

RESOLUTION NO. 2011-49

**A RESOLUTION BY THE BOARD OF COUNTY COMMISSIONERS OF ST. JOHNS COUNTY, FLORIDA, APPROVING THE TERMS AND AUTHORIZING THE CHAIRMAN TO EXECUTE A MEMORANDUM OF AGREEMENT BETWEEN ST. JOHNS COUNTY AND THE ST. JOHNS RIVER WATER MANAGEMENT DISTRICT FOR THE TURNBULL CREEK REGIONAL OFFSITE MITIGATION AREA**

**RECITALS**

**WHEREAS**, St. Johns County (County) and St. Johns River Water Management District (District) wish to formalize an agreement relating to the Turnbull Regional Offsite Mitigation Area (ROMA) located in St. Johns County, Florida; and

**WHEREAS**, Section 373.4135(1), Florida Statutes (F.S.) directs the District to participate in and encourage the establishment of public offsite regional mitigation; and

**WHEREAS**, the County desires to establish a ROMA to serve as mitigation for future environmental resource permits issued by the District to the County for County projects; and

**WHEREAS**, although Section 373.4135(6), F.S., does not require that this Turnbull Creek ROMA be established and operated under an MOA because no money will be donated or paid as mitigation as the site will provide solely for County mitigation, the parties have determined that an MOA would be mutually beneficial.

**NOW THEREFORE, BE IT RESOLVED** by the Board of County Commissioners of St. Johns County, Florida, as follows:

**Section 1.** The above Recitals are incorporated by reference into the body of this Resolution and such Recitals are adopted as findings of fact.

**Section 2.** The Board of County Commissioners hereby approves the terms, provisions, conditions and requirements of the attached Memorandum of Agreement (MOA) and authorizes the County Administrator, or designee, to execute said MOA.

**Section 3.** The Clerk is instructed to record the original MOA in Official Records of St. Johns County, Florida.

**Section 4.** To the extent that there are typographical or administrative errors or omissions that do not change the tone, tenor, or context of this Resolution, then this Resolution may be revised without subsequent approval of the Board of County Commissioners.

**PASSED AND ADOPTED** by the Board of County Commissioners of St. Johns County, Florida, this 1<sup>st</sup> day of March 2011.

BOARD OF COUNTY COMMISSIONERS  
OF ST. JOHNS COUNTY, FLORIDA

By: \_\_\_\_\_

J. Ken Bryan, Chair

ATTEST: Cheryl Strickland, Clerk

By: Ram Halterman  
Deputy Clerk

RENDITION DATE 3/4/11



**MEMORANDUM OF AGREEMENT BETWEEN  
ST. JOHNS RIVER WATER MANAGEMENT DISTRICT AND ST. JOHNS COUNTY  
FOR TURNBULL CREEK REGIONAL OFFSITE MITIGATION AREA (ROMA)**

THIS MEMORANDUM OF AGREEMENT is entered into by the St. Johns River Water Management District (District) and St. Johns County (County) regarding the Turnbull Creek Regional Offsite Mitigation Area (ROMA).

WITNESSETH

WHEREAS, Section 373.4135(1), Florida Statutes (F.S.), directs the District to participate in and encourage the establishment of public offsite regional mitigation;

WHEREAS, the County desires to establish a ROMA to serve as mitigation for future environmental resource permits (ERPs) issued by the District to the County for County projects;

WHEREAS, Section 373.4135(6), F.S., requires that certain ROMAs for which money is donated or paid as mitigation be established and operated pursuant to a Memorandum of Agreement (MOA);

WHEREAS, although Section 373.4135(6), F.S., does not require that this Turnbull Creek ROMA be established and operated under an MOA because no money will be donated or paid as mitigation, the parties have determined that an MOA would be mutually beneficial;

WHEREAS, Section 373.4135, F.S., provides that such MOA need not be adopted by rule;

NOW THEREFORE, for and in consideration of the foregoing, which are made a part of the MOA, the District and the County hereby agree to the following:

The County will implement the Turnbull ROMA as described in the following three documents: (1) "Mitigation Plan for Turnbull Creek Regional Mitigation Area" received by the District on September 25, 2006, as amended by pages 5 and 6 of the RAI "Responses to Comments" received by the District on February 16, 2007, for permit 4-109-107782-1 (the "Plan," attached as Exhibit A); (2) the approved construction plans for permits 4-109-107782-1 and -2; and (3) this MOA. In exchange, the County will be able to use 159.676 Total Functional Gain Units (FGUs) from the ROMA as mitigation for ERPs issued by the District to the County.

A. **Statutory Topics.** The parties have chosen to address each of the topics listed in Section 373.4135(6)(c), F.S., as set forth below.

1. A description of the work that will be conducted on the site and a timeline for completion of such work

The County acquired the 712.44-acre ROMA site after the site had been used for silviculture for many years. The site contains three parcels with approximately 373.76 acres of wetlands and other surface waters and 338.68 acres of uplands.<sup>1</sup>

The County will conduct the following activities to return the site to a more natural state:

- Preservation of 183 acres of wetlands
- Preservation and vegetative and hydrologic enhancement of 83.82 acres of wetlands
- Preservation and vegetative enhancement of 39.29 acres of wetlands
- Preservation and hydrologic enhancement of 64.62 acres of wetlands
- Preservation and creation of 5.33 acres of wetlands
- Preservation and restoration of 2.22 acres of wetlands
- Preservation and enhancement of 3.03 acres of ditches and borrow areas
- Preservation and enhancement of 331.13 acres of uplands through perpetual management.

The Plan (Exhibit A) describes these activities in more detail (e.g., removing roads, culverts, ditches, and berms). The County began conducting these activities in 2008 and expects to complete construction in 2010.

2. A timeline for obtaining any required environmental resource permit

Some of the mitigation activities required an ERP, which the County obtained on May 8, 2007 (4-109-107782-1). The County modified the ERP on September 9, 2009, to address drainage issues and survey corrections (4-109-107782-2). The County is not seeking any modifications or additional ERPs at this time.

3. The environmental success criteria that the project must achieve

- (a) Preserve the entire property in perpetuity by conveying a conservation easement approved in writing by District staff.
- (b) Perform the activities described in the Plan (Exhibit A) and ERPs 4-109-107782-1 and -2, which include the Land Management Plan and Fire Management Plan.

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<sup>1</sup> The acreages in this MOA differ slightly from the acreages in the Plan (Exhibit A). The Plan was prepared in 2006, and since that time, the County has surveyed the area and prepared as-built surveys. The acreages in this MOA are the same as those used in the Uniform Mitigation Assessment Method (UMAM) assessment (Exhibit B) and are the acreages that should be used in reference to the ROMA property.

- (c) Perform the exotic species removal and maintenance as described in the Plan (Exhibit A). In addition, within the wetland areas, remove non-native vegetation such as cattails (*Typha* spp.) and primrose willow (*Ludwigia peruvianna*) by hand clearing or other methods approved by the District so that the vegetation constitutes no more than 10% of the areal cover in each stratum.
- (d) Meet the success criteria in the Plan (Exhibit A).
- (e) For the wetland areas, in addition to the success criteria in the Plan (Exhibit A), meet the following success criteria within five years after initial planting:
  - i. At least 75 percent of the planted individuals in each stratum have survived throughout the monitoring period and are showing signs of normal growth, based upon standard growth parameters such as height and base diameter, or canopy circumference.
  - ii. At least 80 percent cover by appropriate wetland herbaceous species has been obtained.
  - iii. Hydrologic conditions generally conform to those specified in the Plan (Exhibit A).
  - iv. If successful establishment has not occurred as stated above within 5 years following initial planting, then within 30 days of the termination of the monitoring period, the County shall submit to the District a narrative describing the type and causes of failure and a complete set of plans for the redesign or replacement planting of the wetland mitigation area so that the success criteria will be achieved. If an ERP is required for the activity, then the County shall apply for a permit modification. Within 30 days of District approval and, if applicable, issuance of the permit modification, the permittee must implement the redesign and/or replacement planting. Following completion of such work, success criteria as stated above or modified by subsequent permit must again be achieved. In addition, the monitoring must be conducted.
  - v. In the event that 50 percent or greater mortality of planted wetland species in any stratum within the mitigation area occurs, the permittee must undertake a remediation program approved by District staff.

4. The monitoring and long-term management requirements that must be undertaken for the project

The County will monitor the planted areas for a total of 5 years following planting. In addition, the County shall furnish the District with two copies of an annual monitoring report on EN-55 for all wetland creation, restoration, and enhancement areas and

upland enhancement areas for three growing seasons after establishment of this MOA unless otherwise notified by the District.

The District received monitoring reports on November 9, 2009; April 23, 2010; and December 14, 2010, that indicate that the ROMA site is progressing appropriately to meet success criteria.

The County shall perform exotic species removal and maintenance activities and land management and fire management activities as described in the Plan (Exhibit A) and in this MOA.

The County will operate and maintain the site in a manner consistent with the Plan (Exhibit A), permits 4-109-107782-1 and -2, this MOA, and the conservation easement.

5. An assessment of the project

Mitigation value was assessed pursuant to the Uniform Mitigation Assessment Method (UMAM) in Chapter 62-345, Florida Administrative Code. The District has determined that the ROMA can provide 159.676 Total Functional Gain Units (FGUs). The final UMAM assessment dated October 27, 2010, is attached as Exhibit B. Because this assessment accounts for time lag and risk, all of the FGUs will be available once the County records the District-approved conservation easement. To track the use of FGUs, the County and District will maintain a list containing the project name, ERP number, FGUs used, and date used, until all FGUs have been used.

6. Entity responsible for successful completion of the mitigation work

The County is responsible for all work at the ROMA.

7. Definition of the geographic area where the project may be used as mitigation established using the criteria of Section 373.4136(6), F.S.

The FGUs from the ROMA may be used as mitigation for ERPs issued for County projects in the District's Basin 5, which is where the ROMA is located.

8. Full cost accounting of the project, including annual review and adjustment

Because the County will be using the ROMA only for County projects and will not be collecting funds from others to implement the ROMA, and because an MOA is not required for this type of ROMA, the District has determined that a procedure for full cost accounting is not needed in this case.

9. Provision and a timetable for the acquisition of any lands necessary for the project

The County owns the property and does not need to acquire any lands for the ROMA.

10. Provision for preservation of the site

The County will convey a conservation easement to the District, as explained above.

11. Provision for application of all moneys received solely to the project for which they were collected

Because the County will not collect moneys from others to implement the ROMA, the District has concluded that a procedure to track funds is not needed in this case.

12. Provision for termination of the agreement and cessation of use of the project as mitigation if any material contingency of the agreement has failed to occur

If the District determines that the County is not in material compliance with the terms and conditions of this MOA, it shall provide the County with written notice of its material non-compliance and give the County ninety (90) calendar days, or another time period mutually agreed upon in writing, to correct the non-compliance. During the time period provided for correcting the non-compliance, the County may not use FGUs as mitigation for newly issued ERPs from the District. If the County does not correct the material non-compliance within the stated timeframe, the District may terminate use of the remaining FGUs for future ERPs from the District.

If the District determines that the material non-compliance diminishes the value of FGUs already used from the ROMA, then the District shall provide the County with written notice of this determination. The District shall give the County ninety (90) calendar days, or another time period mutually agreed upon in writing, to correct the non-compliance or submit for District approval alternative mitigation for any permits that were not fully mitigated within the ROMA.

The County is obligated to manage the lands in accordance with the Plan, the conservation easement, and this MOA, regardless of whether FGUs have been used or terminated.

B. **Notices.** All notices required by this MOA shall be in writing and shall be sent by registered or certified mail, return receipt requested, as follows:

St. Johns River Water Management District  
Jacksonville Service Center  
7775 Baymeadows Way, Suite 102  
Jacksonville, FL 32256  
Attention: Christine Wentzel\*

St. Johns County  
St. Johns County Environmental Division  
4040 Lewis Speedway  
St. Augustine, FL 32084  
Attention: Tony Cubbedge\*

\*Each party may unilaterally change the person to whom notices are sent by notifying the other party in writing.

- C. **Effective Date and Term.** This MOA shall become effective upon the date the last party signs the agreement. This MOA shall remain in effect for 30 years, and the term shall be automatically renewed for 30 years at the end of the first 30-year term and at the end of any subsequent 30-year term, unless both parties amend or terminate the MOA.
- D. **Amendments.** This MOA, including its exhibits, may be amended in writing by the District and County.
- E. **Severance Clause.** The invalidity of one or more of the phrases, sentences, clauses, or articles contained in the MOA shall not affect the validity of the remainder of this MOA, provided that the material purposes of this MOA can be determined and effectuated.

IN WITNESS WHEREOF, the parties have caused this Memorandum of Agreement to be executed.

Approved as to Form and Legality  
District Office of General Counsel

By: \_\_\_\_\_

ST. JOHNS RIVER WATER  
MANAGEMENT DISTRICT

By: \_\_\_\_\_  
Printed Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Date: \_\_\_\_\_

Approved as to Form and Legality  
St. Johns County Office of General Counsel

By: \_\_\_\_\_

ST. JOHNS COUNTY

By: \_\_\_\_\_  
Printed Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Date: \_\_\_\_\_

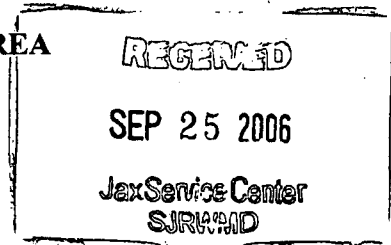


**SCANNED**

Date \_\_\_\_\_

107788-1

**ENVIRONMENTAL RESOURCE  
PERMIT APPLICATION AND  
MITIGATION PLAN  
FOR TURNBULL CREEK  
REGIONAL MITIGATION AREA**



*Prepared for:*

**ST. JOHNS COUNTY BOARD OF COUNTY COMMISSIONERS**  
4012 Lewis Speedway  
St. Augustine, Florida 31284

*Prepared by:*

**JONES EDMUNDS & ASSOCIATES, INC.**  
738 NE Waldo Road  
Gainesville, Florida 32641

Certificate of Authorization #1841

*and*

**TURNBULL ENVIRONMENTAL, INC.**  
50 Agnes Circle  
St. Augustine, Florida 31280

September 2006

**Exhibit A**

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RECEIVED

SEP 25 2006

Jax Service Center

SR 16/CR 13

## 1.0 INTRODUCTION

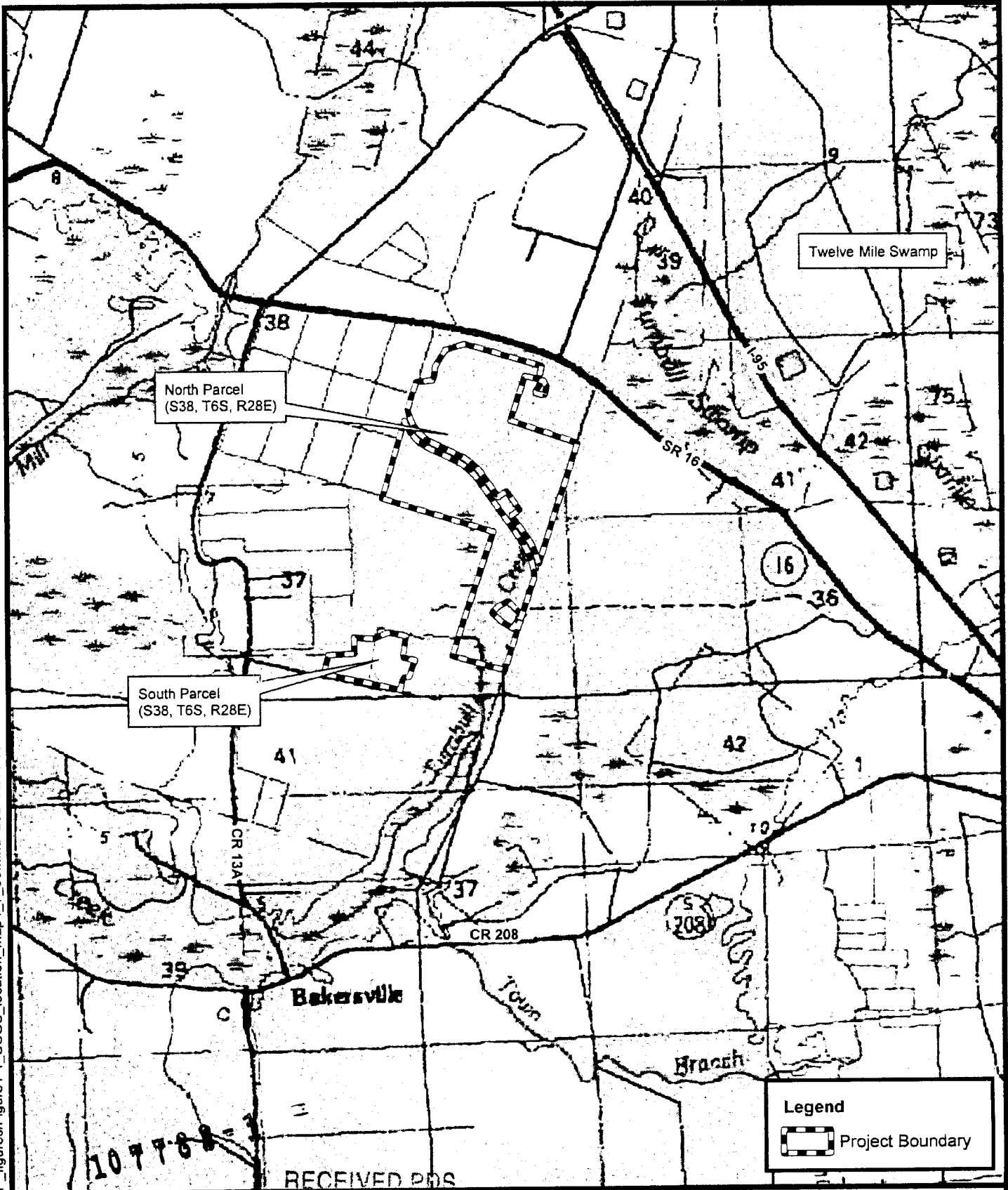
St. Johns County (County) has several large future transportation projects planned, such as County Road (CR) 2209, CR 16A Four-Laning, State Road (SR) 16/CR 13 Intersection Improvements, and US1/CR 210 Interchange Improvement projects. These projects will likely result in wetland impacts. Finding subsequent wetland mitigation areas in the County is difficult due to the lack of County-owned or other public lands where mitigation could be proposed. As a result, the County proactively purchased two tracts of land in the eastern portion of the County to use as a wetland mitigation bank for future capital improvement projects that result in wetland impacts. The proposed mitigation area, referred to as the *Turnbull Regional Mitigation Area* (TRMA), will restore the hydrologic patterns throughout the site to benefit wetland and upland communities, create additional wetland habitat, create valuable wildlife habitat in previously disturbed areas, and enhance on-site wetland and upland community structure which has been altered by years of silviculture. Additionally, the site will provide opportunities for limited public resource-based recreation and environmental education. The County will implement the mitigation activities identified in this plan well in advance of any proposed wetland impacts associated with County capital improvement transportation projects.

The TCRMA project site is made up of two non-adjointing parcels in Section 38, Township 6 South, and Range 28 East in St. Augustine, St. Johns County, Florida (Figure 1.1). The approximately 642-acre north parcel is south of State Road (SR) 16 and east of Pacetti Road/International Golf Parkway, while the approximately 71-acre south parcel is east of Pacetti Road and fronts Scaff Road. The parcels are within the St. Johns River Water Management District's (SJRWMD) Basin 5 (Six-Mile and Julington Creek Nested Basin) and are next to a plus or minus 382-acre parcel that is County owned and has been placed in a conservation easement for previous wetland impacts associated with the World Golf Village.


This project is intended to enhance and restore uplands and wetlands that have been significantly disturbed due to silvicultural use and to create 7.6 acres of forested and herbaceous wetlands in existing borrow areas. The TCRMA is located in an area of St. Johns County experiencing rapid development. This project will greatly improve on-site habitats for wildlife, create a large regionally significant conservation area in conjunction with existing adjacent County lands, and protect a large portion of the Turnbull Creek watershed.

Jones Edmunds & Associates, Inc. (Jones Edmunds) and Turnbull Environmental, Inc. (TEI) conducted a detailed environmental assessment in the summer and fall of 2005 to identify jurisdictional wetlands, unique habitats, wildlife species, exotic species, the potential for listed wildlife species, and all anthropogenic impacts to the two parcels and on-site adjacent wetland communities. In addition, Jones Edmunds and TEI investigated past land-use practices and historical changes to vegetation communities by reviewing historical aerial photography. This document reports on that ecological assessment conducted for the County and provides a mitigation plan for the property. In addition, this report provides the necessary information required in Sections A, C, and E of the completed Environmental Resource Permit application (Appendix A).

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**Legend**

 Project Boundary


**JONES  
EDMUNDS**

SEP 25 2006 **Figure 1.1**  
**USGS Location Map**

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## 2.0 PROPERTY OVERVIEW

Areas west of the project are currently being developed as residential. In addition, several large, medium-density residential urban developments—including Samara Lakes, Palm Lakes, and Murabella southwest of the project and Silver Leaf to the north—are being developed. Given its location within a rapidly developing area of St. Johns County, the Turnbull Regional Mitigation Area is a prime site for residential development. However, this proposed mitigation plan will protect approximately 713 acres of uplands and wetlands in two separate parcels in this rapidly developing area.

Traffic on portions of I-95 in the County exceeds limits established by the Florida Department of Transportation (FDOT). As a result, in 1995 the County entered into an agreement with FDOT to construct a new north/south roadway in this portion of the County to alleviate traffic on I-95. The proposed CR 2209 will run north/south and parallel I-95 as it passes between Racetrack Road and CR 208. The central portion of this proposed roadway will traverse the central region of the Turnbull Creek Mitigation area (Figure 2.1). CR 2209 will reduce the ecological benefit of the proposed mitigation project, particularly in areas that will now be located between SR 16 and CR 2209. However, the large acreages north and south of the road and the proposed overpass over Turnbull Creek will provide ecological improvements to wildlife habitat, wildlife movement, and ecological communities.

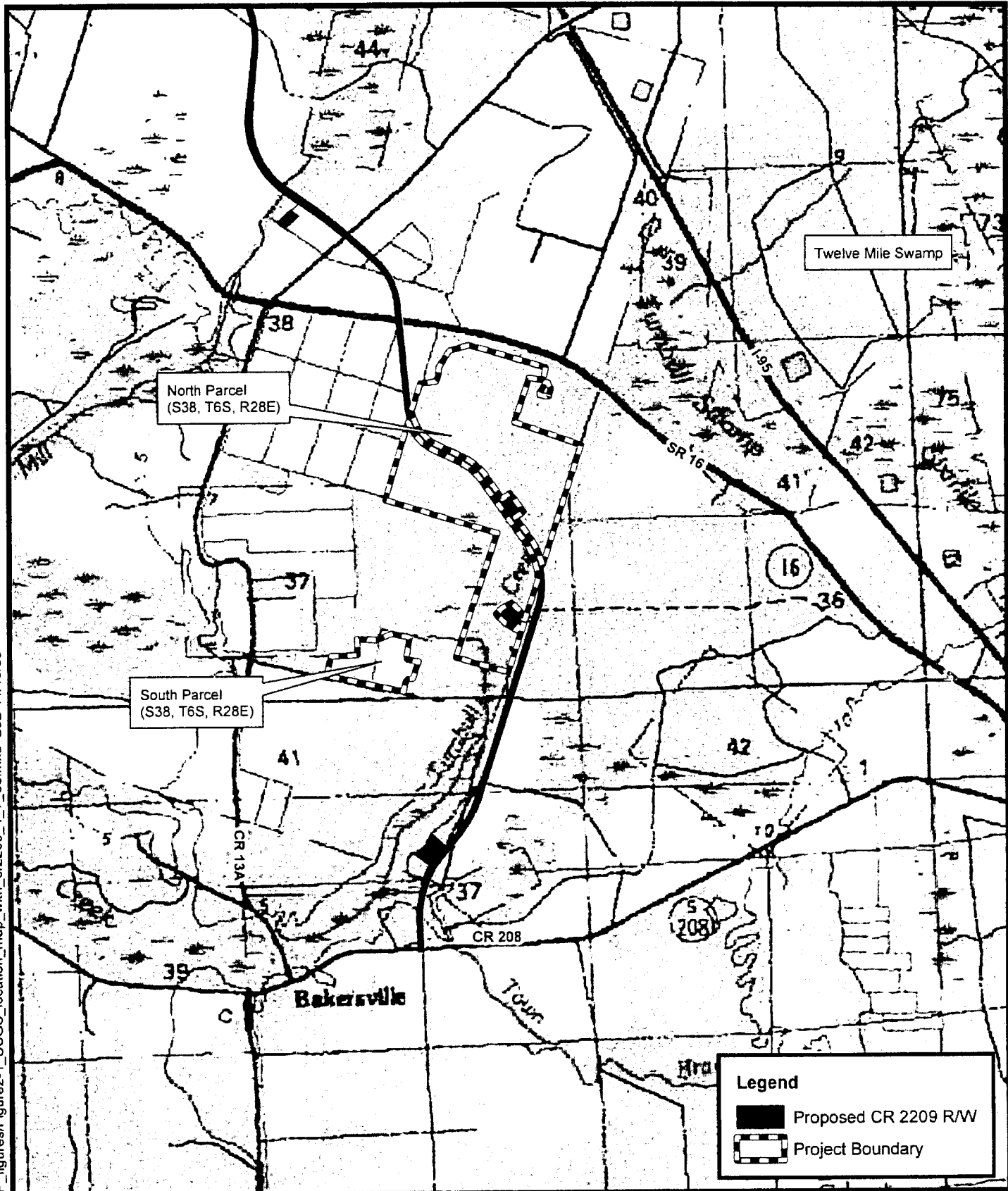
Ecologically, the north and south parcels of the TCRMA are comprised of several unique upland and wetland communities which have all been hurt by silvicultural activities. Seven communities were identified on-site and classified using the 1999 FDOT *Florida Land Use, Forms, Cover, and Classification System* (FLUCCS): Borrow Areas (7420), Pine Flatwoods (4110), Coniferous Plantation (4410), Stream and Lake Swamps (Bottomland 6150), Hydric Pine Flatwoods (6250), Hydric Pine Savanna (6260), and Wetland Forested Mixed (6300) (Figure 2.2). These communities are described in greater detail in Section 4.2.

TCRMA is made up of wetland and upland communities and has been managed for timber production since the early 1990s. Past land practices included clear-cutting uplands and wetlands, planting dense stands of slash pine, constructing numerous logging roads without culverts, and ditching to drain wetland areas. These activities have resulted in widespread soil disturbance and dehydration many acres of wetlands, which has decreased the ecological function of these areas and reduced habitat quality for wildlife.

Turnbull Creek traverses the northern parcel along the eastern and southeastern boundaries and is an important tributary and headwater stream of Six-Mile Creek, which discharges into the St. Johns River approximately 4 miles downstream. Thus, the project area provides important headwater protection, as well as water quality improvement, flood attenuation, wetland buffer, and valuable wildlife habitat. The topography of the project area generally slopes from northwest to southeast towards Turnbull Creek (Figure 2.3).





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**JONES  
EDMUNDS**

**Figure 2.1**  
**Proposed CR 2209 Right of Way**


**Legend**

-  Proposed CR 2209 R/W
-  Project Boundary

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19270-023 ERP\_figures\Figure2-2-existing\_landuse\_6\_28\_06.mxd MCL 06\_28\_06

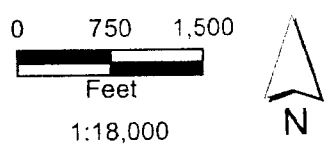


**Legend**

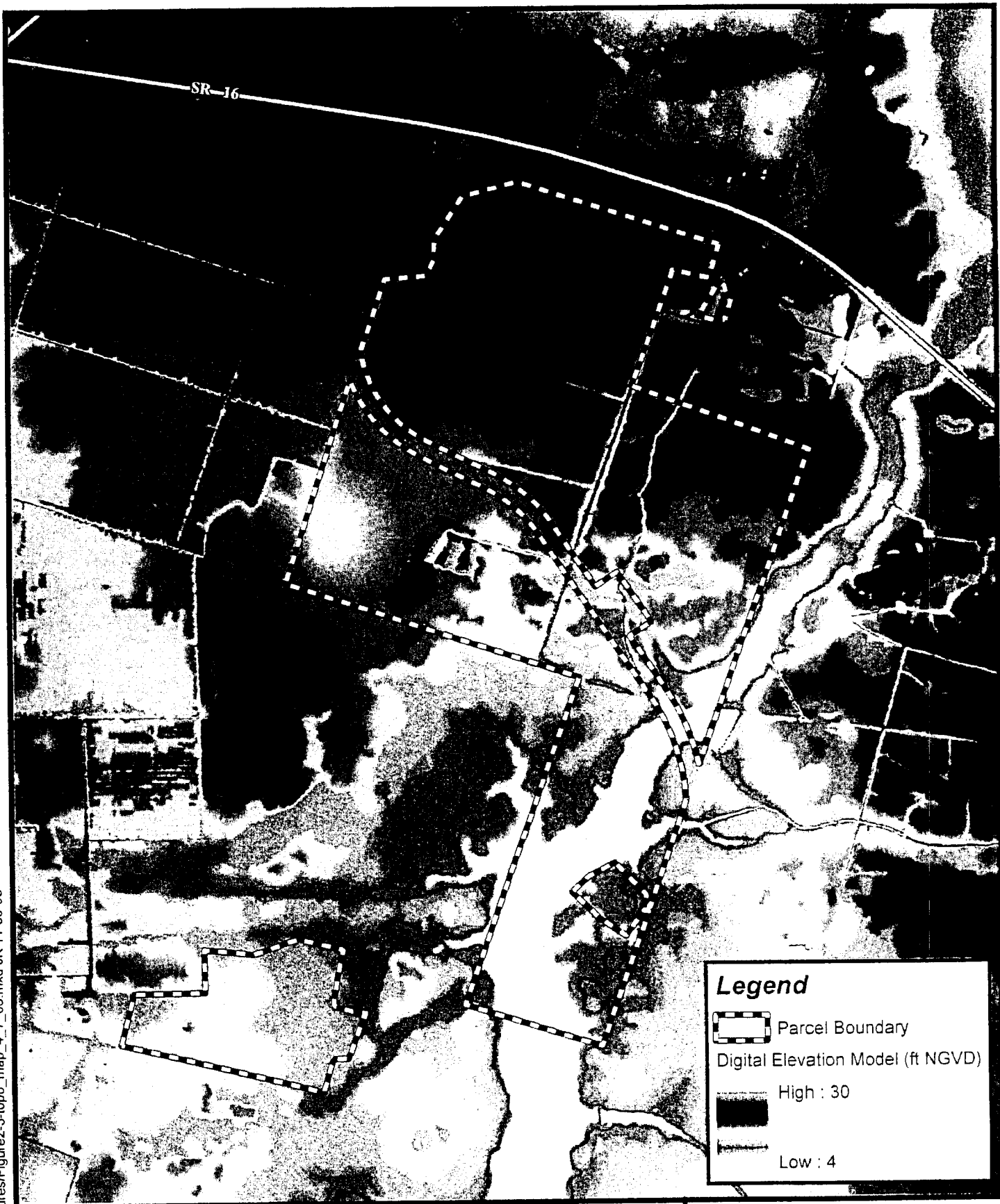
- Project Boundary
- Major Roads (FDOT)
- North Parcel Existing Landuse (FLUCCS)(642 ac)**
  - Borrow Areas (7420); 5.9 ac/0.9%
  - Pine Flatwoods (4110); 111.5 ac/17.4%
  - Coniferous Plantation (4410); 173.8 ac/27.1%
  - Stream and Lake Swamps (6150); 75.2 ac/11.7%
  - Hydric Pine Flatwoods (6250); 12.7 ac/2%
  - Hydric Pine Savanna (6260); 22.1 ac/3.4%
  - Wetland Forested Mixed (6300); 240.4 ac/37.4%
- South Parcel Existing Land Use (FLUCCS) (71 ac)**
  - Pine Flatwoods (4110); 54 ac/76%
  - Wetland Forested Mixed (6300); 17 ac/14%

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**Figure 2.2  
Existing Land Use**



19270-023 ERP\_figures/figure2-3\_topo\_map\_4\_7\_06.mxd JK 11-30-05





**Legend**

-  Parcel Boundary
- Digital Elevation Model (ft NGVD)
  -  High : 30
  -  Low : 4

**JONES  
EDMUNDS**

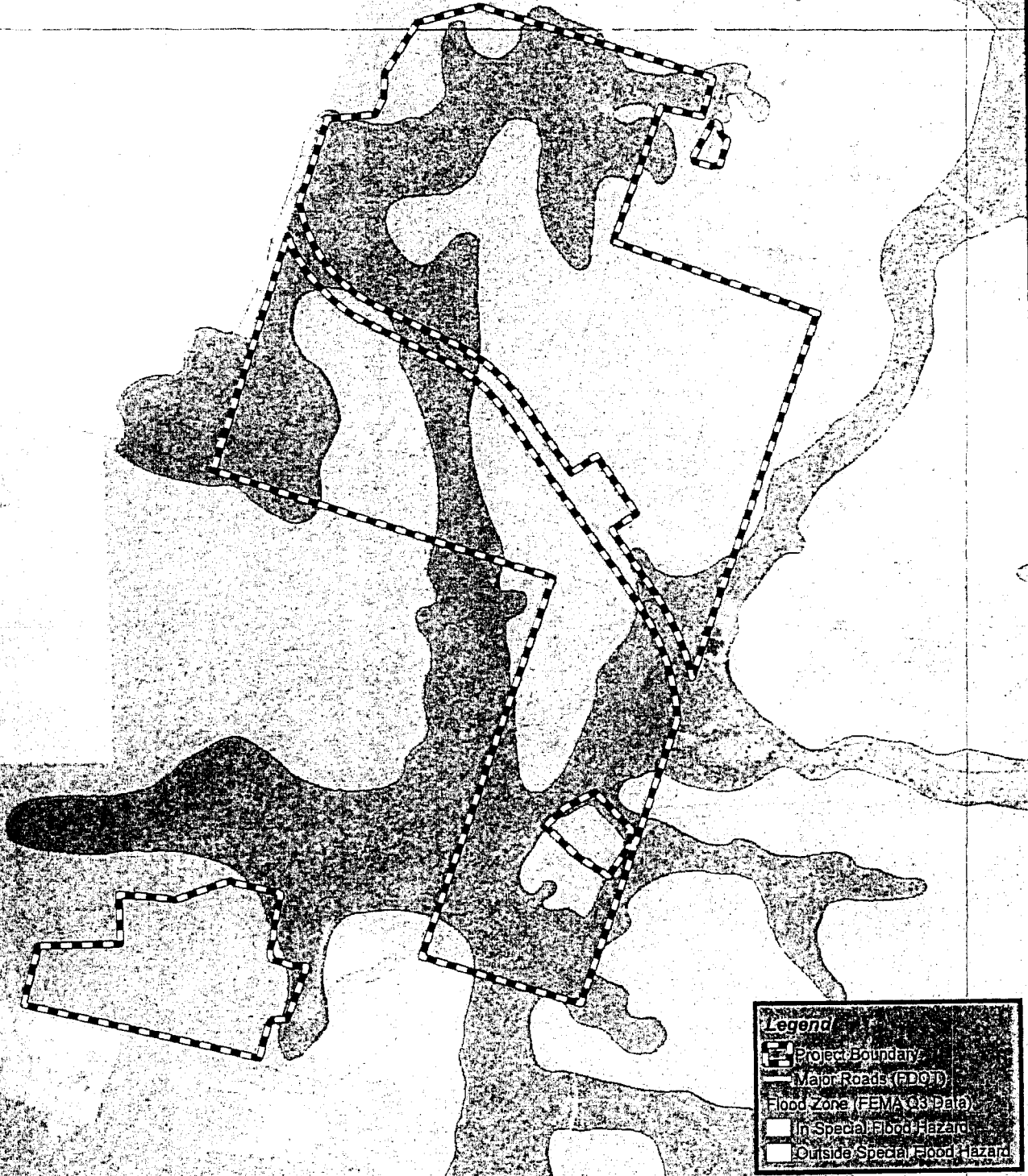
**Figure 2.3  
Topography Map**

0 750 1,500  
  
Feet  
1:18,000

  
N

The northern parcel also contains several relatively large areas that are in the 100-year floodplain. These areas are associated with on-site wetlands and Turnbull Creek (Figure 2.4). Figure 2.5 provides an aerial map of the project site at a scale of 1"=400' using 2005, 1-meter color digital ortho quadrangles. An adjacent parcel map is provided in Appendix B.

SR 16



19270-023 ERP\_figures\Figure2-4-floodplain\_map\_4\_7\_06.mxd JK 11-22-05

**Legend**

- Project Boundary
- Major Roads (FDOT)
- Flood Zone (FEMA Qs Data)
  - In Special Flood Hazard
  - Outside Special Flood Hazard

**JONES  
EDMUNDS**

**Figure 2.4  
FEMA Flood Map**

0 750 1,500  
Feet  
1:18,000

N

For Informational Purposes Only

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**JONES  
EDMUNDS**

**Figure 2.5  
Aerial Map**

0 400 800  
Feet  
1:9,600



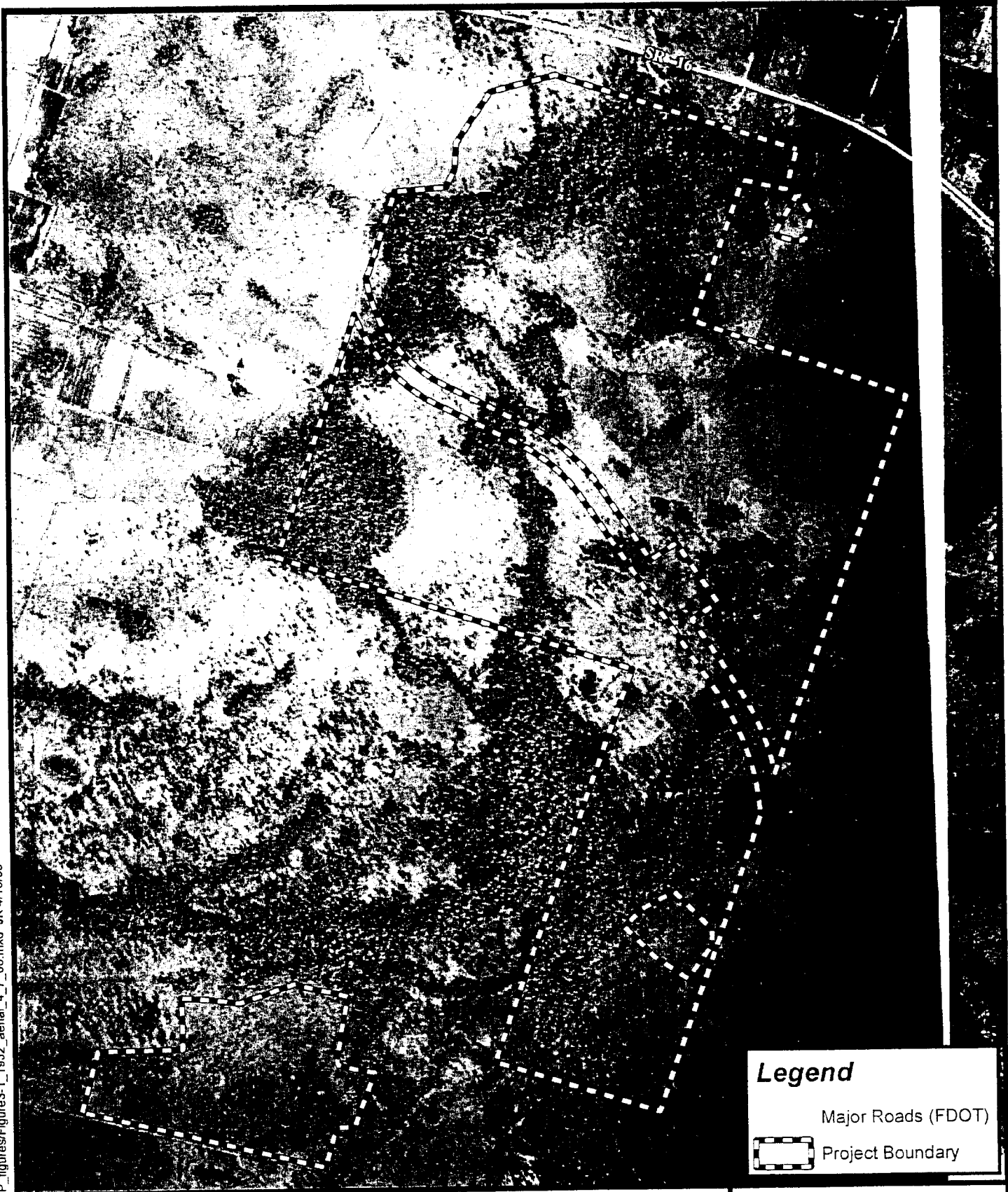
### 3.0 HISTORICAL CONDITIONS

Historical aerial photography from 1952 to 1993 of the project area was obtained from the University of Florida Map Library. A review of this photography reveals that moderate changes have occurred to vegetation communities during the last half century.

Historic aerial photos show that uplands in the north parcel had been cleared before 1952 (Figures 3.1 and 3.2). By 1980, the site appears to have had a relatively mature tree canopy from natural regeneration (Figure 3.3); however, in 1993 the entire western half of the site was clearcut and likely replanted with slash pine soon thereafter. Roads were first constructed at the site between 1952 and 1960, with a majority of the roads being constructed between 1989 and 1993 (Figures 3.4 and 3.5). In addition, an extensive network of ditches was constructed immediately west of the site between 1952 and 1960.


Based on a review of historic aerial photos, the south parcel was also cleared of forest cover before 1952. It was converted to row crops between 1952 and 1960, remaining in this use until the site was left fallow sometime after 1993 (Figures 3.1 through 3.5). The single road through the middle of the site was constructed between 1952 and 1960 (Figures 3.1 and 3.2).

19270-023 mxd/ERP\_figures/Figure3-1\_1952\_aerial\_4\_7\_06.mxd JK 4/13/06



**Legend**


Major Roads (FDOT)

 Project Boundary


**JONES  
EDMUNDS**

**Figure 3.1  
1952 Aerial Photograph**

0 650 1,300

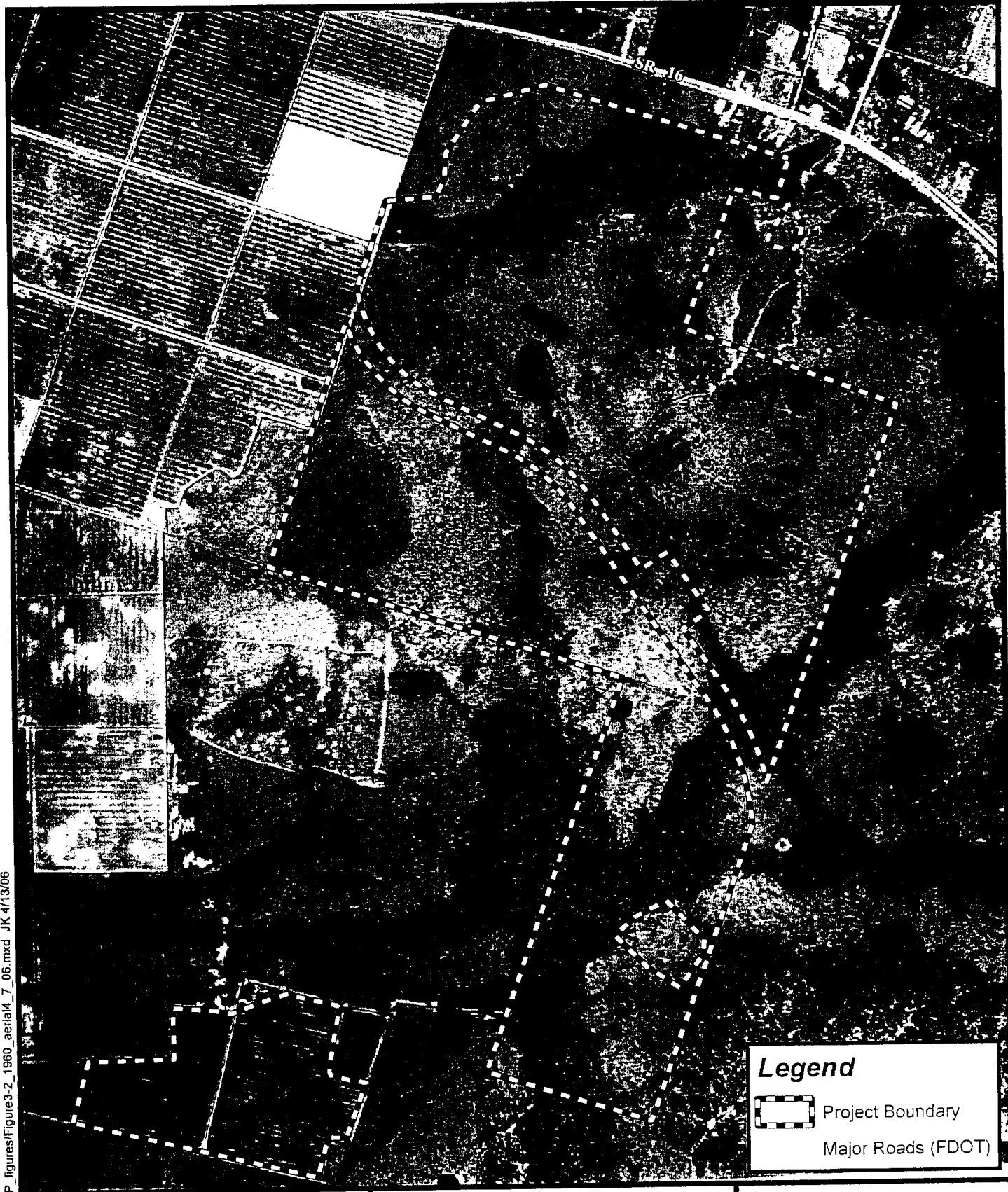
 Feet

1:15,000



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19270-023 mxd/ERP\_figures/Figure3-2\_1960\_aerial4\_7\_06.mxd JK 4/13/06

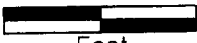



**Legend**

-  Project Boundary
-  Major Roads (FDOT)

**JONES  
EDMUNDS**

**Figure 3.2**  
**1960 Aerial Photograph**

0 650 1,300  
  
 Feet  
 1:15,000

  
 N

**Legend**

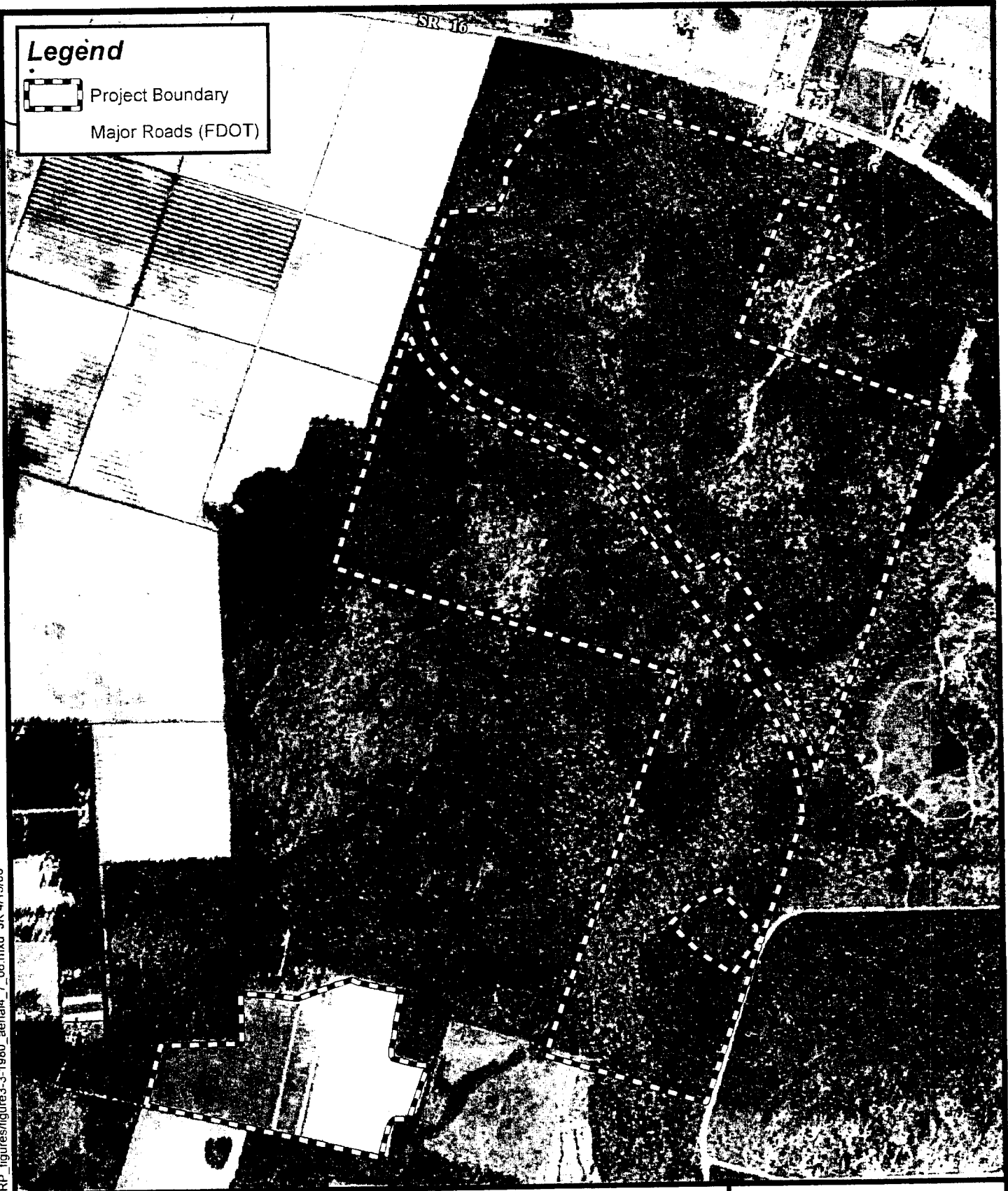


Project Boundary

Major Roads (FDOT)

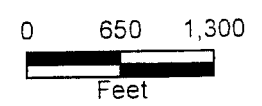
SR 16

19270-023 mxd/ERP\_figures/figure3-3-1980\_aerial4\_7\_06.mxd JK 4/13/06



**JONES  
EDMUNDS**

**Figure 3.3  
1980 Aerial Photograph**



1:15,600



**Legend**



Project Boundary

Major Roads (FDOT)



19270-023 mxd/ERP\_figures/Figure3-4-1989\_aerial4\_7\_06.mxd JK 4/13/06

**JONES  
EDMUNDS**

**Figure 3.4  
1989 Aerial Photograph**

0 650 1,300

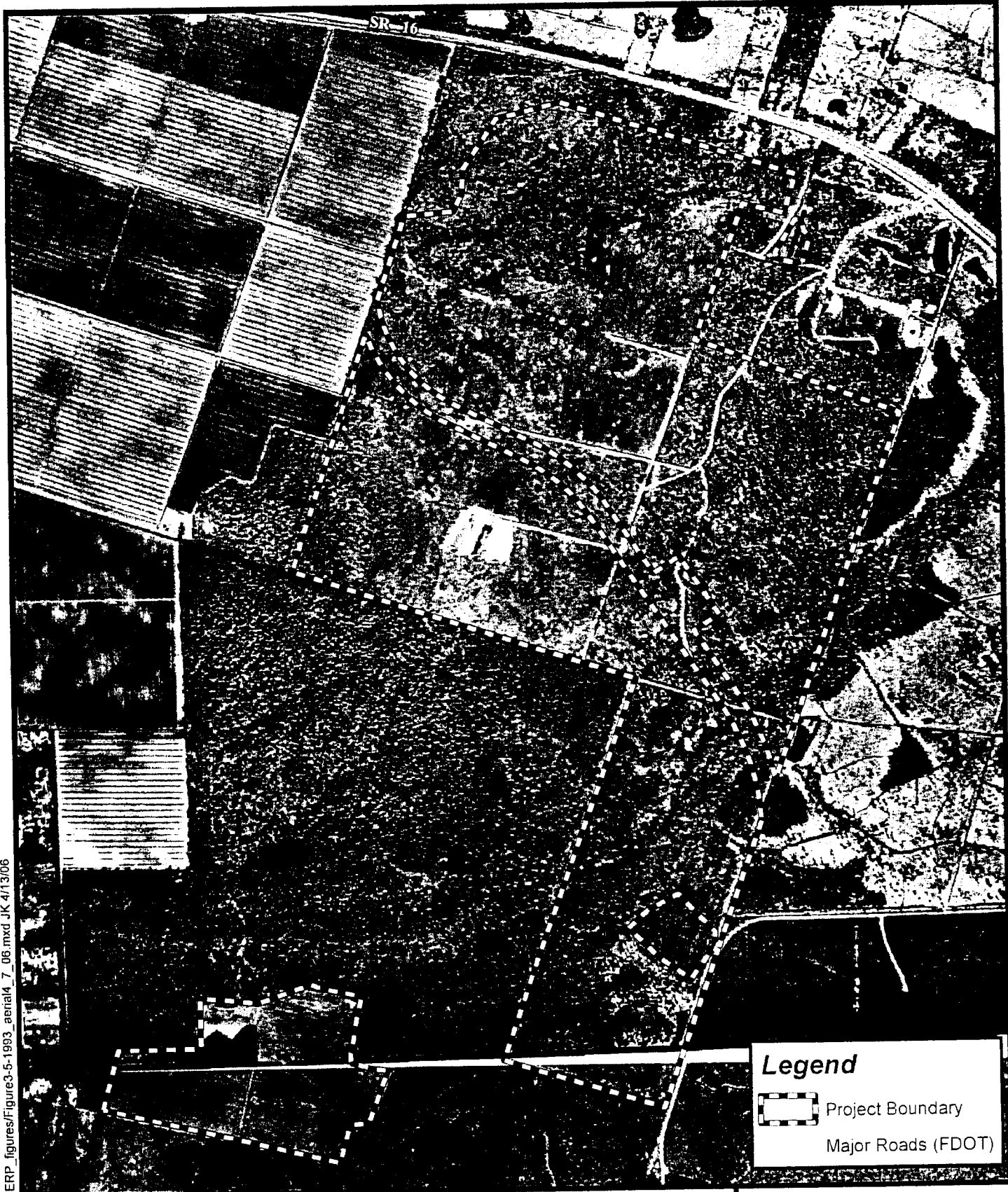


Feet



1:15,000



19270-023 mxd\ERP\_figures\Figure3-5-1993\_aerial4\_7\_06.mxd JK 4/13/06





**Legend**

-  Project Boundary
-  Major Roads (FDOT)

**JONES  
EDMUNDS**

**Figure 3.5  
1993 Aerial Photograph**

0 650 1,300  
  
 Feet  
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 N

## 4.0 EXISTING CONDITIONS

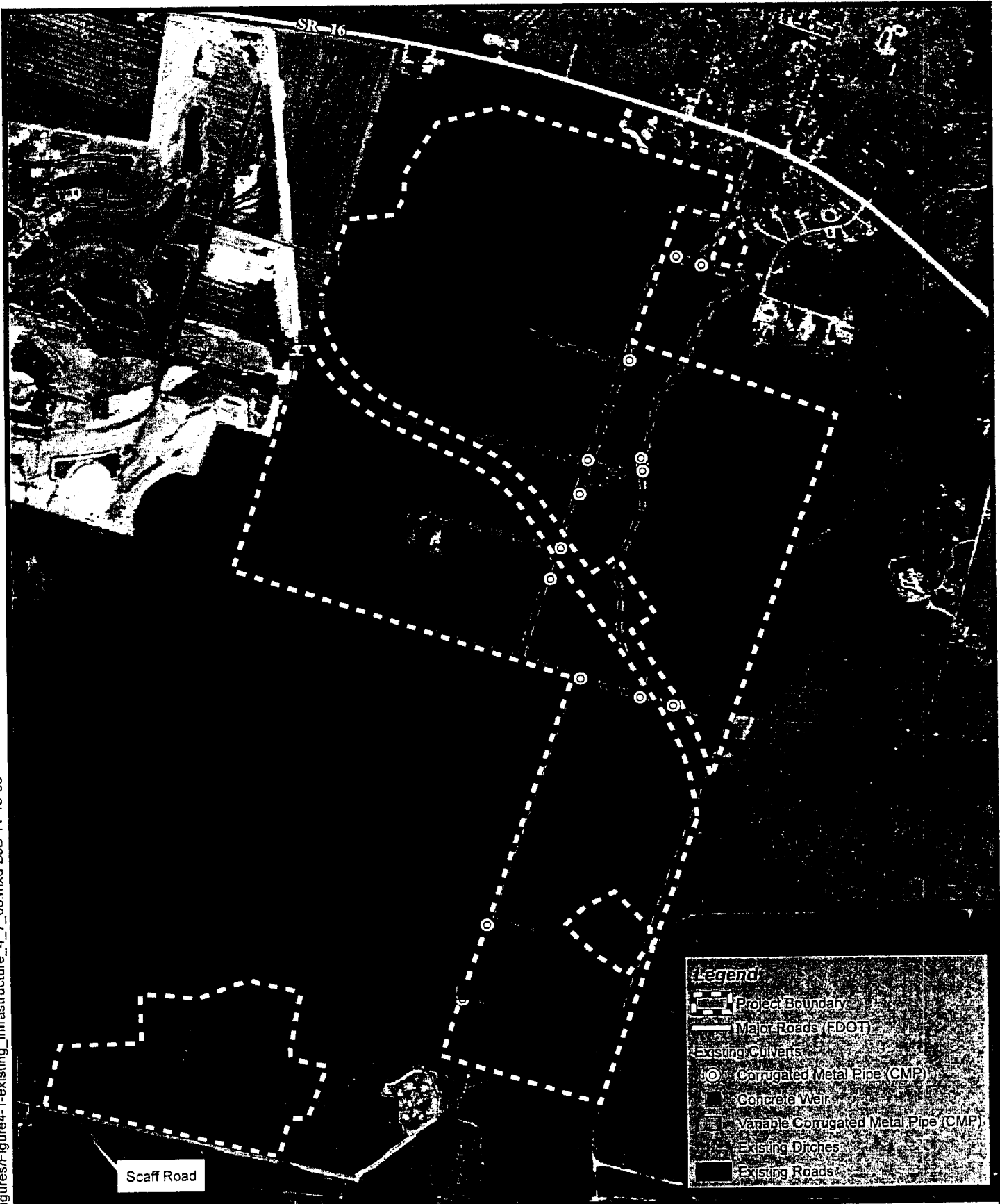
### 4.1 HYDROLOGY

The property has been managed for silviculture for many years, which has had a significant detrimental effect on the hydrology of this site. Logging roads and deep adjacent ditches are located throughout the property (Figure 4.1). These features have affected the historic sheetflow patterns of the site and acted to convey water rapidly southeast to ultimately discharge into Turnbull Creek. The lack of culverts along many of the logging roads that traverse wetlands prevents the historical over-land sheetflow from reaching the adjacent and downstream wetland systems during high rainfall events. An absence of culverts at critical locations also impedes natural water conveyance by impounding water on the upstream side and contributing to dehydrated conditions on the downstream side.

### 4.2 VEGETATION COMMUNITIES

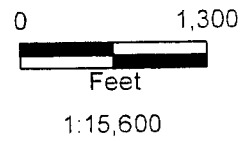
The TCRMA supports three distinct upland vegetative communities—Borrow Areas (7420), Pine Flatwoods (4110), and Coniferous Plantation (4410)—and four distinct wetland communities: Stream and Lake Swamps (Bottomland) (6150), Hydric Pine Flatwoods (6250), Hydric Pine Savanna (6260), and Wetland Forested Mixed (6380) (Figure 2.2). The limits of the vegetation communities were initially determined by previous field investigations by Environmental Consulting & Technology, Inc. (ECT), TEI, and Jones Edmunds and are summarized in the September 2002 report *Preliminary Assessment of Environmental Conditions and Mitigation Value at Turnbull Creek Project Area*. In 2005 Jones Edmunds conducted extensive field investigations using 2004, 1-meter false-color infrared digital ortho quarter quadrangle (DOQQS) imagery and handheld global positioning system (GPS) units with 3- to 5-meter accuracy to refine those community boundaries as depicted on Figure 2.2.

The first upland community, Borrow Areas (FLUCCS 7420) in the northeast and southwest corner of the north parcel, comprises approximately 5.9 acres (Figure 2.2). The borrow area in the northeast region, Site 1, is approximately 0.5 acres and consists of a narrow shallow borrow area that is dominated by wetland vegetation such as marsh fleabane (*Pluchea* spp.), sedges (*Cyperus* spp.), rushes (*Rynchospora* spp.), ludwigia (*Ludwigia repens*), and maidencane (*Panicum hemitomon*). The second borrow area found in the southwest region, Site 2, is approximately 5.4 acres and contains three open-water pits, several large berms, and narrow strips of scraped uplands. The uplands surrounding the pits are dominated by ruderal species such as bluestem (*Andropogon* spp.), green briar (*Smilax* sp.), and scattered young slash pines (*Pinus elliotii*). The central borrow pit is the only pit with a littoral shelf and even in this pit the shelf is only approximately 5 feet wide. The east and west pits have vertical side walls with large 8-foot spoil piles on one side. In the two central pits, soft rush (*Juncus* spp.), ludwigia (*Ludwigia* spp.), marsh fleabane (*Pluchea rosea*), bloodroot (*Lachnanthes caroliniana*), sundew (*Drosera* sp.), bog buttons (*Lachnocaulon* sp.), and meadow beauty (*Rhexia* sp.) are found in widely scattered areas where there are a few small littoral shelves or non-vertical banks.



**JONES  
EDMUNDS**

**Figure 4.1**  
**Existing Infrastructure**



The second upland community, Pine Flatwoods (FLUCCS 4110), is found along the eastern side of the north parcel and dominates the uplands in the south parcel. It comprises approximately 111.5 acres of the north parcel and 54 acres of the south parcel (Figure 2.2). In the north parcel, this community is distinguished from Coniferous Plantation (FLUCCS 4410) by the presence of scattered oaks and bays and the lack of planted even-age pine tree stands. A previous wildfire burned through this community and appears to have killed many of the younger pine saplings. This fire has created a more open understory with a diversity of plant species. Slash pines in this community tend to be much larger than those in most of the intensely managed or naturally regenerating pine areas. A few scattered longleaf pine (*Pinus palustris*) are intermingled in the slash pine canopy. Other scattered canopy species include loblolly bay (*Gordonia lasianthus*), water oak (*Quercus nigra*), redbay (*Persea borbonia*), and live oak (*Quercus virginiana*). The shrub layer is dominated by a mixture of gallberry (*Ilex glabra*), rusty lyonia (*Lyonia ferruginea*), shiny blueberry (*Vaccinium myrsinites*), saw palmetto (*Serenoa repens*), deerberry (*Vaccinium stamineum*), and wax myrtle (*Myrica cerifera*). The herbaceous groundcover is fairly diverse and is generally dominated by slender goldenrod (*Euthamia caroliniana*), starrush whitetop (*Rhynchospora colorata*), candyroot (*Polygala nana*), chalky bluestem (*Andropogon virginicus* var. *glaucus*), and coinwort (*Centella asiatica*).

In the south parcel, the pine flatwoods community comprises all of the approximately 54 acres of on-site uplands (Figure 2.2). Based on the lack of bedding rows, the young slash pines in the southern parcel appear to have naturally regenerated. This parcel was historically used for row crops based as illustrated by historical aerial photography (Figures 3.2-3.5). The understory community is noticeably open and limited to sparse wax myrtle and young laurel oak (*Quercus laurifolia*). However, a dense ground cover of American beautyberry (*Callicarpa americana*), greenbriar, chalky bluestem, dogfennel (*Eupatorium capillifolium*), and blackberry (*Rubus* spp.) is found throughout this community. Slash pine is dense in several locations and fuel loads are lower than other upland areas in the north parcel.

The third upland community, Coniferous Plantation (FLUCCS 4410), comprises 173.8 acres of the north parcel (Figure 2.2). This community is differentiated from the pine flatwoods by dense rows of slash pine planted on elevated beds. Loblolly (*Pinus taeda*) and longleaf pines occasionally occur within these areas. The subcanopy is dominated by gallberry, wax myrtle, swampbay, American beautyberry, and saw palmetto. The herbaceous understory varies from a drier habitat dominated by sawtooth blackberry (*Rubus argutus*), bracken fern (*Pteridium aquilinum*), wiregrass (*Aristida beyrichiana*), and chalky bluestem to a wetter community which includes a greater diversity of wetland species such as Virginia chain fern (*Woodwardia virginica*), cinnamon fern (*Osmunda cinnamomea*), blue maidencane, redroot, mermaid-weed (*Proserpinaca pectinate*), and grassleaf rush (*Juncus marignatus*). In these wetter areas of the pine plantation, red maple (*Acer rubrum*), swampbay (*Persea palustris*), and loblolly bay are often small components of the canopy and subcanopy. Based on an assessment of the soils and vegetation, several areas of this community were historically wetland.

The first wetland community, Stream and Lake Swamps (Bottomland) (FLUCCS 6150) in the southeast region of the north parcel, is associated with Turnbull Creek (Figure 2.2). It is

approximately 75.2 acres and is best characterized as a floodplain forest. Turnbull Creek is a blackwater system that is a tributary of the St. Johns River. It enters the project area at the east central property boundary and drains southwesterly across the north parcel. This community has a dense canopy of red maple, bald cypress (*Taxodium distichum*), blackgum (*Nyssa sylvatica* var. *biflora*), sweetgum (*Liquidambar styraciflua*), swampbay, hackberry (*Celtis laevigata*), American hornbeam (*Carpinus caroliniana*), American elm (*Ulmus Gigantean*), and pignut hickory (*Carya glabra*). The thick canopy stratum has precluded the establishment of a dense understory stratum. Understory species are present but occur sparsely throughout the floodplain. These understory species include buttonbush (*Cephalanthus occidentalis*), Virginia willow (*Itea virginica*), and bluestem palm (*Sabal minor*) while switchcane (*Arundinaria Gigantean*), fireweed (*Erechtites hieracifolia*), mock bishop's-weed (*Ptilimnium capillaceum*), narrowfruit horned beaksedge (*Rhynchospora inundata*), and leathery rush (*Juncus coriaceous*). This wetland is a high-quality floodplain community with large mature trees, distinct hydrologic indicators such as elevated lichen lines, and an abundance of crayfish burrows. It provides a valuable wildlife corridor in this rapidly developing area and is an important hydrologic conveyance system.

The second wetland community, Hydric Pine Flatwoods (FLUCCS 6250), is made up of two small wetlands in the central region of the north parcel, totaling approximately 12.7 acres (Figure 2.2). The hydric pine flatwoods are characterized as small to medium depressional areas having a canopy dominated by small to medium-sized planted or naturally recruited slash pine with an abundance of wetland vegetation. This community often grades into more mesic coniferous plantation. Wetland species such as loblolly bay, sweetbay, myrtle-leaved holly (*Ilex myrtifolia*), black gum, wax myrtle, and buttonbush are common in the subcanopy while Virginia chain fern, cinnamon fern, blue maidencane (*Amphicarpum muhlenbergianum*), fewflower milkweed (*Asclepias lanceolata*), umbrellgrass (*Muhlenbergia capillaries*), redroot, and tall pine barren millwort (*Polygala cymosa*) are common groundcover species. Vegetation suggests that the hydric pine flatwoods were likely historical hardwood or mixed forested wetlands that were converted to pine plantations. In addition, deep tire ruts from the logging equipment that was used during previous harvests are common in some areas. Logging roads with deep roadside ditches traverse both hydric pine flatwood communities and are negatively impacting the hydrology of these wetlands.

Hydric Pine Savanna (FLUCCS 6260), the third wetland community, is in the northeast region of the north parcel. It consists of approximately 22.1 acres of an open-canopy wetland system with scattered mature longleaf pine and loblolly pine with sparse red maple, pond cypress (*Taxodium ascendens*), and sweetbay saplings or young trees. Dominant understory plants include dense areas of Virginia chain fern, yellow-eyed grass (*Xyris* spp.), sedges (*Cyperus* and *Rhynchospora* spp.), rushes (*Juncus* spp.), and Godfrey's marsh fleabane (*Pluchea rosea*). The wetland contains approximately 12 to 18 inches of standing water and transitions into upland areas dominated by saw palmetto and sparse pines. Both this community and adjacent uplands were logged in the past and not replanted. Deep tire ruts from logging equipment were also observed in some areas of this wetland.



Wetland Forested Mixed (FLUCCS 6300) comprises approximately 257.4 acres (240.4 +17 acres) collectively in the north and south parcel, which is a majority of the on-site wetland acreage. This fourth wetland community is found throughout the western region of the north parcel and is the only wetland community in the south parcel (Figure 2.2). This community was historically made up of mature canopy trees consisting of bald cypress, loblolly bay, blackgum, red maple, sweetbay, and some oak species. This community has been significantly disturbed by silvicultural activities. Large areas of this wetland community have been bedded and planted with slash pine except in the lower elevations. Thus, this wetland is largely comprised of even-age stands of slash pine approximately 12 to 15 years old based on the age of planted pine and naturally recruited wetland tree species. The canopy of this community is often dominated by slash pine in the higher elevations and wetland tree species such as bald cypress, red maple, blackgum, and loblolly bay in the lower elevations. Bedding rows often extend into the wetland areas; however, many of the pines have died from water stress. The understory is dominated by a diversity of plants such as wax myrtle, buttonbush, myrtle-leaved holly, swamp dogwood, highbush blueberry (*Vaccinium corymbosum*), Virginia chain fern, cinnamon fern, royal fern, broadwing sedge, and coral greenbriar (*Smilax walteri*). The predominance of wetland understory species further supports the hydric nature of this community. Several logging roads that run east-west bisect portions of this large wetland system. In addition, the deep ditches next to these roads have altered the historic sheetflow pattern by quickly conveying water eastward directly to Turnbull Creek. There are also numerous tire ruts from previous tree harvest activities.

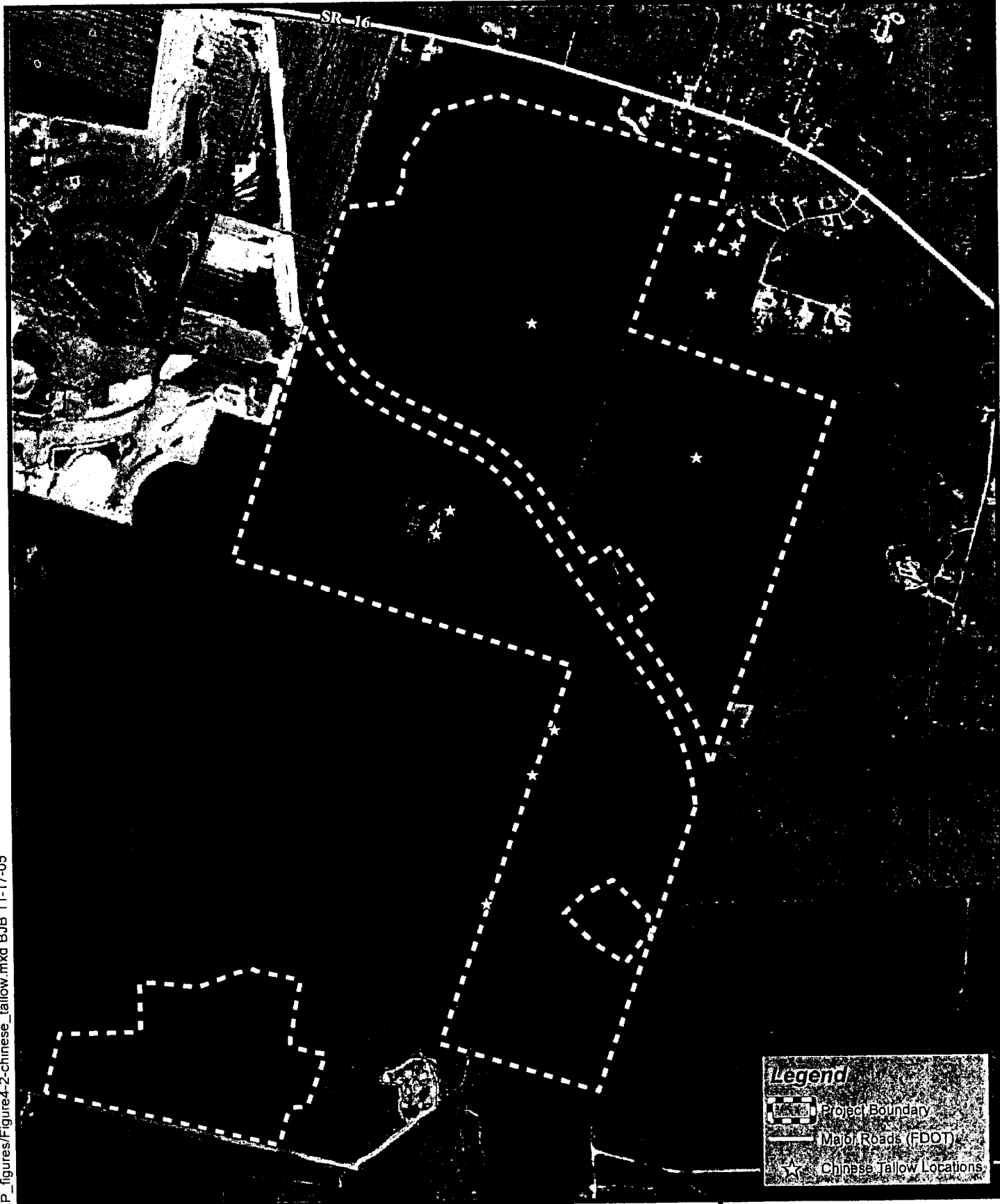
#### 4.3 EXOTIC SPECIES

Chinese tallow (*Sapium sebiferum*) was the only exotic species documented on the site. Sapling and mature trees are found along the roadways in numerous locations (Figure 4.2). The exotic plant populations at TCRMA are not extensive but could escalate if left unmanaged. Because they are close to existing roads, this species could be eliminated from the property.

#### 4.4 WILDLIFE

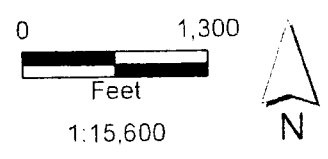
During numerous site visits, Jones Edmunds recorded wildlife observations (Table 1). Although formal pedestrian surveys were not conducted, an abundance of wildlife species was noted during field assessments. State or Federally listed species observed in or near the project area include swallow-tailed kite and osprey. However, several on-site habitats could support additional listed species. The Eastern indigo snake and the Florida black bear could use both the upland and wetland communities for foraging and as refuge while the American alligator could use the existing southern borrow area and Turnbull Creek. The project area is connected via Turnbull Creek and several large forested parcels to Twelve Mile Swamp; thus, wide-ranging species such as the Florida black bear could use the project area. Numerous listed wading bird species such as limpkin, great egret, little blue heron, snowy egret, tri-colored heron, white ibis, wood stork use the on-site wetlands, particularly Turnbull Creek and its floodplain.

19270-023-01/ERP\_figures/Figure4-2-chinese\_tallow.tallow.mxd BJB 11-17-05



**JONES  
EDMUNDS**

**Figure 4.2  
Chinese Tallow Locations**



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Table 1 Observed Wildlife Species in or near Turnbull Regional Mitigation Area

Common name	Scientific name	Listed Species Status	
		State	Federal
<b>Birds</b>			
Turkey Vulture	<i>Cathartes aura</i>		
Black Vulture	<i>Coragyps atratus</i>		
Osprey	<i>Pandion haliaetus</i>	X	
Red-tailed hawk	<i>Ceryle alcyon</i>		
Barred owl	<i>Strix varia</i>		
Swallow-tailed kite	<i>Elanoides forficatus</i>		
Red-shouldered hawk	<i>Buteo lineatus</i>		
Northern cardinal	<i>Cardinalis cardinalis</i>		
Pine warbler	<i>Dendroica pinus</i>		
American robin	<i>Turdus migratorius</i>		
Pileated woodpecker	<i>Dryocopus pileatus</i>		
Tufted titmouse	<i>Parus bicolor</i>		
Mourning dove	<i>Zenaida macroura</i>		
Carolina Wren	<i>Thryothorus ludovicianus</i>		
White-eyed vireo	<i>Vireo griseus</i>		
American crow	<i>Corvus brachyrhynchos</i>		
Northern flicker	<i>Colaptes auritus</i>		
Northern bobwhite	<i>Colinus virginianus</i>		
Blue jay	<i>Cyanocitta cristata</i>		
Brown thrasher	<i>Toxostoma rufum</i>		
Rufous-sided towhee	<i>Pipilo erythrophthalmus</i>		
Wild turkey	<i>Meleagris gallopavo</i>		
<b>Mammals</b>			
Armadillo	<i>Dasypus novemcinctus</i>		
Raccoon	<i>Procyon lotor</i>		
White-tailed deer	<i>Odocoileus virginianus</i>		
Coyote (scat)	<i>Canis latrans</i>		
Wild hog (scat and diggings)	<i>Sus scrofa</i>		
<b>Reptiles / Amphibians</b>			
Pygmy rattlesnake	<i>Sistrurus miliarius</i>		
Cottonmouth	<i>Agkistrodon piscivorus</i>		
Eastern diamondback rattlesnake	<i>Crotalus adamanteus</i>		
Southern black racer	<i>Coluber constrictor</i>		
Six-lined racerunner lizard	<i>Cnemidophorus</i>		

Table 1 Observed Wildlife Species in or near Turnbull Regional Mitigation Area			
Common name	Scientific name	Listed Species Status	
		State	Federal
	<i>sexlineatus</i>		
Five-lined skink	<i>Eumeces inexpectatus</i>		
Ground skink	<i>Scincella lateralis</i>		
Brown anole	<i>Anolis sagrei</i>		
Green anole	<i>Anolis carolinensis</i>		
Green tree frog	<i>Hyla cinerea</i>		
Leopard frog	<i>Rana utricularia</i>		
Cricket frog	<i>Acris gryllus dorsalis</i>		
Bronze frog	<i>Rana clamitans clamitans</i>		
<b>Fish</b>			
Sunfish	<i>Lepomis spp.</i>		
Largemouth bass	<i>Micropterus salmoides</i>		
Mosquito fish	<i>Gambusia holbrooki</i>		

Osprey and swallow-tailed kite could also use canopy trees associated with Turnbull Creek as potential nest sites. Appendix C lists all State and Federally listed species found in St. Johns County, Florida.

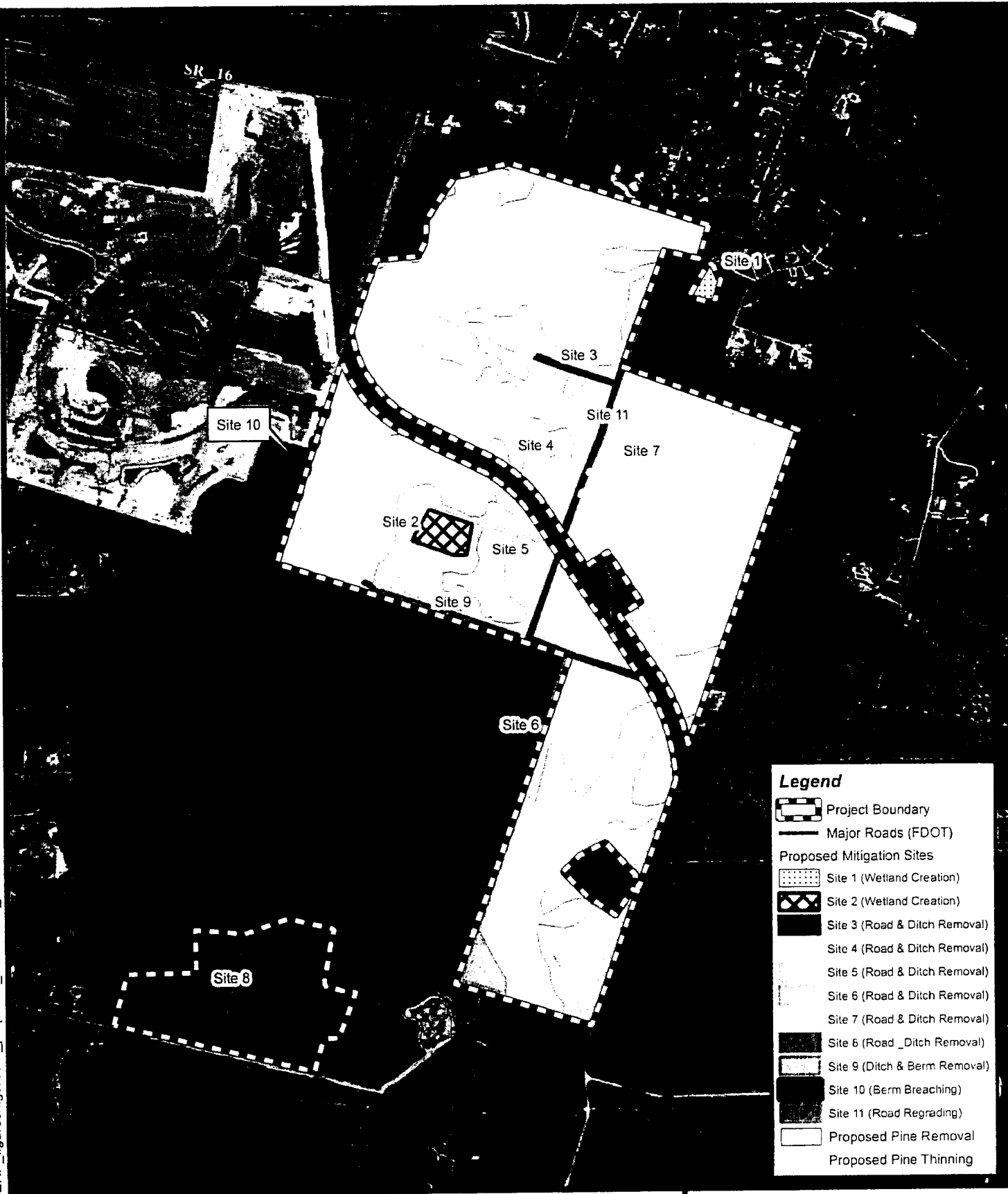
#### 4.5 EXISTING ANTHROPOGENIC FEATURES

As noted earlier, there are numerous elevated dirt roads with deep adjacent ditches throughout the north parcel that were used for silvicultural activities. These roads often transition into trail roads that are currently used by four-wheelers. There is also a small cabin in the northern region of the site that was used by the previous landowner. Two borrow areas are also found in the project area (Figure 4.1).

## 5.0 PROPOSED MITIGATION PLAN

TCRMA consists of wetland and upland communities and has been managed for timber production since the early 1990s. Historic land-use practices included clear-cutting uplands and wetlands, planting dense stands of slash pine, constructing numerous logging roads without culverts, ditching to drain wetland areas, and digging borrow areas to presumably generate road fill. These activities have resulted in widespread soil disturbance and dehydration of large acreages of wetlands, which has decreased the ecological function of these areas and reduced habitat quality for wildlife. The proposed mitigation plan will restore vegetative communities, hydrological flow patterns, and a natural fire regime throughout the property. Two wetland creation areas are also proposed for the two existing borrow areas. The proposed mitigation activities and management of the property will restore and maintain the natural community diversity that supports wetland functions and wildlife habitat. Additionally, the site will provide opportunities for limited public resource-based recreation and environmental education. As previously mentioned, the County will implement these enhancement and creation activities identified in this plan well in advance of any proposed wetland impacts associated with County capital improvement transportation projects. In addition, the entire project area will be placed in a conservation easement allowing passive recreation in limited areas to ensure the protection of these natural areas in perpetuity.

Eleven specific proposed mitigation projects are identified within the project site in addition to planted pine removal and thinning (Figure 5.1). The intent of the proposed mitigation plan is to restore the hydrologic patterns throughout the site to benefit wetland and upland communities, create valuable wildlife habitat in previously disturbed areas, and enhance on-site wetland and upland community structure which has been altered from years of silviculture. Figure 5.2 provides a proposed land-use map for the project area. The following section describes each of the 11 mitigation projects.



**Legend**

- Project Boundary
- Major Roads (FDOT)
- Proposed Mitigation Sites**
- Site 1 (Wetland Creation)
- Site 2 (Wetland Creation)
- Site 3 (Road & Ditch Removal)
- Site 4 (Road & Ditch Removal)
- Site 5 (Road & Ditch Removal)
- Site 6 (Road & Ditch Removal)
- Site 7 (Road & Ditch Removal)
- Site 6 (Road\_Ditch Removal)
- Site 9 (Ditch & Berm Removal)
- Site 10 (Berm Breaching)
- Site 11 (Road Regrading)
- Proposed Pine Removal
- Proposed Pine Thinning

**JONES  
EDMUNDS**

**Figure 5.1  
Proposed Restoration Sites**

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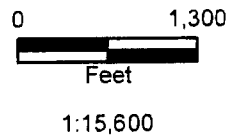
SR 16

Scaff Road

19270-023 ERP\_figures\Figures-2-proposed\_landuse.mxd JK 14/13/06

**JONES**  
**EDMUNDS**

**Figure 5.2**  
**Proposed Landuse**



For Informational Purposes Only

## 5.1 WETLAND CREATION

### 5.1.1 Site 1 (Northeast Borrow Pit)

Site 1 is a narrow 0.3-acre borrow pit area that extends north/south to the property boundary in the northeast corner of the project site (Figure 5.1). Approximately 8 to 12 inches of standing water was present in the deepest central region during site visits in July and September 2005. The site has been colonized by a diversity of wetland plant species and appears to have an appropriate hydrology to sustain wetland communities (Figure 5.3).



Figure 5.3 Photo of Site 1 from South End Facing North

Forested wetland creation is proposed at this site by expanding the existing borrow area to the east and west by clearing approximately 1.5 acres of adjacent young pine plantation and excavating the site down to a target elevation range that has been determined from a topographic survey. The upper 6 inches of topsoil in excavation areas will be stockpiled in adjacent uplands and used as a soil amendment to the creation area. The creation area will then be excavated below the design elevation so that this topsoil can be placed back in the creation area and used for final regrading. This will provide a valuable seed source for native recruitment, help to immediately add important organic matter to sterile sands that would otherwise be present after excavation, reduce soil bulk density, and increase the nutrient storage and water-holding capacity of the creation area. Several snags and large woody material from the adjacent young pine plantation that will be cleared will be placed in creation areas to provide wildlife habitat and roost sites as well as a source of future organic matter. Silt fence or turbidity curtains will be installed along the jurisdictional wetland line of any adjacent wetlands to prevent sediment from entering these natural areas.



Three elevation transects were surveyed across the proposed creation area to define existing elevations (Figure 5.4). In addition, 17 reference ground elevations were surveyed in the existing borrow that is currently supporting hydrophytic vegetation (Table 2). Two seasonal high water table elevation estimates, provided in Table 2, were determined using hydric soil indicators. The seasonal high water table elevation data in combination with the reference elevations taken in the existing borrow area suggest that an elevation range of 22.5 to 23.0 NAVD 88 should be the appropriate target elevation range for this creation area. The dominant elevation in the creation area will be 22.7 feet NAVD 88. Existing and proposed cross sections depicting the target elevation range are provided in Figure 5.5.

The forested wetland creation area will be comprised of three main zones: Zone 1, Zone 2, and Zone 3 (Figures 5.4 and 5.5). Zone 1 represents the 5:1 side slopes that will be constructed to tie the creation area to the adjacent upland grade. This area will be planted with the facultative wet and facultative species red maple, laurel oak, sweetgum, sand cordgrass, soft rush, wax myrtle, and muhly grass (*Muhlenbergia capillaris* var. *capillaris*) as these areas will experience minimal inundation (Table 3). Zone 2 will be designed as a forested wetland zone. This zone represents the majority of the area to be excavated to create a mixed forested wetland that experiences seasonal inundation similar to the mixed forested wetlands that are so common and ecologically important at this project site. Tree species to be planted on 10-foot centers in Zone 2 will include pond cypress, swamp bay, loblolly bay, and black gum. Buttonbush will be planted throughout Zone 2 on 6-foot centers and maidencane, pickerelweed, sawgrass (*Cladium jamaicense*), and duck potato will be planted throughout on 3-foot centers (Table 3). Zone 3 represents an existing narrow vegetated portion of the borrow area that will not be disturbed and will not be planted (Figure 5.5). Trees will be 1-gallon seedlings while herbaceous species will be bare-root stock. Please refer to Table 3 for a detailed planting plan. Silt fences will be installed along the perimeter of the creation area as well as along the outer limits of Zone 3 (Figure 5.5).

This creation area will be considered successful and released from monitoring and reporting requirements when the following proposed criteria are met continuously for at least one year without intervention in the form of irrigation or the addition or removal of vegetation:

1. 80% cover of desirable native species in Zone 1 and 2.
2. 75% survival of planted trees.
3. Less than 10% cover by nuisance or exotic species.
4. Appropriate hydrology to support a forested wetland system in Zone 2.

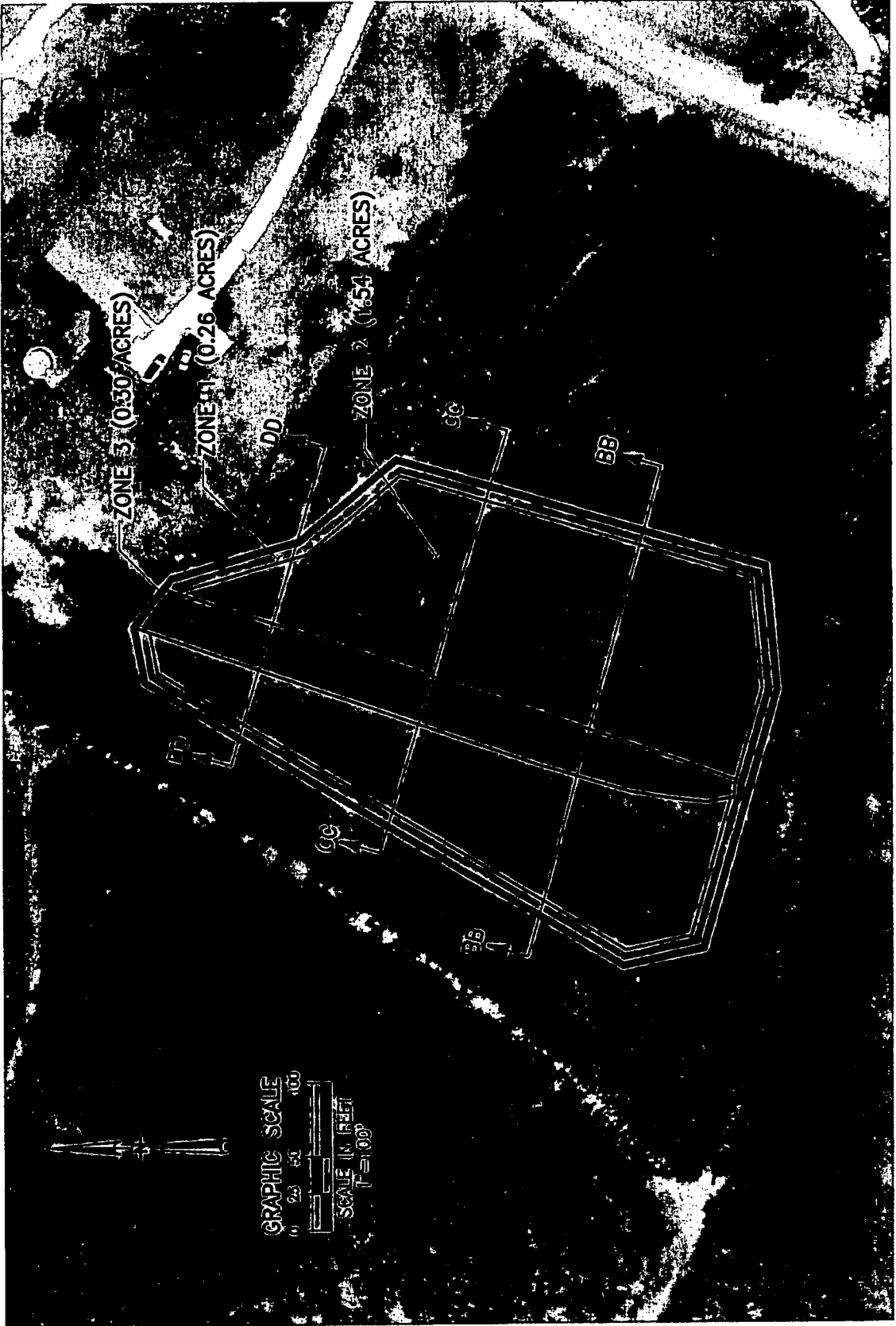
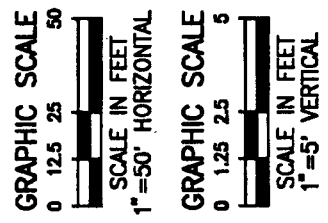
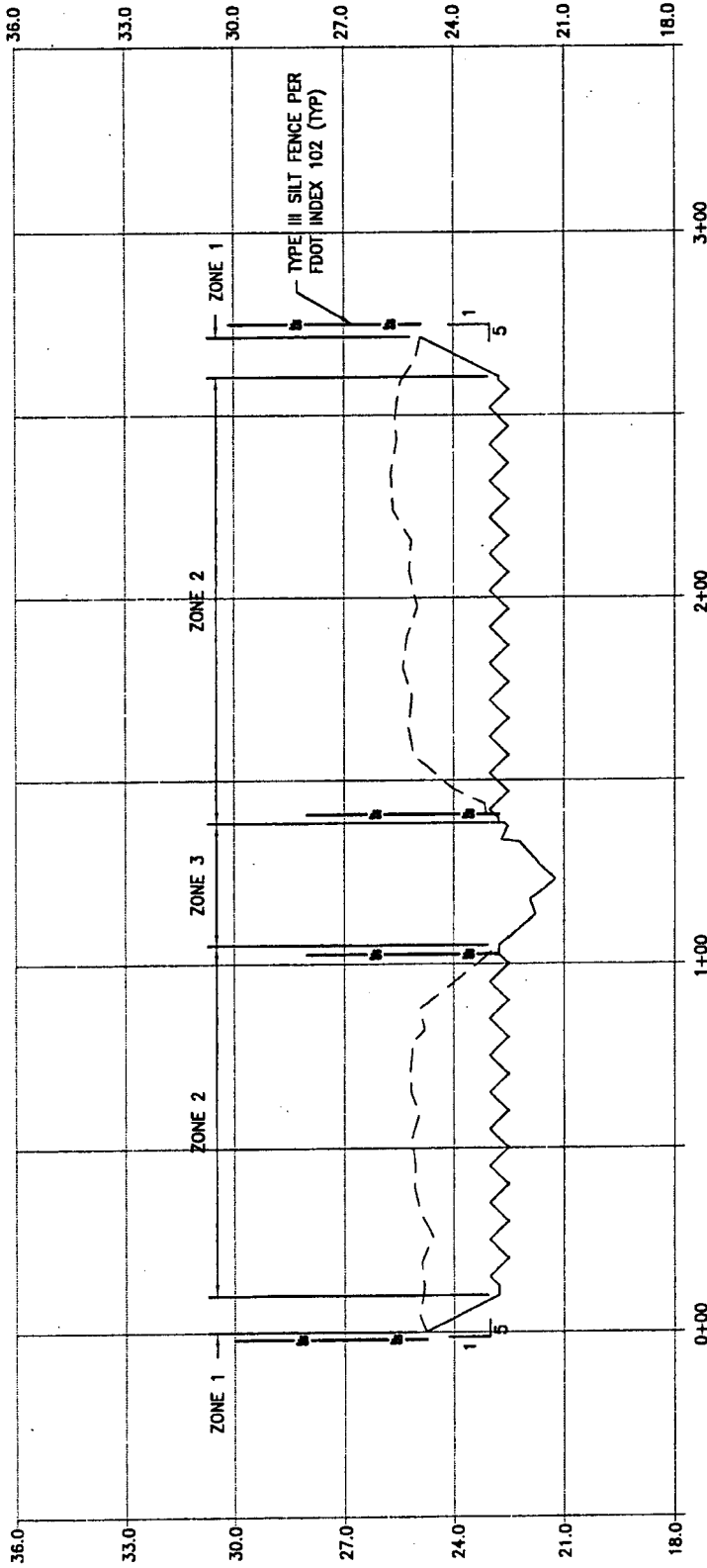


FIGURE 5.4  
 PLAN VIEW OF PROPOSED SITE 1 WETLAND CREATION AREA (1.8 AC)  
 TURNBULL REGIONAL MITIGATION AREA  
 ST JOHNS COUNTY, FLORIDA



- LEGEND:**
- EXISTING GRADE
  - - - - - PROPOSED GRADE (22.5'-23.0' NAVD 88)

**FIGURE 5.5**  
**SITE 1 TYPICAL EXISTING AND PROPOSED CROSS SECTION**  
**TURNBULL REGIONAL WETLAND MITIGATION PROJECT**  
**ST JOHNS COUNTY, FLORIDA**



Table 2 Reference Elevations Taken in Vicinity of Site 1 Creation Area (Northern Borrow Pit)

ID	Site	Elevation (NAVD 88)	Elevation Description	Comments
DE11	Site 1 Creation Area	23.0	High	This area is a good medium to high ground elevation dominated by dense stands of sedges, rushes, and graminoids.
DE15	Site 1 Creation Area	22.8	High	This elevation is a good target design elevation with healthy rosy camphorweed ( <i>Pluchea rosea</i> ), flatsedge ( <i>Cyperus</i> sp.), water hyssop ( <i>Bacopa monnieri</i> ) and little seedbox ( <i>Ludwigia microcarpa</i> ). The water was 1 to 2 inches deep at this point during the evaluation on October 14, 2005.
DE13	Site 1 Creation Area	22.8	Target	This elevation is a good target design elevation with healthy rosy camphorweed, flatsedge ( <i>Cyperus</i> sp.), water hyssop, and little seedbox ( <i>Ludwigia microcarpa</i> ). The water was 1 to 2 inches deep at this point during the evaluation on October 14, 2005.
DE22	Site 1 Creation Area	22.6	Target	This elevation is a good target design elevation with sedges, water hyssop, rosy camphorweed, Asian coinwort ( <i>Centella asiatica</i> ), and wooly panic grass ( <i>Dichanthelium scabriusculum</i> ). The water was 2 inches deep at this point during the evaluation.
DE24	Site 1 Creation Area	22.7	Target	This elevation is a good target design elevation with rosy camphorweed, Elliott's aster ( <i>Symphoricarum elliotii</i> ), rushes, and little seedbox.
DE27	Site 1 Creation Area	23.3	Target	This elevation is a good target design elevation with sedges and sedges. The water was approximately 1 inch deep at this point during the evaluation.
DE28	Site 1 Creation Area	22.8	Target	
SHW6	Creation Area 1 @ flag A25	23.2		

Too High  
 Target High  
 Target Medium  
 Target  
 Target Low  
 Too Low

\*Target Elevation Range 22.5 - 23.0 ft NAVD 88; Dominate elevation = 22.7 ft NAVD 88

Table 3. Proposed design and planting plan for Site 1 forested wetland creation area.

<b>ZONE 1 (SIDE SLOPES) PLANTING SCHEME (TOE OF SLOPE TO ADJACENT GRADE)*</b>					
Type	Species	Common Name	Size	Spacing (ft. On Center)	Quantity**
Herbaceous	<i>Spartina bakerii</i>	Sand cordgrass	Bare Root	3	640
Herbaceous	<i>Juncus</i> spp.	Soft rush	Bare Root	3	480
Herbaceous	<i>Muhlenbergia capillaris</i>	Muhly grass	Bare Root	3	480
<b>Total Herbs</b>					<b>1,600</b>
Shrub	<i>Myrica cerifera</i>	Wax myrtle	1 gal	6	400
<b>Total Shrubs</b>					<b>400</b>
Trees	<i>Acer rubrum</i>	Red maple	1 gal	10	50
Trees	<i>Liquidambar styraciflua</i>	Sweetgum	1 gal	10	50
Trees	<i>Quercus laurifolia</i>	Laurel oak	1 gal	10	60
<b>Total Trees</b>					<b>160</b>
<b>ZONE 2 (BASIN) PLANTING SCHEME (DESIGN ELEVATION = 22.5 - 23.0 ft NAVD 88)***</b>					
Type	Species	Common Name	Size	Spacing (ft. On Center)	Quantity**
Herbaceous	<i>Pontedaria cordata</i>	Pickerelweed	Bare Root	3	2,400
Herbaceous	<i>Sagittaria</i> spp.	Duck potato	Bare Root	3	1,600
Herbaceous	<i>Panicum hemitomon</i>	Maidencane	Bare Root	3	1,200
Herbaceous	<i>Cladium jamaicense</i>	Sawgrass	Bare Root	3	1,600
Herbaceous	<i>Eleocharis</i> spp.	Spikerush	Bare Root	3	1,200
<b>Total Herbs</b>					<b>8,000</b>
Shrub	<i>Cephalanthus occidentalis</i>	Buttonbush	1 gal	6	2,000
<b>Total Shrubs</b>					<b>2,000</b>
Trees	<i>Taxodium ascendens</i>	Pond cypress	1 gal	10	300
Trees	<i>Nyssa sylvatic</i> var. <i>biflora</i>	Black gum	1 gal	10	220
Trees	<i>Persea palustris</i>	Swamp bay	1 gal	10	75
Trees	<i>Gordonia lasianthus</i>	Loblolly bay	1 gal	10	150
<b>Total Trees</b>					<b>745</b>
<b>TOTAL HERBS</b>					<b>9,600</b>
<b>TOTAL SHRUBS</b>					<b>2,400</b>
<b>TOTAL TREES</b>					<b>905</b>
<b>HERBS/AC</b>					<b>5,333</b>
<b>SHRUBS/AC</b>					<b>1,333</b>
<b>TREES/AC</b>					<b>503</b>

\*Zone 1 is 0.26 acres

\*\*Quantities include a 10% increase to account for potential mortality.

\*\*\*Zone 2 is 1.54 acres

### 5.1.2 Site 2 (Southern Borrow Pit)

Creation of 5.5 acres of herbaceous emergent marsh is proposed at the existing borrow area in the southwest corner of the north parcel (Figure 5.1). Several linear borrow pits were excavated and are now deep open-water ponds with vertical banks. These pits are separated by scraped upland areas (Figure 5.6). The creation area will encompass the borrow pits, scraped uplands between the pits, and large spoil piles on the east and west side of the pits.

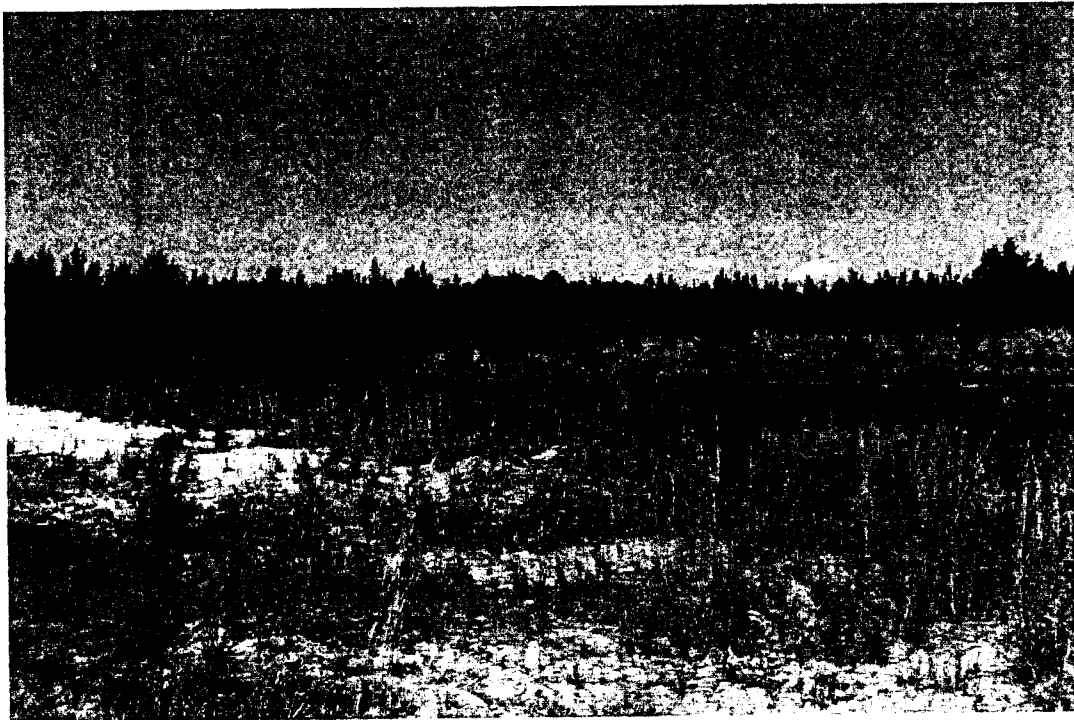


Figure 5.6 Photograph of Site 2 Taken from the North End Facing Southwest

Clary & Associates, Inc. surveyed three elevation transects across the proposed creation area to define existing elevations (Figure 5.7). Adjacent natural reference wetlands are normally used to identify desirable wetland elevations for the proposed creation area. Typically we stake and survey the ground elevation in natural wetlands to signify low, high, and target elevations for the proposed wetland creation sites. Once these elevations are known, a target elevation range is determined. However, determining a successful design elevation at this site was challenging due to the existence of bank erosion, the banks surrounding a majority of the pits, and the lack of a littoral shelf. Small sporadic clumps of desirable vegetation occur along the sides of the ponds; however, the borrow pits are largely devoid of littoral zone vegetation. Algal mats were observed high up on the dirt slopes of the borrow area, which indicates that the site experiences much higher water elevations. Nonetheless, 11 elevation stakes were placed at the site that represent potential target design elevations, elevations that are too high, and elevations that are too low (Table 4).



FIGURE 5.7  
 PLAN VIEW OF PROPOSED SITE 2 WETLAND CREATION AREA (5.5 AC)  
 TURNBULL REGIONAL WETLAND MITIGATION AREA  
 ST JOHNS COUNTY, FLORIDA

Table 4 Reference Elevations Taken in Vicinity of Site 2 Creation Area (Southern Borrow Pits)\*

ID	Site	Elevation (NAVD 88)	Elevation Description	Comments
DE1	Site 2 Creation Area	21.3	Too High	This elevation is a good target design elevation with healthy red maple ( <i>Acer rubrum</i> ) and bay ( <i>Persea</i> sp., <i>Gordonia lasianthus</i> ) saplings and a herbaceous stratum dominated by rushes.
DE2	Site 2 Creation Area	21.4	Too High	This elevation is a good target design elevation with healthy red maple ( <i>Acer rubrum</i> ) and bay ( <i>Persea</i> sp., <i>Gordonia lasianthus</i> ) saplings and a herbaceous stratum dominated by rushes.
DE3	Site 1 Creation Area	21.3	Filsh	This elevation is a good target design elevation with healthy red maple ( <i>Acer rubrum</i> ) and bay ( <i>Persea</i> sp., <i>Gordonia lasianthus</i> ) saplings and a herbaceous stratum dominated by rushes.
DE21	Site 2 Creation Area	21.1	Medium to Filsh	This elevation is a good target design elevation with healthy red maple ( <i>Acer rubrum</i> ) and bay ( <i>Persea</i> sp., <i>Gordonia lasianthus</i> ) saplings and a herbaceous stratum dominated by rushes.
DE1	Site 2 Creation Area	21.3	Medium to Filsh	This elevation is a good target design elevation with healthy red maple ( <i>Acer rubrum</i> ) and bay ( <i>Persea</i> sp., <i>Gordonia lasianthus</i> ) saplings and a herbaceous stratum dominated by rushes.
DE10	Site 2 Creation Area	21.6	Medium	This area is a good medium ground elevation dominated by royal fern ( <i>Osmunda regalis</i> ) and netted chain fern ( <i>Woodwardia arifolia</i> ).
DE7	Site 2 Creation Area	21.4	Target	This elevation is a good target design elevation with healthy red maple ( <i>Acer rubrum</i> ) and bay ( <i>Persea</i> sp., <i>Gordonia lasianthus</i> ) saplings and a herbaceous stratum dominated by rushes.
DE1	Site 2 Creation Area	21.3	Too High	This elevation is a good target design elevation with healthy red maple ( <i>Acer rubrum</i> ) and bay ( <i>Persea</i> sp., <i>Gordonia lasianthus</i> ) saplings and a herbaceous stratum dominated by rushes.
DE1	Site 2 Creation Area	21.3	Too High	This elevation is a good target design elevation with healthy red maple ( <i>Acer rubrum</i> ) and bay ( <i>Persea</i> sp., <i>Gordonia lasianthus</i> ) saplings and a herbaceous stratum dominated by rushes.
SHW1	SHW Elevation Estimates	22.3		Taken in borrow pits on various woody vegetation
SHW2	SHW Elevation Estimates	22.3		Taken in borrow pits on various woody vegetation
SHW3	SHW Elevation Estimates	22.0		Taken in borrow pits on various woody vegetation
SHW4	SHW Elevation Estimates	21.5		Taken in borrow pits on various woody vegetation
SHW5	SHW Elevation Estimates	20.6		Taken in borrow pits on various woody vegetation
SHW6	Creation Area 1 @ flag A25	23.2		Taken in borrow pits on various woody vegetation
DE1	Site 2 Creation Area	21.3	Too High	This elevation is a good target design elevation with healthy red maple ( <i>Acer rubrum</i> ) and bay ( <i>Persea</i> sp., <i>Gordonia lasianthus</i> ) saplings and a herbaceous stratum dominated by rushes.
DE1	Site 2 Creation Area	21.3	Too High	This elevation is a good target design elevation with healthy red maple ( <i>Acer rubrum</i> ) and bay ( <i>Persea</i> sp., <i>Gordonia lasianthus</i> ) saplings and a herbaceous stratum dominated by rushes.
DE31	Reference wetland	21.5	Filsh	This elevation is a good target design elevation with tall milkwort ( <i>Polygala cymosa</i> ), hooded pitcher plants ( <i>Sarracenia</i> sp.), rosy camphorweed, graminoids, and clubmoss ( <i>Lycopodium prostratum</i> ). The water was 1 to 2 inches deep at this point during the evaluation.
DE29	Reference wetland	21.5	Target	This elevation is a good target design elevation with tall milkwort ( <i>Polygala cymosa</i> ), hooded pitcher plants ( <i>Sarracenia</i> sp.), rosy camphorweed, graminoids, and clubmoss ( <i>Lycopodium prostratum</i> ). The water was 1 to 2 inches deep at this point during the evaluation.
DE30	Reference wetland	21.5	Target	This elevation is a good target design elevation with tall milkwort, hooded pitcher plants, rosy camphorweed, graminoids, and clubmoss. The water was 1 to 2 inches deep at this point during the evaluation.
DE31	Reference wetland	21.3	Target	This elevation is a good target design elevation with tall milkwort, hooded pitcher plants, rosy camphorweed, graminoids, and clubmoss. The water was 1 to 2 inches deep at this point during the evaluation.
DE39	Reference wetland	21.6	Target	This elevation is a good target design elevation with healthy vegetative growth which included club moss, Virginia chainfern, goat grass ( <i>Amphicarpum muhlenbergianum</i> ), and myrtle leaf holly ( <i>Ilex myrifolia</i> ).
DE1	Site 2 Creation Area	21.3	Too High	This elevation is a good target design elevation with healthy red maple ( <i>Acer rubrum</i> ) and bay ( <i>Persea</i> sp., <i>Gordonia lasianthus</i> ) saplings and a herbaceous stratum dominated by rushes.
DE1	Site 2 Creation Area	21.3	Too High	This elevation is a good target design elevation with healthy red maple ( <i>Acer rubrum</i> ) and bay ( <i>Persea</i> sp., <i>Gordonia lasianthus</i> ) saplings and a herbaceous stratum dominated by rushes.
DE1	Site 2 Creation Area	21.3	Too High	This elevation is a good target design elevation with healthy red maple ( <i>Acer rubrum</i> ) and bay ( <i>Persea</i> sp., <i>Gordonia lasianthus</i> ) saplings and a herbaceous stratum dominated by rushes.

Too High  
 Target High  
 Target Medium  
 Target  
 Target Low  
 Too Low

\*Target Elevation Range 20.5 - 21.3 ft NAVD 88; Dominant elevation = 20.7 ft NAVD 88



Very few target elevations were obtained since so little littoral vegetation occurs, so most stakes were set at elevations that appeared too low or too high for a target mitigation elevation.

A high-quality reference forested wetland is approximately 400 feet east of the borrow area. Eleven additional reference ground elevations were surveyed in this nearby reference wetland that is currently supporting native hydrophytic vegetation (Table 4). Since the hydrologic and ecological indicators were rather obscure for determining target wetland creation elevations, Jones Edmunds proposes installation of a shallow monitoring piezometer with a continuous water level recorder in this reference wetland and one at the borrow pond. This will allow us to obtain hydrologic data to more accurately determine the appropriate design elevation for an emergent herbaceous marsh before construction. However, the piezometer will not be installed until after the SJRWMD has issued a permit for this project. Once a permit is received the piezometers will be installed. Due to the phased nature of this project, several months will elapse before the site is constructed. This will allow sufficient water elevation data to be collected to review against the proposed design elevation.

The reference elevations taken in the existing borrow area, in combination with those from the nearby reference forested wetland, suggest that an elevation range of 20.5 to 21.3 feet NAVD 88 should be the appropriate target elevation range for this creation area. However, the dominant elevation will be 20.7 feet NAVD 88. These values were chosen as they are higher than elevations that supported no emergent vegetation and lower than elevations that supported facultative or upland vegetation. The elevations in the reference wetland described as low target were also weighted more heavily as the intent is to create an emergent marsh rather than a forested wetland. Existing and proposed topography using target elevation range is depicted in Figure 5.8. However, this proposed design elevation will be reviewed against water table elevations from the reference wetland. If it is found that the proposed design elevation is not appropriate, a letter requesting a design elevation modification will be submitted to SJRWMD to revise the proposed design elevation.

Silt fence will be installed along the perimeter of the creation area before clearing and grubbing of the site to prevent sediment from entering adjacent natural areas. The upland areas and large spoil piles will be pushed into the borrow pits and the entire site will be regraded to the target elevation range. However, three small deep pools (6ft x 6ft) will be left to increase habitat diversity in the creation area and maintain aquatic habitat that currently exists. As with Site 1, the upper 6 inches of topsoil in any excavation area with good organic soils will be stockpiled in adjacent uplands and used as a soil amendment to the creation area. The creation area will then be excavated below the design elevation so that this topsoil can be placed back in the creation area and used for final regrading. This will provide a valuable seed source for native recruitment, help to immediately add important organic matter to sterile sands that would otherwise be present after excavation, reduce soil bulk density, and increase the nutrient storage and water holding capacity of the creation area. Several snags and large woody material from the impact sites will be placed in creation areas to provide wildlife habitat and roost sites as well as a source of future organic matter.

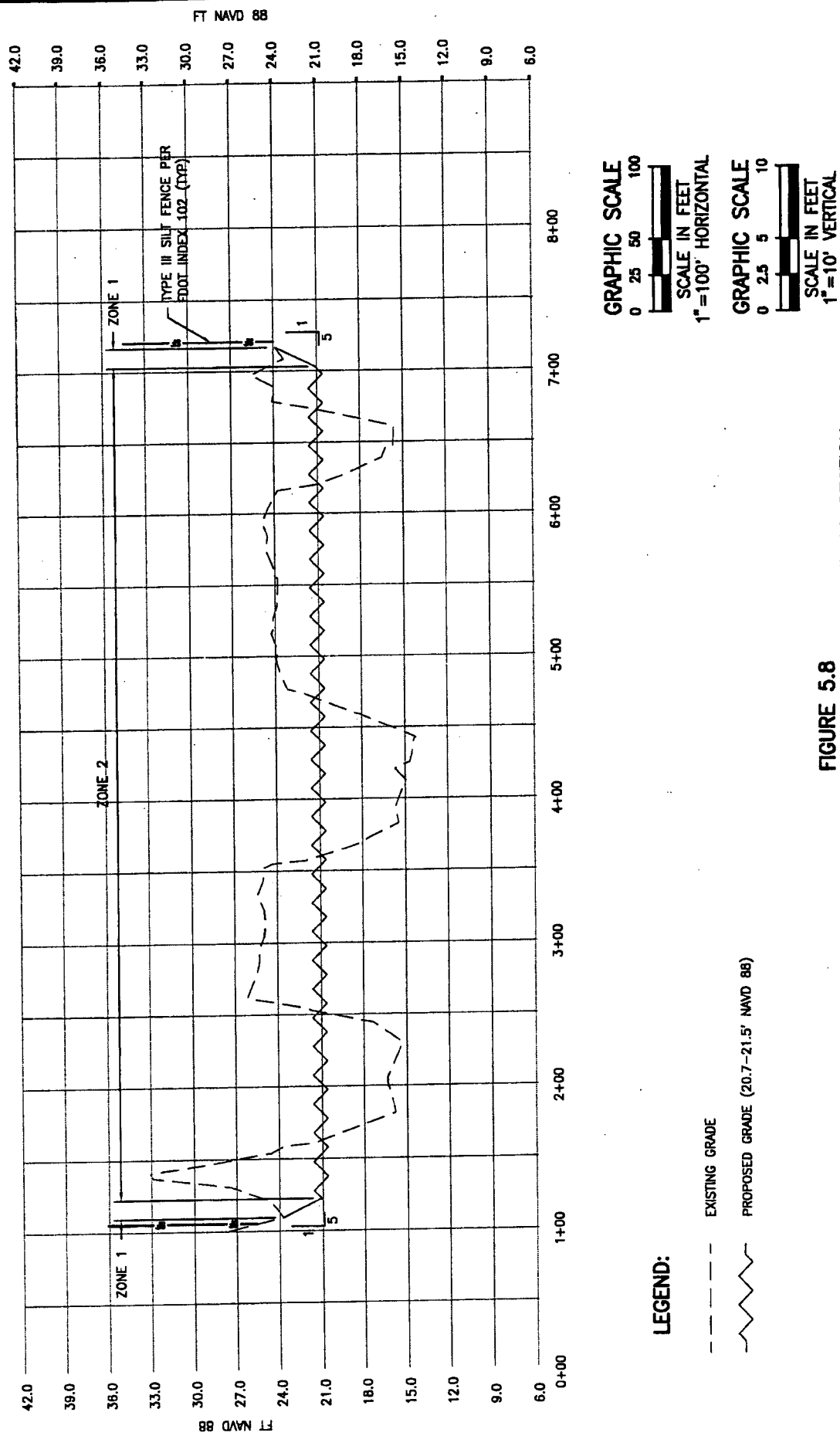


FIGURE 5.8  
 SITE 2 TYPICAL EXISTING AND PROPOSED CROSS SECTION  
 TURNBULL REGIONAL WETLAND MITIGATION PROJECT  
 ST JOHNS COUNTY, FLORIDA



The creation area will consist of Zone 1 and Zone 2 (Figure 5.8). Zone 1 represents the transitional zone between the created wetland and adjacent upland and will consist of 5:1 side slopes that will tie to the existing upland grade. This area will be planted with the facultative wet or facultative species sand cordgrass, soft rush, and muhly grass as these areas will experience minimal inundation. Zone 2 represents the majority of the creation area to be excavated to create a diverse herbaceous emergent marsh. Species to be planted in the excavated and recontoured basin area include spikerush (*Eleocharis* spp), maidencane, sawgrass, fire flag, pickerelweed, and duck potato (Table 5). All herbaceous species will be bare-root stock planted on 3-foot centers. Table 5 provides a detailed planting plan.

This creation area will be considered successful and released from monitoring and reporting requirements when the following proposed criteria are met continuously for at least 1 year without intervention in the form of irrigation or the addition or removal of vegetation:

1. 80% cover of desirable native species in Zone 2.
2. 75% survival of planted trees.
3. Less than 10% cover by nuisance or exotic species.
4. Appropriate hydrology to support an emergent marsh in Zone 2.

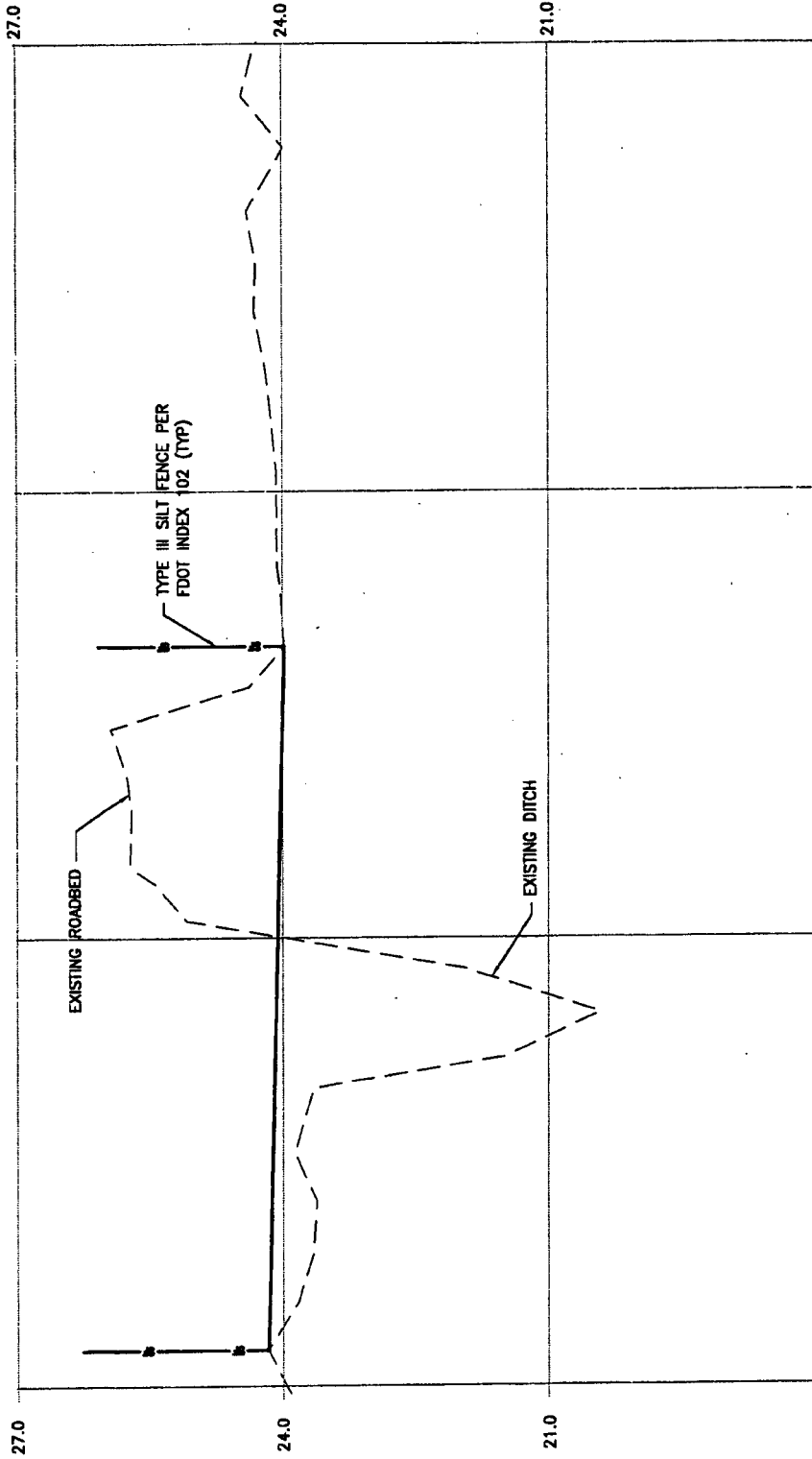
## 5.2 ROAD AND DITCH REMOVAL

These activities involve removing roads, roadside ditches, and berms. Activities presented below in Sections 5.2 and 5.3 result in the backfilling of 4.8 acres of ditches to the adjacent wetland or upland grade. This acreage is reflected on Section E, Table 1 of the ERP application provided in Appendix A and represents the only proposed wetland or surface water impact.

### 5.2.1 Site 3 Road and Ditch Removal

Removal of the northernmost east/west road and the two adjacent ditches is proposed as Site 3 (Figure 5.1). The road is paralleled by a deep roadside ditch approximately 970 feet long. No culverts were installed along the entire length of the road. Road and ditch removal is proposed as mitigation to allow historic sheetflow in adjacent wetlands as well as other low-lying areas and increase wetlands and upland soil water retention.

Jones Edmunds proposes excavation of the elevated road and backfill the adjacent ditches with spoil from the road. The former road and ditch areas will be restored to match existing elevations in adjacent wetlands and uplands. A typical cross section of the existing and proposed grades is provided in Figure 5.9. The existing road and ditch width is approximately 50 feet. Once the road and ditches are regraded, 12 feet of this area will be maintained as a fire break to help with controlled burns. The remaining 38 feet (comprising 0.85 acres) will be planted with longleaf pine, American beautyberry, wire grass, and muhly grass in former uplands. Sweetbay,



**LEGEND:**

- EXISTING GRADE
- PROPOSED GRADE

GRAPHIC SCALE  
0 5 10 20

SCALE IN FEET  
1" = 20' HORIZONTAL

GRAPHIC SCALE  
0 0.5 1 2

SCALE IN FEET  
1" = 2' VERTICAL

**FIGURE 5.9**  
**SITE 3 TYPICAL EXISTING AND PROPOSED CROSS SECTION**  
**TURNBULL REGIONAL MITIGATION AREA**  
**ST JOHNS COUNTY, FLORIDA**



Table 5 Proposed Design and Planting Plan for Site 2 Emergent Marsh Creation Area

ZONE 1 (SIDE SLOPES) PLANTING SCHEME (TOE OF SLOPE TO ADJACENT GRADE)*					
Type	Species	Common Name	Size	Spacing (ft. On Center)	Quantity**
Herbaceous	<i>Spartina bakerii</i>	Sand cordgrass	Bare Root	3	2,150
Herbaceous	<i>Juncus spp.</i>	Soft rush	Bare Root	3	1,100
Herbaceous	<i>Muhlenbergia capillaris</i>	Muhly grass	Bare Root	3	2,150
<b>Total</b>					<b>5,400</b>
ZONE 2 (BASIN) PLANTING SCHEME (DESIGN ELEVATION = 20.5 - 21.3 ft NAVD 88)***					
Type	Species	Common Name	Size	Spacing (ft. On Center)	Quantity**
Herbaceous	<i>Panicum hemitomon</i>	Maidencane	Bare Root	3	2,400
Herbaceous	<i>Cladium jamaicense</i>	Sawgrass	Bare Root	3	3,600
Herbaceous	<i>Thalia geniculata</i>	Fireflag	Bare Root	3	4,800
Herbaceous	<i>Pontedaria cordata</i>	Pickerelweed	Bare Root	3	6,000
Herbaceous	<i>Eleocharis spp.</i>	Spikerush	Bare Root	3	3,600
Herbaceous	<i>Sagittaria spp.</i>	Duck potato	Bare Root	3	3,600
<b>Total</b>					<b>24,000</b>
<b>PLANTS/AC</b>					<b>5,345</b>

\*Zone 1 is 0.57 acres

\*\*Quantities include a 10% increase to account for potential mortality.

\*\*\*Zone 2 is 4.95 acres

black gum, pond cypress, cinnamon fern, and Virginia chain fern will be planted in former wetland areas of the roadbed and ditches. A typical section for road removal in wetlands and uplands is provided in Figures 5.10 and 5.11, respectively. Table 6 provides a detailed planting plan. No monitoring is proposed for this restoration area.

### 5.2.2 Site 4 Road and Ditch Removal

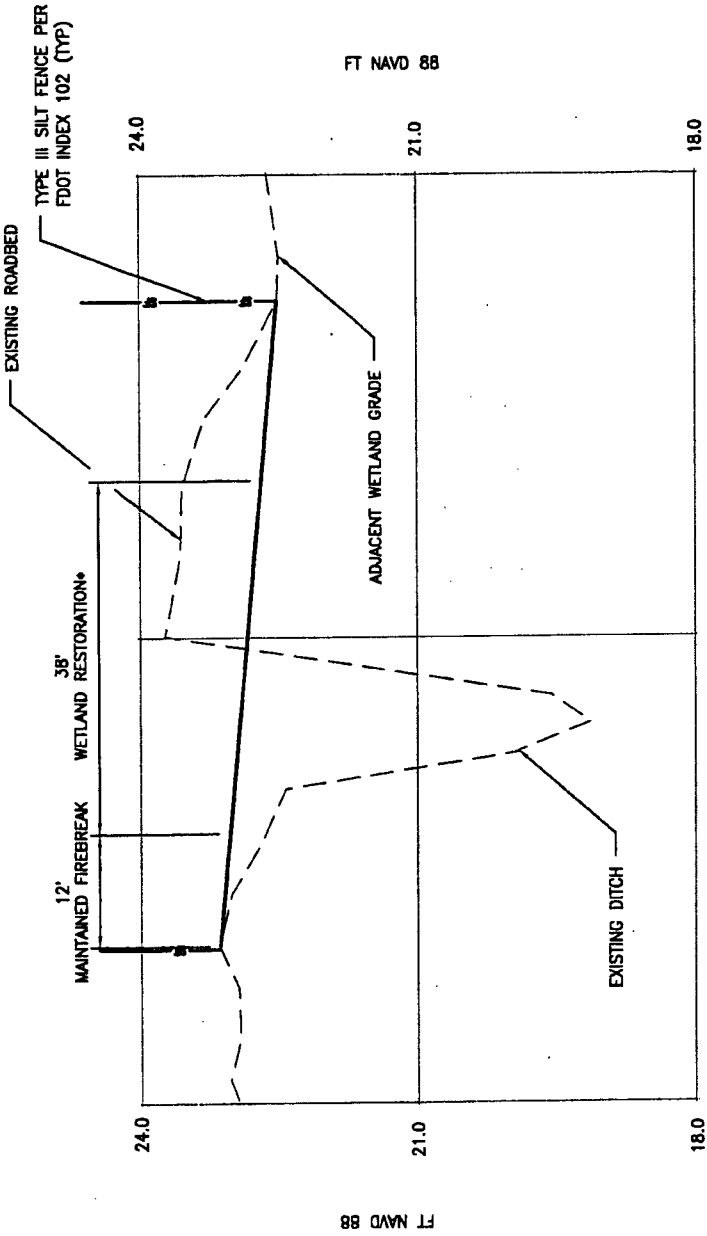
This site entails removing elevated portions of a logging road and the two adjacent ditches south of Site 3 (Figure 5.1). Approximately 2,000 feet of elevated roadbed will be removed north of the proposed CR 2209 right of way (ROW). Hydric pine flatwoods and mixed forested wetlands cross this road. As with Site 3, no culverts were installed across the road along its entire length. Road and ditch removal will allow historic sheetflow in adjacent wetland as well as other low-lying areas and increase wetland and upland soil water retention.

Jones Edmunds proposes excavation of the road and backfill the two roadside ditches with spoil from the road bed to allow historic sheetflow across the former roadbed in these wetland areas. The former road and ditches will be restored to match existing grades in adjacent wetlands and uplands. A typical cross section of the existing and proposed grades is provided in Figure 5.12. The existing road and ditch width is approximately 50 feet. Once the road and ditches are regraded, 12 feet of this area will be maintained as a fire break to help with controlled burns. The remaining 38 feet (comprising 1.75 acres) will be planted with longleaf pine, American beautyberry, wire grass, and muhly grass in former uplands. Loblolly bay, red maple, pond cypress, cinnamon fern, Virginia chain fern will be planted in former wetland areas of the roadbed and ditches. Table 6 provides a detailed planting plan. No monitoring is proposed for this restoration area.

### 5.2.3 Site 5 Road and Ditch Removal

This site is an approximately 950-foot-long section of an east/west logging road south of Site 4. This logging road provides access to Site 2 creation area (Figure 5.1). The road is paralleled by deep roadside ditches and bisects a large wetland system. The logging road will remain until the monitoring and maintenance requirements of Site 2 are met. Once these are met, the road will be removed and the adjacent ditches will be backfilled. Road removal and backfilling ditches will help to reduce dewatering of wetland and upland communities and return the historic sheetflow to the adjacent wetland areas.

Jones Edmunds proposes excavation of the road and backfill the two roadside ditches with spoil from the road bed to allow historic sheetflow across the former roadbed in these wetland areas. The former road and ditch areas will be restored to match existing grades in adjacent wetlands and uplands. A typical cross section of the existing and proposed grades is provided in Figure 5.13. The existing road and ditch width is approximately 50 feet. Once the road and ditches are regraded, 12 feet of this area will be used as a maintained fire break to help with controlled burns. The remaining 38 feet (comprising 0.85 acre) will be planted with longleaf pine,



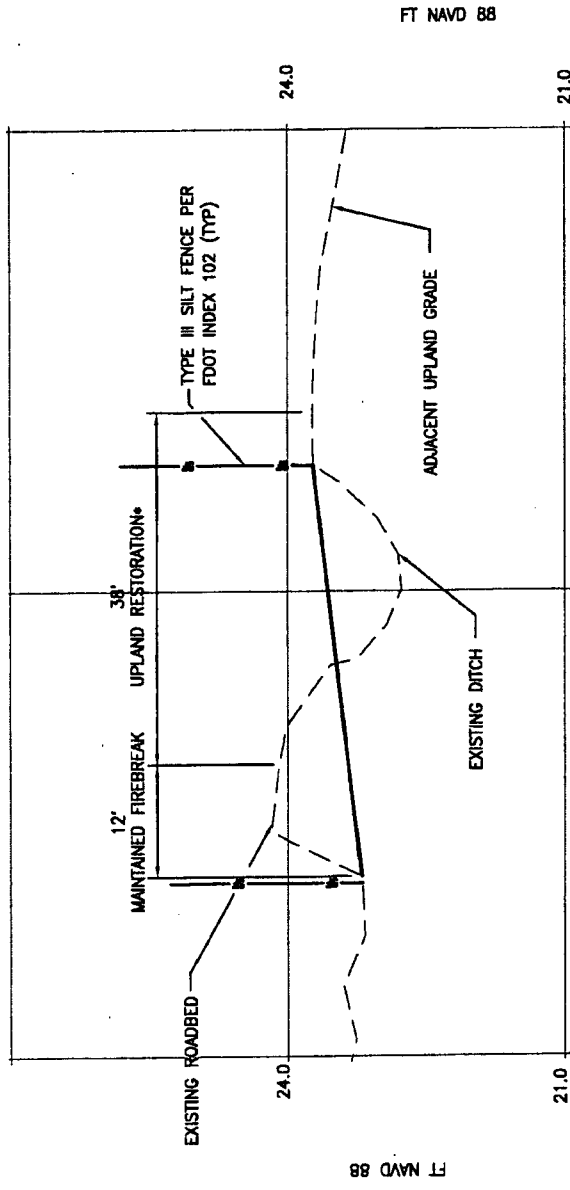
**LEGEND:**

- - - - - EXISTING GRADE
- PROPOSED GRADE
- 

LOBLOLLY BAY, RED MAPLE, POND CYPRESS WILL BE PLANTED ON 10' CENTERS. CINNAMON FERN AND VIRGINIA CHAIN FERN WILL BE PLANTED ON 3' CENTERS.

**FIGURE 5.10**  
**TYPICAL EXISTING AND PROPOSED CROSS SECTION FOR ROAD REMOVAL IN WETLAND**  
**TURNBULL REGIONAL MITIGATION AREA**  
**ST JOHNS COUNTY, FLORIDA**





**LEGEND:**

- - - EXISTING GRADE
- PROPOSED GRADE

\*  
 LONGLEAF PINE WILL BE PLANTED ON 10' CENTERS. AMERICAN BEAUTYBERRY, WIRE GRASS, AND MUHLY GRASS WILL BE PLANTED ON 3' CENTERS.

**FIGURE 5.11**  
**TYPICAL EXISTING AND PROPOSED CROSS SECTION FOR ROAD REMOVAL IN UPLAND**  
**TURNBULL REGIONAL WETLAND MITIGATION PROJECT**  
**ST JOHNS COUNTY, FLORIDA**

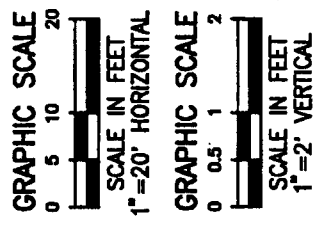
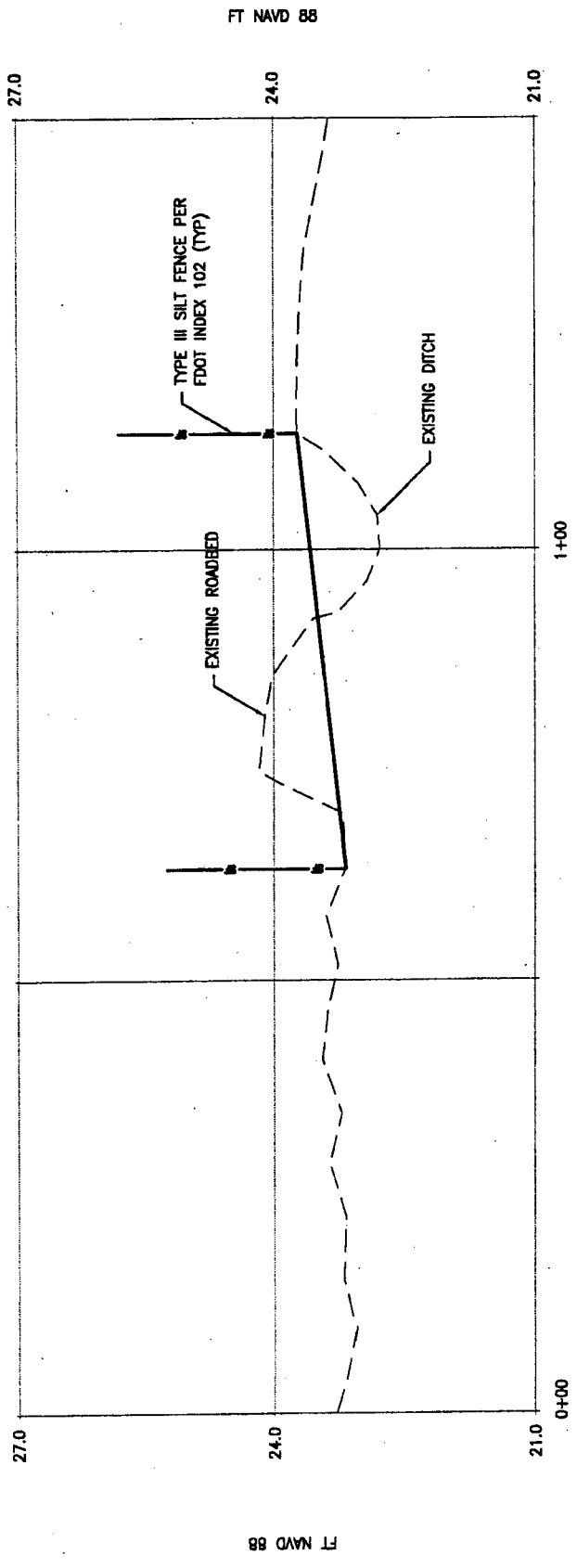




Table 6 Detailed Planting Plan for Sites 3 Through 9

Site	Scientific Name	Common Name	% Plants	# Plants*
Site 3 Uplands (0.7 ac)	<i>Pinus palustris</i>	Longleaf pine	100	320
	<i>Callicarpa americana</i>	American beautyberry	100	880
	<i>Aristida stricta</i>	Wire grass	50	1,800
	<i>Muhlenbergia capillaris</i>	Muhly grass	50	1,800
		<i>Subtotal</i>		<b>4,800</b>
Site 3 Wetlands (0.2 ac)	<i>Gordonia lasianthus</i>	Loblolly bay	30	30
	<i>Acer rubrum</i>	Red maple	30	30
	<i>Taxodium ascendens</i>	Pond cypress	40	40
	<i>Osmunda cinnamomea</i>	Cinnamon fern	50	530
	<i>Woodwardia virginica</i>	Virginia chain fern	50	530
		<i>Subtotal</i>		<b>1,160</b>
	<b>Total</b>		<b>5,960</b>	
Site 4 Uplands (0.8 ac)	<i>Pinus palustris</i>	Longleaf pine	100	405
	<i>Callicarpa americana</i>	American beautyberry	100	1,125
	<i>Aristida stricta</i>	Wire grass	50	2,250
	<i>Muhlenbergia capillaris</i>	Muhly grass	50	2,250
		<i>Subtotal</i>		<b>6,030</b>
Site 4 Wetlands (0.6 ac)	<i>Gordonia lasianthus</i>	Loblolly bay	30	90
	<i>Acer rubrum</i>	Red maple	30	90
	<i>Taxodium ascendens</i>	Pond cypress	40	120
	<i>Osmunda cinnamomea</i>	Cinnamon fern	50	1,660
	<i>Woodwardia virginica</i>	Virginia chain fern	50	1,660
		<i>Subtotal</i>		<b>3,620</b>
	<b>Total</b>		<b>9,650</b>	
Site 5 Uplands (1.1 ac)	<i>Pinus palustris</i>	Longleaf pine	100	510
	<i>Callicarpa americana</i>	American beautyberry	100	1,415
	<i>Aristida stricta</i>	Wire grass	50	2,840
	<i>Muhlenbergia capillaris</i>	Muhly grass	50	2,840
		<i>Subtotal</i>		<b>7,605</b>
Site 5 Wetlands (0.3 ac)	<i>Gordonia lasianthus</i>	Loblolly bay	30	45
	<i>Acer rubrum</i>	Red maple	30	45
	<i>Taxodium ascendens</i>	Pond cypress	40	60
	<i>Osmunda cinnamomea</i>	Cinnamon fern	50	840
	<i>Woodwardia virginica</i>	Virginia chain fern	50	840
		<i>Subtotal</i>		<b>1,830</b>
	<b>Total</b>		<b>9,435</b>	
Site 6 Uplands (2.5 ac)	<i>Pinus palustris</i>	Longleaf pine	100	1,200
	<i>Callicarpa americana</i>	American beautyberry	100	3,340
	<i>Aristida stricta</i>	Wire grass	50	6,670
	<i>Muhlenbergia capillaris</i>	Muhly grass	50	6,670
		<i>Subtotal</i>		<b>17,880</b>
Site 6 Wetlands (1.4 ac)	<i>Gordonia lasianthus</i>	Loblolly bay	30	210
	<i>Acer rubrum</i>	Red maple	30	210
	<i>Taxodium ascendens</i>	Pond cypress	40	280
	<i>Osmunda cinnamomea</i>	Cinnamon fern	50	3,840
	<i>Woodwardia virginica</i>	Virginia chain fern	50	3,840
		<i>Subtotal</i>		<b>8,380</b>
	<b>Total</b>		<b>26,260</b>	
Site 7 Uplands (4.2 ac)	<i>Pinus palustris</i>	Longleaf pine	100	2,000
	<i>Callicarpa americana</i>	American beautyberry	100	5,550
	<i>Aristida stricta</i>	Wire grass	50	11,100
	<i>Muhlenbergia capillaris</i>	Muhly grass	50	11,100
		<b>Total</b>		<b>29,750</b>
Site 8 Uplands (1.2 ac)	<i>Pinus palustris</i>	Longleaf pine	100	585
	<i>Callicarpa americana</i>	American beautyberry	100	1,615
	<i>Aristida stricta</i>	Wire grass	50	3,230
	<i>Muhlenbergia capillaris</i>	Muhly grass	50	3,230
		<b>Total</b>		<b>8,660</b>
Site 9 Wetlands (0.1 ac)	<i>Magnolia virginiana</i>	Silver bay	30	20
	<i>Acer rubrum</i>	Red maple	30	20
	<i>Taxodium ascendens</i>	Pond cypress	40	25
	<i>Osmunda cinnamomea</i>	Cinnamon fern	50	30
	<i>Woodwardia virginica</i>	Virginia chain fern	50	30
		<i>Subtotal</i>		<b>125</b>
Site 9 Uplands (1.7 ac)	<i>Pinus palustris</i>	Longleaf pine	100	805
	<i>Callicarpa americana</i>	American beautyberry	100	805
	<i>Aristida stricta</i>	Wire grass	50	405
	<i>Muhlenbergia capillaris</i>	Muhly grass	50	405
		<b>Total</b>		<b>2,420</b>
	<b>TOTAL</b>		<b>96,935</b>	

\*Includes a 10% increase for potential mortality. Herbaceous species to be planted on 3' centers, shrubs on 6' centers, and trees on 10' centers.



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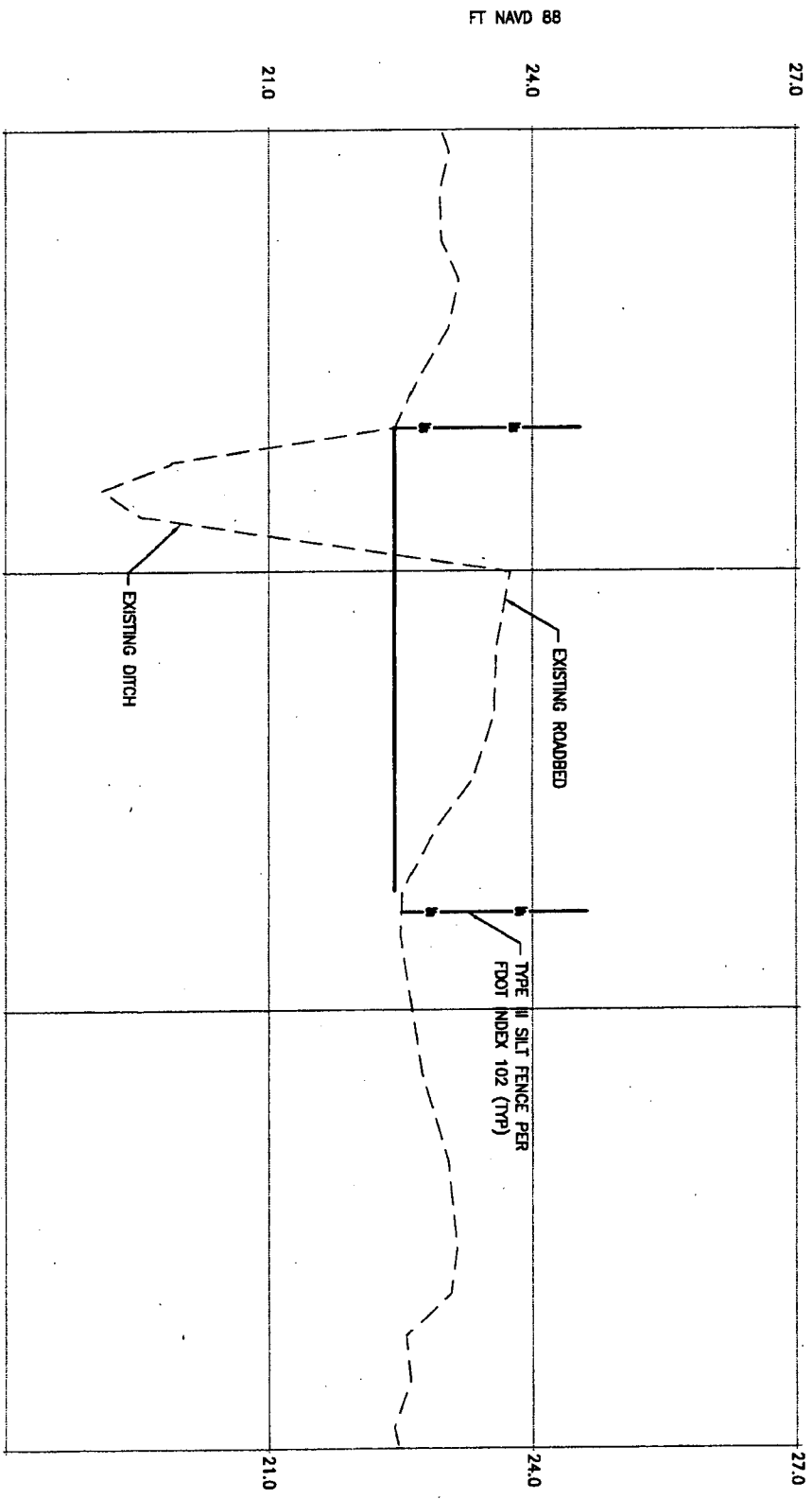
--- EXISTING GRADE

— PROPOSED GRADE

FIGURE 5.12  
 SITE 4 TYPICAL EXISTING AND PROPOSED CROSS SECTION  
 TURNBULL REGIONAL MITIGATION AREA  
 ST JOHNS COUNTY, FLORIDA



Plotted: 6/30/08 3:43pm dsampan



**LEGEND:**

--- EXISTING GRADE

\_\_\_ PROPOSED GRADE

**FIGURE 5.13**  
**SITE 5 TYPICAL EXISTING AND PROPOSED CROSS SECTION**  
**TURNBULL REGIONAL MITIGATION AREA**  
**ST. JOHNS COUNTY, FLORIDA**

**GRAPHIC SCALE**  
 0 5 10 20  
 SCALE IN FEET  
 1"=20' HORIZONTAL

**GRAPHIC SCALE**  
 0 0.5 1 2  
 SCALE IN FEET  
 1"=2' VERTICAL



American beautyberry, wire grass, and muhly grass in former uplands and loblolly bay, red maple, pond cypress, cinnamon fern, and Virginia chain fern in former wetland areas of the roadbed and ditches. Table 6 provides a detailed planting plan. No monitoring is proposed for this restoration area.

#### 5.2.4 Site 6 Road and Ditch Removal

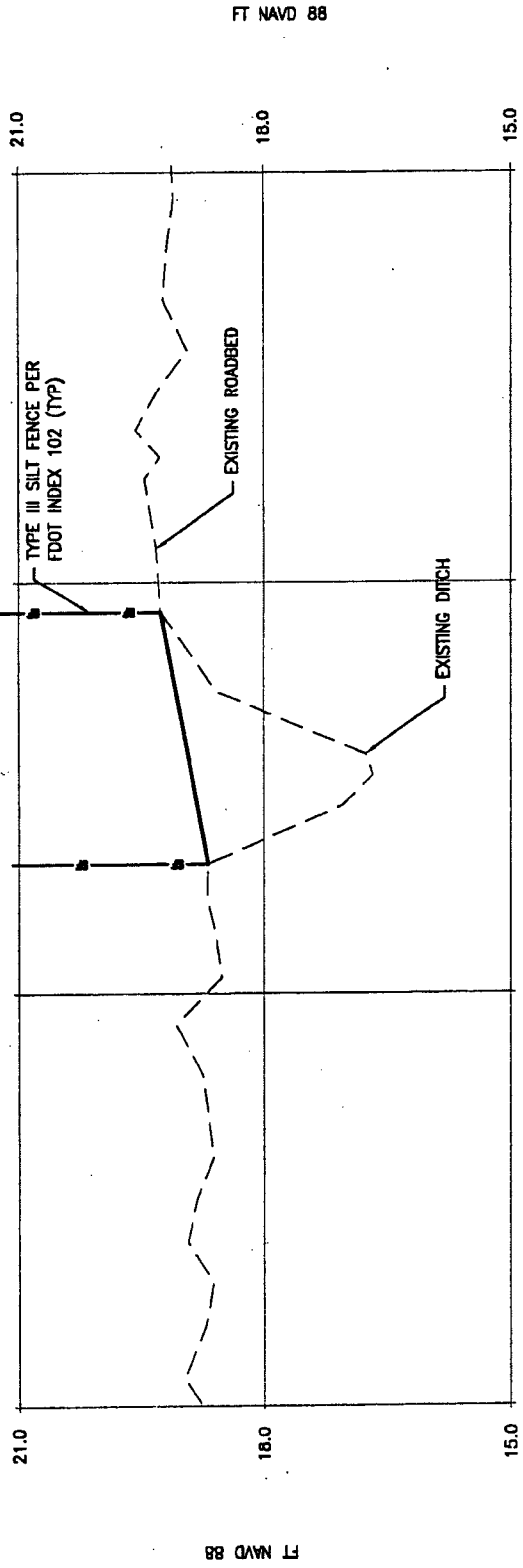
This site entails removing approximately 1,900 feet of a long north/south road that forms the western project boundary of the north parcel (Figure 5.1). The road is paralleled by deep roadside ditches and bisects a large high quality hydric hammock wetland that flows from west to east towards the floodplain wetlands of Turnbull Creek. A culvert has been crushed and the road has washed out in two locations, which demonstrates the need for restoring hydrologic connectivity.

Jones Edmunds proposes that the road be graded down and backfill the two roadside ditches with spoil from the road bed to allow historic sheetflow across the former roadbed in these wetland areas. The former road and ditch areas will be restored to match existing grades in adjacent wetlands and uplands. A typical cross section of the existing and proposed grades is provided in Figure 5.14. The existing road and ditch width is approximately 50 feet. Once the road and ditches are regraded, 12 feet of this area will be used as a maintained fire break to help with controlled burns. The remaining 38 feet (comprising 1.66 acres) will be planted with longleaf pine, American beautyberry, wire grass, and muhly grass in former uplands. Loblolly bay, red maple, pond cypress, cinnamon fern, and Virginia chain fern will be planted in former wetland areas of the roadbed and ditches. Table 6 provides a detailed planting plan. No monitoring is proposed for this restoration area.

#### 5.2.5 Site 7 Road and Ditch Removal

This site entails removing approximately 5,400 feet of elevated portions of a logging road on the east side of the north parcel (Figure 5.1). The road is also paralleled by deep roadside ditches. As with many of the on-site logging roads, no culverts were installed along the entire length of this road. Removal of ditches will also reduce dewatering of adjacent upland communities.

Jones Edmunds proposes excavation the road down and backfill the two roadside ditches with spoil from the road bed to allow historic sheetflow across the former roadbed in low-lying wetland areas and reduce the dewater effects of the ditches. The existing road and ditch width is approximately 50 feet. Once the road and ditches are regraded, 12 feet of this area will be used as a maintained fire break to help with control burns (Figure 5.15). The remaining 38 feet (comprising 2.8 acres) will be planted with longleaf pine, American beautyberry, wire grass, and muhly grass in former uplands of the roadbed and ditches. Table 6 provides a detailed planting plan. No monitoring is proposed for this restoration area.



LEGEND:

- EXISTING GRADE
- PROPOSED GRADE

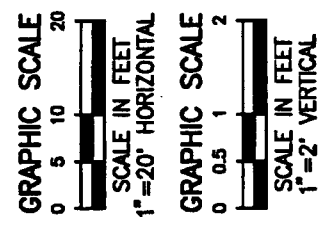
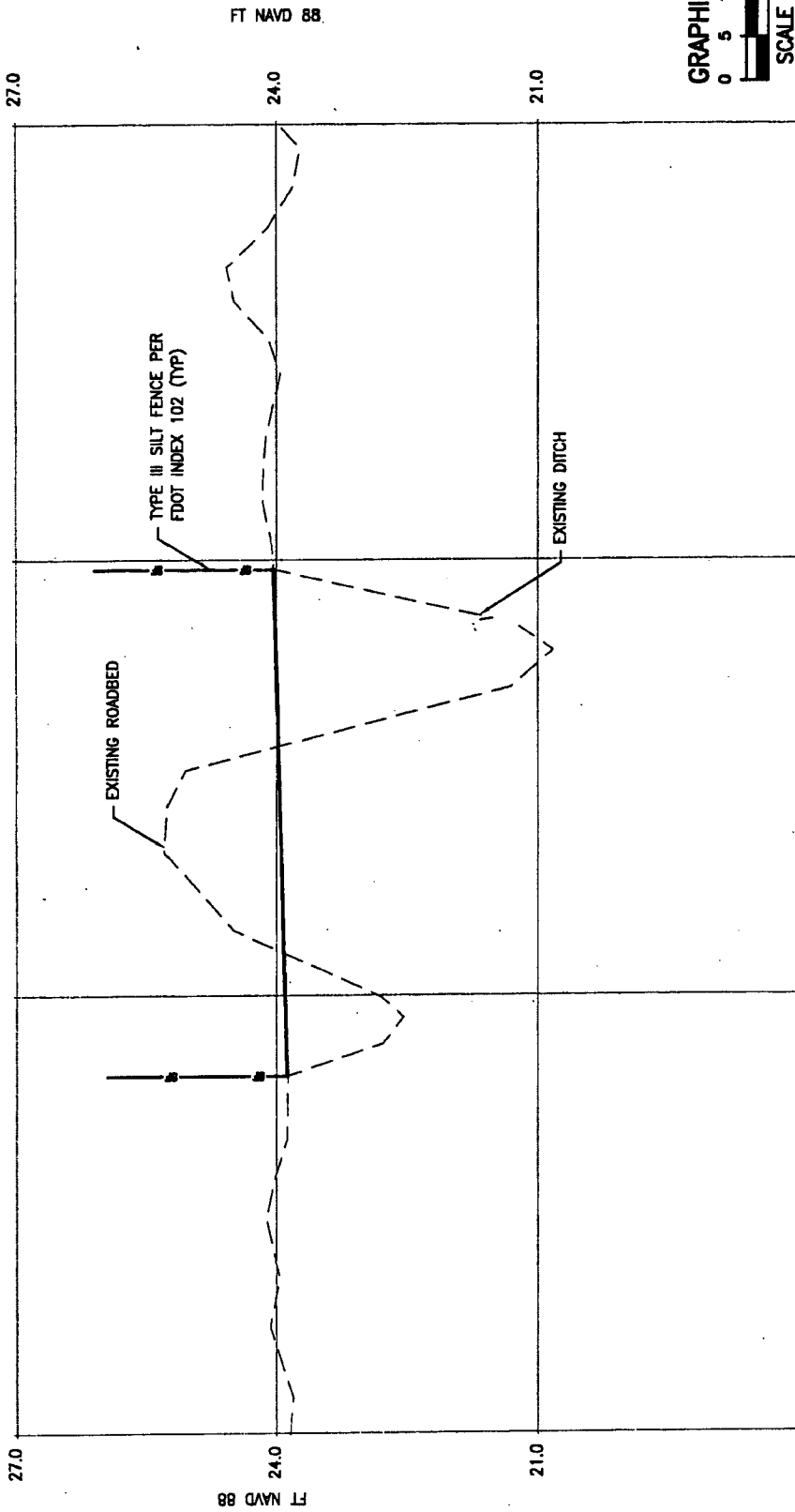


FIGURE 5.14  
SITE 6 TYPICAL EXISTING AND PROPOSED CROSS SECTION  
TURNBULL REGIONAL MITIGATION AREA  
ST JOHNS COUNTY, FLORIDA





**LEGEND:**

- EXISTING GRADE
- PROPOSED GRADE

GRAPHIC SCALE  
0 5 10 20

SCALE IN FEET  
1"=20' HORIZONTAL

GRAPHIC SCALE  
0 0.5 1 2

SCALE IN FEET  
1"=2' VERTICAL

**FIGURE 5.15**  
**SITE 7 TYPICAL EXISTING AND PROPOSED CROSS SECTION**  
**TURNBULL REGIONAL MITIGATION AREA**  
**ST JOHNS COUNTY, FLORIDA**



### 5.2.6 Site 8 Road and Ditch Removal

This site entails removing approximately 5,400 feet of elevated portions of a logging road in the center of the south parcel (Figure 5.1). The road is also paralleled by roadside ditches. As with many of the other sites, no culverts were installed along the entire length of this road. Road and ditch removal will allow historic sheetflow in adjacent wetland as well as other low-lying areas and increase wetland and upland soil water retention.

Jones Edmunds proposes that the road be graded down and backfill the two roadside ditches to allow historic sheetflow across the former roadbed in low-lying or wetland areas and reduce the dewater effects of the ditches. The existing road and ditch width is approximately 40 feet. Once the road and ditches are regraded, these areas will be planted with longleaf pine, American beautyberry, wire grass, and muhly grass in former uplands of the roadbed and loblolly bay, red maple, pond cypress, cinnamon fern, Virginia chain fern in former wetland areas of the roadbed and ditches. Table 6 provides a detailed planting plan. No monitoring is proposed for this restoration area.

## 5.3 DITCH AND BERM WORK

### 5.3.1 Site 9 Ditch and Berm Removal

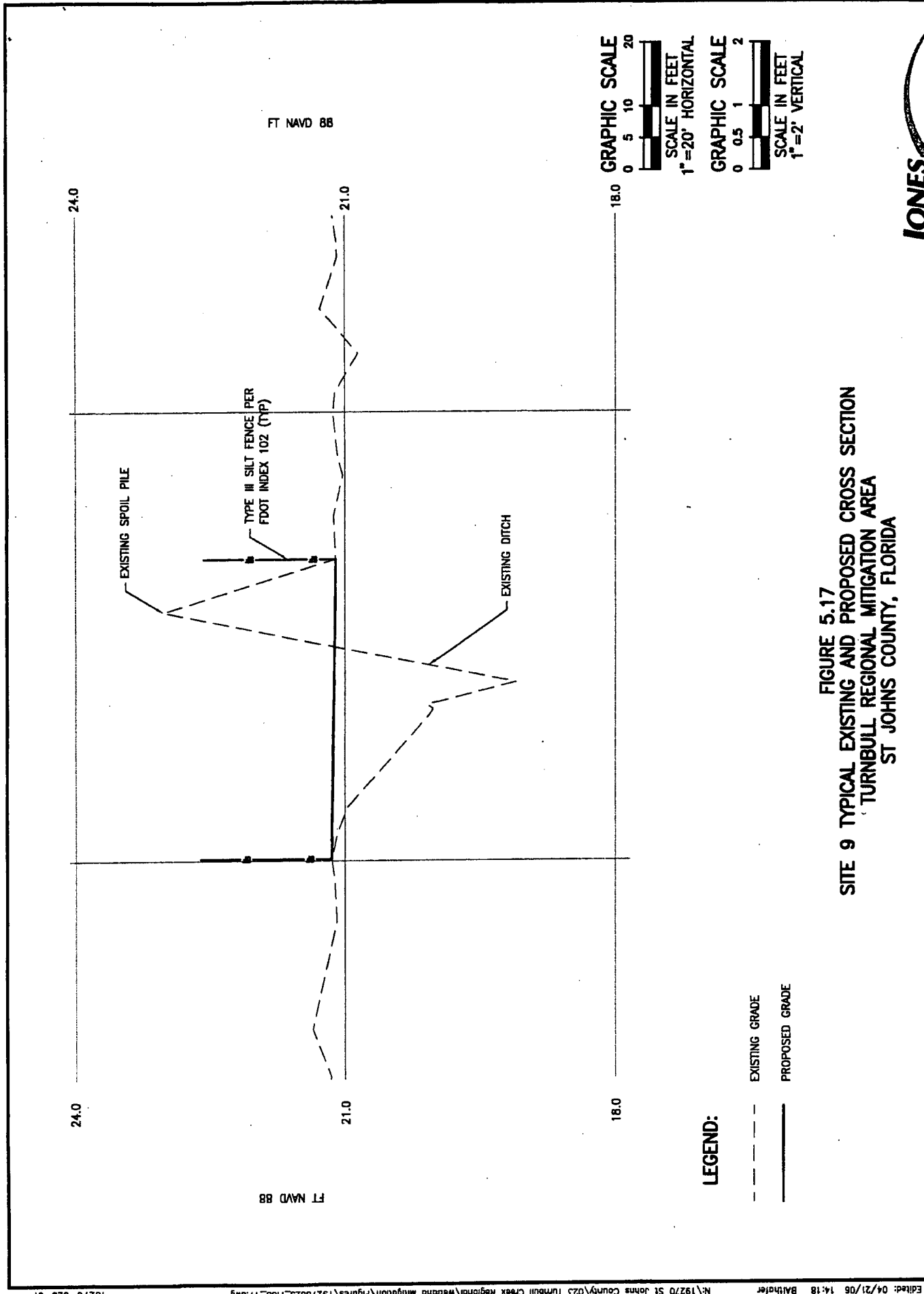
This site entails backfilling an approximately 2,000-foot-long-by-5-foot-wide ditch in the southwestern region of the north parcel (Figure 5.1). A photograph of the site is provided as Figure 5.16. This ditch bisects several wetland communities that historically sheetflowed from north to south during large rainfall events. The spoil from excavation of the ditch was placed on the south side of the ditch and stops potential sheetflow from the project area south to a mature high-quality forested wetlands on the adjacent St. Johns County parcel.



Figure 5.16 Photograph of Site 9 Taken from Eastern End Facing West

Jones Edmunds proposes that the ditch be backfilled using the adjacent spoil/berm and regrade the area to adjacent grade. This will restore the natural hydrologic connectivity of the wetlands and reduce dewatering of adjacent communities. Restoration of this area will result in approximately 0.8 acres of upland and wetland restoration based on a ditch width of approximately 5 feet and spoil pile width of 12 feet (17 feet x 2,000 feet long). Existing and proposed cross sections are provided in Figure 5.17. The regraded areas will be planted with longleaf pine, American beautyberry, wire grass, and muhly grass in former uplands and loblolly bay, red maple, pond cypress, cinnamon fern, and Virginia chain fern in former wetland areas of the ditch and spoil piles. Table 6 provides a detailed planting plan. No monitoring is proposed for this restoration area.





**GRAPHIC SCALE**  
 0 5 10 20  
 SCALE IN FEET  
 1" = 20' HORIZONTAL

**GRAPHIC SCALE**  
 0 0.5 1 2  
 SCALE IN FEET  
 1" = 2' VERTICAL

**LEGEND:**

--- EXISTING GRADE

--- PROPOSED GRADE

**FIGURE 5.17**  
**SITE 9 TYPICAL EXISTING AND PROPOSED CROSS SECTION**  
**TURNBULL REGIONAL MITIGATION AREA**  
**ST. JOHNS COUNTY, FLORIDA**



### 5.3.2 Site 10 Berm Breaching

Site 10 is located along the western boundary of the north parcel (Figure 5.1). This enhancement site consists of two separated ditches; north ditch and south ditch. The north ditch is a large deep ditch with a large spoil berm on its east side (Figures 5.1 and 5.18). It then turns west and flows off-site around the tree line. Currently, the north ditch is routing water west away from a large area of on-site wetlands located south and southeast. The south ditch and berm system continues due south along the property line through a high-quality wetland (Figure 5.19). This ditch is hydrologically disconnected from the north ditch by an approximately 5-foot-wide berm. A berm is also on the east side of the south ditch as it flows south (Figure 5.19). This ditch may be dewatering adjacent wetlands and facilitating flow to the south.

Jones Edmunds proposes removal of the spoil pile that separates the north and south ditch and excavate approximately 15-foot-wide breaches in the berms in two locations to allow flow south and east into the adjacent wetlands. Jones Edmunds developed a hydrologic and hydraulic model for this project to investigate the potential for off-site flooding caused by the proposed mitigation projects. A model was developed for this specific site to determine an appropriate berm removal elevation. Results of the model also show that excavating the berm to adjacent wetland grade would result in flow from the wetland into the ditch during mean annual rainfall events. Thus, the berms are proposed to be excavated to an elevation of 23.5 feet NAVD 88 to allow flows from all storm events greater than the mean annual to overtop the berm and flow into the adjacent wetlands.

Ditch blocks would be ecologically beneficial; however, they could back water up and force water to flow out of the ditch to the west which is off-site. This could potentially cause flooding to the adjacent parcel which is being developed for a residential neighborhood. Therefore, ditch blocks will not be used at this site. Typical existing and proposed cross sections are provided in Figure 5.20. No vegetation planting is proposed in excavated breach areas.



Figure 5.18 Photograph of Site 10 on North Berm Facing North. North ditch is to the Left (West)



Figure 5.19 Photograph of Site 10 Depicting South Ditch and Berm Taken from West Side of Project Area Looking East

## 5.4 ROAD REGRADING

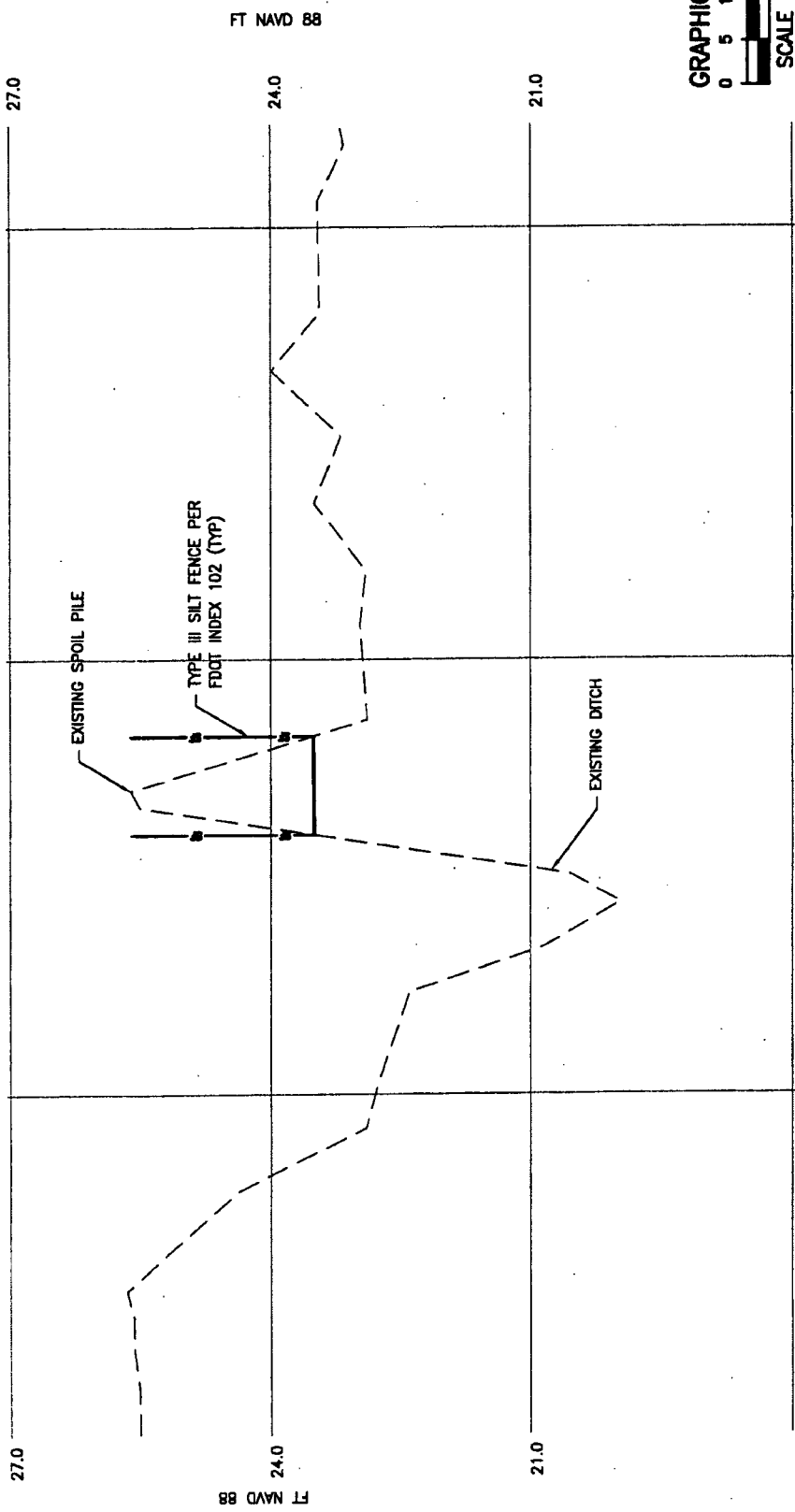
### 5.4.1 Site 11

Site 11 entails excavating 1 foot of road bed and partially backfilling the adjacent ditch along the main north-south access road in the project area (Figure 5.1). This road will provide the only vehicular access to the site and thus removing the road was not feasible. Since this road is the largest of all on-site roads, the adjacent ditch is very large and deep. Moderate flow was observed in this ditch during several site visits. Thus, it is conveying relatively large volumes of water rapidly off-site and ultimately to Turnbull Creek to the southeast.

Several culverts were installed along the entire length of this road. These culverts will be removed before road excavation and reinstalled with the invert elevation equal to the new ditch bottom elevation. Excavated road bed material will be used to partially backfill deep adjacent ditches. Road and ditch regrading will help to slow flow in this ditch, decrease dewatering effects from this ditch in adjacent communities, and subsequently increase wetland and upland soil water retention. Figure 5.21 depicts existing and proposed cross sections.

## 5.5 EXOTIC SPECIES REMOVAL

Chinese tallow has been found in numerous locations, demarcated with a star in Figure 4.2, throughout the site. Trees and saplings will be manually removed and the stumps sprayed with an appropriate herbicide to stop stump sprouting. A follow-up maintenance inspection would



LEGEND:

- EXISTING GRADE
- PROPOSED GRADE

GRAPHIC SCALE  
0 5 10 20  
SCALE IN FEET  
1"=20' HORIZONTAL

GRAPHIC SCALE  
0 0.5 1 2  
SCALE IN FEET  
1"=2' VERTICAL

FIGURE 5.20  
SITE 10 TYPICAL EXISTING AND PROPOSED CROSS SECTION  
TURNBULL REGIONAL MITIGATION AREA  
ST JOHNS COUNTY, FLORIDA



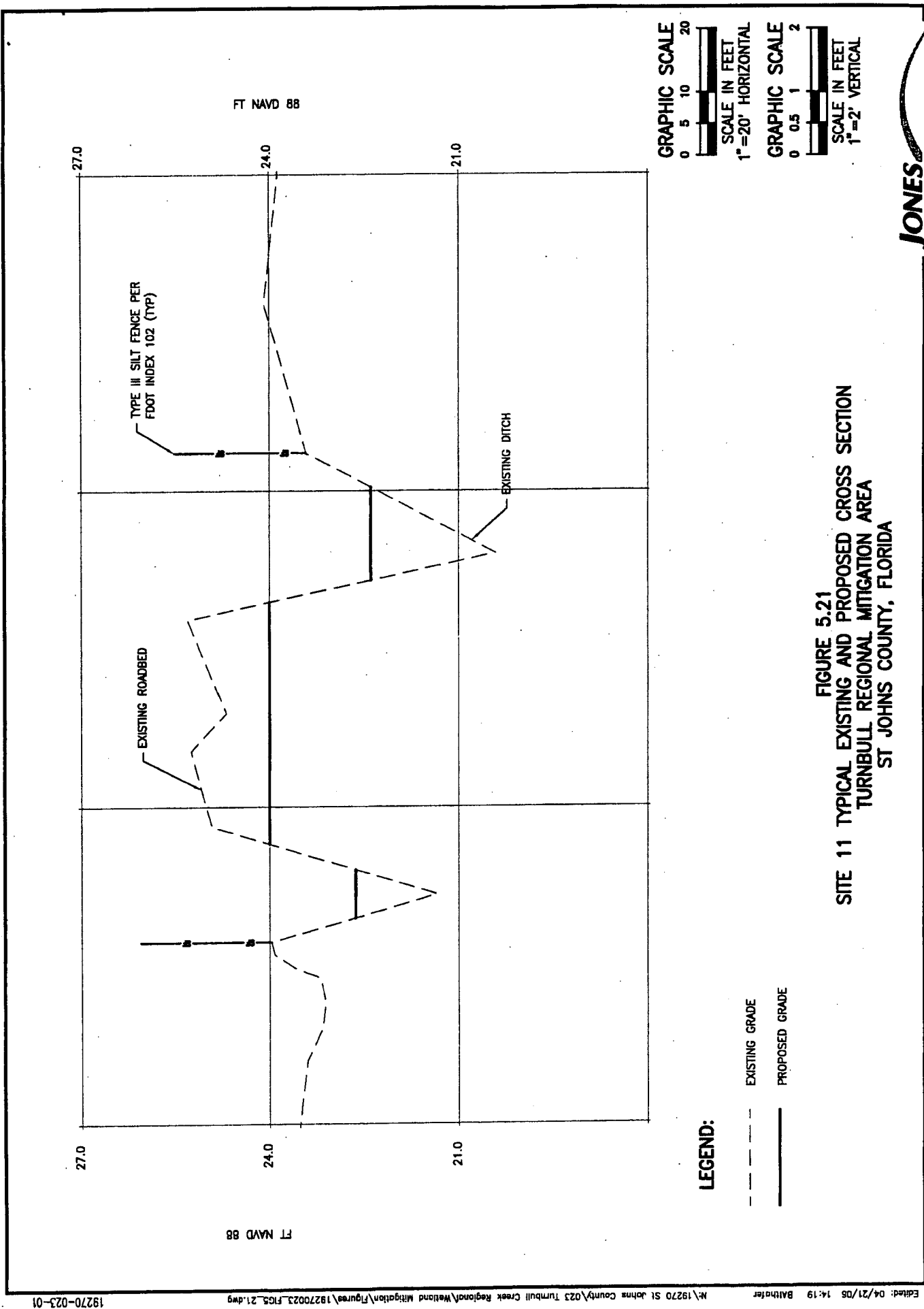


FIGURE 5.21  
 SITE 11 TYPICAL EXISTING AND PROPOSED CROSS SECTION  
 TURNBULL REGIONAL MITIGATION AREA  
 ST JOHNS COUNTY, FLORIDA



also be necessary to reapply herbicide to any stumps that have resprouted. Semi-annual site inspections will be conducted throughout the property for the first 5 years and will be followed by additional annual events after the initial 5-year period. Any resprouted tallow trees will be resprayed with herbicide and any newly discovered trees will be manually removed and the stumps treated. A specific management plan and schedule are provided in Section 8.4.2.

## 5.6 UPLAND ENHANCEMENT

Slash pine was planted in dense rows throughout the north parcel and into the wetlands, particularly in the northern and western regions of this parcel. Much of the pine canopy in the southern parcel appears to have naturally regenerated from previous plantations. The south parcel also contains areas where the pine stands are very dense and need to be thinned. The proposed thinning areas at both the north and south parcels are shaded light gray in Figure 5.1.

Several stands in the north parcel contain marketable sized timber. These areas will be thinned during the dry season using mechanized equipment that will minimize soil disturbance. Timber will be sold to offset a portion of the proposed restoration and enhancement costs. A controlled burn program will be established to enhance the uplands and increase plant diversity of the mitigation area. Uplands will be managed to promote an uneven-aged stand with older growth.

## 5.7 WETLAND ENHANCEMENT

Wetland enhancement will be accomplished by discontinuing silvicultural activities, manually removing planted pine trees in wetland areas throughout the north and south parcels, and removing roads and ditches at various sites previously discussed. Areas where manual removal is proposed are depicted in green in Figure 5.1.

Planted pine in wetland areas will be manually removed to decrease competition with the native wetland tree canopy species and allow the historic canopy species to dominate. Manual removal was chosen rather than mechanical thinning to minimize disturbance to the hydric soils and understory vegetation. In these areas, pine trees will be manually dropped in place with chain saws and simply allowed to decompose. Small low-ground-pressure equipment such as a Bobcat may be used to regrade any existing bedding rows once trees have been felled.

The on-site wetlands in the north parcel will also be hydrologically enhanced by removing existing elevated logging roadbeds (Sites 3-6 and 8), removing a large ditch and berm system (Site 9), and breaching a large berm that directs flow away from on-site wetlands (Site 10). These activities will help to restore or enhance the historical sheetflow through these communities and minimize the dewatering effects of numerous on-site ditches which accelerate flow to Turnbull Creek.

## 6.0 UNIFORM MITIGATION ASSESSMENT METHOD

The Uniform Mitigation Assessment Method (UMAM) was used to determine the proposed Functional Loss (FL) credits the TCRMA would generate. UMAM assessments were conducted using the following 13 mitigation categories to ensure that all mitigation areas were accurately evaluated:

1. Wetland Enhancement South of CR 2209
2. Wetland Enhancement North of CR 2209
3. Upland Enhancement South of CR 2209
4. Wetland Enhancement North of CR 2209
5. Turnbull Creek Wetland Enhancement
6. Hydric Pine Flatwoods Enhancement
7. Hydric Pine Savannah Enhancement
8. South Parcel Wetland Enhancement
9. South Parcel Upland Enhancement
10. Road and Ditch Removal in Uplands
11. Road and Ditch Removal in Wetlands
12. Site 1 (NE Forested Wetland Creation)
13. Site 2 (SW Emergent Marsh Creation)

These 13 UMAM assessment areas are depicted in Figure 6.1. UMAM assessments were completed using these 13 categories since many of proposed Mitigation Sites 1 through 11 are close to each other and could potentially overlap. In addition, more than one restoration or enhancement project will take place in a given area. For example, in the uplands and wetlands, roads and ditches will be removed and dense pine stands will be thinned. Therefore, UMAM assessments were done for the entire wetland or upland community acreage rather than a specific acreage associated with each mitigation site. The exception to this is the proposed creation areas which have their own independent UMAM assessment. In addition, UMAM assessments for road and ditch removal were separated into road and ditch removal in uplands and road and ditch removal in wetlands as Water Environment is not pertinent to road removal in uplands.

The Current Condition and With Mitigation UMAM scenarios were completed assuming the presence of the proposed CR 2209 ROW. Since this large roadway will be passing through the middle of the project area, Location and Landscape Support values for wetlands or uplands between CR 2209 and SR 16 would be lower than values for wetlands and uplands south of CR 2209. As a result, separate UMAM assessments were completed for these scenarios. This provides a more realistic assessment of the ecological lift that the proposed mitigation activities will provide. In addition, the current condition for UMAM assessments 3 (Upland Enhancement South of CR 2209) and 9 (South Parcel Upland Enhancement), which are being conducted in uplands, were scored as if the assessment area were developed for County infrastructure or facilities. This is a realistic assumption as the County will likely develop the upland areas if they are not used as a regional mitigation site.

**Legend**

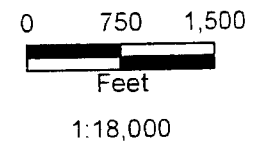
- Major Roads (FDOT)
- Project Boundary (713 ac)
- UMAM Assessment Areas (730 ac)
  - Wetland Enhancement South of CR 2209 (101.2 ac; 77.8+23.4 ac)
  - Wetland Enhancement North of CR 2209 (160.4 ac)
  - Upland Enhancement South of CR 2209 (116.1 ac)
  - Upland Enhancement North of CR 2209 (155.4 ac)
  - Turnbull Creek Wetland Enhancement (73.9 ac)
  - Hydric Pine Flatwood Enhancement (12.1 ac)
  - Hydric Pine Savannah Enhancement (22.1 ac)
  - South Parcel Wetland Enhancement (17.1 ac)
  - South Parcel Upland Enhancement (52.6 ac)
  - Road and Ditch Removal in Uplands (9.8 ac)
  - Road and Ditch Removal in Wetlands (2.6 ac)
  - Site 1 (NE Creation) (1.5 ac)
  - Site 2 (Southern Creation) (5.5 ac)



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**JONES  
EDMUNDS**

**Figure 6.1  
UMAM Assessment Areas**





Road distances through wetlands and uplands were quantified using the measuring tool in Environmental Systems Research Institute, Inc. (ESRI) ArcMap 9.0 software based on the existing vegetation communities. Road and ditch widths were measured in the field and multiplied by road length to determine acreage.

Table 7 summarizes the proposed activities and the resulting FL credits the mitigation activities will generate. The FL credits generated by this project are based on the Relative Functional Gain from each proposed mitigation activity multiplied by the proposed mitigation acreage. A total of 124.4 credits will be generated from multiple mitigation activities occurring within the project boundary. The UMAM worksheets are provided in Appendix E, with a UMAM summary sheet at the end of Appendix E.

Proposed Mitigation Project	Type of Mitigation	Acreage	RFG	Existing Community Type	Proposed Community Type	Resulting FL Credits
Wetland Enhancement South of CR 2209	Wetland Enhancement	101.2	0.100	Wetland Forested Mixed	Wetland Forested Mixed	10.1
Wetland Enhancement North of CR 2209	Wetland Enhancement	160.3	0.100	Wetland Forested Mixed	Wetland Forested Mixed	16.0
Upland Enhancement South of CR 2209	Upland Enhancement	116.1	0.299	Coniferous Plantation	Coniferous Plantation	34.8
Upland Enhancement North of CR 2209	Upland Enhancement	155.4	0.210	Coniferous Plantation	Coniferous Plantation	32.6
Turnbull Creek Wetland Enhancement	Wetland Enhancement	73.9	0.075	Stream & Lake Swamps (Bottomland)	Stream & Lake Swamps (Bottomland)	5.5
Hydric Pine Flatwoods Enhancement	Wetland Enhancement	12.1	0.112	Hydric Pine Flatwoods	Hydric Pine Flatwoods	1.4
Hydric Pine Savannah Enhancement	Wetland Enhancement	22.1	0.075	Hydric Pine Savannah	Hydric Pine Savannah	1.7
South Parcel Wetland Enhancement	Wetland Enhancement	17.1	0.075	Wetland Forested Mixed	Wetland Forested Mixed	1.3
South Parcel Upland Enhancement	Upland Enhancement	52.6	0.299	Coniferous Plantation	Coniferous Plantation	15.7
Road and Ditch Removal in Uplands	Upland Restoration	9.8	0.274	Roads & Highways	Pine Flatwoods	2.7
Road and Ditch Removal in Wetlands	Wetland Restoration	2.6	0.350	Roads & Highways	Wetland Forested Mixed	0.9
Site 1 (NE Creation)	Wetland Creation	1.5	0.228	Borrow Areas	Wetland Forested Mixed	0.3
Site 2 (Southern Creation)	Wetland Creation	5.5	0.274	Borrow Areas	Freshwater Marsh	1.5
<b>TOTAL</b>		<b>730.2</b>				<b>124.4</b>

## 7.0 HYDROLOGIC AND HYDRAULIC MODEL

Jones Edmunds developed a hydrologic and hydraulic model for the north parcel to investigate the hydrologic patterns that will occur in the mitigation area assuming implementation of the proposed mitigation projects. The model was also used to confirm that no negative impacts will occur to adjacent lands after the projects are implemented.

The hydrologic and hydraulic model was developed using the Interconnected Channel and Pond Routing software package (ICPR) (v 3.02, Service Pack 6b) for the north parcel of the Turnbull Creek project site shown in Figure 7.1. This model was developed to investigate any potential hydrologic changes that could occur upstream or downstream of the mitigation area due to the implementation of the proposed mitigation projects. An H&H model was not developed for the south parcel as the only hydrologic-related mitigation activity is backfilling a hydrologically isolated roadside ditch. Thus, it is assumed that backfilling this ditch will not negatively affect adjacent parcels.

The model was built to analyze hydrology and hydraulics for the study area. The model schematic was created using ESRI's ArcGIS9.1 and geographic information system (GIS)-based tools developed by Jones Edmunds (Figure 7.1). Once the model was parameterized in GIS, it was imported into ICPR.

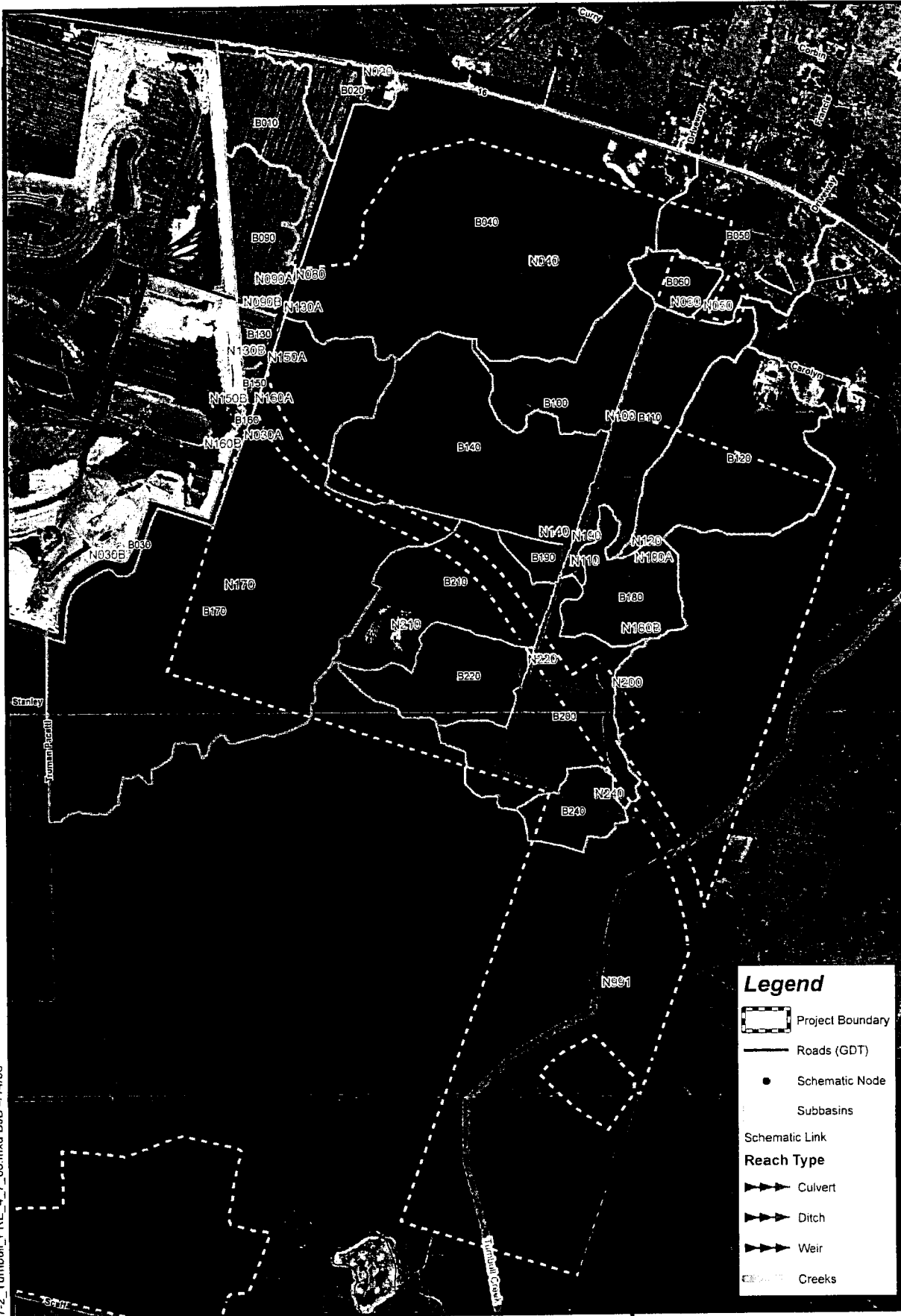
### 7.1 EXISTING CONDITIONS

The study area was divided into 21 subbasins ranging in size from 0.45 to 165 acres. Subbasins were then connected based on topographic and hydraulic features. The model schematic for existing conditions is shown in Figure 7.2. The primary drainage features influencing connectivity of subbasins are a farm ditch on the western edge of the project area and logging roads throughout the project area as shown in Figure 7.2. The farm ditch drains sod farms west of the project site. The majority of this farm area is being converted to a residential neighborhood (Mill Creek). Based on the ERP approved by the SJRWMD on June 10, 2003 (ERP #4-109-87819-2), this area is draining west to Mill Creek No. 2, so this area will no longer contribute to the ditch along the western limits of the project area.

A second ditch in the eastern portion of the project site runs north to south and eventually drains southward to Turnbull Creek. Both the eastern ditch and the western ditch were modeled as channels within ICPR. The other basins within the project site were hydraulically connected using large overland weirs or culverts. The 25-year 24-hour storm event was modeled in ICPR using the Florida Modified Type II rainfall distribution on the 24-hour rainfall depth of 9.2 inches for St. Johns County from the SJRWMD (Rao, 1991).



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**Legend**

- Project Boundary
- Roads (GDT)
- Schematic Node
- Subbasins
- Schematic Link
- Reach Type**
- Culvert
- Ditch
- Weir
- Creeks

**Figure 7.2**  
Pre-development  
Model Schematic

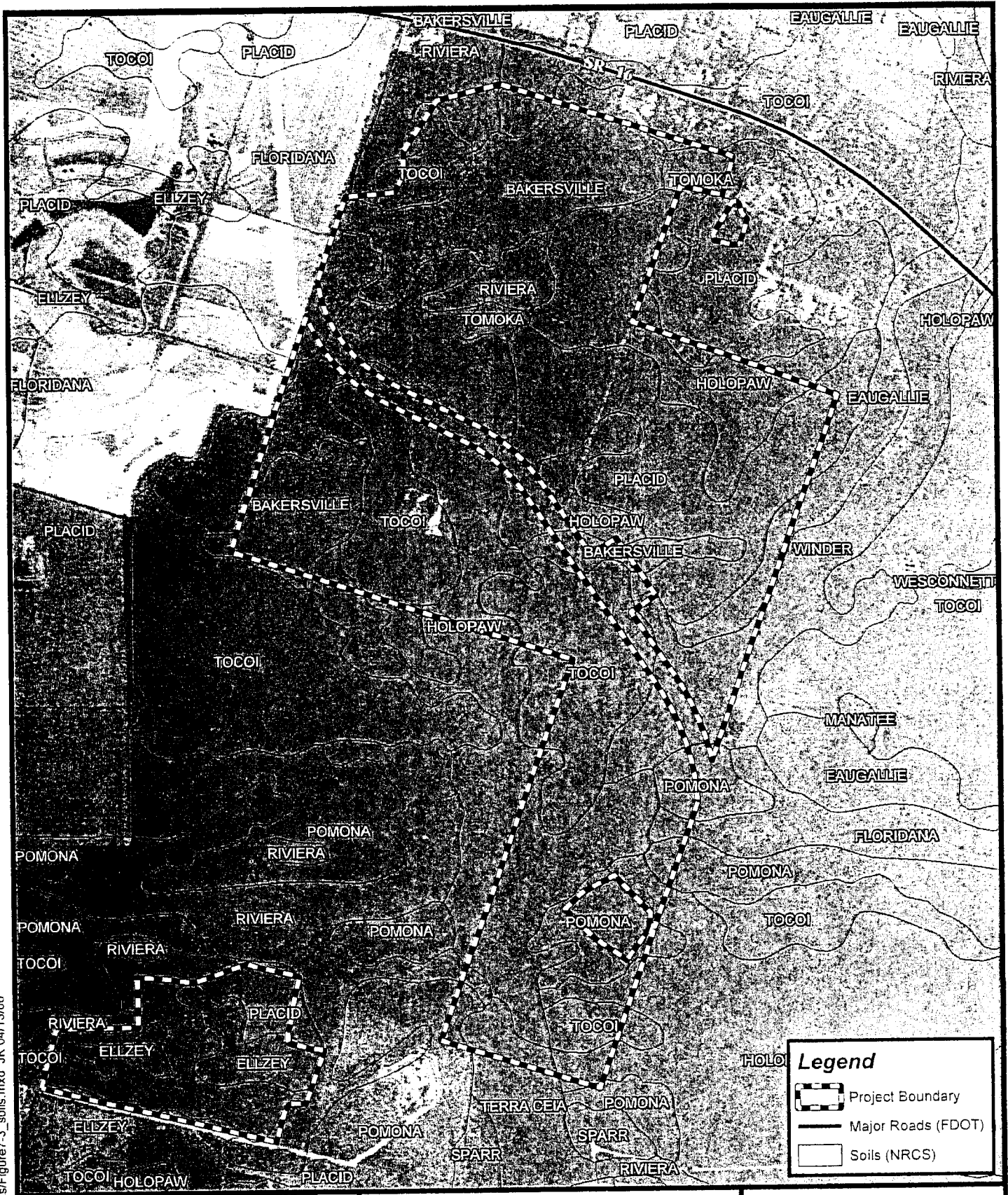
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**JONES**  
**EDMUNDS**

The methodology used to obtain specific model parameters is detailed below:

- **Topographic Information:** Topographic information for the study area was extracted from the St. Johns County Light Detection and Ranging (LiDAR) dataset that was collected in January of 2003. A digital terrain model (DTM) was created from the LiDAR data points and supplemental three-dimensional breaklines. The DTM provided a three-dimensional representation of the watershed and was the basis for interpolating the contours used for modeling. In January 2006, a registered land surveyor collected culvert inverts and channel cross-sections throughout the project site. The vertical reference for all data is the North American Vertical Datum of 1988 (NAVD88). The geographic coordinate system used for all GIS analyses was NAD 1983 State Plane Florida FIPS 0901 East in units of feet.
- **Directly Connected Impervious Area (DCIA):** The project site consists primarily of natural vegetation communities and a few dirt logging roads. As a result there are negligible directly connected impervious areas within the project site.
- **Curve Numbers (CN):** A composite Curve Number (CN) was calculated for the pervious area of each subbasin using CNs from Table 2-2c of Soil Conservation Service (SCS) TR-55 and modifying them for the study area (NRCS, 1986). Curve number calculations and a copy of Table 2-2c from TR-55 are included in Appendix E. A soils map of the project site is provided in Figure 7.3.
- **Time of Concentration (Tc):** Tc for each subbasin was calculated as the combination of sheet and shallow concentrated flow—and channel flow where applicable. All of these flows are based on the NRCS TR-55 equations (NRCS, 1986). The Tc calculations can be found in Appendix E.
- **Stage-Area:** Stage-area relationships for each subbasin were calculated using a GIS tool that extracts the storage area from topographic data at stages varying from 0.1- to 1-foot intervals.
- **Boundary Conditions:** Turnbull and Mill Creek No. 2 are the boundary conditions for the project site. The boundary conditions were set at the peak stage as determined from the FEMA Flood Insurance Study (FIS) 12109CV000B. Node N991, representing Turnbull Creek, was set at 20.0 feet for the 25-year 24-hour storm event based on Figure 2.24P of the FIS. Node N999 located east of County Road 13A, represents Mill Creek No. 2, and was set at 11.3 feet for the 25-year 24-hour storm event based on FIS figure 13P.







19270-023 ERP\_figures\Figure7-3\_soils.mxd JK 04/13/06


**JONES  
EDMUNDS**

**Figure 7.3  
Soils Map (NRCS)**

**Legend**

-  Project Boundary
-  Major Roads (FDOT)
-  Soils (NRCS)

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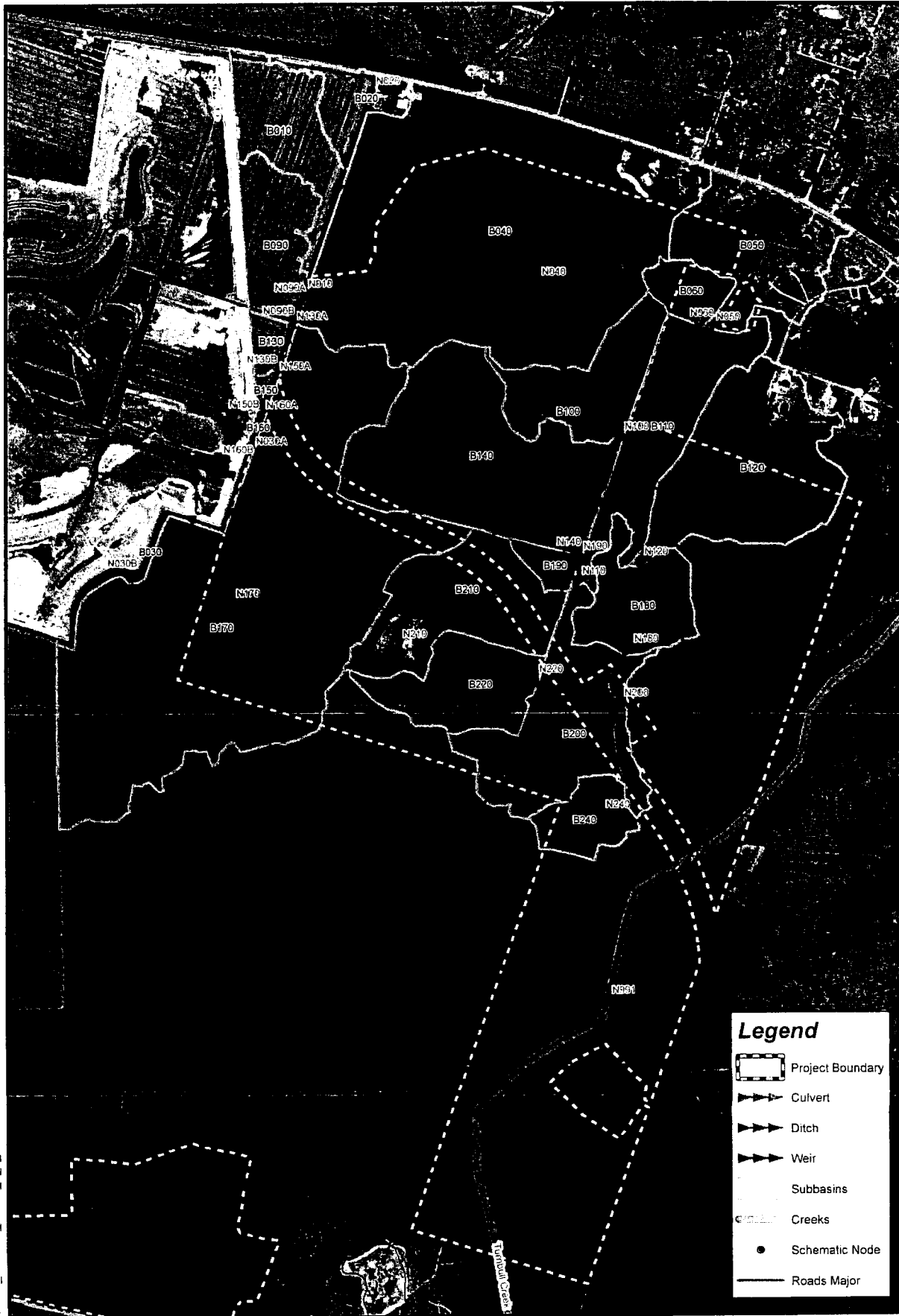
  
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## 7.2 PROPOSED CONDITIONS

The proposed conditions model (i.e., with all mitigation activities implemented) was developed to investigate the changes that the proposed mitigation projects may have on off-site flood stages and downstream flows. Figure 7.4 shows the model schematic for the proposed conditions.

The following describes how the proposed mitigation projects were modeled:

- The eastern drainage ditch that runs alongside an existing road will be filled and the road removed (Restoration Site 7) so that these areas match the surrounding grade. The drainage ditch in the model (C180A\_180B and C180B\_200) was replaced with an overland weir (W180\_200) to model the overland flow that will occur from this regrading. The invert of the overland weir was set at the surrounding natural grade based on a site survey of the area.
- The main road running north-south through the center of the project site (Restoration Site 11) will be graded down approximately 1 foot along the length with the adjacent roadside ditches partially filled. The culverts that are currently running under this road would be removed. To model the consequence of these changes, culverts P050\_100, P060\_110, P100\_110, P190\_110, P110\_200, P140\_190, P110\_120, P120\_180A, P220\_200, P200\_240, and P240\_991 were removed from the model and overflow weirs W220\_200, W190\_110, W100\_110, W050\_110, and W060\_110 (modeling culvert overflows) were lowered by approximately 1 foot.
- Roads running east-west (Restoration Sites 3, 4, and 5) to the west of the main north/south road will be removed. To account for this in the model, overflow weirs W140\_190, W140\_210, W170\_140, and W100\_140 representing the flow over these roads were lowered to the surrounding grade based on the site survey.
- The drainage ditch west of the project site conveys runoff that historically would have been overland flow into the project site. To restore some of this historic flow, the approximately 25.6-foot-high spoil berm to the east of the ditch will be lowered in several locations to an elevation of 23.5 feet (Restoration Site 10). This would allow flow into the on-site wetlands during large storm events but would be high enough to prevent discharge back into the ditch from the project site. This would encourage the wetlands to be re-hydrated without potentially flooding areas downstream. These berm breaches were modeled by lowering the weir representing the berm to an elevation of 23.5 feet.



**JONES  
EDMUNDS**

**Figure 7.4**  
**Proposed Conditions**  
**Model Schematic**

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- The southern borrow ponds (Restoration Site 2) located near the center of the project area will be filled to a targeted wetland grade and converted to herbaceous emergent marsh. This was modeled by reducing storage in Basin 210 to account for filling these borrow areas.
- It is proposed that the ditches that currently convey flow within basins B100, B110, B140, and B180 will be eliminated. To account for this change the Tc calculations for these basins were adjusted—with the former channel conveyance being converted to shallow concentrated flow. The calculations for the proposed conditions Tc can be found in Appendix E.

### 7.3 REVIEW OF PRE- AND POST- DEVELOPMENT STAGE CONDITIONS

The results of the existing conditions ICPR model were compared to the proposed conditions ICPR model to determine what hydrologic changes could potentially occur when the mitigation activities were implemented. Stages at nodes of interest and outflows to Turnbull Creek and Mill Creek No.2 were reviewed for any negative effects caused by the proposed changes. Nodes of interest were those nodes that represented areas outside of the project boundary north, south, and west of the site. Stages for existing and proposed conditions at all nodes are shown in Table 8 for the 25-year 24-hour rainfall event. Peak discharges from the site for existing and proposed conditions are shown in Table 9.

### 7.4 RESULTS AND DISCUSSION

Based on the results of the ICPR model for the 25-year 24-hour storm event, the proposed peak discharges at boundary or off-site nodes are expected to decrease or remain the same in comparison to the existing peak discharges (Tables 8 and 9). This is partially because there is minimal topographic change, a typically high groundwater table, and very little internal water storage at the site. For example, peak stages at node N020 which is upstream of the project site is expected to remain the same compared to the existing peak stages. The proposed peak discharges for nodes N030B and N999, which are downstream of the project area, slightly decrease or experience no change in peak stage, respectively (Table 8). The slight decrease in peak stage at N030B occurs due to the berm breaching proposed at Site 10, which will allow hydrologic flow from the large north-south ditch to enter a large depressional forested wetland. This should help enhance the hydrologic conditions in this wetland as flows are currently diverted in the large ditch to the west and away from this wetland.

Node	Existing Stage (ft)	Proposed Stage (ft)	Difference (ft)
N010	25.4	25.4	0
N020	25.6	25.6	0
N030A	24.9	24.9	0
N030B	24.4	23.9	-0.5
N040	24.4	24.1	-0.3
N050	25.5	24.1	-0.9
N060	23.5	24.1	0.6
N090A	25.4	25.4	0
N090B	25.3	25.3	0
N100	24.4	24	-0.4
N110	23.4	23.8	0.4
N120	24	23.8	-0.2
N130A	25.3	25.3	0
N130B	25.2	25.2	0
N140	23.2	23.1	-0.1
N150A	25.2	25.2	0
N150B	25.1	25.1	0
N160A	25	25	0
N160B	25	25	0
N170	23.2	23.1	-0.1
N180A**	23.6		
N180B**	22.2	22.2	0
N190	22.5	23.7	1.2
N200	21.1	21.2	0.1
N210	22.4	22.2	-0.2
N220	22.4	21.4	-1
N240	20.7	20.4	-0.3
N991	20	20	0
N999	11.3	11.3	0

\*Highlighted cells correspond to offsite basins or boundary nodes  
 \*\*Proposed conditions N180 was equated with existing conditions N180B

Node	Creek	Existing Maximum Inflow (cfs)	Proposed Maximum Inflow (cfs)	Difference (cfs)
N991	Turnbull	540.3	538.9	-1.4
N999	Mill no.2	46.4	33.0	-13.4

Within the project boundary, peak stage for the 25-year 24-hour storm for nodes N060, N110, N190, and N200 slightly increased (Table 8). These increases imply that in basins B060, B110, B190, and B200 peak stage will increase slightly which will rehydrate the basins and the hydroperiod should more closely reflect historic conditions. Removing the roads and ditches will also restore the historic sheetflow pattern in the project area.

Based on the results detailed above, the proposed restoration activities at the TCRMA should not result in negative hydrologic effects such as flooding to property owners upstream or downstream of the project site.

## 7.5 CONCLUSION

The proposed mitigation projects at the TCRMA should have no negative impacts on peak stages upstream of the project site or increase peak discharges into Turnbull Creek or Mill Creek No. 2 for the 25-year 24-hour storm event. As a result, no negative hydrologic impacts (i.e., flooding) to adjacent land owners are anticipated after the proposed mitigation projects are implemented. The model also demonstrates that the hydroperiod, represented by peak stage should increase slightly in many of the basins which should restore the hydroperiod of on-site wetland and upland communities to more closely mimic historic conditions.

## 8.0 CONCEPTUAL LAND MANAGEMENT PLAN

### 8.1 LAND MANAGEMENT GOALS

TCRMA was acquired to help meet mitigation needs for freshwater wetland impacts associated with County capital-improvement projects. This overriding purpose leads to the adoption of the following land management goals:

- Restore and maintain water quality and natural hydrological regimes.
- Restore, maintain, and protect native natural communities and diversity.
- Provide opportunities for environmental education and recreation where compatible with these goals.

The following sections outline specific objectives and strategies to achieve these goals.

### 8.2 RESOURCE PROTECTION AND MANAGEMENT

#### 8.2.1 Security

Currently, TCRMA has not been fenced or posted, although portions of the boundary are fenced. The north access point is from SR 16, which is currently gated and locked. In addition, residents from the adjacent Turnbull Creek Estates development access the property through a section of fence that is cut. This fence opening will be converted to a pedestrian-only access point (with the opening in the fence small enough to prohibit entry with an ATV).

The property will be posted with appropriate signs identifying the area as County-owned conservation lands. Fencing of the remainder of the property is not recommended due to the nature of the property boundary. Several securities measures that will be considered by the County are listed below:

#### Security Strategies

- Install and maintain boundary and entrance signs.
- Install a pedestrian-only access point for Turnbull Creek Estates residents.
- Encourage regular patrols by law enforcement officials (Florida Fish & Wildlife Conservation Commission, Sheriff's Office, etc).
- Conduct regular site visits by County staff to discourage dumping or vandalism.
- Evaluate the feasibility of establishing an on-site security residence.

### 8.2.2 Water Resources Protection

Restoration and preservation of the natural hydrological regime is the principal water resource management issue at TCRMA. This includes the continual protection of Turnbull Creek's extensive wetland and floodplain forest communities. Currently, these communities have been disturbed by silvicultural activities, yet they still provide important ecological functions such as flood storage, wildlife habitat, and natural buffer to the increasing development found nearby. These wetlands also help maintain water quality of Turnbull Creek watershed, which is a tributary of Six Mile Creek and the St. Johns River.

If available and in conjunction with CR 2209 ROW acquisition, it would be important to secure additional property rights, in full fee or as a conservation easement, along the east and south boundaries of Turnbull Creek. These additional conservation measures would help further protect and enhance water resource functions in the area.

### 8.2.3 Resource Management

The primary goal of resource management is the restoration of natural communities to promote and maintain a more functional ecological system. On Turnbull Creek, the principal means of achieving this goal are 1) hydrological restoration, 2) reduction of the shrub layer in the uplands and adjacent wetlands to promote an herbaceous layer and canopy basal area that mimics historical conditions, and 3) conversion of silviculturally altered uplands and wetlands back to historical natural communities.

Much of the natural communities at TCRMA are either fire dependent or fire influenced, making prescribed fire the most important land management tool for restoring and preserving community diversity, ecotones, and their ecological processes. Section 9.0 of this document provides a specific fire management plan for this property.

In general, the initial fire management approach is to implement a dormant season burn to remove accumulated fuel loads. The Division of Forestry (DOF) has agreed to provide technical oversight and logistical support and has indicated that an aerial ignition using a helicopter would be the preferred technique for implementing a prescribed fire for the entire site. Areas that were not successfully burned may be mechanically reduced (mowed) to remove accumulated litter and debris. If necessary, a second dormant-season burn will be applied.

However, the ultimate goal for the TCRMA is to establish growing season burns to mimic natural lightning-ignited fires. Growing season burns result in a reduced shrub layer, a diverse and abundant herbaceous layer, and a reduction of hardwoods. Vegetative conditions at Turnbull Creek should be suitable for a growing season burn within 1 to 2 years after the dormant-season burn has been applied. Subsequent burns will occur every 2 to 4 years.

Due to surrounding residential developments and existing and planned roadways, smoke management issues may restrict opportunities for prescribed fires. If that proves to be the case,

mechanical fuel reduction via mowing will continue periodically to manage and maintain an herbaceous understory with a minimal shrub layer as a means of mimicking the benefits of prescribed fire.

#### 8.2.4 Exotic Species

The most problematic exotic plant species at the site is Chinese tallow tree. This species population at TCRMA is not extensive but could become so if left unmanaged. Due to the relatively low densities and the species being located primarily along roads, eliminating this species from the property is feasible and attainable.

Larger individual Chinese tallow trees will be mechanically removed and stumps treated with appropriate herbicides following label directions and restrictions. Smaller individuals will be cut or hand pulled and burned or removed. The property will be systematically surveyed annually for presence of exotic plants, and any individuals found will be physically removed or herbicided.

TCRMA has what appears to be a small to medium feral hog population. The County should implement a feral hog removal program via trapping by a licensed trapper.

#### Exotic Species Strategies

- By May 2008, treat all exotic plants currently found on site.
- Annually monitor and remove or treat all exotic plants found on the site.
- Annually monitor adjacent property boundaries for presence of other exotic plant populations that may serve as a contamination source.
- Monitor damage by feral hogs and remove via trapping as needed.

### 8.3 LAND USE MANAGEMENT

Because the County has purchased the property for mitigation purposes, the County will restrict public use as necessary in order to protect natural resources and the restoration and conservation projects. County staff will coordinate with the Division of Historical Resources to identify, locate, register on master site file, and protect cultural and historical resources, if any.

TCRMA can provide limited public use opportunities, such as hiking, bird watching, picnicking, horseback riding, and environmental education. All other uses, including hunting, biking, motorized vehicles, and camping will be prohibited. An active county recreational facility at the northeast corner of the Turnbull Creek property is proposed that will be used as a trailhead and nature park facility and will also likely contain ball fields. If such uses are implemented,

additional details and guidelines for compatible activities will be incorporated into this document.

In cooperation with the SJRWMD, the St. Johns County School Board has established a Legacy Program at several schools in St. Johns County. The Legacy Program is an environmental education program developed for middle and high school students, but also offers opportunities for developing skills in such areas as landscape architecture, carpentry, and recreation management. The Legacy program will be approached for possible interest in assisting the County with some of the management needs at Turnbull Creek, while serving as an outdoor classroom for students.

## 9.0 FIRE MANAGEMENT PLAN

The TCRMA Fire Management Plan (FMP) serves as a working tool and informational document on fire management activities for the County, the DOF Forest Management Bureau and Forest Protection Bureau, and the Florida Department of Agriculture Services. The purpose of fire management in the TCRMA is to restore, maintain, and protect native ecosystems, natural communities, ecotones, and their associated ecological processes.

### 9.1 FIRE HISTORY

Historically, the primary causal agents for fire in the Eastern Flatwoods of Florida were lightning strikes and Native American Indians. These fires were frequent low-intensity fires which occurred primarily in the early growing season (May - June). Before County ownership, historic fire activity consisted of sporadic dormant-season prescribed fires and an occasional wildfire. Approximately 12 to 16 years ago, a prescribed fire on the site escaped and the resultant wildfire consumed approximately 400 acres. As a result, the fuel loads on-site are not excessive and DOF personnel indicated during a site visit that a successful prescribed fire program can be readily implemented. The initial goal will be to reduce fuel loads with subsequent burns intended to mimic historical fire regimes by conducting prescribed fires during the early growing season.

### 9.2 PRESCRIBED FIRE

Prescribed fires are carried out to meet clearly stated measurable management objectives, including but not limited to hazard removal, ecological process restoration, seed bed preparation, disease control, wildlife management, and access improvement. In cooperation with DOF personnel, County staff will develop a document titled *Prescribed Burning Plans for TCRMA*, that identifies management objectives, areas scheduled to be burned, acceptable weather parameters, and other pertinent fire information to be used for the coming year. The Prescribed Burning Plan for TCRMA will be developed to mimic the natural fire regime and to fulfill the fire management purpose of restoring, maintaining, and protecting native ecosystems, natural communities, ecotones, and their ecological processes.

Based on the annual Prescribed Burning Plan, individual fires will be conducted based on a burn plan (prescription) that will contain, at a minimum, what is required by Florida Administrative Code 5I-2.006. The plan also must include the smoke screening procedure as outlined in Chapter 7, Appendix 2 of DOF's FIRE MANUAL. Before each prescribed burn, a courtesy call will be made to Division of Historical Resources, SJRWMD, and other appropriate agencies.

Only Certified Prescribed Burn Managers will prepare burn plans and supervise prescribed burns. In addition to being certified, all Burn Managers will have completed a minimum training program which includes Interagency Basic Prescribed Fire, Florida Fire Behavior, and Standards for Survival. All prescribed fires will meet the provisions of Florida Statutes 590.125(2 & 3) and



Florida Administrative Code 5I-2.006(2) and Prescribed Fire Standards parameters will be followed on all prescribed fires.

### 9.3 SMOKE MANAGEMENT

Caution will be exercised to prevent a public safety hazard or health hazard from the smoke of any prescribed fire or wildfire on TCRMA. The Burn Manager or his/her designee will contact the Florida Department of Transportation to request placement of signs when smoke from a prescribed fire or wildfire threatens to reduce visibility on a main road or highway. Every effort will be made to prevent prescribed fires from entering areas of organic soils during dry periods. If organic soils should be ignited, suppression efforts will be taken as deemed necessary by the District Manager or designee. In addition, if smoke threatens to cause a safety hazard or public nuisance, direct immediate suppression action will be taken.

### 9.4 ENVIRONMENTALLY SENSITIVE AREAS

The use of heavy equipment in the on-site wetlands and floodplain forest associated with Turnbull Creek will be avoided. All loading, unloading, and staging of equipment, vehicles, and crews will be conducted on existing roads and/or firebreaks.

### 9.5 CULTURAL AND ARCHEOLOGICAL SITES

There are no known cultural and/or archeological sites on TCRMA. If such sites are encountered, fire management activities described in this plan will be modified to protect any cultural or archaeological resources to the greatest extent possible.

### 9.6 FIREBREAKS AND FIRE LINES

Permanent firebreaks are natural barriers and existing roads and trails. Systems of approximately 12-ft-wide permanent firebreaks will be established and maintained around and within the boundaries of TCRMA to guard against fires escaping. These firebreaks will be unplanted portions of roads and ditches that are removed or backfilled as part of the proposed mitigation sites.

All permanent firebreaks and fire lines will meet the established Best Management Practices (BMPs). Emphasis is placed on the use of permanent firebreaks, water, and foam during prescribed burning and wildfire suppression on TCRMA, when conditions allow. Plowed and/or bulldozed lines will be used only to prevent imminent and possibly extensive damage to life, property, or resources, including threats to firefighters. These plowed and bulldozed fire lines will be rehabilitated and BMPs will be implemented as soon as practical after fires are suppressed.

## 9.7 POST-BURN EVALUATION/MONITORING

Post-burn evaluations and monitoring will be done for each prescribed fire and wildfire on TCRMA. To provide information and data for future management decisions, the County will maintain a record of all prescribed fires and wildfires and make this record a part of any annual reporting requirements associated with use of the property for mitigation.

## 9.8 PROPOSED IMPLEMENTATION

The FMP will be implemented over several years, beginning with the drafting of the FMP followed by on-going forested stewardship using controlled burns. The following provides the proposed schedule for implementing the TCRMA FMP:

- Implement the approved mitigation and restoration activities according to SJRWMD and ACOE permit authorizations.
- Finalize TCRMA FMP by May 2007.
- By May 2008, reduce fuel loads and shrub layer via implementation of the first dormant-season burn and evaluate success.
- If needed, conduct selective mowing or a second dormant-season burn.
- By May 2010, develop and implement the annual Prescribed Burning Plan (Section 9.0), including prescriptions that direct and promote growing-season burns.
- With DOF and other forest management experts, develop and implement a forest stewardship plan that promotes old growth, uneven-age forest canopies.

10.0 REFERENCES

NRCS. *Technical Release 55: Urban Hydrology for Small Watersheds*. USDA (U.S. Department of Agriculture). June 1986.

Rao, Donthamsetti V. *Technical Publication SJ 91-3: 24-Hour Rainfall Distributions for the St. Johns River Water Management District, Northeast Florida*. SJRWMD. 1991.

**ENVIRONMENTAL RESOURCE  
PERMIT APPLICATION AND  
MITIGATION PLAN  
FOR TURNBULL CREEK  
REGIONAL MITIGATION AREA**

**RESPONSE TO SJRWMD  
REQUEST FOR ADDITIONAL  
INFORMATION**

107782-1

*Prepared for:*

**ST. JOHNS COUNTY BOARD OF COUNTY COMMISSIONERS**  
4012 Lewis Speedway  
St. Augustine, Florida 31284

*Prepared by:*

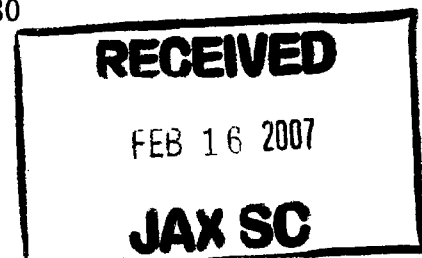
**JONES EDMUNDS & ASSOCIATES, INC.**  
730 NE Waldo Road  
Gainesville, Florida 32641

Certificate of Authorization #1841

*and*

**TURNBULL ENVIRONMENTAL, INC.**  
50 Agnes Circle  
St. Augustine, Florida 31280

February 2007



**Response 13:** After further consideration and discussions with the Florida Department of Forestry (DOF), a perimeter firebreak will be maintained in the uplands only. The DOF will help the County burn the TCRMA and feels that the entire site should be burned at one time rather than dividing the site up into blocks as was previously proposed. Thus, the proposed fire breaks throughout the site are no longer proposed. Under lower fuel loads, acceptable soil moisture and humidity, and other prescribed fire parameters, fire will be allowed to burn into wetlands, as had naturally occurred in the past. Wetlands will be protected from prescribed fire in adjacent uplands by the use of 'soft' firebreak techniques, such as application of fire-retardant foam or back-burning adjacent to the wetland line to create a 'blackline.'

*Comment 14: Please indicate the extent of the proposed horse riding trails, hiking trails, educational facilities, boardwalks, etc. that may be constructed within wetlands [40C-4.301 and 4.302, F.A.C.].*

**Response 14:** The only public-access-related infrastructure will be a hiking trail which will also serve as the sole access road into the project area. Please refer to Figure R-14 for the location of the proposed hiking trail.

*Comment 15: Please revise the extent of the areas that will involve the timber being cut, dropped and left on the ground on Figure 5.1. Based on the FLUCCS map, there are areas that are shown as being enhanced by pine removal, but the FLUCCS indicates they are not communities dominated by pine and thus may not benefit from the removal of the existing pines [40C-4.301 and 4.302, F.A.C.].*

**Response 15:** Please refer to Figure R-15 in Attachment R-15. The proposed thinning areas have been planted with pines and the planting rows are obvious on aerial photographs in many areas. The proposed thinning areas were ground truthed on December 13, 2006. Many of the proposed areas have planted pines interspersed with the naturally recruited cypress, sawgrass, Virginia chain fern, and other FACW or OBL species.

*Comment 16: Please discuss the anticipated densities of the remaining trees within the wetlands areas in which the pines will be thinned. Will all of these pines be removed from the site, or will the pines be dropped and left in any areas [40C-4.301 and 4.302, F.A.C.]?*

**Response 16:** Slash pine has a considerably higher evapotranspiration (ET) rates than mixed forested wetlands (cypress and hardwoods) that dominate the on-site wetlands. For example, Gholz and Clark (2002) found that annual ET rates for slash pine forests averaged 959, 951, and 1110 mm/yr in North Florida systems while Ewel and Smith (1992) found that cypress swamps ET averaged 600 mm/yr. The intent of the proposed wetland thinning is to remove the planted pines and thin wetland areas that have had a high density of natural pine recruits in areas that were formerly dominated by cypress and mixed hardwood species. Not only will this activity restore the historical canopy coverage of these wetlands, it should also enhance hydroperiods that have been suppressed due to the planted and naturally recruited pine canopy.

Typical slash pine plantation densities are 500 to 700 trees/acre. The goal of this activity is to reduce pine density by 80 to 90 percent. This would result in a remaining pine density of approximately 40 to 60 pines per acre. The pine appear to have been planted approximately 10-14 years ago based on 1993 aerial photography. As a result, a majority of trees have a diameter at breast height (DBH) greater than 6 inches. Trees with a DBH greater than 6 inches will be cut and removed from the site by a contractor using the methods that result in the least amount of disturbance to the wetland. Trees less than 6 inches in DBH will be cut and left in place to decompose naturally. In transitional areas we propose to remove at least 90% of those present as it is felt that these areas are where the pines compete most with young cypress and other desirable wetland tree species.

A majority of the wetland areas where thinning is proposed generally have sufficient natural recruitment of young desirable canopy species such as bald cypress, red maple, and loblolly bay. After pine removal, permanent photo stations will be installed in several areas to review these areas for cypress and other wetland tree recruitment, existing cypress and other wetland tree health, and pine recruitment. Results of these qualitative reviews will be presented in the annual monitoring reports. If additional removal is proposed, this will be explained in the report as required maintenance and approval from SJRWMD will be requested.

#### ADDITIONAL COMMENTS FROM CHRISTINE WENTZEL

*Comment: Will culverts be installed under the proposed firebreaks that will remain at mitigation sites 3 through 8? I think these will be necessary in order to get restoration of sheet flow through the wetland.*

**Response:** No firebreaks will remain at Sites 3-8. The only firebreaks currently proposed may occur along the perimeter of the site in uplands. These firebreaks will be disked through existing grade and thus no dredging or filling is proposed in any upland or wetland areas.

*Comment: The three borrow pits within mitigation site 2 and the ditches in mitigation sites 3 through 8 and 11 will need to be assessed as wetland enhancement, not wetland creation or restoration.*

**Response:** Comment noted.

*Comment: I am concerned that if the number pine trees dropped and left in the wetland is extensive, that the wetland won't be enhanced. I guess we will see the number of trees you are considering dropping during our field visit.*

**Response:** Comment noted.

Mitigation	Habitat Type	Location and Landscape Support		Water Environment		Community Structure		Time Lag	Risk Factor	Preservation Adjustment Factor	Relative Functional Gain	Acres Provided	Functional Gain Units
		before	after	before	after	before	after						
we thin p	620	7	7	8	8	7	8	1.07	1.5	1	0.0208	39.29	0.654833
we hydro	630	7	7	6	8	7	8	1.07	1.25	1	0.0748	64.62	4.8314
we thin p		7	7	8	8	6	8	1	1	0.5	0.0333	183	6.1000
we hydro		7	7	7	7	6	7	1	1	0.5	0.0167	89.82	1.3970
we thin p		7	7	6	8	7	8	1.07	1.5	1	0.0623	89.82	5.2224
we hydro		7	7	0	8	0	8	1.07	2	1	0.3583	6.33	1.9095
2 we	640	7	7	8	8	1	8	1.07	2	1	0.1090	2.1	0.2290
2 we	640	7	7	0	8	1	8	1.92	1.5	1	0.2662	2.22	0.5910
34569 WR	630	7	7	0	8	1	8	1.92	1.5	1	0.0810	0.98	0.0753
34569 WR	630	7	7	8	8	0	8	1.92	1.5	1	0.3489	11.34	3.9566
1-7-9 WR	434	0	7	0	8	0	7	1.07	1.25	0.8	0.4187	133.8934	133.8934
411	411	0	7	0	8	0	7	1.07	1.25	0.8	0.0000	0.0000	0.0000
U	U			X	X			1	1		0.0000		0.0000
U	U			X	X			1	1		0.0000		0.0000
U	U			X	X			1	1		0.0000		0.0000

Total Impact Acres 4475.13  
 Total Wetland Acres Provided 331.13  
 Total Upland Acres Provided 159.676  
 Total Functional Gain 159.676

1. This number exceeds 57.676 acres in the WMA because it counts wetland acres that are preserved, either directly or indirectly, in the WMA. The acres of wetland that are preserved were included in the total upland acreage. Some wetland acreage has been counted which exceeds the acres that would be preserved and included.

Subtracted 1.25 from Site 2  
 Subtracted 0.34 from Site 11  
 Sub 2.14 from Site 11 & add 1.25 from Site 2  
 Includes perpetual management