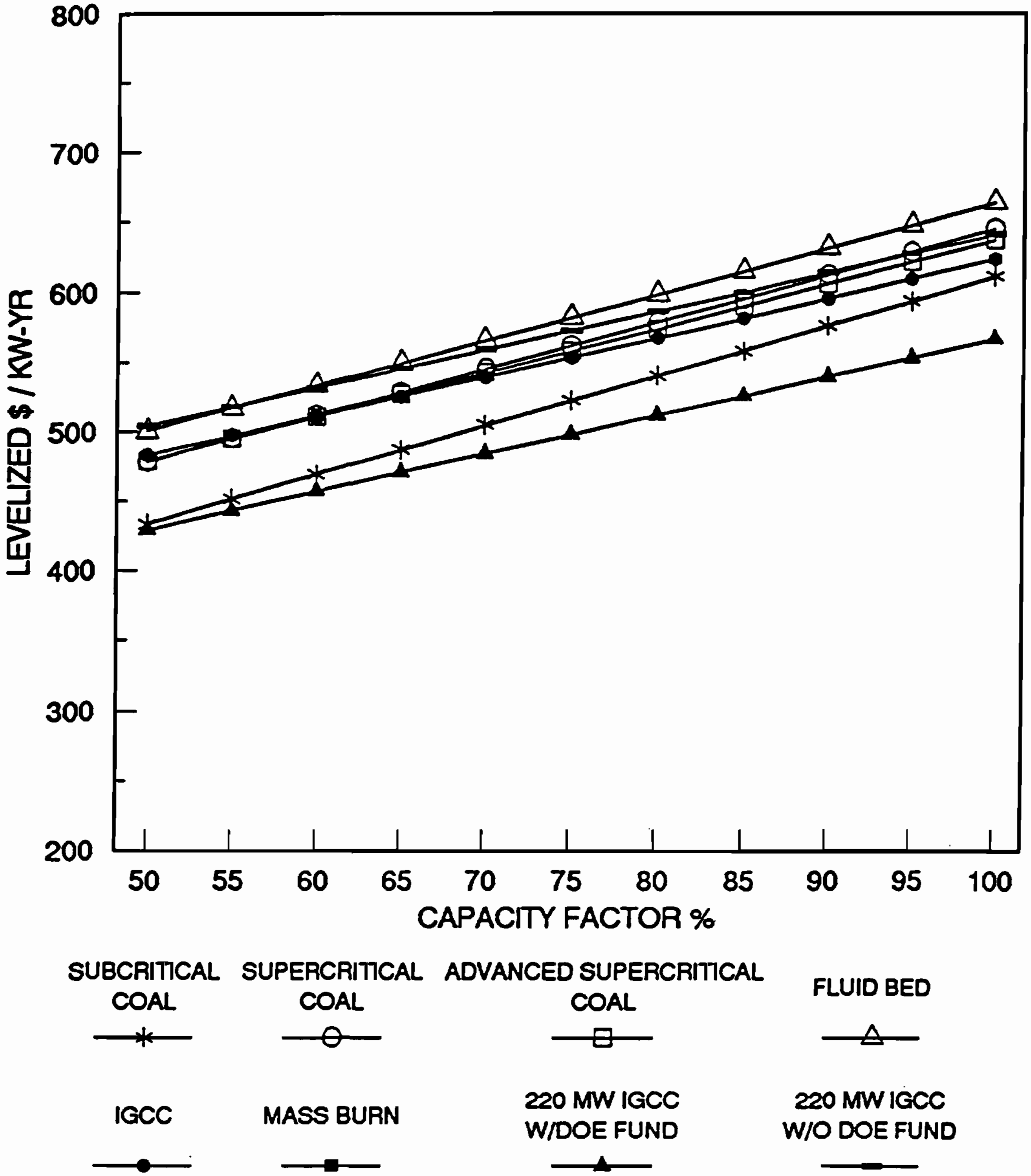
Intermediate Load Technologies

- IGCC,
- CC,
- Phosphoric acid fuel cell,
- Photovoltaic solar cell, and
- Solar thermal, and

Peaking Technologies

- CT.

The baseload conventional PC and IGCC technologies were maintained because of their relatively low levelized costs, and compared to other baseload technologies, the favorable environmental performance of IGCC units compared to conventional coal units. The CC unit had the best economics of all of the intermediate technologies, but the fuel cells and solar technologies were advanced into the economic analysis



NOTE: MSW-MASS BURN not pictured because the minimum Levelized Cost (Capacity = 0%) is greater than 800 $/KW-YR.

FIGURE 8.2.3-1.

ECONOMIC SCREENING CURVES--BASELAOD UNITS

Source: Tampa Electric Company, 1991.

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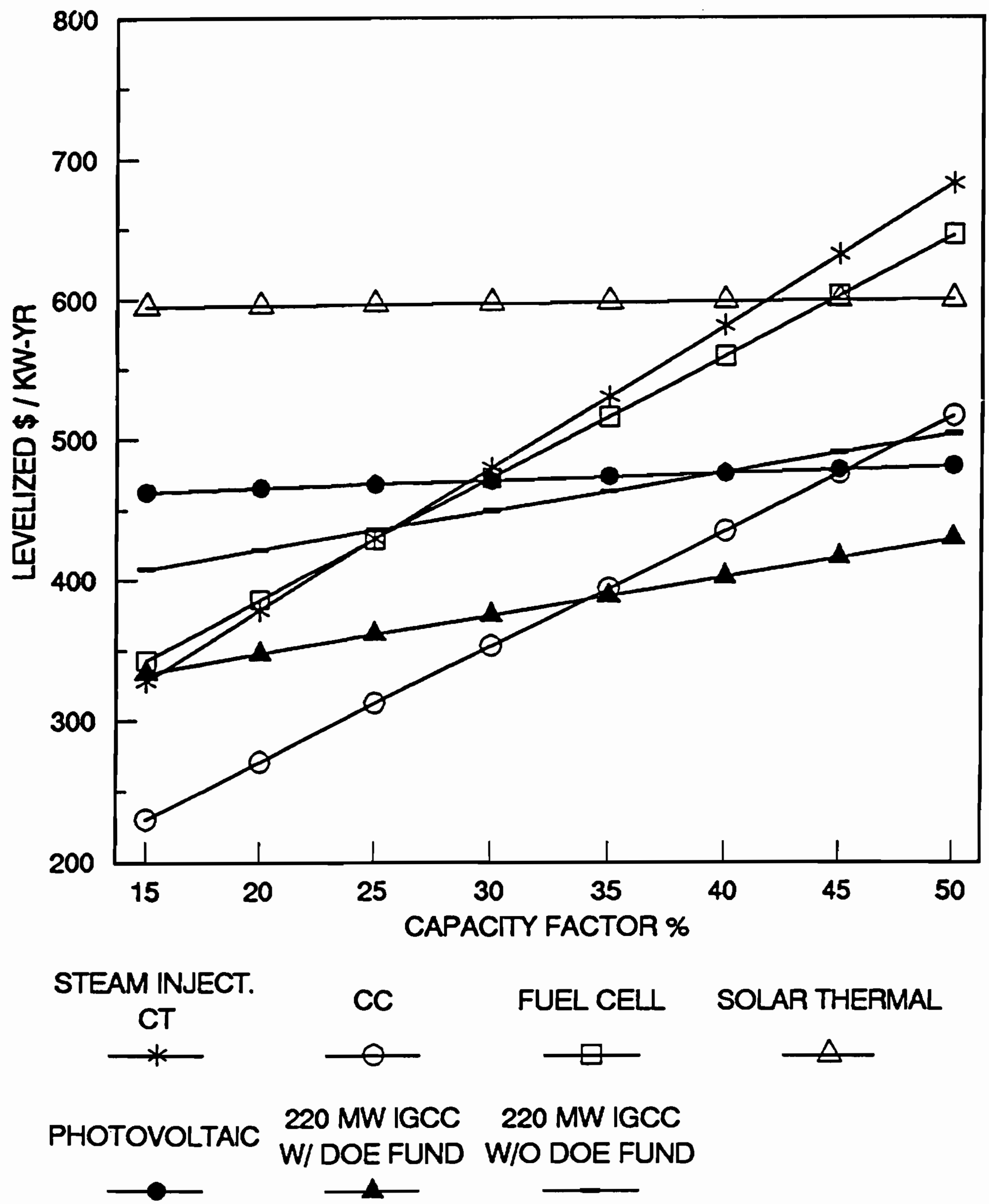

FIGURE 8.2.3-2.

ECONOMIC SCREENING CURVES--INTERMEDIATE UNITS

Source: Tampa Electric Company, 1991.

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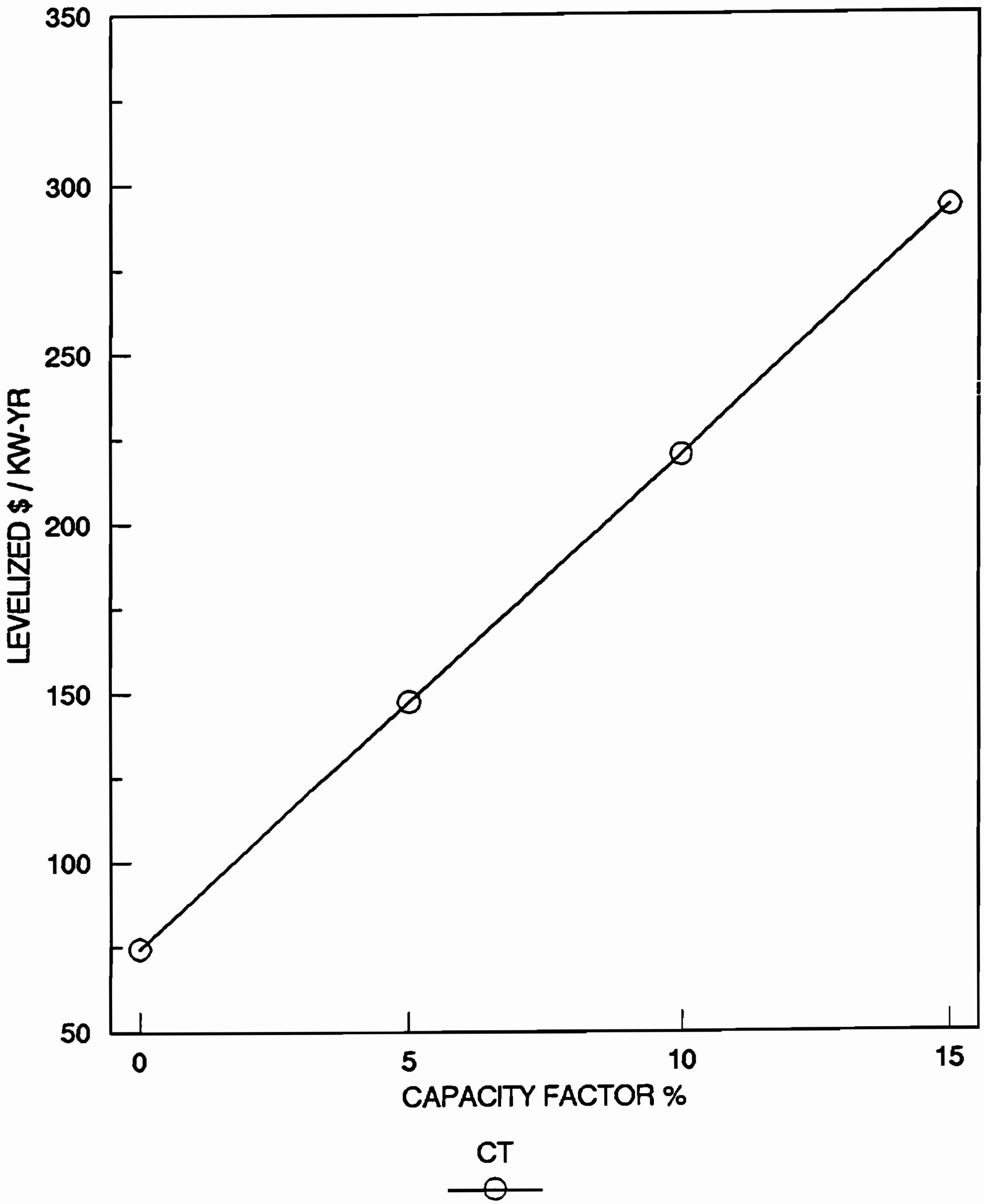

FIGURE 8.2.3-3.

ECONOMIC SCREENING CURVES--PEAKING UNITS

Source: Tampa Electric Company, 1991.

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because of their exceptional environmental performance (very low noise, extremely low or no emissions, possibility of siting in or close to load centers).

The goal of the economic optimization analysis was to identify the best resource plan for serving the forecasted energy requirements. The development of the supply side plan involved the use of dynamic programming to optimize the mix of generating capacity on the system. The objective function of the optimization analysis was to minimize present worth revenue requirements for the Tampa Electric Company system.

First, in the analysis, various power resource scenarios, comprised of a mixture of the remaining alternative generating technologies, joint participation and purchased power generation, and DSM programs were developed. Next, these alternatives were analyzed, along with future system demand and energy requirements, future DSM programs, and existing generating capabilities, to arrive at a number of viable generating expansion scenarios involving combinations of the alternative generation technologies, conservation, DSM programs, and power purchases. Each alternative satisfied the established reliability criteria.

The capital expenditures associated with each capacity addition were determined based on the alternative generation technology, fuel type, and in-service year. The fixed charges resulting from the capital expenditures were expressed in present-worth dollars for comparison.

The fuel and the operation and maintenance costs associated with each power resource scenario were projected based on estimated unit dispatch. The projections, also expressed in present-worth dollars, were combined with the fixed charges to obtain the total present worth of revenue requirements for each alternative power resource plan.

The expansion plan which was initially identified by this analysis as having the lowest revenue requirements was then compared to other generation plans which may be strategically superior for Tampa Electric Company and its Customers. These various expansion plans were again compared to one another on an economic basis, including an analysis of the sensitivity of the revenue requirement projections to changes in base case assumptions regarding fuel availability and costs.

The final step in the power resource planning process was a strategic issues/risk analysis which was conducted to compare the overall performance of each individual generation expansion plan alternative under additional factors that were not easily quantified. These strategic issues may affect the type, capacity, and/or timing of Tampa Electric Company's future generation resource requirements. These issues, such as high and low fuel price, natural gas availability, environmental legislation, and potential joint ownership projects, were evaluated in the process of determining the optimal expansion plan. In this way, an economically sound expansion plan is selected which has the flexibility to respond to future technological and economical changes.

8.2.3.1 Proposed Project Technologies

Based on these analyses, Tampa Electric Company's proposed power resource plan for generating capacity additions which best meets its Customers needs during the 1995 through 2010 period was presented in Table 1.3.3-1. The proposed plan includes three of the seven alternative generation technologies which were considered in the economic optimization analyses. The proposed plan involves a combination of IGCC, CC, and CT generation technologies. The four technologies not included in the proposed plan were conventional PC with FGD units, phosphoric acid fuel cell, photovoltaic solar cell, and solar thermal. Despite their exceptional environmental performance, the latter three technologies were not included at this time primarily due to the status of the technology development (i.e., pilot scale for the solar photovoltaic cell and phosphoric acid fuel cell) and their relatively high costs.

As baseload technologies, IGCC and PC with FGD have relatively similar costs; however, IGCC technology was selected due to its better environmental performance. Further, Tampa Electric Company's opportunity to obtain $120 million in DOE funding for the Polk Unit 1 under the Clean Coal Technology Demonstration program makes the IGCC unit the most cost-effective generation alternative to meet the capacity needs and Customer demands.

8.2.3.2 Potential Alternative Technologies

Based on the previous evaluations, potential alternative technologies to the proposed Polk Power Station project may include:

- Three CC units without CG facilities,
- Three IGCC units, and
- PC with FGD units.

CT units are the most reliable, cost-effective, and environmentally acceptable technology for providing peak load needs; therefore, no alternatives for these units were considered reasonable for the proposed six stand-alone CT units for the Polk Power Station project.

Three CC Units Without CG Facilities

CC units using only natural gas or oil as fuel would have certain environmental advantages compared to the proposed IGCC technology since this alternative does not involve the handling and storage of coal or coal combustion by-products. However, natural gas and fuel oil can be subject to availability limits and significant changes in price in certain economic and political conditions, while coal prices and supplies are projected to be relatively stable in the foreseeable future. The capability of the proposed CC units to burn a combination of natural gas, fuel oil, or coal gas provides a high degree of fuel flexibility to maintain a reliable and cost-effective power supply. Due to this fact, the alternative of using three CC units without CG capabilities would not meet the overall objective of the project and may have an adverse effect on Tampa Electric Company's ability to supply reliable, cost-effective power to its Customers in the future.

Three CC units without CG facilities would also not meet the project objectives of DOE to conduct cost-shared projects to demonstrate innovative, energy-efficient, and environmentally acceptable generating technologies using coal under its Clean Coal Technology Demonstration program. The fact that the proposed IGCC unit will include both the HGCU demonstration technology and the proven CGCU technology to control emissions of SO_2 avoids any risks for Tampa Electric Company and its Customers in providing a reliable power supply. Therefore, since the alternative of using all three CC units without CG capabilities would not meet the overall project objectives of Tampa Electric Company and DOE, this alternative was not considered reasonable for further analysis.

Three IGCC Units

The two stand-alone CC units proposed for the Polk Power Station project will be designed, with some modifications, to be capable of using coal gas as well as the currently proposed primary natural gas and backup fuel oil fuels. The alternative of using three IGCC units would primarily involve constructing additional CG facilities at the site to provide coal gas for the two CC units and expanding certain of the coal handling and storage facilities and, possibly, the temporary by-product (i.e., slag and sulfur) storage areas. The proposed treatment system for CG wastewaters and the associated brine storage area would also need to be expanded. Therefore, the expansion of these facilities would involve a greater use of land resources on the site compared to the proposed project. Sufficient land area is available within the main plant site area to locate these additional and/or expanded facilities.

For this alternative, most of the other facilities proposed for the project, such as the rail spur, process water supply system, and cooling reservoir, would not require changes or expansions. Also, potential environmental issues such as air emissions and water uses and discharges would be relatively similar between the proposed project and the alternative of providing CG capabilities for the two other CC units.

Construction of the additional CG facilities would involve increased capital expenditures. According to Tampa Electric Company's power resource planning efforts, the two stand-alone CC units are currently proposed to meet future intermediate load power supply needs, while the proposed IGCC unit is proposed to meet baseload needs. Therefore, at this time, additional capital expenditures for the CC units with lower, intermediate loads would not be as cost-effective as the proposed project based on projected prices for natural gas, fuel oil, and coal. However, since natural gas and fuel oil can be subject to unanticipated, significant changes in price, the cost-effectiveness of providing the additional CG facilities may change in the future and meet Tampa Electric Company's project objective of providing the most cost-effective power supply to meet its Customer needs. In addition, the alternative of providing CG capabilities for all three CC units would provide Tampa Electric Company with additional flexibility to respond to future changes in relative prices and availability of natural gas, fuel oil, and coal as fuels.

This alternative would also meet the project objectives of DOE since it would not affect the proposed project demonstrations of the integration of CG and CC technologies and the HGCU system. The possible addition of CG facilities for the two proposed stand-alone CC units may even further DOE's overall Clean Coal Technology Demonstration program objectives for the commercialization of its demonstration projects.

Based on these facts, the alternative generation technology of providing CG facilities for the two proposed stand-alone CC units is considered a reasonable alternative. There is sufficient land area within the main plant site area to locate the additional CG facilities and to expand associated facilities such as coal, slag, and sulfur storage areas and CG wastewater treatment and brine storage areas. Most other facilities, such as the cooling reservoir, water supply and use, rail spur, and access roads, would not require changes or expansions. Any potential environmental issues could be avoided or minimized by proper design and controls similar to the proposed IGCC unit. Therefore, Tampa Electric Company could implement this alternative of adding CG facilities for one or two of the stand-alone CC units at the Polk Power Station at some time in the future. The future decision to implement this alternative would be primarily based on economic considerations regarding the level of additional capital expenditures and the relative prices of coal, natural gas, and fuel oil as fuels for the units and Tampa Electric Company's obligation to implement the most cost-effective power resource plan to meet the electricity demands of its Customers.

PC With FGD Units

Similar to the IGCC technology, the use of PC units with a FGD system was considered as a potential alternative generating technology based on future natural gas and fuel oil availability and price stability considerations relative to coal fuel. This potential alternative would involve the use of PC unit(s) instead of the proposed IGCC unit and/or instead of one or both of the two proposed stand-alone CC units.

The use of the PC unit generating technology instead of the proposed IGCC unit would similarly avoid the price stability and availability concerns associated with natural gas and fuel oil. However, the alternative PC technology has the relative disadvantage compared to the IGCC technology in not allowing the flexibility to use these other fuels in the event of coal delivery disruptions and unforeseen coal price fluctuations. This lack of fuel flexibility could adversely impact Tampa Electric Company's project objective and obligation to most cost-effectively meet the future power demands of its Customers.

Several potential environmental issues associated with proposed IGCC and alternative PC technologies are similar since both technologies involve the delivery, handling, and storage of coal, and generate solid by-products which require development of some onsite storage facilities. However, the PC technology also has certain environmental disadvantages relative to the proposed IGCC unit.

Table 8.2.3-2 provides a comparison of key facility and environmental requirements for nominal 400-MW IGCC and PC with FGD power plants. These requirements were developed based on a study sponsored by EPRI which specifically evaluated and compared the overall performance, capital cost, and environmental emissions and issues for comparable IGCC and PC generating units (EPRI, 1988). In this EPRI study, specific criteria and design assumptions were established to evaluate the IGCC and PC technologies on the most consistent basis possible. For example, the evaluations were based on units and systems that would provide similar nominal net generating capacities and used a single design coal fuel, Illinois No. 6, which also is the coal, with certain modifications, considered for licensing purposes for the proposed IGCC unit for the Polk Power Station. Also, the sites for both units were assumed to be *green field* locations where all generating unit and associated facilities (e.g., rail spur, access roads, fuel storage area, cooling system, etc.) would need to be developed.

As shown in Table 8.2.3-2, the PC unit requires slightly more land area for the main power plant facilities than an equivalent IGCC unit, primarily due to the need for a larger coal storage area to provide a similar time period of fuel supply based on its relatively higher coal consumption rate (i.e., higher net heat rate). The PC unit would require almost twice as much land area for permanent storage of solid by-products (i.e., bottom and fly ash and gypsum) due primarily to its higher production volume of gypsum from the FGD system to control SO_2 emissions relative to the elemental sulfur recovery and H_2SO_4 volumes from the IGCC unit syngas cleanup systems. A higher land area requirement would also be required to provide a similar period of storage for gypsum from the PC unit on a temporary basis relative to the elemental sulfur from the IGCC unit, assuming that both by-products were marketable for offsite use. The PC unit with a FGD system also requires facilities for the delivery, handling, and storage of limestone which is not required for the assumed IGCC unit technology.

Table 8.2.3-2. Comparison of Key Facility and Environmental Requirements for Nominal 400-MW IGCC and PC Power Plants

Facility Requirement	IGCC Plant	PC Plant
Land area		
Power plant and fuel handling/storage facilities (acres)	190	215
Permanent solid waste/by-product disposal, if needed (acres)	100	180
Net heat rate (Btu/kwh)	9,132	9,737
Coal usage, as received, 100 percent load (tph)	153	176
Limestone usage (tph)	N/A	21
Water flows		
Condenser circulating water (gpm)	99,010	158,330
Cooling makeup water (gpm)	2,014	3,228
Process/service water supply (gpm)	875	519
Wastewater flows		
Cooling tower blowdown (gpm)	206	330
Boiler blowdown (gpm)	23	30
Demineralizer spent regenerant (gpm)	46	10
Other treated wastewater (gpm)	414	10
Air emissions, stacks only		
SO_2 (lb/hr)*	996	1,190
NO_x (lb/hr)*	345	790
Particulates (lb/hr)	†	33
Solids		
Sulfur (tpd)	119	
Gypsum, dry (tpd)		776
Slag/ash, dry (tpd)	345	383

Note: N/A = not applicable.

* Air emission rates from the PC plant have been modified from the EPRI study to reflect 95-percent sulfur removal efficiency versus 90-percent in the study, and NO_x emissions of 0.2 lb/MMBtu versus 0.5 lb/MMBtu in the study.

† Negligible.

Sources: EPRI, 1988.
ECT, 1992.

The alternative PC technology would require more than 60 percent more water for condenser cooling purposes as an equivalent IGCC unit since PC unit electricity generation is totally based on STs whereas only the HRSG/ST component of the IGCC unit requires cooling water. The EPRI study was based on the use of mechanical draft cooling towers as the heat dissipation system for both the IGCC and PC units. If a cooling reservoir was used as the proposed heat dissipation system, PC units would also involve significantly higher water volumes for circulating water, makeup water, and blowdown purposes than IGCC units. Therefore, if a PC unit was used instead of the proposed IGCC unit or the CC units for the Polk Power Station, the proposed cooling reservoir area would need to be increased and the proposed cooling water makeup from the Floridan aquifer and discharge volumes would be significantly increased. However, the PC unit would require less process/service water than an equivalent IGCC unit and would require the treatment of significantly less wastewater than the IGCC unit, primarily due to water uses in the CG process.

The air pollutant emission rates presented in Table 8.2.3-2 reflect modifications of the rates contained in the EPRI study to represent similar sulfur removal efficiencies (i.e., 95 percent) for SO_2 emissions for both technologies and more current assumed performance standards for NO_x emissions from PC units. Even with these modifications to reflect better efficiency and performance of the PC unit, the use of the PC technology would still result in higher SO_2 emissions and more than two times higher NO_x emissions than from the equivalent IGCC unit. Also, particulate emissions from the exhaust stack would occur from the PC unit, while particulate emissions from the IGCC unit are negligible.

Finally, using conventional PC generation technology instead of the proposed IGCC unit would not meet DOE's objective to demonstrate clean coal technologies and DOE would not be a cost-sharing participant in the project. Therefore, Tampa Electric Company and its Customers would not have the financial benefit of DOE's $120 million participation in the proposed project. Based on this fact and the relative environmental disadvantages of the PC technology in terms of land and water use requirements, the use of a PC unit instead of the proposed IGCC unit was not considered a reasonable generation alternative for further analysis by Tampa Electric Company.

The use of PC units instead of one or two of the proposed stand-alone CC units would also involve limitations in future fuel use flexibility and additional land use and environmental acceptability issues compared to the proposed project. For example, even though not proposed at this time, use of PC units versus CC units would preclude the flexibility and possible cost-effectiveness to use natural gas or fuel oil in addition to coal as fuel for the two CC units. Compared to the proposed stand-alone CC units, one or two PC units would involve the use of significantly more land area for the power block facilities, coal and by-product storage, and cooling reservoir areas; significantly increased groundwater withdrawals and cooling water blowdown; and increased NO_x and particulate air emissions.

Also, the CC technology allows the development of generating capacity in phases to cost-effectively match the growth in electricity demands. For example, one or two CT units can be developed and operated in simple-cycle mode for some time period prior to adding HRSG and ST facilities to complete the CC units. Therefore, capital expenditures can also be phased to most cost-effectively meet future demands and changes in future demands. On the other hand, PC units must be developed in total at one time and generally must be relatively larger (i.e., generating capacities of 300 MW or more) than CC to be considered cost-effective for electricity generation. Therefore, the PC technology requires that all capital investment be made at one time and may result in development of excess capacity for some time until demand growth catches up with the large capacity addition.

Finally, CC units have more operational flexibility than PC units in responding to and meeting the various types of demands and system needs (i.e., peaking, intermediate, and baseloads). CC units can start and stop generating electricity relatively faster than PC units to meet peak and intermediate loads, particularly when the CT components are operated in simple-cycle mode using bypass exhaust stacks. Whereas, PC units can require up to 24 hours to begin generating electricity depending on their shutdown status and are generally used to meet only baseload demands. Based on Tampa Electric Company's power resource plan, the proposed CC units at the Polk Power Station are needed to meet future intermediate loads for which PC units are generally not considered operationally suitable.

Thus, the generation technology alternative of using PC instead of the proposed stand-alone CC units was not considered to offer any environmental, operational, or cost-effectiveness advantages in meeting the project objectives compared to the proposed project. This alternative generation technology was not considered as a reasonable alternative for the proposed Polk Power Station project.

8.3 PROPOSED SITE DESIGN ALTERNATIVES

The following sections discuss the potential alternatives to the major processes, facilities, and systems comprising the proposed Polk Power Station project. These potential alternatives were identified and evaluated by Tampa Electric Company to determine which alternatives were considered reasonable compared to the proposed project based on environmental, engineering, and economic factors. The introduction to Chapter 8.0 described the approach for determining whether or not an alternative was considered reasonable relative to the objectives and needs for the proposed project based on environmental, technical, and economic considerations.

8.3.1 SITE LAYOUT ALTERNATIVES

Within the Polk Power Station site, two potential alternatives were considered regarding the location and layout of the proposed facilities. These potential alternatives included Tampa Electric Company's proposed site layout and a layout reversing the locations of the coal and slag storage areas. Due to the size of the proposed site (i.e., 4,348 acres), numerous site layout alternatives could have been considered. However, the use of the limited unmined area on the site to the east of SR 37 for the main power plant structures and facilities, and the use of mined-out portions for the cooling reservoir and other water management/wildlife habitat areas were determined to take the best advantage of the existing site conditions. These proposed uses would minimize earth-moving costs, while enhancing the environmental quality of the mined-out areas through effective reclamation programs.

8.3.1.1 Proposed Site Layout

Figures 3.3.0-1 and 3.2.0-2 show the proposed layout of the major facilities for the Polk Power Station project. The main power plant facilities will be located on unmined lands to the east of SR 37. Although not mined, this area has been disturbed (e.g., used for dragline walks, service roads, and material storage) by adjacent mining activities. The area contains several small, isolated marsh and willow/elderberry swamp wetlands. Most of these wetland areas have also been previously disturbed by adjacent phosphate mining activities. According to Tampa

Electric Company's proposed development plans, the entire main facility area which is currently approximately 140 ft-NGVD will be filled to an elevation of between 140 to 145 ft-NGVD to provide adequate flood protection and drainage for the facilities. The fill material will be obtained from spoil piles in adjacent mined-out areas during the cooling reservoir construction. Therefore, the existing small wetland areas on the main plant site area will be impacted by the proposed project site layout.

Since these small wetlands are in scattered locations on the unmined plant site area, it would be extremely difficult and costly to design a facility layout which avoided these wetlands. As discussed in Section 2.3.6, the overall ecological value and function of these isolated wetlands are limited. Further, as discussed in Section 4.4, the proposed development/reclamation plan for the Polk Power Station site will result in an overall net increase in wetland acreages on the site compared to pre-mining conditions which will provide appropriate mitigation for the loss of these small wetland areas. Therefore, the impact of the loss of these wetlands on the main plant site area is considered minimal and mitigated by the reclamation of wetlands on other areas within the site.

8.3.1.2 Alternative Site Layout

In the proposed project layout, the coal storage area is located within the onsite rail loop and the temporary slag storage area is located east of the coal yard and adjacent to the CG facilities (see Figure 3.2.0-2). Tampa Electric Company evaluated the alternative of reversing the coal and slag storage area locations. However, the alternative of reversing the area locations was found to have no environmental advantages and would decrease the efficiency (i.e., increase costs) of the operations. This alternative layout would also involve the filling of the small wetland areas on the main plant site area. Based on these findings, Tampa Electric Company selected the proposed site layout and did not consider the alternative layout as a reasonable alternative for further analysis.

8.3.2 FUEL HANDLING AND STORAGE ALTERNATIVES

The proposed Polk Power Station project will involve the delivery, handling, and storage of primarily three fuels: natural gas, No. 2 fuel oil, and coal. Natural gas will be delivered to the site by pipeline from the existing or future gas transmission system in the region. The specific route for the pipeline has not been determined at this time (see Section 8.3.9). Natural gas will not be stored on the site. Fuel oil will be delivered to the site by tanker truck, rail, or potentially pipeline if the proposed GATX fuel oil pipeline is constructed along Fort Green Road adjacent to the eastern boundary of the site. Fuel oil will be stored in steel tanks designed in accordance with applicable regulatory standards and include a surrounding impervious spill catchment berms and stormwater collection and oil/water separation treatment systems. Coal will be delivered to the site by rail and/or by truck. A rail spur accessing the site will be constructed from the existing CSX Railroad line which runs adjacent to the eastern site boundary along Fort Green Road. Truck delivery of coal will involve the use of custom-designed aluminum, bottom-dump trailers with knife gate top covers to prevent fugitive dust impacts during transport.

All of the proposed fuel delivery systems will be designed to meet applicable regulatory standards and codes to minimize potential safety concerns and environmental impacts. No reasonable alternatives to these proposed fuel delivery systems were identified and considered by Tampa Electric Company.

For the proposed Polk Power Station project, coal will be unloaded from the rail cars and/or trucks by bottom dumper into receiving hoppers and transported by conveyor to the coal storage area. Reclaiming of the coal pile will be by mobile equipment (i.e., bulldozers). The coal storage area will be lined with a synthetic liner or other materials with similar low-permeability characteristics and be designed with stormwater runoff and leachate collection and treatment systems prior to discharge of the treated runoff water to the cooling reservoir for reuse. The coal handling and storage facilities will also include appropriate fugitive dust controls (e.g., covered conveyors, baghouses at transfer points, and water spraying of piles).

Potential alternatives to the proposed coal unloading and stacking methods include rail car rotary dumpers, boom stacker, traveling stacker/reclaimer, and rotary plow reclaim. Since these alternatives do not provide environmental advantages compared to the proposed methods and would involve significantly higher costs, Tampa Electric Company did not consider these alternatives reasonable for further analysis.

Potential alternatives to the proposed lined coal storage area would involve use of an unlined storage area and/or a covered storage area. An unlined coal storage area would result in significant cost savings; however, it would have greater potential environmental impacts due to leachate seepage into the surficial aquifer. Due to the environmental disadvantages, the unlined storage area alternative was not considered reasonable.

The alternative of a covered coal storage area would have several environmental advantages. The cover would eliminate or minimize rainfall from entering the coal pile and, therefore, minimize potential leachate seepage impacts. Also, the cover would potentially reduce fugitive air emissions from the coal pile relative to an uncovered pile. However, the covered coal storage area alternative would involve significantly higher costs than the proposed storage area plans.

The proposed lined coal storage area will minimize potential leachate seepage impacts and the management plans for the pile include appropriate fugitive emission control measures such as wetting and use of crusting agents on the inactive pile. Thus, the relative environmental advantages of the covered coal storage area alternative versus the proposed storage area plans are minimal and Tampa Electric Company selected the proposed plan since it involved significantly lower costs.

8.3.3 COOLING SYSTEM ALTERNATIVES

The cooling or heat rejection system involves the transfer and/or rejection to the atmosphere of waste heat from the condensation of the steam turbine exhaust steam. Optimization of the heat rejection system will minimize plant capital and operation costs as well as potential environmental impacts of the operations. In general, three alternative cooling systems are available for power plant facilities involving steam turbine generating technology:

- Cooling reservoir,
- Cooling towers, and
- Once-through cooling.

Once-through cooling requires the availability of very large quantities of water compared to the other cooling systems and is, therefore, usually feasible only for coastal sites or inland sites adjacent to large rivers or lakes. Given the location of the proposed Polk Power Station site, the alternative of a once-through cooling system was not considered to be a reasonable or even a feasible alternative.

8.3.3.1 Proposed Cooling Reservoir System

Tampa Electric Company evaluated the alternatives of using either a cooling reservoir or mechanical draft cooling towers as the heat rejection system for the proposed Polk Power Station project. Tampa Electric Company selected the cooling reservoir alternative as the proposed system for the project based on a combination of environmental and engineering/economic considerations as well as the existing characteristics of the site. The proposed reservoir will be constructed in an area which has been mined for phosphate and currently consists of water-filled mine cuts between rows of spoil piles. Locating the reservoir in this area offers several advantages. First, the mined-out area will be required to be reclaimed even without the proposed reservoir use; therefore, the costs associated with the reservoir development for the most part represent reclamation costs which would be required in any case. Second, constructing the reservoir in the mined-out lands allows the reservoir the be primarily a below-grade water body. As a below-grade facility, some of the needed makeup water will be provided by surficial aquifer groundwater seepage, reducing the use of groundwater pumped from the Floridan aquifer for makeup.

Further, the cooling reservoir alternative reduces the need to discharge cooling water blowdown and treated wastewaters from the site to surface water bodies. Treated process wastewaters, except from the CG facilities, will be discharged to the cooling reservoir for reuse as the recirculating water which again reduces the use of pumped groundwater for cooling water makeup. The normal operating level of water in the reservoir will be approximately 136 ft-NGVD, with an outfall control structure designed to allow for continuous blowdown discharges as well as to control stormwater discharges from the reservoir. Based on this design, the cooling reservoir will have storage capacity to detain direct rainfall on and runoff to the reservoir to reduce peak runoff flows during storm events and to maintain mass flow contributions to the Little Payne Creek system. Based on the outfall control structure design, discharges from the cooling reservoir will be approximately 3.1 MGD on a daily average basis. Further, based on the estimated water quality in the reservoir, the discharged water will not require treatment and will not result in adverse impacts to water quality and quantity conditions in the receiving water body, Little Payne Creek.

The estimated costs for site development and construction of the cooling reservoir are approximately $8.9 million. However, if the mined-out area for the reservoir was not used for this proposed project use, the area would still need to be reclaimed in compliance with FDNR reclamation regulations. The estimated costs for these agency-required reclamation activities would be approximately $4.2 million. Therefore, the net estimated costs for developing the mined-out area for the proposed cooling reservoir versus required, standard reclamation of the area are approximately $4.7 million. Also, the proposed cooling reservoir will require less electrical power to operate than the alternative cooling tower system which equates to additional cost savings for the proposed reservoir.

8.3.3.2 Alternative Cooling Tower System

The alternative cooling system would involve the use of mechanical draft cooling towers. In a mechanical draft cooling tower system, cooling water is pumped from the cooling tower basin through the condenser to condense the turbine exhaust steam. This heated water is returned to the cooling tower where it is distributed over the tower fill and allowed to cascade down through the tower. Large fans pull air through the tower; heat exchange occurs by evaporation and convection. Cooling tower water evaporation losses would be replaced by makeup water pumped from the Floridan aquifer. Based on the anticipated Floridan aquifer water quality, treatment of makeup water would be required to allow approximately 15 cycles of concentration. The 15 cycles were selected to minimize groundwater withdrawals. Blowdown (i.e., discharge) from the cooling tower system would be required on a routine basis to maintain adequate water quality in the tower for efficient performance. This blowdown water would not meet Florida Class III surface water quality standards or groundwater quality standards. Therefore, the blowdown water would require extensive treatment prior to reuse and/or discharge from the site. Additional land area on the site would be required for the treatment of the cooling tower makeup and blowdown waters and for the disposal of sludge and solid wastes generated by these water treatment systems.

The drift from cooling towers at 15 cycles of concentration would have a high TDS and would contribute to particulate loading to ambient air quality. The drift would also have potential terrestrial ecology impacts.

Based on Tampa Electric Company's evaluations, the alternative cooling tower system was considered to have greater environmental impacts than the proposed cooling reservoir system. Wastes from the required treatment systems for the cooling tower makeup and blowdown waters would require the development of additional landfill areas on the site or consume offsite landfill capacities if the wastes were shipped offsite for disposal. The use of cooling towers would also involve potential environmental impacts associated with drift from the towers.

The estimated costs for the cooling tower equipment, equipment foundations, and associated water treatment facilities are approximately $19.2 million. As discussed previously, the construction costs for the cooling reservoir are approximately $8.9 million; however, the mined-out area for the proposed cooling reservoir would still need to be reclaimed at an estimated cost of $4.2 million to meet agency requirements, if the cooling tower alternative was used for the project. Therefore, the cooling tower alternative would require approximately $14.5 million more in expenditures than the proposed cooling reservoir.

Based on these evaluations, the use of the cooling tower system alternative for the Polk Power Station versus the proposed cooling reservoir would result in increased environmental issues and potential impacts and significantly higher costs for the facility construction, operation, and maintenance. Thus, the cooling tower alternative offered no environmental or economic advantages compared to the proposed cooling system and was not considered a reasonable alternative for the proposed project.

8.3.4 BIOLOGICAL FOULING CONTROL ALTERNATIVES

Periodic biocide treatment of recirculating cooling water is necessary to control biological fouling of condensers, associated piping, and related equipment. Potential biofouling control alternatives include:

- Chlorination,
- Sodium bromination,
- Ozonation,
- Ultraviolet radiation, and
- Mechanical cleaning.

8.3.4.1 Proposed Biofouling Control Method

For the Polk Power Station project, chlorination using sodium hypochlorite, gaseous chlorine, or bromine chloride is the proposed method for biocide treatment of recirculating cooling water withdrawn from and returned to the cooling reservoir. Chlorination is the most widely used and environmentally-accepted biocide treatment method in the electric utility industry. When dissolved in water, chlorine hydrolyzes to form hypochloric and hypochlorous acids which are effective biocides. Biological control is achieved by periodically adding sufficient chlorine (i.e., termed shocking) to the recirculating water intake stream to provide a residual chlorine concentration which kills micro-organisms. The total residual chlorine concentration (i.e., free plus combined residuals) is maintained long enough in the system to kill the micro-organisms within the recirculating water condenser, piping, and equipment.

Based on extensive, demonstrated experience in power plant operations, the use of chlorine as a biocide can be effectively managed to minimize residual chlorine concentrations in the cooling reservoir. Also, given the large volume of water in the reservoir, any residual chlorine in the recirculating water discharge to the cooling reservoir will be quickly dissipated or *consumed* within the reservoir shortly after discharge. Therefore, residual chlorine concentrations in the cooling reservoir and proposed discharges from the reservoir will be below state and federal water quality standards and have no environmental impacts on groundwater and surface water resources in the vicinity of the Polk Power Station site.

8.3.4.2 Potential Alternative Biofouling Control Methods

Based on operational experience and testing programs, potential, non-chlorine biofouling control alternatives are considered less favorable than the proposed chlorination method primarily due to cost-effectiveness and operational efficiency factors. The uses of sodium bromide and ozone as biocides involve significantly higher operational costs than chlorine, especially in the treatment of such large water volumes as recirculating cooling water for power plants. Ultraviolet radiation also involves higher operational costs and has operational deficiencies since this alternative is relatively ineffective in treating water with suspended particles. Mechanical cleaning is ineffective in cleaning remote portions of the cooling system equipment and destroying micro-organisms suspended in the water.

Based on these considerations, these potential alternatives offer no environmental, operational, or cost-effectiveness advantages relative to the proposed chlorination method for biofouling control. Further, the use of chlorination has been widely demonstrated as a cost-effective, environmentally acceptable, and operationally efficient method for biofouling control within the power industry. Thus, Tampa Electric Company has selected chlorination as the proposed control method for the Polk Power Station.

8.3.5 COOLING WATER MAKEUP/PROCESS WATER SOURCE ALTERNATIVES

8.3.5.1 Proposed Water Sources

The proposed Polk Power Station project involves the use of a combination of sources for makeup water for the cooling reservoir to replace water primarily lost through net evaporation and for water quality management purposes. The proposed makeup water sources include:

- Direct rainfall on the reservoir;
- Direct stormwater runoff from surrounding and internal earthen berms;
- Treated stormwater runoff from areas associated with industrialized activities (e.g., coal and slag storage, power block, and fuel oil storage areas);
- Treated process wastewaters (except CG process waters);
- Treated domestic wastewaters;
- Net seepage from the surficial aquifer; and
- Groundwater pumped from the Floridan aquifer.

The proposed uses of all of these sources of cooling makeup water are focused on the objective of maximizing the reuse and recycling of water in order to minimize the use of groundwater withdrawals from the Floridan aquifer to provide cooling water makeup. According to current engineering designs and analyses, groundwater from the Floridan aquifer will be withdrawn and provided directly to the cooling reservoir at an estimated annual average rate of 5.0 MGD and a peak rate of 6.5 MGD to maintain normal operational water levels of approximately 136 ft-NGVD in the reservoir after full build-out of the proposed facilities. In addition, groundwater withdrawals from the Floridan aquifer for process, service, and potable uses are estimated to be approximately 1.6 MGD on an annual average basis and approximately 2.8 MGD on a maximum basis. Thus, for the proposed project, the total estimated groundwater withdrawals for cooling water makeup and other plant uses are approximately 6.6 MGD on an annual average basis under normal operating conditions at full build-out of the project (i.e., 1,150 MW) and a peak of 9.3 MGD.

Most of the groundwater for process uses will be treated prior to use in order to provide water with adequate high quality to meet required process water uses (e.g., boiler makeup, pump seals, and non-chemical cleaning). As discussed in Section 3.5, an R.O. system is proposed to treat the Floridan aquifer water, based on the relatively high quality of the water needed for process water uses and Tampa Electric Company's objectives to maximize the reuse of treated wastewaters and, in turn, minimize groundwater withdrawals.

8.3.5.2 Potential Alternative Water Sources

Potential alternative sources of cooling water makeup and process water to either replace or supplement the proposed Floridan aquifer groundwater withdrawals include:

- Groundwater withdrawn from the intermediate aquifer;
- Groundwater withdrawn from the deep, lower Floridan aquifer (i.e., highly mineralized water);
- Stormwater runoff from all or a larger portion of the site;
- Surface water from streams; and
- Public water supply/wastewater treatment systems.

The potential alternative of groundwater withdrawals from the intermediate aquifer at the proposed site does not provide environmental advantages compared to proposed withdrawals from the Floridan aquifer and potentially some disadvantages since many of the domestic water supply wells within the site vicinity are located in this aquifer. Further, the productivity of this aquifer is much lower than the Floridan aquifer; therefore, the extent of any potential aquifer drawdown impacts would be greater than those for the Floridan aquifer. Therefore, the intermediate aquifer was not considered a reasonable alternative for the required water supplies for the proposed project.

The potential alternative of withdrawing groundwater to supply all or some portion of the needed cooling water makeup and process water from the deep, lower

Floridan aquifer was considered by Tampa Electric Company. Water from this deep unit of the Floridan aquifer is highly mineralized and would require extensive treatment prior to use for potable, industrial process, and cooling makeup water purposes. Without pre-treatment, the use of this highly mineralized water would create significant operational and maintenance problems in process water systems and, if provided directly to the cooling reservoir for makeup water, would have adverse water quality impacts in the surficial aquifer due to groundwater seepage from the reservoir and from discharges from the reservoir. Therefore, use of groundwater from the deep, mineralized unit of the Floridan aquifer for process water or cooling water makeup would require extensive and costly pre-treatment compared to the proposed use of low mineralized water from the upper Floridan aquifer system. Such extensive treatment would also create additional volumes of brine or sludge wastes which, in turn, would require additional onsite or offsite disposal areas. Based on these facts, Tampa Electric Company did not consider the potential use of groundwater from the deep Floridan aquifer as a reasonable alternative to the proposed project.

In order to minimize groundwater withdrawals, Tampa Electric Company also considered the potential alternative of collecting and using stormwater runoff from all or a larger portion of the Polk Power Station site to supplement process water and cooling water makeup needs. This potential alternative would involve diverting some volume of the stormwater runoff to the Payne Creek, Little Payne Creek, and/or South Prong Alafia River drainage basins. The collected stormwater runoff from these drainage basins would be directed to the cooling reservoir in order to potentially reduce the need for groundwater withdrawals. However, based on the reclamation requirements of FDNR and SWFWMD to maintain hydrologic conditions relatively similar to pre-mining conditions in terms of the rate and volume of stormwater runoff, the incorporation of this potential alternative into the proposed project would not meet these regulatory reclamation requirements. Therefore, the potential alternative of collecting additional stormwater from the site area was not considered a reasonable alternative.

Withdrawals or diversions of surface water from the nearby Payne Creek, Little Payne Creek, and South Prong Alafia River systems were also considered as potential sources for process and cooling water makeup. However, due to the periodic low-flow conditions in these streams, the withdrawal of water for the proposed project use was not feasible and/or would create significant adverse environmental impacts on these stream systems. Thus, the potential alternative of using surface water sources for facility water needs was not considered reasonable for the proposed project.

Other potential alternative sources of cooling makeup and/or process water would be from public water supply or wastewater treatment systems. However, the nearest public systems are located over 10 miles from the site. Therefore, these alternatives were not considered reasonable at this time.

8.3.6 COOLING RESERVOIR WATER DISCHARGE ALTERNATIVES

8.3.6.1 Proposed Discharge System

The proposed Polk Power Station project has been designed to maximize the recycling and reuse of water in order to minimize groundwater withdrawals and water discharges. Except for the CG process waters, the treated wastewaters from other plant processes and systems will be routed to the cooling reservoir for reuse in the recirculating water cooling system. Discharges from the cooling reservoir are estimated to be approximately 3.1 MGD on an annual average basis to the Little Payne Creek drainage system. During storm events, discharges from the reservoir will be greater. However, the discharges of primarily excess stormwater will be managed and controlled to reduce peak flows from the reservoir and, in turn, downstream flooding conditions compared to pre-mining conditions and to satisfy FDNR and SWFWMD requirements for mass flow contributions.

8.3.6.2 Potential Alternative Discharge Systems

Potential alternatives for discharges from the cooling reservoir would include:

- Discharge to Payne Creek or South Prong Alafia River surface water systems,
- Deep well injection of discharge water, and
- Zero discharge from the cooling reservoir.

The first potential alternative would involve the discharge of water from the cooling reservoir directly to the Payne Creek or South Prong Alafia River systems. The Payne Creek and South Prong Alafia River drainage systems in the vicinity of the site have been significantly impacted by phosphate mining activities similar to the Little Payne Creek system, the proposed receiving water body. Direct discharges to these creeks from the cooling reservoir and plant site area would not meet FDNR requirements to reclaim drainage basins of mined areas to pre-mining conditions. Therefore, since the use of these other surface water drainage systems does not meet regulatory requirements and offers no environmental advantages, these potential discharge alternatives were not considered reasonable.

Another potential discharge alternative would involve disposing of the cooling reservoir discharge water in a deep injection well. This well would need to be at least 24 inches in diameter and at least 3,000 to 4,000 ft deep to reach deep strata that are capable of receiving adequate quantities of the discharge water. This potential discharge alternative would avoid any water quality or quantity concerns associated with the proposed discharge plan to the Little Payne Creek system. However, the injection well alternative would be costly to construct and would require extensive studies even to demonstrate its engineering feasibility. Therefore, this potential alternative was not considered reasonable for further analysis.

If the project were designed to have zero discharge from the cooling reservoir, potential environmental concerns with any discharges would be eliminated. The implementation of this zero-discharge alternative may be feasible by increasing the heights of the earthen berms surrounding the cooling reservoir to provide sufficient water storage capacity under all foreseen and unforeseen situations and providing water treatment facilities to ensure water quality in the reservoir does not exceed applicable groundwater and surface water standards. The specific height of berms required would be difficult to determine since the design must consider all, even unforeseen, future situations. Another means of implementing this zero discharge alternative would be to subject the potential discharge water or water within the reservoir to extensive treatment which would produce a concentrated solid waste. This solid waste would then need to be disposed in a landfill facility on- or offsite.

Both of these methods of potentially achieving the zero discharge alternative would involve significantly higher construction and operating costs compared to the proposed project. In addition, the technical feasibility of being able to demonstrate that zero discharges would occur under all future situations may not be possible. Based on these issues and the fact that the proposed discharge plan for the Polk Power Station project is expected to have minimal environmental impacts, the potential zero discharge alternative was not considered reasonable.

8.3.7 WASTEWATER CONTROL AND TREATMENT ALTERNATIVES

8.3.7.1 Sanitary Wastewater System Alternatives

The following potential alternatives were evaluated for treatment of the 10,500 GPD of sanitary wastewater generated from the proposed Polk Power Station project:

- Onsite package treatment system,
- Septic systems, and
- Offsite publicly owned treatment works (POTW).

Proposed Treatment System

The proposed onsite package treatment system is a prefabricated outdoor module which treats sanitary wastes through continuous aeration, sedimentation and biodegradation, filtration, and chlorination of the effluent prior to discharge to the cooling reservoir. The treatment process will generate sludge which will be dewatered and hauled offsite by a licensed contractor for disposal.

Potential Alternative Systems

The septic tank alternative is a relatively low-cost alternative. For this alternative, the onsite soils must have a satisfactory absorption rate without interference from groundwater or impervious strata. The septic system alternative is viable at the Polk Power Station site, but offers no environmental advantages compared to the proposed treatment system.

Offsite treatment involves directing the sanitary wastes by pipeline to the nearest POTW. The closest POTWs which may have sufficient capacity to accept the project sanitary wastewaters are located more than 10 miles from the Polk Power Station site (i.e., Mulberry or Fort Meade). The costs for the required pipeline from the site to these facilities and associated equipment would be extremely high and significantly exceed the costs for the proposed onsite treatment system. Also, construction of the pipeline may result in certain environmental impacts. Based on these considerations, the proposed onsite treatment system was considered as the only reasonable alternative for sanitary wastewater treatment.

8.3.7.2 Process Wastewater Treatment Alternatives

Proposed Treatment Systems

For the proposed Polk Power Station project, process wastewaters, except for process water from the CG facilities, and stormwater runoff from industrial activity areas of the site will be appropriately treated and routed to the cooling reservoir for reuse in the recirculating water cooling system. Sources of these process wastewaters include boiler blowdown, non-chemical cleaning water, and other low-volume, intermittent streams such as plant drains and laboratory wastes. Sources of stormwater runoff industrial activity areas include the coal, slag, fuel oil, and wastewater treatment sludge storage areas and the immediate power block areas. The proposed treatment systems for these wastewaters and stormwaters include a combination of sedimentation, oil/water separation, neutralization/oxidation, clarification, chemical restabilization, and polishing filtration. The treated waters will have acceptable quality for reuse in the cooling reservoir and their discharge to the reservoir will not create any significant adverse environmental impacts.

Potential Alternative Systems

Potential alternatives to the proposed process wastewater treatment system which were considered included:

- Discharge of treated wastewater directly offsite,
- Disposal of wastewater by deep well injection, and
- Zero liquid discharge treatment.

The discharge of treated wastewater directly to offsite surface waters (i.e., Little Payne Creek, Payne Creek, or South Prong Alafia River) rather than the proposed discharge to the cooling reservoir would create the need for additional groundwater makeup withdrawals by approximately 0.5 MGD to maintain the normal operating water level in the reservoir. Also, since the treated wastewater may not meet all Florida Class III water quality standards, the direct discharge of the wastewater to the smaller streams (i.e., Little Payne Creek and Payne Creek) in the site vicinity would not be feasible or permittable. These smaller streams do not have sufficient flow volumes to allow for mixing in compliance with the state standards. The South Prong Alafia River may have sufficient flow to allow for mixing; however, discharge of wastewater to the river offers no environmental advantages compared to the proposed discharge to the cooling reservoir since the water volume in the reservoir is greater than the river flow. Also, construction of a discharge pipeline to the South Prong Alafia River would involve higher costs than the proposed discharge plan.

As discussed previously for the cooling reservoir discharge alternatives, the potential alternative of disposing the treated wastewater in a deep injection well would involve construction of a 3,000 to 4,000-ft deep well to reach suitable strata for receiving the water. Again, the injection well alternative would be significantly more costly than the proposed discharge plan and would require extensive studies to demonstrate the feasibility of the alternative. Therefore, this potential alternative was not considered reasonable.

The final wastewater disposal alternative would involve the construction and operation of additional treatment facilities to reduce the wastewater to a solid waste or sludge with no liquid discharge. This alternative would eliminate any concerns associated with the quality of the treated wastewater in the cooling reservoir. However, the disposal of the solid waste or sludge would require additional land area for storage on the site or in an offsite landfill facility. Further, the construction and operation of such treatment facilities would involve significantly higher costs than the proposed plan.

Thus, these potential alternatives for wastewater disposal offered no significant environmental advantages compared to the proposed treatment and discharge system, and in most cases, would involve significantly higher costs and certain technical uncertainties.

8.3.7.3 Coal Gasification Process Water Handling Alternatives

The chemical and physical characteristics of process water from the gasification facilities depends on the composition of the coal used in the facilities. As a demonstration project, a variety of coals will be tested and used in the gasification facilities. Therefore, it is difficult to predict the specific quality of the process water generated in the gasification facilities at this time. Based on this consideration, the proposed gasification process water will be contained and processed in a separate system. The gasification process waters will be handled and recycled within the process, to the extent possible. The proposed handling system for the gasification process water will have no liquid discharges and after concentration, will create a brine which will be stored in a lined area on the site. At this time, no other alternatives were considered reasonable for the handling of the gasification process waters.

During and after the demonstration period for the IGCC unit, Tampa Electric Company will developed operational data on the quality of the gasification process water and examine other possible handling and treatment methods for this water. If these future operational testing data demonstrate that the gasification process water will meet applicable water quality standards after certain treatment and not adversely affect the reservoir operations, Tampa Electric Company may request appropriate regulatory approvals to discharge these process waters to the cooling reservoir.

8.3.7.4 Chemical Cleaning Wastewater Disposal Alternatives

The HRSG tubes will require pre-operational and periodic chemical cleaning to remove scale and corrosion and restore heat transfer surfaces. Wastewater produced by this chemical cleaning will be collected and removed by a licensed contractor for offsite treatment and disposal. This proposed disposal method was considered better environmentally than any other potential alternative.

8.3.8 BY-PRODUCT DISPOSAL ALTERNATIVES

For the proposed Polk Power Station project, the slag, sulfur, and H_2SO_4 by-products will be temporarily stored on the site and marketed and sold for offsite use. The proposed temporary slag storage area will be lined with a synthetic material or other materials with similar low-permeability characteristics and have a stormwater runoff collection system. The sulfur and H_2SO_4 will be temporarily stored in tanks or specifically designed rail cars.

Other potential alternatives for disposal of these by-products would be the provision of permanent storage facilities on the site or disposal in offsite landfill facilities. These potential alternatives would involve the commitment of much larger land areas, onsite or offsite, for storage of these by-products than the proposed disposal plans. These alternatives would also not take advantage of potential economic advantages resulting from the sale of these commercially useful by-products. Based on these facts, these potential alternatives were not considered reasonable.

8.3.9 ASSOCIATED FACILITIES CORRIDOR ALTERNATIVES

The proposed Polk Power Station project will include several associated, linear facilities: electric transmission lines, railroad spur, natural gas pipeline, and potentially, fuel oil pipeline. The proximity of the site to existing linear facilities was a key consideration in selecting the proposed Polk Power Station site. Due to the site's proximity to existing facilities, most of the proposed corridors for new linear facilities are located completely within the boundaries of the site and no other alternative routes for these onsite corridors were considered by Tampa Electric Company to be needed or reasonable. The following describes the associated, linear facilities for the proposed project.

8.3.9.1 Transmission Lines

Two transmission line corridors, each containing two 230-kV circuits, will be needed to connect the Polk Power Station to the regional power grid. One of these corridors will connect the onsite substation to the existing Tampa Electric Company Hardee-Pebbledale 230-kV transmission line. The right-of-way for existing Hardee-Pebbledale line is located within the Polk Power Station site along the northeast boundary of the site. Therefore, the proposed transmission line corridor is located completely within the site boundaries and no other alternative corridor route was considered to be reasonable or needed to minimize environmental effects.

The other proposed transmission line corridor for the Polk Power Station will connect the onsite substation to the existing Tampa Electric Company Mines-Pebbledale 230-kV transmission line located to the north of the site at a point west of the unincorporated community of Bradley Junction. This proposed transmission line corridor will run west from the onsite substation to SR 37. This portion of the corridor will be 400 ft wide and is located entirely within the Polk Power Station site boundaries. The proposed centerline of the corridor will turn north at SR 37 at a point approximately 1,500 ft north of Bethlehem Road. The proposed corridor will traverse north along SR 37, and then turn northwest at a point south of Bradley Junction in order to connect to the existing circuit while avoiding this community.

The corridor width along SR 37 is 0.5 mile and is increased to 1 mile southwest of Bradley Junction to allow flexibility in routing the line around mined areas and phosphate clay settling ponds, and to avoid the existing community. The total length of this transmission line corridor is approximately 5.2 miles, including approximately 0.75 mile on the Polk Power Station site.

In addition to the proposed corridor route, Tampa Electric Company considered a potential alternative corridor which would run south on SR 37 to SR 674 and west to the Polk/Hillsborough County line. The alternative corridor would then run north along the county line to the existing Mines-Pebbledale transmission line. This alternative corridor was significantly longer than the proposed corridor and would potentially impact more wetland and residential areas along the county line. Based on these findings, this alternative was not considered reasonable compared to the proposed corridor.

8.3.9.2 Natural Gas Pipeline

Natural gas will be used as the primary fuel for the stand-alone CT and CC units planned for the Polk Power Station. Natural gas will be delivered to the site via a pipeline from the existing or future natural gas transmission system in the region. FGT has existing gas transmission pipelines in the vicinity and crossing the western tract of the site. FGT is also currently proposing certain additions to and expansions of its system in the site vicinity such as a new metering station at the intersection of SR 37 and CR 630 within the Polk Power Station site and a new pipeline between its St. Petersburg and Sarasota laterals, which would be located primarily along CR 39 in Hillsborough County, approximately 5.5 miles to the west of the site. Other natural gas transmission companies are also considering developing new systems in the region.

At the current time, Tampa Electric Company is evaluating the various alternatives to supply natural gas to the Polk Power Station. Therefore, specific interconnection points to the existing or planned future gas transmission system in the site area and, in turn, the proposed pipeline route or alternative routes to the Polk Power Station site have not been determined at this time.

8.3.9.3 Fuel Oil Pipeline

Initially, No. 2 fuel oil will be used as a primary fuel for the stand-alone advanced CT unit planned for the Polk Power Station, which will be integrated with the CG and HRSG/ST facilities to form the IGCC unit. Fuel oil will be delivered to the site by tanker truck and/or rail. This will occur during the first year of operation, after which conversion to IGCC will have been completed. After this conversion, based on current fuel cost considerations, Tampa Electric Company anticipates that fuel oil will serve primarily as a backup fuel for the IGCC and stand-alone CT and CC units.

GATX is currently proposing to construct a new fuel oil pipeline in the site region. The proposed pipeline would parallel Fort Green Road and the CSX Railroad located adjacent to the eastern boundary of the Polk Power Station site. When constructed, fuel oil could be delivered to the site via a pipeline from the proposed GATX pipeline to the onsite fuel oil storage tanks. The corridor for this supply pipeline would be located within the boundaries of the Polk Power Station site and, therefore, would not affect offsite land uses or resources. No other alternatives for the pipeline corridor route were considered reasonable.

8.3.9.4 Railroad Spur

Railroad access to the Polk Power Station will be provided by construction of a rail spur from the existing CSX Railroad line which runs along the east side of Fort Green Road adjacent to the eastern boundary of the site. This rail spur will be used for delivery of coal and certain equipment and materials to the site. Except for a short segment (i.e., approximately 200 ft) of the rail spur to cross Fort Green Road, the spur will be located within the boundaries of the Polk Power Station site. Therefore, any offsite impacts associated with the construction of this rail spur will be insignificant and no alternative routes were considered reasonable.

8.4 NO-ACTION ALTERNATIVE

The no-action alternative represents the situation in which the proposed Polk Power Station project would not be constructed and operated. Of course, if the proposed project were not constructed, all potential environmental impacts of the project would be avoided. To varying degrees, these potential impacts involve air quality, groundwater and surface water resources, wetland and ecological resources, and socioeconomic and transportation conditions. These potential impacts involve both potentially adverse and beneficial effects.

Under the no-action alternative, Tampa Electric Company would be unable to reliably meet the future electricity needs of its Customers beginning in 1995 when Polk Unit 1 is currently scheduled to be in-service. Further, without the proposed future units, Tampa Electric Company may be forced to implement a program of selective or rolling blackouts during periods of peak demand. Operating at LOLP levels which are detrimental to system reliability and with forced blackouts would present unacceptable conditions for an electric utility with the mandated obligation to provide reliable and cost-effective electric power to its Customers. The no-action alternative would also be inconsistent with the FPSC certification of the need for the proposed Polk Unit 1.

Finally, under the no-action alternative, DOE would not achieve its objective for the proposed IGCC demonstration project to demonstrate the efficient and environmentally acceptable use of the coal for electric power generation. Under this situation, DOE would cancel its agreement with Tampa Electric Company to provide $120 million in potential funding for the demonstration project.

REFERENCES

Environmental Consulting & Technology, Inc. (ECT). 1990. Power Plant Site Selection Assessment Report. Gainesville/Tampa, FL.

Electric Power Research Institute (EPRI). 1988. An Evaluation of Integrated-Gasification - Combined-Cycle and Pulverized-Coal-Fired Steam Plants. Volumes 1 and 2. Research Project 2029-7.

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POLK POWER STATION SITE RECLAMATION REQUIREMENTS

A majority of the land at the Polk Power Station project site has been mined to recover phosphate or disturbed due to mining related activities. Current mining of portions of the site lying west of SR 37 and north of SR 674 will continue into 1994. Due to these past and ongoing mining activities, more than 94 percent of the 4,348-acre site will be mined or disturbed by mining activities prior to Tampa Electric Company's use of the site for the Polk Power Station project.

Section 211, F.S., and Chapter 16C-16, F.A.C. prescribe the State of Florida requirements to reclaim lands mined for phosphate subsequent to July 1, 1975, commonly referred to as "mandatory lands." Reclamation of lands mined prior to July 1, 1975 is not mandatory; however, state severance tax-based funding is available to reimburse owners of certain "non-mandatory" lands for some or all of the cost of voluntary reclamation activities. Non-mandatory reclamation is governed by Section 378, F.S. and Chapter 16C-17, F.A.C. Both of these regulatory programs are administered by FDNR. The Polk County Phosphate Mining Ordinance 88-19 also prescribes the requirements for reclamation of mined lands in the county.

This chapter describes the reclamation status of the site, together with the procedures to be followed and applications to be filed to reclaim the site to accommodate the Polk Power Station project in accordance with FDNR rules. Because most of the site has been mined and because FDNR and Polk County are now an integral part of the SCA process (Section 403, F.S.), it is appropriate to incorporate these regulatory requirements into the SCA for the Polk Power Station project. The complete description of the reclamation plan and the completed FDNR forms are contained in the Conceptual Reclamation Plan Application submitted by Tampa Electric Company to FDNR as a separate document.

9.1 BACKGROUND OF SITE RECLAMATION REQUIREMENTS AND PLANS

9.1.1 RECLAMATION STATUS OF THE SITE

The Polk Power Station site consists of four separate types of land with respect to FDNR land reclamation regulations. These include: (1) lands disturbed prior to 1975; (2) lands disturbed prior to 1975 and re-mined subsequently; (3) lands mined subsequent to July 1975; and (4) lands not disturbed by phosphate mining. To simplify this description, the site has been subdivided into the parcels shown on Figure 9.1.1-1 and described in the following paragraphs.

9.1.1.1 American Cyanamid Old Lands (Parcel A)

Parcel A consists of lands owned by the American Cyanamid Company in Section 35, Township 31 South, Range 23 East. This property, totaling approximately 400 acres, is not subject to the mining lease agreement between IMC Fertilizer and American Cyanamid at the Haynsworth Mine. The parcel was mined prior to 1940 and is not eligible for reclamation funding through the FDNR Non-Mandatory Reclamation Trust Fund. Tampa Electric Company's proposed reclamation activities on this parcel will consist of minor grading to facilitate construction of the transmission line and a service road, regrassing of this area, and planting a 150 ft wide forested swath along the CR 630 and Fort Green Road rights-of-way in order to create a visual buffer for the main plant facilities. In the event the Polk Power Station project is not built, no additional reclamation work would be required on this parcel.

Tampa Electric Company proposes to use this parcel primarily as a buffer to the proposed facilities and to locate a transmission line from Fort Green Road into the plant site.

There are no mandatory reclamation requirements associated with this parcel.

9.1.1.2 American Cyanamid Old Lands (Parcel B)

American Cyanamid also owns approximately 127 acres in Section 2, Township 32 South, Range 23 East, referred to as Parcel B. This property is not subject to the

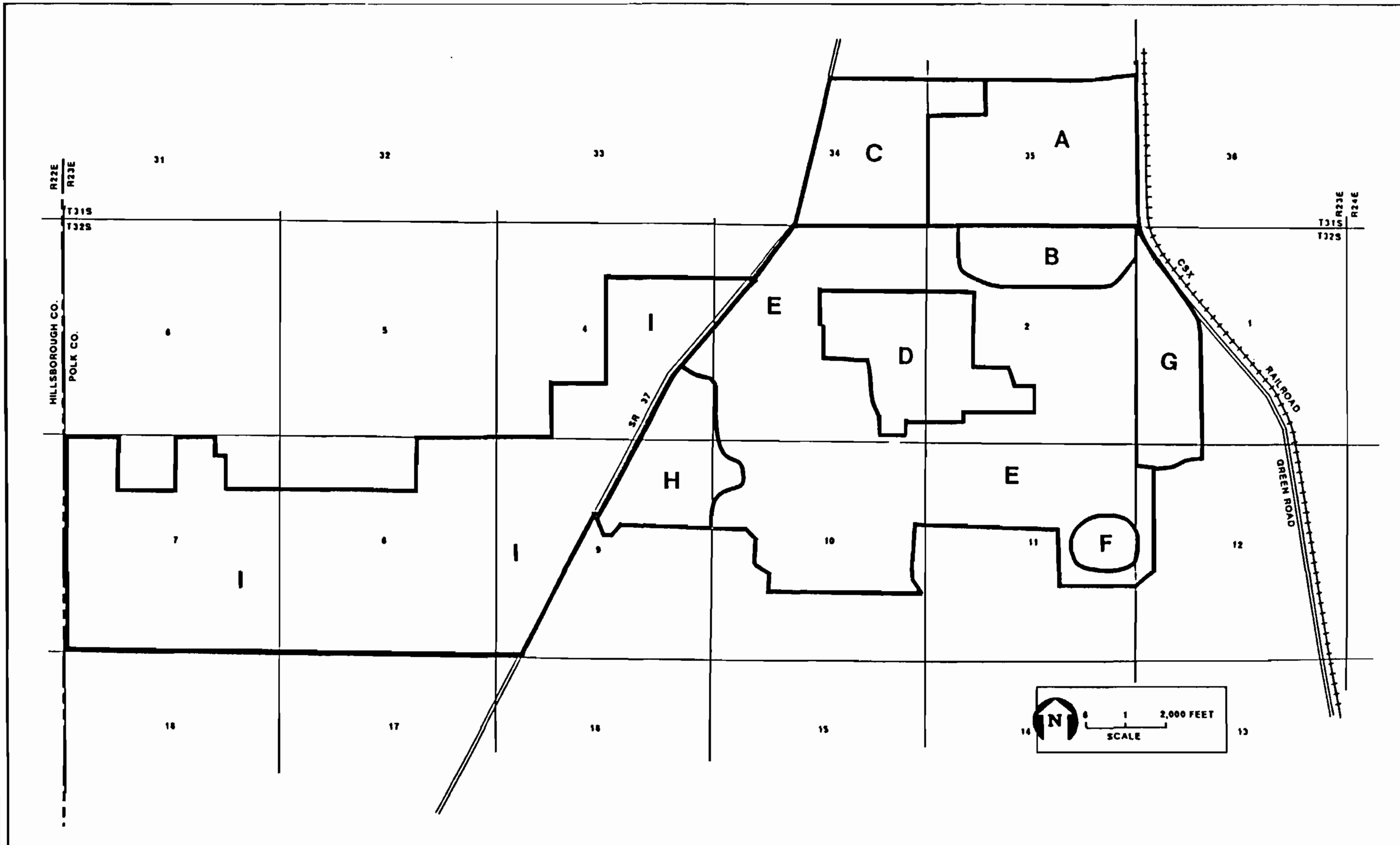

FIGURE 9.1.1-1.

RECLAMATION STATUS PARCELS ON POLK POWER STATION SITE

Sources: USGS, Duette NE, FL, Revised 1972. Baird, FL, Revised 1987. ECT, 1992.

TAMPA ELECTRIC
A TECO ENERGY COMPANY

POLK POWER STATION

mining lease agreement between IMC Fertilizer and American Cyanamid. The parcel was mined prior to 1940; however, it is not eligible for reclamation funding through the FDNR Non-Mandatory Reclamation Trust Fund. Four acres along the southern boundary of this parcel were disturbed by Agrico when the adjacent property was mined; this 4-acre area is addressed by Agrico's mandatory reclamation programs. Parcel B consists of a rectangular deep lake in an old mine cut which is nearly divided into two cells.

Tampa Electric Company proposes to use this land as part of the stormwater management system for the Polk Power Station. This will require only minor grading activities along the northwest and southeast corners of the lake to improve drainage into an out of the lake. These activities are included in the separate Conceptual Reclamation Plan Application. In the event the project is not constructed, no alternate reclamation plans will be needed since no mandatory reclamation obligation exists for this parcel, with the exception of the 4 acres disturbed by Agrico. These acres would be reclaimed in accordance with Agrico's existing approved plans.

9.1.1.3 <u>American Cyanamid/IMC Fertilizer Land (Parcel C)</u>

Parcel C consists of land owned by the American Cyanamid Company in Sections 34 and 35, Township 31 South, Range 23 East. This property, totalling 248 acres, is subject to a mining lease agreement between IMC Fertilizer and American Cyanamid. Although some of this land was mined prior to 1940, IMC Fertilizer re-mined this property during 1987-1991. Mandatory reclamation plans for this area have been approved by FDNR and the property has been reclaimed by grading overburden left at the site into upland pasture, lakes, and wetlands. This parcel has not been released from reclamation liability because the post-reclamation monitoring period has not expired.

Tampa Electric Company proposes to use this parcel primarily as a buffer area to the proposed plant facilities and the southern most lake and wetland area of the parcel as a part of the site stormwater management system. These changes will be accomplished by grading an outlet swale to connect the reclaimed "C" shaped lake and wetland system on this parcel with the plant site stormwater drainage outlet to the south and the old mine cut lake located on Parcel B to the east. The re-graded swale will be revegetated to wetland vegetative conditions. The remainder of this parcel will not be affected by Tampa Electric Company's proposed plans. Some supplemental tree planting is proposed along SR 37 and CR 630 to provide a visual buffer for the main plant facilities.

It is anticipated the Tampa Electric Company will acquire this parcel before American Cyanamid and/or IMC Fertilizer are released from mandatory reclamation obligations triggered by IMC Fertilizer's re-mining of the property. An amendment to the approved IMC Fertilizer reclamation program will be required to accommodate Tampa Electric Company's proposed drainage system changes. In the event the project is not constructed, no alternate plans will be required because the site has already been reclaimed in accordance with IMC Fertilizer's approved program.

9.1.1.4 <u>Agrico Land--Plant Site (Parcel D)</u>

Parcel D consists of land owned by Agrico in Sections 2 and 3, Township 32 South, Range 23 East. This parcel, totalling approximately 300 acres, is an irregular-shaped parcel of unmined land surrounded by mined, but unreclaimed land. The FDNR mandatory reclamation liability for this parcel would be limited to minor grading and revegetation of areas disturbed in association with adjacent mining. These activities were performed by Agrico after 1975 and the parcel is subject to mandatory land reclamation requirements.

Tampa Electric Company proposes to locate the primary power plant facilities for the Polk Power Station on this parcel. Tampa Electric Company will acquire this property in its current condition and assume any reclamation liability associated with this land. In the event the project is not constructed, it is Tampa Electric Company's understanding that a modification to Agrico's approved conceptual plan and reclamation programs would be necessary prior to commencing reclamation. This modification would be required in the event that Agrico's plans to develop above grade clay waste disposal facilities in this area have changed.

9.1.1.5 **Agrico Land--Cooling Reservoir (Parcel E)**

Parcel E consists of land owned by Agrico in Sections 1, 2, 3, 4, 10, 11, and 12, Township 32 South, Range 23 East. This parcel, totalling approximately 1,697 acres, is an irregular shaped parcel of mined, but unreclaimed, land which surrounds the proposed main plant facility site (Parcel D). All of this property was mined after 1975 by Agrico and is subject to the FDNR mandatory reclamation obligations.

For the proposed Polk Power Station, Tampa Electric Company will convert approximately half of this parcel into a primarily below-grade cooling water reservoir, as described in Section 3.5. The remainder will be reclaimed as wetland and upland systems. Tampa Electric Company will acquire this property in its current condition and assume all reclamation liability associated with this land. In the event the project is not constructed, it is Tampa Electric Company's understanding that a modification to Agrico's approved conceptual plan and reclamation programs would be necessary prior to commencing reclamation. This modification would be required in the event that Agrico no longer plans to develop above grade clay waste disposal facilities in this area.

9.1.1.6 **Agrico Land--Eagle's Nest (Parcel F)**

Parcel F consists of land owned by Agrico in Section 11, Township 32 South, Range 23 East. This parcel, totalling approximately 33 acres, is a circular shaped parcel of undisturbed land which once contained an eagle's nest (number PO-40). This abandoned eagle's nest is discussed in Section 2.3.6. Disturbance of this parcel by Agrico was prohibited by USFWS regulations. Accordingly, there is no mandatory reclamation obligations associated with this parcel. Tampa Electric Company will also not disturb this parcel for the Polk Power Station.

9.1.1.7 <u>Agrico Land--Reclaimed Lake (Parcel G)</u>

Parcel G consists of land owned by Agrico in Sections 1 and 12, Township 32 South, Range 23 East. This parcel, totalling approximately 142 acres, is a rectangular shaped reclaimed lake and adjacent uplands. All of this land was mined by Agrico after 1975 and reclaimed pursuant to Chapter 16C-16, F.A.C. Final release of the land from reclamation liability would otherwise be expected to occur during the review and processing of this SCA.

According to Tampa Electric Company's plans, this parcel will be connected to the old mine cut lake in Parcel B to complete the stormwater management system east of SR 37 and connecting plant site drainage to Little Payne Creek which is similar to pre-mining conditions. This will be accomplished by grading a swale between this parcel and Parcel B. The rail spur and access road from Fort Green Road will also be constructed on the northern end of this parcel. The lake in this parcel will also receive water discharged from the proposed cooling reservoir.

These changes will require a modification of Agrico's approved conceptual reclamation plan and program for this parcel. In the event the project is not constructed, no changes to Agrico's approved conceptual plan and reclamation program will be required for this parcel since it is already reclaimed.

9.1.1.8 <u>Agrico Land--Southwest Buffer Area (Parcel H)</u>

Parcel H consists of land owned by Agrico in Sections 3, 4, 9, and 10, Township 32 South, Range 23 East. This property, totalling approximately 190 acres, is an irregular shaped parcel of unmined land. The FDNR mandatory reclamation liability for this parcel will be limited to minor grading and revegetation of three corridors cleared for access to other mineable areas. These activities were performed by Agrico after 1975.

For the Polk Power Station, Tampa Electric Company will use this land only as a buffer area. No additional disturbance to this parcel will occur. Tampa Electric

Company will amend Agrico's conceptual plan and program for this parcel to reflect the fact that it was not mined and will not be used by Agrico to store clay wastes. These amendments will be identical to those required in the event the project is not built.

9.1.1.9 Agrico Land (Parcel I)

Parcel I consists of land owned by Agrico in Sections 3, 4, 7, 8, and 9, Township 32 South, Range 23 East. This property, totalling approximately 1,511 acres, is an irregular shaped parcel bordered by SR 674 on the south, SR 37 on the east, and the Hillsborough County line on the west. Agrico began mining this parcel in 1989 and projects mining to continue into 1994. When completed, Agrico will have mined approximately 1,056 acres of this parcel.

For the Polk Power Station project, Tampa Electric Company will use this land as a wildlife habitat/corridor system by reclaiming this land into wetlands and uplands. No plant facilities are planned for this parcel.

Tampa Electric Company will acquire this property prior to release from reclamation liability requirements of FDNR; therefore, the approved conceptual reclamation plans for this land will need to be amended. In the event the project is not built, it is Tampa Electric Company's understanding that this parcel would be reclaimed in accordance with Agrico's approved plans.

9.1.2 PROCEDURES TO AMEND APPROVED RECLAMATION PLANS AND PROGRAMS

The purchase by Tampa Electric Company of Agrico lands subject to the mandatory reclamation requirements of FDNR introduces an additional party or applicant into the normal implementation procedures for FDNR reclamation rules. Tampa Electric Company representatives, during the course of several meetings with FDNR staff, were provided with the following guidelines for submission of the necessary information for FDNR's review:

1. An individual Conceptual Reclamation Plan should be prepared addressing the specific aspects of the 4,348 acre Polk Power Station site in terms of pre-mining and post-reclamation hydrology, topography and land use. Since most pre-mining and post-reclamation comparisons of these aspects within FDNR Chapter 16C-16, F.A.C., apply only when considering the entire mine site and 523 acres of the site were mined prior to 1975 and are not within FDNR's jurisdiction, this plan would serve primarily as an information base for the project and provide details to be included in future FDNR program submittals.
2. Agrico, as the mine operator, would continue to share the responsibility for land reclamation with Tampa Electric Company even after the change in land ownership. The Agrico Conceptual Reclamation Plan (AGR-FG-CPF) would require the appropriate modification to reflect the proposed mine wide changes as the result of the Polk Power Station construction. This modification would be limited to the 3,573 acres of Agrico mandatory lands within the Polk Power Station site.
3. The portion of the American Cyanamid land (248 acres) under lease to IMC Fertilizer is included in the IMC Fertilizer Haynsworth Mine Conceptual Plan. The reclamation of this parcel is effectively complete and only minor changes would be involved because of the inclusion of this property into the Tampa Electric Company site plans. These changes, as envisioned, would require only an amendment to the approved Program [IMC-H-87(3)], not the Conceptual Plan.

4. Variance requests would be required on the basis that this industrial land use, while not prohibited by FDNR Chapter 16C-16, F.A.C., is not compatible with all the standards developed primarily for the reclamation of natural wildlife habitat and agricultural land uses.

The majority of Polk Power Station site (3,573 acres) is located within the boundary limits of Agrico's Fort Green Mine which is an active phosphate mining operation consisting of 31,906 total acres. The Fort Green Mine Conceptual Reclamation Plan was originally approved by the Governor and cabinet, sitting as the agency head of FDNR on April 6, 1982. Subsequent modifications were approved on July 19, 1983; February 18, 1986; February 11 and November 22, 1988; and May 14, 1991.

The Conceptual Reclamation Plan Application submitted to FDNR contains applications to modify the approved Fort Green Mine Conceptual Plan and incorporates all of the proposed changes described in this document. These applications include:

Applicant	Acres Included	FDNR Form
Tampa Electric Company	4,348*	No. 1
Agrico	31,906	No. 6
Tampa Electric Company	4,348†	No. 7

*Includes old lands for continuity.

†Variance requests.

Following approval of the applications, the individual programs within the application area would then be amended for consistency as shown in Table 9.1.2-1.

The total land use and cover distribution by FLUCCS code for the approved Agrico plan is summarized in Table 4.4.1-1 in Section 4.4.1 of this SCA. Also, the following maps, which are included in the conceptual plan application, are provided in Appendix 11.16 of this SCA:

- Location map,
- Mining operations status map,

Table 9.1.2-1. Acreages of Reclamation Program After Approval of Applications Related to Polk Power Station Site

Program I.D.	Tampa Electric Company Acres	Agrico Acres*
FG-SPA-1	595	
FG-SPA-2	442	
FG-PC-4	475	
FG-SRS-37	66	7
FG-83-2	1,071	119
FG-84-2	409	
FG-84-3	113	
FG-84-4	142	
FG-SP-15	33	573
FG-SP-16	231	14
IMC-87-3	248	

*Programs split by land exchange.

Source: ECT, 1992.

- Pre-mining topography and drainage,
- Pre-mining vegetation and land use,
- Existing vegetation and land use,
- Post-reclamation topography and drainage,
- Post-reclamation vegetation and land use, and
- Aerial photograph of the Polk Power Station site.

9.1.3 TAMPA ELECTRIC COMPANY RECLAMATION PLANS

The proposed Tampa Electric Company reclamation plan for the Polk Power Station project was designed with the following major objectives and criteria:

1. Re-establish watershed divides to the greatest extent possible in their pre-mining location and re-establish drainage basin runoff flow patterns to pre-mining conditions in accordance with applicable FDNR and SWFWMD requirements;
2. Increase the post-reclamation wetland acres above pre-mining conditions to provide an offset for not meeting the specific requirements of Chapter 16C-16.0051(5)(a), F.A.C., within the cooling reservoir, discussed in more detail in Section 9.1.4;
3. Create a contiguous system of wetlands and forested uplands where possible to provide for wildlife corridors between existing known systems at the site boundaries;
4. Create wetland and upland reclamation designs which provide or enhance wildlife habitat systems of primary importance to threatened and endangered species; and
5. Work in conjunction with Agrico to ensure that the overall objectives in terms of reclamation land use diversity to match pre-mining conditions were met on a mine wide basis including the specific requirements of Chapter 16C-16.0051(4), F.A.C.

The Tampa Electric Company reclamation plan as submitted will optimize all of these criteria within the constraints of the project location and operational requirements. Specific details of the final reclamation design, figures and tabular comparisons are provided in the Conceptual Reclamation Plan Application submitted to FDNR.

9.1.4 APPLICABLE FDNR RECLAMATION RULES

Chapter 16C-16, F.A.C. sets forth phosphate mine reclamation requirements of the State of Florida. Polk County's Phosphate Mining Ordinance 88-19 is generally consistent with FDNR reclamation requirements. Certain sections of these requirements were developed during normal rulemaking procedures with the obvious objective to restore lands mined for phosphate back to the uses which existed before mining, primarily agriculture and natural Florida landscape habitats.

Although the reclamation rules do not prohibit an industrial land use for reclaimed land, the lack of specific recognition of this option in the rule creates some difficulties in terms of compliance with all requirements. The most significant lack of rule flexibility occurs in the area of water body design to consider the construction of a cooling reservoir versus a lake.

Tampa Electric Company's proposed plans to fulfill each of the 12 reclamation and restoration standards contained in Chapter 16C-16.0051, F.A.C., are addressed in the following:

1. Safety--Tampa Electric Company will satisfy completely the requirements for site cleanup and structures.
2. Backfilling and Contouring--Tampa Electric Company will completely satisfy the requirement to grade all lands to a 4-ft horizontal to 1-ft vertical slope, or gentler, including the surrounding and interior berms of the cooling water reservoir.
3. Soil Zone--Tampa Electric Company does not control the ability to use topsoils on the site, as encouraged by this rule. However, all lands to be reclaimed by Tampa Electric Company will consist of re-graded overburden spoil, including topsoil. This growing medium has proven to be suitable based on phosphate industry experience.
4. Wetlands--Tampa Electric Company will satisfy completely the requirement to restore wetlands on an acre-for-acre, type-for-type basis. The acreage tabulations from the pre-mining vegetation and land use and the

post-reclamation land use and vegetation maps are summarized in Table 9.1.4-1 to demonstrate compliance with this requirement.

The overall increase in wetland acres does not include the contribution of the cooling reservoir edge, but is intended to augment these acres with high quality wetland acres separate from the reservoir.

5. Water bodies--Tampa Electric Company has optimized the design of artificially created water bodies which drain into Little Payne Creek, Payne Creek, and/or the South Prong Alafia River. In response to the FDNR's recommendation, Tampa Electric Company has designed the cooling water reservoir to maximize its thermal efficiency. With the exception of the cooling water reservoir, all other water bodies will be reclaimed to be consistent with health and safety practices, be modeled to maximize beneficial contributions within local drainage patterns, be graded to balance deep and shallow water and provide high ratios of various shoreline slopes, and be revegetated to provide aquatic and wetland wildlife habitat values.

5a. Annual Zone of Fluctuation--Tampa Electric Company will satisfy this requirement for reclaiming the equivalent of 25 percent of the total highwater surface area to an annual zone of fluctuation. Tampa Electric Company will intentionally not meet the requirement to hydrologically connect these wetlands to the cooling water reservoir because such a connection is not considered beneficial. Instead, Tampa Electric Company is proposing to reclaim an acreage outside of the reservoir equivalent to more than 25 percent of the highwater surface area of the cooling water reservoir (i.e., 727 acres at 136 ft-NGVD x 25 percent = 182 acres) as wetlands which will be connected to receiving streams. Tampa Electric Company will request FDNR approval of this plan as being preferable to hydrologically connecting these wetlands to the cooling water reservoir.

5b. Shallow Water Zone--Tampa Electric Company will design and grade a shallow water zone into the slopes of artificial waterbodies located on

Table 9.1.4-1. Pre-Mining and Post-Reclamation Land Use and Vegetation Map Acreage Tabulations

Parcel/Type (FLUCCS Category)	Pre-Mining Acreage	Post-Reclamation Acreage	Difference
IMC Fertilizer herbaceous (640)	12	26	+14
IMC Fertilizer forested (610-630)	11	8	-3
Agrico herbaceous (640)	244	379	+135
Agrico forested (610-630)	265	312	+47
Subtotal herbaceous	256	405	+149
Subtotal forested	276	320	+44
TOTAL WETLANDS	**532**	**725**	**+193**

Source: ECT, 1992.

mandatory lands which drain into the South Prong Alafia River, Payne Creek, and Little Payne Creek. The proposed Tampa Electric Company cooling water reservoir will contain approximately 60 acres of shallow water zone which could be applied to this requirement of 143 acres (i.e., annual low water x 20 percent). Tampa Electric Company will apply for a variance from full compliance with this requirement in the Conceptual Reclamation Plan Application submitted to FDNR.

5c. Perimeter Greenbelt--Tampa Electric Company will design and vegetate a perimeter greenbelt of vegetation consisting of tree and shrub species indigenous to the area around each proposed lake in accordance with this requirement. Tampa Electric Company will not satisfy this requirement for the cooling water reservoir because the reservoir berm precludes the intent of the greenbelt under sub-section 2 of this rule. Tampa Electric Company plans to reclaim an additional 100 acres to forested conditions in compliance with the standards contained in Chapter 16C-16.051(9)(c), F.A.C. This acreage is based upon the fact that there are 35,000 ft of shoreline in the cooling water reservoir; application of a 120 ft wide perimeter greenbelt would result in reforestation of 100 acres.

6. Water Quality--Tampa Electric Company will comply with this requirement. Detailed descriptions of projected water quality in the cooling water reservoir and potential water quality impacts are provided in Chapters 3.0, 4.0, and 5.0 of this SCA.

7. Flooding and Drainage--Tampa Electric Company will take all reasonable steps to insure that its development will not cause offsite flooding and is providing hydrologic modeling results to document compliance with this standard. The 1991 pre-application review meetings identified the restoration of the original drainage pattern of the area as a significant issue to be resolved before FDNR staff could recommend approval of Tampa Electric Company's application. The proposed plans contained in the conceptual plan maps have responded to these concerns. The

following summarizes the proposed pre-mining and post-reclamation acreages within the three onsite drainage basins:

Basin Name	Size of Basin Pre-Mining	Size of Basin Post-Reclamation	Percent Change in Size
South Prong Alafia River	816	801	-1.8
Payne Creek	716	710	-0.8
Little Payne Creek	2,816	2,837	0.7

According to Tampa Electric Company's plans, watershed boundaries will be re-established to match pre-mining locations and acreages.

8. Waste Disposal--Tampa Electric Company does not believe these standards apply to its plans.
9 Revegetation--Tampa Electric Company will meet or exceed all of these requirements.
10. Wildlife--Tampa Electric Company's proposed reclamation plan for the 1,511 acres of the site which lie west of SR 37 will provide exceptional habitat for wildlife. The mixture of wetlands and uplands proposed by Tampa Electric Company will be one of the largest single wildlife conservation reclamation areas in Florida, if not the largest. The plan includes the creation of a wildlife corridor between the headwater areas of Payne Creek and Little Manatee River and the South Prong Alafia River system. Ownership and controlled access by Tampa Electric Company will protect this habitat into the 21st Century.

    Further, Tampa Electric Company is planning similar uses for the majority of the 775-acre American Cyanamid parcel. In fact, less than 1,000 acres of the entire site will be reclaimed to an industrial use including the cooling reservoir area; the remaining 78 percent of the project site will be buffer and wildlife habitat. Tampa Electric Company proposes that this high percentage of wildlife habitat will provide appropriate mitigation and compensation for not meeting all the reclamation standards.

11. Time Schedule--Tampa Electric Company will meet reasonable time schedule requirements that are developed as part of this SCA and reclamation plan approval processes. Delays which have occurred in the reclamation of Agrico lands were necessary to meet the complex planning and permitting requirements for the overall Polk Power Station project.
12. Exceptions and Innovations--While Tampa Electric Company believes its project is innovative, it will not apply for release from any FDNR rules on this basis.

9.2 RELATIONSHIP OF PROPOSED PLANT AND ASSOCIATED FACILITIES TO RECLAMATION PLANS

9.2.1 PLANT AND ASSOCIATED FACILITIES LOCATIONS

The proposed plant facilities and site layout are described in Chapter 3.0. The proposed main plant structures with the exception of transmission line structures will not be constructed on mined lands and will not directly affect the proposed reclamation plans or FDNR reclamation rules except for the creation of a storm-water retention basin. Access roads and the railroad spur will be partially constructed on mined lands and the cooling reservoir will be constructed within mined lands to take advantage of the voids left after mining. The cooling reservoir design and water quality considerations are discussed in previous chapters of the SCA. The reservoir's proposed slopes and cover are consistent with FDNR requirements for safety and soil stabilization.

9.2.2 WETLANDS

Two wetland areas west of SR 37 have been previously permitted by USACE and FDER and mined in the phosphate mining operation. According to Tampa Electric Company's proposed plans, these systems will be restored in compliance with the conditions contained in the respective permits.

USACE has asserted jurisdictional authority over the majority of the existing mine excavation areas and certain other old mine pits and disturbed areas on the Polk Power Station site. A preapplication meeting held with USACE has provided assurance that the proposed wetland reclamation adjacent to the plant site will provide sufficient mitigation for the proposed filling activities. A Section 404 permit application to USACE is included in Appendix 11.1. SWFWMD has evaluated certain remnant disturbed wetlands proposed to be mitigated for in the context of the surface water management permit for the site.

Based on the lack of undisturbed wetlands within the proposed construction activity area, FDER did not require a binding wetland jurisdictional determination of the site (see Appendix 11.10). Wetland mitigation impacts will be evaluated by the FDER on the basis of comparing the existing Agrico reclamation plan to the proposed Tampa Electric Company plan in terms of wetland construction. The proposed Tampa Electric Company wetland mitigation plan matches the Agrico Plan on the basis of total wetland acres, type for type, and should satisfy this requirement.

All mitigation wetlands have been carefully designed to function effectively within the established watersheds, contribute beneficial water quality and quantity additions to receiving streams, and maximize wildlife habitat values through diversity.

9.2.3 WILDLIFE AND ENDANGERED SPECIES

No significant wildlife habitat will be lost or impacted by the construction and operation of the proposed plant and cooling reservoir. The cooling reservoir will contain high quality water and, similar to phosphate industry reservoirs, provide habitat for fish, reptiles, wading birds and many species of migratory water fowl.

A water subsidy through discharges from the reservoir and other proposed stormwater drainage changes will be provided to Little Payne Creek wetlands which have been hydrologically altered by past mining in the area. The wetland losses within the proposed cooling reservoir area will be mitigated through the creation of new wetlands in areas which were previously uplands subject to agricultural and silvacultural activities.

Reclaimed upland areas are proposed for reforestation in much higher densities than required by the FDNR in order to create wildlife corridors instead of open pasture.

9.3 RELEASE PROCEDURES

It is the intent of Tampa Electric Company to seek release from FDNR of individual logical reclamation units (LRU's) as the projects are completed and standards are satisfied. The specific boundaries of certain LRU's will need to be amended to incorporate the appropriate boundaries of the proposed construction activities in a more logical fashion.

9.4 FINANCIAL RESPONSIBILITY

It is Tampa Electric Company's understanding that until the reclamation requirements of the FDNR have been satisfied, Tampa Electric Company and Agrico will share the responsibility for the Agrico portion of the Polk Power Station site. IMC Fertilizer will share the same responsibility for their portion of the American Cyanamid property. FDNR assigns the primary responsibility for reclamation to the mine operator regardless of land ownership.

9.5 VARIANCES AND AMENDMENTS

An amendment/modification to the Agrico conceptual reclamation plan AGR-FG-CPF will be required to incorporate the proposed changes in the project site.

As part of this modification, a variance will be sought from Chapter 16C-16.0051(5), F.A.C., and Chapter 16C-16.0051(11)(b), F.A.C., reclamation standards for lake design and reclamation timing, respectively. The request for variance from these standards and supporting information for this request is provided in the Conceptual Reclamation Plan Application submitted to FDNR as a separate document.

TABLE OF CONTENTS
CHAPTER 10.0

LIST OF TABLES

CHAPTER 10.0
COORDINATION

Various federal, state, regional, and local agencies were contacted by Tampa Electric Company to provide inputs for the Polk Power Station project. The general public and public organizations were also contacted regarding the project. Through these contacts, Tampa Electric Company obtained comments and inputs on the Environmental Licensing Plan of Study (POS) for the project, the applicable regulatory requirements of the various agencies, and key issues or concerns to be addressed in the licensing program. These agency and public contacts occurred throughout the approximately 18-month period of the licensing efforts prior to submission of this SCA.

Table 10.0.0-1 presents an overall listing of the agencies and public organizations which were contacted regarding the Polk Power Station project.

Table 10.0.0-1. Polk Power Station Agency and Public Organization Contacts

Date	Agency/ Organization	Purpose	Contact(s)
04/25-26/90	DOE	Reasonableness review	DOE staff
05/16-17/90	DOE	General meeting	DOE staff
05/25/90	DOE	General meeting	DOE staff
06/01/90	DOE	General meeting	DOE staff
06/11/90	DOE	Project review meeting	DOE staff
06/19/90	DOE	General meeting	DOE staff
08/15/90	DOE	General meeting	DOE staff
10/30/90	DOE	Scoping meeting	DOE staff
11/07/90	DOE	Discuss cooperative agreement	DOE staff
11/15/90	DOE	Discuss cooperative agreement	DOE staff
12/14/90	DOE	Review EIV	DOE staff
01/10/91	FDHR	Request listing of sites on Master Site File in project area	J. Erdmann-Maglievaz
01/14/91	Polk County	Discuss site selection assessment and plans for Polk Power Station	R. Jackson
01/23/91	Polk County	Discuss site selection and plans for Polk Power Station	D. Costello
01/23/91	Polk County	Discuss site selection and plans for Polk Power Station	N. Combee
01/23/91	Polk County	Discuss site selection and plans for Polk Power Station	R. Connors
01/23/91	Polk County	Discuss site selection and plans for Polk Power Station	M. Young
01/23/91	FDER	Discuss plans for Polk Power Station and ambient air monitoring program	B. Oven M. Linn T. Collins
01/23/91	FDNR	Discuss plans for Polk Power Station	V. Sharpe C. Albin S. Partney B. Murphy

Table 10.0.0-1. Polk Power Station Agency and Public Organization Contacts (Continued, Page 2 of 5)

Date	Agency/ Organization	Purpose	Contact(s)
01/29/91	FDOT	Obtain traffic counts on roads in project area	J. Cranford
02/08/91	Polk County	Discuss land use and zoning	D. Martin and other staff
02/21/91	Polk County, Department of Development Coordination, and CFRPC	Submit and review POS	M. Bishop B. Sodt
02/21/91	SWFWMD	Submit and review POS	R. Viertel and other staff
02/22/91	FDER	Submit and review POS	B. Oven S. Palmer and other staff
02/22/91	FDNR	Submit and review POS	V. Sharpe and other staff
02/22/91	FDCA	Submit and review POS	P. Darst
03/04/91	EPA	Review POS	H. Mueller C. Hoberg and other staff
03/12/91	FPSC	Discuss site selection assessment and Siting Task Force results	Commissioners and staff
03/19/91	DOE	Sign cooperative agreement	DOE staff
03/28/91	FDER	Discuss standard operating procedures (SOP) for air monitoring	B. Blommel T. Collins
04/02/91	Polk County	Discuss land use and zoning	D. Martin and other staff
05/17/91	FDNR	Obtain pre-mining information	S. Partney and other staff
06/17/91	FDER	Discuss site selection and plans for Polk Power Station	C. Browner and staff
07/05/91	FDER	Discuss comments on POS	S. Palmer
07/17/91	Siting Task Force	Tour of Polk Power Station site	Siting Task Force members
08/06/91	FDER	Discuss comments on POS	S. Palmer and other staff

Table 10.0.0-1. Polk Power Station Agency and Public Organization Contacts (Continued, Page 3 of 5)

Date	Agency/ Organization	Purpose	Contact(s)
08/13/91	FDER	Audit of ambient air quality monitoring program records	K. Colaw
08/13/91	FDER	First quarterly audit of air quality monitoring network	G. Carroll
08/13/91	DOE	Meeting with contractors	DOE staff
08/26/91	DOE	Meeting on strategy	DOE staff
09/04/91	Polk County	Discuss IGCC project at Polk Power Station	D. Costello
09/04/91	Polk County	Discuss IGCC project at Polk Power Station	N. Combee
09/04/91	Polk County	Discuss IGCC project at Polk Power Station	R. Connors
09/04/91	Polk County	Discuss IGCC project at Polk Power Station	M. Young
09/04/91	Polk County	Discuss IGCC project at Polk Power Station	L. Libertore
09/04/91	FPSC	Discuss IGCC project and DOE grant	Staff
09/05/91	FPSC	Filed Need Petition	Staff
09/09/91	FDER	Discuss water quality QA program	A. Tyndell J. Watts S. Palmer
09/11/91	FDNR	Discuss reclamation issues	J. Craft and other staff
09/20/91	Siting Task Force	Tour of Polk Power Station site	Siting Task Force members
09/30/91	FDNR	Review preliminary conceptual reclamation plan	V. Sharpe and other staff
10/16/91	FDER	Discuss water quality data validation	J. Watts
10/21/91	FDER	Discuss ambient air quality monitoring program audit results	D. Arbes K. Colaw D. Stuart
11/06/91	National Audubon Society	Discuss conceptual reclamation plans	R. Paul

Table 10.0.0-1. Polk Power Station Agency and Public Organization Contacts (Continued, Page 4 of 5)

Date	Agency/ Organization	Purpose	Contact(s)
11/13/91	FDER	Audit of PACE Laboratories	K. Colaw
11/20/91	FPSC	Prehearing conference on Need Petition	FPSC Commissioners and staff
12/03/91	EPA and DOE	Discuss federal NEPA requirements and procedures for Polk Power Station	H. Mueller C. Hoberg M. Ghate B. Buvinger
12/03/91	FDER	Second quarterly audit of air quality monitoring network	G. Carroll
12/10/91	FPSC	Public hearing on need determination	FPSC commissioners
12/16/91	Polk County	Discuss CUP application requirements	D. Martin
01/08/92	Polk County	Discuss CUP application	D. Martin and other staff
01/17/92	Polk County	Pre-application meeting on CUP application	P. McLemore and other staff
01/30/92	FPSC	Special agenda vote on Need Petition	FPSC Commissioners and staff
02/17/92	FDNR	Discuss conceptual reclamation plan	V. Sharpe and other staff
02/19/92	FDER	Third quarterly audit of air quality monitoring network	G. Carroll
03/06/92	USACE	Discuss wetland areas onsite	J. Bachelor
03/10/92	FDNR	Discuss hydrological analyses	V. Sharpe and other staff
03/16/92	Polk County	Impact review meeting on CUP application	P. McLemore and other staff
03/17/92	USACE	Site visit to review wetlands	J. Bachelor
03/18/92	SWFWMD	Review conceptual reclamation and stormwater management plans	W. Hartmann and other staff
03/30/92	FDER	Wetland jurisdiction discussions	T. Bell
04/01/92	Polk County	Discuss comments and responses for CUP application	C. Deardorf and other staff

Table 10.0.0-1. Polk Power Station Agency and Public Organization Contacts (Continued, Page 5 of 5)

Date	Agency/ Organization	Purpose	Contact(s)
04/03/92	Polk County	Transportation pre-application meeting	K. Saggerman
04/30/92	Public meeting in Chicora	Discuss Polk Power Station project	Local citizens
05/06/92	FGFWFC	Discuss Polk Power Station project	T. King R. Coleman
05/06/92	Polk County	Discuss CUP conditions	D. Martin
05/07/92	Public meeting in Fort Meade	Discuss Polk Power Station project	Local citizens
05/12/92	Public meeting in Mulberry	Discuss Polk Power Station project	Local citizens
05/13/92	Polk County	Zoning Advisory Board meeting on CUP application	Zoning Advisory Board
05/19/92	Public meeting in Bartow	Discuss Polk Power Station project	Local citizens
05/29/92	FDER	Discuss BACT and air quality permitting issues	C. Fancy and other staff
06/02/92	Polk County	Board of County Commissioners meeting on CUP application	County Commissioners
06/03/92	USACE	Discuss wetland jurisdiction issues	R. Silver
06/09/92	FDNR	Discuss reclamation plans	J. Craft and other staff
07/15/92	DOE	Project review meeting and site tour	DOE staff
07/22/92	DOE	Discuss EIV/EIS for Polk Power Station and tour site	DOE staff and EIS contractor

Source: ECT, 1992.

APPENDIX 11.1

FEDERAL PERMIT APPLICATIONS

11.1.1 NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT APPLICATIONS

11.1.2 JOINT APPLICATION FOR WORKS IN THE WATERS OF FLORIDA

11.1.3 PREVENTION OF SIGNIFICANT DETERIORATION PERMIT APPLICATION

11.1.1 NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT APPLICATIONS

Please print or type in the unshaded areas only
(fill-in areas are spaced for elite type, i.e., 12 characters/inch).

Form Approved. OMB No. 2040-0086. Approval expires 5-31-92.

FORM 1 GENERAL | EPA | U.S. ENVIRONMENTAL PROTECTION AGENCY

GENERAL INFORMATION

Consolidated Permits Program
(Read the "General Instructions" before starting.)

I. EPA I.D. NUMBER

F | D

LABEL ITEMS

I. EPA I.D. NUMBER — Not Yet Assigned

III. FACILITY NAME — Tampa Electric Company, Polk Power Station Project

V. FACILITY MAILING ADDRESS — P.O. Box 111
Tampa, Florida 33602-00111

VI. FACILITY LOCATION — State Road 37 and County Road 630
Polk County, Florida

GENERAL INSTRUCTIONS

If a preprinted label has been provided, affix it in the designated space. Review the information carefully; if any of it is incorrect, cross through it and enter the correct data in the appropriate fill-in area below. Also, if any of the preprinted data is absent *(the area to the left of the label space lists the information that should appear)*, please provide it in the proper fill-in area(s) below. If the label is complete and correct, you need not complete Items I, III, V, and VI *(except VI-B which must be completed regardless)*. Complete all items if no label has been provided. Refer to the instructions for detailed item descriptions and for the legal authorizations under which this data is collected.

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold-faced terms.

SPECIFIC QUESTIONS	YES	NO	FORM ATTACHED	SPECIFIC QUESTIONS	YES	NO	FORM ATTACHED
A. Is this facility a **publicly owned treatment works** which results in a **discharge** to **waters of the U.S.**? (FORM 2A)		X		B. Does or will this facility *(either existing or proposed)* include a **concentrated animal feeding operation** or **aquatic animal production facility** which results in a **discharge** to **waters of the U.S.**? (FORM 2B)		X	
C. Is this a facility which currently results in **discharges** to **waters of the U.S.** other than those described in A or B above? (FORM 2C)		X		D. Is this a proposed facility *(other than those described in A or B above)* which will result in a **discharge** to **waters of the U.S.**? (FORM 2D)	X		X
E. Does or will this facility treat, store, or dispose of **hazardous wastes**? (FORM 3)		X		F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)		X	
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)		X		H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)		X	
I. Is this facility a proposed **stationary source** which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an **attainment area**? (FORM 5)		X		J. Is this facility a proposed **stationary source** which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an **attainment area**? (FORM 5)	X		

III. NAME OF FACILITY

1 SKIP POLK POWER STATION

IV. FACILITY CONTACT

A. NAME & TITLE (last, first, & title)	B. PHONE (area code & no.)
2 AUTRY, A. SPENCER, DIRECTOR, ENV	813 228 4111

V. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX

3 POST OFFICE BOX 111

B. CITY OR TOWN	C. STATE	D. ZIP CODE
4 TAMPA	FL	33601 -0111

VI. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER

5 STATE ROAD 37

B. COUNTY NAME

POLK

C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE (if known)
6 NA	FL	33835	

EPA Form 3510-1 (8-90)

CONTINUE ON REVERSE

CONTINUED FROM THE FRONT

VII. SIC CODES (4-digit, in order of priority)

A. FIRST		B. SECOND	
7 4911	(specify) Electric Power Generation	7	(specify)
C. THIRD		**D. FOURTH**	
7	(specify)	7	(specify)

VIII. OPERATOR INFORMATION

A. NAME

8 TAMPA ELECTRIC COMPANY

B. Is the name listed in Item VIII-A also the owner? ☒ YES ☐ NO

C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box; if "Other", specify.)

F = FEDERAL
S = STATE
P = PRIVATE
M = PUBLIC (other than federal or state)
O = OTHER (specify)

P (specify)

D. PHONE (area code & no.)

A 813 228 4111

E. STREET OR P.O. BOX

POST OFFICE BOX 111

F. CITY OR TOWN	G. STATE	H. ZIP CODE
B TAMPA	FL	33601

IX. INDIAN LAND

Is the facility located on Indian lands? ☐ YES ☒ NO

X. EXISTING ENVIRONMENTAL PERMITS

A. NPDES (Discharges to Surface Water)	D. PSD (Air Emissions from Proposed Sources)	
9 N NONE	9 P NONE	
B. UIC (Underground Injection of Fluids)	**E. OTHER (specify)**	
9 U NONE	9 NONE	(specify)
C. RCRA (Hazardous Wastes)	**E. OTHER (specify)**	
9 R NONE	9 NONE	(specify)

XI. MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property bounderies. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements. See Figures 1 and 2

XII. NATURE OF BUSINESS (provide a brief description)

See attached description.

XIII. CERTIFICATION (see instructions)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE (type or print)	B. SIGNATURE	C. DATE SIGNED
Charles R. Black Vice President, Project Management		July 30, 1992

COMMENTS FOR OFFICIAL USE ONLY

C

EPA Form 3510-1 (8-90)

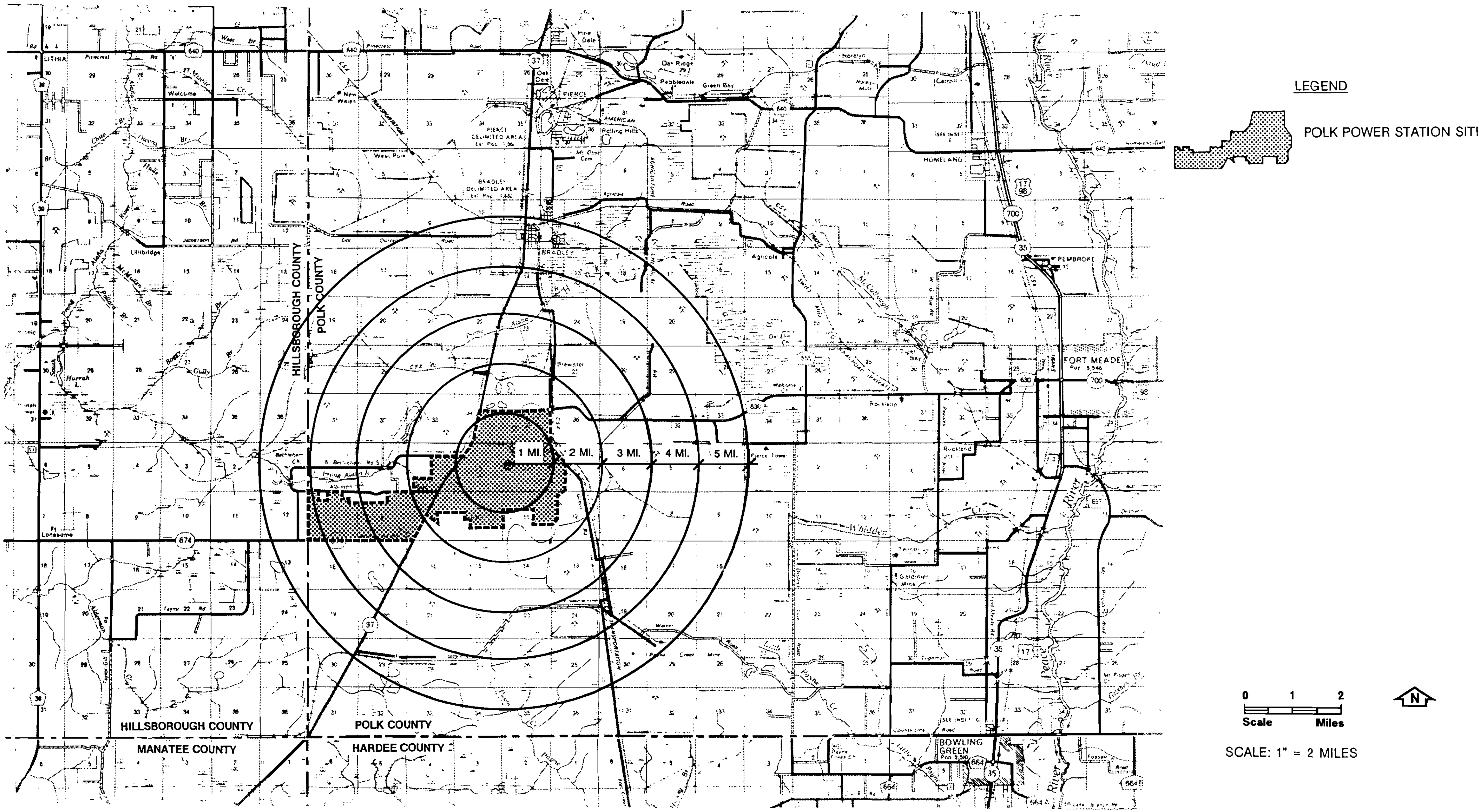

FIGURE 1.

5-MILE RADIUS OF THE POLK POWER STATION

Sources: FDOT, 1987, 1988. ECT, 1992.

TAMPA ELECTRIC
A TECO ENERGY COMPANY

POLK POWER STATION

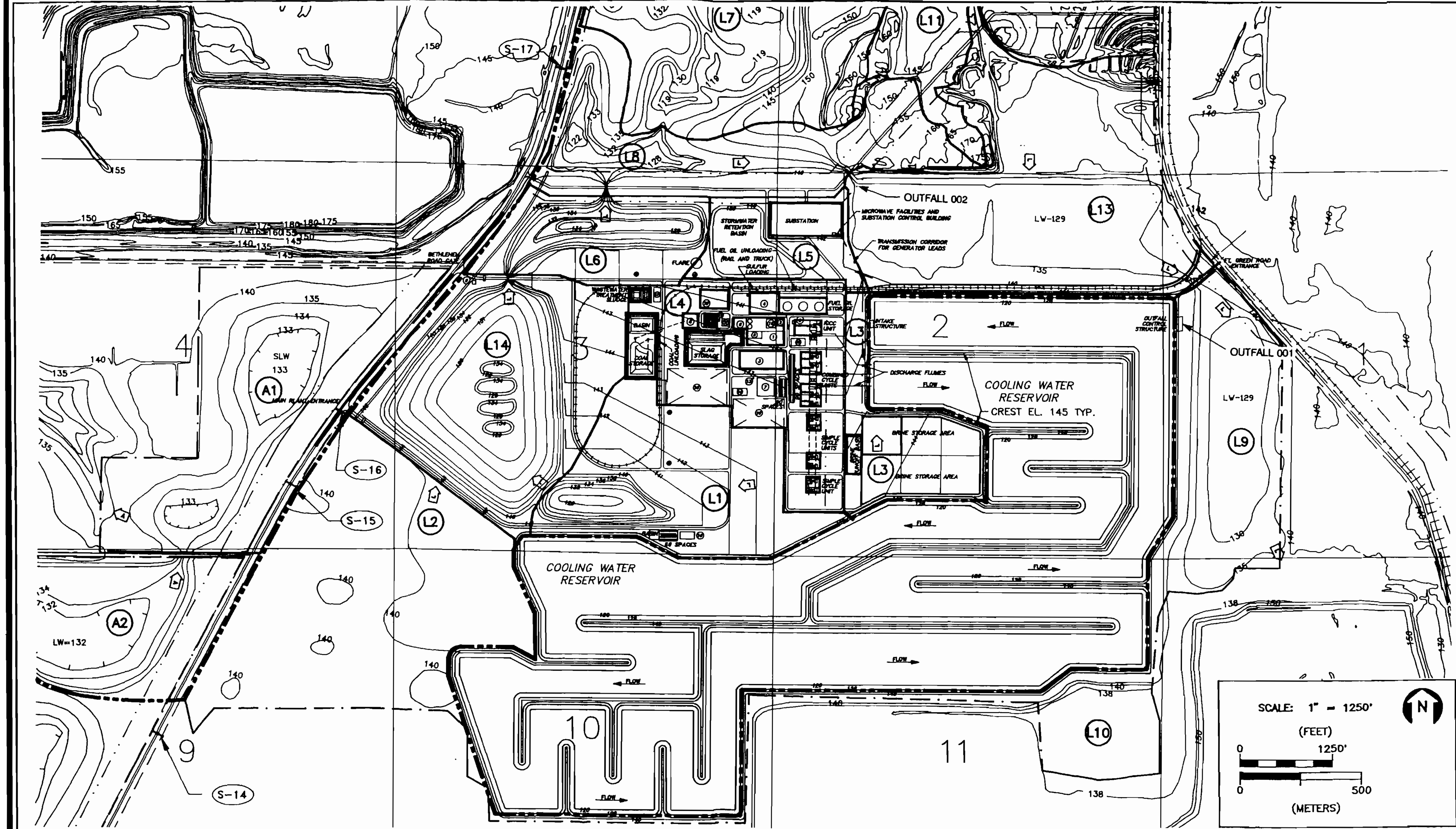

FIGURE 2.

SITE DRAINAGE PLAN AND OUTFALLS 001 AND 002

Source: ECT, 1992.

TAMPA ELECTRIC
A TECO ENERGY COMPANY

POLK POWER STATION

TAMPA ELECTRIC COMPANY
POLK POWER STATION

FORM 1--ITEM XII. NATURE OF BUSINESS

The Polk Power Station site consists of approximately 4,348 acres in southwest Polk County. The site is bordered by the Hillsborough County line along the western boundary; Fort Green Road [County Road (CR) 663] on the east; CR 630 and Bethlehem and Albritton Roads along the north; and State Road (SR) 674 and phosphate clay settling areas on the south. SR 37 bisects the property running in a southwest to northeast direction. The property to the east of SR 37 consists primarily of recently mined areas with water-filled mine cuts between over-burden spoil piles, recently reclaimed areas, and old mined and unreclaimed areas. The area to the west of SR 37 is currently being mined for phosphate matrix. These operations are scheduled to continue into 1994. Except for the approximately 775-acre tract south of CR 630 (Sections 34 and 35), the site has been part of the Agrico Fort Green Mine.

Southwest Polk County is relatively flat, with elevations generally ranging between 120 and 150 feet-National Geodetic Vertical Datum (ft-NGVD). The prevalent land use in the area is phosphate strip mining. The Polk Power Station site itself fits this description. The elevation of the plant site is approximately 140 ft-NGVD. More than 91 percent (i.e., approximately 3,970 acres) of the site has been or is proposed to be disturbed by phosphate mining activities prior to Tampa Electric Company's use of the site. Some of the mined-out areas will be developed into a cooling reservoir.

The proposed Polk Power Station project involves the phased construction and operation of electric generating units and associated facilities. The total generating capacity of the units at the site will be approximately 1,150 megawatts (MW). The generating units planned for the Polk Power Station will be developed at the site according to a phased schedule which matches Tampa Electric Company's forecasted growth in electricity demands beginning in 1995 and continuing into the year 2010.

The first generating facilities at the Polk Power Station site will be an integrated coal gasification combined cycle (IGCC) demonstration project developed by Tampa Electric Company and supported in part through funding from the U.S. Department of Energy (DOE) under the Clean Coal Technology Demonstration program. The IGCC unit will consist of a nominal net 150-MW advanced combustion turbine (CT), fueled by No. 2 fuel oil during the first year of operation in 1995. Heat recovery steam generator (HRSG), steam turbine (ST), and coal gasification (CG) facilities will be added and integrated with the advanced CT a year later to complete the nominal net 260-MW IGCC unit. After integration of these facilities, the IGCC unit will be fueled by coal-derived gas (i.e., called coal gas or syngas) which is produced in the CG facilities, with No. 2 fuel oil as a backup fuel. This IGCC unit will be known as Polk Unit 1. Tampa Electric Company's current Power Resource Plan indicates that later facilities will consist of two combined cycle (CC) generating units and six simple-cycle CTs fueled by natural gas with No. 2 fuel oil as the backup fuel.

Please type or print in the unshaded areas only

EPA ID Number *(copy from Item 1 of Form 1)*

Form Approved
OMB No 2040-0086
Approval expires 7-31-88

Form 2D NPDES

EPA New Sources and New Dischargers Application for Permit to Discharge Process Wastewater

I. Outfall Location

For each outfall, list the latitude and longitude, and the name of the receiving water

Outfall Number (list)	Latitude Deg	Latitude Min	Latitude Sec	Longitude Deg	Longitude Min	Longitude Sec	Receiving Water (name)
001	27	43	41	82	38	20	Unnamed reclaimed lake to unnamed canal to Little Payne Creek
002	27	44	1	82	18	19	Unnamed old mine cut to unnamed reclaimed lake to unnamed canal to Little Payne Creek (see Form 2F)

II. Discharge Date *(When do you expect to begin discharging?)*

1996

III. Flows, Sources of Pollution, and Treatment Technologies

A. For each outfall, provide a description of (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and stormwater runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

Outfall Number	1. Operations Contributing Flow (list)	2. Average Flow (include units)	3. Treatment (Description or List Codes from Table 2D-1)
001	Cooling reservoir blowdown	3.10 MGD	1 - O, 1 - U
	Contributing sources:		
	--Recirculating cooling water	355.70 MGD	--
	--Industrial wastewater treatment plant (IWT) effluent	0.44 MGD	2 - C, 1 - U, 1 - Q
	--Sanitary sewage treatment plant (STP) effluent	0.01 MGD	3 - A, 1 - U, 2 - F
	--Stormwater runoff from fuel storage/switchyard and CT/CC areas	0.08 MGD	1 - H
	--Groundwater makeup	4.91 MGD	--
	--Groundwater seepage (in)	0.28 MGD	--
	--Precipitation	2.97 MGD	--
	--Reverse osmosis concentrate	0.35 MGD	--
002	Stormwater from industrial activity	0.60 MGD	See Form 2F

B. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item III-A. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g., for certain mining activities), provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. See Figure 1

C. Except for storm runoff, leaks, or spills, will any of the discharges described in item III-A be intermittent or seasonal?

☐ Yes *(complete the following table)* ☒ No *(go to item IV)*

Outfall Number	1. Frequency		2. Flow		
	a. Days Per Week *(specify average)*	b. Months Per Year *(specify average)*	a. Maximum Daily Flow Rate *(in mgd)*	b. Maximum Total Volume *(specify with units)*	c. Duration *(in days)*

IV. Production

If there is an applicable production-based effluent guideline or NSPS, for each outfall list the estimated level of production (projection of actual production level, not design), expressed in the terms and units used in the applicable effluent guideline or NSPS, for each of the first 3 years of operation. If production is likely to vary, you may also submit alternative estimates (attach a separate sheet) NA

Year	a. Quantity Per Day	b. Units of Measure	c. Operation, Product, Material, etc *(specify)*

CONTINUED FROM THE FRONT	EPA ID Number *(copy from Item 1 of Form 1)*	Outfall Number 001

V. Effluent Characteristics

A, and B: These items require you to report estimated amounts *(both concentration and mass)* of the pollutants to be discharged from each of your outfalls. Each part of this item addresses a different set of pollutants and should be completed in accordance with the specific instructions for that part. Data for each outfall should be on a separate page. Attach additional sheets of paper if necessary.

General Instructions *(See table 2D-2 for Pollutants)*

Each part of this item requests you to provide an estimated daily maximum and average for certain pollutants and the source of information. Data for all pollutants in Group A, for all outfalls, must be submitted unless waived by the permitting authority. For all outfalls, data for pollutants in Group B should be reported only for pollutants which you believe will be present or are limited directly by an effluent limitations guideline or NSPS or indirectly through limitations on an indicator pollutant.

1. Pollutant	2. Maximum Daily Value *(include units)*	3. Average Daily Value *(include units)*	4. Source *(see instructions)*
See Table 1 for outfall 001			

CONTINUED FROM THE FRONT	EPA ID Number *(copy from Item 1 of Form 1)*	

C. Use the space below to list any of the pollutants listed in Table 2D-3 of the instructions which you know or have reason to believe will be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it will be present.

1 Pollutant	2 Reason for Discharge
NA	NA

VI. Engineering Report on Wastewater Treatment

A. If there is any technical evaluation concerning your wastewater treatment, including engineering reports or pilot plant studies, check the appropriate box below.

[X] Report Available [ ] No Report

B. Provide the name and location of any existing plant(s) which, to the best of your knowledge, resembles this production facility with respect to production processes, wastewater constituents, or wastewater treatments.

Name	Location
TECO Power Services Hardee Power Station	Hardee County, Florida (The Hardee Power Station is a combined cycle generating facility built on reclaimed phosphate lands. Unlike the Hardee Power Station, Polk Power Station contains a coal gasification unit.)

EPA ID Number *(copy from item one of Form 1)*

VII. Other Information *(Optional)*

Use the space below to expand upon any of the above questions or to bring to the attention of the reviewer any other information you feel should be considered in establishing permit limitations for the proposed facility. Attach additional sheets if necessary.

A preliminary Best Management Practices (BMP) plan is included as part of this NPDES application in anticipation of fulfilling the requirements of 40 CFR 122.44(K).

VIII. Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

A. Name and Official Title *(type or print)*	B. Phone No.
Charles R. Black Vice President, Project Management	(813) 228-4111
C. Signature	**D. Date Signed**
CRBlack	07/30/92

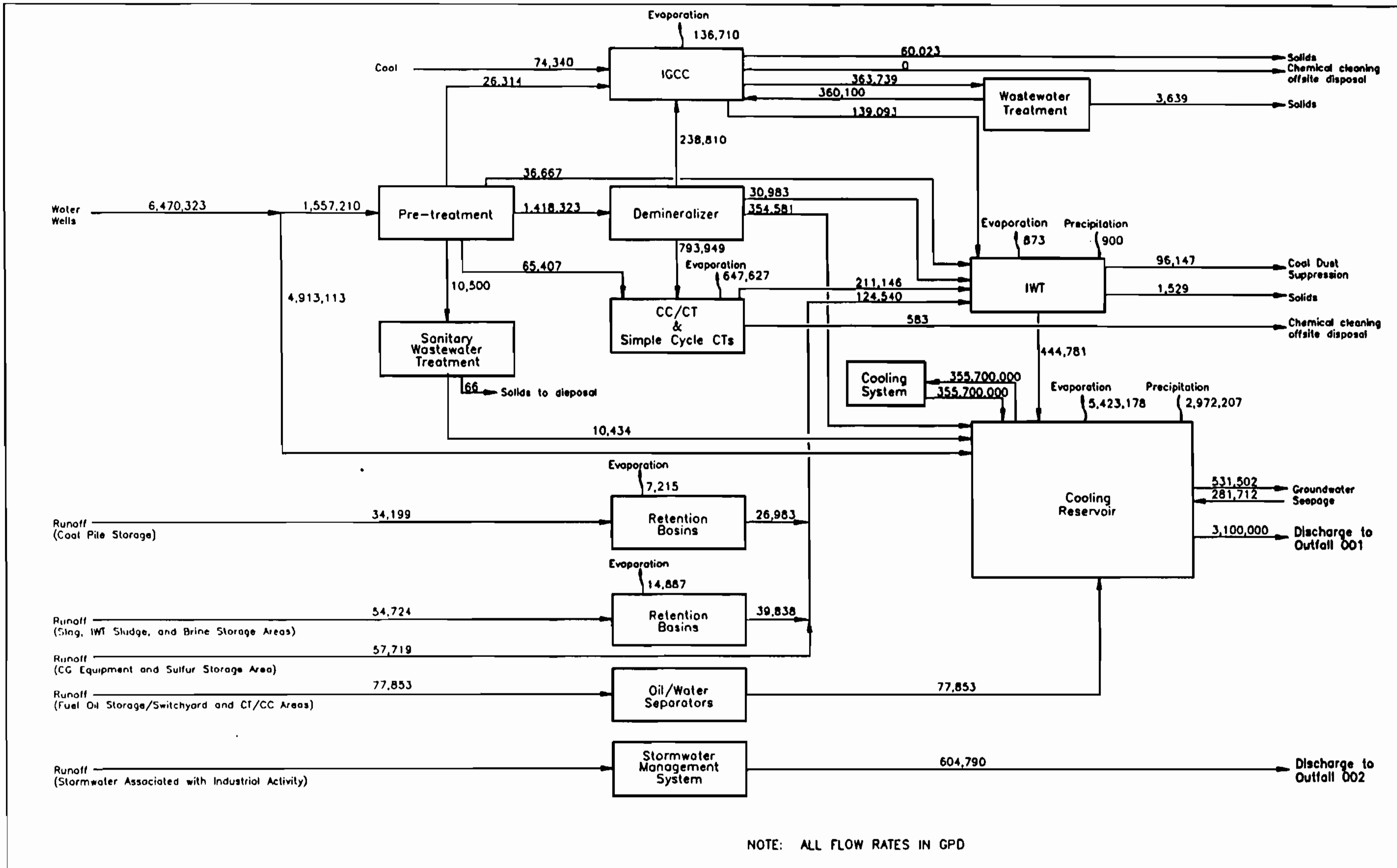

FIGURE 1.

WATER MASS BALANCE, ANNUAL AVERAGE MAKEUP

Source: UE&C, 1992. ECT, 1992.

TAMPA ELECTRIC
A TECO ENERGY COMPANY

POLK POWER STATION

Table 1. Estimated Cooling Reservoir Discharge (Outfall 001) Effluent Water Quality

Parameter	Average Daily Concentration	Average Daily Mass (lb/day)	Source
Biochemical oxygen demand	1.3 mg/L	33.6	See note
Chemical oxygen demand	1.4 mg/L	36.2	
Total organic carbon	9.1 mg/L	235.4	
Total suspended solids	10 mg/L	258.7	
Flow	3.1 MGD	--	
Ammonia nitrogen	0.01 mg/L	0.3	
Temperature, winter	65 °C	--	
Temperature, summer	87 °C	--	
pH, units	6.6	--	
Aluminum	0.4 mg/L	10.3	
Antimony	0.009 mg/L	0.2	
Arsenic	0.001 mg/L	0.03	
Barium	0.001 mg/L	0.03	
Beryllium	0.0001 mg/L	0.003	
Cadmium	0.0006 mg/L	0.02	
Chloride	36.0 mg/L	931.3	
Chlorine	0.0004 mg/L	0.01	
Chromium	0.00004 mg/L	0.001	
Color, platinum-cobalt units	45	--	
Copper	0.003 mg/L	0.1	
Cyanide	0.000004 mg/L	0.0001	
Fecal coliform	0.8 mpn/100 mL	--	
Fluoride	1.1 mg/L	28.5	
Iron	0.9 mg/L	23.3	
Lead	0.001 mg/L	0.03	
Magnesium	30.2 mg/L	781.3	
Manganese	0.08 mg/L	2.1	
Mercury	0.000007 mg/L	0.0002	
Nickel	0.01 mg/L	0.3	
Nitrate	0.3 mg/L	7.8	
Oil and grease	0.2 mg/L	5.2	
Phosphate	0.6 mg/L	15.5	
Radioactivity, Radium 226	2.1 pCi/L	--	
Selenium	0.00005 mg/L	0.001	
Sulfate	114.6 mg/L	2,964.8	
Sulfide	0.65 mg/L	16.8	
Surfactants	0.086 mg/L	2.2	
Zinc	0.04 mg/L	1.0	

Note: All parameter data represent average concentration and mass loading estimates based on engineering studies (Source Code 1) and best professional estimates (Source Code 4).

MPN = most probable number.

TAMPA ELECTRIC COMPANY
POLK POWER STATION

STORMWATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY FROM CONSTRUCTION SITE
40 CFR 126.26

The following narrative description is submitted in compliance with the application requirements for operators of stormwater discharges associated with industrial activity from construction activities.

The following application requirements are addressed as outlined in 40 Code of Federal Regulations (CFR) 122.26:

(i) Location (including location map) and nature of construction activity;
(ii) Total site area and site area which is expected to undergo excavation;
(iii) Proposed measures to control pollutants in stormwater discharges during construction and a description of applicable state and local erosion and sediment control requirements;
(iv) A description of applicable state and local stormwater management controls and proposed measures to control pollutants in stormwater discharges following completion of construction activities;
(v) Estimate of the site runoff coefficient, the quality of stormwater discharge and the nature of soil at the site, and the increase in impervious area following completion of construction activities; and
(vi) Name of receiving water.

(i) Location (including location map) and nature of construction activity.

<u>RESPONSE</u>

The Polk Power Station will be located on an approximately 4,348-acre site in southwest Polk County, Florida. Refer to Item XI of Form 1 for a site location map and approximate site boundaries.

The general site preparation and construction activities associated with the overall development of the project site will include the following:

- Clearing, grubbing, corridor preparation, and construction of the three access roads and rail spur to the main power plant facilities area;
- Construction of temporary berms within the cooling reservoir area to provide separate subareas for onsite storage of water from dewatering and stormwater runoff from other subareas under construction;
- Sequential dewatering of reservoir and reclaimed wetland subareas by pumping to other subareas and excavation and surrounding and internal berm construction activities in dewatered subareas of the reservoir;
- Construction of temporary runoff storage basins and drainage ditches to collect and route runoff to water storage subareas within the cooling reservoir area during grading, excavation, and construction activities;
- Clearing, grubbing, and cutting of main plant site area and filling the area with materials excavated from cooling reservoir area;
- Stabilizing, grading, and contouring main plant facilities area for construction of facilities foundations, interior roadways, and parking lots;
- Construction of areas for coal unloading, permanent stormwater retention basins, by-product (e.g., sulfur, slag) and fuel storage, brine treatment and storage, and wastewater treatment sludge storage;
- Performing groundwork, as necessary, for construction of facility footings and foundations, and underground electrical, water, and other utility piping systems;
- Development of substation, and on- and offsite transmission line rights-of-way; and
- Earthmoving, grading, and contouring for reclaimed wetland and upland areas and drainage systems.

Fill material will be provided from other areas on the site with the exception of some finishing foundation and bed support materials such as limerock, crushed rock ballast, and other materials which will be provided from regional, contracted sources.

(ii) Total site area and site area which is expected to undergo excavation.

RESPONSE

The Polk Power Station will be located on approximately 4,348 acres. The area of the site which is expected to undergo excavation for the purpose of constructing the power plant facilities includes approximately 3,200 acres. Refer to Form I, Item XI, Figure 2 for a plant layout.

(iii) Proposed measures to control pollutants in stormwater discharges during construction and a description of applicable state and local erosion and sediment control requirements.

RESPONSE

Stormwater discharges associated with construction activities will be managed in accordance with applicable regulations. All dewatering water from general site preparation activities will be collected, managed, and contained within the site boundaries by sequentially pumping or routing water to and from subareas within the site as the construction activities proceed. No offsite land or surface water body impacts are expected from the proposed dewatering activities.

The initial site preparation activities for the main plant site and cooling reservoir areas will involve establishing preliminary site access and clearing, grubbing, and initial earthwork activities in the plant site, access road, and rail spur areas. Temporary berms will be constructed within the mined-out reservoir area to establish three subareas for the sequential dewatering, water storage, and construction process for the cooling reservoir. Also, temporary stormwater runoff basins and drainage ditches will be developed, as needed, to route runoff to the onsite water storage subareas.

During normal rainfall conditions, stormwater runoff from areas under construction is expected to be contained within the dewatering storage subareas on the site. However, during extreme or cumulative storm events in excess of the 25-year, 24-hour rainfall event, some runoff may need to be discharged from these storage subareas to the Little Payne Creek system. In this event, the stormwater runoff will be initially detained within the storage subareas to allow for sediment settling and will be discharged through overflow swale(s) with appropriate controls and measures (e.g., straw bales and silt fences) to minimize transport of sediments offsite. Therefore, any stormwater runoff discharges are not expected to adversely impact offsite water bodies.

The surface water management system will be designed in accordance with the regulations and requirements of the Southwest Florida Water Management District (SWFWMD), which has been delegated authority under Chapter 17-25.090, Florida Administrative Code (F.A.C.). A comprehensive sedimentation and erosion control plan will be developed for the Polk Power Station in compliance with the regulatory requirements. The erosion control plan will prevent soil loss caused by stormwater runoff during project construction and operation. Both structural and non-structural (vegetative) erosion control measures will be designed, implemented, and properly maintained in accordance with best management practices.

The erosion and sedimentation control practices will include the following:

- Scheduling of activities to minimize the amount of disturbed area at any one time;
- Locating roads, railroad spurs, and parking areas on contour;
- Limiting construction traffic to access roads and areas to be graded and forbidding traffic in streams or drainage ditches;
- Compacting loose soil as soon as possible after excavation, grading, or filling;
- Using silt fences, straw bales, temporary rip-rap, etc., to minimize transport of sediment;

- The construction superintendent implementing the plan and ensuring that construction personnel are familiar with and adhere to the plan; and
- Managing runoff during construction and maintaining it on the site.

In addition to the erosion control practices described previously, Tampa Electric Company will employ various vegetative practices to control erosion and sedimentation, including permanent seeding of the cooling reservoir berms and swales.

Other erosion control structure practices will include, as necessary, the construction of temporary perimeter berms, rip-rap in potentially high-velocity areas, straw bales or other barriers, silt fences, diversionary berms or swales, and graveled road and railroad beds.

The construction plan is to direct nearly all stormwater under normal rainfall conditions into the cooling reservoir area and other mined-out areas on the site. The mine cuts, which are below-grade, will be capable of retaining a considerable amount of stormwater. This capacity will increase as the above-grade berm is constructed from the overburden.

In the event that small isolated sedimentation basins are required, these will be constructed by excavation. These basins will be cleaned out as needed.

Swales will be constructed for directing runoff around the construction site to the cooling reservoir or to sedimentation basins. These swales will be excavated, graded, and stabilized with gravel, sod, etc. The cross-sectional area of these swales will be designed such that erosional velocities are not reached.

Straw bale berms and silt fences will be constructed as needed. These barriers will be embedded (4 inches for bales and 8 inches for silt fences) into the soil to prevent washout. Steel rods or steel posts will be used as required to anchor these barriers.

If extreme or cumulative storm events in excess of the 25-year, 24-hour rainfall event occur during the construction activities, some stormwater runoff may need to be discharged offsite to the adjacent surface water body systems. The runoff will be initially detained within the cooling reservoir and mined-out areas or in sedimentation basins. Also, sediment transport associated with any discharges from these areas will be further controlled by use of appropriate measures such as straw bales and silt fences.

(iv) A description of applicable state and local stormwater management controls and proposed measures to control pollutants in stormwater discharges following completion of construction activities.

RESPONSE

Similar to the pre-mining drainage conditions, the surface runoff from the Polk Power Station site will be drained into three watersheds: South Prong Alafia River, Payne Creek, and Little Payne Creek. Currently the proposed project site has been significantly altered by the phosphate mining activities. To alleviate the existing mining impacts and to minimize the potential hydrologic impact due to the proposed project, the Polk Power Station onsite drainage plan is designed to achieve the following objectives:

1. Comply with the Florida Department of Natural Resources' (FDNR's) reclamation regulation (Chapter 16C-16, F.A.C.);
2. Comply with SWFWMD's surface water regulations (Chapter 40D-4, F.A.C.);
3. Comply with the Florida Department of Environmental Regulation's (FDER's) stormwater management regulation (Chapter 17-25, F.A.C.);
4. Comply with the U.S. Environmental Protection Agency (EPA) regulation for stormwater discharges associated with industrial activities (40 CFR 122.26); and
5. Comply with state and federal regulations for surface water and groundwater standards.

The onsite master drainage plan is designed to detain at least the first inch of runoff from areas surrounding the plant site for water quality treatment. The drainage system will also provide sufficient storage and detention capacity for water quantity control so that the post-reclamation peak runoff rate will not exceed the pre-mining peak discharge for a design storm event (25-year, 24-hour event) in each of the three watersheds. The detention/storage capacity will be provided by stormwater detention basins and reclaimed wetland areas.

Although the onsite drainage pattern and watershed have been significantly altered by mining activities, the proposed project will restore the drainage basin boundaries to approximately (i.e., within 2 percent) pre-mining conditions for the three basins within the project site: South Prong Alafia River, Payne Creek, and Little Payne Creek. The onsite drainage for each watershed is described as follows.

South Prong Alafia River

The drainage basin boundary of South Prong Alafia River watershed within the project site will be restored to approximately its pre-mining location. The total drainage area after reclamation will be 801 acres compared to the pre-mining drainage area of 816 acres. According to FDNR's requirements, this mined area west of State Road (SR) 37 will be regraded and planted with vegetation to enhance wildlife habitats. Also, to comply with these requirements, the onsite reclamation plan will create approximately 216 acres of forested and non-forested wetland areas. The runoff from the reclaimed upland forest and pasture will not be associated with industrial activity and will sheet flow into two separate wetland areas (east and west) prior to offsite discharge. The wetlands will have a large surface area to significantly suppress the peak discharge and will allow for the settling and filtering of suspended material and removal of nutrients by plant uptake prior to offsite discharge. The stormwater from the eastern wetland will also be routed to a tributary of the South Prong Alafia via a vegetated swale. The stormwater from the western wetland will also be discharged into a small tributary of the South Prong Alafia River in the extreme northwestern corner of the site. This offsite discharge from this wetland will be controlled by a fixed hydraulic structure to maintain the proper hydroperiod for the wetland.

Payne Creek

The drainage basin boundary of the Payne Creek watershed within the project site will be restored to approximately its pre-mining position. The total drainage area after reclamation will be 710 acres compared to the pre-mining drainage area of 716 acres. Similar to the South Prong Alafia River, the presently mined area will be reclaimed to contain 242 acres of wetlands and upland forests. The runoff from this reclaimed upland forest will not be associated with industrial activity and will sheet flow into the wetlands prior to offsite discharge. The substantial wetland areas will have flood control functions and provide water quality treatment. The discharge from the wetlands will drain southward across SR 674 through an existing culvert similar to pre-mining conditions. This offsite discharge will be routed to Payne Creek which runs along the western side of SR 37.

Little Payne Creek

The drainage basin boundary of the Little Payne Creek watershed within the project site will be restored to approximately its pre-mining position. The total drainage area after reclamation will be 2,837 acres, compared to a pre-mining drainage area of 2,816 acres. The power block and associated facilities, including the cooling reservoir, will be located within the Little Payne Creek basin. Mined-out areas in this basin will also be reclaimed upland and wetland areas.

The cooling water reservoir receives direct rainfall and runoff from its 778-acre area, including 727 acres of water surface area and 108 acres of interior berms and the inside slope of the exterior berm.

Stormwater runoff associated with industrial activities from the CG process area and sulfur storage area will be collected and routed to the industrial wastewater treatment (IWT) plant.

Runoff associated with industrial activity from CT/CC units, fuel oil storage area, and substation will be treated in an oil/water separator and then discharged into the cooling reservoir.

The runoff from coal pile, slag storage, active brine storage, and IWT sludge storage will be collected in retention basins to allow settling of the suspended solids then routed to the IWT for further treatment. A small portion of the treated water from the IWT will be used for dust suppression in the coal handling system, and the remainder will be discharged into the cooling water reservoir for reuse in the cooling system.

The total drainage area associated with industrial activities which ultimately discharges to the cooling reservoir is approximately 65 acres. In addition to recirculating cooling water and the IWT effluent, the cooling water receives other process waters described in Section 3.5. Blowdown from the cooling reservoir will be discharged to a reclaimed lake along the eastern edge of the cooling reservoir via a controlled structure (Outfall 001).

Two detention basins will be constructed to collect stormwater runoff from plant site areas not described above. The detention basins will provide water quantity and water quality treatment as required by SWFWMD. A 0.2-acre detention basin located south of the power block and adjacent to the northern berm of the cooling reservoir will receive runoff from the administration building, parking lot, and a small area in the immediate vicinity of the building. The total subbasin area is about 3 acres, and the detention basin will detain at least 1 inch of runoff from the area. The discharge from this detention basin will be drained via a control structure into a reclaimed wetland located east of SR 37 and west of the cooling reservoir (see Figure 2).

A 26-acre detention basin will be constructed to the north of the power block. This basin will receive stormwater runoff from 172 acres. This detention basin will detain at least 1 inch of runoff prior to discharging into a second wetland area lying to the west of the basin and northwest of the main plant facilities (see Figure 2).

The runoff from the detention basins and other site areas to the west of the power block plant site and east of SR 37 will be drained into a wetland area to the west of the large detention basin. The discharge from this wetland will be routed north and then eastward via swales via Outfall 002 into the old mine-cut lake which also receives runoff from the northeastern portion of the project site. The total drainage area discharged to the old mine-cut lake is approximately 1,994 acres.

The discharge from the old mine-cut lake will be drained southward into an existing reclaimed lake located along the eastern edge of the proposed cooling water reservoir. The blowdown from the reservoir will also be routed into this existing reclaimed lake. The blowdown and stormwater runoff discharges from the reclaimed lake will be routed offsite through a swale and drain into Little Payne Creek system which runs along the west of Fort Green Road near the project area.

(v) Estimate of the site runoff coefficient, the quality of stormwater discharge and the nature of soil at the site, and the increase in impervious area following completion of construction activities.

RESPONSE

The runoff coefficient for the Polk Power Station site for a 24-hour mean annual storm (4.5 inches) which has a return period of 2.33 years is estimated to be 0.62. For a 25-year, 24-hour (9 inches) storm event, the site runoff coefficient is estimated to be 0.78.

Stormwater management control will be executed to prohibit the discharge of stormwater which would cause or contribute to a violation of water quality standards. Table 1 includes estimated construction-related stormwater discharge water quality values.

Table 1. Estimated Construction Stormwater Discharge Water Quality

Parameter	Unit Measurement
Oil and grease, mg/L	5
Biochemical oxygen demand (BOD5), mg/L	2
Chemical oxygen demand (COD), mg/L	51
Total suspended solids (TSS), mg/L	100
Total Kjeldahl nitrogen, mg/L	1
Total phosphorus, mg/L	1
pH, units	6 to 8.5

Source: ECT, 1992.

During construction, fill material will be provided from other areas on the site with the exception of some finishing foundation and support materials such as limerock, crushed rock ballast, and other materials which will be provided from regional, contracted sources. The soil types situated on the Polk Power Station plant site include Smyrna-Myakka, Arents-Water, and Ona soils [U.S. Department of Agriculture (USDA), 1990]. These three soil types are described as follows. Seventeen other soil types occur across the site, but cover significantly less area.

The Smyrna-Myakka soil complex consists primarily of fine sands which cover broad areas of flatwoods. These soils are somewhat poorly drained with slopes that are smooth to concave at 0 to 2 percent. The water table within these soils is typically 0 to 1 foot below land surface (ft bls) for 1 to 4 months in most years. The Smyrna soils have an organic matter content of 1 to 5 percent, and the Myakka soils have an organic matter content of 2 to 5 percent (SCS, 1990). This soil complex has only a slight erosional risk.

The Arents-Water complex is a soil type resulting from mining activities. The Arents consists of piles (various slopes) of soil material and overburden that originally overlaid the phosphate matrix. The water part of this classification forms after the ore has been mined.

The Ona fine sands are also found in broad areas of flatwoods. The Ona soils are somewhat poorly drained with shallow slopes of 0 to 2 percent. The water table within this soil unit is typically 0 to 1 ft bls for 1 to 4 months in most years. The Ona sand has only a slight erosional risk.

Following completion of construction, the increase of impervious area at the Polk Power Station will be approximately 70 acres. Proposed measures to control pollutants in stormwater discharges following completion of construction activities is included in Section (iii).

(vi) Name of receiving water.

RESPONSE

During normal rainfall conditions, stormwater runoff from areas under construction will be contained within the dewatering storage subareas on the site. During extreme or cumulative storm events in excess of the 25-year, 24-hour rainfall event, some runoff may need to be discharged from the storage subareas to the Little Payne Creek system via the old-mine cut.

REFERENCES

Soil Conservation Service (SCS). 1990. (from SCA 2.3)

U.S. Department of Agriculture (USDA). 1990.

Please print or type in the unshaded areas only

EPA ID Number *(copy from Item I of Form 1)*

Form Approved. OMB No. 2040-0086
Approval expires 5-31-92

Form 2F NPDES

EPA

United States Environmental Protection Agency
Washington, DC 20460

Application for Permit to Discharge Storm Water Discharges Associated with Industrial Activity

Paperwork Reduction Act Notice

Public reporting burden for this application is estimated to average 28.6 hours per application, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate, any other aspect of this collection of information, or suggestions for improving this form, including suggestions which may increase or reduce this burden to: Chief, Information Policy Branch, PM-223, U.S. Environmental Protection Agency, 401 M St., SW, Washington, DC 20460, or Director, Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

I. Outfall Location

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. Outfall Number (list)	B. Latitude			C. Longitude			D. Receiving Water (name)
001*	27	43	41	82	38	20	Unnamed reclaimed lake to unnamed
							canal to Little Payne Creek
002	27	44	1	82	18	19	Unnamed old mine cut to unnamed
							reclaimed lake to unnamed canal to
							Little Payne Creek

II. Improvements

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in this application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions. No

1. Identification of Conditions, Agreements, Etc.	2. Affected Outfalls		3. Brief Description of Project	4. Final Compliance Date	
	number	source of discharge		a. req.	b. proj.

B. You may attach additional sheets describing any additional water pollution (or other environmental projects which may affect your discharges) you now have under way or which you plan. Indicate whether each program is now under way or planned, and indicate your actual or planned schedules for construction.

III. Site Drainage Map

Attach a site map showing topography (or indicating the outline of drainage areas served by the outfall(s) covered in the application if a topographic map is unavailable) depicting the facility including: each of its intake and discharge structures; the drainage area of each storm water outfall; paved areas and buildings within the drainage area of each storm water outfall, each known past or present areas used for outdoor storage or disposal of significant materials, each existing structural control measure to reduce pollutants in storm water runoff, materials loading and access areas, areas where pesticides, herbicides, soil conditioners and fertilizers are applied; each of its hazardous waste treatment, storage or disposal units (including each area not required to have a RCRA permit which is used for accumulating hazardous waste under 40 CFR 262.34); each well where fluids from the facility are injected underground; springs, and other surface water bodies which receive storm water discharges from the facility. See Figure 2 in Form 1

Continue on Page 2

*Outfall 001 is an industrial discharge which is addressed in EPA Form 2D.

Continued from the Front

IV. Narrative Description of Pollutant Sources

A. For each outfall, provide an estimate of the area (include units) of impervious surfaces (including paved areas and building roofs) drained to the outfall, and an estimate of the total surface area drained by the outfall.

Outfall Number	Area of Impervious Surface (provide units)	Total Area Drained (provide units)	Outfall Number	Area of Impervious Surface (provide units)	Total Area Drained (provide units)
002	70 acres	1,000 acres			

B. Provide a narrative description of significant materials that are currently or in the past three years have been treated, stored or disposed in a manner to allow exposure to storm water; method of treatment, storage, or disposal; past and present materials management practices employed to minimize contact by these materials with storm water runoff; materials loading and access areas; and the location, manner, and frequency in which pesticides, herbicides, soil conditioners, and fertilizers are applied.

Outfall 002 will commence operation in 1995.

C. For each outfall, provide the location and a description of existing structural and nonstructural control measures to reduce pollutants in storm water runoff; and a description of the treatment the storm water receives, including the schedule and type of maintenance for control and treatment measures and the ultimate disposal of any solid or fluid wastes other than by discharge.

Outfall Number	Treatment	List Codes from Table 2F-1
002	See attached description	1 - U

V. Nonstormwater Discharges

A. I certify under penalty of law that the outfall(s) covered by this application have been tested or evaluated for the presence of nonstormwater discharges, and that all nonstormwater discharges from these outfall(s) are identified in either an accompanying Form 2C or Form 2E application for the outfall.

Name and Official Title (type or print)	Signature	Date Signed
Charles R. Black Vice President, Project Management	CRBlack	07/30/92

B. Provide a description of the method used, the date of any testing, and the onsite drainage points that were directly observed during a test.

See IV.B

VI. Significant Leaks or Spills

Provide existing information regarding the history of significant leaks or spills of toxic or hazardous pollutants at the facility in the last three years, including the approximate date and location of the spill or leak, and the type and amount of material released.

See IV.B

 Continue on Page 3

EPA ID Number *(copy from Item I of Form 1)*

Continued from Page 2

VII. Discharge Information

A,B,C, & D: See instructions before proceeding. Complete one set of tables for each outfall. Annotate the outfall number in the space provided. Tables VII-A, VII-B, and VII-C are included on separate sheets numbered VII-1 and VII-2.

E: Potential discharges not covered by analysis - is any toxic pollutant listed in table 2F-2, 2F-3 or 2F-4, a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ Yes *(list all such pollutants below)* ☒ No *(go to Section IX)*

VIII. Biological Toxicity Testing Data

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ Yes *(list all such pollutants below)* ☒ No *(go to Section IX)*

IX. Contract Analysis Information

Were any of the analysis reported in item VII performed by a contract laboratory or consulting firm?

☐ Yes *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)* ☒ No *(go to Section X)*

A. Name	B. Address	C. Area Code & Phone No.	D. Pollutants Analyzed

X. Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

A. Name & Official Title *(type or print)*	B. Area Code and Phone No.
Charles R. Black Vice President, Project Management	(813) 228-4111
C. Signature CRBlack	D. Date Signed 07/30/92

Discharge information will be provided 2 years following commencement of plant operation.

EPA ID Number (*copy from Item I of Form 1*)	Form Approved. OMB No. 2040-0086 Approval expires 5-31-92

VII. Discharge Information *(Continued from page 3 of Form 2F)*

Part A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 20 Minutes	Flow-weighted Composite	Grab Sample Taken During First 20 Minutes	Flow-weighted Composite		
Oil and Grease		N/A				
Biological Oxygen Demand (BOD5)						
Chemical Oxygen Demand (COD)						
Total Suspended Solids (TSS)						
Total Nitrogen						
Total Phosphorus						
pH	Minimum	Maximum	Minimum	Maximum		

Part B - List each pollutant that is limited in an effluent guideline which the facility is subject to or any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit). Complete one table for each outfall. See the instructions for additional details and requirements.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 20 Minutes	Flow-weighted Composite	Grab Sample Taken During First 20 Minutes	Flow-weighted Composite		

 Continue on Reverse

Continued from the Front

Part C - List each pollutant shown in Tables 2F-2, 2F-3, and 2F-4 that you know or have reason to believe is present. See the instructions for additional details and requirements. Complete one table for each outfall.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 20 Minutes	Flow-weighted Composite	Grab Sample Taken During First 20 Minutes	Flow-weighted Composite		

Part D - Provide data for the storm event(s) which resulted in the maximum values for the flow weighted composite sample.

1. Date of Storm Event	2. Duration of Storm Event *(in minutes)*	3. Total rainfall during storm event *(in inches)*	4. Number of hours between beginning of storm measured and end of previous measurable rain event	5. Maximum flow rate during rain event *(gallons/minute or specify units*	6. Total flow from rain event *(gallons or specify units)*

7. Provide a description of the method of flow measurement or estimate.

TAMPA ELECTRIC COMPANY
POLK POWER STATION

FORM 2F--ITEM IV.C. OUTFALL 002 DESCRIPTION

Outfall 002 receives stormwater from approximately 70 acres of impervious area, including laydown areas, paved areas within the plant site, and enclosed raw material storage areas. This stormwater is routed to a 26-acre retention basin located north of the plant facilities. The discharge from this retention basin will combine with non-regulated runoff in the reclaimed wetlands area, for eventual discharge to the old mine cut area.

Outfall 002 does not receive any process discharge or stormwater which has come in contact with the coal pile, slag storage area, sludge disposal area, or other waste or by-product storage area. Stormwater from these areas receives pretreatment (e.g., oil/water separation, settling), as needed, and then is routed to the industrial wastewater treatment plant if additional treatment is necessary.

Two detention basins will be constructed to collect stormwater runoff from the plant site areas. The detention basins will provide water quantity and water quality treatment as required by SWFWMD.

A 0.2-acre detention basin located south of the facilities and adjacent to the northern berm of the cooling reservoir will receive runoff not associated with industrial activity from the administration building, parking lot, and a small area in the immediate vicinity of the building. The total subbasin area is about 3 acres, and the detention basin will detain at least 1 inch of runoff from the area. The discharge from this detention basin will be drained via a control structure into the reclaimed wetland located east of SR 37 and west of the cooling reservoir. Stormwater runoff from the railyard will also drain to the reclaimed wetland area located west of the power block. This reclaimed wetland will discharge to a second reclaimed wetland area located northwest of the power block.

Another 26-acre detention basin will be constructed to the north of the power block. This basin will receive stormwater runoff associated with industrial activity from 172 acres. This detention basin will detain at least 1 inch of runoff prior to discharging into the reclaimed wetland area lying northwest of the power block.

Ultimately, the runoff from the reclaimed wetland areas and site area will be routed north and then eastward via swales into the old mine-cut lake (Outfall 002) which will also receive runoff from the northeastern portion of the site. The discharge from the old mine-cut lake will be drained southward into an existing reclaimed lake located along the eastern edge of the proposed cooling water reservoir. The blowdown from the reservoir (Outfall 001) will also be routed into this existing reclaimed lake. The blowdown and stormwater runoff discharges from the reclaimed lake will be routed offsite through a swale and drain into Little Payne Creek system which runs along the west of Fort Green Road near the project area.

PRELIMINARY

BEST MANAGEMENT PRACTICES PLAN
TAMPA ELECTRIC COMPANY
POLK POWER STATION

Prepared for:

TAMPA ELECTRIC
A TECO ENERGY COMPANY

Tampa, Florida

Prepared by:

ECT
Environmental Consulting & Technology, Inc.
Gainesville, Florida

ECT No. 90-263-0409

TABLE OF CONTENTS

1.0 INTRODUCTION

Best Management Practices (BMPs) are measures to prevent or mitigate water pollution from sources ancillary to industrial manufacturing or treatment process. The purpose of BMPs is to prevent toxic pollutants or hazardous substances from damaging the aquatic environment.

This Preliminary BMP Plan has been developed to satisfy the National Pollutant Discharge Elimination system (NPDES) Permit requirements for Tampa Electric Company Polk Power Station. This Preliminary BMP will be finalized within 6 months prior to commercial operation of Polk Unit No. 1 and will be implemented upon the start of commercial operation of Polk Unit No. 3. The BMP Plan will then be updated whenever there are significant operational or physical changes made at the facility.

This Preliminary BMP Plan provides an overview of potential programs and procedures which may contribute to the goal of minimizing potential inadvertent pollutant discharges to the Waters of the United States.

The Polk Power Station site consists of approximately 4,348 acres in southwest Polk County. The site is bordered by the Hillsborough County line along the western boundary; Fort Green Road [County Road (CR) 663] on the east; CR 630 and Bethlehem and Albritton Roads along the north; and State Road (SR) 674 and phosphate clay settling areas on the south. SR 37 bisects the property running in a southwest to northeast direction. The property to the east of SR 37 consists primarily of recently mined areas with water-filled mine cuts between over-burden spoil piles, recently reclaimed areas, and old mined and unreclaimed areas. The area to the west of SR 37 is currently being mined for phosphate matrix. These operations are scheduled to continue into 1994. Except for the approximately 775-acre tract south of CR 630 (Sections 34 and 35), the site has been part of the Agrico Fort Green Mine.

Southwest Polk County is relatively flat, with elevations generally ranging between 120 and 150 feet National Geodetic Vertical Datum (ft-NGVD). The prevalent land use in the area is phosphate strip mining. The Polk Power Station site itself fits this description. The elevation of the plant site is approximately 140 ft-NGVD. More than 91 percent (i.e., approximately 3,970 acres) of the site has been or is proposed to be disturbed by phosphate mining activities prior to Tampa Electric Company's use of the site. Some of the mined-out areas will be developed into a cooling reservoir.

The proposed Polk Power Station project involves the phased construction and operation of electric generating units and associated facilities. The total generating capacity of the units at the site will be approximately 1,150 megawatts (MW). The generating units planned for the Polk Power Station will be developed at the site according to a phased schedule which matches Tampa Electric Company's forecasted growth in electricity demands beginning in 1995 and continuing into the year 2010. The first generating facilities at the Polk Power Station site will be an integrated coal gasification combined cycle (IGCC) demonstration project developed by Tampa Electric Company and supported in part through funding from the U.S. Department of Energy (DOE) under the Clean Coal Technology Demonstration program. The IGCC unit will consist of a nominal net 150-MW advanced combustion turbine (CT), fueled by No. 2 fuel oil during the first year of operation in 1995. Heat recovery steam generator (HRSG), steam turbine (ST), and coal gasification (CG) facilities will be added and integrated with the advanced CT a year later to complete the nominal net 260-MW IGCC unit. After integration of these facilities, the IGCC unit will be fueled by coal-derived gas (i.e., called coal gas or syngas) which is produced in the CG facilities, with No. 2 fuel oil as a backup fuel. This IGCC unit will be known as Polk Unit 1. Tampa Electric Company's current Power Resource Plan indicates that later facilities will consist of two combined cycle (CC) generating units and six simple-cycle CTs fueled by natural gas with No. 2 fuel oil as the backup fuel. Figure 1 provides an illustration of the proposed Polk Power Station facilities.

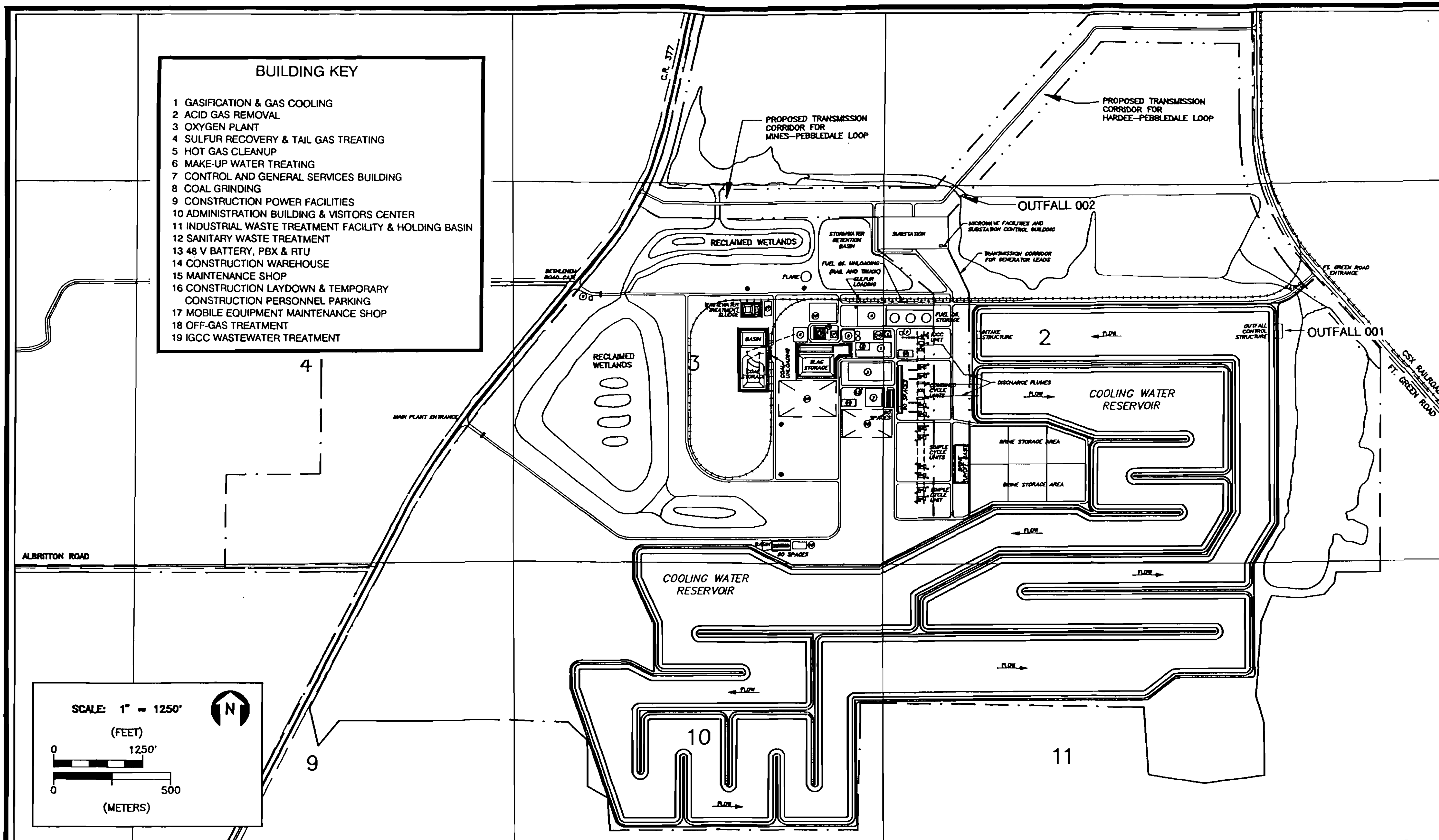

FIGURE 1.

POLK POWER STATION FACILITY SITE PLAN

Sources: UE&C, 1992. ECT, 1992.

TAMPA ELECTRIC
A TECO ENERGY COMPANY

POLK POWER STATION

2.0 BEST MANAGEMENT PRACTICES PLAN OBJECTIVES

The objective of the BMP Plan is to prevent or minimize the potential for the release of significant amounts of pollutants to the Waters of the United States from activities and areas which are ancillary to the operation of Polk Power Station. The term pollutant refers to any substances listed as toxic under Section 307(a)(1) of the Clean Water Act, oil, as defined by Section 311 of the Clean Water Act, and any substances listed as hazardous under Section 311 of the Clean Water Act.

The potential types of activities and areas addressed by this BMP Plan are described in the following sections.

2.1 RISK IDENTIFICATION AND ASSESSMENT

The following areas have been preliminarily identified as areas having the potential risk of discharging to Waters of the United States:

- Toxic substances storage areas;
- Oil storage areas;
- Hazardous materials storage areas;
- Material storage areas;
- In-plant transfer, process, and material handling areas;
- Loading and unloading facilities; and
- By-product industrial wastewater treatment (IWT) plant sludge and brine storage areas.

2.2 REPORTING OF BEST MANAGEMENT PRACTICES INCIDENTS

An incident reporting system will be in place at Polk Power Station to keep records of any incidents such as spills, leaks, and runoffs which would result in improper discharge to the Waters of the United States. This system of documentation will be developed for the purpose of minimizing discharge reoccurrence, expediting cleanup activities, and complying with applicable regulations.

The incident reporting system includes notification of a discharge to appropriate plant personnel to begin immediate action; formal written reports for review and evaluation by plant management; and notification to the Tampa Electric Company Environmental Planning Department. The Environmental Planning Department will in turn notify the appropriate governmental agencies.

2.3 MATERIAL COMPATIBILITY

Chemical substances, both hazardous and nonhazardous, are identified and controlled through a variety of programs.

A Material Safety Data Sheets (MSDS) source program will be developed for the facility. The program assures compliance with applicable federal regulations and Florida Statutes, and is intended to provide all plant personnel with handling and disposal information of all chemical and materials used in the plant.

The MSDS contain information concerning the known and suspected health risks associated with the product; proper precautions and safe handling practices; and emergency procedures for spills, fires, disposal, and first aid. The MSDS will be grouped in the following categories:

Abrasives
Absorbants
Acids
Adhesives
Antifreeze
Asphalt product
Biocides
Brine
Cleaners contact
Cleaners general
Cleaners skin
Concrete and masonry
Desiccants
Electrolytes
Epoxy and resins
Fine slag
Fire control products
Fuels and additives
Gases
Gasket material
Gasoline
Herbicides
Insulating materials
IWT sludge
Lime
Lubricants
Metals and alloys
Paint and coatings
Pesticides
Preservatives
Reagents
Reagent atomic standards
Refractory
Sealants
Slag
Smoke sticks
Solvents
Static eliminators
Surfactants
Sulfur
Water and wastewater treatments
Welding electrodes
Wood products

Prior to purchasing materials for the plant, an MSDS will be obtained from the manufacturer or vendor for review. This information can identify any potential dangers to employees, as well as directions for storage and spill procedures and fire prevention.

2.4 GOOD HOUSEKEEPING

It is Tampa Electric Company's policy to maintain a clean and orderly work environment. This policy will be reflected in a variety of programs, plant personnel inspections, system/unit operating guidelines, and training programs for the Polk Power Station. The practices and procedures covered by these programs ensure that any spills or leaks will be detected and cleaned up promptly.

2.5 PREVENTIVE MAINTENANCE

The Polk Power Station will develop a preventive maintenance program prior to the start of commercial operations. This preventive maintenance program involves inspection and testing of plant equipment and systems to uncover conditions which could cause breakdowns or failures resulting in significant discharges of pollutants to surface waters. The program prevents breakdowns and failures by routine adjustment, repair, or replacement of items. The preventive maintenance program includes record systems for scheduling inspections and corrective actions. The criteria for formal equipment inspection is determined by analyzing the short- and long-term effects that the equipment breakdown will have on electrical generation, personnel safety, regulatory requirements, and economic and historical data.

2.6 INSPECTIONS AND RECORDS

Visual inspections of plant facilities, systems, tanks, pipelines, and storage areas will be conducted on a regular basis. Plant operations personnel will be required to make routine rounds or patrols of various areas of the power plant as part of their job responsibility. While on these rounds, they will look for any unusual conditions, faulty equipment operations, leaks, spills, or other problems which are causing, or potentially could cause, an environmental incident. Any leaks or spills observed, or deterioration of equipment which could contribute to an incident will be reported and investigated. Visual inspections will be performed at a frequency consistent with maintenance, operational, and regulatory requirements.

2.7 SECURITY

Security at the Polk Power Station will be provided by a hired guard service. Guards will be onsite 24 hours a day, 7 days a week to secure and control access to the station. A guard is stationed at station entrances to clear both employees and visitors.

Guards will be required to write reports of observed abnormalities detailing incidents of fire, explosion, threats, assaults, vandalism, property damage, intrusion, theft, or similar security matters.

2.8 EMPLOYEE TRAINING

Polk Power Station will provide training for its employees. New employee orientation will include a general safety training course and an environmental training course. The courses will cover hazardous materials handling and disposal, and fire safety. In addition, power plant operations personnel will receive instructions on the safety-related aspects of all operating systems to ensure that they are well educated on the potential safety and environmental impacts of the systems for which they are responsible. Specialty training will be provided to plant personnel in support of specific training needs. A training program regarding hazardous waste and hazardous materials handling will be conducted annually for the plant personnel engaged in the handling of hazardous materials in accordance with the provisions of 40 Code of Federal Regulations 26.

11.1.2 JOINT APPLICATION FOR WORKS IN THE WATERS OF FLORIDA

Florida Department of Environmental Regulation
Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

DER Form # 17-312.900(1)
Form Title Joint Ap. for Works in the Waters of Florida
Effective Date October 30, 1991
DER Application No. ______ (Filled in by DER)

Joint Application for Works in the Waters of Florida

Department of the Army (Corps)/Florida Department of Environmental Regulation (DER)/
Department of Natural Resources (DNR)/Delegated Water Management District (Delegated WMD)

Type or Print Legibly

Corps Application Number (official use only)	DER Application Number (official use only)

1. Applicant's Name and Address

Name Tampa Electric Company
Last Name, First name (If individual); Corporate Name; Name of Govt. Agency
Street Post Office Box 111
City Tampa State Florida Zip 33601-0111
Telephone (813) 228-4111 (Day) (____) ______ (Night)

2. Name, Address, Zip Code, Telephone Number and Title of Applicant's Authorized Agent

Name A. Spencer Autry, Director of Environmental
Last Name, First Name
Corporate Name; Name of Govt. Agency Tampa Electric Company
Street Post Office Box 111
City Tampa State Florida Zip 33601-0111
Telephone (813) 228-4111 (Day) (____) ______ (Night)

3. Name of Waterway at Work Site: Little Payne Creek

4. Street, Road or Other Location of Work State Road 37, County Road 630, Fort Green Road (see Figure 1)
Incorporated City or Town near Bradley Junction
Section 34 and 35 Township 31 South Range 23 East
Section 1,2,3,4,9,10,11, and 12 Township 32 South Range 23 East
Section ______ Township ______ Range ______

County(ies) Polk

Coordinates in Center of Project: **Federal Projects Only:** ______ x ______ y

Latitude 27 ° 43 ' 30 " Longitude 81 ° 59 ' 0 "

Lot N/A Block ______ Subd ______ Plat Bk ______ Pg ______

Directions to Locate Site: Approximately 12 miles south of Highway 60 in Mulberry, on the east side of State Road 37 (approximately 4 miles south of Bradley Junction, see Figure 1)

5. Names, Addresses, and Zip Codes of Adjacent Property Owners Whose Property Also Adjoins the Water (Excluding Applicant). Show Numbers or Names of These Owners on Plan Views. If More Than Six (6) Owners Adjoin the Project, You May Be Required to Publish a Public Notice for the DER.

1. Agrico Chemical Company
   Post Office Box 1110
   Mulberry, Florida 33689
2. American Cyanamid Company
   Post Office Box 5290
   Lakeland, Florida 33807
3. Guy A. Lamb
   723 Northeast 7th Street
   Fort Meade, Florida 33841
4. Seminole Fertilizer, Inc.
   Post Office Box 471
   Bartow, Florida 33830
5. ______
6. ______

Northwest District, 160 Governmental Center, Pensacola, Florida 32501-5794, 904-436-8300
Northeast District, Suite B200, 7825 Baymeadows Way, Jacksonville, Florida 32256-7577, 904-448-4300
Central District, 3319 Maguire Blvd, Suite 232, Orlando, Florida 32803-3767, 407-894-7555
Southwest District, 4520 Oak Fair Blvd, Tampa, Florida 33610-7347, 813-623-5561
South District, 2269 Bay St, Fort Myers, Florida 33901-2896, 813-332-6975
Southeast District, 1900 S. Congress Ave., Suite A, West Palm Beach, Florida 33406, 407-433-2650

6. **Proposed Use** (Check one or more as applicable) Private Single Family ☐ Multi Family ☐
Public ☐ Commercial ☒ New Work ☐ Alteration of Existing Works ☐ Maintenance ☐ Other (Explain) ____________

7. **Desired Permit Duration** (see Fee Schedule)
5 Yr ☒ 10 Yr ☐ Other (Specify) ____________

8. **General Permit or Exemption Requested**
DER General Permit FAC Rule 17-312. ______ DER Exemption FAC Rule 17-312. ______ Section 403. ______ F.S.

9. **Total Extent of Work in Jurisdictional Open Waters or Wetlands:** (Use additional sheets and provide complete breakdown of each category if more space is needed.

a. Within Corps Jurisdiction:
Fill: 11,025,471 Sq. Ft. 253.11 Acres 3,550,075 Cu. Yds.
Excavation: N/A Sq. Ft. N/A Acres N/A Cu. Yds.

b. Within DER Jurisdiction:
Fill: N/A Sq. Ft. ______ Acres ______ Cu. Yds.
Excavation: N/A Sq. Ft. ______ Acres ______ Cu. Yds.
Excavation Waterward of MHW N/A cu. yds. (Information needed for DNR)

c. DER Jurisdictional Area Severed (Area Landward of Fill Structures which will be Severed):
N/A Sq. Ft. ______ Acres

d. DER Jurisdictional Area Created (New Excavation from Uplands, Exclusive of Mitigation):
N/A Sq. Ft. ______ Acres

e. Docks, Piers, and Over Water Structures:
Total Number of Slips N/A Total Number of Mooring Pilings ______
Length ______ Width ______ Height above MHW ______
Length ______ Width ______ Height above MHW ______
Number of Finger Piers ______ Length ______ Width ______ Height ______
Number of Finger Piers ______ Length ______ Width ______ Height ______
Total area of structure over waters & wetlands ______ sq. ft.
Use of structure ______

Will the docking facility provide:	No	Yes	Number
Liveaboard Slips	☐	☐	______
Fueling Facilities	☐	☐	______
Sewage Pump-out Facilities	☐	☐	______
Other Supplies or Services Required for Boating (Excluding refreshments, bait and tackle)	☐	☐	______

f. Seawall length N/A ft. Seawall material ______
Riprap revetment length ______ ft. Slope ______ H: ______ V Toe width ______ ft.
Riprap at toe of seawall length ______ ft. Slope ______ H: ______ V Toe width ______ ft.
Size of riprap ______
Type of riprap or seawall material ______

g. Other (See Item 10).

DER Form #	17-312.900(1)
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10. Description of Work (be specific; use additional sheets as necessary).

See Attachment A, Response to Item 10.

11. Turbidity, Erosion, and Sedimentation Controls Proposed:

Existing mine cuts to be dewatered prior to commencement of grading activities. A silt screen will be erected upstream of the point of offsite discharge (see Figure 5, Sheet 9 of 13, and Attachment A, Response to Item 10).

12. Date Activity is Proposed to Commence December 1993 ; to be Completed January 1997

Total Time Required to Construct ______

13. Previous Applications for this Project have been:

	Date	DER No.	Corps No.
A. Denied (date)			
B. Issued (date)	April 20, 1990	531620259	89IPC-20202 06/29/90 20223 08/30/89
C. Other (please explain)			

Differentiate between existing work and proposed work on the drawings.

14. Certification. Application is hereby made for a permit or permits to authorize the activities described herein.

A. I Certify That: (Please check appropriate space)

1. I am the record owner [ ]; lessee [ ], or the record easement holder [ ] of the property on which the proposed project is to be undertaken, as described in the attached legal document.
2. I am **not** [X] the record owner, lessee, or record easement holder of the property on which the proposed project is to be undertaken, as described in the attached legal document, but I will have, before undertaking the proposed work, the requisite property interest. (Please explain what the interest will be and how it will be acquired.)

Attach legal description of property or copy of deed to the property on which project is to occur (must be provided) (See Attachment B)

B. I understand I may have to provide any additional information/data that may be necessary to provide reasonable assurance or evidence that the proposed project will comply with the applicable State Water Quality Standards or other environmental standards both before construction and after the project is completed.

C. In addition, I agree to provide entry to the project site for inspectors with proper identification or documents as required by law from the environmental agencies for the purpose of inspecting the site. Further, I agree to provide entry to the project site for such inspectors to monitor permitted work, if a permit is granted.

D. This is a Joint Application and is **not** a Joint Permit. I hereby acknowledge the obligation and responsibility for obtaining **all** of the required state, federal or local permits **before** commencement of construction. I also understand that before commencement of this proposed project, I must be granted separate permits or authorizations from the U.S. Corps of Engineers, the U.S. Coast Guard, the Department of Environmental Regulation, the Delegated Water Management District (where applicable), and the Department of Natural Resources, as necessary.

DER Form #	17-312.900(1)
Form Title	Joint Ap. for Works in the Waters of Florida
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E. I am familiar with the information contained in this application, and that to the best of my knowledge and belief, such information is true, complete and accurate. I further certify that I possess the authority to undertake the proposed activities or am acting as the duly authorized agent of the applicant. I understand that knowingly making any false statement or representation in this application is a violation of Section 403.161, F.S. and Chapter 837, F.S.

A. Spencer Autry
Typed/Printed Name of Applicant or Agent

Signature of Applicant or Agent

July 24, 1992
Date

Director, Environmental
(Corporate Title if applicable)

AN AGENT MAY SIGN ABOVE IF APPLICANT COMPLETES THE FOLLOWING:

I hereby designate and authorize the agent listed above to act on my behalf as my agent in the processing of this permit application and to furnish on request, supplemental information in support of the application.

Charles R. Black
Typed/Printed Name of Applicant

Signature of Applicant

July 24, 1992
Date

Vice President, Project Management
(Corporate Title if applicable)

15. **For your information:** Section 370.034, Florida Statutes, requires that all dredge and fill equipment owned, used, leased, rented or operated in the state shall be registered with the Department of Natural Resources. Before selecting your contractor or equipment you may wish to determine if this requirement has been met. For further information, contact the Chief of the Bureau of Saltwater Licenses and Permits, Department of Natural Resources, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399. Telephone No. (904) 487-3122. ***This is not a requirement for a permit from the Department of Environmental Regulation.***

    18 U.S.C. Section 1001 provides that, Whoever, in any manner within the jurisdiction of any department or agency of The United States knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than five years, or both.

16. Please submit this completed form, with attached drawings and the complete DER processing fee (see Fee Schedule in Rule 17-4.050, F.A.C., copy attached) to the appropriate DER or Delegated WMD office with jurisdiction over the project site.

TAMPA ELECTRIC
A TECO ENERGY COMPANY

To Whom It May Concern:

Tampa Electric Company intends to acquire all lands designated in this application for the Polk Power Station and its associated facilities prior to the commencement of construction. This land will be used for construction of these facilities as described in the application.

Charles R. Black
Vice President
Project Management

/wp78

TAMPA ELECTRIC
A TECO ENERGY COMPANY

To Whom It May Concern:

Please be advised that A. Spencer Autry, Director of Environmental, is the authorized representative of Tampa Electric Company concerning matters with which this permit application deals.

Sincerely,

Charles R. Black
Vice President
Project Management

/Permit2

TAMPA ELECTRIC COMPANY
P.O. Box 111 Tampa, Florida 33601-0111 (813) 223-0888

ATTACHMENT A
RESPONSE TO ITEM 10

With this application Tampa Electric Company seeks permission to place fill within and recontour heavily disturbed wetlands and open water areas which have formed subsequent to phosphate mining activities on the proposed Polk Power Station property (see Figures 1, 2, 3, 4, and 5).

Existing, unreclaimed mine cuts on the property will be incorporated into a cooling reservoir, a stormwater retention pond and wetland enhancement areas (see Figures 2, 3, 4, and 5). Areas proposed for fill placement are either currently unvegetated or are narrow littoral zones vegetated with a dominance of invasive cattail (Typha sp.). Approximately 211.78 acres of this wetland type will be filled for the construction of a series of containment berms for the cooling reservoir, transmission line, and the power plant (see Table 1).

Elsewhere within the Polk Power Station site, isolated disturbed wetlands, which have either formed subsequent to clearing and earthmoving activities or are relict systems, will be displaced for the construction of a functional and practical power plant. These freshwater wetlands are also typically dominated by nuisance species of vegetation including groundsel bush (Baccharis halmifolia), primrose willow (Ludwigia peruviana), Carolina willow (Salix caroliniana) and cattail. More desirable species found within these wetlands included red maple (Acer rubrum), laurel oak (Quercus laurifolia), water oak (Quercus nigra), dahoon holly (Ilex cassine), buttonbush (Cephalanthus occidentalis), sand cordgrass (Spartina bakeri), pickerel-weed (Pontederia cordata), softrush (Juncus effusus), arrowhead (Sagittaria lancifolia), Virginia chain fern (Woodwardia virginica), redroot (Lacnanthes caroliniana) and goldenrod (Solidago fistulosa). Approximately 41.33 acres of this habitat will be displaced for the construction of the plant site.

SCA/EA REC 90263 0407 07/92

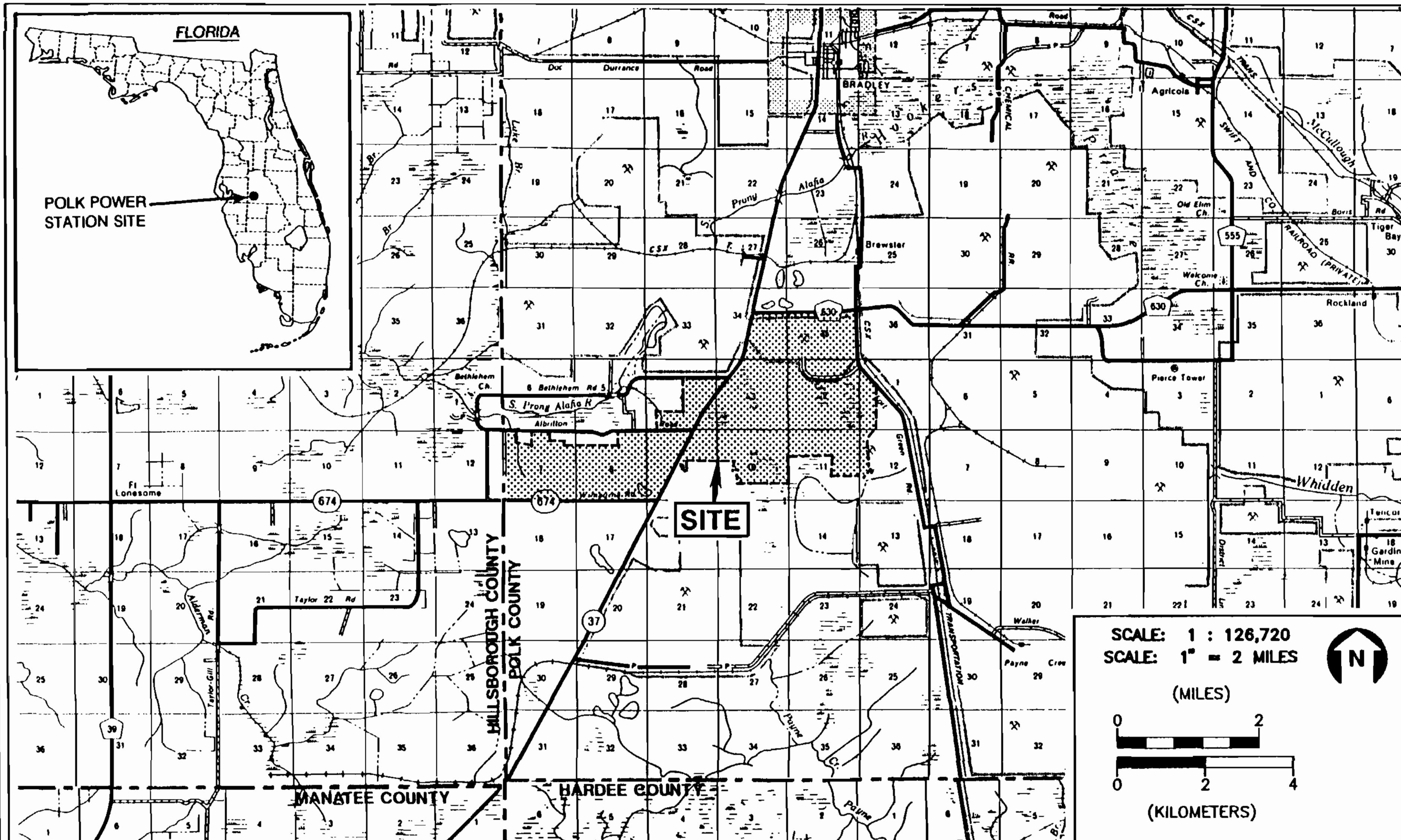

FIGURE 1.
SITE LOCATION MAP
DREDGE AND FILL PERMIT APPLICATION

Sources: FDOT Maps., Hillsborough Co., Polk Co., Manatee Co., Hardee Co.; ECT, 1992.

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POLK POWER STATION

FIGURE 2.
KEY MAP FOR AERIAL PHOTOGRAPHS, POST-RECLAMATION TOPOGRAPHY AND POST-RECLAMATION VEGETATION
DREDGE AND FILL PERMIT APPLICATION
Sources: I.F. Rooks & Assoc. Inc.; ECT, 1992.

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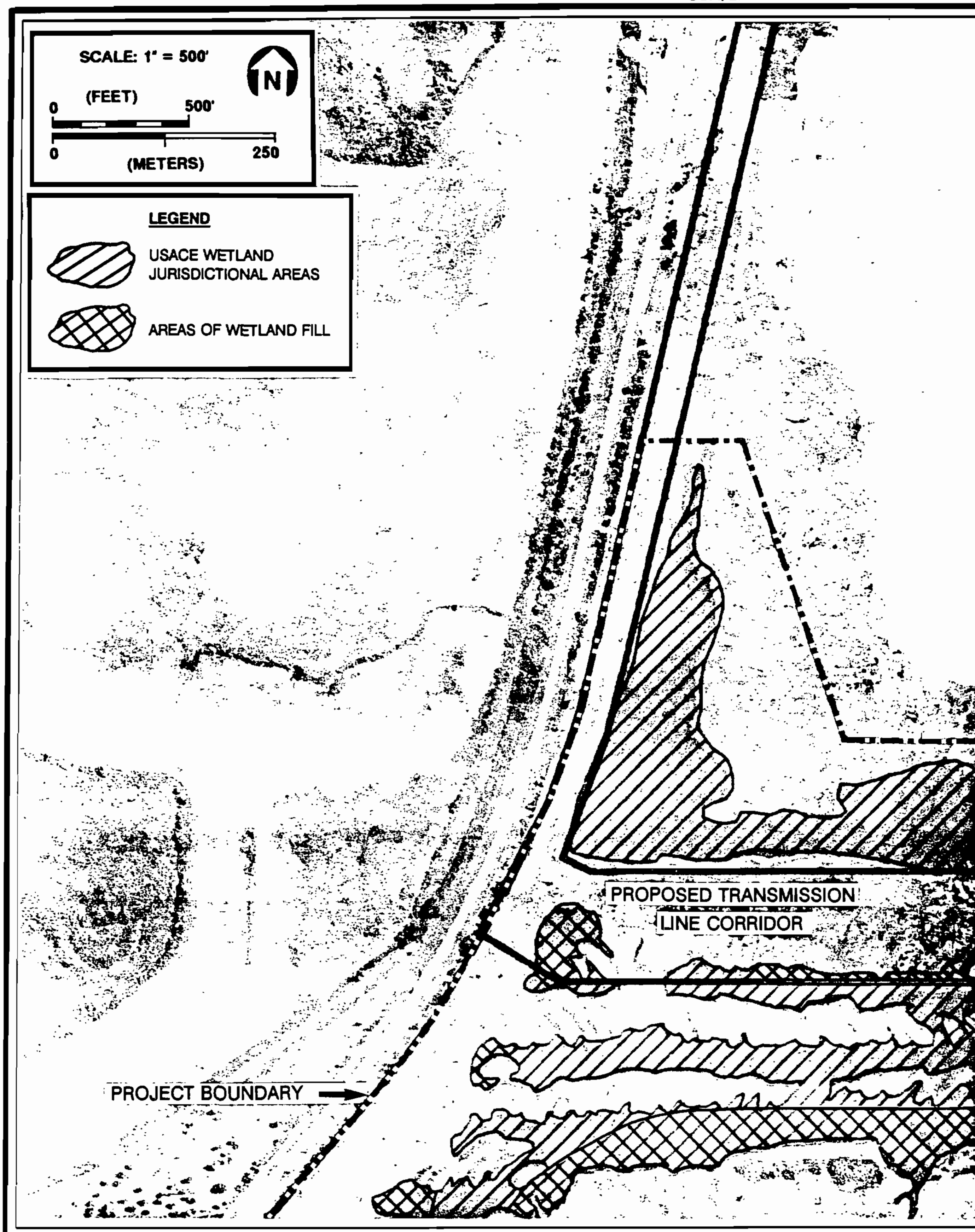

FIGURE 3.
AERIAL PHOTOGRAPHY WITH USACE WETLAND DELINEATIONS (PAGE 1 OF 13)
DREDGE AND FILL PERMIT APPLICATION
Sources: I.F. Rooks & Assoc. Inc.; ECT, 1992.

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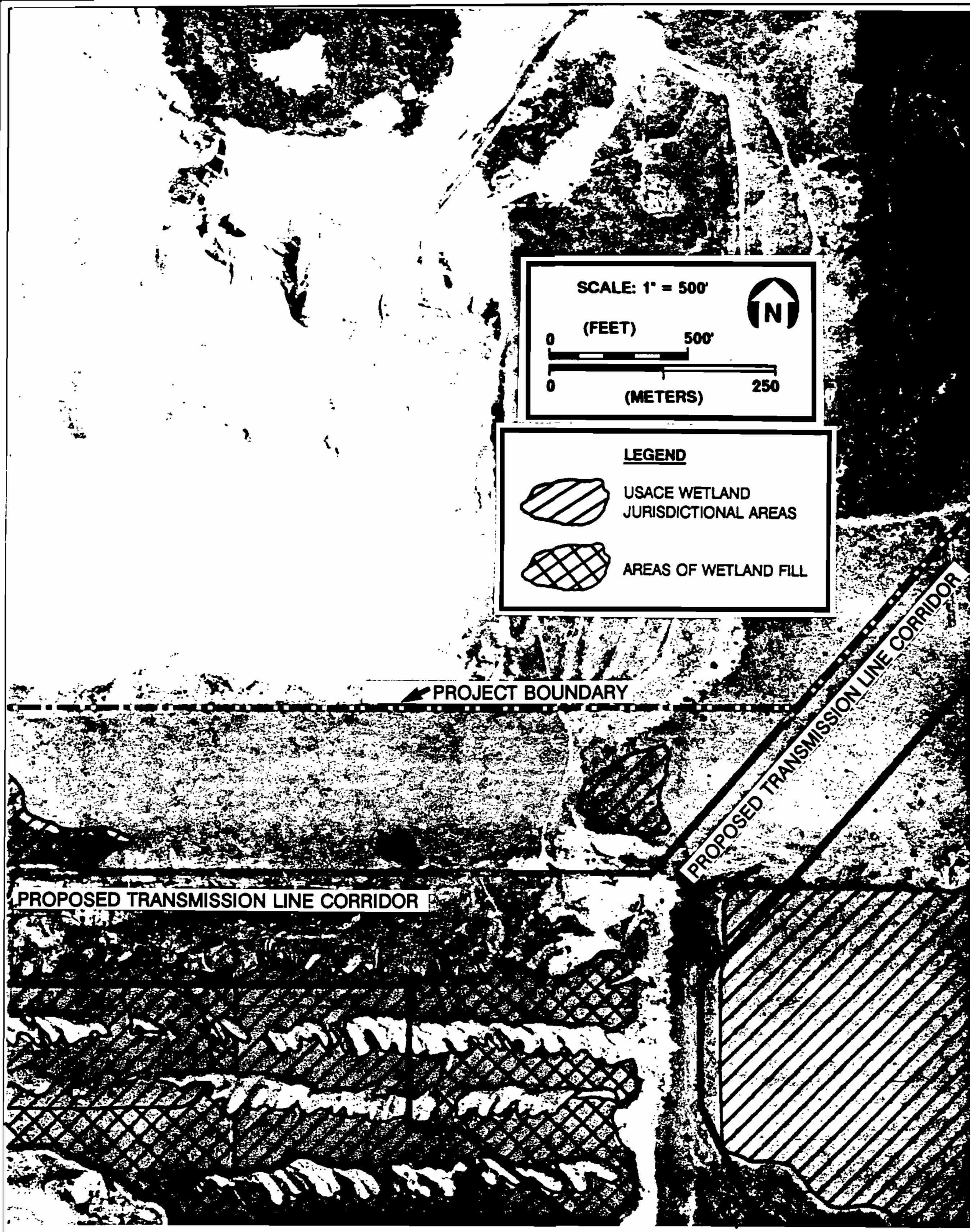

FIGURE 3.
AERIAL PHOTOGRAPHY WITH USACE WETLAND DELINEATIONS (PAGE 2 OF 13)
DREDGE AND FILL PERMIT APPLICATION
Sources: I.F. Rooks & Assoc. Inc.; ECT, 1992.

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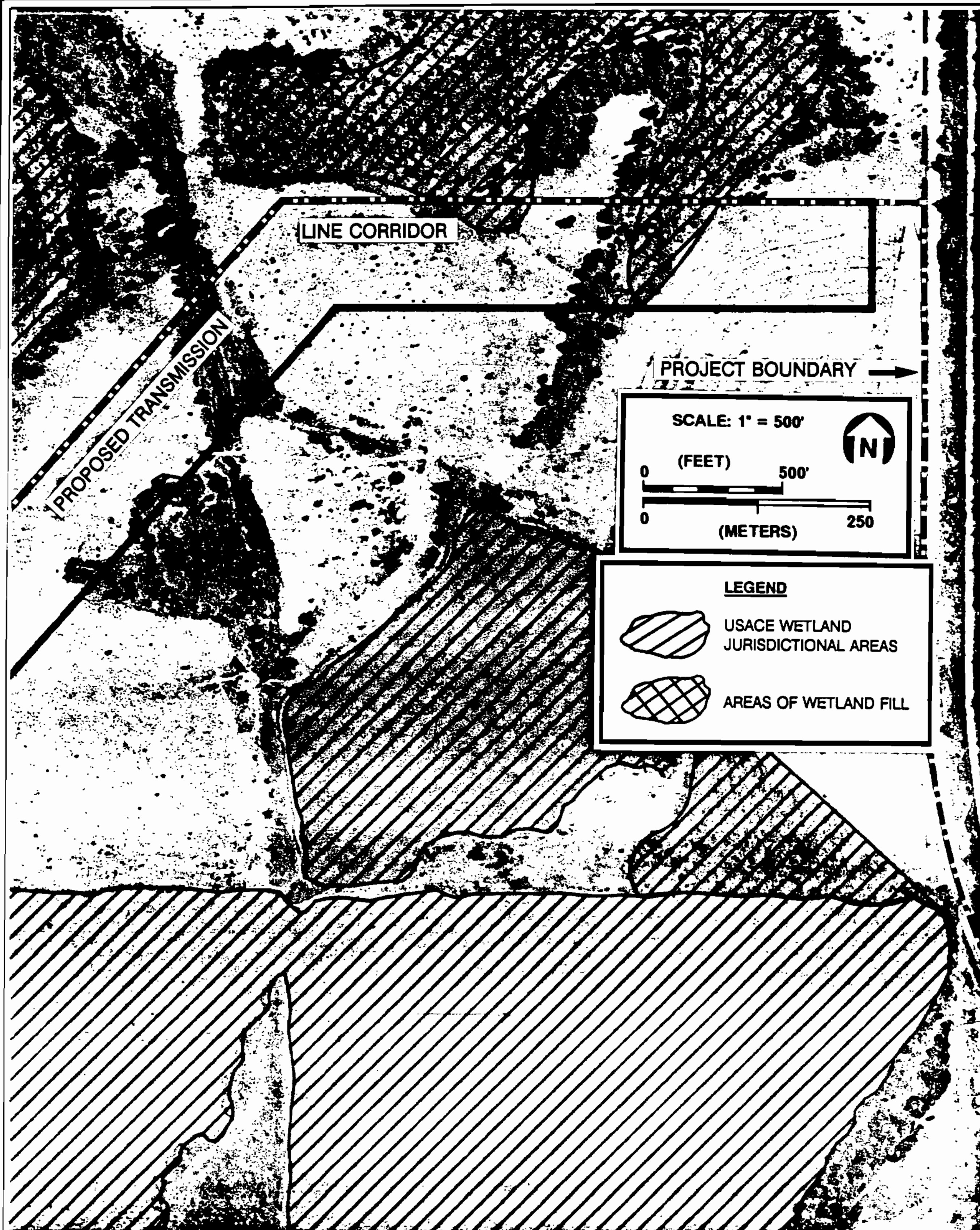

FIGURE 3.
AERIAL PHOTOGRAPHY WITH USACE WETLAND DELINEATIONS (PAGE 3 OF 13)
DREDGE AND FILL PERMIT APPLICATION
Sources: I.F. Rooks & Assoc. Inc.; ECT, 1992.

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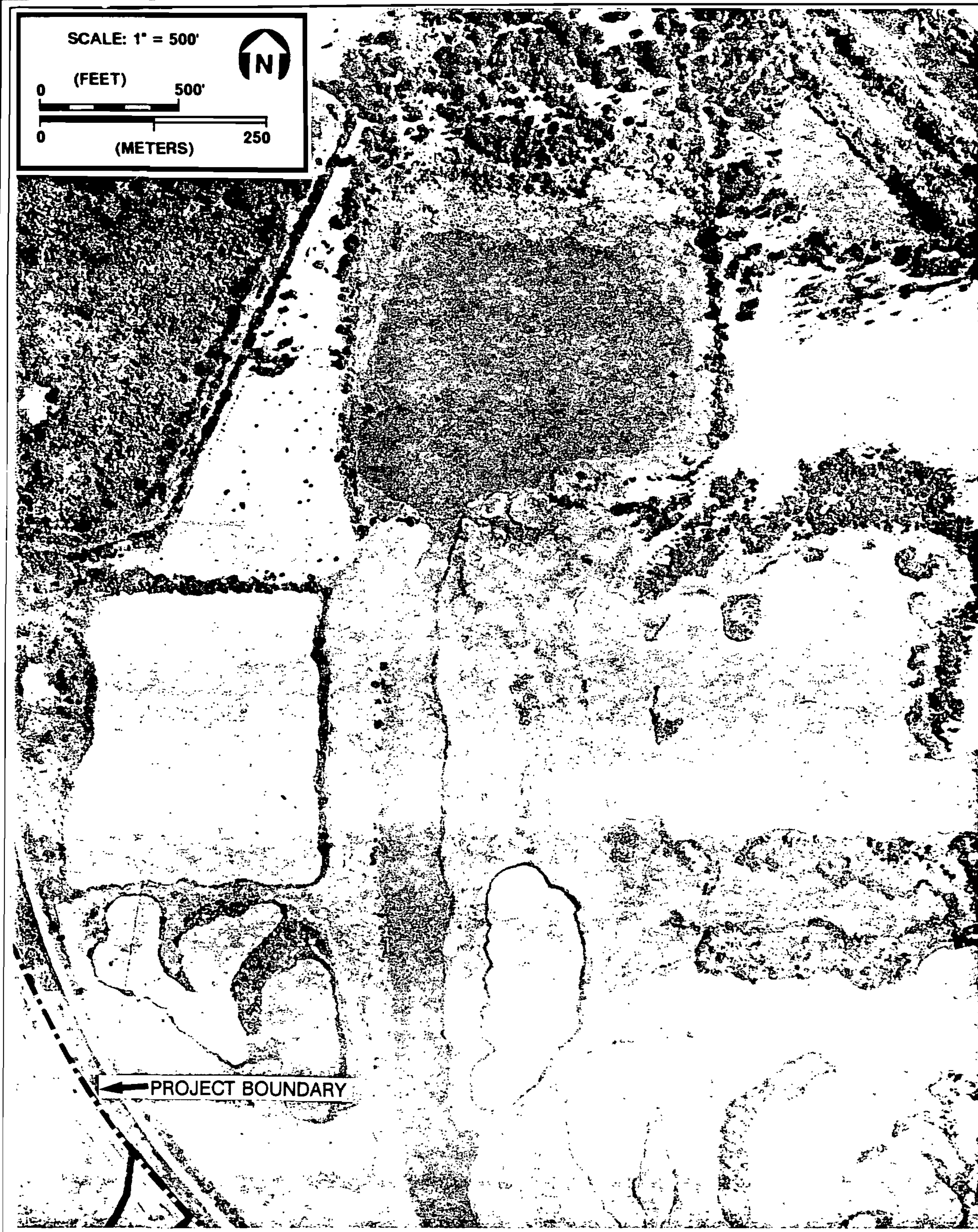

FIGURE 3.
AERIAL PHOTOGRAPHY WITH USACE
WETLAND DELINEATIONS (PAGE 4 OF 13)
DREDGE AND FILL PERMIT APPLICATION
Sources: I.F. Rooks & Assoc. Inc.; ECT, 1992.

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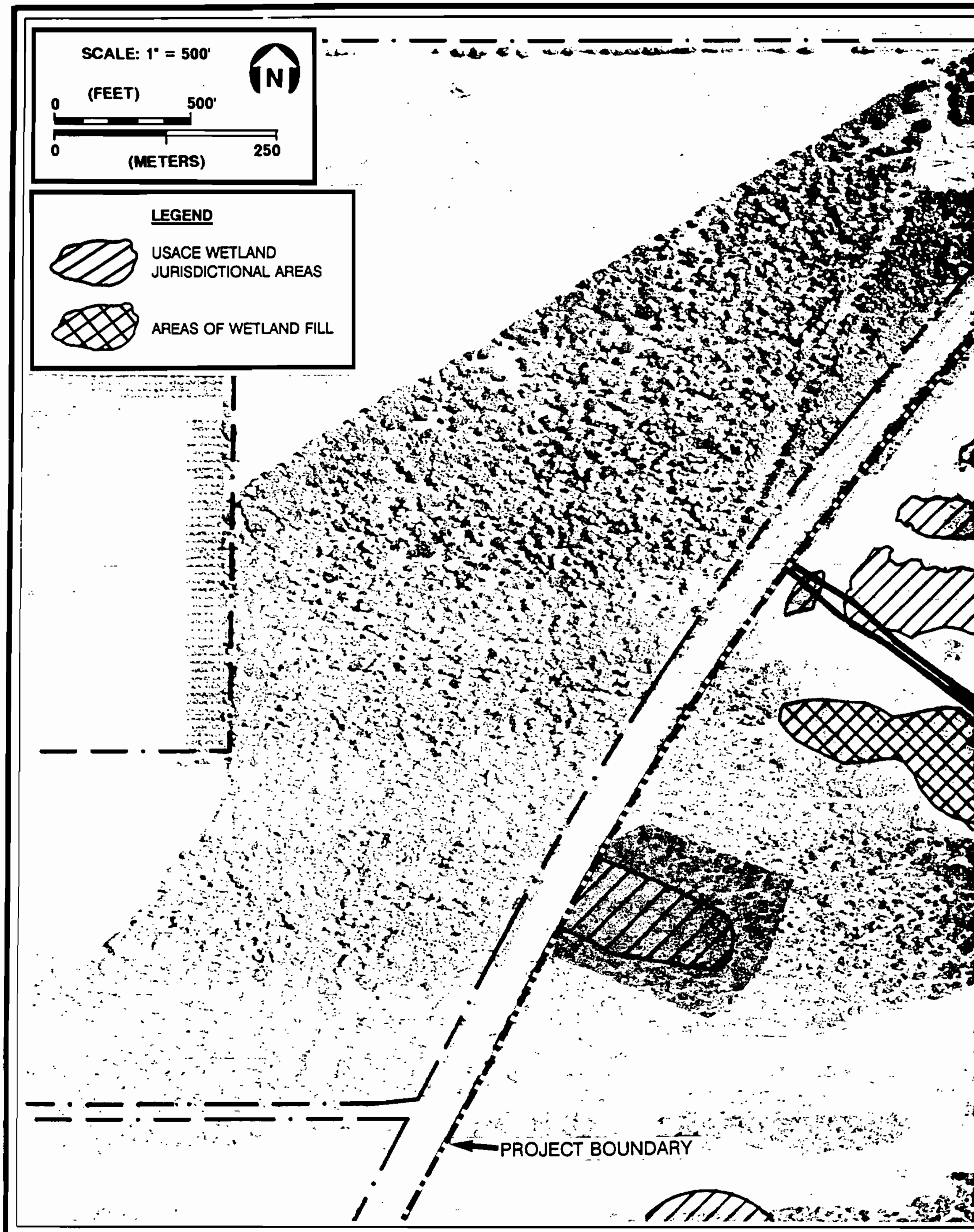

FIGURE 3.
AERIAL PHOTOGRAPHY WITH USACE WETLAND DELINEATIONS (PAGE 5 OF 13)
DREDGE AND FILL PERMIT APPLICATION
Sources: I.F. Rooks & Assoc. Inc.; ECT, 1992.

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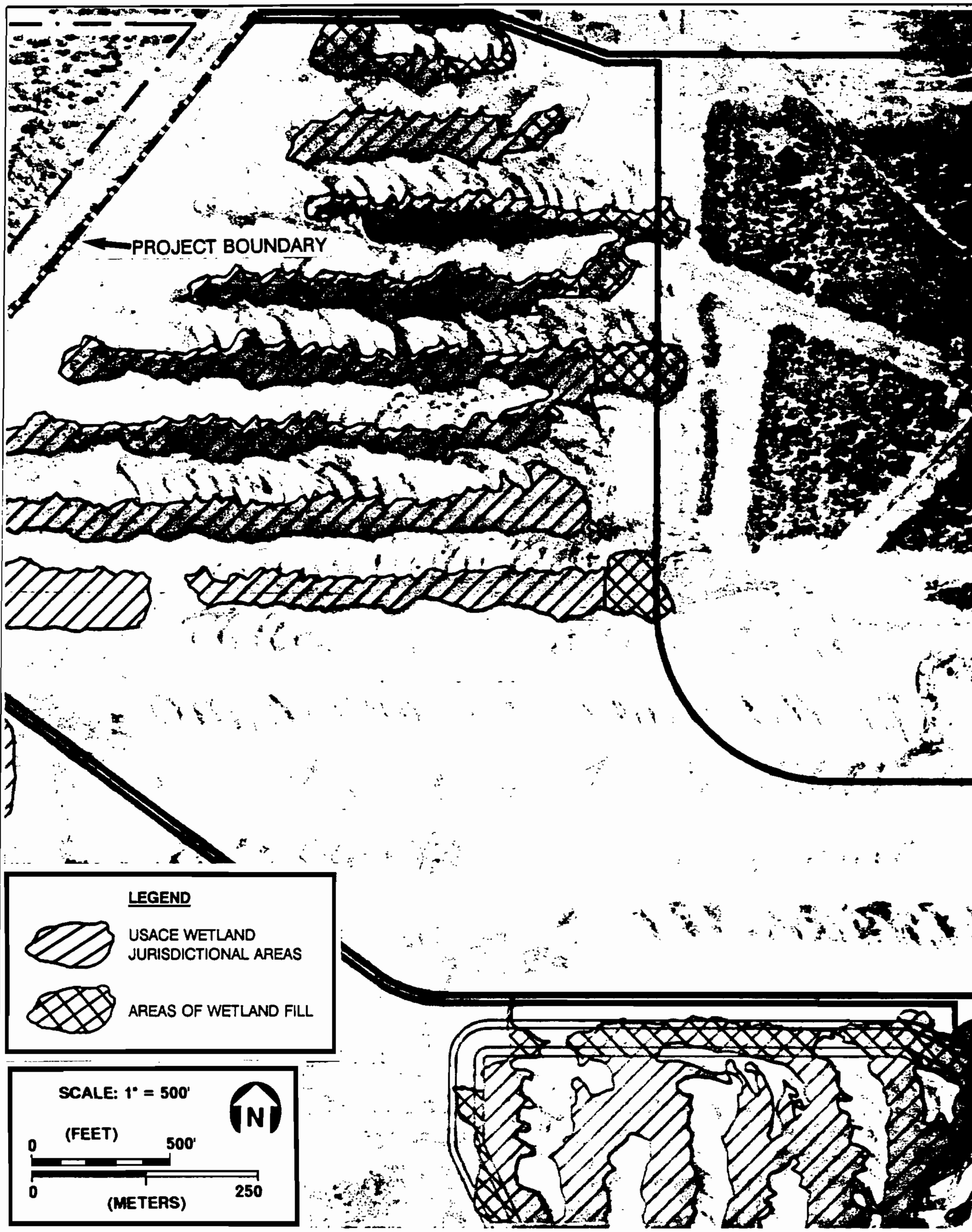

FIGURE 3.
AERIAL PHOTOGRAPHY WITH USACE WETLAND DELINEATIONS (PAGE 6 OF 13)
DREDGE AND FILL PERMIT APPLICATION
Sources: I.F. Rooks & Assoc. Inc.; ECT, 1992.

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FIGURE 3.
AERIAL PHOTOGRAPHY WITH USACE WETLAND DELINEATIONS (PAGE 7 OF 13)
DREDGE AND FILL PERMIT APPLICATION
Sources: I.F. Rooks & Assoc. Inc.; ECT, 1992.

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FIGURE 3.
AERIAL PHOTOGRAPHY WITH USACE WETLAND DELINEATIONS (PAGE 8 OF 13)
DREDGE AND FILL PERMIT APPLICATION
Sources: I.F. Rooks & Assoc. Inc.; ECT, 1992.

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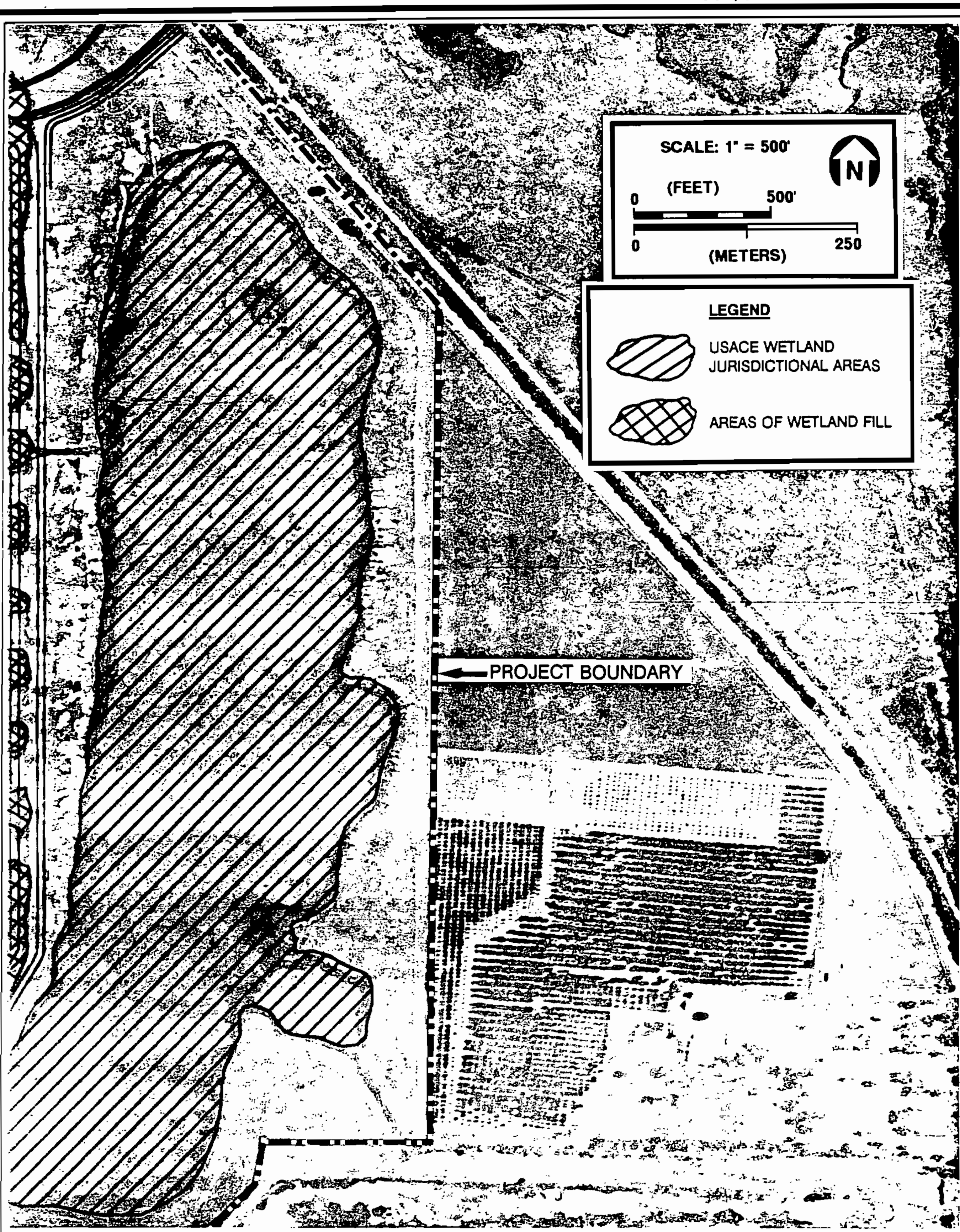

FIGURE 3.
AERIAL PHOTOGRAPHY WITH USACE WETLAND DELINEATIONS (PAGE 9 OF 13)
DREDGE AND FILL PERMIT APPLICATION
Sources: I.F. Rooks & Assoc. Inc.; ECT, 1992.

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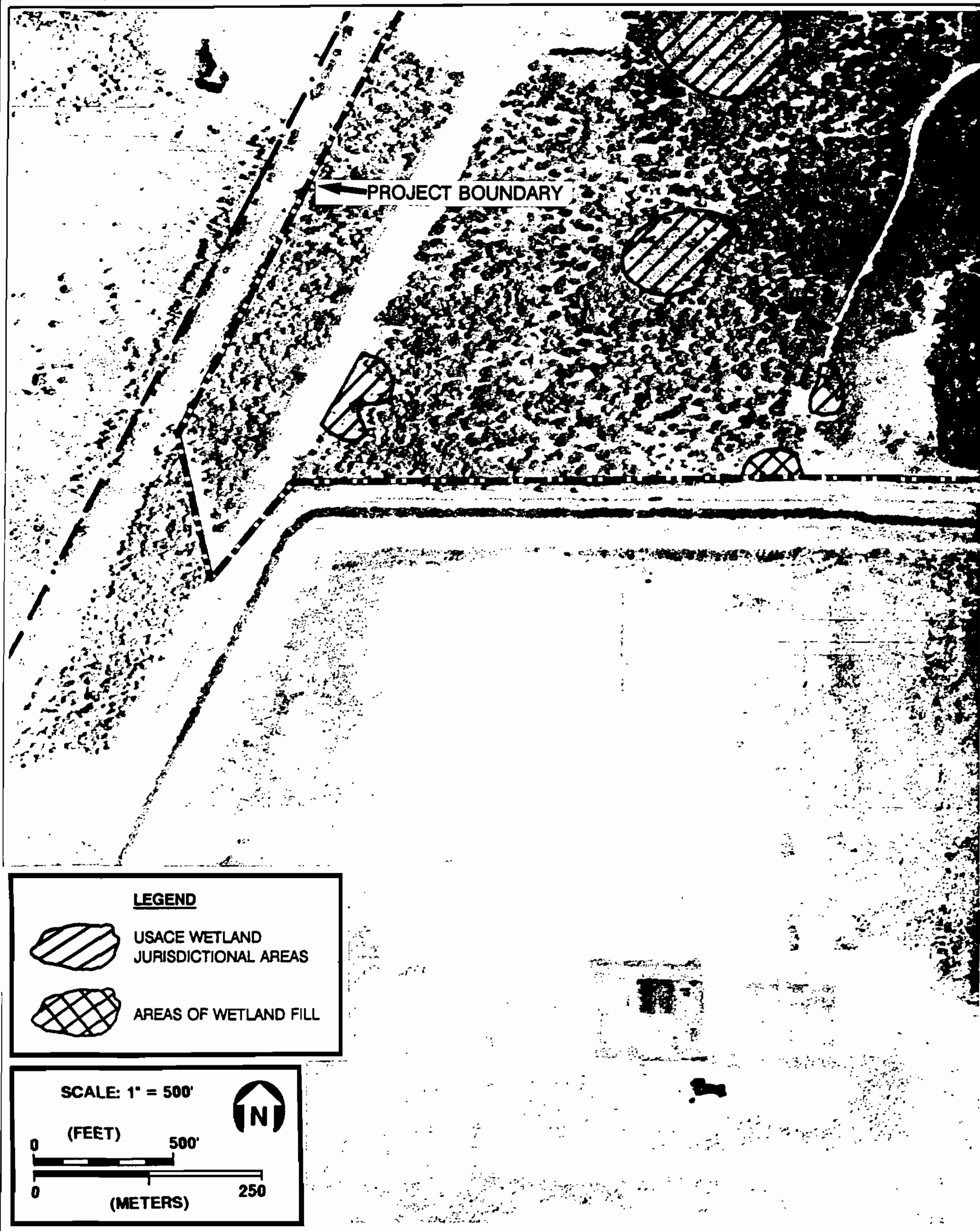

FIGURE 3.
AERIAL PHOTOGRAPHY WITH USACE WETLAND DELINEATIONS (PAGE 10 OF 13)
DREDGE AND FILL PERMIT APPLICATION
Sources: I.F. Rooks & Assoc. Inc.; ECT, 1992.

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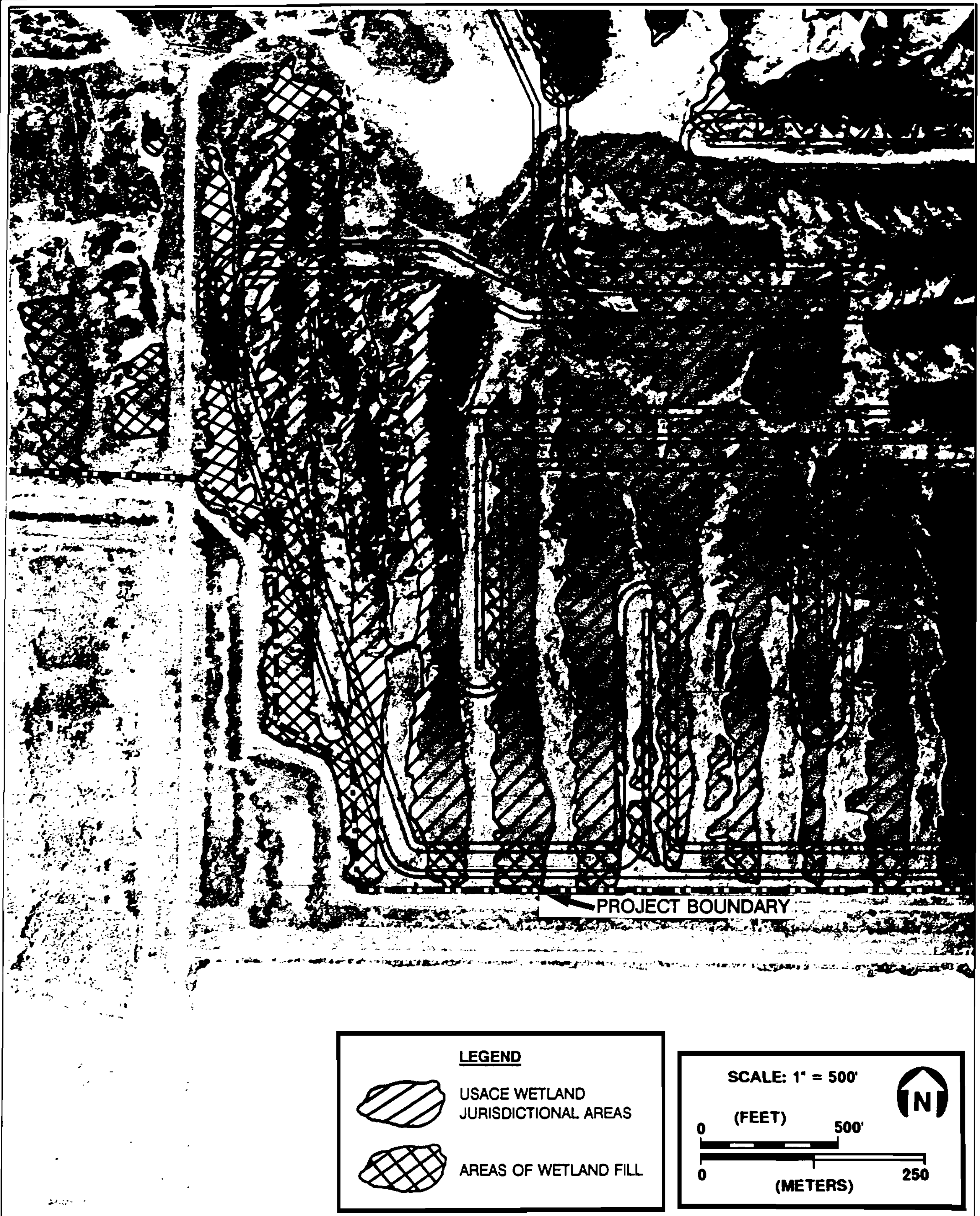

FIGURE 3.
AERIAL PHOTOGRAPHY WITH USACE WETLAND DELINEATIONS (PAGE 11 OF 13)
DREDGE AND FILL PERMIT APPLICATION
Sources: I.F. Rooks & Assoc. Inc.; ECT, 1992.

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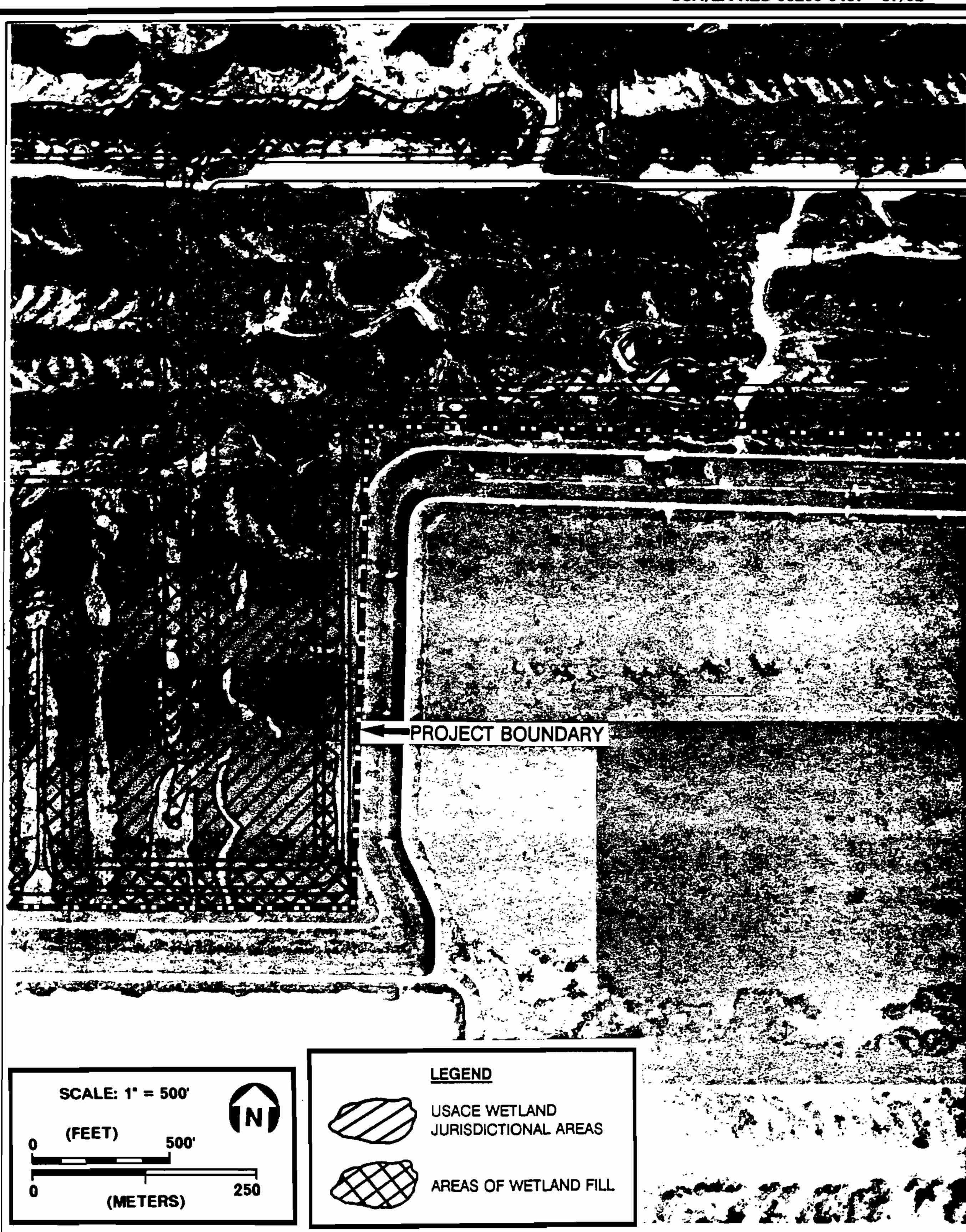

FIGURE 3.
AERIAL PHOTOGRAPHY WITH USACE WETLAND DELINEATIONS (PAGE 12 OF 13)
DREDGE AND FILL PERMIT APPLICATION
Sources: I.F. Rooks & Assoc. Inc.; ECT, 1992.

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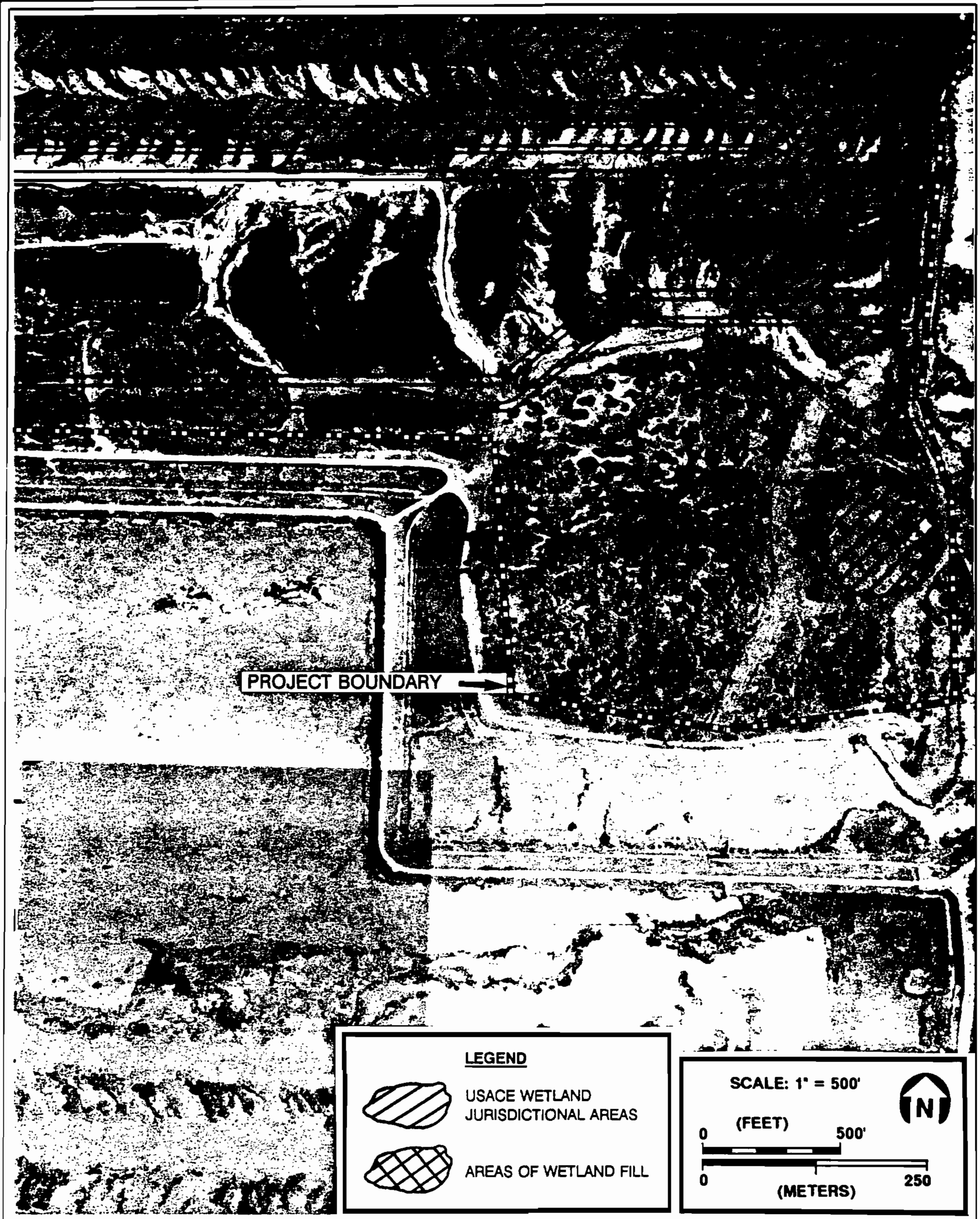

FIGURE 3.
AERIAL PHOTOGRAPHY WITH USACE WETLAND DELINEATIONS (PAGE 13 OF 13)
DREDGE AND FILL PERMIT APPLICATION
Sources: I.F. Rooks & Assoc. Inc.; ECT, 1992.

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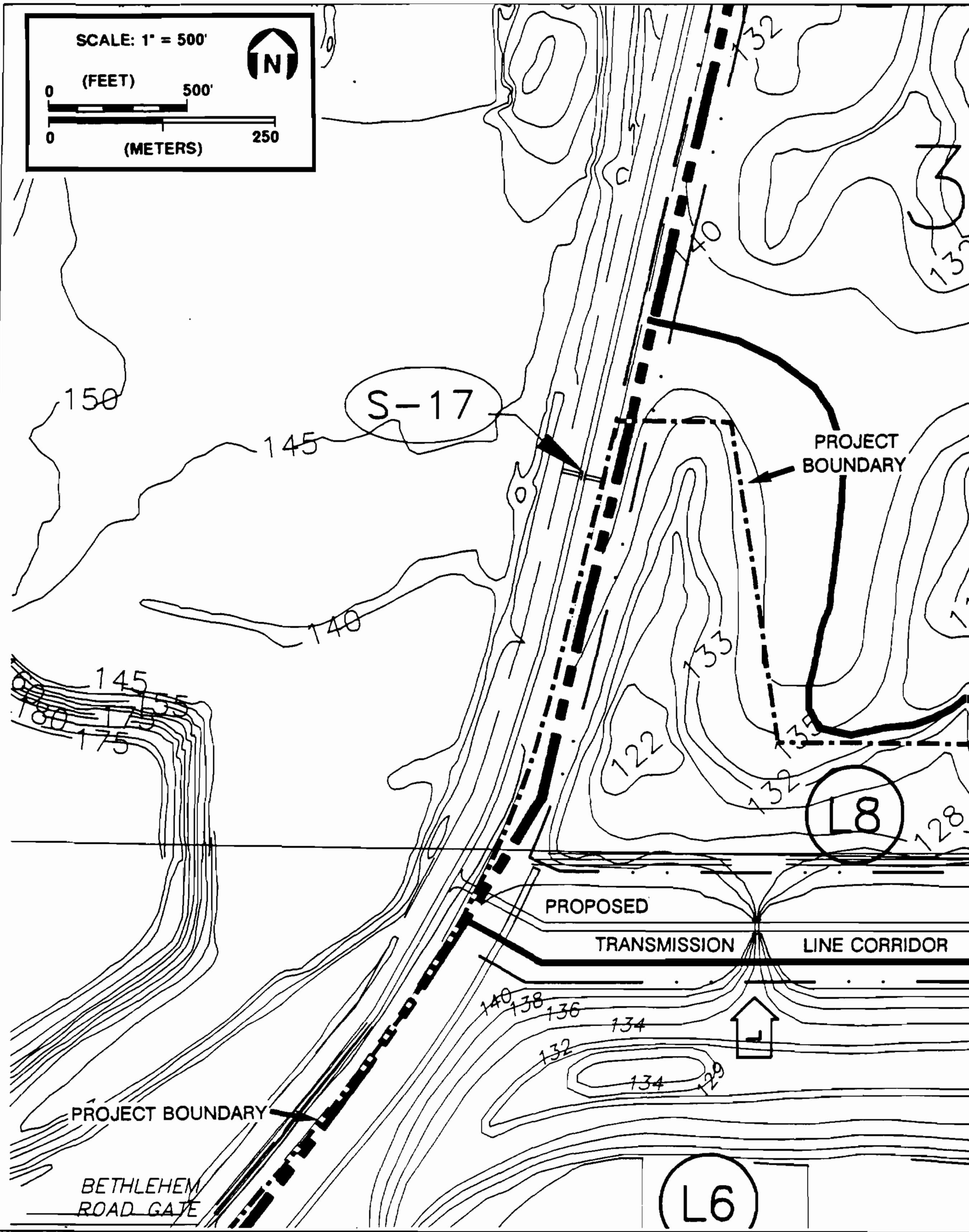

FIGURE 4.
POST-RECLAMATION TOPOGRAPHY (PAGE 1 OF 13)
DREDGE AND FILL PERMIT APPLICATION

Source: ECT, 1992.

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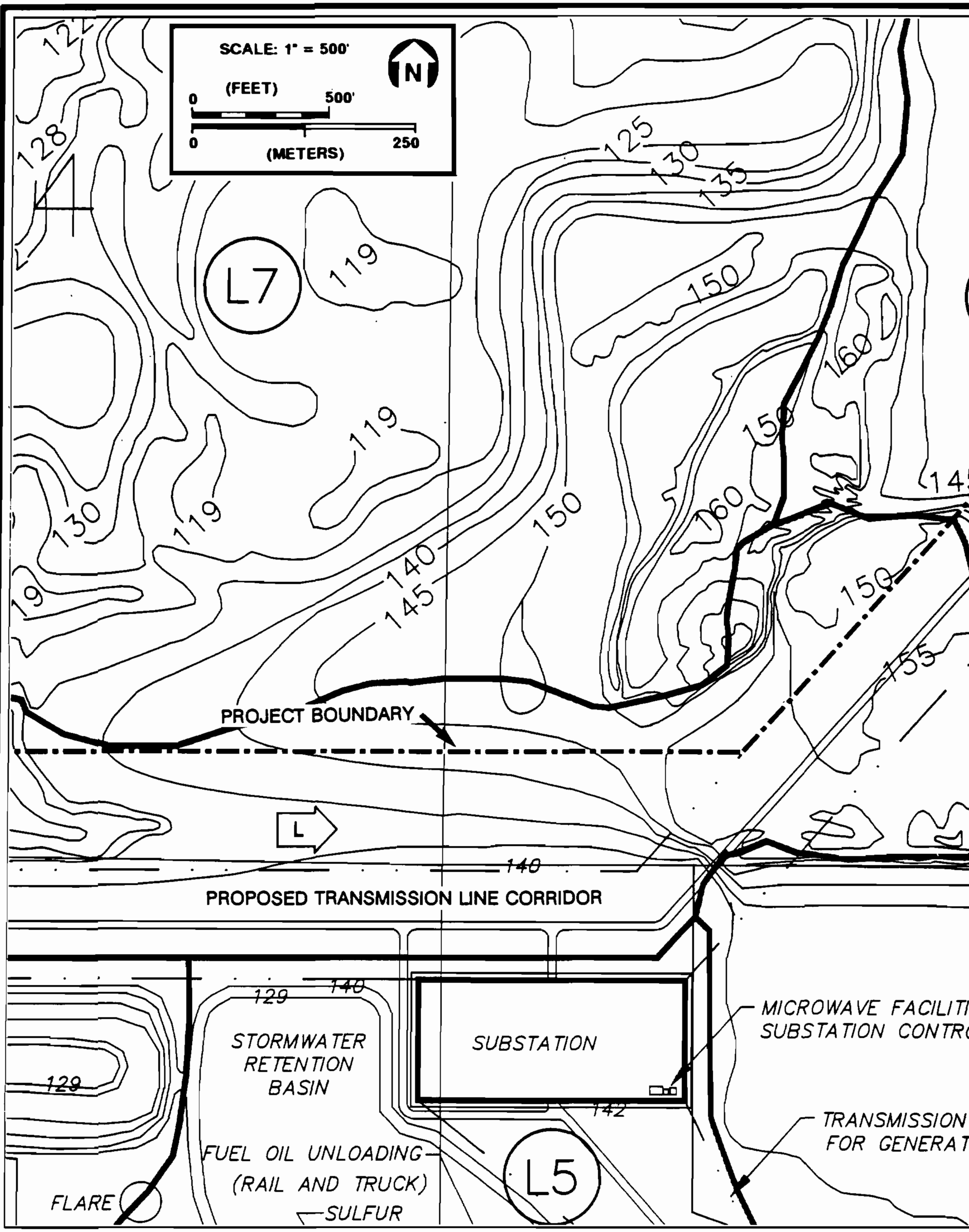

FIGURE 4.
POST-RECLAMATION TOPOGRAPHY (PAGE 2 OF 13)
DREDGE AND FILL PERMIT APPLICATION

Source: ECT, 1992.

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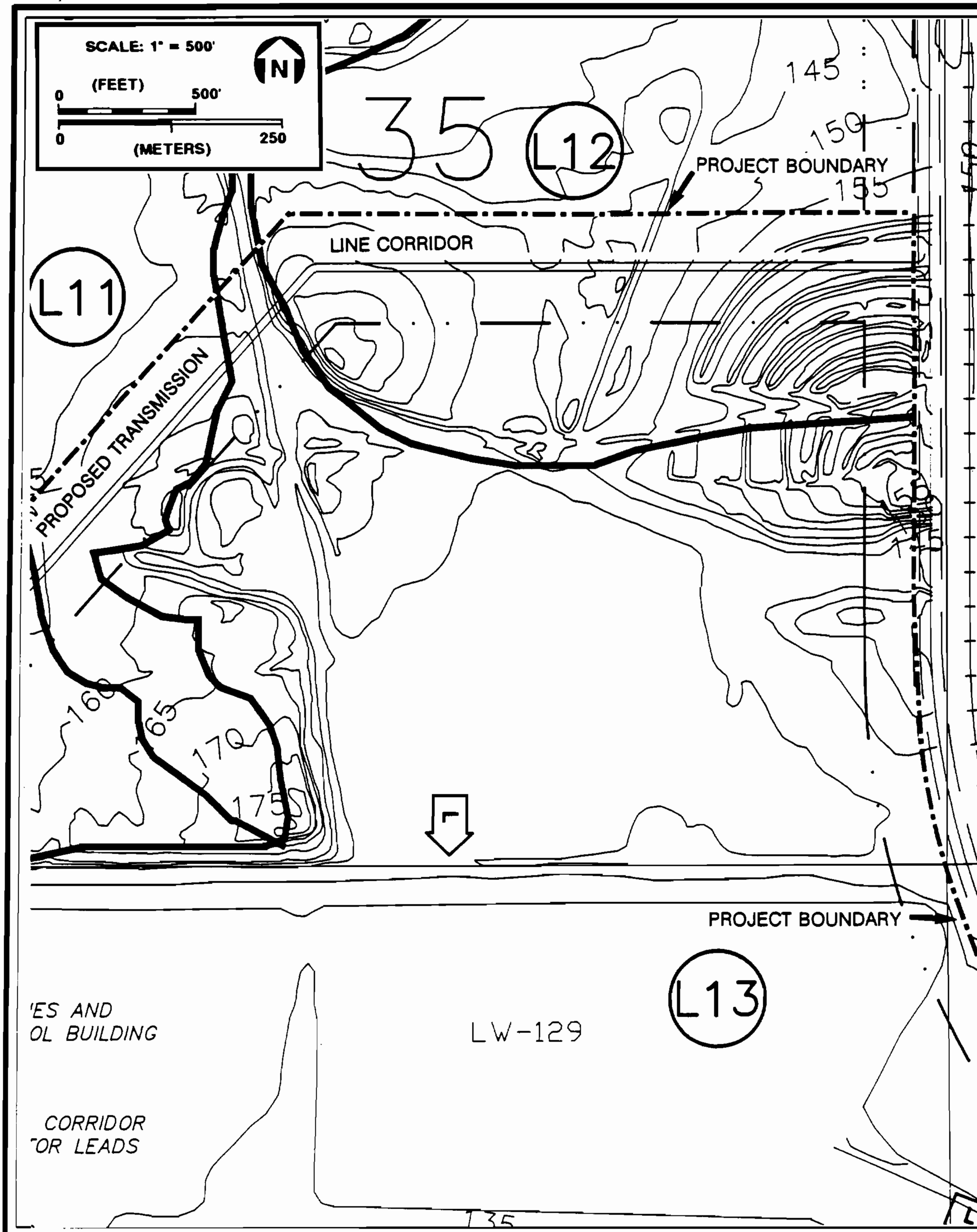

FIGURE 4.
POST-RECLAMATION TOPOGRAPHY (PAGE 3 OF 13)
DREDGE AND FILL PERMIT APPLICATION

Source: ECT, 1992.

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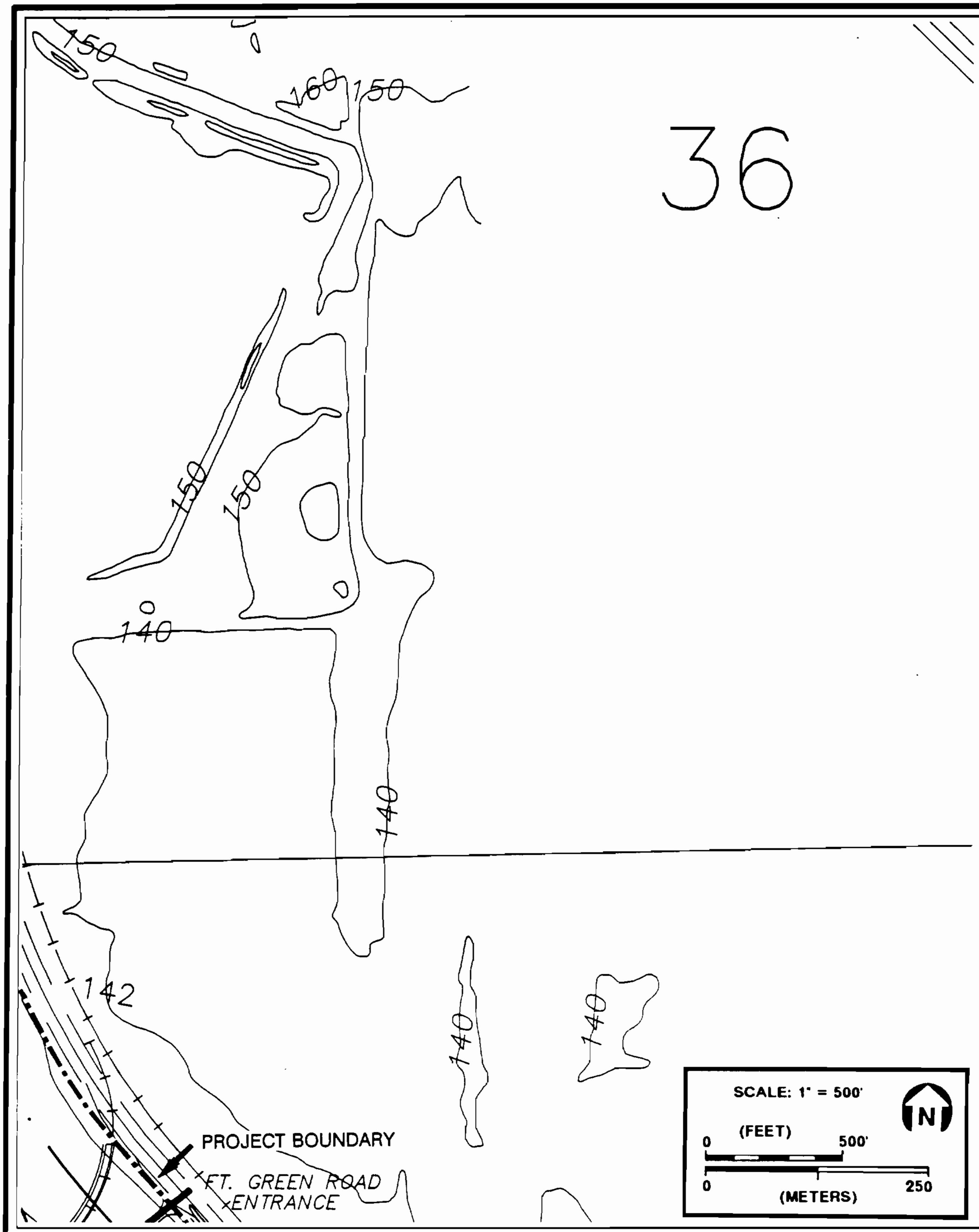

FIGURE 4.
POST-RECLAMATION TOPOGRAPHY (PAGE 4 OF 13)
DREDGE AND FILL PERMIT APPLICATION

Source: ECT, 1992.

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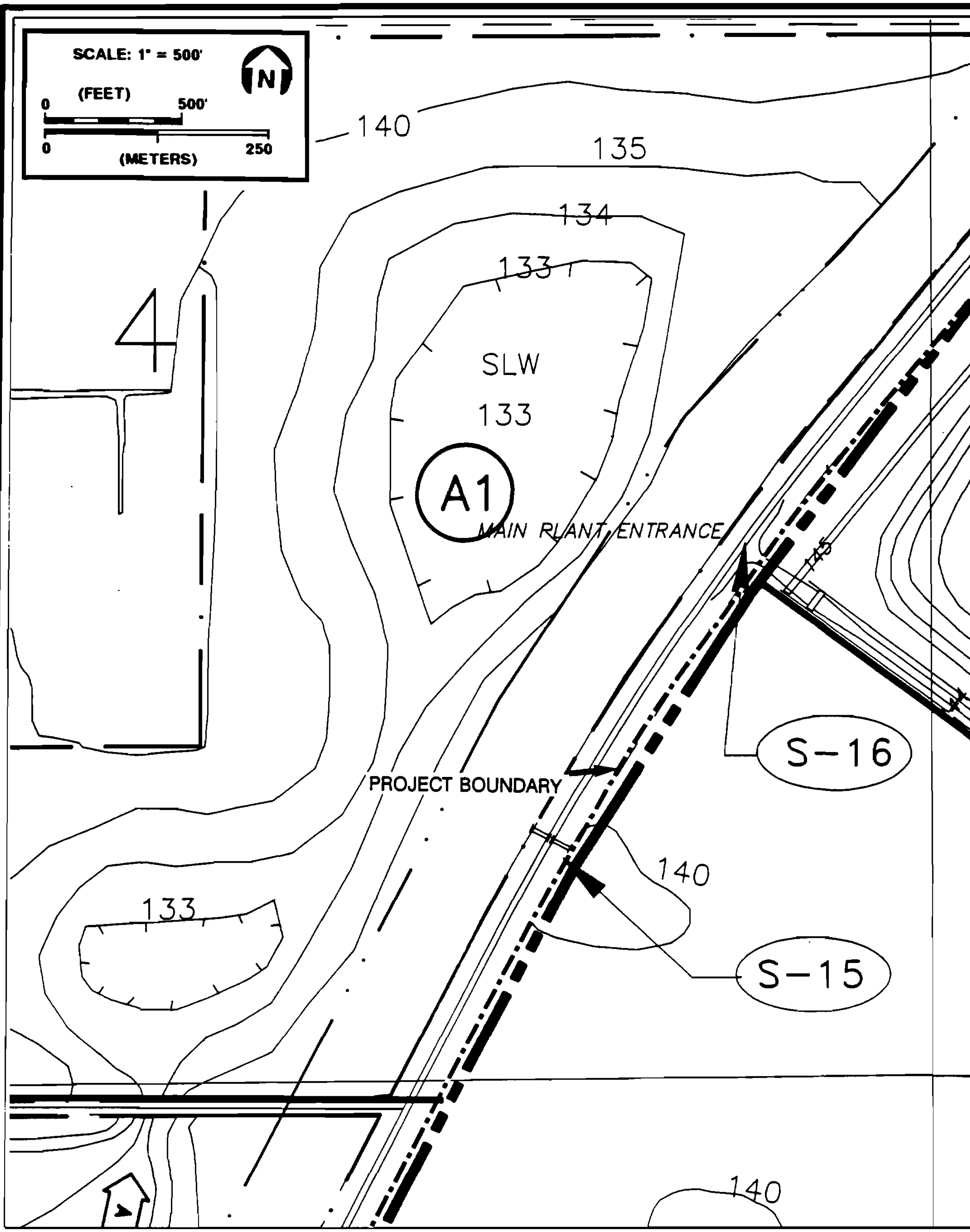

FIGURE 4.
POST-RECLAMATION TOPOGRAPHY (PAGE 5 OF 13)
DREDGE AND FILL PERMIT APPLICATION

Source: ECT, 1992.

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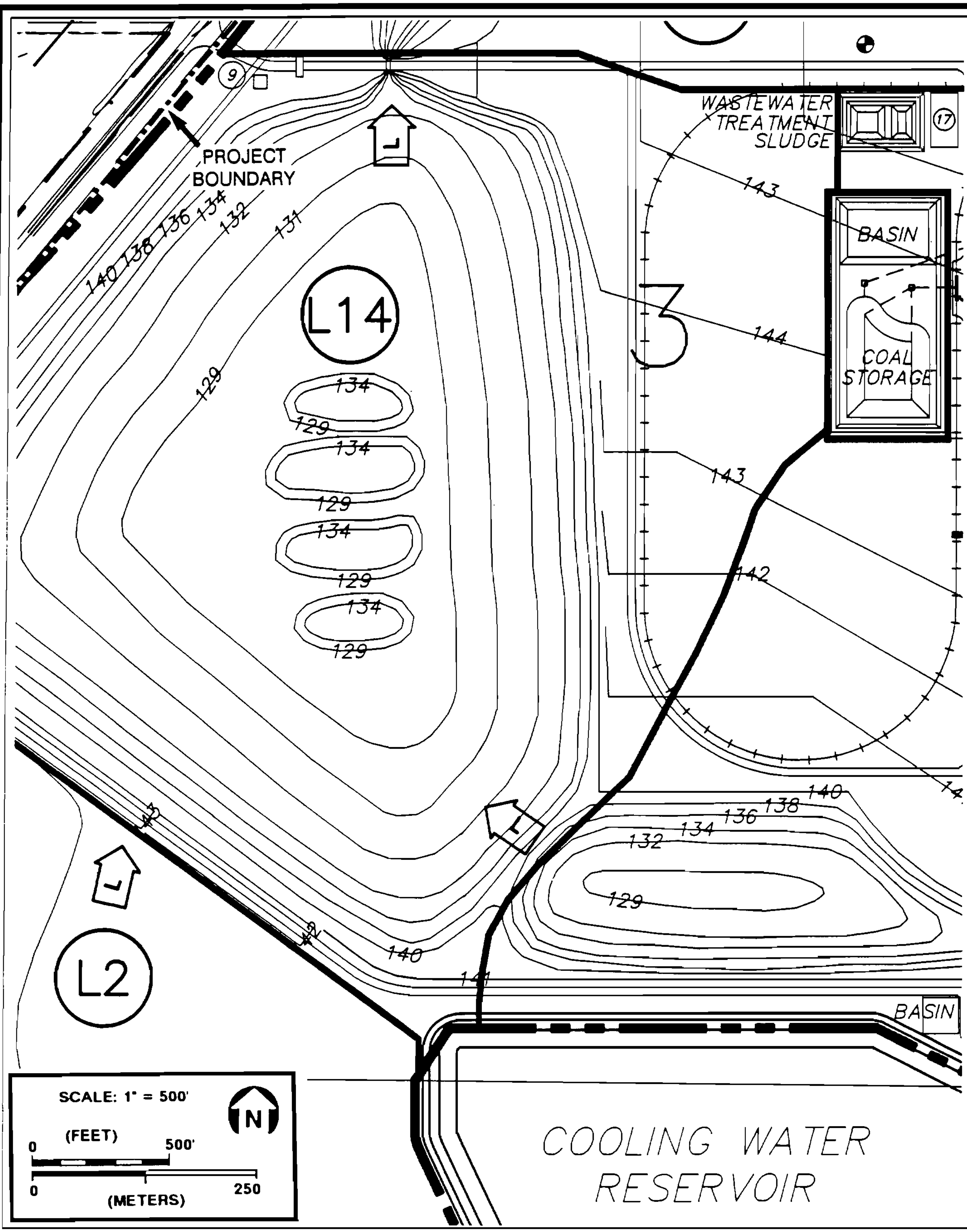

FIGURE 4.
POST-RECLAMATION TOPOGRAPHY (PAGE 6 OF 13)
DREDGE AND FILL PERMIT APPLICATION

Source: ECT, 1992.

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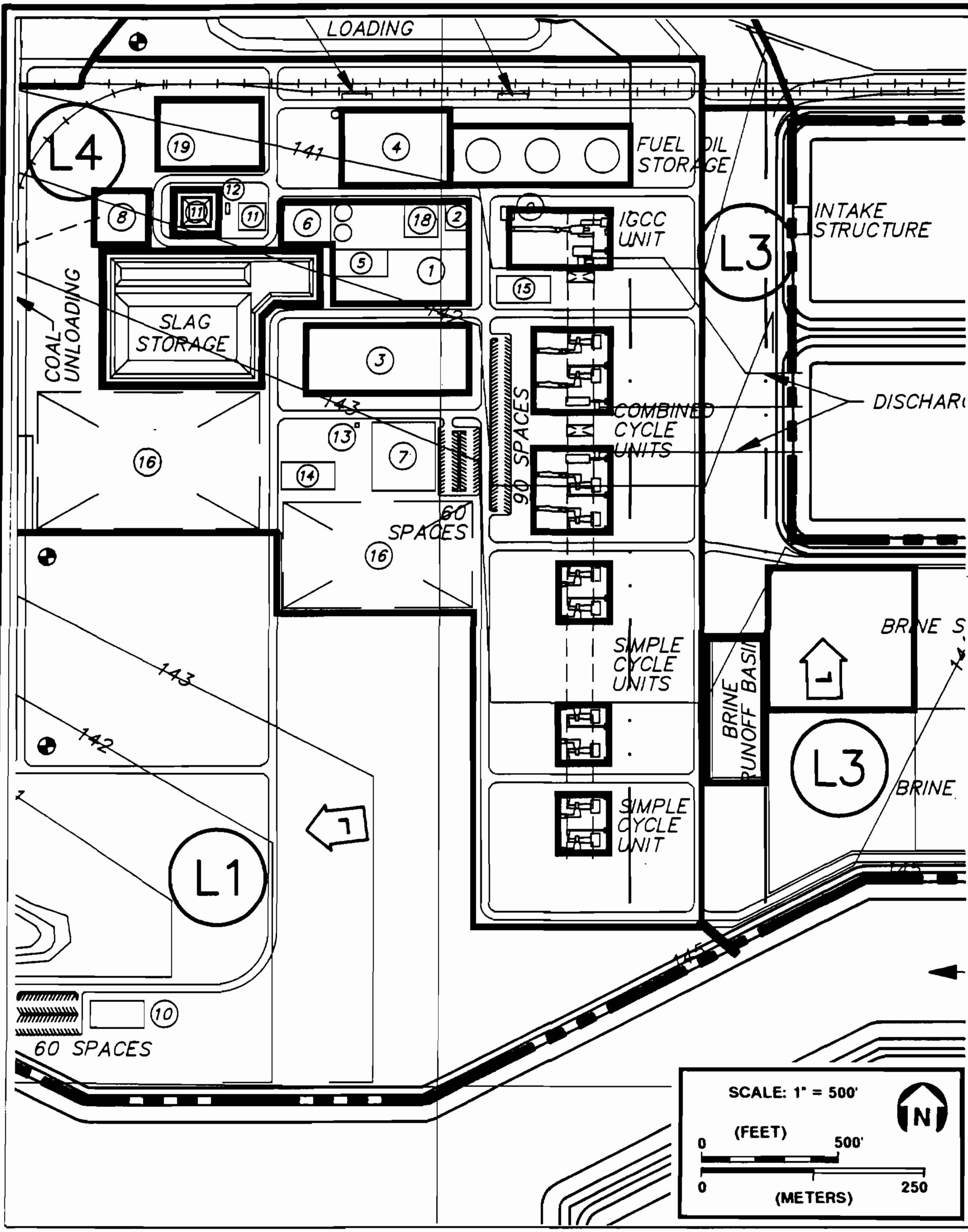

FIGURE 4.
POST-RECLAMATION TOPOGRAPHY (PAGE 7 OF 13)
DREDGE AND FILL PERMIT APPLICATION

Source: ECT, 1992.

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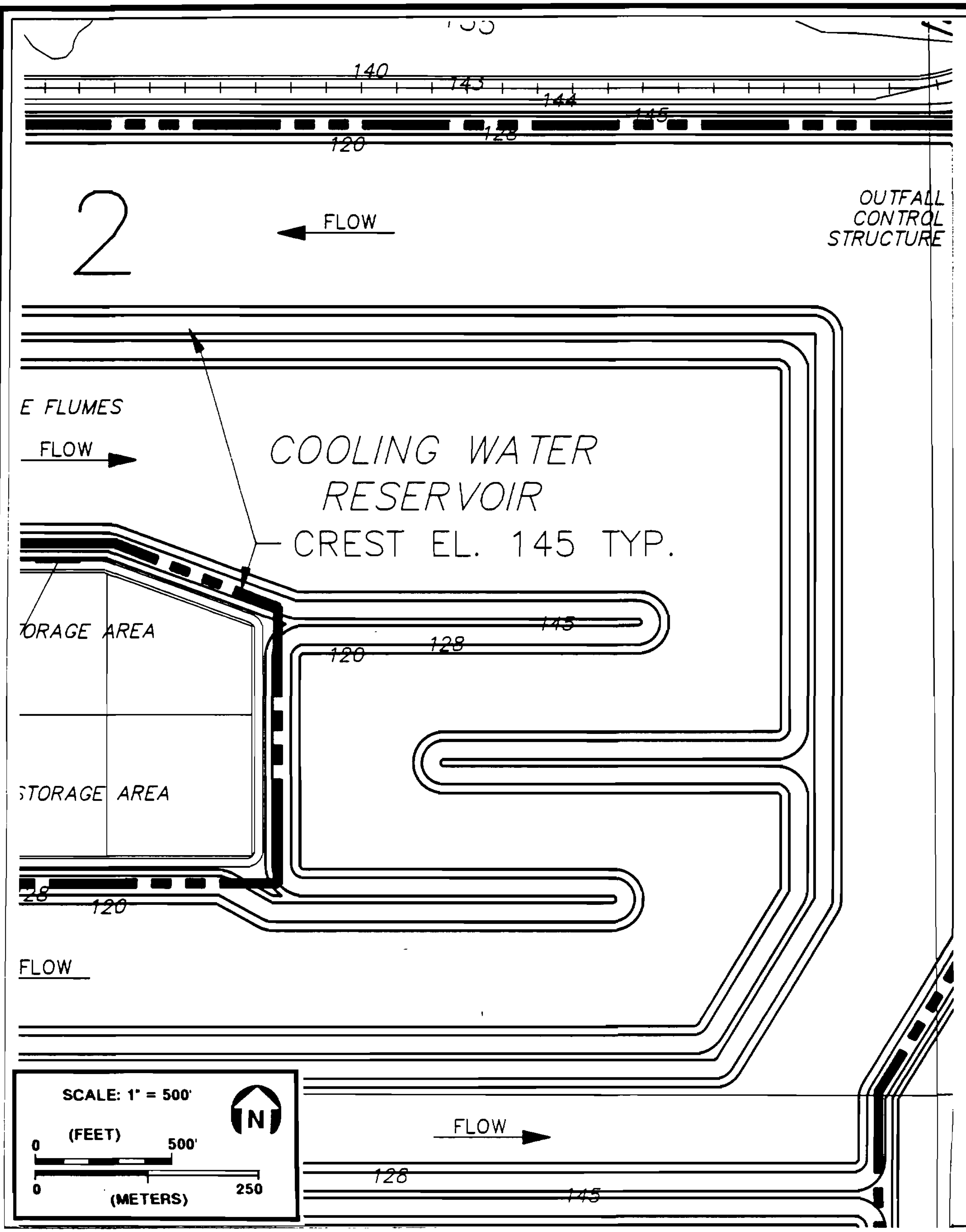

FIGURE 4.
POST-RECLAMATION TOPOGRAPHY (PAGE 8 OF 13)
DREDGE AND FILL PERMIT APPLICATION

Source: ECT, 1992.

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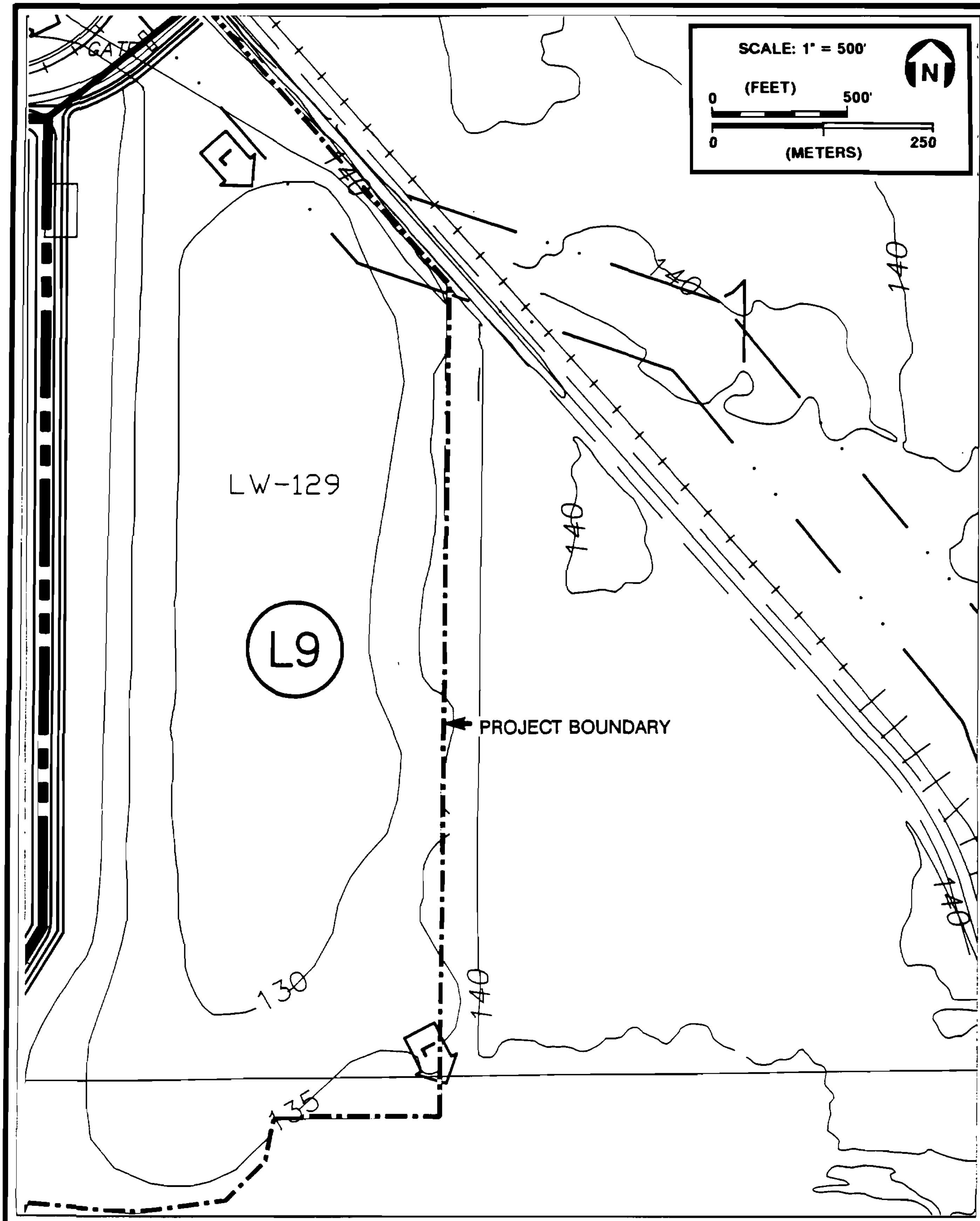

FIGURE 4.
POST-RECLAMATION TOPOGRAPHY (PAGE 9 OF 13)
DREDGE AND FILL PERMIT APPLICATION

Source: ECT, 1992.

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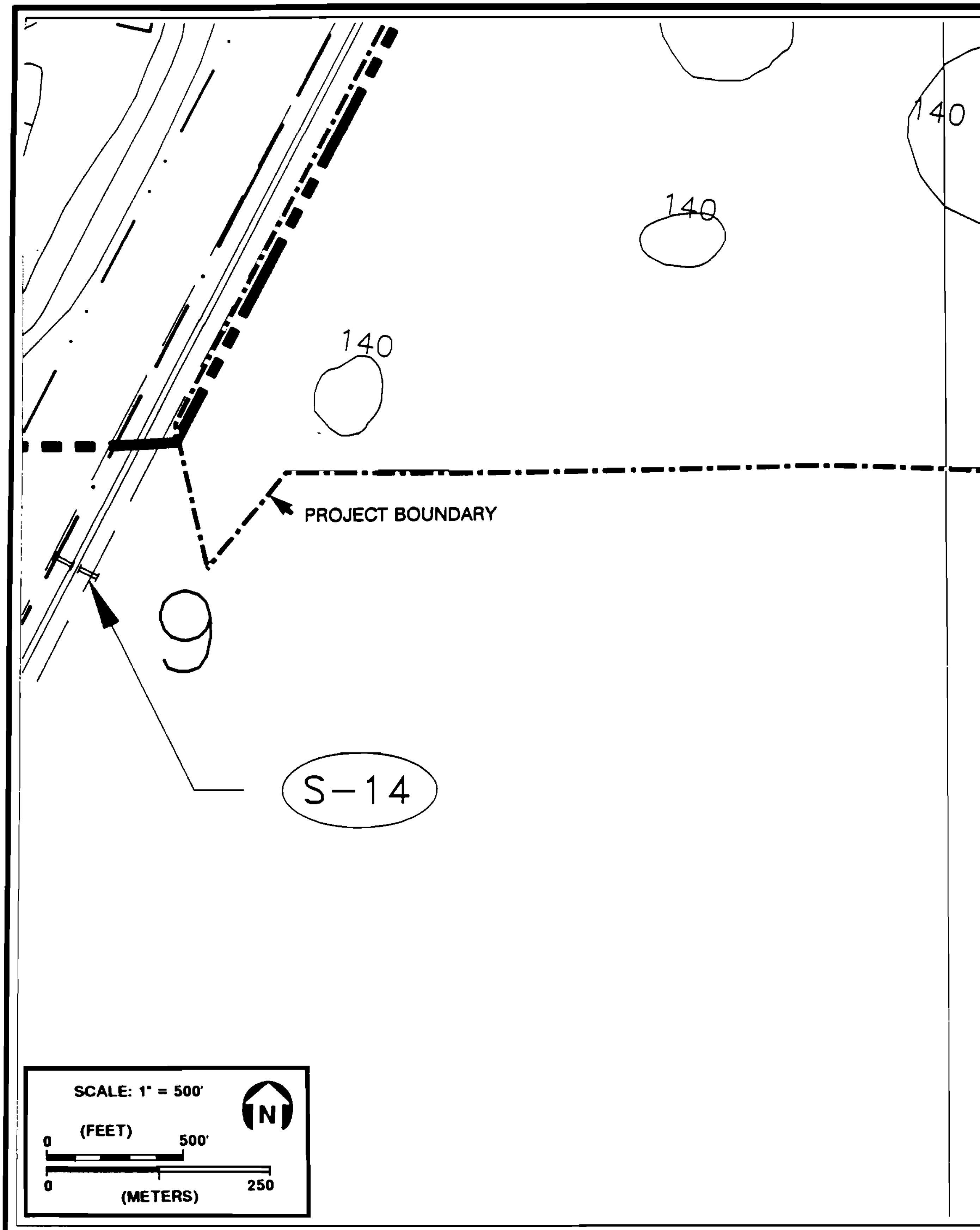

FIGURE 4.
POST-RECLAMATION TOPOGRAPHY (PAGE 10 OF 13)
DREDGE AND FILL PERMIT APPLICATION

Source: ECT, 1992.

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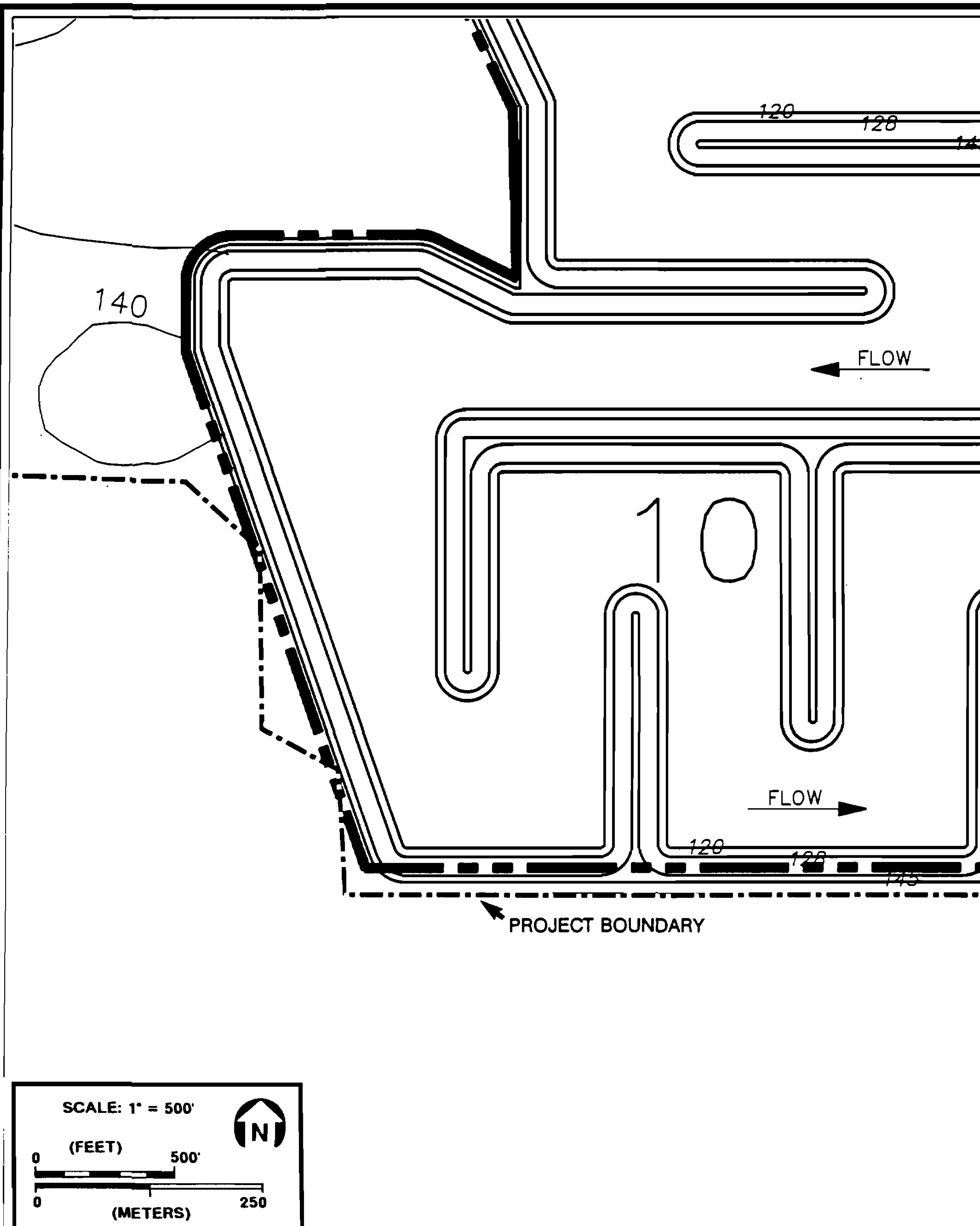

FIGURE 4.
POST-RECLAMATION TOPOGRAPHY (PAGE 11 OF 13)
DREDGE AND FILL PERMIT APPLICATION

Source: ECT, 1992.

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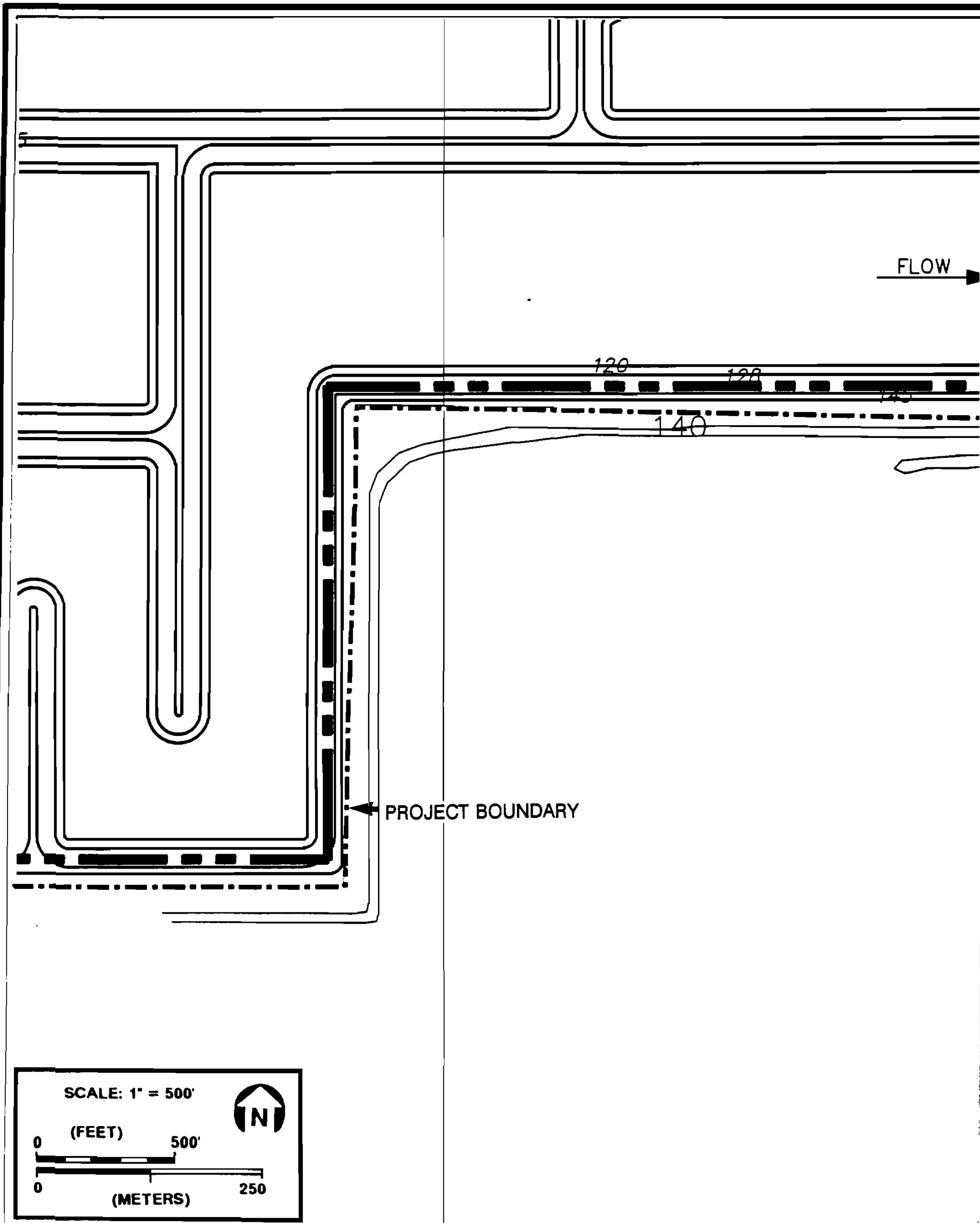

FIGURE 4.
POST-RECLAMATION TOPOGRAPHY (PAGE 12 OF 13)
DREDGE AND FILL PERMIT APPLICATION

Source: ECT, 1992.

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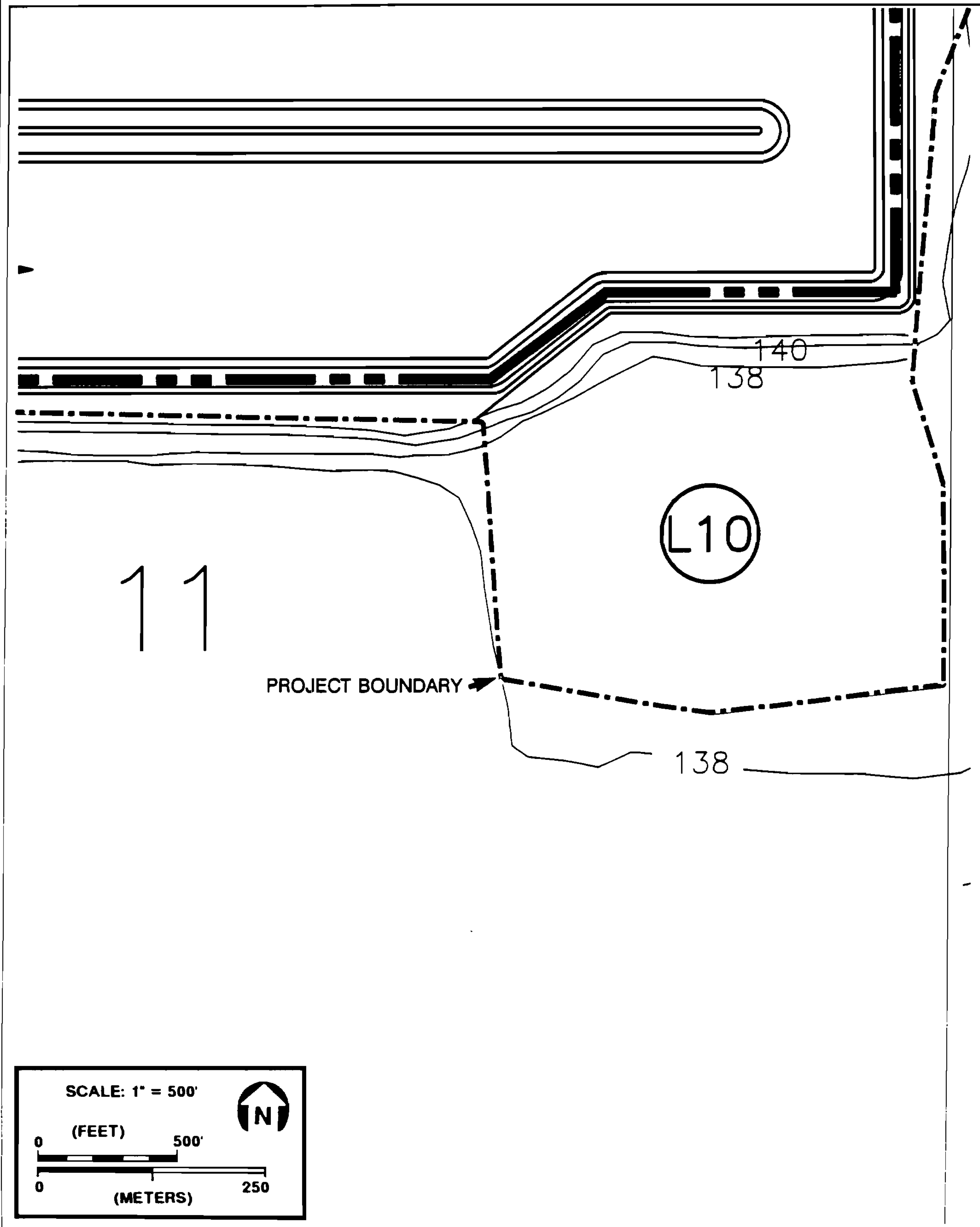

FIGURE 4.
POST-RECLAMATION TOPOGRAPHY (PAGE 13 OF 13)
DREDGE AND FILL PERMIT APPLICATION

Source: ECT, 1992.

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POLK POWER STATION

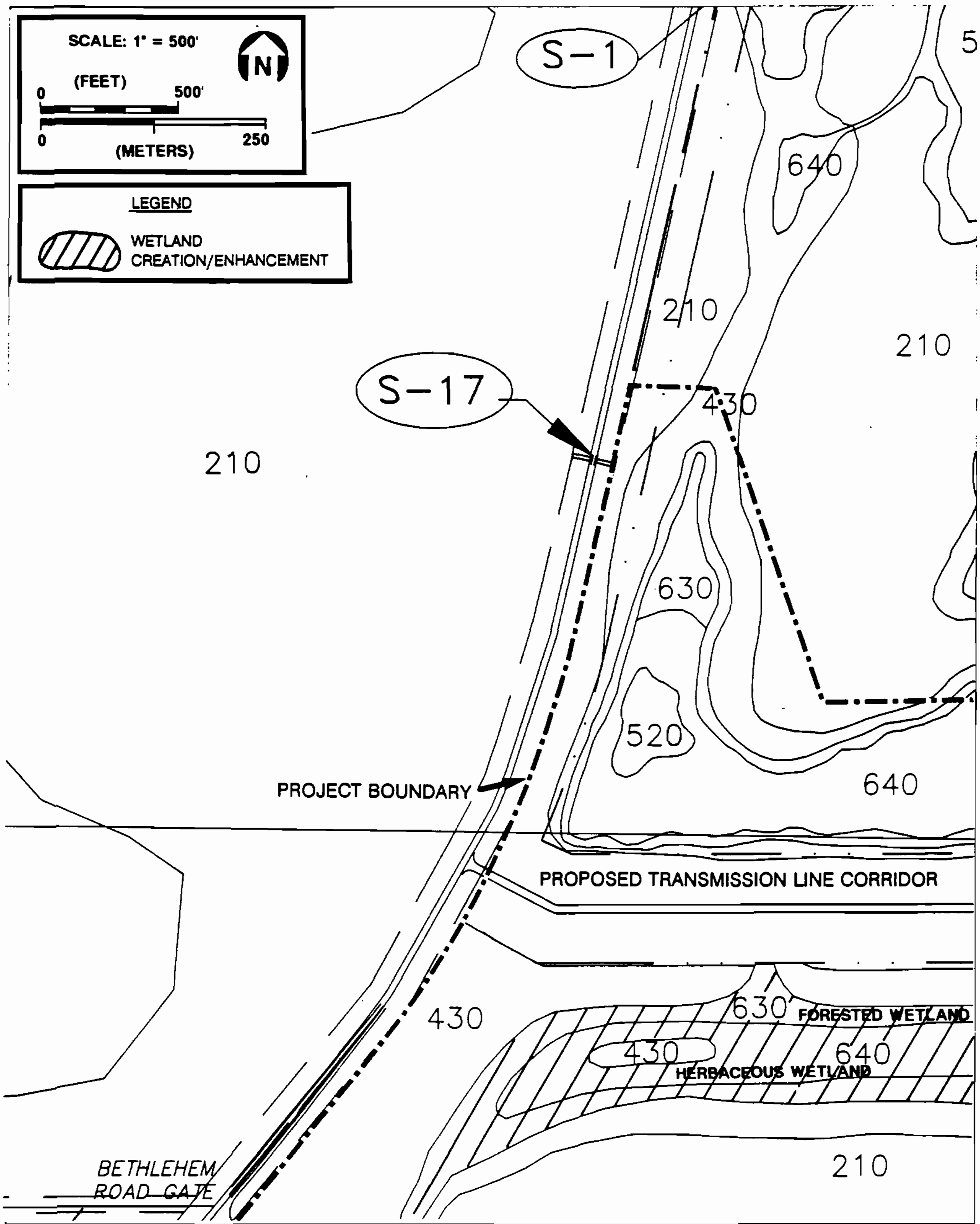

FIGURE 5. (PAGE 1 OF 13)
POST-RECLAMATION LAND USE WITH WETLAND CREATION/ENHANCEMENT AREAS DEPICTED
DREDGE AND FILL PERMIT APPLICATION
Source: ECT, 1992.

TAMPA ELECTRIC
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POLK POWER STATION

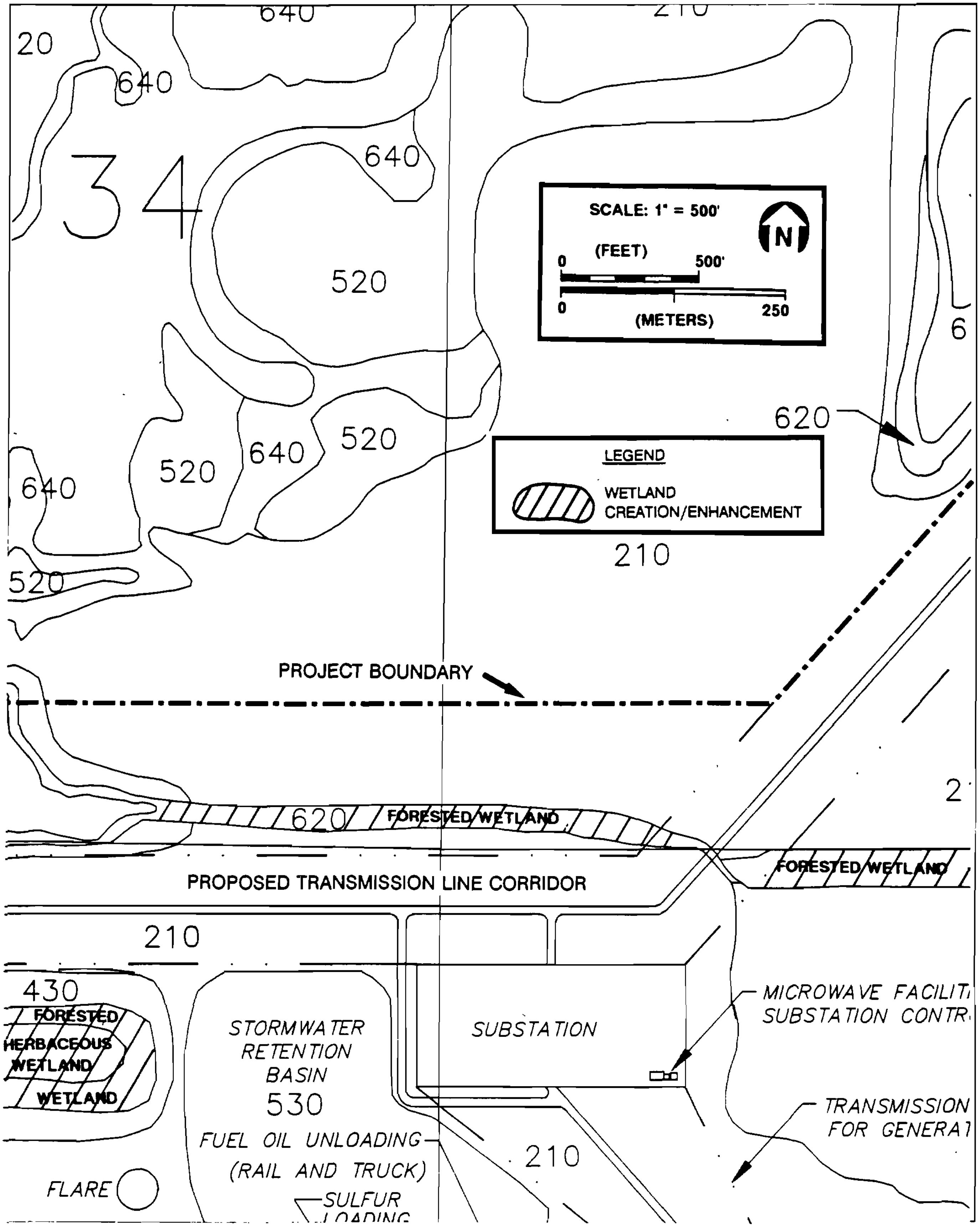

FIGURE 5. (PAGE 2 OF 13)
POST-RECLAMATION LAND USE WITH WETLAND CREATION/ENHANCEMENT AREAS DEPICTED DREDGE AND FILL PERMIT APPLICATION
Source: ECT, 1992.

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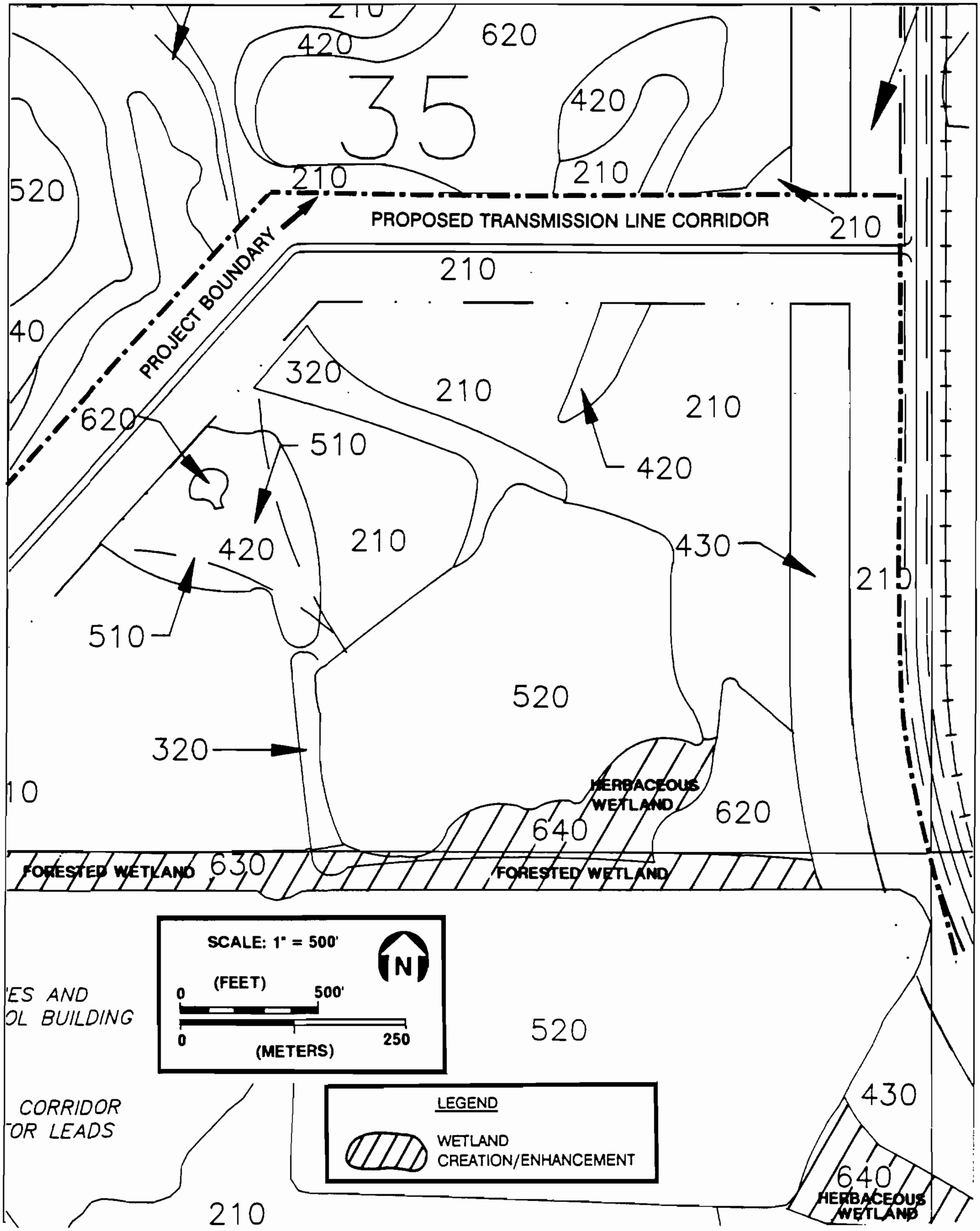

FIGURE 5. (PAGE 3 OF 13)
POST-RECLAMATION LAND USE WITH WETLAND CREATION/ENHANCEMENT AREAS DEPICTED
DREDGE AND FILL PERMIT APPLICATION
Source: ECT, 1992.

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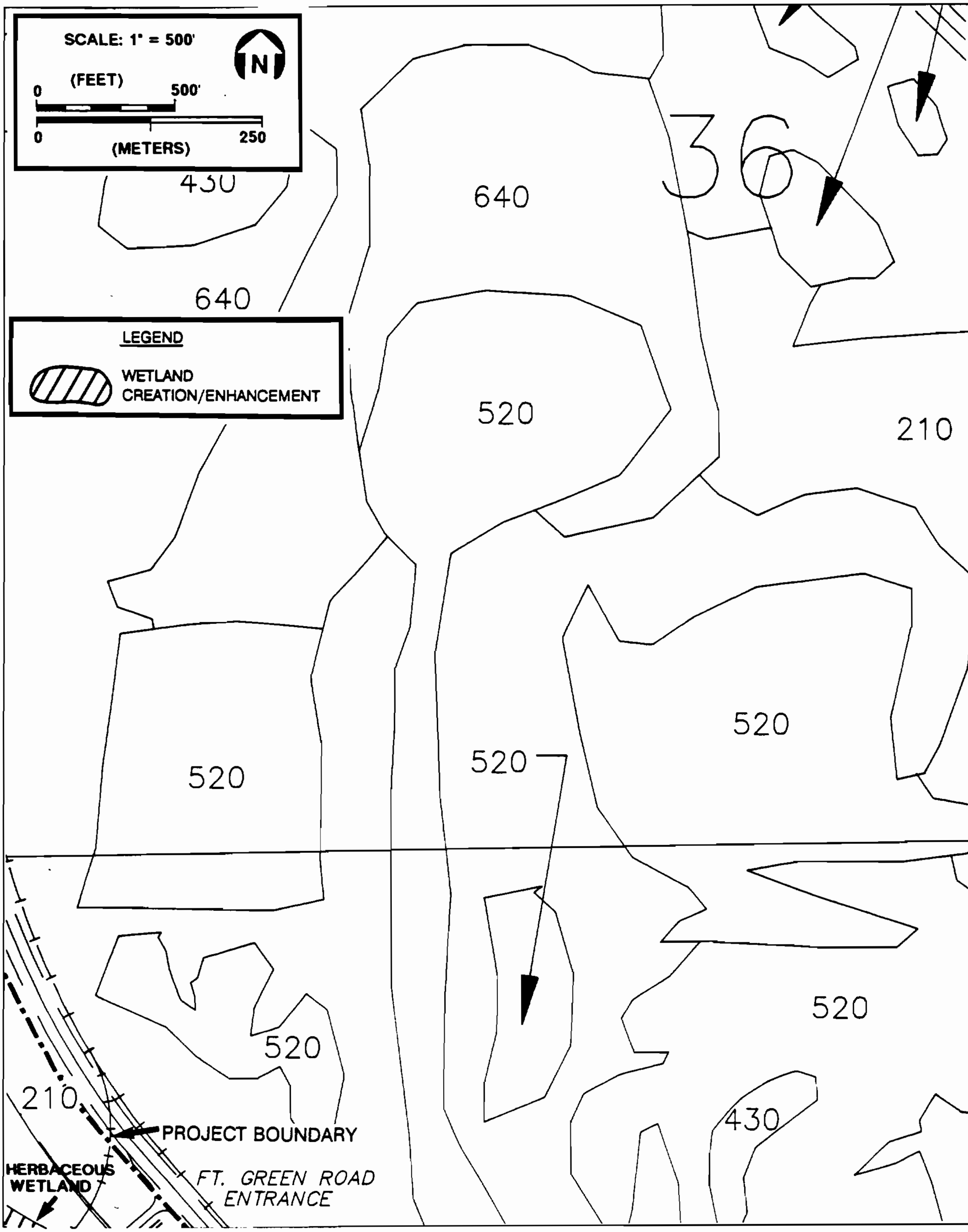

FIGURE 5. (PAGE 4 OF 13)
POST-RECLAMATION LAND USE WITH WETLAND CREATION/ENHANCEMENT AREAS DEPICTED DREDGE AND FILL PERMIT APPLICATION
Source: ECT, 1992.

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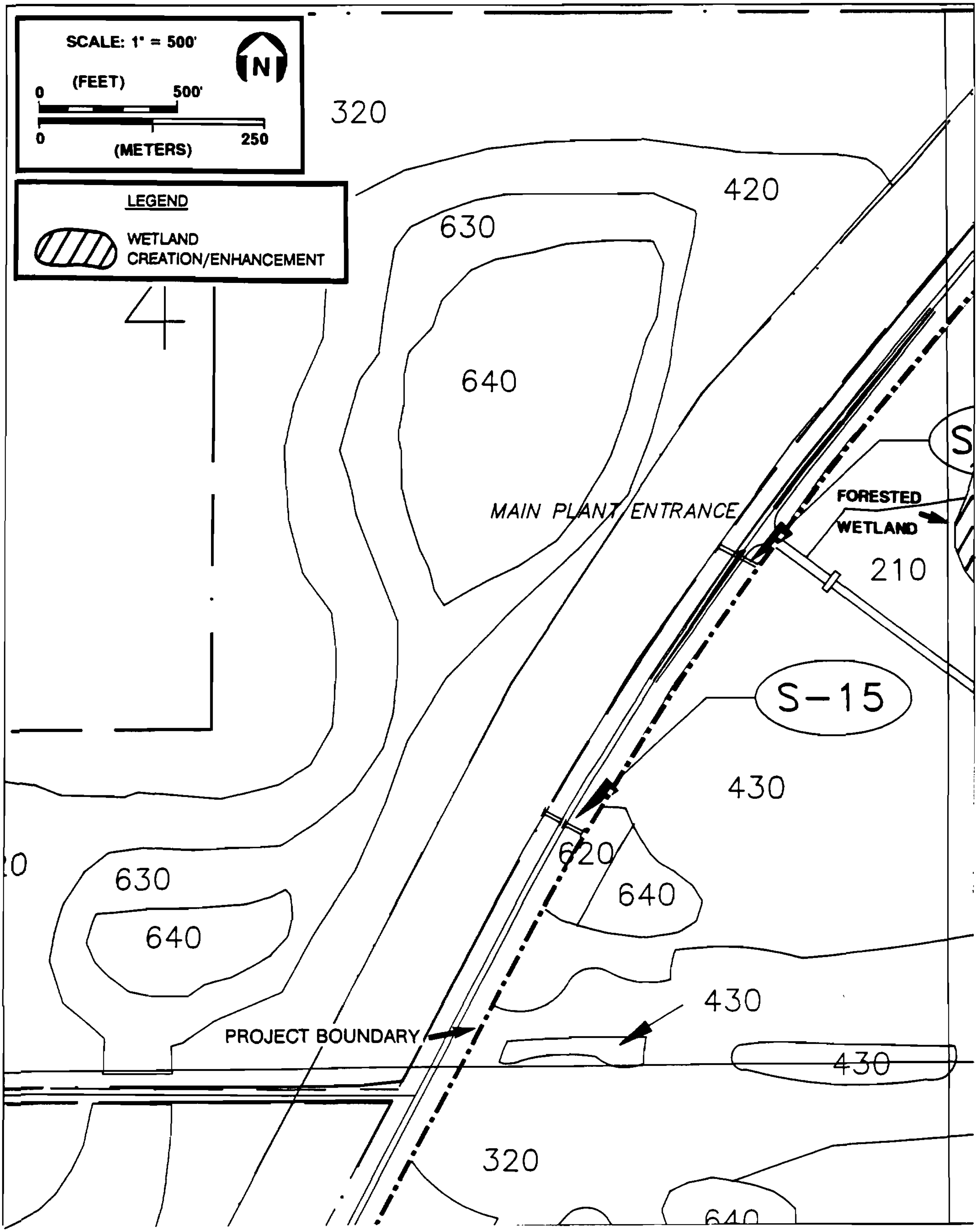

FIGURE 5. (PAGE 5 OF 13)
POST-RECLAMATION LAND USE WITH WETLAND CREATION/ENHANCEMENT AREAS DEPICTED
DREDGE AND FILL PERMIT APPLICATION
Source: ECT, 1992.

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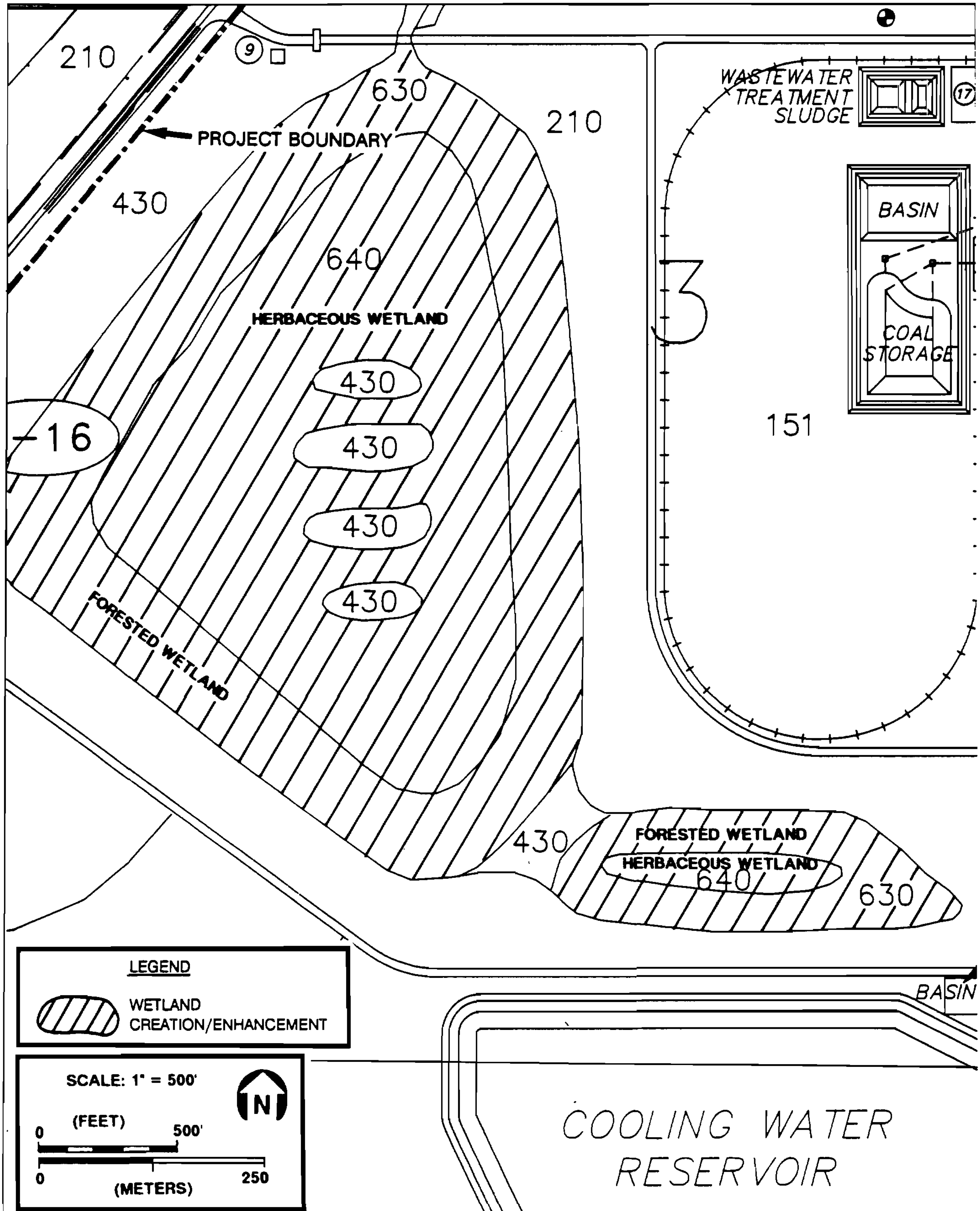

FIGURE 5. (PAGE 6 OF 13)
POST-RECLAMATION LAND USE WITH WETLAND CREATION/ENHANCEMENT AREAS DEPICTED DREDGE AND FILL PERMIT APPLICATION
Source: ECT, 1992.

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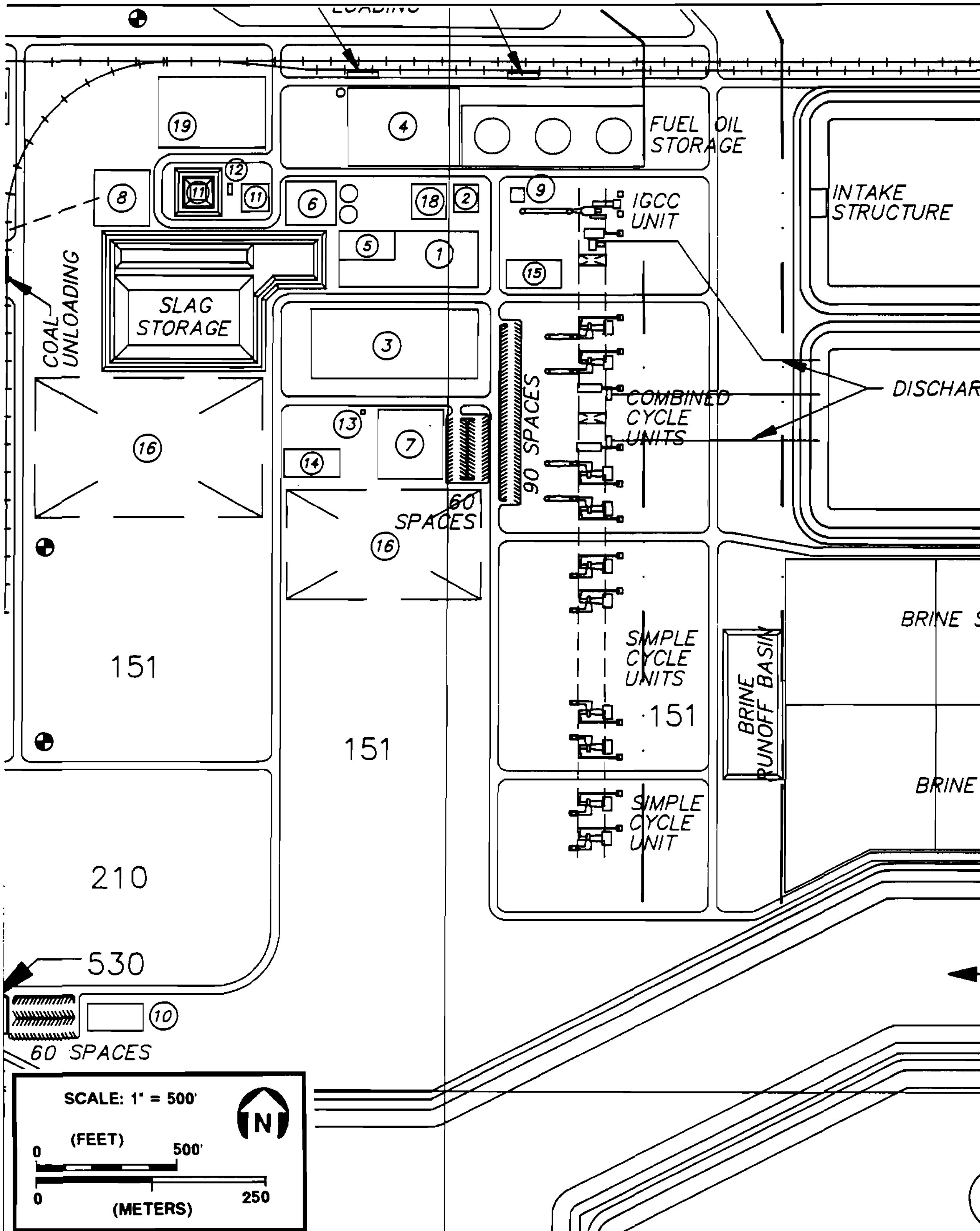

FIGURE 5. (PAGE 7 OF 13)
POST-RECLAMATION LAND USE WITH WETLAND CREATION/ENHANCEMENT AREAS DEPICTED
DREDGE AND FILL PERMIT APPLICATION
Source: ECT, 1992.

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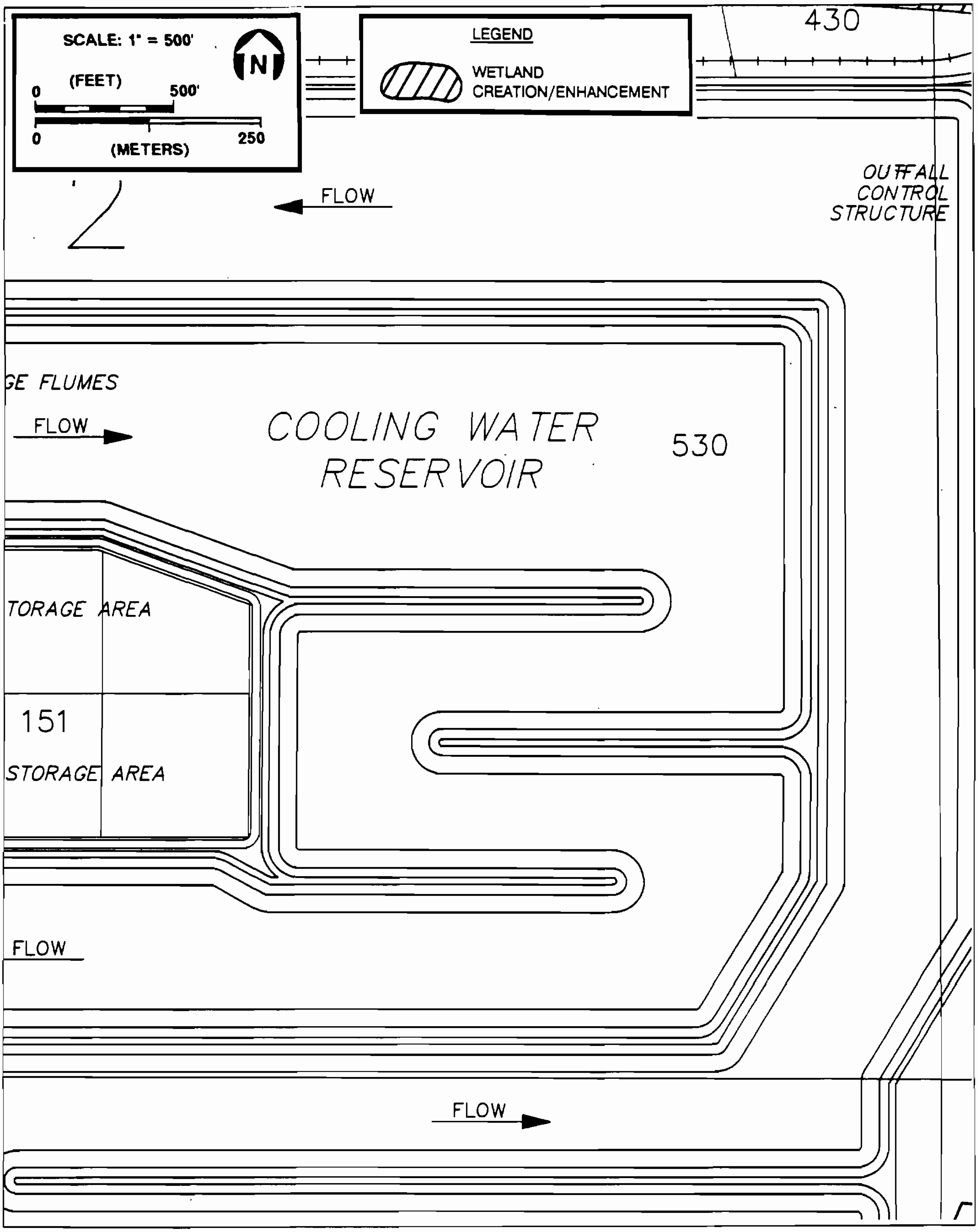

FIGURE 5. (PAGE 8 OF 13)
POST-RECLAMATION LAND USE WITH WETLAND CREATION/ENHANCEMENT AREAS DEPICTED
DREDGE AND FILL PERMIT APPLICATION
Source: ECT, 1992.

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POLK POWER STATION

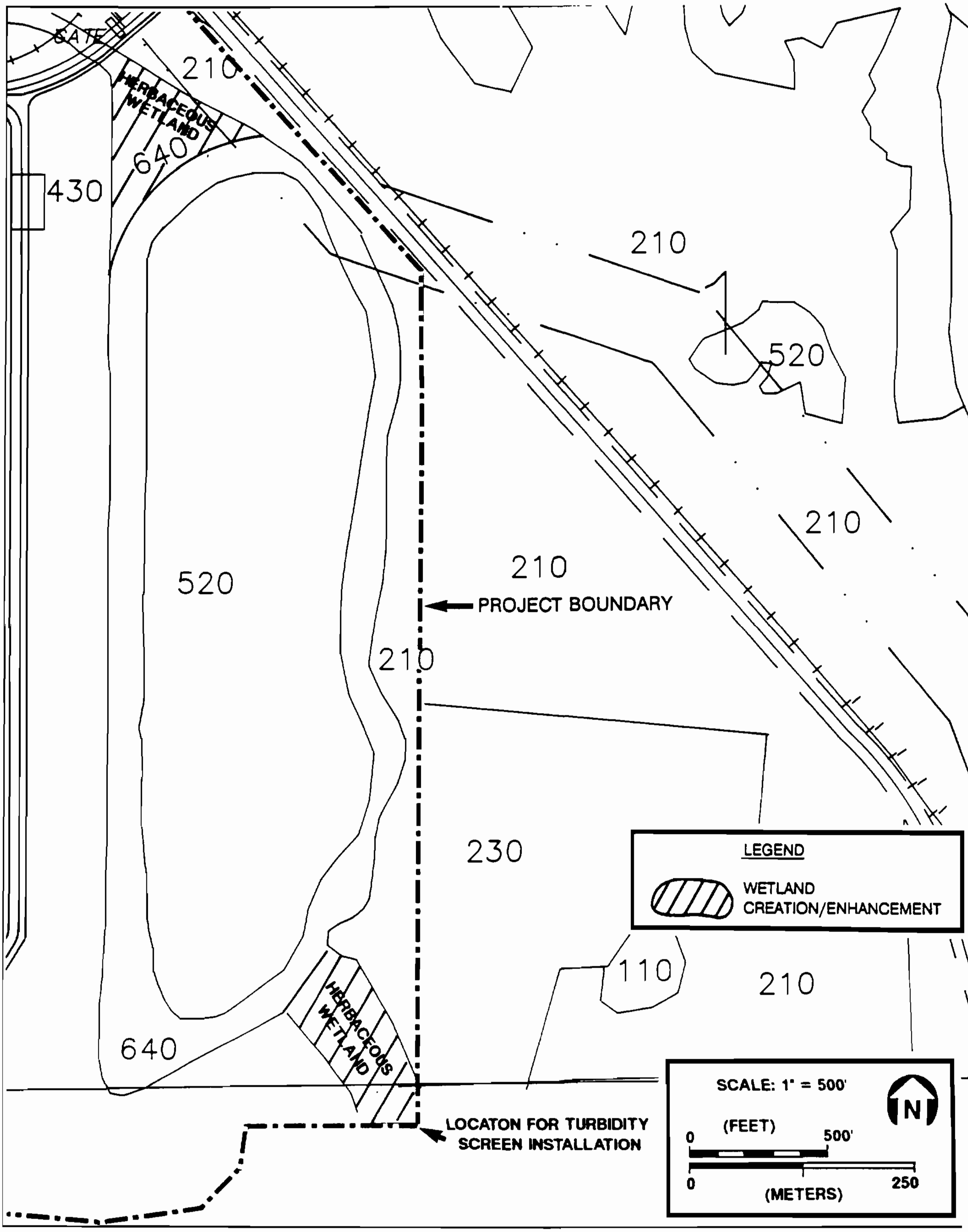

FIGURE 5. (PAGE 9 OF 13)
POST-RECLAMATION LAND USE WITH WETLAND CREATION/ENHANCEMENT AREAS DEPICTED DREDGE AND FILL PERMIT APPLICATION
Source: ECT, 1992.

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POLK POWER STATION

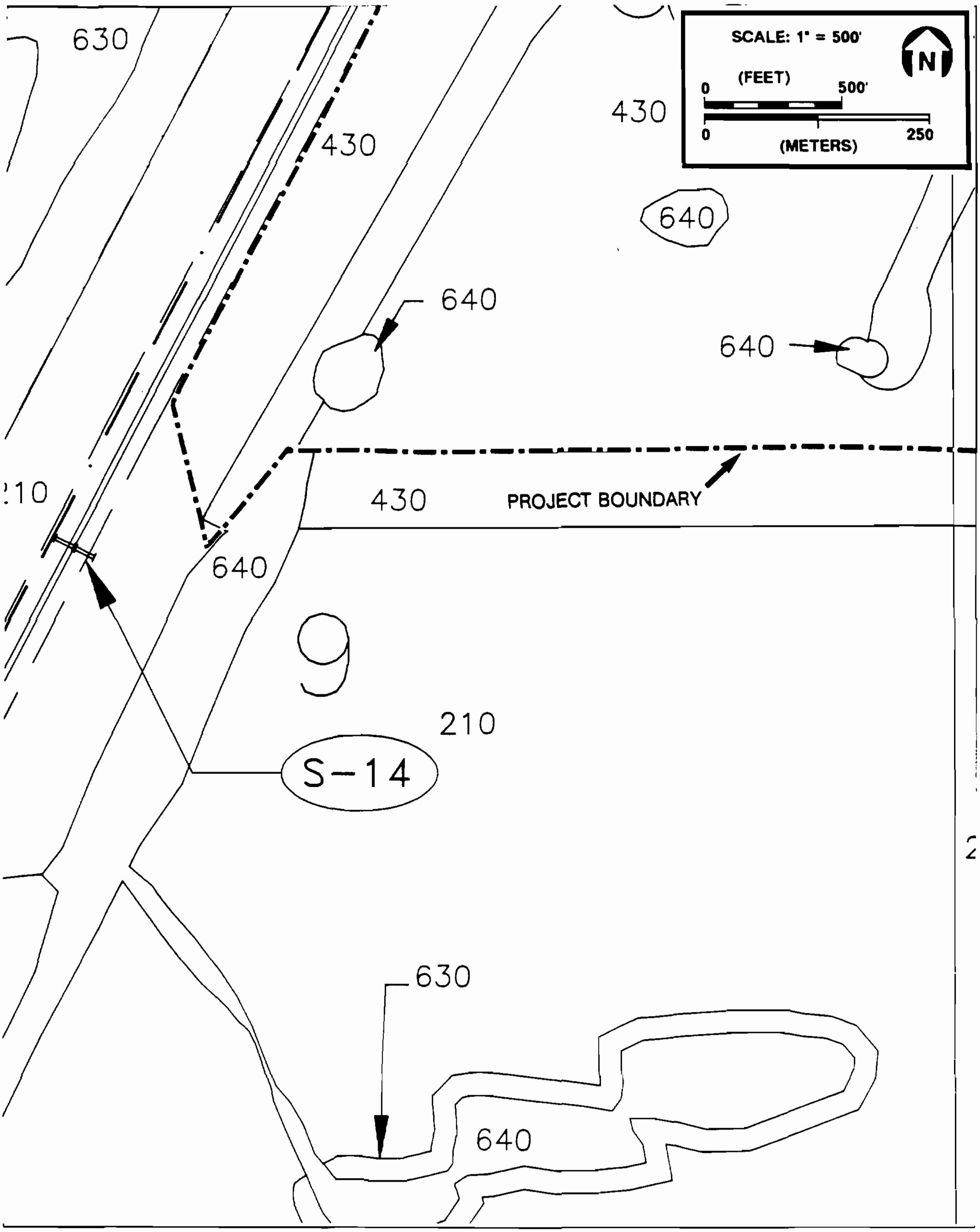

FIGURE 5. (PAGE 10 OF 13)
POST-RECLAMATION LAND USE WITH WETLAND CREATION/ENHANCEMENT AREAS DEPICTED
DREDGE AND FILL PERMIT APPLICATION
Source: ECT, 1992.

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POLK POWER STATION

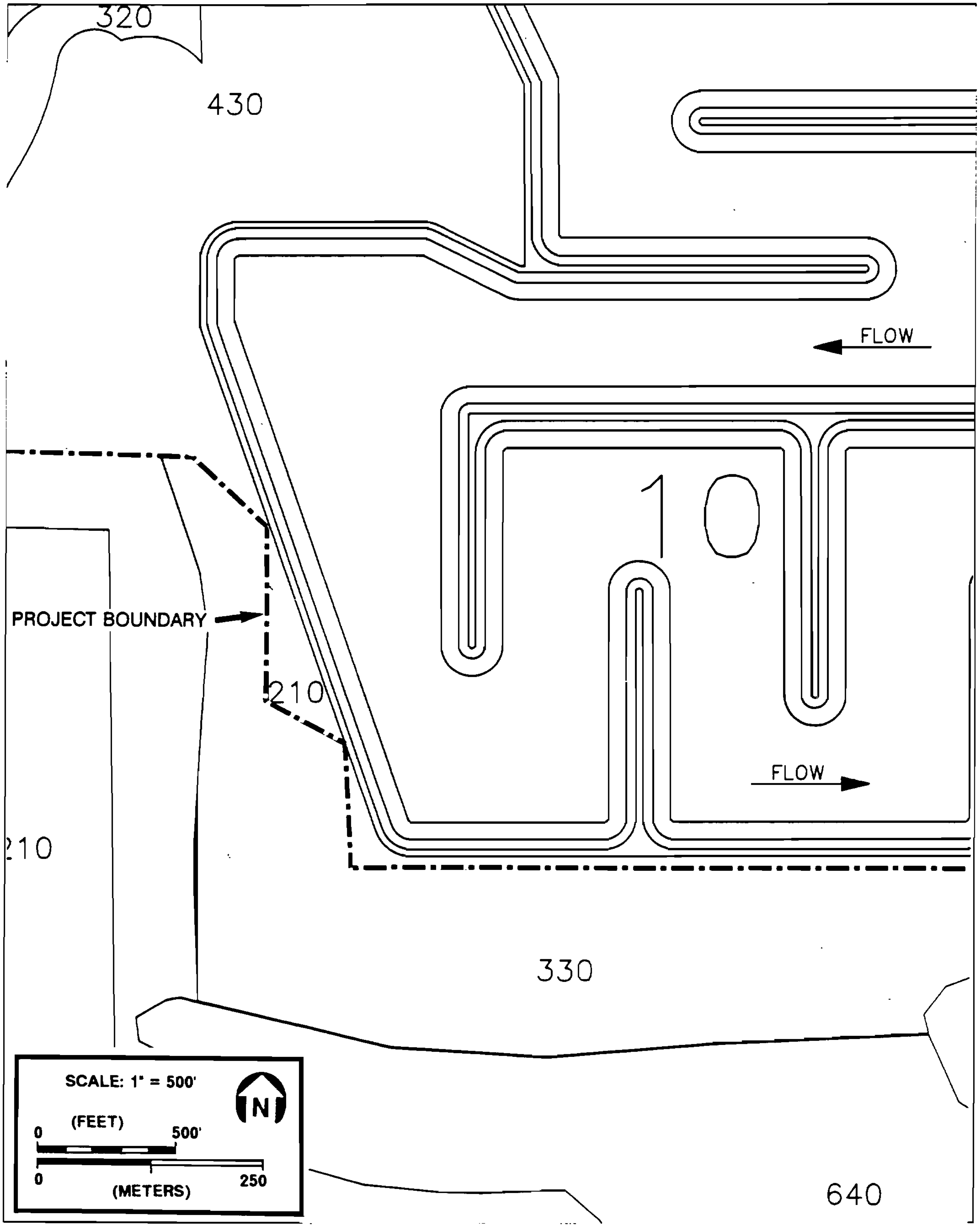

FIGURE 5. (PAGE 11 OF 13)
POST-RECLAMATION LAND USE WITH WETLAND CREATION/ENHANCEMENT AREAS DEPICTED
DREDGE AND FILL PERMIT APPLICATION
Source: ECT, 1992.

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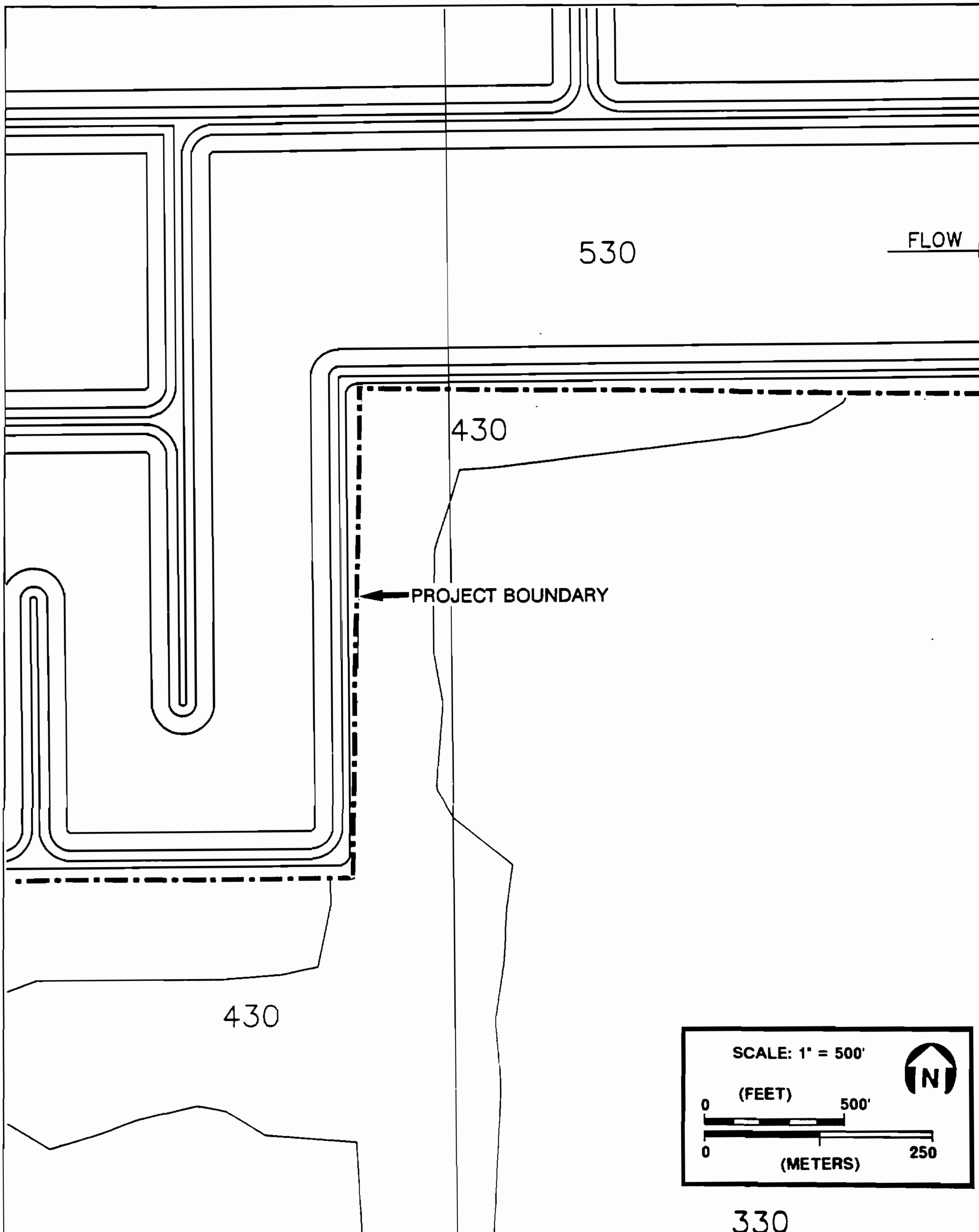

FIGURE 5. (PAGE 12 OF 13)
POST-RECLAMATION LAND USE WITH WETLAND CREATION/ENHANCEMENT AREAS DEPICTED
DREDGE AND FILL PERMIT APPLICATION
Source: ECT, 1992.

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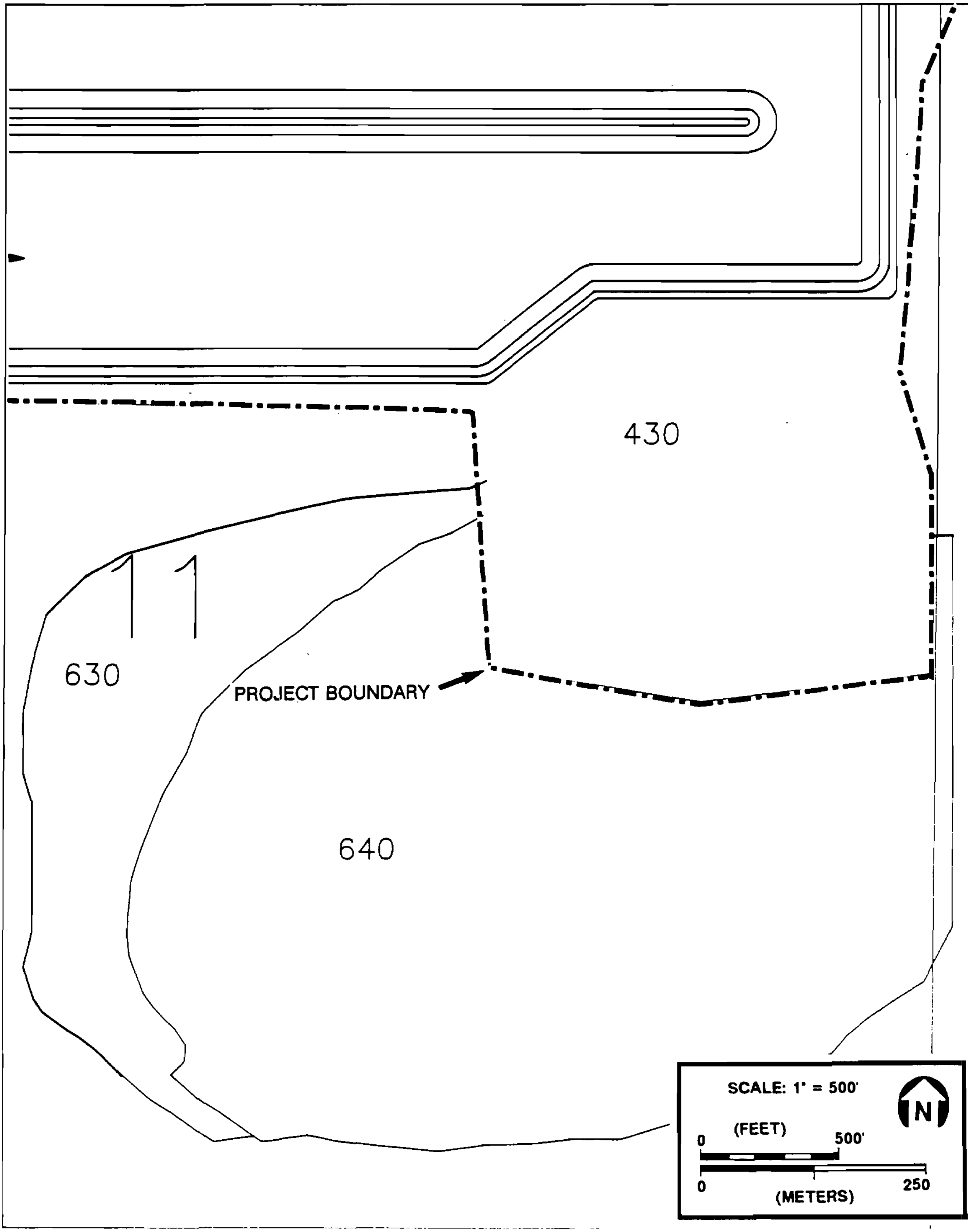

FIGURE 5. (PAGE 13 OF 13)
POST-RECLAMATION LAND USE WITH WETLAND CREATION/ENHANCEMENT AREAS DEPICTED DREDGE AND FILL PERMIT APPLICATION
Source: ECT, 1992.

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Table 1. Acreages and Volumes of Wetland Fill

	Acres	Cubic Yards
Mine cuts filled for construction of the cooling water reservoir	180.81	2,917,068
Mine cuts filled for plant site construction	30.97	499,649
Disturbed herbaceous and early successional forested wetlands for plant site construction	41.33	133,358
TOTAL FILL	**253.11**	**3,550,075**

Source: ECT, 1992.

A total of 253.11 acres of highly disturbed wetlands are proposed for fill placement for construction of the Polk Power Station. As compensation for impacts to these wetland areas, Tampa Electric Company proposes to provide approximately 168.41 acres of combined wetland creation and wetland enhancement (see Table 2). The mitigation plan provides for recontouring of the remaining mine cuts to provide approximately 18.94 acres of forested wetland enhancement and 23.20 acres of herbaceous wetland enhancement. The remainder of the compensation package includes approximately 62.69 acres of forested wetland creation and approximately 63.58 acres of herbaceous wetland enhancement. The ratio of compensation acreage offered per acre of wetland fill is approximately 0.67:1.0.

The compensation package will include plantings of laurel oak, water oak, sweet gum (Liquidambar styraciflua), swamp redbay (Persea palustris), red maple, black gum (Nyssa sylvatica var. biflora) and other tree species as available for the canopy layer, as well as an herbaceous layer which includes maindencane (Panicum hemitomon), pickerelweed, and arrowhead.

Construction within or adjacent to the existing mine cuts will be facilitated by isolating and draining working areas and pumping the water into nearby mine cuts. This will minimize the occurrence of erosion or downstream silt and sedimentation in runoff. The only silt/sedimentation barrier to be installed will be erected upstream of a ditch which leads off the property (see Figure 5, Sheet 9 of 13 and Figure 6). Site grading activities will be primarily accomplished with pans and bulldozers. Typical cross sections of jurisdictional areas proposed for fill placement are included (Figure 7 and 8).

ALTERNATIVES ANALYSIS

In order to meet the needs of a rapidly growing community, it has become necessary for several utility companies serving the area to update and expand their capacity to generate and transmit electricity. Numerous transmission corridors have been constructed or expanded to even out loading, and deactivated generating facilities

Table 2. Acreages of Wetland Compensation

	Acres
Wetland Creation	
Forested	62.69
Herbaceous	63.58
Wetland Enhancement	
Forested	18.94
Herbaceous	23.20
Total Mitigation	
Forested	81.63
Herbaceous	86.78
TOTAL COMBINED MITIGATION	**168.41**

Ratio = Mitigation:Impact = 0.67:1.0

Source: ECT, 1992.

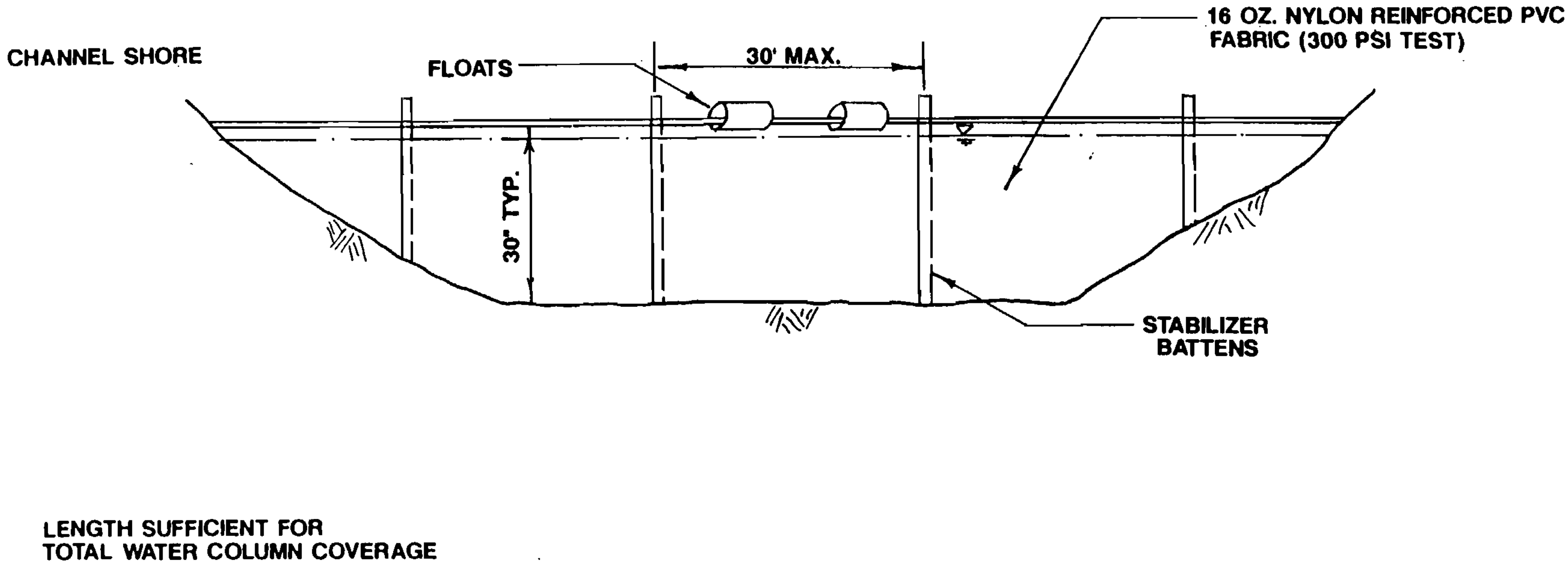

FIGURE 6.
TURBIDITY SCREEN DETAIL
DREDGE AND FILL PERMIT APPLICATION

Source: ECT, 1992.

TAMPA ELECTRIC
A TECO ENERGY COMPANY

POLK POWER STATION

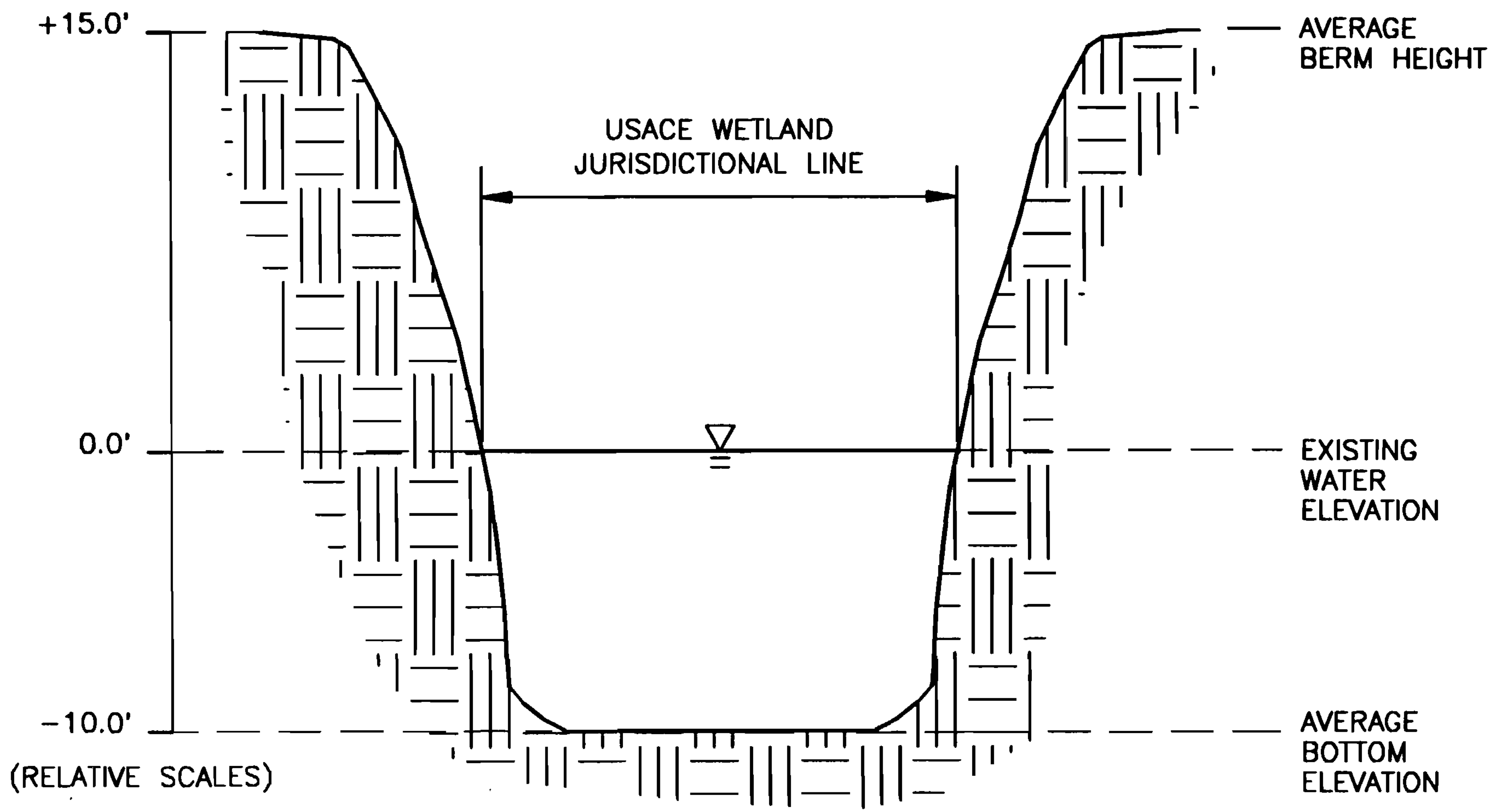

FIGURE 7.
TYPICAL CROSS SECTION OF EXISTING MINE CUTS
DREDGE AND FILL PERMIT APPLICATION

Source: ECT, 1992.

TAMPA ELECTRIC
A TECO ENERGY COMPANY

POLK POWER STATION

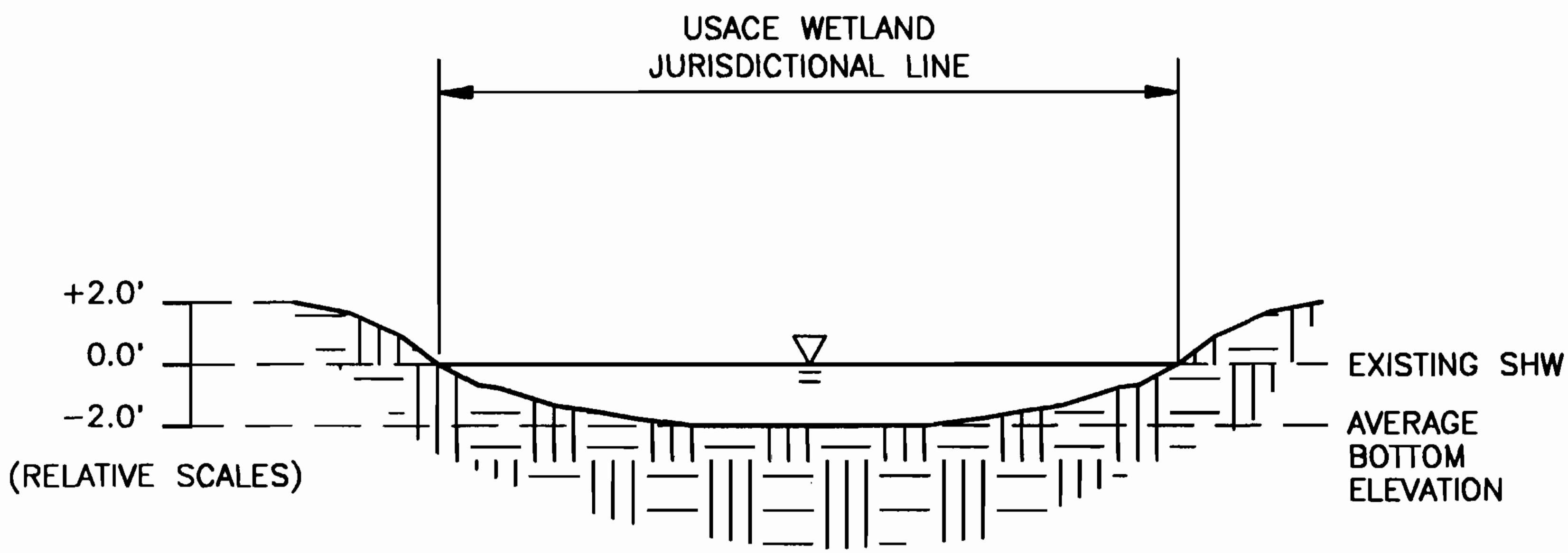

FIGURE 8.
TYPICAL CROSS SECTION OF EXISTING DISTURBED HERBACEOUS WETLANDS
DREDGE AND FILL PERMIT APPLICATION

Source: ECT, 1992.

TAMPA ELECTRIC
A TECO ENERGY COMPANY

POLK POWER STATION

have been returned to service to assist in managing peak loads. In addition to these measures, new, modern generating facilities need to be constructed to supply the west-central Florida area.

During the course of selecting an appropriate site for constructing a new power plant, Tampa Electric Company first considered a large tract of land on lower Tampa Bay adjacent to Port Manatee that was Tampa Electric Company property. This property had the advantages of ready access to a barge transported coal supply, proximity to the area which was to be served, and existing Tampa Electric Company ownership. However, this property had the disadvantage of being located adjacent to an environmentally sensitive estuary, Cockroach Bay. Public concerns expressed relative to this proposed power plant site led Tampa Electric Company to establish a committee comprised of public and private individuals from the business and environmental communities to examine alternatives to the Port Manatee site. Upon examining the available property that had appropriate dimensions and assessing the various parcels for environmental sensitivity, proximity to the service area and access to fuel supplies, the committee selected the property now known as the Polk Power Station.

The Polk Power Station property has the advantages of already being in a highly disturbed condition subsequent to phosphate mining activities, access to rail service for fuel supply, and access by existing highways or roads for ancillary service and employee commuting. Construction of the Polk Power Station on the selected property has a disadvantage since an exceptionally large acreage of the property is, by definition, jurisdictional wetland. The vast majority of the jurisdictional wetland is open water standing in unreclaimed mine cuts made when draglines excavated below natural grade to access phosphate reserves. Although the site plan proposes a seemingly large acreage of displacement for this type of habitat, most has been retained within the design of the cooling reservoir (see Figure 3). In addition most of the berms constructed for directing the cooling water around its circuitous path are situated such that they overlie the upland ridges between the mine cuts.

The placement of fill for plant site construction in other disturbed areas which contain jurisdictional wetlands is necessary for the development of a workable site plan. Wetland areas that are sufficiently removed from the plant site will be retained intact after construction (i.e., the southwestern corner of the property, see Figure 5, Pages 5 and 10 of 13). The remainder are displaced, but their functions and values are more than replaced by the large, inter-connected wetland compensation areas with diverse habitat and mosaics of wetland and upland communities. Tampa Electric Company has substantially avoided the potential disturbance to higher quality wetlands by the selection of the Polk Power Station over the Port Manatee property, minimized the displacement of wetlands with a sensitive site plan, only displaced the most disturbed wetland areas with the lowest functional values, and more than compensated for the values and functions displaced with a large, diverse community derived from wetland creation and wetland enhancement.

ATTACHMENT B

POLK POWER STATION LEGAL DESCRIPTION OF LANDS

LANDS FROM FREEPORT MACMORAN RESOURCE PARTNERS, LIMITED PARTNERSHIP (Agrico Chemical Company)

LANDS TO THE EAST OF STATE ROAD 37:

TOWNSHIP 32 SOUTH, RANGE 23 EAST, POLK COUNTY, FLORIDA

SECTION 1

That part of the West 330.00 feet of the East 1/2 of the West 1/2 of said Section 1, lying southwesterly of Fort Green Road, AND all that part of the West 1/4 of said Section 1 lying southwesterly of Fort Green Road.

SECTION 2

a. The West 848.00 feet of the NW 1/4 of the NW 1/4.
b. The South 3/4 LESS that part described as; Begin 400.00 feet West of the NE corner of said South 3/4, run thence West 3600.00 feet; thence South 150.00 feet; thence East 450.00 feet; thence South 200.00 feet; thence East 700.00 feet; thence North 200.00 feet; thence East 2450.00 feet; thence North 150.00 feet to the POINT OF BEGINNING.

SECTION 3

All lying East of State Road 37.

SECTION 4

All lying East of State Road 37.

SECTION 9

BEGIN at the NE corner of said Section 9 and proceed S.00°04'08"E. along the East line of said Section 9 for 2117.07 feet; thence N.88°05'57"W. for 323.11 feet; thence S.88°42'07"W. for 983.72 feet; thence N.89°51'23"W. for 1058.61 feet; thence S.39°38'56"W. for 454.20 feet; thence N.13°09'59"W. for 538.34 feet to the easterly right-of-way line of State Road No. 37 (being 80 feet at right angles from centerline); thence N.27°31'59"E. along said right-of-way line for 2184.60 feet to the North line of said Section 9; thence N.89°32'05"E. along said North line for 1765.11 feet to the POINT OF BEGINNING.

SECTION 10

BEGIN at the NE corner of said Section 10 and proceed S.00°00'02"E. along the East line of said Section 10 for 1885.69 feet thence N.88°45'46"W. for 324.02 feet; thence S.01°25'49"W. for 1761.69 feet; thence N.89°56'27"W. for 3504.25 feet; thence N.02°46'52"W. for 454.48 feet; thence N.61°33'02"W. for 320.02 feet; thence N.00°22'41"W. for 641.25 feet; thence N.46°54'10"W. 372.71 feet; thence N.88°05'57"W. for 820.69 feet; to the West line of said Section 10; thence N.00°04'08"W. for 2117.07 feet to the NW corner of said Section 10; thence S.89°53'15"E. along the North line of said Section 10 for 5274.75 feet to the POINT OF BEGINNING.

SECTION 11

BEGIN at the NE corner of said Section 11 and proceed S.00°13'13"E. along the East line of said Section 11 for 731.09 feet; thence S.22°01'06"W. for 60.15 feet; thence S. 04°41'20"W. for 1038.35 feet; thence S.16°25'50"E. for 399.84 feet again to the East line of said Section 11;. thence S.00°13'13"E. along said East line for 448.50 feet to the East Quarter Section Corner of said Section 11; thence S.00°19'20"W. along the East line of the SE 1/4 of said Section 11 for 277.57 feet; thence S.83°10'34"W. for 845.66 feet; thence N.80°44'17"W. for 775.80 feet; thence N.04°00'31"W. for 937.40 feet; thence N.88°45'46"W. for 3637.10 feet to the West line of said Section 11; thence N.00°00'02"W. for 1885.69 feet to the NW corner of said Section 11; thence N.89°55'04"E. for 5298.52 feet to the POINT OF BEGINNING.

SECTION 12

BEGIN at the NW corner of said Section 12 and proceed S.88°52'09"E. along the North line of the NW 1/4 of said Section 12 for 1649.70 feet to a concrete monument number 1943; thence S.00°19'05"W. for 75.98 feet; thence S.89°23'48"W. for 614.63 feet; thence S.10°48'34"W. for 155.81 feet; thence S.43°38'11"W. for 211.14 feet; thence S.82°21'29"W. for 355.22 feet; thence N.84°53'22"W. for 385.84 feet; thence S.22°01'06"W. for 320.75 feet to the West line of said Section 12; thence N.00°13'13"W. along said West line for 731.09 feet to the POINT OF BEGINNING.

LANDS TO THE WEST OF STATE ROAD 37:

TOWNSHIP 32 SOUTH, RANGE 23 EAST, POLK COUNTY, FLORIDA

SECTION 3

The part of the South 1/2 of the NW 1/4 lying West of State Road No. 37. LESS existing county maintained right-of-way for Bethlehem Road.

SECTION 4

The SE 1/4 of the SW 1/4, LESS existing county maintained right-of-way for Albritton Road. The SE 1/4 of said Section 4 lying North and West of State Road No. 37, LESS existing county maintained right-of-way for Albritton Road, and subject to GAS PIPELINE EASEMENT in O.R. Book 219 on Page 341 of the Public Records of Polk County, Florida. That part of the South 1/2 of the NE 1/4 of said Section 4 lying North and West of State Road No. 37, LESS existing county maintained right-of-way for Bethlehem Road, and subject to GAS PIPELINE EASEMENT in O.R. Book 219 on Page 341 of the Public Records of Polk County, Florida.

TOWNSHIP 32, SOUTH, RANGE 23 EAST, POLK COUNTY, FLORIDA

SECTION 7

The NE 1/4, LESS the NE 1/4 of the NE 1/4, AND LESS the North 416.00 feet of the East 209.00 feet of the NW 1/4 of the NE 1/4, AND LESS existing county maintained right-of-way for Albritton Road.
The SE 1/4, LESS right-of-way for State Road No. 674.
The SW 1/4, LESS right-of-way for State Road No. 674.
The NW 1/4, LESS the NE 1/4 of the NW 1/4, AND LESS existing county maintained right-of-way for Albritton Road. Said Section 7 being subject to existing Florida Gas Transmission Co. Pipeline Easement.

SECTION 8

The NE 1/4, LESS the West 1/2 of the NW 1/4 of the NE 1/4.
The SE 1/4 of Section 8, LESS right-of-way for State Road No. 674.
The SW 1/4 of Section 8, LESS right-of-way for State Road No. 674.
The South 1/2 of the NW 1/4.

SECTION 9

ALL, lying West of State Road No. 37 LESS existing county maintained right-of-way for Albritton Road, AND LESS right-of-way for State Road No. 674.

LANDS FROM AMERICAN CYANAMID COMPANY

TOWNSHIP 31 SOUTH, RANGE 23 EAST, POLK COUNTY, FLORIDA

SECTION 34

All the part of the S-3/4 of E-3/4 of the section lying east of the right-of-way of State Road 37 and also lying south of the right-of-way of County Road 630 (formerly designated State Road 630).

SECTION 35

All the part of the S-3/4 of the section lying south of the right-of-way of County Road 630 (formerly designated State Road 630) and also lying west of the right-of-way of the Brewster-Fort Green Road.

TOWNSHIP 32 SOUTH, RANGE 23 EAST, POLK COUNTY, FLORIDA

SECTION 2

a. The N-1/2 of N-1/2, LESS the west 848 feet thereof, and SUBJECT TO existing right-of-way of the Brewster-Fort Green Road at the northeast corner thereof.

b. The part of the S-1/2 of N-1/2 (being part of U.S. Government Lot 1 in the NW-1/4 and of U.S. Government Lot 1 in the NE-1/4) described as: begin at a point on the north boundary of said S-1/2 of N-1/2 located 400 feet west of the northeast corner thereof (measured along said north boundary), thence west along said north boundary 3600 feet, thence south 150 feet, thence east 450 feet, thence south 200 feet, thence east 700 feet, thence north 200 feet, thence east 2450 feet, thence north 150 feet to the point of beginning. (The directions "north" and "south" meaning the bearing of the east boundary of Section 2, and the directions "east" and "west" meaning the bearing of the north boundary of said S-1/2 of N-1/2 of Section 2.)

Source: Andrew Edgemon & Associate, 1991.

REC'D JUL 06 1992

Southwest Florida Water Management District

2379 Broad Street (U.S. 41 South) Brooksville, Florida 34609-6899
Phone (904) 796-7211 or 1-800-423-1476 SUNCOM 628-4150

July 1, 1992

Anthony N. Arcuri
Environmental Consulting and Technology, Inc
5405 Cypress Center Drive
Suite 200
Tampa, Fla. 33609

Subject: Proposed Tampa Electric Co. Polk Power Station Site
Sections 2,3/Township 32 S/Range 23 E
Polk County

Dear Mr. Arcuri:

As a result of the June 29, 1992, on site meeting with you, it was determined that there are some areas of wetlands in the unmined portion of the proposed power plant site. The poor quality of the June 13, 1991, aerial photograph you provided, and the disturbed nature of the site made it unworkable to verify the present wetland boundaries you identified. After inspecting better quality 1984 aerial photography and examining the National Wetland Inventory (NWI) maps for the unmined portion of the site, we determined that they more realistically reflect the acreage and type of wetlands you will need to compensate for. Please utilize these maps for wetland planning purposes for this project.

Please contact me at 534-1448 to further discuss this matter.

Sincerely,

David Bishof
Environmental Scientist
Bartow Permitting Department
Resource Regulation

DB:kmh226

cc: Richard Gannon

Excellence Through Quality Service

Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

April 15, 1992

Tampa Electric Company
c/o Robert Hearon
Environmental Consulting & Tech., Inc.
5405 Cypress Center Drive, Suite 200
Tampa, FL 33609

Dear Mr. Hearon:

This letter is to confirm our telephone conversation regarding my request that TECO have a binding jurisdictional determination done on the proposed Polk County power plant site. After discussing the matter with Rick Cantrell. I am withdrawing my request that a binding jurisdictional determination be done for the site.

The BWRM staff has discussed how the baseline study should deal with mined-out lands, i.e., to evaluate them as if reclamation has been completed and the restored communities were mature. Part of the application information shall be copies of all permits issued to mine the site and copies of the approved LRU's from DNR for the site. This information should be used to produce maps showing what the site will look like after reclamation has occurred without a power plant on the site. The maps should show all wetlands indicate the wetland type and jurisdiction and be used to estimate the impacts of the power plant on the restored wetlands. If the review of the reclamation plans indicates that the reclamation plans can be revised to incorporate both the power plant and the required reclamation, the impact of the plant would be greatly reduced.

If you have any questions, I can be contacted at (904) 488-0130.

Sincerely,

Trudie D. Bell

Trudie D. Bell
Environmental Supervisor II
Wetland Resource Management

cc: Buck Oven