LEVY NUCLEAR PLANT AND ASSOCIATED TRANSMISSION LINES
WETLAND MITIGATION PLAN

COMPREHENSIVE DESIGN DOCUMENT

LEVY COUNTY, FLORIDA

September 2011

FOR

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PEF 903
St. Petersburg, Florida 33733

REPORT BY

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EXECUTIVE SUMMARY

Progress Energy Florida (PEF), a regional power company that provides electric service to over five million people throughout Florida, has proposed to build a new nuclear generating facility in Levy County, Florida. PEF has been working with the Nuclear Regulatory Commission (NRC) through the long, complex entitlement process requiring numerous permits and approvals for the Levy Nuclear Plant (LNP). A part of the process is acquisition of wetland permits from the State of Florida and U.S. Army Corps of Engineers (ACOE). Wetland permit applications have been submitted to the Florida Department of Environmental Protection (FDEP) and ACOE. This plan addresses the compliance with the Environmental Resource Permit (ERP) rules through FDEP under the Power Plant Siting Act Site Certification process and the ACOE Section 404 and Section 10 Individual Permit for the plant and associated transmission lines. The content of this document is the detailed mitigation plan for LNP and associated transmission lines.

In June 2008, PEF formally filed a Site Certification Application (SCA) with FDEP which was approved in August 2009 (FDEP Site Certification No. PA 08-51C) and a Section 404 permit application with the ACOE (ACOE Permit No. SAJ-2008-490). These applications involve 668.4 acres of permanent wetland impacts related to the construction of LNP and associated new powerlines. An April 23, 2010 preliminary Wetland Mitigation Plan was submitted and has been preliminarily reviewed by FDEP, this document is the detailed mitigation plan and refinement of the watershed approach presented in the April plan.

Due to the location and substantial size and reach of the project, wetland impacts occur within several drainage basins. PEF proposes a mitigation plan that compensates wetland losses within the basin (watershed) of the impacts. The impacts occur in five different basins from the development of the power plant and associated transmission lines within the preferred rights-of-way. The watersheds being impacted include the Waccasassa, Withlacoochee, Hillsborough, Upper Coastal, and Tampa Bay watersheds as defined by FDEP. The mitigation plan has been designed to satisfy the requirements of the state and federal agencies based upon Uniform Mitigation Assessment Method (UMAM) and agency specific mitigation guidelines as outlined in the LNP Conditions of Certification (COC) and the 2008 mitigation rule for ACOE (33 CFR Parts 325 and 332, 40 CFR Part 230). The COC required the submittal of the wetland mitigation plan to FDEP by May 24, 2010 which was accomplished by the submittal of the April 2010 Wetland Mitigation Plan. As stated above, this plan is a refinement of the April plan.

The 2008 mitigation rule for ACOE indicates that a watershed based approach is the preferred method to provide wetland impact compensation. As stated above this mitigation plan meets the requirements of the permittee-responsible mitigation under a watershed approach. The 2008 mitigation rule also outlines the information needed in the mitigation plan such as the objectives, site selection, site protection, baseline information, determination of credits, mitigation work plan, maintenance plan, performance standards, monitoring plan management plan and financial assurances. The wetland mitigation plan presented herein meets these requirements.

Under the permittee-responsible mitigation approach PEF is financially responsible for all aspects of this wetland mitigation effort. The specific financial assurance instrument that PEF will use will be determined once the wetland mitigation plan has been reviewed and approved by the regulatory agencies. Funds for the mitigation activities contained in this plan for lands owned by the Florida Forest Service (FFS), and Pasco County are not contained in any of their budgets and would not occur if PEF was not funding and conducting these activities as a part of this wetland mitigation plan.

Wetland impacts for the LNP project have been assessed by UMAM for each basin on the project site (Table 1). Development will impact 59.1 acres of herbaceous wetlands (loss of 38.7 UMAM units) and 609.3 acres of forested wetland (loss of 250.4 UMAM units).

Table 1. Summary of wetland impacts for Levy Nuclear Plant development.

Watershed	Herbaceous Wetland Functional Loss Units	Herbaceous Wetland Acreage	Forested Wetland Functional Loss Units	Forested Wetland Acreage	Total Functional Loss Units	Total Acreage Impacted
Waccasassa	-1.3	2.6	-181.7	385.5	-183.0	388.1
Withlacoochee (plant site)	-0.4	2.4	-29.2	124.7	-29.6	127.1
Withlacoochee (trans. lines)	-9.8	13.8	-9.2	27.2	-19.0	41.0
Hillsborough River	-15.7	22.4	-0.9	1.1	-16.6	23.5
Upper Coastal	-5.2	8.5	-29.1	70.1	-34.3	78.6
Tampa Bay	-6.3	9.4	-0.3	0.7	-6.6	10.1
Total	**-38.7**	**59.1**	**-250.4**	**609.3**	**-289.1**	**668.4**

Source: April 23, 2010 Wetland Mitigation Plan

In response to the impacts defined above, PEF evaluated numerous mitigation sites and eventually identified six potential sites. Detailed mitigation plans have been developed for the six different mitigation sites. These sites include the following:

- Daniels Island Tract within the Goethe State Forest (GSF) in the Waccasassa watershed;
- LNP site with activities in the Waccasassa and Withlocoochee watersheds;
- Boarshead Ranch (BHR) in the Withlacoochee and Hillsborough watersheds
- Five Mile Creek (FMC) and Homosassa Tract within the Withlacoochee State Forest (HT) within the Upper Coastal watershed; and
- Brooker Creek Preserve (BCP) in the Tampa Bay watershed.

In the April 2010 Wetland Mitigation Plan, the Daniels Island Tract plan called for pine thinning, ditch filling and blocking, low water crossing (LWC) installation and timber thinning for management of Red Cockaded Woodpecker (RCW) habitat. This plan still incorporates some of these activities, but has eliminated the ditch filling/blocks and pine thinning. This plan also increases the number of LWC's and culvert replacements. Some of the LWC's are outside of the Daniels Island tract boundary so this site is now referred to as the Goethe State Forest site. The LNP site focused primarily on habitat restoration and hydrologic improvement through the installation of raised road beds with additional culverts and LWC's. This plan retains most of the same activities, but has reduced the number of raised road beds and culverts and proposes the installation of additional LWC's to achieve the hydrologic enhancement. The BHR site is

focused on enhancing existing wetland pasture and converting it to freshwater marsh habitat, in addition to several hydrologic improvements through the installation of several new culverts. This plan proposed a few different enhancement areas than the April 2010 plan, but is still taking the same basic approach. For the FMC site, this plan essentially utilizes the same plan, with very few changes. The HT under the April 2010 plan initially called for hydrologic improvements, wetland enhancement via supplemental planting and timber management activities. This plan has eliminated most of the supplemental plantings and timber management activities and now will include additional low water crossings, trail road removal and supplemental planting of additional wetland enhancement areas. The BCP site includes the same northern low water crossing, wetland enhancement planting and treatment of invasive/exotic species within some of the same specified areas, however, this plan has reduced the amount of wetland enhancement associated with treatment of invasive/exotic species, as it was not clear that credit would be given for enhancement in several large areas. This plan proposes the installation of an additional low water crossing in order to restore a historic flow path that was identified through historic aerial photographs.

Table 2 provides a summary of the proposed UMAM lift scores associated with each specific mitigation site. The mitigation for the impacts occurring on the tracts will be accomplished through a variety of mitigation techniques designed to result in environmentally enhanced, sustainable, natural areas. The mitigation plan produces more mitigation value than is necessary for each basin. Table 3 provides a summary of wetland impacts and mitigation by watersheds for Levy Nuclear Plant development**.**

Table 2. Summary of proposed UMAM lift scores for Levy Nuclear Plant development.

Mitigation Site	Watershed	Activity	Herbaceous Wetland Functional Gain Units	Forested Wetland Functional Gain Units	Upland Functional Gain Units	Total Functional Gain Units
Goethe State Forest	Waccasassa	wetland restoration	0	+62.3	+9.3	+71.6
LNP Site	Waccasassa	wetland enhancement and preservation	+16.5	+105.8	+194.8	+317.1
	Withlacoochee	wetland enhancement and preservation	+2.4	+8.4	+45.0	+55.8
Boarshead Ranch	Withlacoochee	wetland creation, enhancement and restoration	+11.0	+9.60	0.0	+20.6
	Hillsborough	wetland creation, enhancement and restoration	+19.0	+1.0	0.0	+20.0
Five Mile Creek	Upper Coastal	wetland creation, enhancement and restoration	+5.5	+0.2	+0.1	+5.8
Homosassa Tract	Upper Coastal	wetland enhancement and restoration	+3.5	+52.1	+0.0	+55.6
Brooker Creek Preserve	Tampa Bay	wetland enhancement and restoration	+3.2	+11.5	0.0	+14.7
Total			**+61.1**	**+250.9**	**+249.2**	**+561.2**

Table 3. Summary of wetland impacts and mitigation by watersheds for Levy Nuclear Plant development.

Watershed	Impacts		Mitigation		Upland
	Herbaceous Wetland Functional Loss Units	Forested Wetland Functional Loss Units	Herbaceous Wetland Functional Gain Units	Forested Wetland Functional Gain Units	Functional Gain Units
Waccasassa	-1.3	-181.7	+16.5	+168.1	+204.1
Withlacoochee	-0.4	-29.2	+13.4	+18.0	+45.0
Hillsborough	-15.7	-0.9	+19.0	+1.0	0.0
Upper Coastal	-5.2	-29.1	+9.0	+52.3	+0.1
Tampa Bay	-6.3	-0.3	+3.2	+11.5	0.0
Total	**-38.7**	**-250.4**	**+61.1**	**+250.9**	**+249.2**

The Goethe mitigation site is located on a FFS parcel in Levy County, Florida. This parcel is located at the southern extent of the 53,587 acre State Forest. Additionally, the site abuts the northeast corner of the LNP site. Surrounding the state forest is the 21,406 acre Gulf Hammock Conservation Easement to the north and a portion of the 110 mile Cross Florida Greenway (Inglis Island) to the south. The hydrologic enhancement/restoration activities proposed at Goethe will improve the link between these two regionally significant areas and will ultimately result in an ecologically improved and protected corridor between these two large systems. The proposed habitat restoration activities will improve the health and viability of on-site nesting for RCWs. These enhancement/restoration activities are not in the current state forest funding program and there is no timeline for their inclusion into the program.

The LNP mitigation site is located on a PEF-owned parcel in Levy County, Florida. This parcel abuts the southwestern portion of the Goethe State Forest parcel to the north and a portion of the 110 mile Cross Florida Greenway (Inglis Island) to the south. The enhancement/restoration activities proposed at LNP will improve the link between these two regionally significant preserves and will ultimately result in an ecologically improved and protected corridor between these two large systems.

The BHR mitigation site is located on a privately-owned parcel in Pasco County, Florida. This parcel is part of a corridor that is situated where the Hillsborough and Withlacoochee rivers diverge, and is adjacent to approximately nine square miles of Southwest Florida Water Management District (SWFWMD)-owned Green Swamp property and other conservation lands located to the north, east and south. The enhancement/restoration activities proposed at BHR will improve wetland and ecosystem functions in the floodplains of the aforementioned rivers

and will ultimately result in the removal of disturbances to native communities while creating habitat by enhancing the largest area of natural forest remaining in the upper Withlacoochee and Hillsborough Watersheds which allows for an ecologically improved and protected corridor between these two large systems. The enhancement will therefore have greater benefits than the site specific scores described herein.

The FMC mitigation site is located on a county-owned parcel in Pasco County, Florida. This parcel is part of a corridor that is situated between Connor Preserve, a 500-acre SWFWMD parcel to the east and Starkey Wilderness Preserve, a 19,000-acre SWFWMD wildlife preserve to the west. The enhancement/restoration activities proposed at FMC will improve the link between these two regionally significant preserves and will ultimately result in an ecologically improved and protected corridor between these two large systems.

The HT mitigation site is located on state owned lands managed by the FFS in Citrus County, Florida. This 5,529 acre parcel is part of the larger 157,479 acre Withlacoochee State Forest which is made up of seven tracts. The parcel is located just west of U.S. 19 and lies between the Homosassa River and the Chassahowitzka River. It is situated in close proximity to other public conservation lands such as the Chassahowitzka National Wildlife Refuge, Chassahowitzka Wildlife Management Area, Crystal River Preserve State Park, Crystal River Archaeological State Park, and Homosassa Springs Wildlife State Park. It is adjacent to the Chassahowitzka Riverine Swamp Sanctuary. The HT is also adjacent to but not within an aquatic preserve or Area of Critical State Concern and the Chassahowitzka National Wildlife Refuge has designated a Migratory Bird Sanctuary in a portion of the Refuge that adjoins the HT.

The BCP mitigation site refers to the existing Transmission Line Corridor (TLC) and the surrounding habitats, which totals approximately 1,300 acres. PEF owns the existing transmission line right-of-way (ROW), while the rest of BCP is owned and managed by Pinellas County, Florida. This parcel is part of the largest remaining natural forest in Pinellas County and the proposed mitigation plan will restore historic flow patterns that were disturbed during the construction of the PEF transmission line ROW, within the TLC. The installation of this existing ROW altered historic flow patterns and affected the hydrology and species composition of the adjacent natural wetlands. The proposed mitigation plan will help to return BCP to a more natural hydrologic condition and help to restore the adjacent natural wetlands within the Preserve.

The PEF wetland mitigation plan compensates for wetland losses within the basin of the impacts through the use of six strategically located sites. The plans calls for the restoration and enhancement of both wetland and adjacent upland vegetative communities in the effected basins to the greatest extent possible. The location of these ecological functional improvements are designed to satisfy the requirements of the state and federal agencies based upon UMAM and agency specific mitigation guidelines and result in the improvement in overall ecological function for wetland and upland vegetative communities, wetland and upland dependent species (protected and non-protected) across thousands of acres in regional

significant locations that expand conservation areas and meet regional watershed conservation goals.

Upon completion of the construction of the LNP project and implementation of the wetland mitigation plan, PEF customers and the public will benefit from clean energy and the restoration of thousands of acres of regionally significant habitat across five watershed basins.

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1.0 INTRODUCTION

Progress Energy Florida (PEF), a regional power company that provides electric service to over five million people throughout Florida, has proposed to build a new nuclear generating facility in Levy County, Florida (Figure 1-1). PEF has been working with the Nuclear Regulatory Commission (NRC) through the long, complex entitlement process requiring numerous permits and approvals for the Levy Nuclear Plant (LNP). A part of the process is acquisition of wetland permits from the State of Florida and U.S. Army Corps of Engineers (ACOE). Wetland permit applications have been submitted to the Florida Department of Environmental Protection (FDEP) and ACOE. This plan addresses the compliance with the Environmental Resource Permit (ERP) rules through FDEP under the Power Plant Siting Act Site Certification process and the ACOE Section 404 and Section 10 Individual Permit for the plant and associated transmission lines. The content of this document is the detailed mitigation plan for LNP and associated transmission lines.

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Due to the location and substantial size and reach of the project, wetland impacts occur within several drainage basins. PEF proposes a mitigation plan that compensates wetland losses within the basin (watershed) of the impacts. The impacts occur in five different basins from the development of the power plant and associated transmission lines within the preferred rights-of-way (Figure 1-3). The watersheds being impacted include the Waccasassa, Withlacoochee, Hillsborough, Upper Coastal, and Tampa Bay watersheds as defined by FDEP. The mitigation plan has been designed to satisfy the requirements of the state and federal agencies based upon Uniform Mitigation Assessment Method (UMAM) and agency specific mitigation guidelines as outlined in the LNP Conditions of Certification (COC) and the 2008 mitigation rule for ACOE (33 CFR Parts 325 and 332, 40 CFR Part 230). The COC required the submittal of the wetland mitigation plan to FDEP by May 24, 2010 which was accomplished by the submittal of the April 2010 Wetland Mitigation Plan. As stated above, this plan is a refinement of the April plan.

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plan and financial assurances. The wetland mitigation plan presented herein meets these requirements.

Under the permittee-responsible mitigation approach PEF is financially responsible for all aspects of this wetland mitigation effort. The specific financial assurance instrument that PEF will use will be determined once the wetland mitigation plan has been reviewed and approved by the regulatory agencies. Funds for the mitigation activities contained in this plan for lands owned by the Florida Forest Service (FFS), and Pasco County are not contained in any of their budgets and would not occur if PEF was not funding and conducting these activities as a part of this wetland mitigation plan.

Wetland impacts for the LNP project have been assessed by UMAM for each basin on the project site (Table 1-1). Development will impact 59.1 acres of herbaceous wetlands (loss of 38.7 UMAM units) and 609.3 acres of forested wetland (loss of 250.4 UMAM units).



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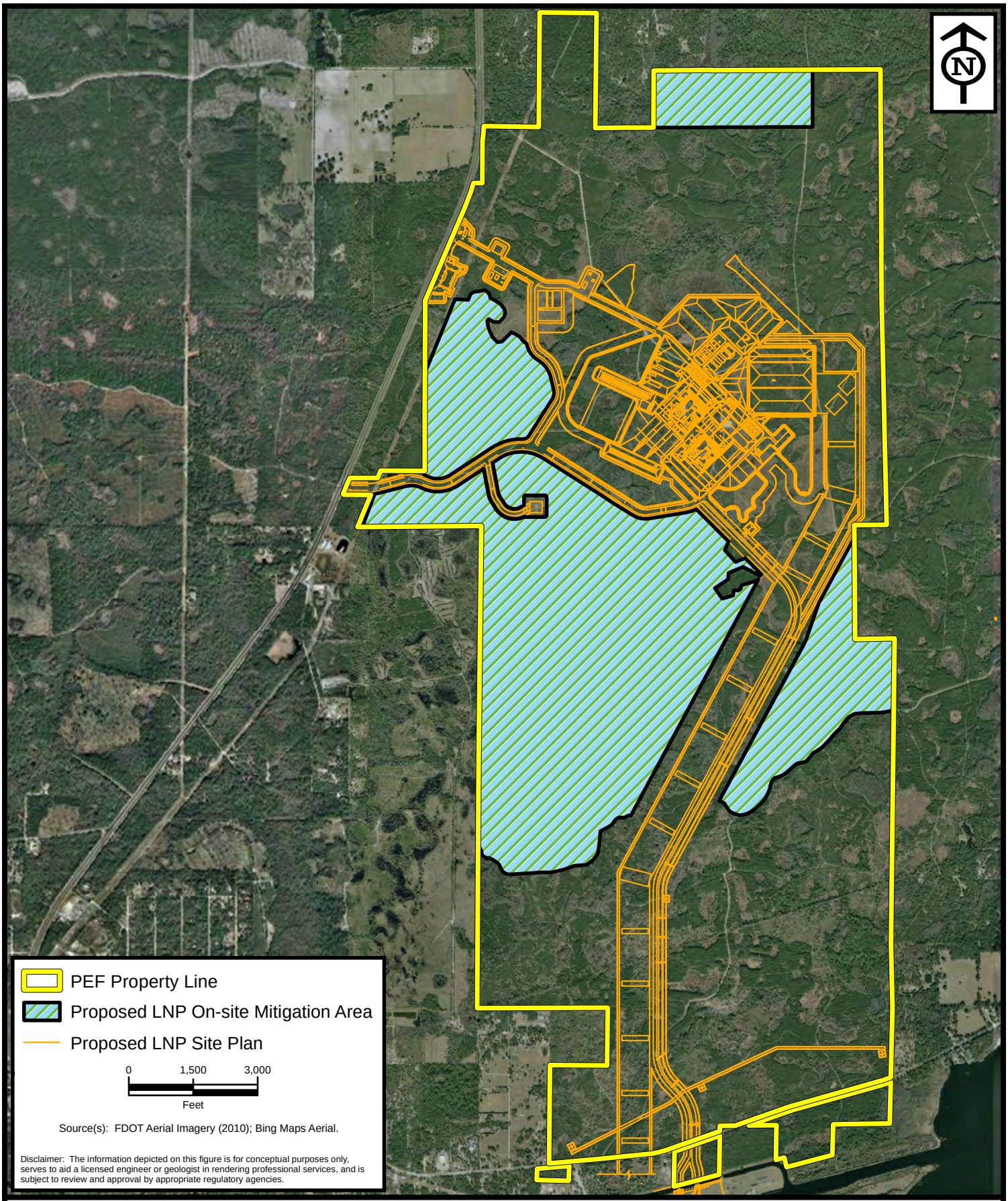
General Location Map

Proposed Levy Nuclear Plant Project

Levy County, Florida

Project:	EJ11021.00
Date:	June 2011
Drwn/Chkd:	JGB/JRN
Figure:	**1-1**

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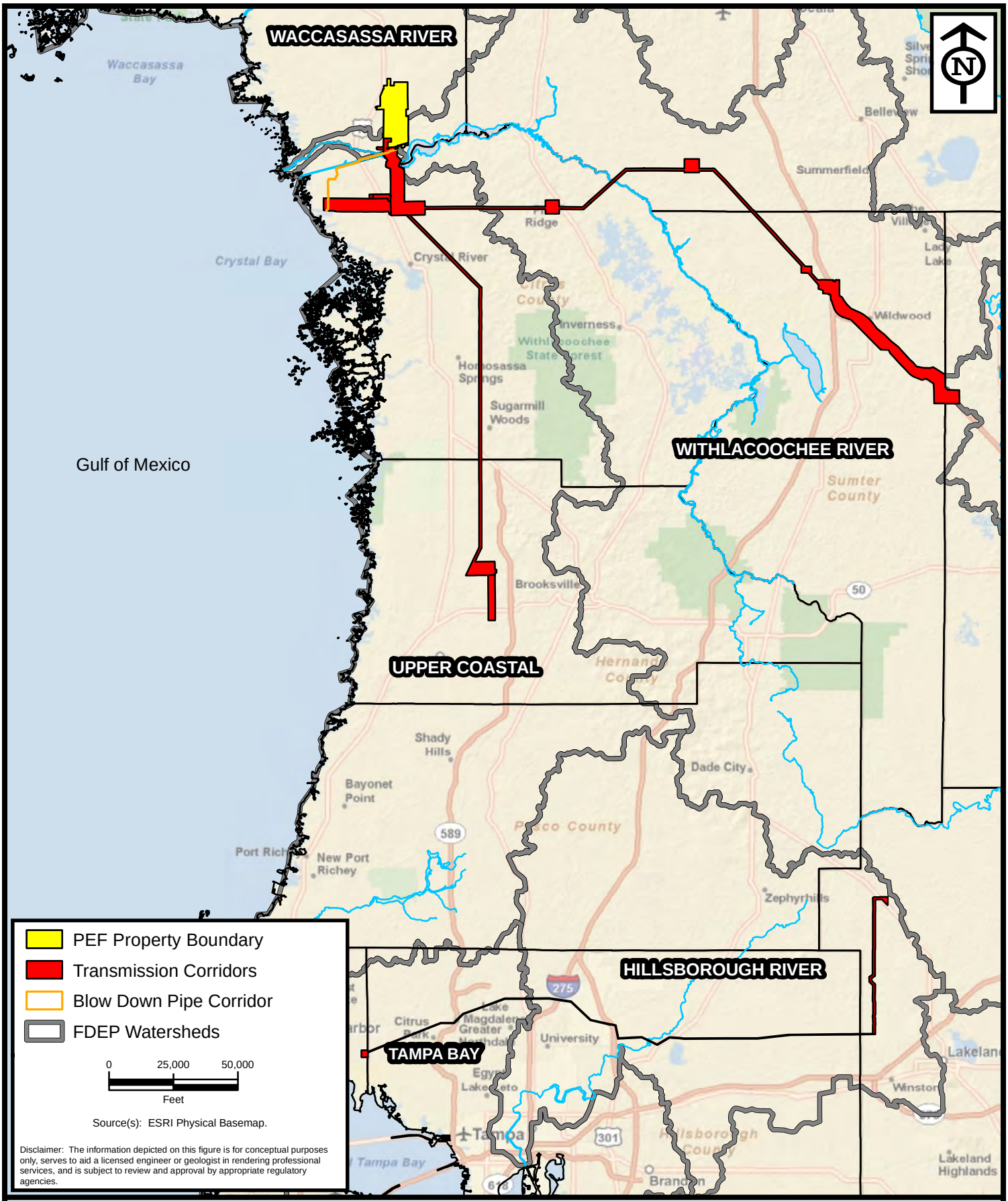
Project Site

Proposed Levy Nuclear Plant Project

Levy County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JGB/JRN
Figure:	**1-2**

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LNP Site and Corridors

Proposed Levy Nuclear Plant Project

Florida

Project:	EJ11021.00
Date:	June 2011
Drwn/Chkd:	JGB/JRN
Figure:	**1-3**

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Table 1-1. Summary of wetland impacts for Levy Nuclear Plant development.

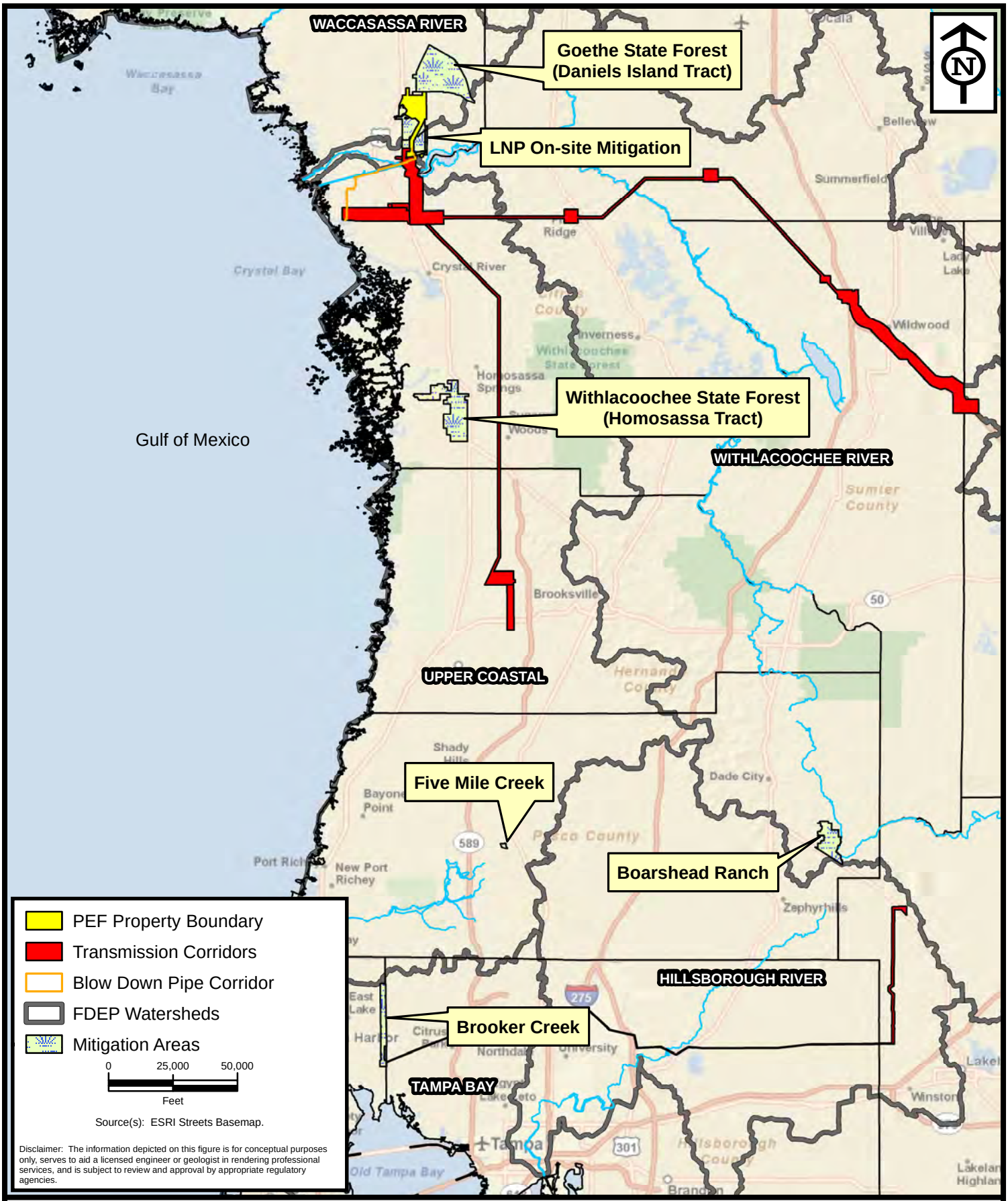
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Tampa Bay	-6.3	9.4	-0.3	0.7	-6.6	10.1
Total	**-38.7**	**59.1**	**-250.4**	**609.3**	**-289.1**	**668.4**

Source: April 23, 2010 Wetland Mitigation Plan

In response to the impacts defined above, PEF evaluated numerous mitigation sites and eventually identified six potential sites. Detailed mitigation plans have been developed for the six different mitigation sites (Figure 1-4). These sites include the following:

- Daniels Island Tract within the Goethe State Forest (GSF) in the Waccasassa watershed;
- LNP site with activities in the Waccasassa and Withlocoochee watersheds;
- Boarshead Ranch (BHR) in the Withlacoochee and Hillsborough watersheds
- Five Mile Creek (FMC) and Homosassa Tract within the Withlacoochee State Forest (HT) within the Upper Coastal watershed; and
- Brooker Creek Preserve (BCP) in the Tampa Bay watershed.

In the April 2010 Wetland Mitigation Plan, the Daniels Island Tract plan called for pine thinning, ditch filling and blocking, low water crossing (LWC) installation and timber thinning for management of Red Cockaded Woodpecker (RCW) habitat. This plan still incorporates some of these activities, but has eliminated the ditch filling/blocks and pine thinning. This plan also increases the number of LWC's and culvert replacements. Some of the LWC's are outside of the Daniels Island tract boundary so this site is now referred to as the Goethe State Forest site. The LNP site focused primarily on habitat restoration and hydrologic improvement through the installation of raised road beds with additional culverts and LWC's. This plan retains most of the same activities, but has reduced the number of raised road beds and culverts and proposes



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LNP Mitigation Parcels

Proposed Levy Nuclear Plant Project

Florida

Project:	EJ11021.00
Date:	June 2011
Drwn/Chkd:	JGB/JRN
Figure:	**1-4**

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the installation of additional LWC's to achieve the hydrologic enhancement. The BHR site is focused on enhancing existing wetland pasture and converting it to freshwater marsh habitat, in addition to several hydrologic improvements through the installation of several new culverts. This plan proposed a few different enhancement areas than the April 2010 plan, but is still taking the same basic approach. For the FMC site, this plan essentially utilizes the same plan, with very few changes. The HT under the April 2010 plan initially called for hydrologic improvements, wetland enhancement via supplemental planting and timber management activities. This plan has eliminated most of the supplemental plantings and timber management activities and now will include additional low water crossings, trail road removal and supplemental planting of additional wetland enhancement areas. The BCP site includes the same northern low water crossing, wetland enhancement planting and treatment of invasive/exotic species within some of the same specified areas, however, this plan has reduced the amount of wetland enhancement associated with treatment of invasive/exotic species, as it was not clear that credit would be given for enhancement in several large areas. This plan proposes the installation of an additional low water crossing in order to restore a historic flow path that was identified through historic aerial photographs.

Table 1-2 provides a summary of the proposed UMAM lift scores associated with each specific mitigation site. The mitigation for the impacts occurring on the tracts will be accomplished through a variety of mitigation techniques designed to result in environmentally enhanced, sustainable, natural areas. The mitigation plan produces more mitigation value than is necessary for each basin. Table 1-3 provides a summary of wetland impacts and mitigation by watersheds for Levy Nuclear Plant development**.** Subsequent sections of the document provide specific details for the mitigation efforts by basin for LNP project.

Table 1-2. Summary of proposed UMAM lift scores for Levy Nuclear Plant development.

Mitigation Site	Watershed	Activity	Herbaceous Wetland Functional Gain Units	Forested Wetland Functional Gain Units	Upland Functional Gain Units	Total Functional Gain Units
Goethe State Forest	Waccasassa	wetland restoration	0	+62.3	+9.3	+71.6
LNP Site	Waccasassa	wetland enhancement and preservation	+16.5	+105.8	+194.8	+317.1
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Boarshead Ranch	Withlacoochee	wetland creation, enhancement and restoration	+11.0	+9.60	0.0	+20.6
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Five Mile Creek	Upper Coastal	wetland creation, enhancement and restoration	+5.5	+0.2	+0.1	+5.8
Homosassa Tract	Upper Coastal	wetland enhancement and restoration	+3.5	+52.1	+0.0	+55.6
Brooker Creek Preserve	Tampa Bay	wetland enhancement and restoration	+3.2	+11.5	0.0	+14.7
Total			**+61.1**	**+250.9**	**+249.2**	**+561.2**

Table 1-3. Summary of wetland impacts and mitigation by watersheds for Levy Nuclear Plant development.

Watershed	Impacts		Mitigation		Upland
	Herbaceous Wetland Functional Loss Units	Forested Wetland Functional Loss Units	Herbaceous Wetland Functional Gain Units	Forested Wetland Functional Gain Units	Functional Gain Units
Waccasassa	-1.3	-181.7	+16.5	+168.1	+204.1
Withlacoochee	-0.4	-29.2	+13.4	+18.0	+45.0
Hillsborough	-15.7	-0.9	+19.0	+1.0	0.0
Upper Coastal	-5.2	-29.1	+9.0	+52.3	+0.1
Tampa Bay	-6.3	-0.3	+3.2	+11.5	0.0
Total	**-38.7**	**-250.4**	**+61.1**	**+250.9**	**+249.2**

Listed Species

PEF and their contractors have spent hundreds of hours on each of these sites completing the analyses necessary to develop the wetland mitigation plan. Although formal listed species surveys have not been conducted on the mitigation sites, preliminary assessments and observations of listed plant and animal species occurrence on each site were conducted. The purpose of these assessments was to gather information regarding the existing habitat conditions on each site, and document the occurrence of listed species, if observed while on the site.

Listed plant species are those plants that are listed by the U.S. Fish and Wildlife Services (FWS) under Title 50, Part 17 of the Code of Federal Regulations (50 CFR 17) as endangered or threatened and the listed animal species are those classified as endangered, or threatened by FWS under 50 CFR 11-12. This list was developed by reviewing the available county species lists from the USFWS, literature review, and previous field work completed by PEF. Listed species with habitats not found on the mitigation sites were eliminated including aquatic species such as the West Indian manatee, gulf sturgeon, and the four species of sea turtles. Also eliminated were the piping plover and salt marsh vole due to no suitable habitat being present on the mitigation sites. Although no longer protected by Endangered Species Act, the bald eagle remains protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act and was included in the review

As part of the wetland mitigation plan implementation, PEF will conduct additional reviews for listed species and if necessary coordinate with FWS on any appropriate permits necessary prior to construction.

2.0 WACCASASSA WATERSHED – GOETHE STATE FOREST

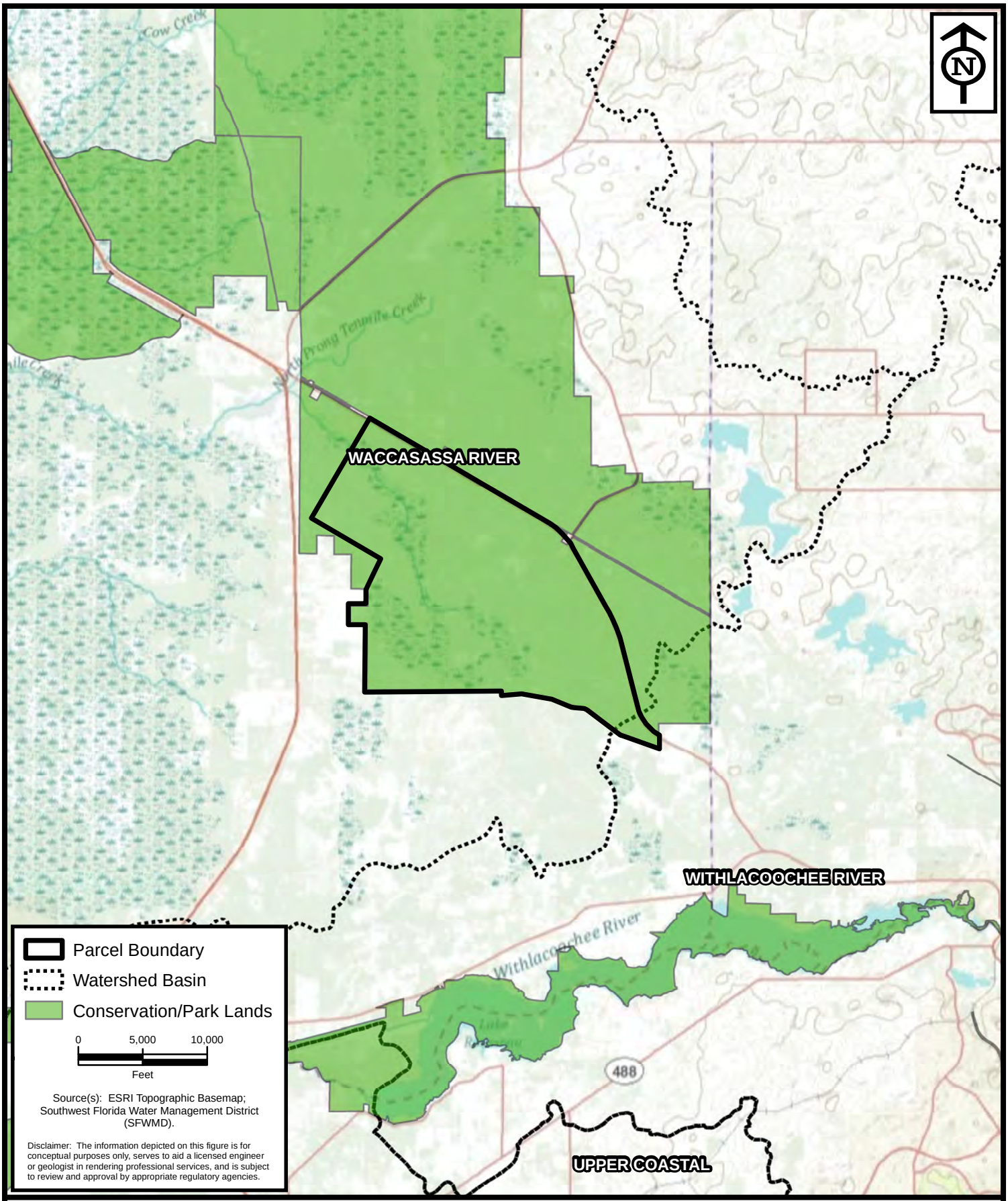
2.1 Introduction

The goal of the LNP mitigation plan is to utilize a "watershed" approach to offset wetland impacts by restoring/enhancing lower quality wetlands within the same watershed in which they occur. The Goethe State Forest (Goethe) site and the Levy Nuclear Plant site (LNP) are both located in the Waccasassa Watershed and will offset herbaceous and forested wetland impacts associated with the plant site development and installation of new transmission lines for the LNP project. More specifically, the Goethe site will offset wetland impacts through the enhancement and restoration of wetland hydrology and RCW habitat. This section deals specifically with the Goethe site; for the details of the mitigation efforts at the LNP Tract, please see Section 3.0.

The Goethe mitigation site is located on a FFS parcel in Levy County, Florida (Figure 2-1). This parcel is located at the southern extent of the 53,587 acre State Forest. Additionally, the site abuts the northeast corner of the LNP site. Surrounding the state forest is the 21,406 acre Gulf Hammock Conservation Easement to the north and a portion of the 110 mile Cross Florida Greenway (Inglis Island) to the south (Figure 2-2). The hydrologic enhancement/restoration activities proposed at Goethe will improve the link between these two regionally significant areas and will ultimately result in an ecologically improved and protected corridor between these two large systems. The proposed habitat restoration activities will improve the health and viability of on-site nesting for RCWs. These enhancement/restoration activities are not in the current state forest funding program and there is no timeline for their inclusion into the program.

2.2 Impact Summary

The wetland impacts within the Waccasassa Watershed from the proposed LNP project total ±357.3 acres of permanent fill and ±30.8 acres of permanent clearing. These impacts will generate a total loss of 183.0 functional units. The impact summary is provided on Table 2-1 (below). The majority of these impacts will be the result of permanently clearing and filling existing forested wetlands, with a smaller portion coming from clearing and filling of herbaceous and open water wetlands. The proposed mitigation plan will provide for ±388.7 functional units of lift within the Waccasassa Watershed; ±71.6 functional units of lift will be derived from the Goethe site which will offset the forested wetland impacts, while the remaining units will be provided in the LNP site (see Section 2.6 for details of the UMAM scores).



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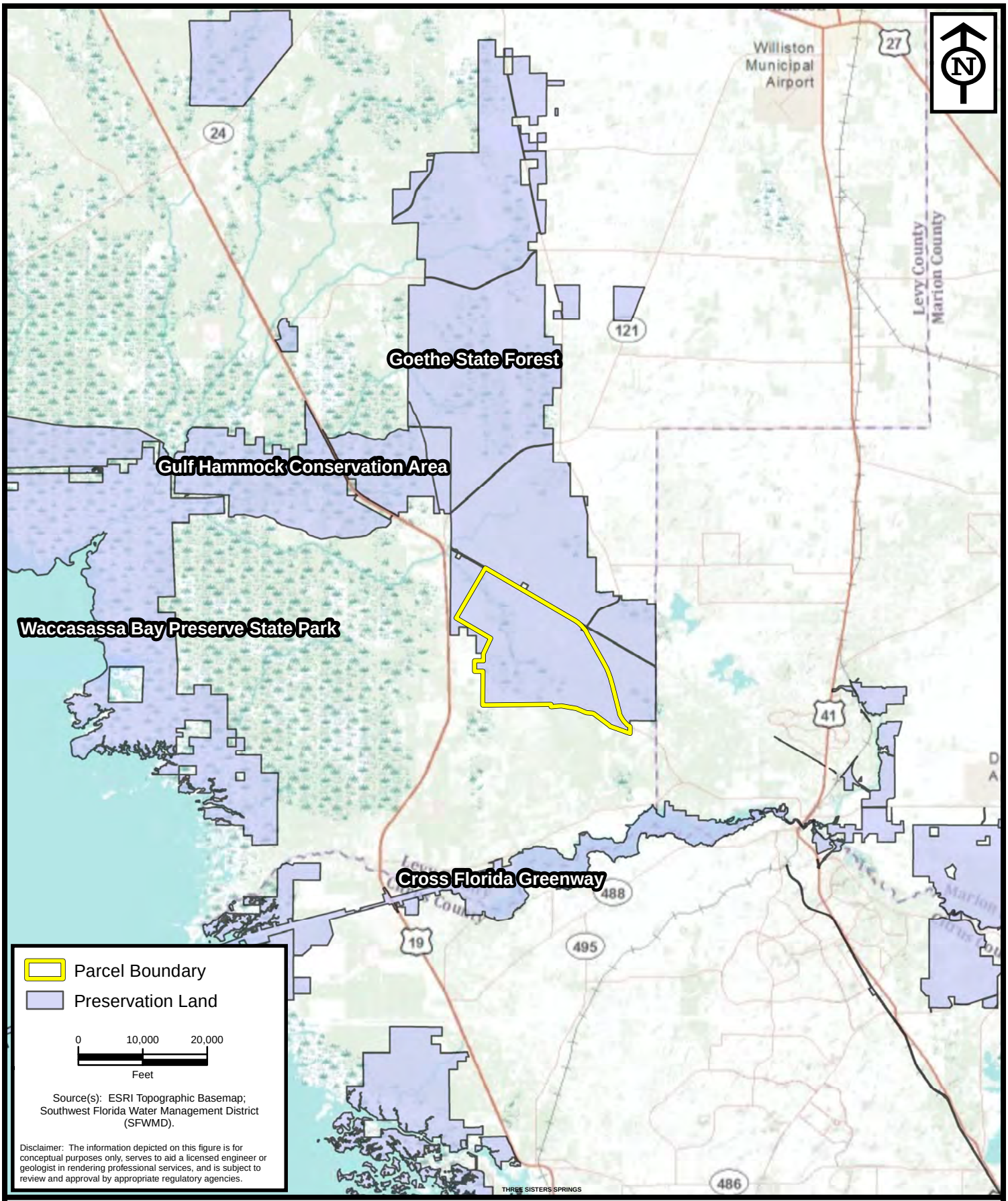
Waccasassa River and Withlacoochee River Watersheds

Goethe State Forest Parcel

Levy County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JGB/JRN
Figure:	**2-1**

Path: Q:_Projects\EJ\2011\021\00\fig\Daniels\Report\Pro_basin.mxd Date: 7/15/2011 9:36:03 AM



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Regional Preservation Land

Goethe State Forest Parcel

Levy County, Florida

Project:	EJ11021.00
Date:	July2011
Drwn/Chkd:	JGB/JRN
Figure:	**2-2**

Path: Q:_Projects\EJ\2011\021\00\fig\Daniels\Report\Pro_location.mxd Date: 7/15/2011 9:41:20 AM

Table 2-1. Waccasassa Watershed wetland impacts by UMAM functional loss and acreage

Area	Herbaceous Wetland Acreage (including open water)	Herbaceous Wetland Functional Loss	Forested Wetland Acreage	Forested Wetland Functional Loss	Total Acres	Total Functional Loss
Permanent Fill	2.6 acres	-1.3 units	354.7 acres	-181.6 units	357.3	-182.9
Permanent Clearing	None	None	30.8 acres	-0.1 units	30.8	-0.1
Total					**388.1**	**-183.0**

2.3 Site Description

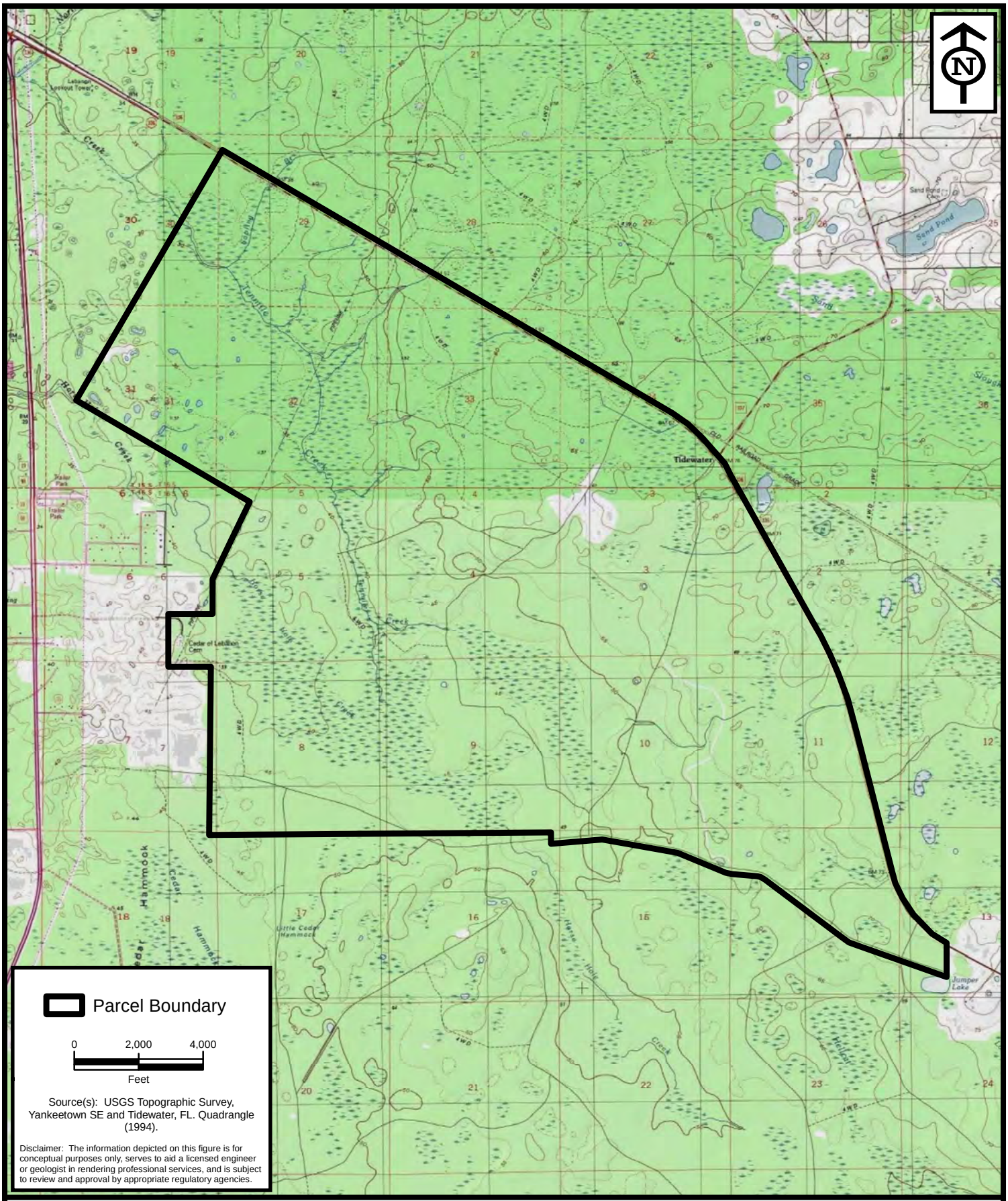
The Goethe site is located in Sections 32, 33, and 34 of Township 15 South, Range 17 East and Sections 3, 4, 5, 8, 9, 10, 11, 14, 15, 16, and 17 in Range 17 East, Section 16 South. It is further located south of CR 336 and east of Gasline Road in Levy County, FL (Figure 2-3). The total area of the Goethe parcel is ±7,535.8 acres, and the proposed enhancement/restoration activities for this project are evenly distributed through the project area. Based on hydrologic modeling, water flows from the southern wetlands, off property to the northwest along Ten Mile Creek.

2.3.1 Historic Conditions

Historically, the property consisted of multiple isolated wetland domes, long strands of bottomland hardwood forest associated with Ten Mile Creek, and vast stands of pine flatwoods (Figure 2-4).

2.3.2 Current Conditions

Various habitat types are present at the Goethe site including the bottomland hardwoods associated with the creek, surrounding forested and herbaceous wetlands, and several vast pine flatwood stands. The land has been maintained and managed by the FFS since the purchase in 1992 from Mr. J.T. Goethe. Management of the state forest has focused on timber management, wildlife management, outdoor recreation, and ecological restoration. Additionally, water control structures have been installed in multiple locations.



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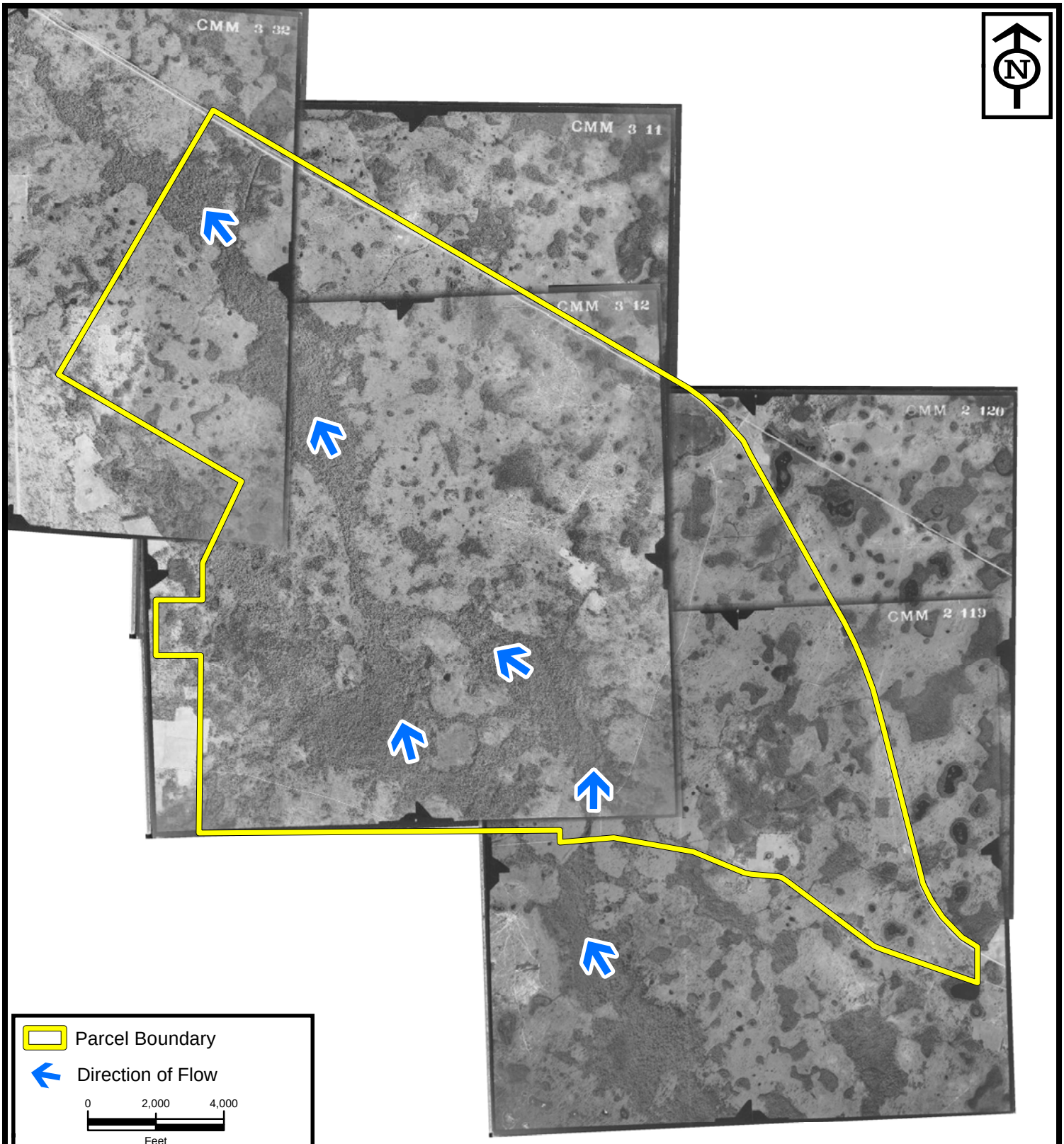
Project Location

Goethe State Forest Parcel

Levy County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JGB/JRN
Figure:	**2-3**

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Source(s): University of Florida PALMM Imagery, (1940).

Disclaimer: The information depicted on this figure is for conceptual purposes only, serves to aid a licensed engineer or geologist in rendering professional services, and is subject to review and approval by appropriate regulatory agencies.

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1940 Historic Aerial Imagery

Goethe State Forest Parcel

Levy County, Florida

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Figure:	**2-4**

Path: Q:_Projects\EJ\2011\021\00\fig\Daniels\Report\Pro_historic.mxd Date: 7/15/2011 12:34:11 PM

The Florida Land Use, Cover, Forms and Classification System (FLUCFCS) was used to determine the different community types on site. Please see the Goethe Community Map, Figure 2-5, for details of the specific community locations.

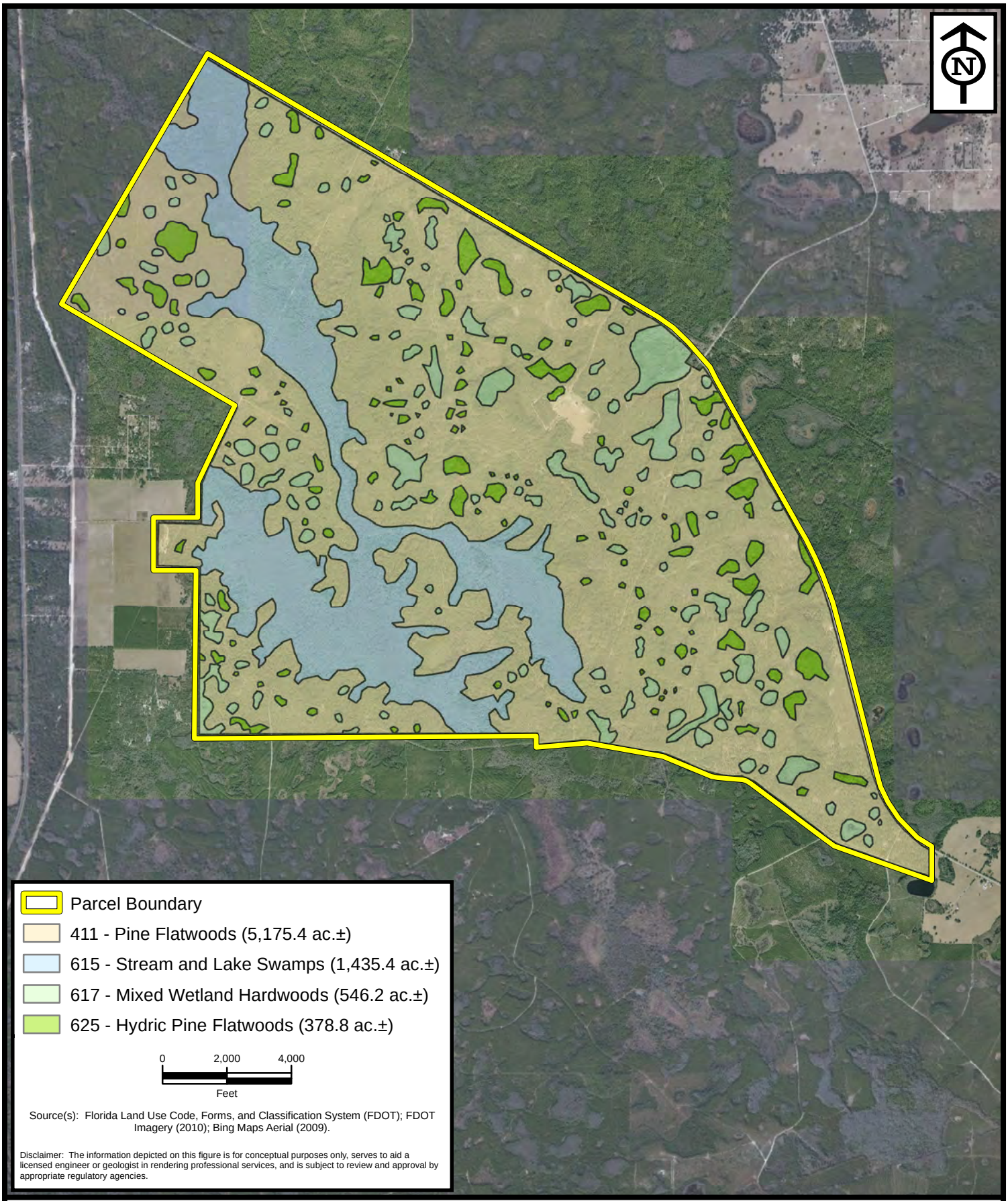
Uplands

1. Pine Flatwoods (FLUCFCS 411). On-site uplands are dominated by a mixture of mesic and slightly xeric pine flatwoods. The canopy consists of predominantly longleaf pine (*Pinus palustris*) and some slash pine (*P. elliottii*). The subcanopy and shrub layer includes saw palmetto (*Serenoa repens*), gallberry (*Ilex glabra*), and shiny blueberry (*Vaccinium myrsinites*). The groundcover is predominantly grasses, including wiregrass (*Aristida stricta* var*. beyrichiana*), panicgrasses (*Dichanthelium* spp.), and broomsedges (*Andropogon* spp.).

Wetlands

1. Hydric Pine Flatwoods (FLUCFCS 625). Wetlands abutting the upland pine flatwoods share a dominance of pine trees. The pine canopy consists of a combination of longleaf pine, slash pine, and pond pine (*P. serotina*). The subcanopy consists of scattered sweetbay (*Magnolia virginiana*), swamp bay (*Persea palustris*), loblolly bay (*Gordonia lasianthus*), pond cypress (*Taxodium ascendens*), dahoon (*Ilex cassine*), titi (*Cyrilla racemiflora*), and/or wax myrtle (*Myrica cerifera*). Shrubs include gallberry, saw palmetto, and fetterbush (*Lyonia lucida*). Groundcover species include wiregrass (*Aristida stricta*), blue maidencane (*Amphicarpum muhlenbergianum*), yellow-eyed grass (*Xyris* spp.), Carolina redroot (*Lachnanthes caroliana*), beaksedges (*Rhynchospora* spp.), and pitcherplants (*Sarracenia* spp.).

2. Mixed Wetland Hardwoods (FLUCFCS 617). The project area is covered with small, scattered isolated depressions with no surface connection to other wetlands. Pond cypress, bald cypress (*T. distichum*), and swamp tupelo (*Nyssa sylvatica*) co-dominate. Other canopy or subcanopy species include red maple (*Acer rubrum*), dahoon (*Ilex cassine*), swamp bay, slash pine, sweetbay (*Magnolia virginiana*), loblolly bay. Shrubs include fetterbush, common buttonbush (*Cephalanthus occidentalis*), wax myrtle, titi, and St. John's wort (*Hypericum* spp.). Herbaceous species include Virginia chain fern (*Woodwardia virginica*), royal fern (*Osmunda regalis* var*. spectabilis*), cinnamon fern (*Osmunda cinnamomea*), maidencane (*Panicum hemitomon*), sawgrass (*Cladium jamaicense*), various species of beaksedge, lizard's tail (*Saururus cernuus*), Carolina redroot, and sphagnum moss (*Sphagnum* spp.).



Source(s): Florida Land Use Code, Forms, and Classification System (FDOT); FDOT Imagery (2010); Bing Maps Aerial (2009).

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Mitigation Activity Area - Existing Community Map

Goethe State Forest Parcel

Levy County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JGB/JRN
Figure:	**2-5**

Path: Q:_Projects\EJ\2011\021\00\fig\Daniels\Report\Pro_flucfcs.mxd Date: 7/15/2011 12:13:44 PM

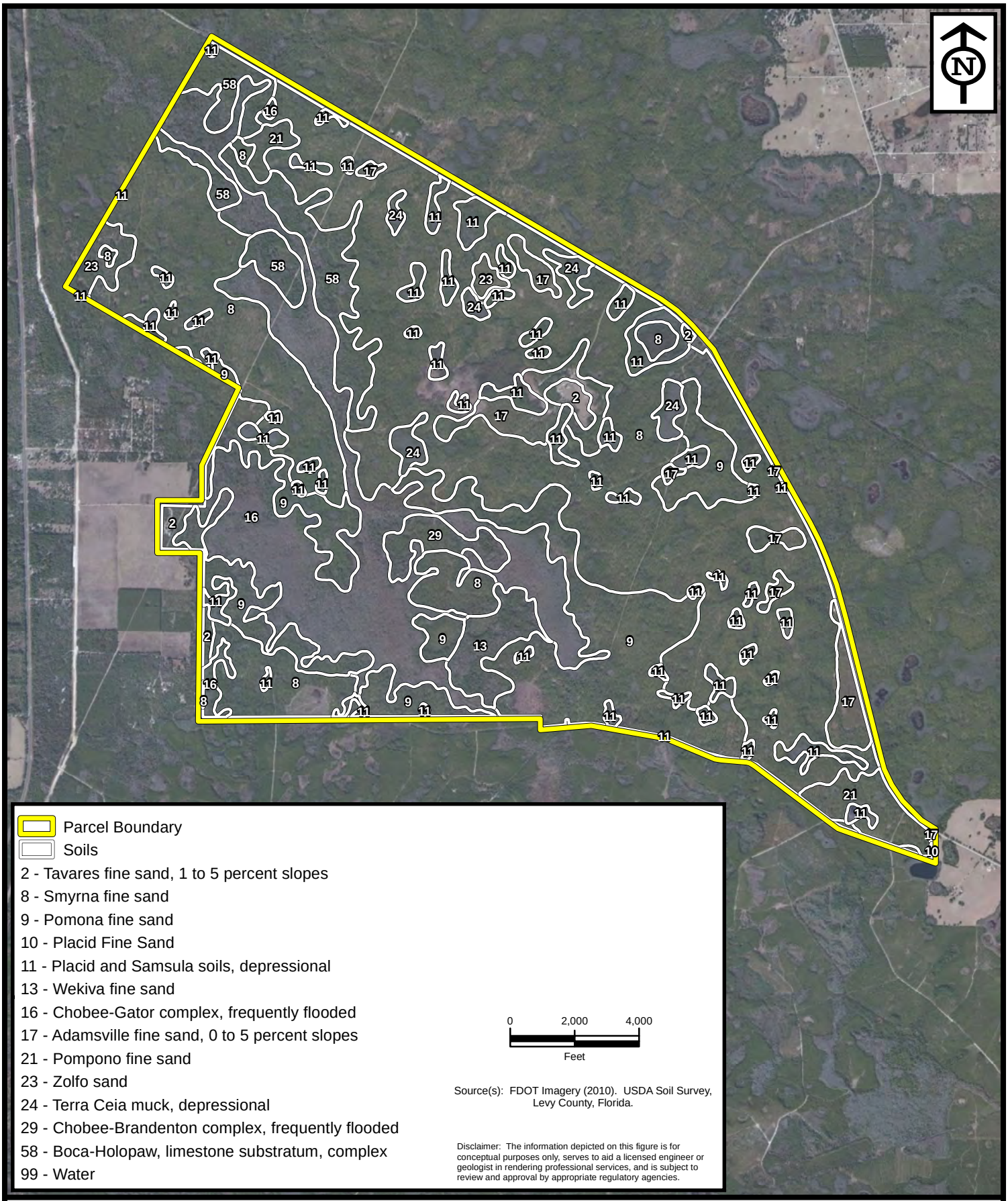
3. Stream and Lake Swamps (FLUCFCS 615). Wetlands associated with Ten Mile Creek, its tributaries, and associated naturalized ditches are dominated by bottomland hardwoods. Dominant species include sweetgum (*Liquidambar styraciflua*), sweetbay, bald cypress, and scattered water oak (*Q. nigra*). Smaller trees and shrubs include American hornbeam (*Carpinus caroliniana*), swamp dogwood (*Cornus foemina*), dahoon, saw palmetto, swamp bay, wax myrtle, and highbush blueberry (*Vaccinium corymbosum*). Herbaceous species are similar to the mixed wetland hardwoods and include Virginia chain fern, royal fern, cinnamon fern, maidencane, sawgrass, various species of beaksedge, lizard's tail, Carolina redroot, and sphagnum moss.

2.3.3 Soils

According to the Natural Resources Conservation Service (NRCS) soil map for Levy County, thirteen soil types are present on the Goethe site (Figure 2-6). The NRCS soils are listed below:

Table 2-2. Goethe site soil types

NRCS Soil Type	Hydric	Acreage
2 Tavares Fine Sand	No	63.1
8 Smyrna Fine Sand	No	3,564.1
9 Pomona Fine Sand	No	1,136.2
10 Placid Fine Sand	Yes	0.5
11 Placid and Samsula Soils, depressional	Yes	457.7
13 Wekiva Fine Sand	Yes	123.3
16 Chobee-Gator Complex, Frequently Flooded	Yes	1,122.5
17 Adamsville Fine Sand, 0-5 % slopes	No	264.8
21 Pompano Fine Sand	Yes	144.2
23 Zolfo Sand	No	74.5
24 Terra Ceia Muck, depressional	Yes	99.7
29 Chobee-Bradenton Complex, frequently flooded	Yes	85.6
58 Boca-Holopaw, Limestone Substratum, complex	Yes	399.5



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NRCS Soils

Goethe State Forest Parcel

Levy County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JGB/JRN
Figure:	**2-6**

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2.4 Mitigation Plan

The two major components of the mitigation plan for Goethe are hydrologic restoration and RCW habitat restoration (Figure 2-7). Currently, the land is being managed by the FFS for timber, wildlife, recreation, and ecological restoration. The goal of this plan is to complement and enhance the existing activities taking place within Goethe State Forest. For details of the proposed hydrologic restoration, please see Section 2.11 for engineering and planting detail drawings.

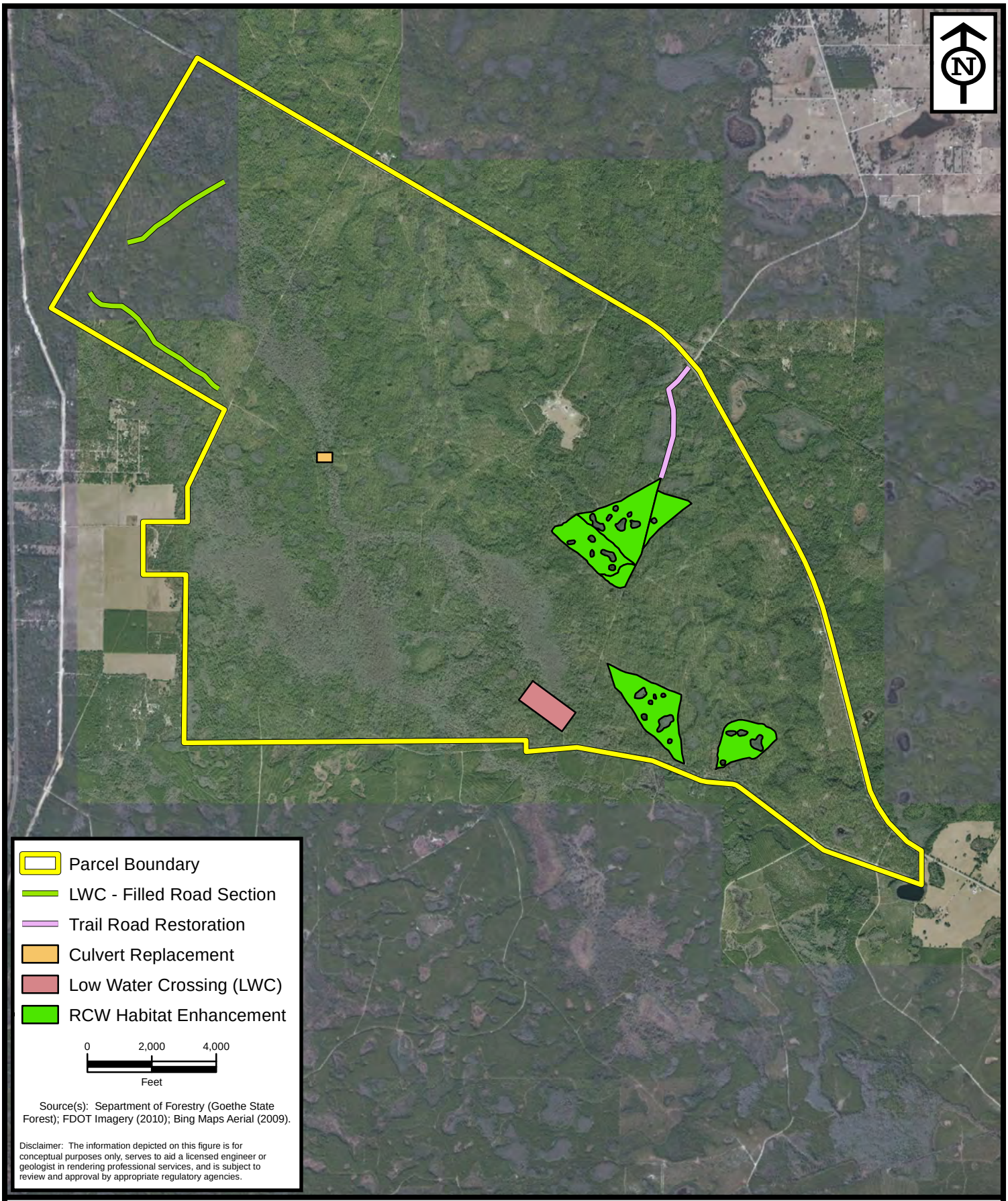
2.4.1 Hydrologic Restoration

Hydrology of the Goethe site has been altered over time by the construction of trail roads and the installation of artificial water control structures (culverts). This mitigation plan proposes to revert several of these areas to historic hydrology. Five activities are planned throughout the project area including three LWC's, one culvert replacement, and one trail road restoration.

Two of the LWC's are located in the northwest portion of the site and will consist of filling a depressed road channel to bring it up to grade with the surrounding wetlands. Currently the depressed road bed is capturing natural flow and diverting it perpendicular to how it would naturally flow in the surrounding landscape. One of the proposed LWC will be achieved by grading the roadside berms down to the elevation of the surrounding wetlands. Currently, the berms prevent natural sheet flow across the road.

The culvert replacement activity will occur where a large volume of water moves along Ten Mile Creek. The FFS has noted many problems with erosion control and has attempted to fix the problem with the installation of multiple (8+) culvert pipes. This solution has not reduced the erosion problem and will likely not withstand the significant weight of fully encumbered logging trucks. Therefore, the individual pipes will be replaced with an extensive concrete box culvert system designed to allow necessary flow and support the weight of vehicular traffic.

The trail road restoration will occur on the road currently used to enter the site. Wetlands located on either side of the road are currently hydrologically restricted by a few small culvert pipes. The proposed plan will remove the trail road entirely and replant the area to join the two wetland areas and recreate a contiguous system. The target community is described as mixed wetland hardwoods.



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Mitigation Activity Area - Proposed Mitigation Activities

Goethe State Forest Parcel

Levy County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JGB/JRN
Figure:	**2-7**

Path: Q:_Projects\EJ\2011\021\00\fig\Daniels\Report\Pro_mitigation.mxd Date: 7/15/2011 9:44:10 AM

1. Mixed Wetland Hardwood Creation. The elevation of the trail road area will be graded down to adjacent wetland elevations to establish a hydrological connection; therefore, creating a hardwood forested wetland system once planted. The area will be hydrated by the abutting wetland systems.

The mixed wetland hardwood area will be planted on ten-foot centers at a density of 440 stems/acre with 3-gallon size Florida native trees including:

Red maple
Water oak
Carolina ash (*Fraxinus caroliniana*)

2.4.2 RCW Habitat Enhancement

Florida Natural Areas Inventory (FNAI) describes the Red Cockaded Woodpecker habitat as "open, mature pine woodlands that have a diversity of grass, forb, and shrub species". Optimal habitat should not consist of pine stands that are too crowded nor have too much woody vegetation – especially mid-level trees – near them. Management goals are generally to have a wide open, park-like stand of mid to old-age longleaf pine trees with a mostly herbaceous understory.

Traditionally, optimal habitat is maintained through fire management practices to retard the growth of large shrub or sub-canopy vegetation. Due to the limited availability of fire management in Goethe, the FFS has proposed to use extensive mowing in the areas where RCW nests have been identified or are likely to occur. The mowing will be used to prevent growth of sub-canopy species and maintain a healthy diversity of groundcover.

The UMAM rule (Chapter 62-345) describes Location and Landscape Support as the "value of functions provided by an assessment area to wildlife influenced by the landscape position of the assessment area and its relationship with surrounding areas." The rule goes on to describe that many wildlife species utilize multiple habitats throughout their life history for nesting, feeding, and cover. It is critical to the survival of all wildlife species to have adequate access to appropriate habitat.

Currently, the RCW suffers from a limited distribution combined with fragmentation and poor management of habitat. The proposed mowing activities will create and sustain a large concentrated area of optimal habitat and thus significantly increase the Location and Landscape support of Goethe for the RCW.

2.5 Hydrology & Hydraulics

2.5.1 Objective

The hydrologic and hydraulic engineering analysis for the Goethe site demonstrated improved rainfall runoff conveyance and flow patterns that better represent historic, unaltered conditions at sites within the state forest. These improvements addressed mitigation modifications – including larger roadway culverts, grading of disturbed terrain, and culvert removal to establish low-water crossings of wetlands – at several sites. To demonstrate improved water movement, a hydrologic and hydraulic modeling analysis was conducted as described below.

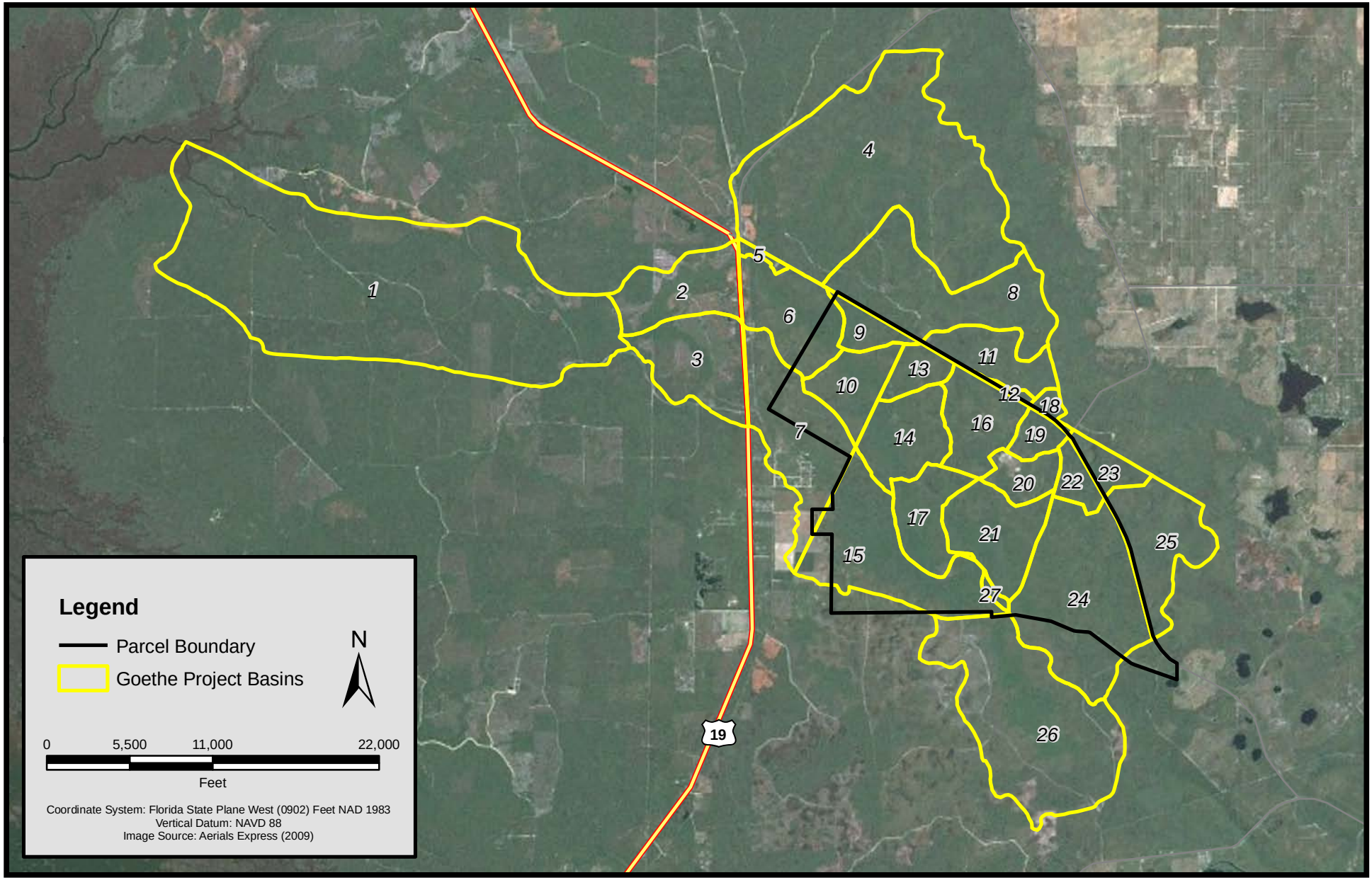
2.5.2 Model Setup

The Advanced Interconnected Pond Routing model (ICPR) Version 3.10 with service pack 3, 2002, was used to simulate rainfall runoff, conveyance, and flooding conditions in the Goethe system. The modeled system includes Ten Mile Creek, North Prong Ten Mile Creek, Sapling Branch, Horse Hole Creek, Crow Rookery Slough and Coffee Creek. These feed into Cow Creek, the Waccasassa River, and the Gulf of Mexico. The total basin area encompasses 30,000 acres.

This section describes the calculation of ICPR input parameters including basin area, time of concentration, curve number, interconnectivity, stage-storage relationships, and boundary forcing conditions.

Subbasin Area

Contributing basin boundaries and areas were determined from a combination of a Suwannee River Water Management District (SRWMD) Geographic Information System (GIS) basin coverage, U.S. Geologic Survey (USGS) Digital Elevation Models (DEMs), and Florida Department of Emergency Management (FDEM) lidar data (2006). DEMs supplemented the lidar which was not available for the entire basin. The overall watershed was subdivided into 27 subbasins as shown in Figure 2-8. Notably, subbasin connectivity and divides, or model nodes, generally coincide with locations of mitigation sites to enable and facilitate analyses of modifications to improve basin flow. Table 2-3 provides the calculated drainage area, curve number, and time of concentration for each subbasin.



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Figure 2-8 - Goethe Drainage Subbasins
Goethe State Forest Parcel
Levy County, Florida

PROJECT	C2011-025
FIGURE	2-8
DRAWN BY	JK
DATE	JUNE 2011

Table 2-3. Goethe ICPR model hydrologic input parameters

Subbasin	Area (acres)	Weighted Curve Number	Time of Concentration, T_c (min)
1	6038	83	3311
2	756	78	951
3	897	81	457
4	4041	84	1075
5	50	88	34
6	823	85	1292
7	1196	74	444
8	1531	84	550
9	226	80	311
10	492	88	166
11	526	84	237
12	42	82	173
13	249	84	148
14	671	87	207
15	1398	86	834
16	621	84	340
17	544	88	232
18	83	81	168
19	188	88	197
20	295	82	221
21	771	89	381
22	204	84	183
23	225	85	236
24	1841	84	398
25	870	84	419
26	2356	83	963
27	37	83	34

Curve Number

The U.S. Soil Conservation Service Curve Number (CN) generally represents the subbasin's rainfall runoff properties – its ability to store or shed rainfall – and is a function of the soil properties as well as land cover/use. Geographic Information System tools were applied to SRWMD digital soil and land use coverages to calculate the CNs. The CN calculation assumes an antecedent rainfall condition corresponding to SCS Type II – or typical, mean conditions.

Time of Concentration

Time of concentration is a characteristic of the response of a watershed to a rainfall event and represents the time required for a drop of water to travel from the most hydrologically remote location within a subbasin. It is a function of the subbasin slope, length, and CN. For each subbasin, the main channel slope was calculated based on lidar and DEM topographic data. Lag time was calculated from the SCS lag time equation with this slope and converted to time of concentration.

Subbasin Interconnectivity

The subbasins were interconnected in the ICPR model to reflect the natural movement of water in the system. Connectivity included overland flow/natural weirs, existing culverts, and channels. Natural weirs correspond to elevated roadways.

Stage-Storage Relationships

For each subbasin, a stage-storage relationship was calculated to represent the amount (volume) of rainfall runoff potentially stored in the basin during a storm event. Model input parameters account for this storage capacity as volume of water stored within the available subbasin topography at one-foot vertical intervals. These relationships allow the ICPR model to simulate the rate at which each subbasin will be inundated from rainfall runoff. Lidar and USGS DEMs provided the necessary topographic data to calculate these relationships.

Boundary Conditions

Two types of boundary conditions were applied within the model. One boundary condition was the tailwater condition at the model outlet at Cow Creek near the Gulf of Mexico (the outlet of subbasin 1). Consistent with Federal Emergency Management Agency guidelines, the 2.33-year hurricane surge stillwater condition was applied at this boundary (for all rainfall runoff events). The 2.33-yr peak stillwater elevation was calculated by extrapolating the published 10-, 50-, 100-, and 500-yr stillwater surge elevations from the Levy County Flood Insurance Study Report (FEMA, 1983). The resulting elevation was 2.0 ft. NAVD.

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Two types of boundary conditions were applied within the model. One boundary condition was the tailwater condition at the model outlet at Cow Creek near the Gulf of Mexico (the outlet of subbasin 1). Consistent with Federal Emergency Management Agency guidelines, the 2.33-year hurricane surge stillwater condition was applied at this boundary (for all rainfall runoff events). The 2.33-yr peak stillwater elevation was calculated by extrapolating the published 10-, 50-, 100-, and 500-yr stillwater surge elevations from the Levy County Flood Insurance Study Report (FEMA, 1983). The resulting elevation was 2.0 ft. NAVD.

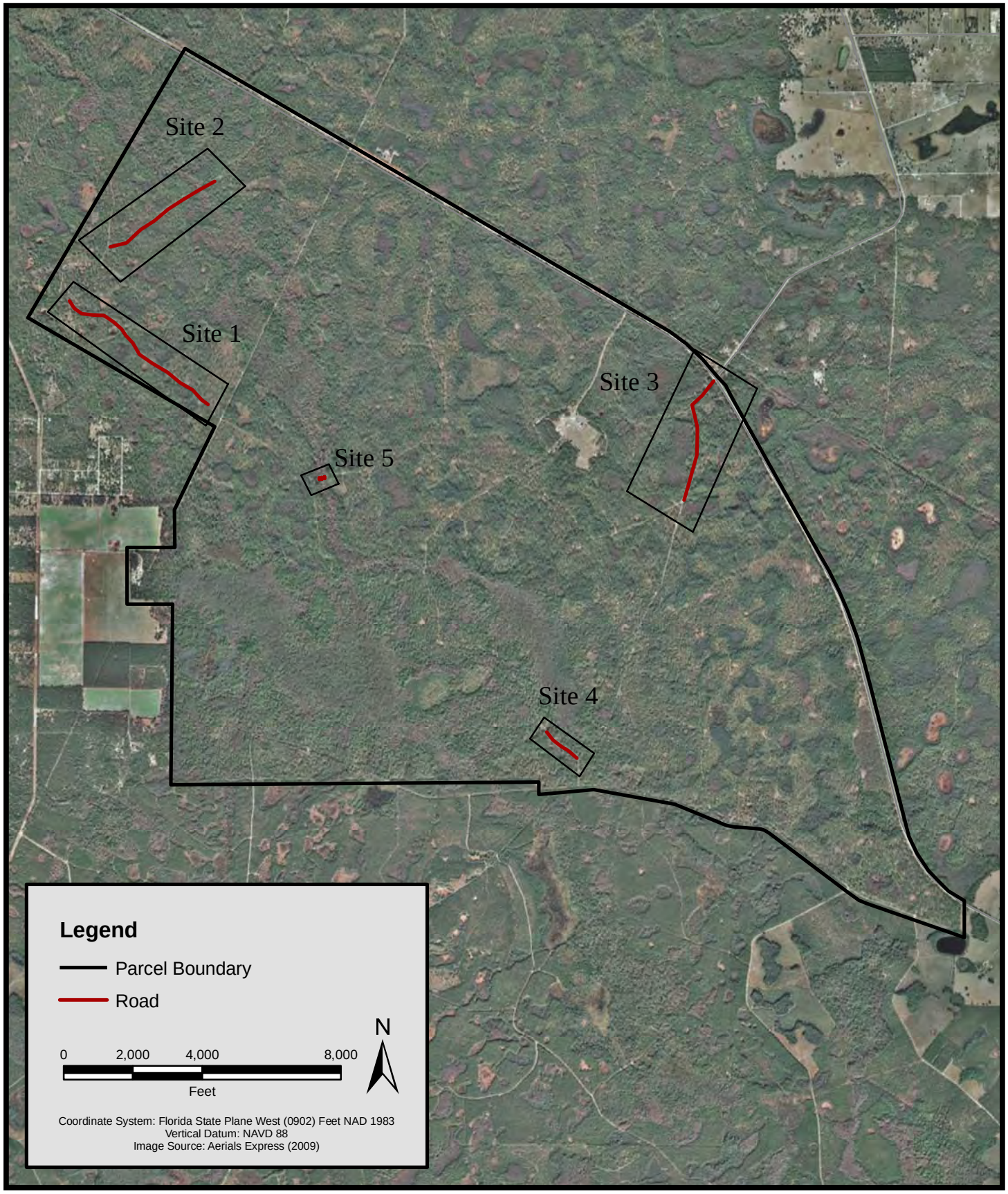
The second boundary condition was rainfall (volume and temporal distribution) applied at each subbasin. The SCS Type II, Florida Modified, 24-hour distribution was applied with the 24 hour rainfall depths shown in Table 2-4 for the five rainfall events simulated (according to the Southwest Florida Water Management District Environmental Resource Permitting Information Manual - Part D Project Design Aids - July 1996).

Table 2-4. Goethe ICPR Model 24-hour Rainfall Depths

Recurrence Interval (years)	Rainfall Depth (inches)
2.33	4.8
10	6.7
25	8.5
50	9.5
100	11.2

2.5.3 Model Application Results

The ICPR model setup described above was applied to the system for five rainfall events representing the 2.33-, 10-, 25-, 50-, and 100-year return periods. The model was applied to both existing (pre-construction) and proposed (post-construction) conditions. The post-construction conditions represent the proposed mitigation modifications at several candidate sites (shown in Figure 2-9) within the system (more details about the modifications are provided in the civil design section of this report). Comparison of the pre- and post-construction model results at each site demonstrate the improved flow conveyance gained from the cumulative effect of all modifications. These results are presented in Table 2-5 and described below for each site.



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Figure 2-9 - Progress Energy Mitigation Sites
Goethe State Forest Parcel
Levy County, Florida

PROJECT	C2011-025
FIGURE	2-9
DRAWN BY	JK
DATE	JUNE 2011

Table 2-5. Pre- and post-construction peak flows at each mitigation site

Site*	Pre-construction Flow, cfs		Post-construction Flow, cfs		Difference, cfs		Percent Change	
	2.33YR	25YR	2.33YR	25YR	2.33YR	25YR	2.33YR	25YR
2	528.7	1072.0	601.4	1117.8	72.6	45.9	13.7	4.3
3**	10.1	236.8	77.8	239.8	67.6	3.0	667.6	1.3
4	11.3	98.8	19.1	83.1	7.8	-15.7	69.1	-15.9
5	423.7	1298.7	446.5	1296.3	22.8	-2.4	5.4	-0.2

*Site 1 was not modeled, see below.
** This is the combined flow from subbasin 22 to subbasins 19 and 20.

Site 1

Modifications at Site 1 include grading of the terrain along a dirt road. The road follows a depression (likely created by heavy use) with small ridges bordering the road (typically on both sides). Sheet flow (which historically traveled perpendicular to the road) is intercepted by the ridges and road and diverted along the road. The modification intends to restore the natural sheetflow by scraping down the ridges and filling the road bed as necessary to create a naturally sloping terrain.

These modifications were not simulated in ICPR due to the scale and location of the subbasin (upstream of the road near a drainage divide). Nevertheless, topographic contours and surveys indicate the existing conditions of the road do divert the natural flow, and the percent flow improvement should be similar to that gained at Site 2 described below.

Site 2

Modifications at Site 2 include grading of the terrain along a dirt road. Site 2 lies between subbasins 10 and 6 and is represented in the model as a channel (in Ten Mile Creek) connecting the basins. Similar to Site 1, use of the road has apparently created a depression along the road itself with small ridges bordering the road. As a result, sheet flow (which historically traveled perpendicular to the road) is intercepted by the ridges and road and diverted along the road (perpendicular to its historical path). The modification intends to restore the

natural sheetflow by scraping down the ridges and filling the road bed as necessary to creating a naturally sloping terrain.

While this flow pattern is two-dimensional, the improvement of one-dimensional flow along the natural flow path was simulated in ICPR (a one-dimensional model) by lowering the model cross section ground elevations 0.25 ft. along the road to represent removal of the ridges. Comparison of pre- and post-construction model results indicates Site 2 peak flow for the mean annual event (2.33-yr storm) increases 14%. The 25-year peak flow increases 4%.

Site 3

Proposed modifications at Site 3 include grading the dirt road to restore natural sheet flow currently being intercepted and diverted by the road. Site 3 falls along the boundaries of subbasins 22, 19 and 20. The pre-construction condition of this site is represented in the model as two culverts and a weir to simulate the flow that overtops the road. The post-construction condition of this site removes the two culverts and simulates the weir with adjusted elevations to represent the proposed regrading. Comparison of pre- and post-construction model results indicates Site 3 peak flow for the mean annual event (2.33-yr storm) increases over 600%, and the peak 25-year event flow increases 1 percent.

Site 4

Site 4 falls along the boundary of subbasins 27 and 21. At Site 4, one 12-in corrugated metal pipe (CMP) under a gravel road blocks the natural flow. The pre-construction condition of this site is represented in the ICPR model as a culvert and a weir to simulate the flow that overtops the road. Model results indicate the constriction created by the culvert and road cause the mean annual flow to overtop the road.

Three 14-in x 23-in horizontal elliptical pipes are proposed at Site 4. The ICPR model represents the post-construction condition of this site by removing the culvert and replacing it with three- 14-in x 23-in horizontal elliptical pipes. Model results indicate these pipes will pass the mean annual peak flow (19 cfs) without road overtopping. Comparison of pre- and post-construction model results indicates Site 4 peak flow for the mean annual event (2.33-yr storm) increases 69%. The 25-year peak flow decreases 16%. The decrease is attributable to a slight increase in tailwater in the downstream subbasin (21). The increase is due to cumulative mitigation modifications (at other sites) that are restoring the system to more natural conditions.

Site 5

Site 5 lies along the boundary of subbasins 17 and 14. It is understood that the pipes through a dirt road at Site 5 continually wash out due to erosion that results in stream turbidity and sedimentation. Also, trucks damage the pipes. Currently, eight pipes cross the dirt road. These pipes include four 50" plastic pipes and four 36" corrugated metal pipes. No existing erosion control is apparent. This condition is simulated in the ICPR model as eight pipes, four plastic and four CMP and a weir to simulate the flow that could overtop the road.

According to model results, the eight culverts pass the mean annual flow without road overtopping. Events greater than the mean annual storm do overtop the road. For example, 627 cfs of the 25-year peak flow passes over the road due to the existing pipes' inability to convey the peak flow.

The proposed solution is replacement of the existing pipes with eight 3-ft x 6-ft box culverts robust enough to withstand loads from large trucks. This condition is simulated in the ICPR model as eight 3-ft x 6-ft box culverts and a weir to simulate the flow that could overtop the road. With proper erosion protection, these culverts should withstand washouts for the 25-year event (25 percent chance of occurrence in any given year) and pass the peak flow without road overtopping. Comparison of pre- and post-construction model results indicates Site 5 peak flow for the mean annual event increases 5%. The 25-year peak flow has virtually no change.

The proposed culverts also reduce the head difference from the upstream to the downstream side of the road from about 4.5 ft. to 3.0 ft. This increase in 2.33-yr event flow and decrease in head loss will better represent historical conditions.

2.6 UMAM Score

All wetland impacts in Florida must be assessed using UMAM, pursuant to Chapter 62-345 Florida Administrative Code (F.A.C.). The Jacksonville District Office of The US Army Corps of Engineers and all of the State permitting agencies utilize this methodology when assessing wetland impacts. Under the UMAM process, each proposed wetland impact is assessed, based on its current condition, and assigned specific numeric scores for the location, hydrologic status and plant structure community. These scores are then converted into a number representing the value of the wetland being impacted, as it relates to fish and wildlife utilization, utilizing the formula provided in Chapter 62-345 F.A.C. The numeric value for each impact is then summed to generate the overall value of the proposed impacts for the project.

The same process is applied to the proposed mitigation activities to offset the wetland impacts. Each proposed activity (wetland enhancement, wetland restoration etc.) is assigned a numeric score, utilizing the same parameters listed above, based on the type of activity and acreage proposed. Each activity is then assigned a numeric score, and these scores are then summed to generate the overall value of the proposed mitigation for the project. The proposed mitigation value must be greater than or equal to the impact value in order for the wetland impacts to be sufficiently offset.

The proposed mitigation plan for Goethe will provide for 71.6 units of functional lift to offset the wetland impacts within the Waccasassa watershed (Table 2-6), while the rest of the impacts will be mitigated for at the LNP site. The scoring system utilized during the UMAM process is outlined in the UMAM handbook and its scoring requirements.

Water environment scores for existing communities were assessed at a 6 due to the abundance of artificial water control structures (culverts). Target water environment UMAM scores presented in Table 2-6 ranged from 7 to 8 based on the proximity of the area to the proposed low water crossing. Additionally, the Location and Landscape Support for the RCW habitat was assessed at 6 based on the natural growth of the subcanopy in areas not maintained for RCW populations. Scores for the proposed trail road restoration went from 0 to 7 based on the current absence of wetland functions and values.

Table 2-6. Goethe mitigation plan proposed UMAM score summary

Area	Location		Water		Community		Acreage	Risk	Time Lag	RFG[1]	FG[2]
	Current	With	Current	With	Current	With					
Direct wetland hydrologic enhancement	8	8	6	8	7	7	275.0	1.25	1.14	0.0468	12.7
Indirect wetland hydrologic enhancement	8	8	6	7	7	7	2,085.4	1.25	1.14	0.0234	48.8
RCW upland mowing	6	7	0	0	7	7	233.0	1.25	1.00	0.04	9.3
Trail road restoration	0	7	0	8	0	7	3.6	1.50	2.18	0.2141	0.8
Total							2,597.0				71.6

[1]Relative Functional Gain
[2]Functional Gain

2.7 Engineering

Proposed engineering improvements for the five sites within the Goethe site will generally consist of either road improvements or culvert installation. The paragraphs below summarize the proposed improvements for each site.

Site 1 - The contractor will provide approximately 1100 cy of fill and re-grade approximately one mile of the existing dirt road to bring the road elevation up to the adjacent existing grade elevations (Section 2.11, Sheet 10 and Sheet 12 of 22, typical section).

Site 2 - The contractor will provide approximately 1000 cy of fill and re-grade approximately 3500 linear ft. of the existing dirt road to bring the road elevation up to the adjacent existing grade elevations (Section 2.11, Sheet 11 and Sheet 12 of 22, typical section).

Site 3 - The contractor will excavate approximately 1000 cy of soil and re-grade approximately 3800 linear ft. of dirt road in order to bring the road elevation down to the adjacent existing grade elevations (Section 2.11, Sheets 13-15 of 22). The road elevations are roughly 6 inches above the existing adjacent grade.

Site 4 - The contractor will demolish the existing 12-in diameter culvert and install three 14-in. x 23-in.diameter elliptical reinforced concrete culverts at the same location (Section 2.11, Sheet 10). The proposed plan calls for north inverts of 42.7 ft. and south inverts of 43.2 ft. for all three culverts (Section 2.11, Sheets 16 and 17 of 22). The contractor will dewater as necessary and will provide backfill so as to establish a minimum of 12 inches of soil cover over the culverts.

Site 5 - The contractor will demolish four 50-in. diameter plastic pipe culverts and four 36-in. diameter reinforced concrete pipe culverts (Section 2.11, Sheet 18 of 22). The contractor will install eight 6-ft x 3-ft precast reinforced concrete box culverts so as to provide a North and South invert of 33.0 ft. (Section 2.11, Sheets 18 and 19 of 22). Before installation, the contractor will de-water and compact the subgrade beneath the box culverts. Upon installation of the box culverts, the contractor will backfill and provide a minimum of 12 inches of soil cover over the proposed box culverts.

2.8 Implementation Schedule

The construction of the Goethe site will begin upon the commencement of construction and wetland impacts associated with the LNP project. The mitigation plan will be implemented in phases, as some activities, such as the excavation and planting of the trail road area, are seasonal in nature and can only be completed under favorable conditions. The replacement of multiple culverts on Ten Mile Creek and RCW habitat

have the highest priority, with the low water crossings having the next highest priority, and the trail road restoration having the lowest priority.

As with any construction project, natural conditions and weather patterns will be observed and activities will be planned to best coincide with suitable weather conditions. Prior to any land disturbance, all appropriate erosion and sedimentation control measures will be installed, including silt fence around all disturbed areas and sediment curtains in the channel. Any other applicable compliance items, such as County land clearing permits or any other local permit requirements, will also be addressed before the construction aspect begins. Excavation of the trail road area will occur during the dry season (October-March) and wetland plantings will occur once excavation is complete and the area has been constructed properly and approved. Maintenance for invasive/exotic species will be conducted year-round, with manual, mechanical and/or chemical removal methodologies to be utilized throughout the year to ensure the best results.

Based on the above-referenced priorities, an implementation schedule of the mitigation activities is listed below:

Activity	Timeframe
Acquire local land disturbance permits, mobilization of contractor and equipment, establish all turbidity/erosion control measures	Week 1
Clear and excavate areas and dispose of excess material	Week 2
Finish grade roadway	Week 3
Generate and review as-built surveys	Week 4
Plant wetland restoration area	Weeks 5-6
Begin 5 year monitoring and maintenance period	Week 7

* Optimal planting season for herbaceous species is March through September, and October through March for forested species.

2.9 Monitoring and Maintenance Requirements

The hydrologic enhancement areas (LWC, box culvert, and trail road removal) will be monitored continuously for five years to ensure their success. Monitoring will document that daily, monthly, and seasonal water levels are matching those proposed in the hydrologic modeling. In addition, wildlife utilization, hydrologic conditions,

presence of invasive/exotic species and any other management issues will be noted and addressed.

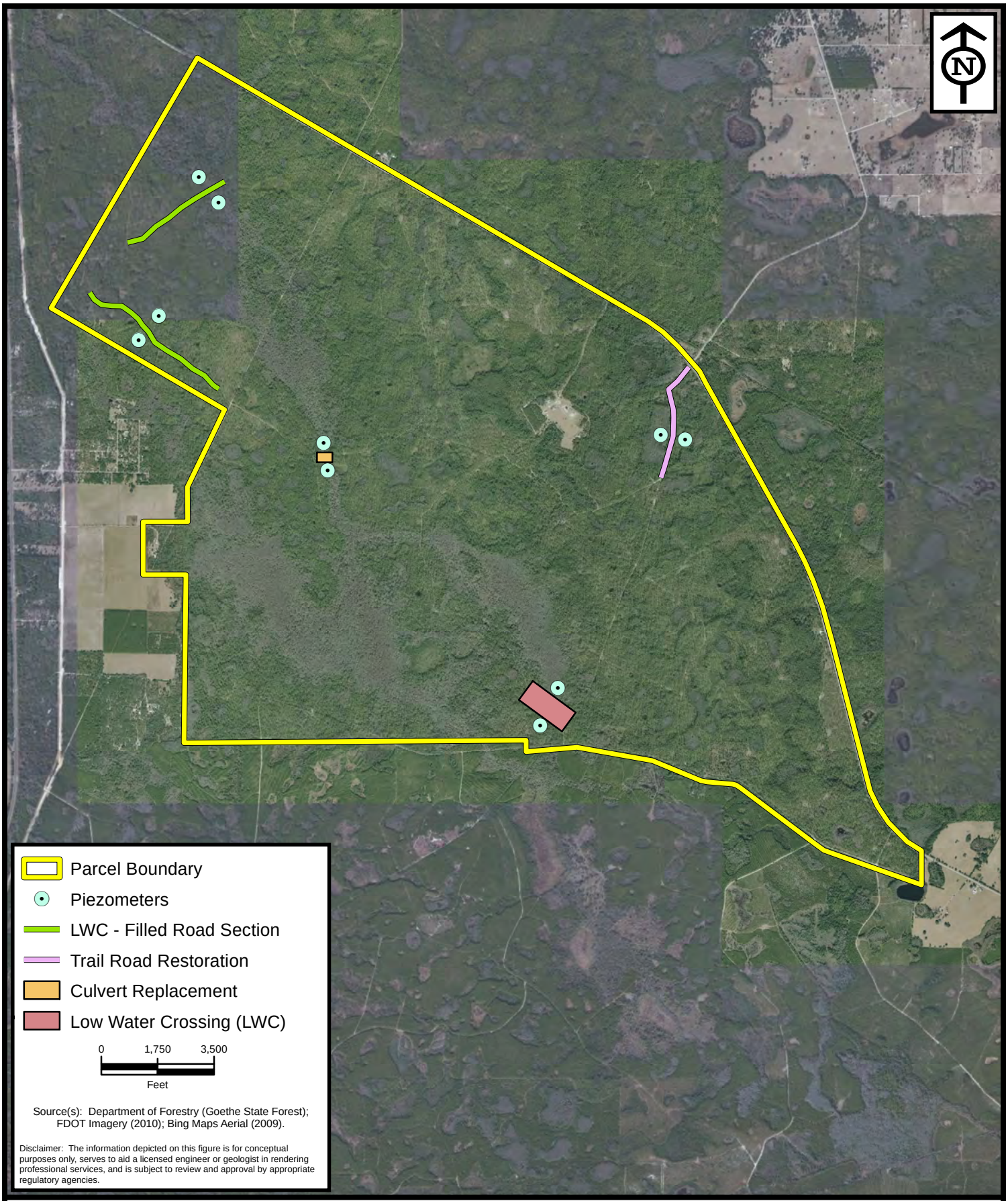
The wetland restoration areas (trail road removal) will be monitored annually and maintained on a quarterly basis to ensure their success. Monitoring will document that each habitat type is naturally progressing to resemble its intended target community in regard to plant species and composition. In addition, wildlife utilization, hydrologic conditions, presence of invasive/exotic species and any other management issues will be noted and addressed.

The RCW habitat control will be maintained on an as needed basis based on the current conditions of the shrub and subcanopy growth. Regular mowing of the area will be used to maintain minimal growth of undesirable species. Factors that will likely determine the mowing schedule include, but are not limited to, seasonal climate conditions, occurrence of wildfires, and availability of mowing equipment.

The quantitative monitoring of the forested restoration area will consist of establishing fixed linear transects covering approximately 10 percent of the area. The transects will be 25 ft. wide and will average 300 ft. long. Hydrology will be observed through the use of recording piezometers installed strategically throughout the site (Figure 2-10). The data that will be observed and recorded within each transect/plot will include:

- date of installation and number and types of plants installed;
- total coverage and survivorship of desirable planted species and any other dominant species;
- the presence and overall coverage of any listed invasive/exotic species;
- success of any previously recommended treatment methods and any future methods proposed;
- any areas of mortality of planted or other natural species;
- current hydrologic conditions, water depths and hydric soils observed;
- any evidence of wildlife presence or utilization;
- any maintenance needs in regard to stabilization, erosion, vandalism etc. and suggested corrective actions.

Hydrologic restoration areas will be monitored by the installation of piezometers and the collection of pre-construction and post-construction data. Post-construction data collected with the piezometers will be compared to both pre-construction data and the proposed hydrologic model.



Source(s): Department of Forestry (Goethe State Forest); FDOT Imagery (2010); Bing Maps Aerial (2009).

Disclaimer: The information depicted on this figure is for conceptual purposes only, serves to aid a licensed engineer or geologist in rendering professional services, and is subject to review and approval by appropriate regulatory agencies.

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Mitigation Activity Area - Monitoring Activities

Goethe State Forest Parcel

Levy County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JGB/JRN
Figure:	**2-10**

Path: Q:_Projects\EJ\2011\021\00\fig\Daniels\Report\Pro_monitoring.mxd Date: 7/15/2011 9:48:00 AM

A baseline monitoring event for the restoration area will be conducted at Goethe no less than 60 days after the completion of planting. The baseline event will help to establish the initial conditions after construction and will be used as a reference to assess progression during future monitoring events. The annual monitoring will commence after the baseline event and will be submitted to FDEP and ACOE in the fall (September/October) of each year. The report will consist of a narrative describing the site conditions, the management activities that have occurred, photographs taken from fixed location points and maps depicting the mitigation area. The forested restoration area will be monitored for at least five years until the success criteria are met. The monitoring period may be adjusted based upon the performance of the vegetation establishment.

Baseline monitoring for the hydrologic restoration areas will begin within one year of pre-construction data. The baseline event will help to establish the initial conditions after construction and will be used as a reference to assess progression during future monitoring events. Data will be collected from the piezometers monthly and compiled for 6-month and annual reports. The post-construction monitoring will commence after the baseline event and will be submitted to FDEP and ACOE by April 1 (annual report) and July 1 (6-month report) of each year. The report will consist of a narrative describing the site conditions, photographs taken from fixed location points, summary data from each piezometer, local rainfall data, and maps depicting the mitigation area.

2.10 Success Criteria

Specific success criteria outlined below will ensure that the proposed mitigation activities achieve their intended design and function. The main focus of the success criteria for Goethe will emphasize the re-establishment of historic hydrology patterns and flow. Regular monitoring and maintenance implementation is crucial to ensuring success at Goethe. The mitigation area will be considered successful when the following criteria have been met after the required monitoring time frame:

Forested Restoration (trail road) Area:

- 80% survivorship/species composition of planted (or naturally recruited) wetland trees including red maple, water oak, Carolina ash, or any other wetland tree;
- 5% or less total coverage of any invasive/exotic species;
- hydrology is well established and visibly apparent based on the hydrologic indicators as defined by Rule 62-340, Florida Administrative Code (F.A.C.);
- the above criteria must be met within the five years of annual monitoring.

Hydrologic Restoration Areas:

- hydrology is well established and visibly apparent based on the hydrologic indicators as defined by Rule 62-340, Florida Administrative Code (F.A.C.);

- monthly hydrology readings for areas downstream of mitigation activities increase proportionally with monthly rainfall data.

RCW Habitat Mowing:

- This process is ongoing with no specified end date due to the need to sustain this vanishing habitat.

The progress of the mitigation area towards reaching success is tracked through the monitoring reports that will be submitted annually to FDEP and ACOE for review and approval. In the event that the above criteria are not met at the end of the monitoring period, or it is becoming obvious during annual monitoring that an area will not meet the established success criteria, then PEF will work closely with FDEP and ACOE staff in order to identify and correct any issues identified during the monitoring. Once the success criteria outlined above are met, the mitigation effort will be deemed a success and the monitoring of the mitigation area will be ended.

2.11 Engineering and Planting Detail Drawings

Please see the attached engineering and planting detail drawings.

PROGRESS ENERGY MITIGATION PROJECT
GOETHE STATE FOREST PARCEL
LEVY COUNTY, FLORIDA

DRAWING INDEX

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SHEET 21	EROSION CONTROL DETAILS
SHEET 22	PROPOSED PLANTING PLAN



LOCATION MAP
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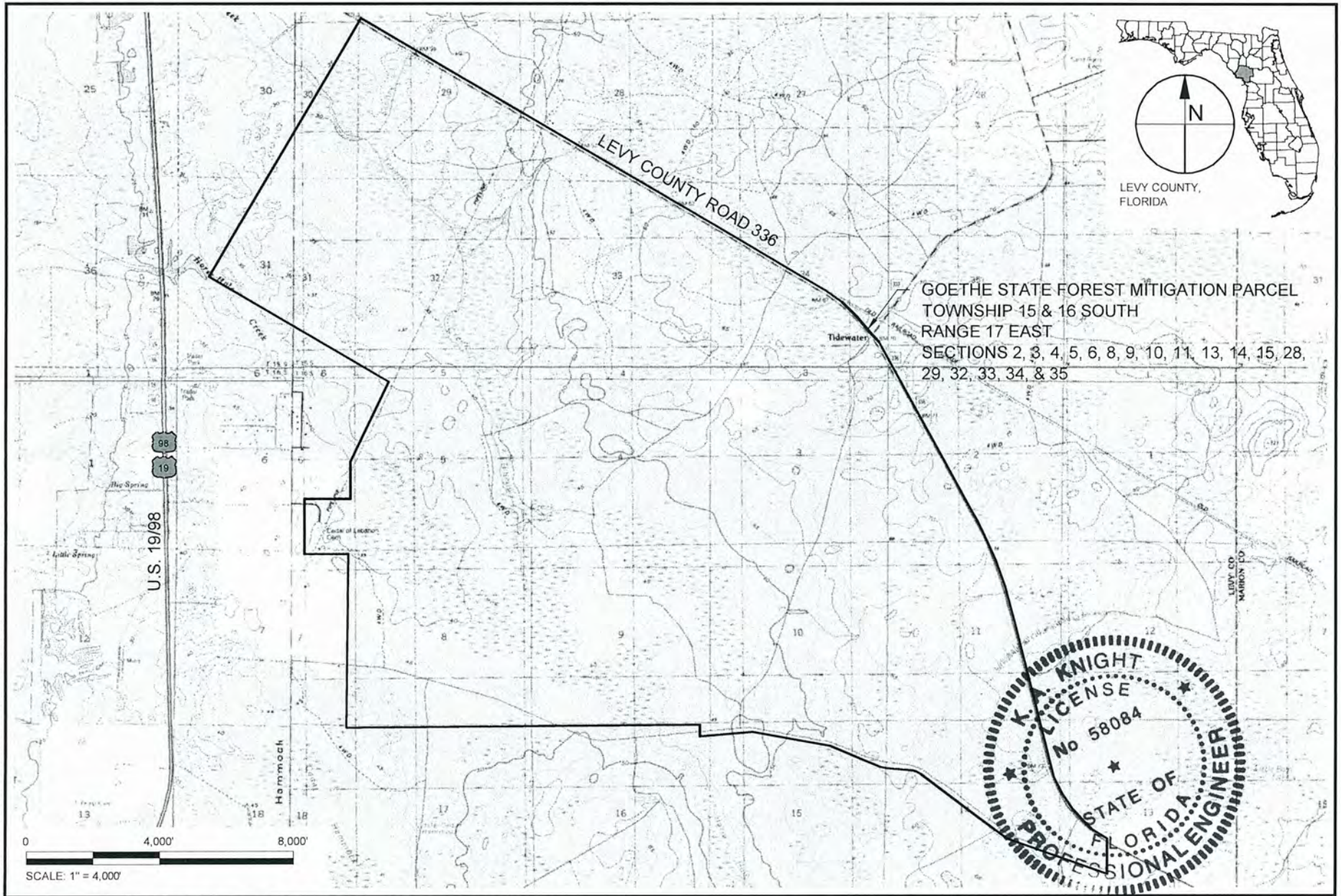
TITLE SHEET
PROGRESS ENERGY MITIGATION PROJECT
GOETHE STATE FOREST PARCEL
LEVY COUNTY, FLORIDA

PROJECT	C2011-025
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SHEET	1 of 22
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PROJECT LOCATION MAP
PROGRESS ENERGY MITIGATION PROJECT
GOETHE STATE FOREST PARCEL
LEVY COUNTY, FLORIDA

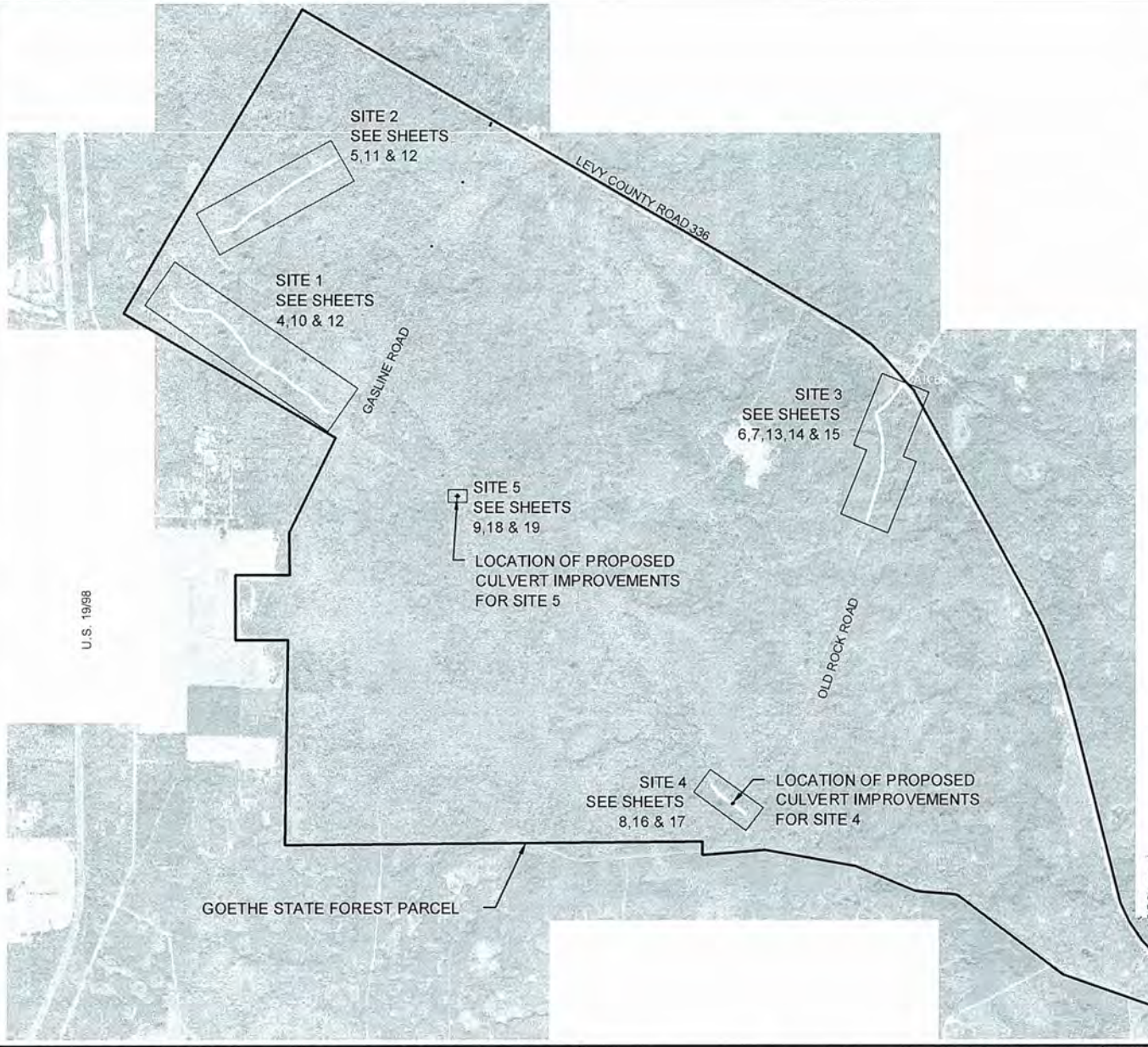
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0 4,000' 8,000'

SCALE: 1" = 4,000'

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REFERENCES:

1. ALL HORIZONTAL COORDINATES SHOWN HEREON ARE REFERENCED TO STATE PLANE NAD 1983 FLORIDA WEST ZONE (2007 ADJUSTMENT), U.S. SURVEY FEET.
2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO DATUM NAVD 1988, U.S. SURVEY FEET. THE BENCHMARKS UTILIZED WERE NGS (NATIONAL GEODETIC SOCIETY) BENCHMARK "FLGPS 35 1989" WITH AN ELEVATION OF 35.18 FEET, NGS BENCHMARK "LEVY 57 1996" WITH AN ELEVATION OF 32.74 FEET, AND NGS BENCHMARK "LEVY 58 1996" WITH AN ELEVATION OF 31.79 FEET.
3. LIMITED TOPOGRAPHICAL SURVEY PROVIDED BY MORGAN & EKLUND, INC., DATED MAY 2011.
4. ADDITIONAL TOPOGRAPHICAL INFORMATION TAKEN FROM UGSG DEM DATA, 2009.
5. AERIAL REFERENCE: FDOT, 2006
6. LIDAR OBTAINED FROM FLORIDA DIVISION OF EMERGENCY MANAGEMENT, 2007.

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PROJECT OVERVIEW
PROGRESS ENERGY MITIGATION PROJECT
GOETHE STATE FOREST PARCEL
LEVY COUNTY, FLORIDA

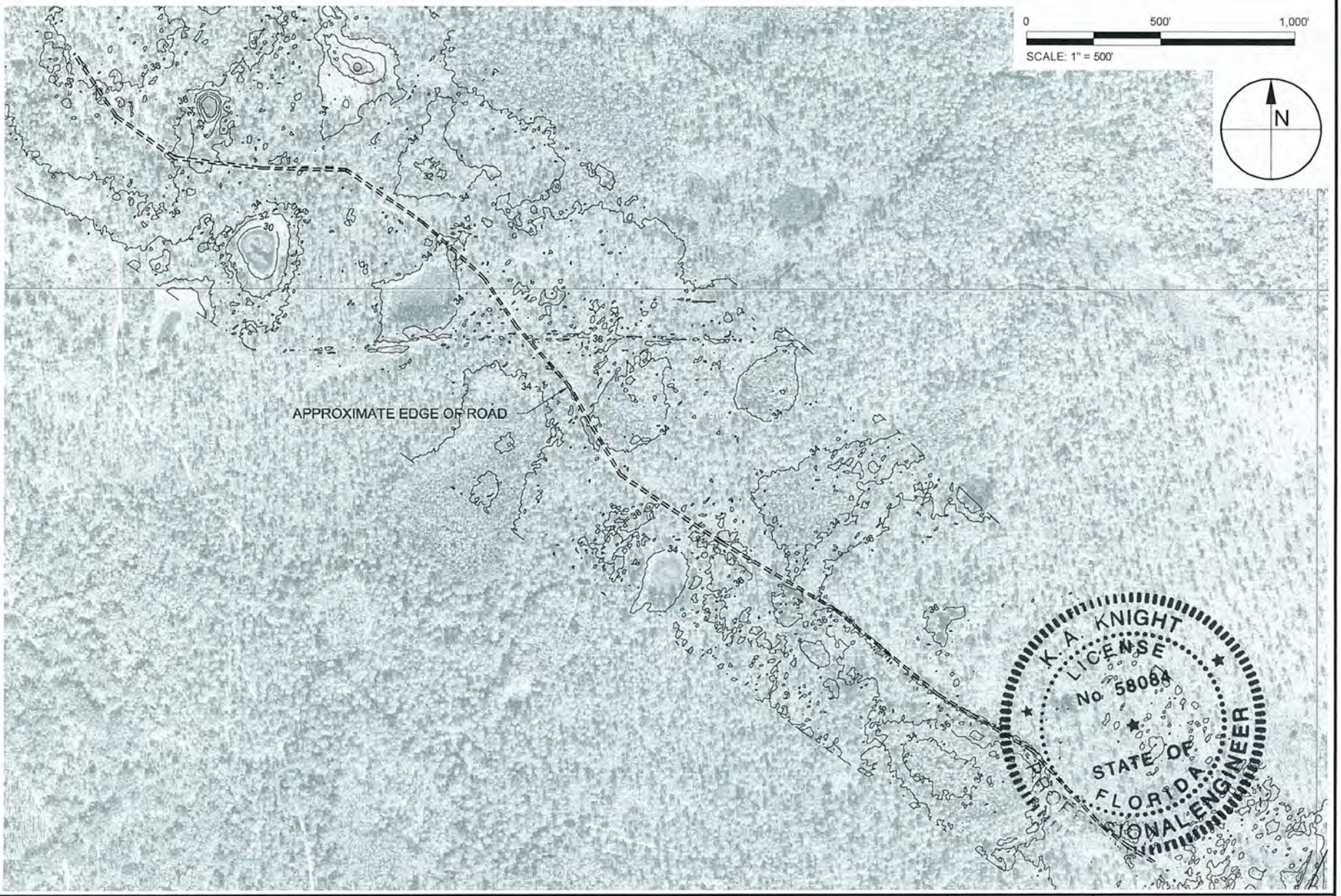
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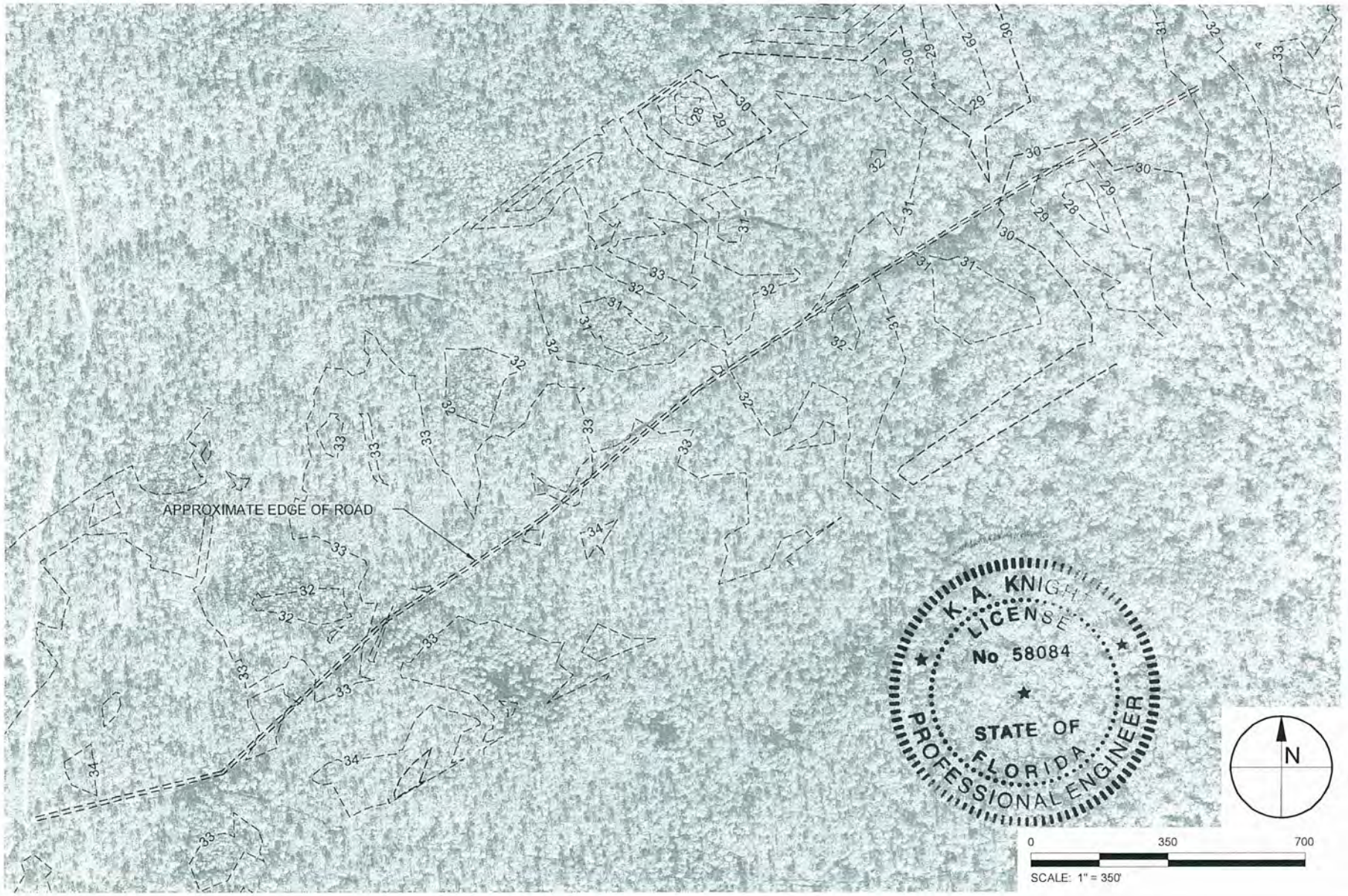
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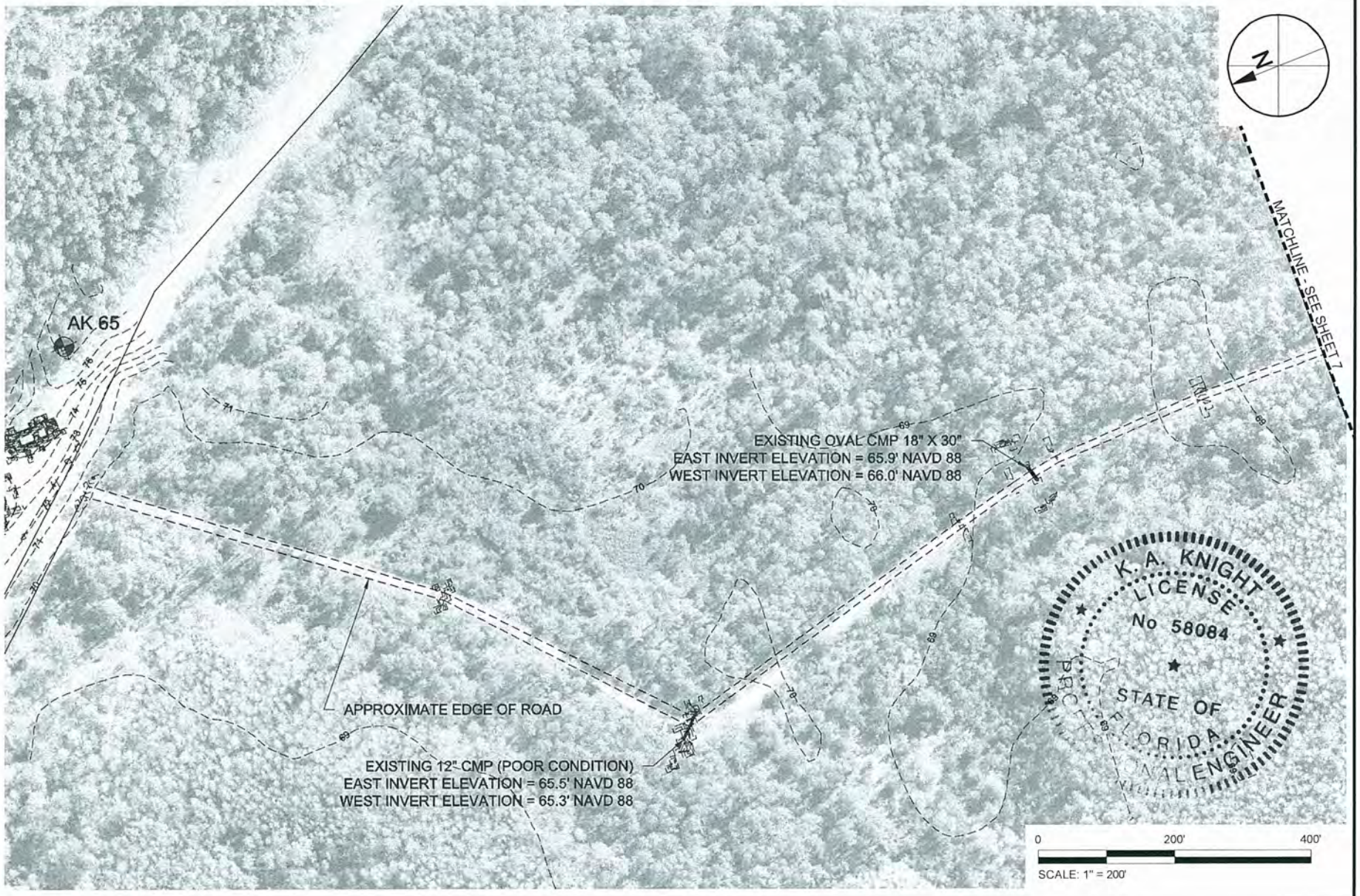
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KEITH A. KNIGHT P.E.# 58084 DATE

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TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

EXISTING CONDITIONS 1 OF 2 - SITE 3
PROGRESS ENERGY MITIGATION PROJECT
GOETHE STATE FOREST PARCEL
LEVY COUNTY, FLORIDA

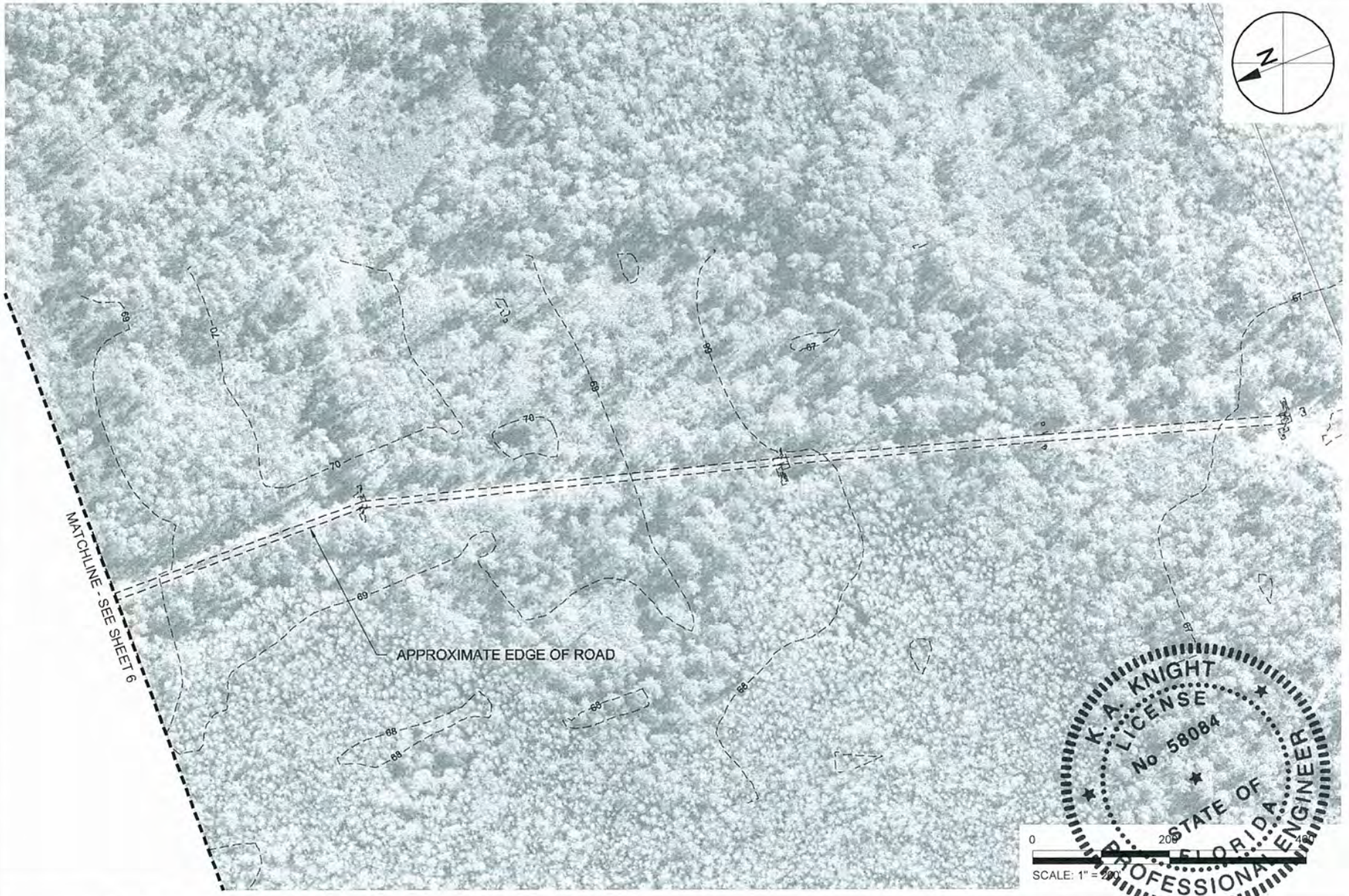
PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	6 of 22
DATE	JUNE 2011

SEAL

KEITH A. KNIGHT P.E. # 58084 DATE: 9-20-11

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K. A. KNIGHT
LICENSE
No 58084
STATE OF FLORIDA
PROFESSIONAL ENGINEER

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

EXISTING CONDITIONS 2 OF 2 - SITE 3
PROGRESS ENERGY MITIGATION PROJECT
GOETHE STATE FOREST PARCEL
LEVY COUNTY, FLORIDA

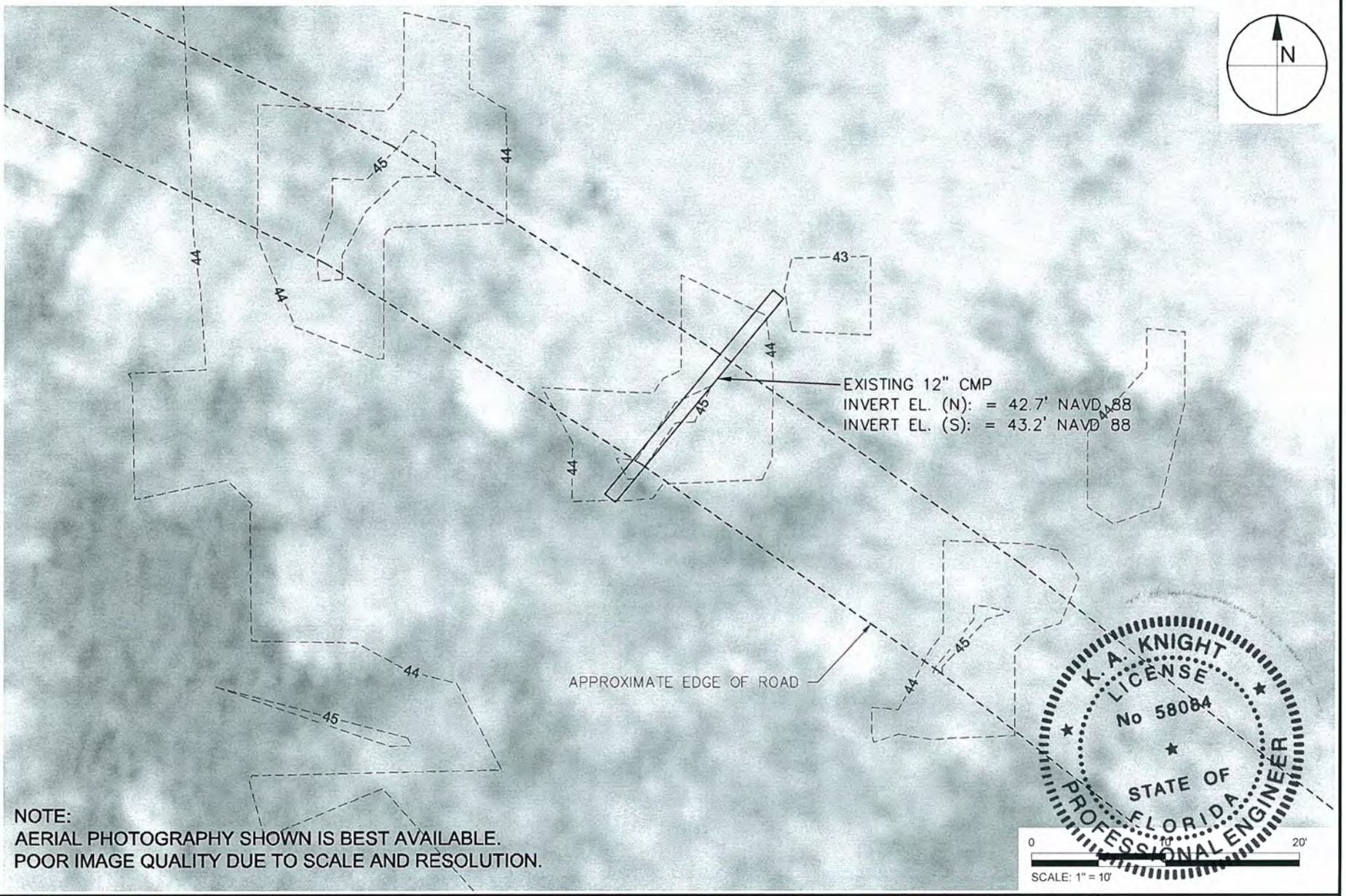
PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	7 of 22
DATE	JUNE 2011

SEAL

KEITH A. KNIGHT P.E.# 58084 — DATE 9-2011

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TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

EXISTING CONDITIONS - SITE 4
PROGRESS ENERGY MITIGATION PROJECT
GOETHE STATE FOREST PARCEL
LEVY COUNTY, FLORIDA

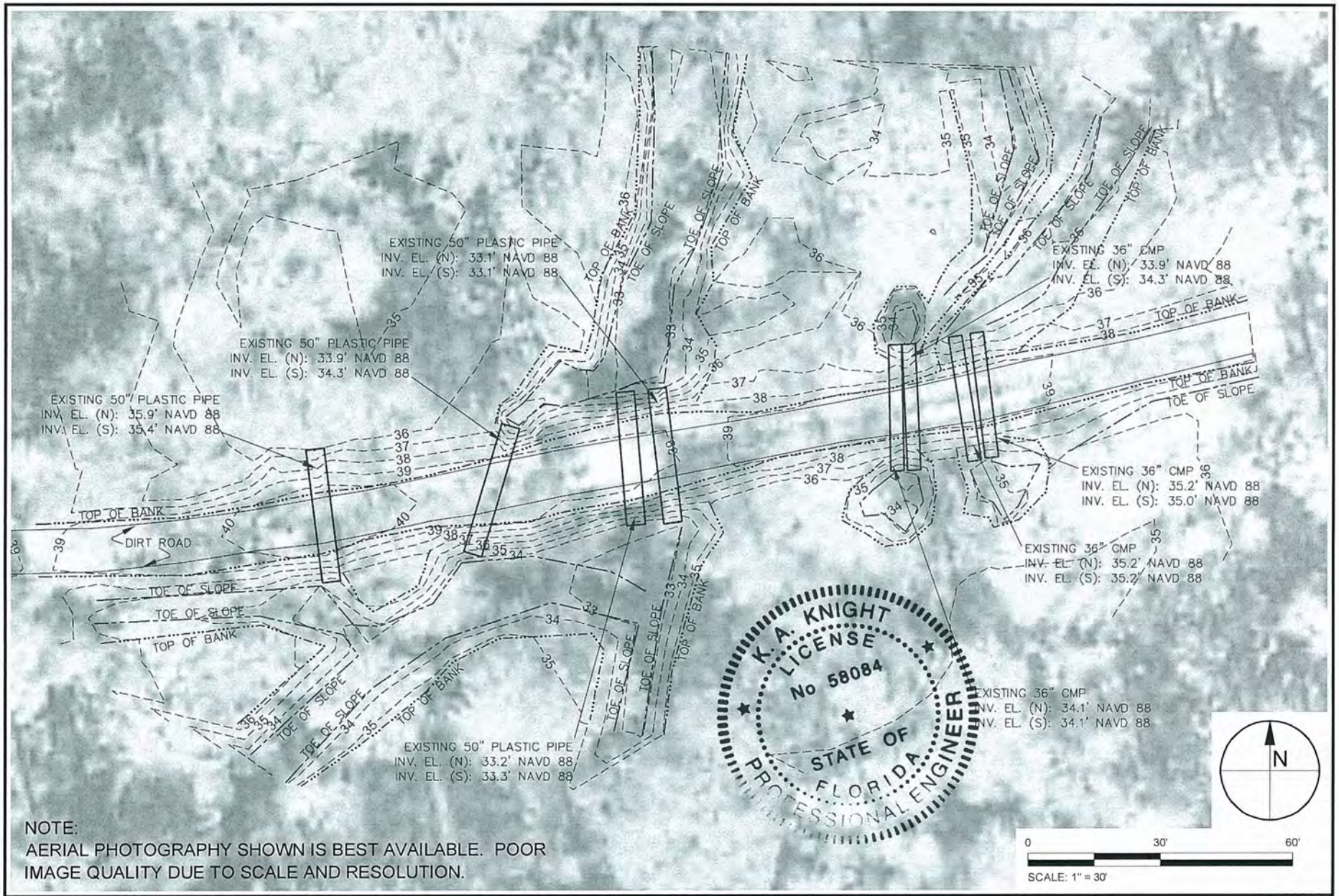
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DRAWN BY	RLJ/CAS
SHEET	8 of 22
DATE	JUNE 2011

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KEITH A. KNIGHT P.E.# 58084 — DATE 6-20-11

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BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

EXISTING CONDITIONS - SITE 5
PROGRESS ENERGY MITIGATION PROJECT
GOETHE STATE FOREST PARCEL
LEVY COUNTY, FLORIDA

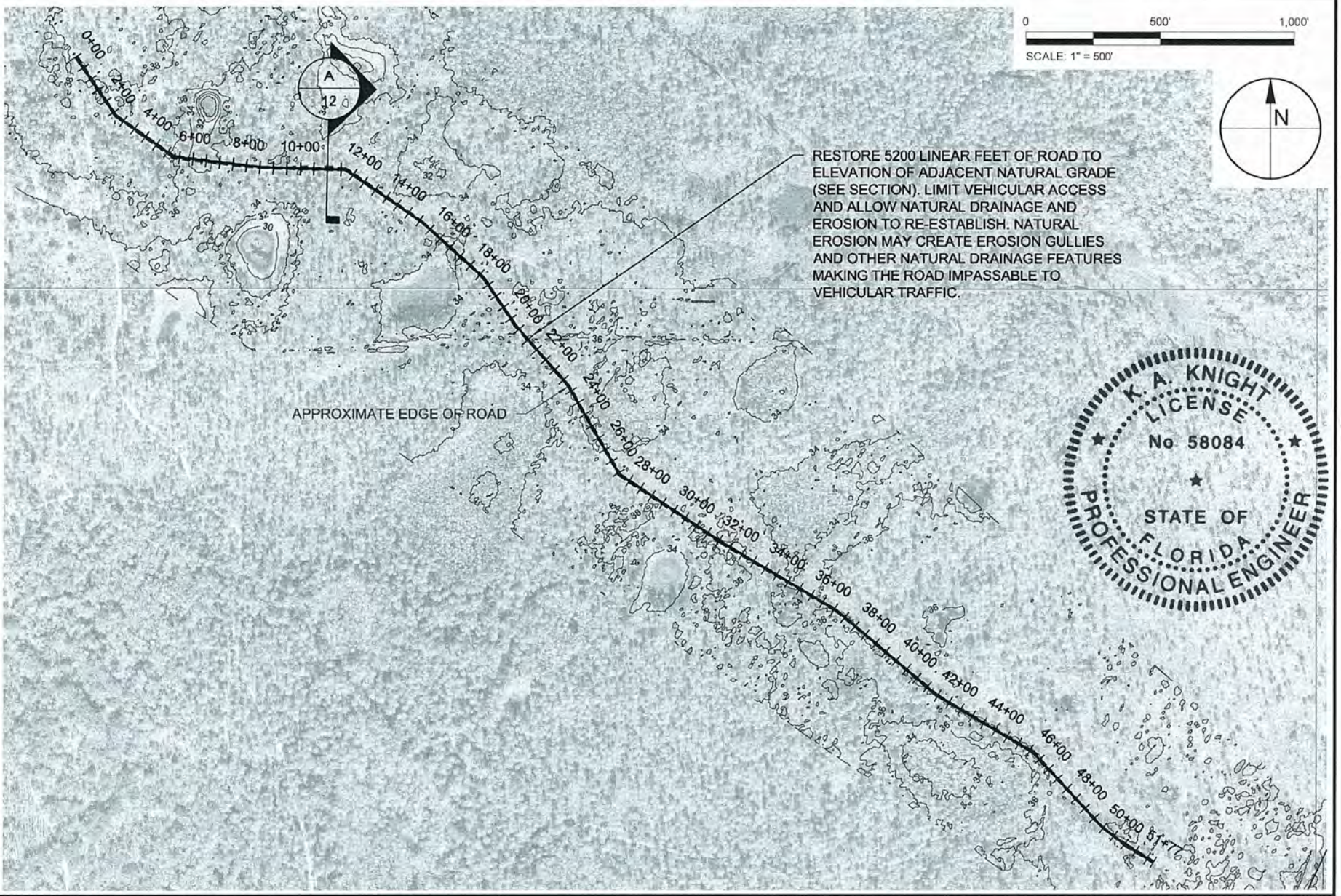
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DRAWN BY	RLJ/CAS
SHEET	9 of 22
DATE	JUNE 2011

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KEITH A. KNIGHT P.E. # 58084 — DATE 9-20-11

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10151 DEERWOOD PARK BLVD.
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JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

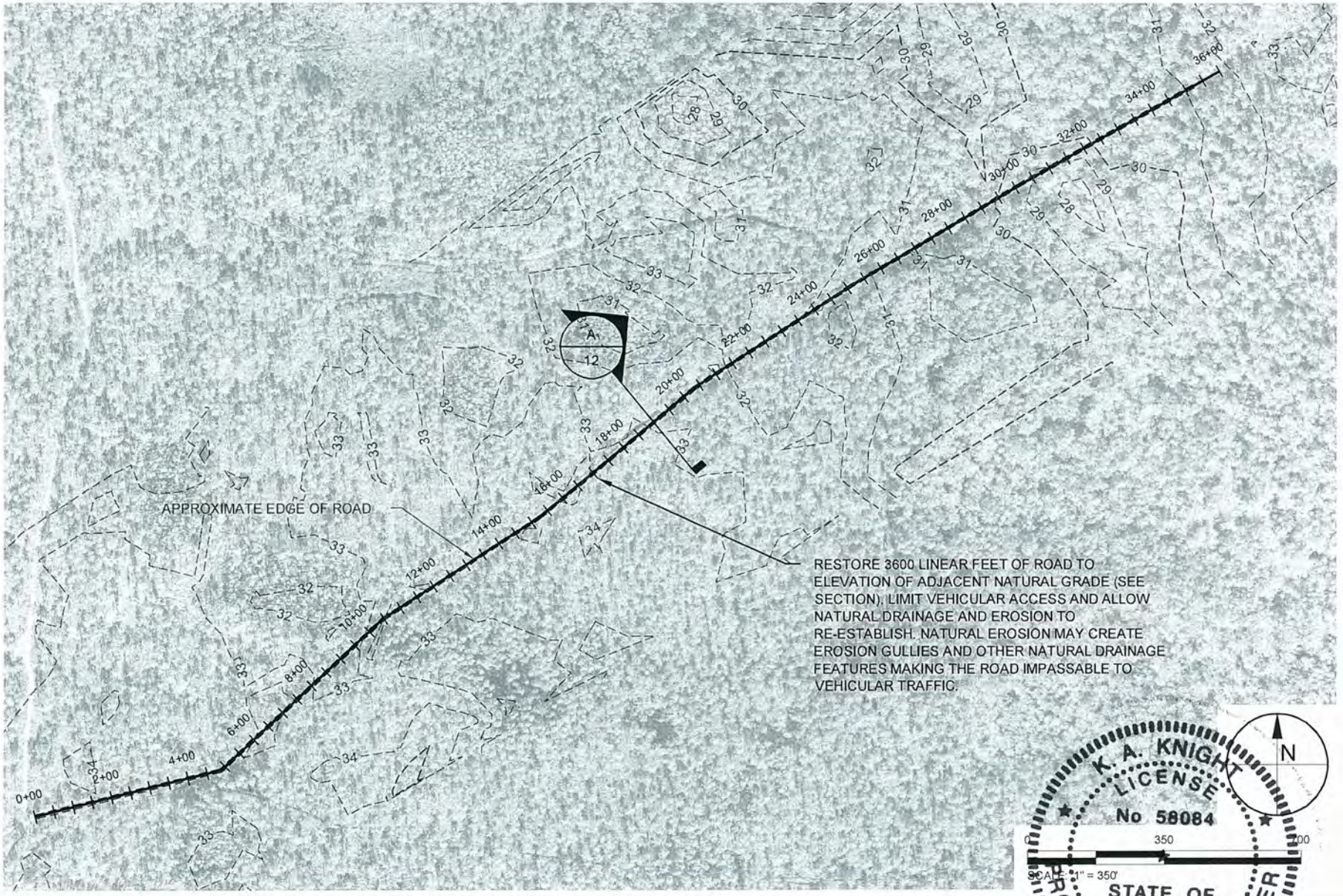
GRADING PLAN - SITE 1
PROGRESS ENERGY MITIGATION PROJECT
GOETHE STATE FOREST PARCEL
LEVY COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
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DATE	JUNE 2011

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KEITH A. KNIGHT P.E.# 58084 — DATE 7-2011

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CERTIFICATE OF AUTHORIZATION # 4815

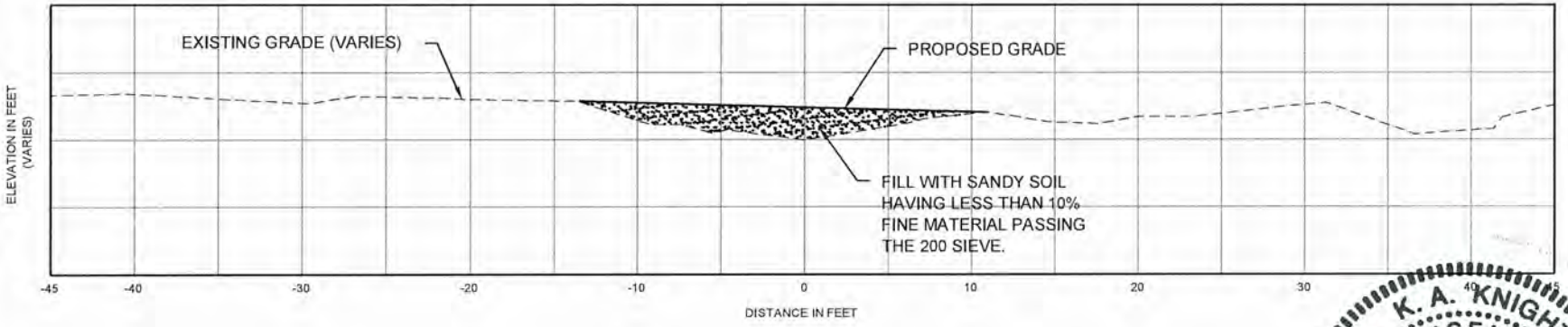
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PROGRESS ENERGY MITIGATION PROJECT
GOETHE STATE FOREST PARCEL
LEVY COUNTY, FLORIDA

PROJECT	C2011.025
DRAWN BY	RLJ/CAS
SHEET	11 of 22
DATE	JUNE 2011

KEITH A. KNIGHT P.E.# 58084 — DATE 7-19-2011

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TYPICAL SECTION DETAIL
ROADWAY RESTORATION LOW ROAD ELEVATION

(A)

SCALE: 1" = 10'
V-SCALE: 1" = 5'

0 10'

K. A. KNIGHT
LICENSE
No 58084
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PROFESSIONAL ENGINEER

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10151 DEERWOOD PARK BLVD.
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JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

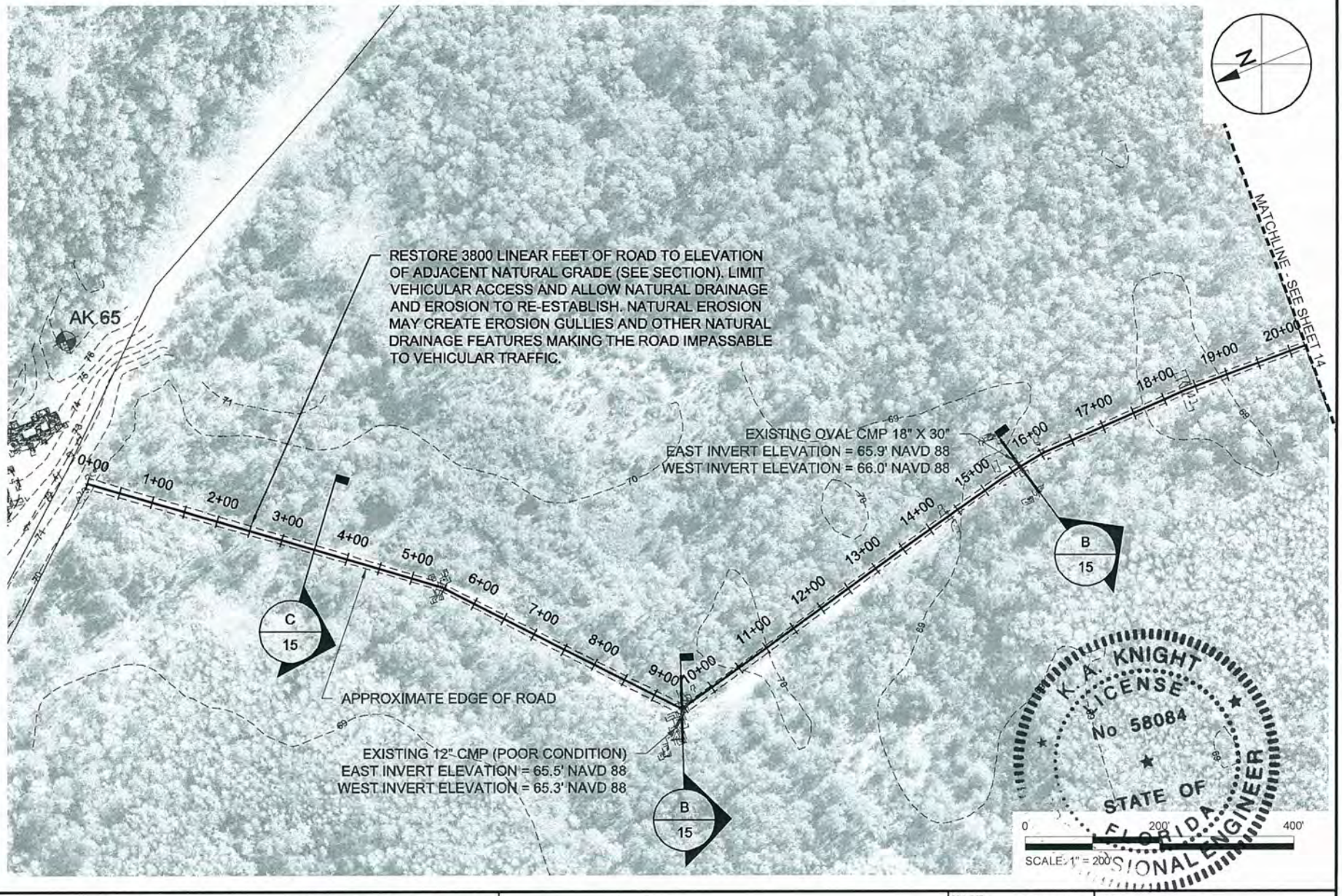
CROSS SECTION - SITES 1 AND 2
PROGRESS ENERGY MITIGATION PROJECT
GOETHE STATE FOREST PARCEL
LEVY COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	12 of 22
DATE	JUNE 2011

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JACKSONVILLE, FL 32256
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GRADING PLAN 1 OF 2 - SITE 3
PROGRESS ENERGY MITIGATION PROJECT
GOETHE STATE FOREST PARCEL
LEVY COUNTY, FLORIDA

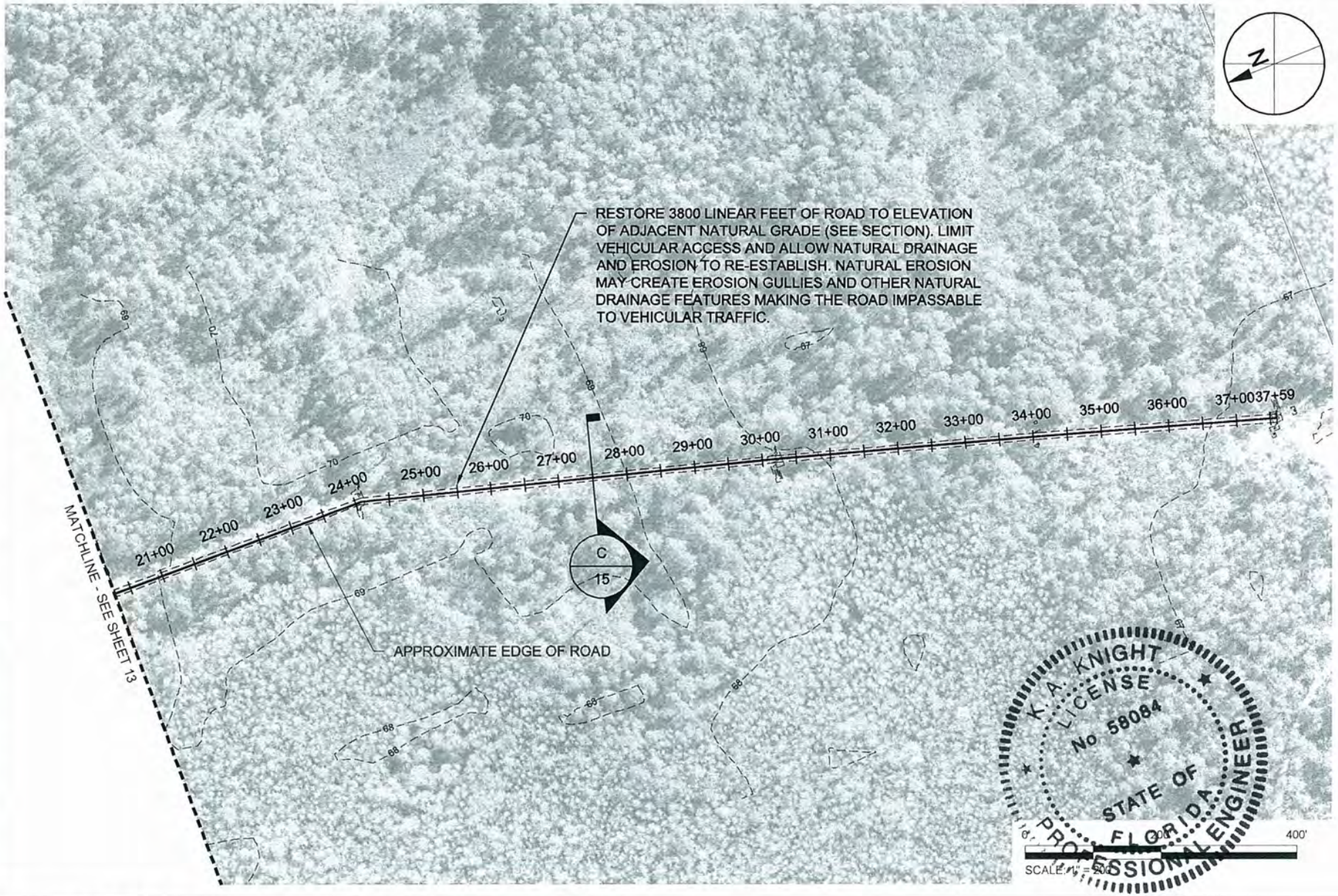
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DATE	JUNE 2011

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KEITH A. KNIGHT P.E. # 58084 — DATE 9-20-11

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JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

GRADING PLAN 2 OF 2 - SITE 3
PROGRESS ENERGY MITIGATION PROJECT
GOETHE STATE FOREST PARCEL
LEVY COUNTY, FLORIDA

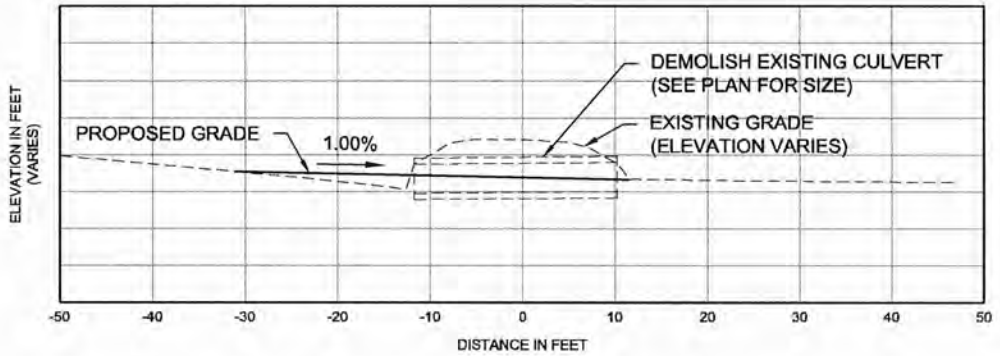
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DRAWN BY	RLJ/CAS
SHEET	14 of 22
DATE	JUNE 2011

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KEITH A. KNIGHT P.E.# 58084 — DATE 9-2011

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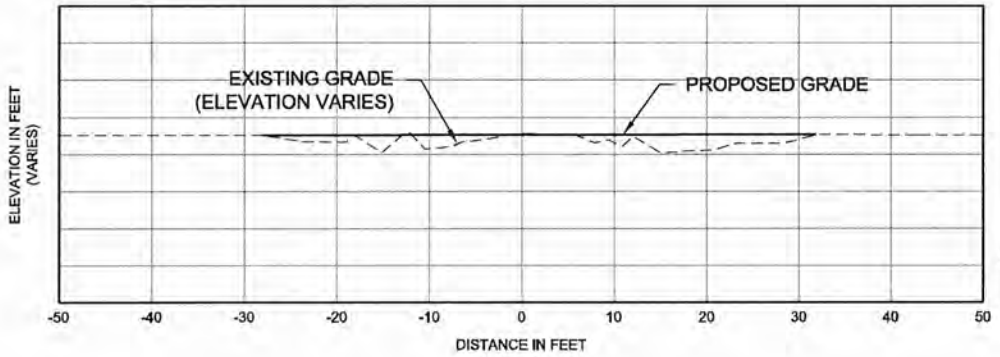
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B TYPICAL ROAD RESTORATION SECTION AT CULVERT LOCATIONS

SCALE: 1" = 20'
V-SCALE: 1" = 10'

0 20'



C TYPICAL ROAD RESTORATION SECTION

SCALE: 1" = 20'
V-SCALE: 1" = 10'

0 20'

K. A. KNIGHT
LICENSE
No 58084
STATE OF FLORIDA
PROFESSIONAL ENGINEER

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

CROSS SECTION - SITE 3
PROGRESS ENERGY MITIGATION PROJECT
GOETHE STATE FOREST PARCEL
LEVY COUNTY, FLORIDA

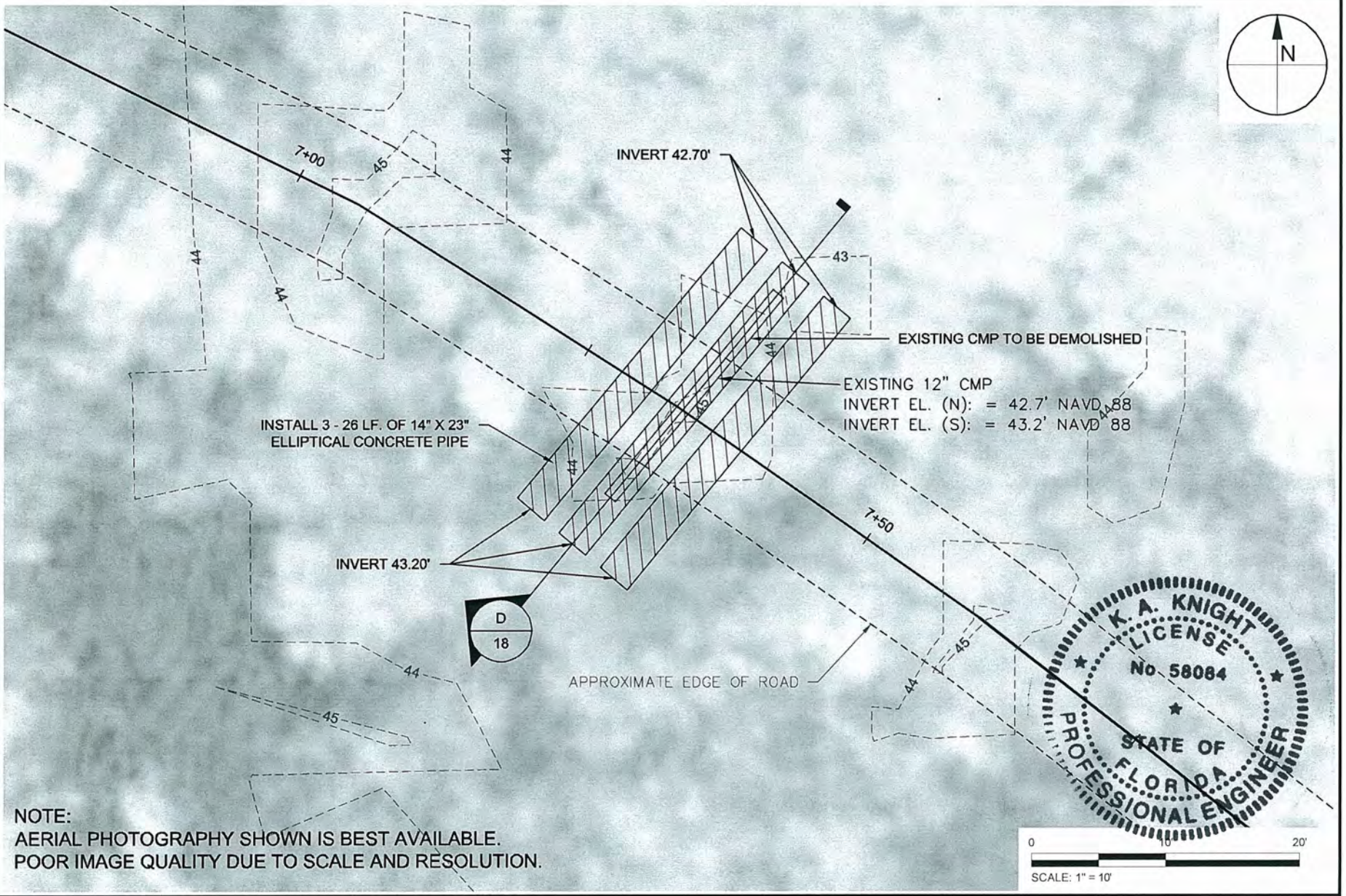
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DRAWN BY	RLJ/CAS
SHEET	15 of 22
DATE	JUNE 2011

SEAL

KEITH A. KNIGHT P.E. # 58084 DATE 9-20-11

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10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

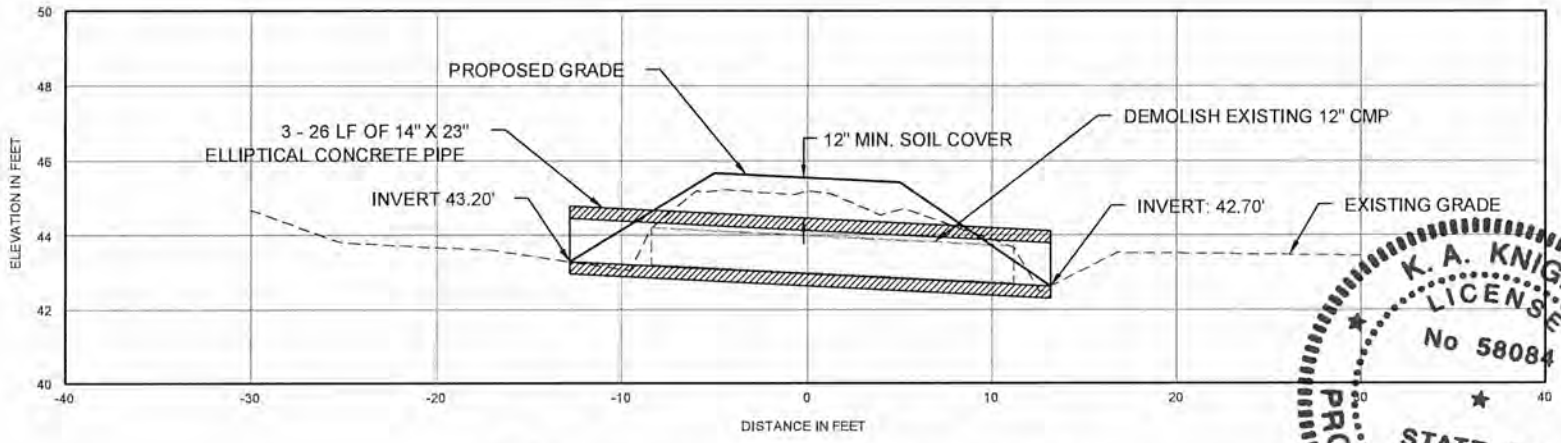
GRADING PLAN - SITE 4
PROGRESS ENERGY MITIGATION PROJECT
GOETHE STATE FOREST PARCEL
LEVY COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	16 of 22
DATE	JUNE 2011

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KEITH A. KNIGHT P.E.# 58084 DATE 9-2011

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D SITE 4 - CULVERT CROSS SECTION

SCALE: 1" = 10'
V-SCALE: 1" = 5'

0 10'

K. A. KNIGHT LICENSE No 58084 STATE OF FLORIDA PROFESSIONAL ENGINEER

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

CROSS SECTION - SITE 4
PROGRESS ENERGY MITIGATION PROJECT
GOETHE STATE FOREST PARCEL
LEVY COUNTY, FLORIDA

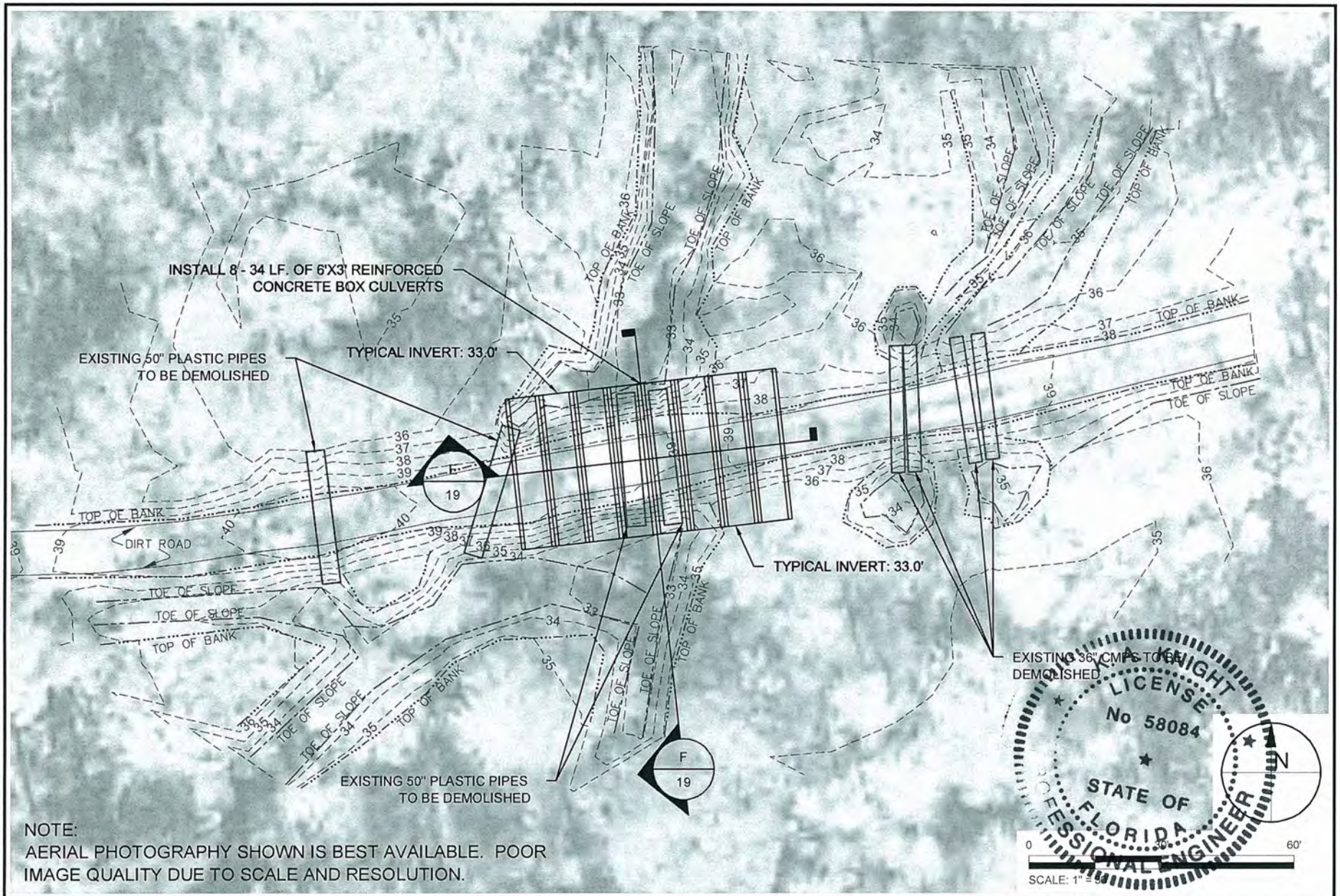
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SHEET	17 of 22
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KEITH A. KNIGHT P.E.# 58084 DATE

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10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

GRADING PLAN - SITE 5
PROGRESS ENERGY MITIGATION PROJECT
GOETHE STATE FOREST PARCEL
LEVY COUNTY, FLORIDA

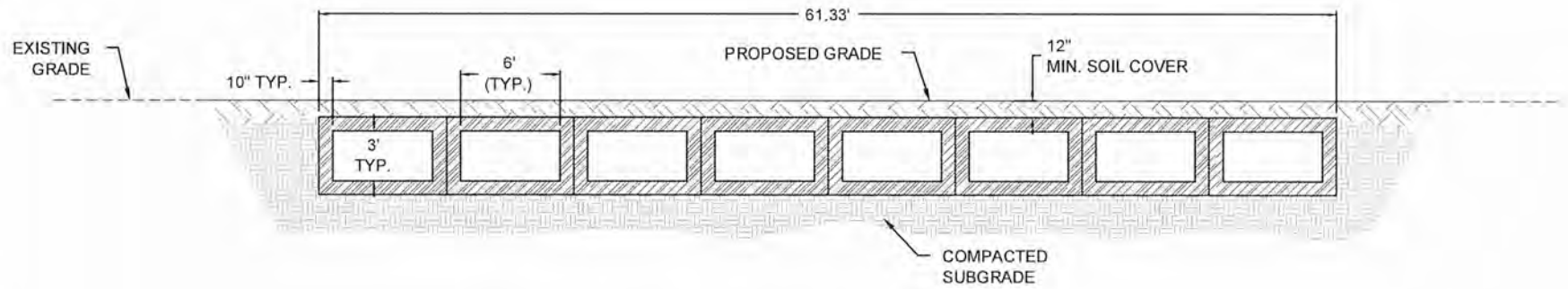
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DATE	JUNE 2011

SEAL

KEITH A. KNIGHT P.E. # 58084 — DATE 9-20-11

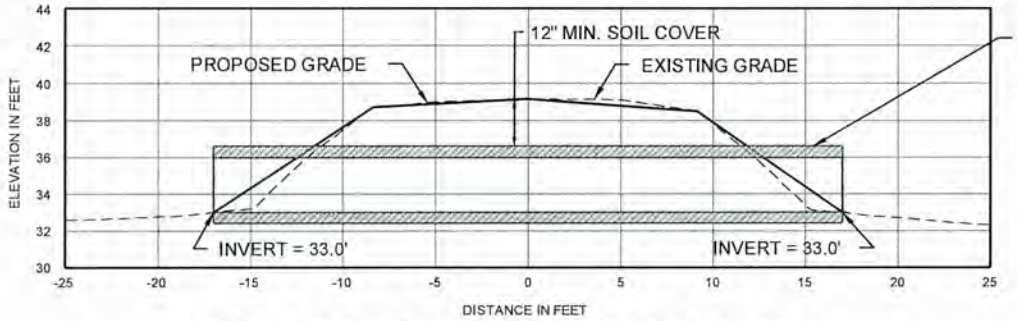
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E SITE 5 CULVERT - DETAIL 6'X3' CONCRETE BOX CULVERTS

SCALE: 1" = 10'



F SITE 5 CULVERT - CROSS SECTION

SCALE: 1" = 10'

K. A. KNIGHT LICENSE No 58084 STATE OF FLORIDA PROFESSIONAL ENGINEER SEAL

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

CROSS SECTION & DETAIL - SITE 5
PROGRESS ENERGY MITIGATION PROJECT
GOETHE STATE FOREST PARCEL
LEVY COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	19 of 22
DATE	JUNE 2011

KA Knight 9-20-11
KEITH A. KNIGHT P.E. # 58084 DATE

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EROSION CONTROL AND GENERAL VEGETATION NOTES:

1. THE CONTRACTOR SHALL IMPLEMENT AND MAINTAIN EROSION CONTROL MEASURES AS NECESSARY TO COMPLY WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS AND COMPLY WITH STATE WATER QUALITY CRITERIA FOR STORMWATER DISCHARGE. EROSION CONTROL MEASURES INCLUDE BUT ARE NOT LIMITED TO TURBIDITY SCREENS, MULCHING, HAY BALES, AND SILT FENCE. IF A WATER QUALITY VIOLATION OCCURS, THE CONTRACTOR SHALL BE WHOLLY RESPONSIBLE FOR ALL DAMAGE AND ALL COSTS WHICH MAY RESULT INCLUDING LEGAL FEES, CONSTRUCTION COSTS, AND FINES.

2. DISTURBED AREAS SHALL BE VEGETATED, FERTILIZED, MULCHED, AND MAINTAINED IN ACCORDANCE WITH PROJECT SPECIFICATIONS AND CITY, COUNTY, STATE, AND FEDERAL REQUIREMENTS.

3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING PERMANENT VEGETATION AT ALL DISTURBED AREAS PER NPDES FINAL STABILIZATION REQUIREMENTS.

4. EROSION CONTROL MEASURES SHALL BE MAINTAINED FOR THE ENTIRE DURATION OF THE PROJECT OR UNTIL PERMANENT VEGETATION IS ESTABLISHED.

5. EROSION CONTROL MEASURES SHALL BE PLACED TO CONTAIN ALL POINTS OF DISCHARGE TO SURFACE WATERS OR WETLANDS INCLUDING CURB INLETS, DITCH BOTTOM INLETS, DITCHES, AND DOWNSTREAM PORTIONS OF NATURAL DRAINAGE PATHWAYS, STREAMS, CANALS, AND TIDAL WATERS ADJACENT TO CONSTRUCTION.

6. 48 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION, THE CONTRACTOR WILL SUBMIT A "NOTICE OF INTENT" TO THE EPA IN ACCORDANCE WITH NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM RULES AND REGULATIONS.

7. THE SITE CONTRACTOR IS RESPONSIBLE FOR REMOVING THE TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES AFTER COMPLETION OF CONSTRUCTION AND ONLY WHEN AREAS HAVE BEEN STABILIZED.

8. SILT FENCES AND FILTER BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.



TAYLOR ENGINEERING INC.
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CERTIFICATE OF AUTHORIZATION # 4815

EROSION CONTROL NOTES
PROGRESS ENERGY MITIGATION PROJECT
GOETHE STATE FOREST PARCEL
LEVY COUNTY, FLORIDA

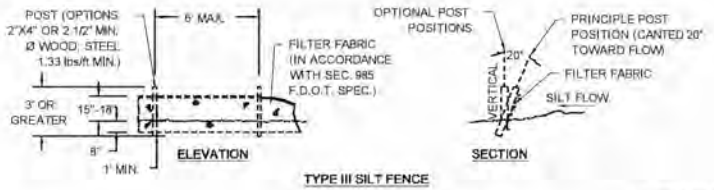
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DRAWN BY	RLJ/CAS
SHEET	20 of 22
DATE	JUNE 2011

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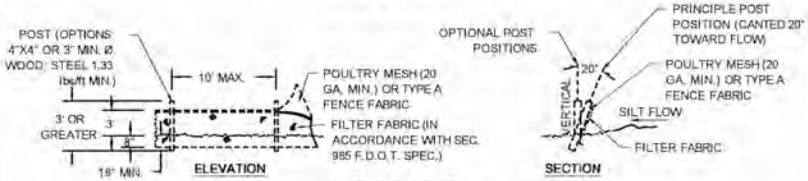
KA Knight 9-2011
KEITH A. KNIGHT P.E. # 58084 DATE

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

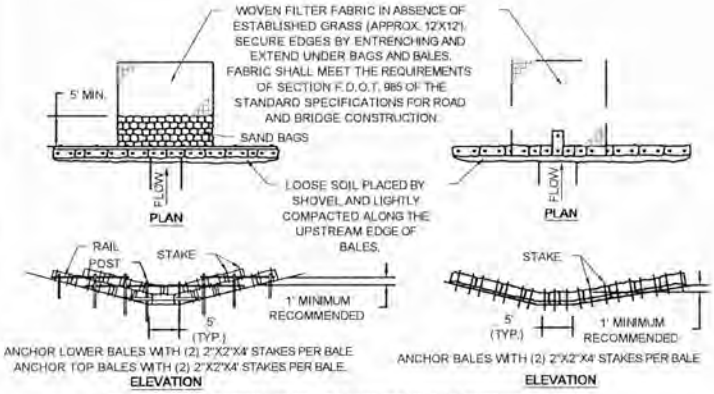
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TYPE III SILT FENCE



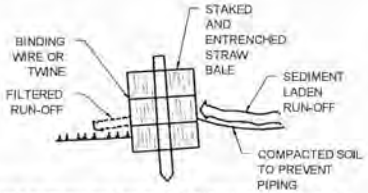
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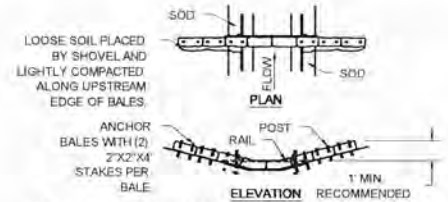
APPLICATION AND SPACING OF TYPES I & TYPES II HAY BALE BARRIERS SALL BE IN ACCORDANCE WITH SHEET 1 OF 3, F.D.O.T, INDEX NO. 102

TYPE II TYPE I

TYPICAL STRAW BALE DETAIL

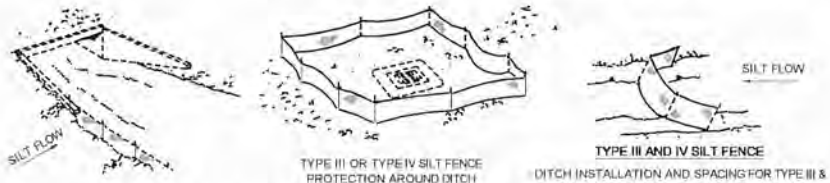


CROSS SECTION OF A PROPERLY INSTALLED STRAW BALE



SPACING: BALE BARRIERS FOR PAVED DITCHES SHOULD BE SPACED IN ACCORDANCE WITH CHART I, SHEET 1 OF 3, INDEX NO. 102 OF THE F.D.O.T. ROADWAY AND TRAFFIC DESIGN STANDARDS.

STRAW BALE BARRIER FOR PAVED DITCH



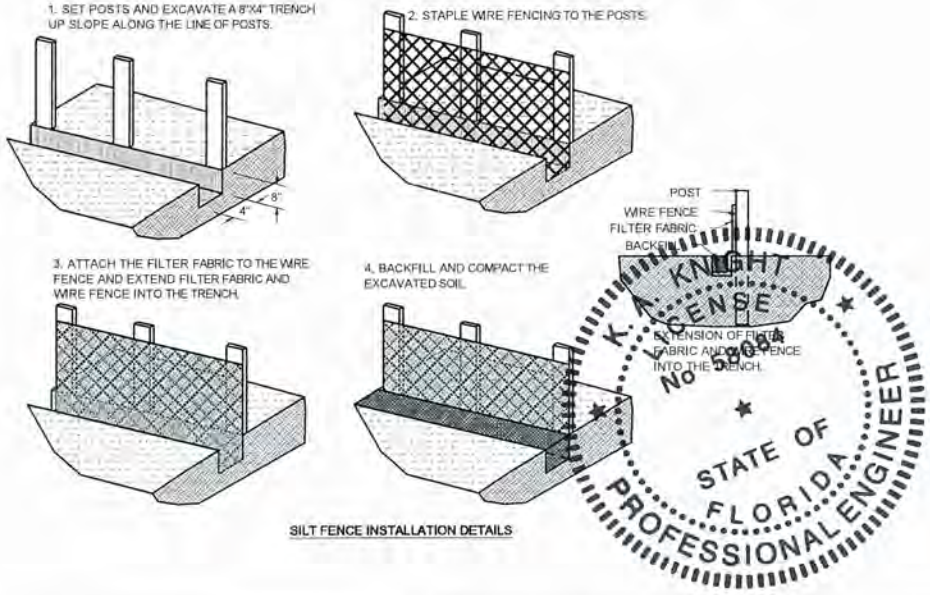
TYPE III OR TYPE IV SILT FENCE PROTECTION AROUND DITCH BOTTOM INLETS.

TYPE III AND IV SILT FENCE

DITCH INSTALLATION AND SPACING FOR TYPE III & TYPE IV FENCE TO BE IN ACCORDANCE WITH SHEET 1 OF 3, OF THE F.D.O.T. INDEX NO. 102

TYPE III OR TYPE IV SILT FENCE

DO NOT DEPLOY IN A MANNER THAT SILT FENCES WILL ACT AS A DAM ACROSS PERMANENT FLOWING WATERCOURSES. SILT FENCES ARE TO BE USED AT UPLAND LOCATIONS AND TURBIDITY BARRIERS USED AT PERMANENT BODIES OF WATER.



SILT FENCE INSTALLATION DETAILS

KEITH A. KNIGHT LICENSE No. 59084 STATE OF FLORIDA PROFESSIONAL ENGINEER

TAYLOR ENGINEERING INC.

10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

EROSION CONTROL DETAILS
PROGRESS ENERGY MITIGATION PROJECT
GOETHE STATE FOREST PARCEL
LEVY COUNTY, FLORIDA

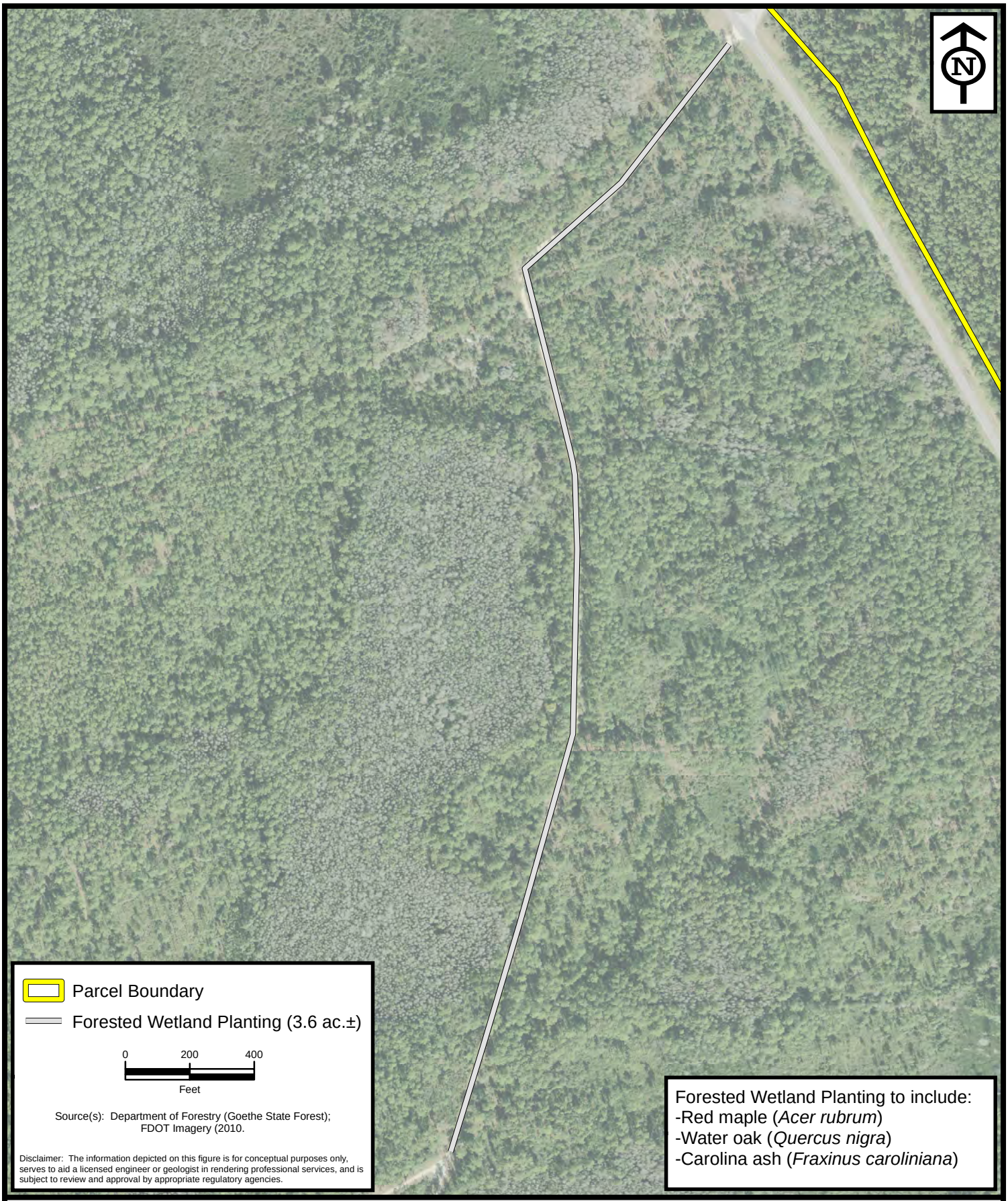
PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	21 of 22
DATE	JUNE 2011

SEAL

KA Knight 6-20-11
KEITH A. KNIGHT P.E.# 59084 DATE

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

CATHY SHELL X:\SYS\PROJECTS\C2011-025 PROGRESS ENERGY\PERMITTING\PLOT\11-025P-ERDR2K.DWG 7/18/2011 5:21:39 PM



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Proposed Planting Plan

Goethe State Forest Parcel

Levy County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JGB/JRN
Sheet:	**22 of 22**

Path: Q:_Projects\EJ\2011\021\00\fig\Daniels\Report\Planting.mxd Date: 7/15/2011 9:50:23 AM

3.0 WACCASASSA AND WITHLACOOCHEE WATERSHEDS – LEVY NUCLEAR PLANT SITE

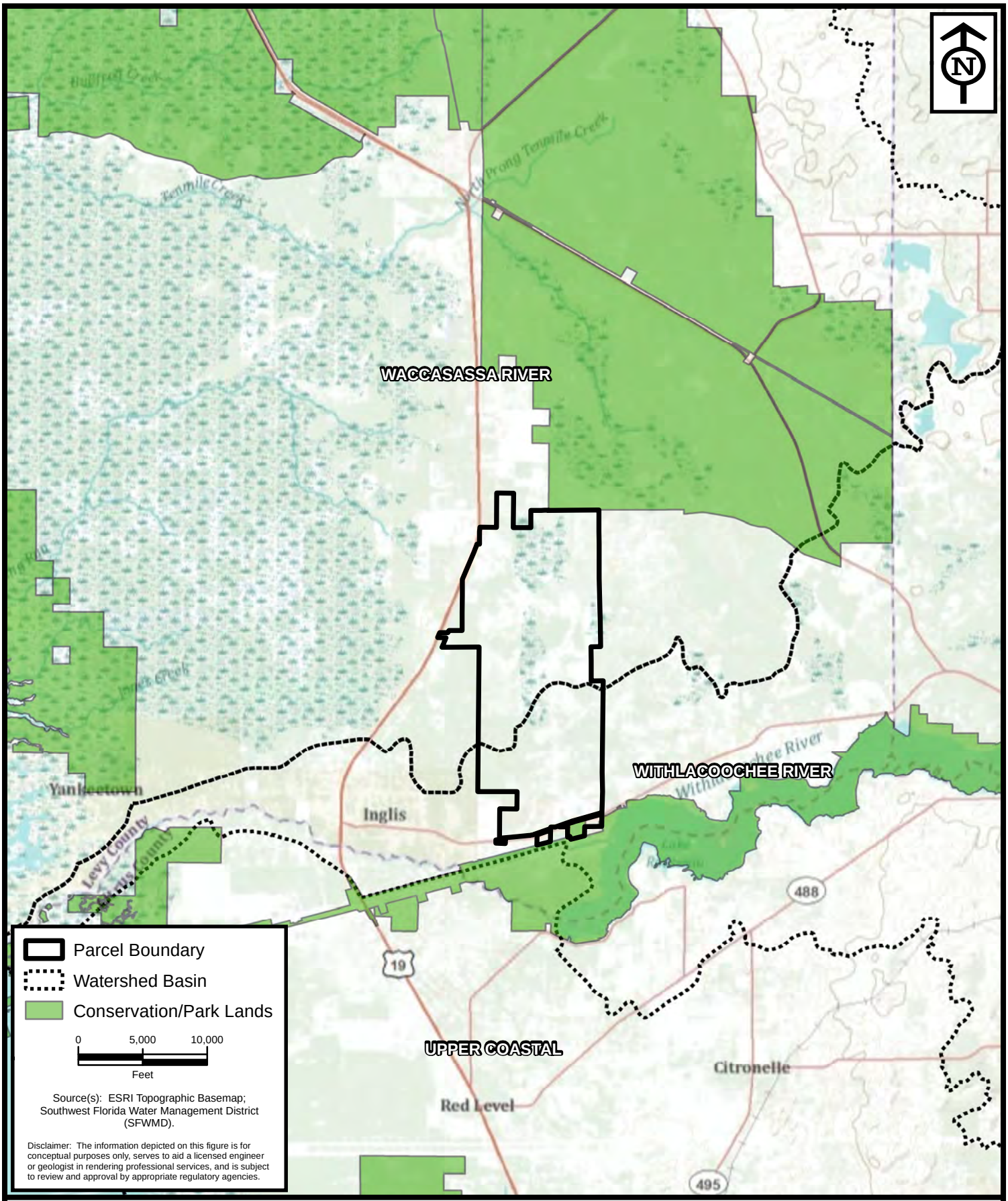
3.1 Introduction

The proposed wetland impacts for LNP are summarized in Table 1-1 and the mitigation plan for the 556.2 acres of impact (-231.6 UMAM units; -11.5 herbaceous units and -220.1 forested units) in the Waccasassa and Withlacoochee Basin are partially contained in this section. The LNP on-site mitigation will produce 372.9 UMAM credits. This section of the overall mitigation plan provides the details for the LNP on-site mitigation.

The LNP mitigation site is located on a PEF-owned parcel in Levy County, Florida (Figure 3-1). This parcel abuts the southwestern portion of the Goethe State Forest parcel to the north and a portion of the 110 mile Cross Florida Greenway (Inglis Island) to the south (Figure 3-2). The enhancement/restoration activities proposed at LNP will improve the link between these two regionally significant preserves and will ultimately result in an ecologically improved and protected corridor between these two large systems.

3.2 Impact Summary

The wetland impacts within the Waccasassa and Withlacoochee Watersheds for LNP site development and associated transmission line impact total approximately 556.2 acres. These impacts will generate a total loss of 231.6 functional units (-11.5 herbaceous and -220.1 forested). The impact summary is provided on Table 3.1 (below). The majority of these impacts will be the result of permanently clearing and filling existing forested wetlands, with a smaller portion coming from clearing and filling of herbaceous and open water wetlands. The proposed mitigation plan for LNP on-site will provide for 372.9 functional units of lift within the Waccasassa and Withlacoochee Watersheds, of which 317.1 functional lift units will be in the Waccasassa Watershed and 55.8 functional gain units will be in the Withlacoochee Watershed. Furthermore, within the Waccasassa Watershed, 16.5 functional units of lift will be provided to offset herbaceous and open water impacts, while 300.6 functional units of lift will offset the forested wetland impacts. Within the Withlacoochee Watershed, 2.4 functional units of lift will be provided to offset herbaceous and open water impacts, while 53.4 functional units of lift will offset the forested wetland impacts. (Section 3.6 provides details of the UMAM scores).



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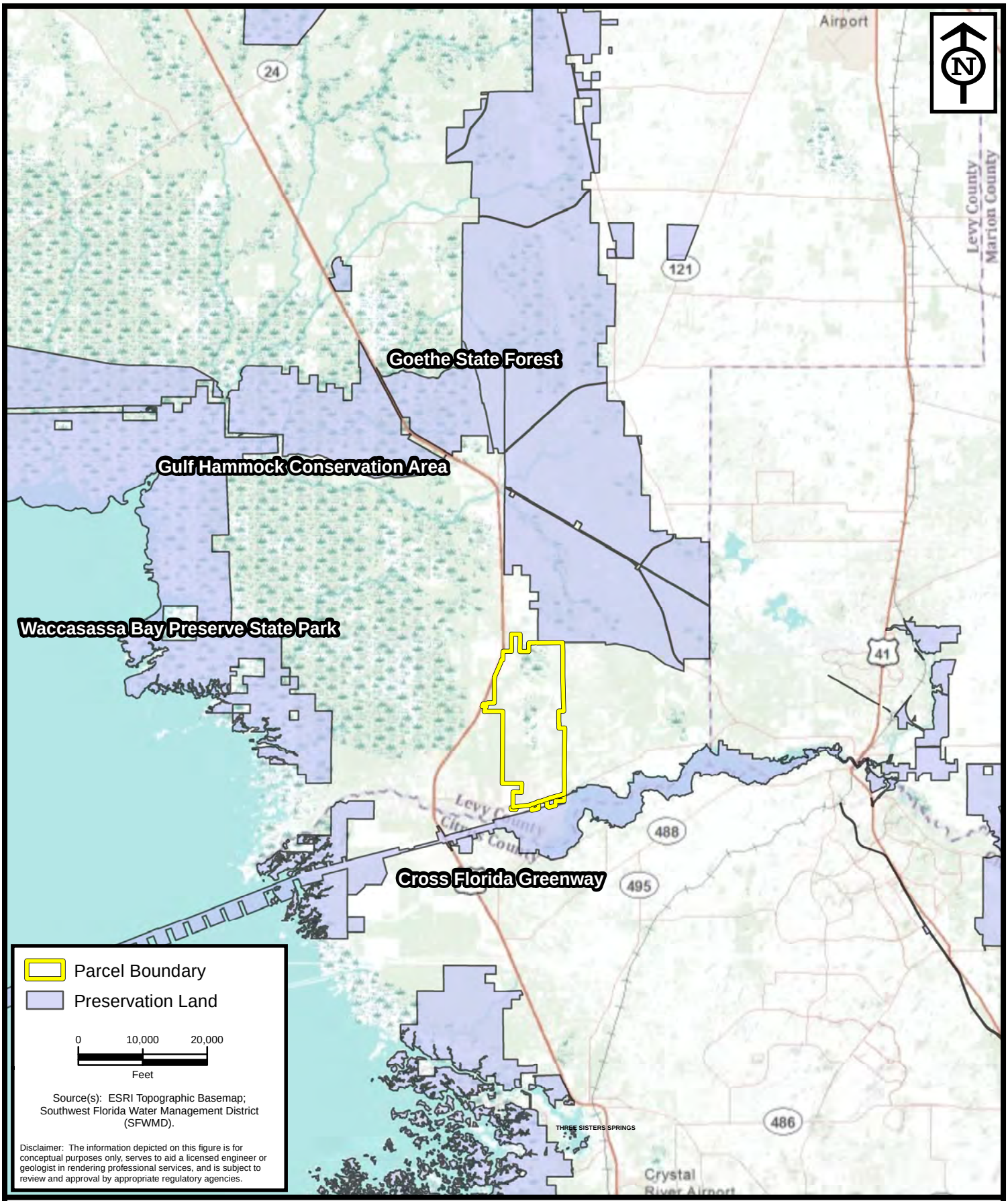
Waccasassa River and Withlacoochee River Watersheds

Levy Nuclear Plant Site

Levy County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JRN/JGB
Figure:	**3-1**

Path: Q:_Projects\EJ\2011\021\00\fig\LNP_Plant\Report\Pro_basin.mxd Date: 7/25/2011 9:19:53 AM



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Regional Preservation Land

Levy Nuclear Plant Site

Levy County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JGB/JRN
Figure:	**3-2**

Path: Q:_Projects\EJ\2011\021\00\fig\LNP_Plant\Report\Pro_location.mxd Date: 7/7/2011 11:28:37 AM

Table 3-1. Waccasassa and Withlacoochee Watershed wetland impacts by UMAM functional loss and acreage

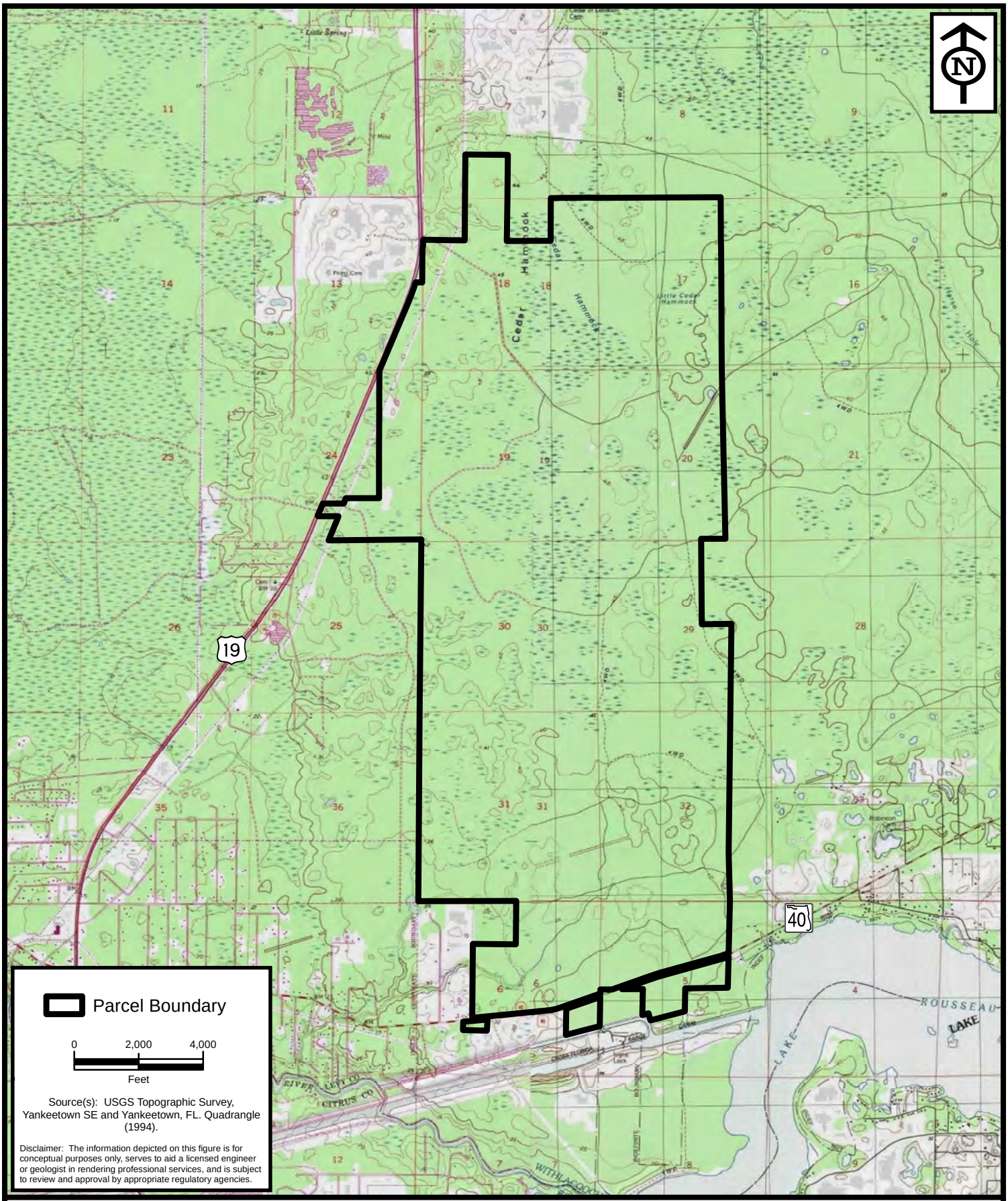
Watershed	Herbaceous Wetland Functional Loss Units	Herbaceous Wetland Acreage	Forested Wetland Functional Loss Units	Forested Wetland Acreage	Total Functional Loss Units	Total Acreage Impacted
Waccasassa	-1.3	2.6	-181.7	385.5	-183.0	388.1
Withlacoochee (plant site)	-0.4	2.4	-29.2	124.7	-29.6	127.1
Withlacoochee (trans. lines)	-9.8	13.8	-9.2	27.2	-19.0	41.0
Total	**-11.5**	**18.8**	**-220.1**	**537.4**	**-231.6**	**556.2**

3.3 Site Description

The LNP site is located in Sections 17-20 and 29-32, Township 16 South, Range 17 East; and Sections 5 and 6, Township 17 South, Range 17 East in Levy County, FL (Figure 3-3). The total area of the LNP parcel is approximately 5,200 acres, but the proposed enhancement/restoration activities for this project are located primarily in the four mitigation zones, comprised of 1,548.7 acres. Water in the northern portion of the site (Waccasassa watershed) flows north through the Goethe State Forest site and water in the southern portion of the project area (Withlacoochee watershed) flows west and south (Figure 3-4). As noted above, the LNP on-site mitigation is divided along two separate watersheds, the Waccasassa and the Withlacoochee. The majority of the on-site mitigation lies within the Withlacoochee watershed.

3.3.1 Historic Conditions

Historically, the property consisted primarily of pine plantation and is currently being used for silvicultural practices. On-site hardwood wetlands have been avoided to the greatest extent practicable. Traditional silvicultural practices have resulted in ditching, trail roads, and bedding rows.



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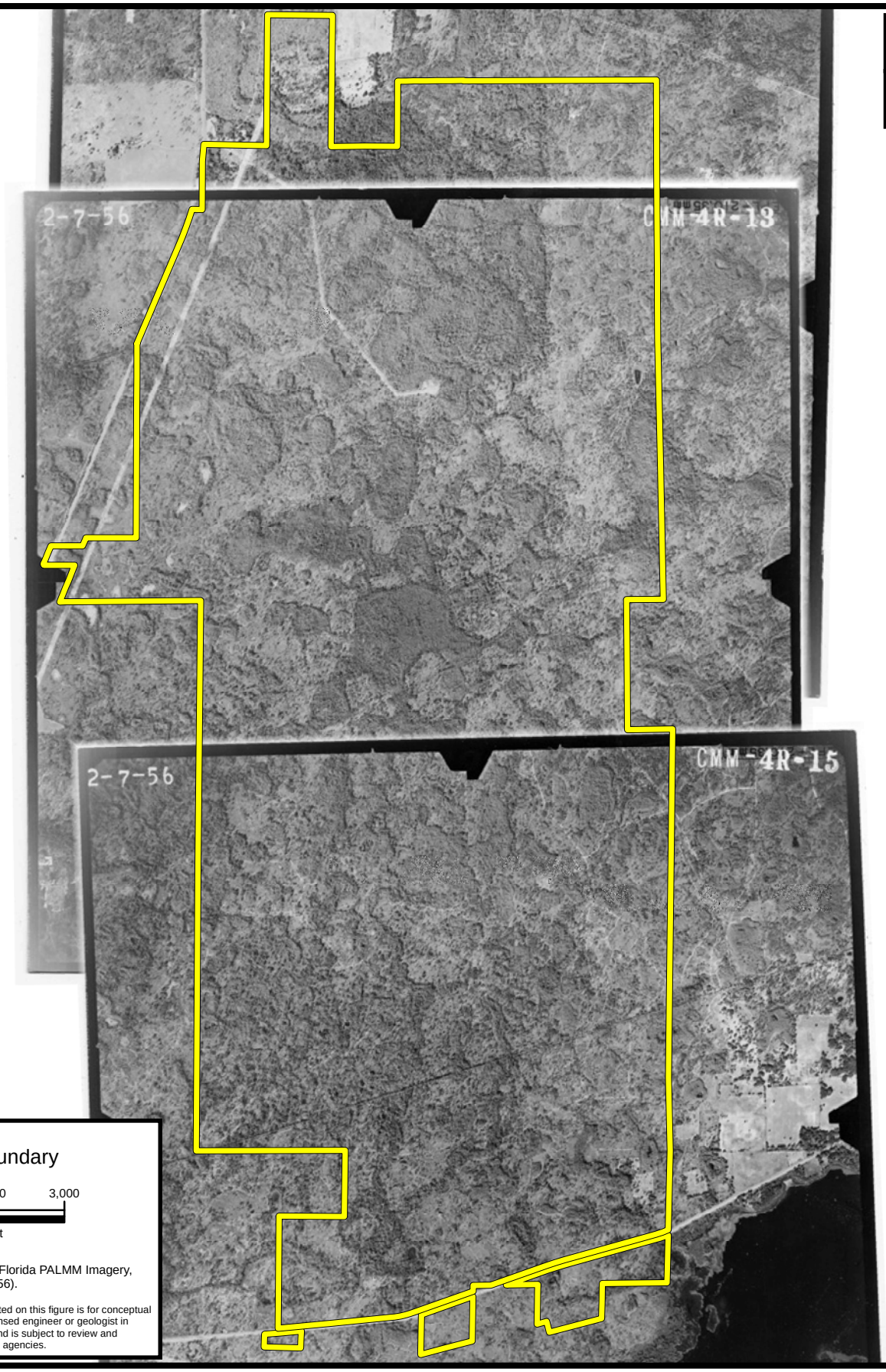
Project Location

Levy Nuclear Plant Site

Levy County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JRN/JGB
Figure:	**3-3**

Path: Q:_Projects\EJ\2011\021\00\fig\LNP_Plant\Report\Pro_Quad.mxd Date: 7/7/2011 12:05:09 PM



Parcel Boundary

0 1,500 3,000

Feet

Source(s): University of Florida PALMM Imagery, (1956).

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1956 Historic Aerial Imagery

Levy Nuclear Plant Site

Levy County, Florida

Project:	EJ11021.00
Date:	Junly2011
Drwn/Chkd:	JRN/JGB
Figure:	**3-4**

Path: Q:_Projects\EJ\2011\021\00\fig\LNP_Plant\Report\Pro_historic.mxd Date: 7/8/2011 3:40:53 PM

3.3.2 Current Conditions

Various habitat types are present at the LNP site including pine plantation, surrounding forested and herbaceous wetlands, and several areas cleared of vegetation. Many of the existing habitats are highly degraded from historic land disturbances.

FLUCFCS was used to determine the different community types on site. Please see the LNP Community Map (Figure 3-5) for details of the specific community locations.

Uplands

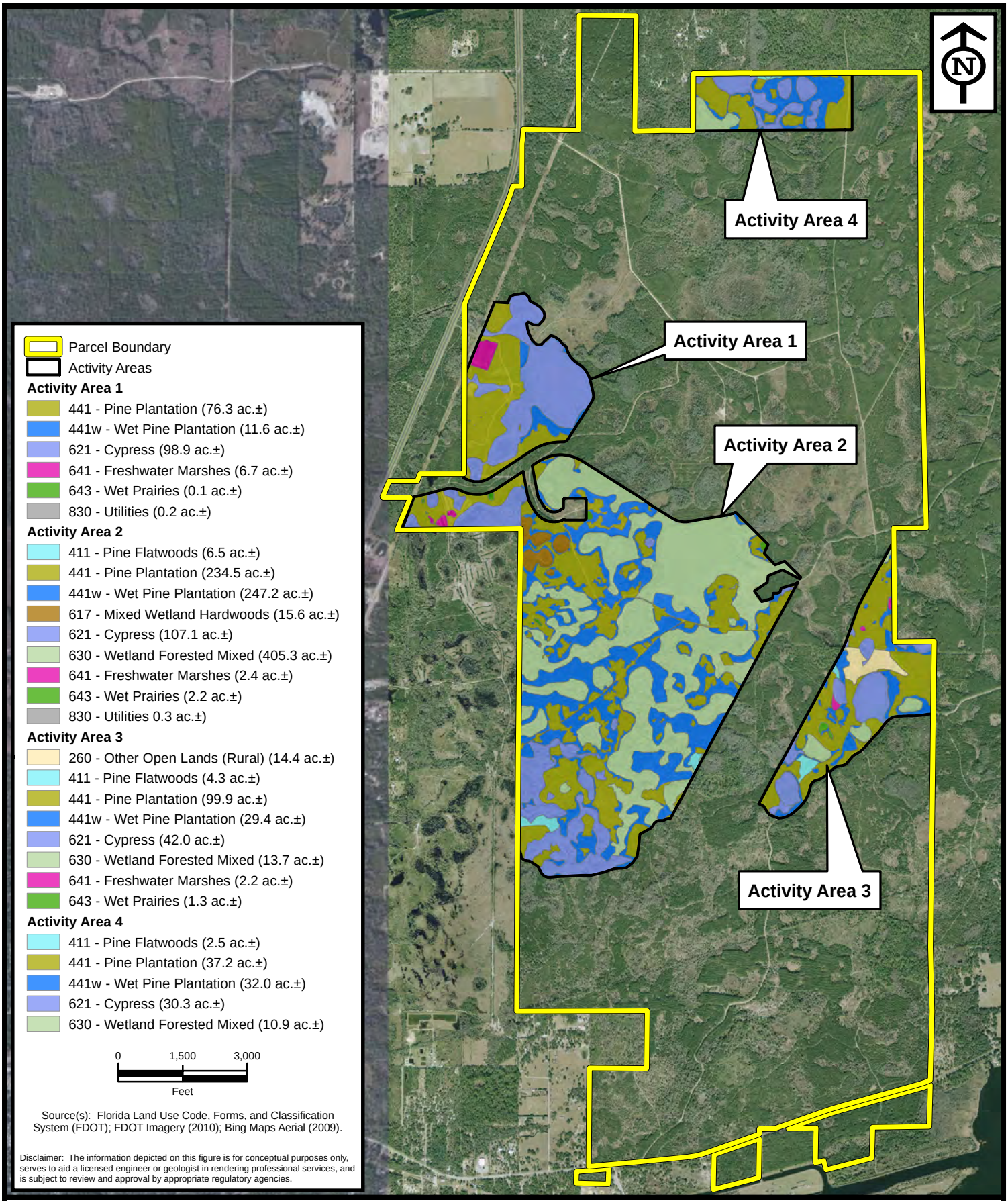
1. Open Rural Lands (FLUCFCS 260). Several acres within the mitigation activity areas have been previously cleared and are not currently planned for any specific use. The vegetation growing there is a mix of opportunistic pioneer species.

2. Pine Flatwoods (FLUCFCS 411). On-site uplands not in silvicultural rotation are dominated by a mixture of mesic and slightly xeric pine flatwoods. The canopy consists of predominantly longleaf pine and some slash pine. The subcanopy and shrub layer includes saw palmetto, gallberry, and shiny blueberry. The groundcover is predominantly grasses, including wiregrass, panicgrasses, and broomsedges.

3. Pine Plantation (FLUCFCS 441). A majority of on-site uplands are in silvicultural rotation as pine plantation. The canopy consists of predominantly slash pine. The subcanopy and shrub layer includes saw palmetto, gallberry, and shiny blueberry. The groundcover is predominantly grasses, including wiregrass, panicgrasses, and broomsedges.

Wetlands

1. Mixed Wetland Hardwoods (FLUCFCS 617). This community type is dominated by bald cypress and swamp tupelo. Other canopy or subcanopy species include red maple, dahoon, swamp bay, slash pine, sweetbay, loblolly bay. Shrubs include fetterbush, common buttonbush, wax myrtle, titi, and St. John's wort. Herbaceous species include Virginia chain fern, royal fern, cinnamon fern, maidencane, sawgrass, various species of beaksedge, lizard's tail, Carolina redroot, and sphagnum moss.



Parcel Boundary
Activity Areas

Activity Area 1
- 441 - Pine Plantation (76.3 ac.±)
- 441w - Wet Pine Plantation (11.6 ac.±)
- 621 - Cypress (98.9 ac.±)
- 641 - Freshwater Marshes (6.7 ac.±)
- 643 - Wet Prairies (0.1 ac.±)
- 830 - Utilities (0.2 ac.±)

Activity Area 2
- 411 - Pine Flatwoods (6.5 ac.±)
- 441 - Pine Plantation (234.5 ac.±)
- 441w - Wet Pine Plantation (247.2 ac.±)
- 617 - Mixed Wetland Hardwoods (15.6 ac.±)
- 621 - Cypress (107.1 ac.±)
- 630 - Wetland Forested Mixed (405.3 ac.±)
- 641 - Freshwater Marshes (2.4 ac.±)
- 643 - Wet Prairies (2.2 ac.±)
- 830 - Utilities 0.3 ac.±)

Activity Area 3
- 260 - Other Open Lands (Rural) (14.4 ac.±)
- 411 - Pine Flatwoods (4.3 ac.±)
- 441 - Pine Plantation (99.9 ac.±)
- 441w - Wet Pine Plantation (29.4 ac.±)
- 621 - Cypress (42.0 ac.±)
- 630 - Wetland Forested Mixed (13.7 ac.±)
- 641 - Freshwater Marshes (2.2 ac.±)
- 643 - Wet Prairies (1.3 ac.±)

Activity Area 4
- 411 - Pine Flatwoods (2.5 ac.±)
- 441 - Pine Plantation (37.2 ac.±)
- 441w - Wet Pine Plantation (32.0 ac.±)
- 621 - Cypress (30.3 ac.±)
- 630 - Wetland Forested Mixed (10.9 ac.±)

0 1,500 3,000
Feet

Source(s): Florida Land Use Code, Forms, and Classification System (FDOT); FDOT Imagery (2010); Bing Maps Aerial (2009).

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Mitigation Activity Area - Existing Community Map

Levy Nuclear Plant Site

Levy County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JRN/JGB
Figure:	**3-5**

Path: Q:_Projects\EJ\2011\021\00\fig\LNP_Plant\Report\Pro_flucfcs.mxd Date: 8/9/2011 6:06:59 PM

2. Cypress (FLUCFCS 621). This community type is dominated by bald cypress. Other canopy or subcanopy species include swamp bay, slash pine, and loblolly bay. Shrubs include fetterbush, common buttonbush, and St. John's wort. Herbaceous species include Virginia chain fern, cinnamon fern, maidencane, sawgrass, various species of beaksedge, and sphagnum moss.

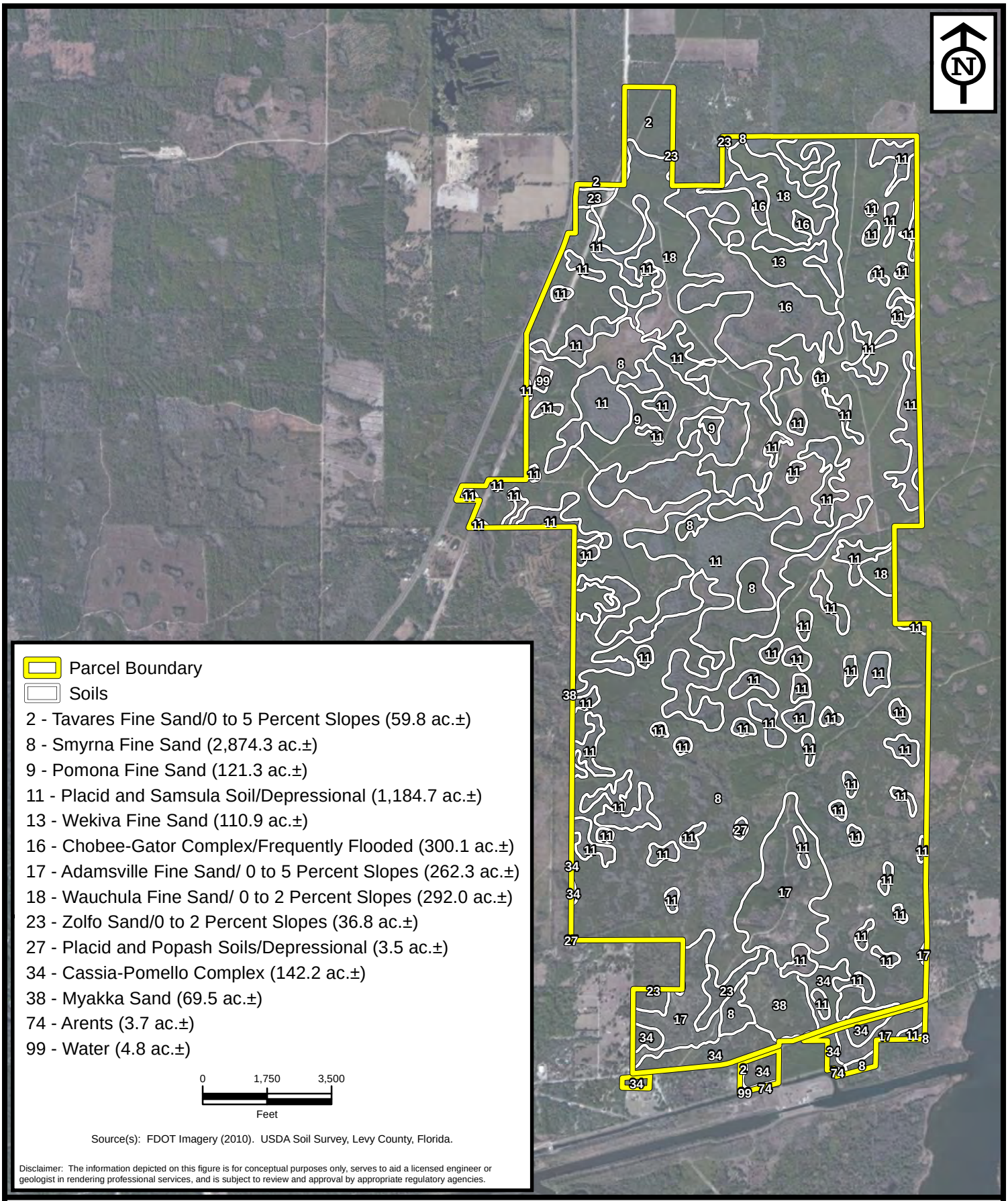
3. Wetland Forested Mixed (FLUCFCS 630). This community type is an even mixture of bald cypress, loblolly bay, and slash pine. Shrubs include fetterbush, common buttonbush, and St. John's wort. Herbaceous species include Virginia chain fern, cinnamon fern, maidencane, sawgrass, various species of beaksedge, and sphagnum moss.

4. Freshwater Marshes (FLUCFCS 641). This community is composed of a mixture of sawgrass, arrowhead (*Sagittaria* spp.), maidencane, needlerush (*Juncus effuses*), and cattail (*Typha* spp.).

5. Wet prairies (FLUCFCS 643). This community is composed of a mixture of sawgrass, maidencane, needlerush, St. Johns wort, yellow-eyed grass (*Xyris* spp.), and whitetop sedge (*Dichromena colorata*).

3.3.3 Soils

According to the NRCS soil map for Levy County, thirteen soil types are present on the LNP site along with open water (Figure 3-6). The NRCS soils are listed in Table 3-2.



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NRCS Soils

Levy Nuclear Plant Site

Levy County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JRN/JGB
Figure:	**3-6**

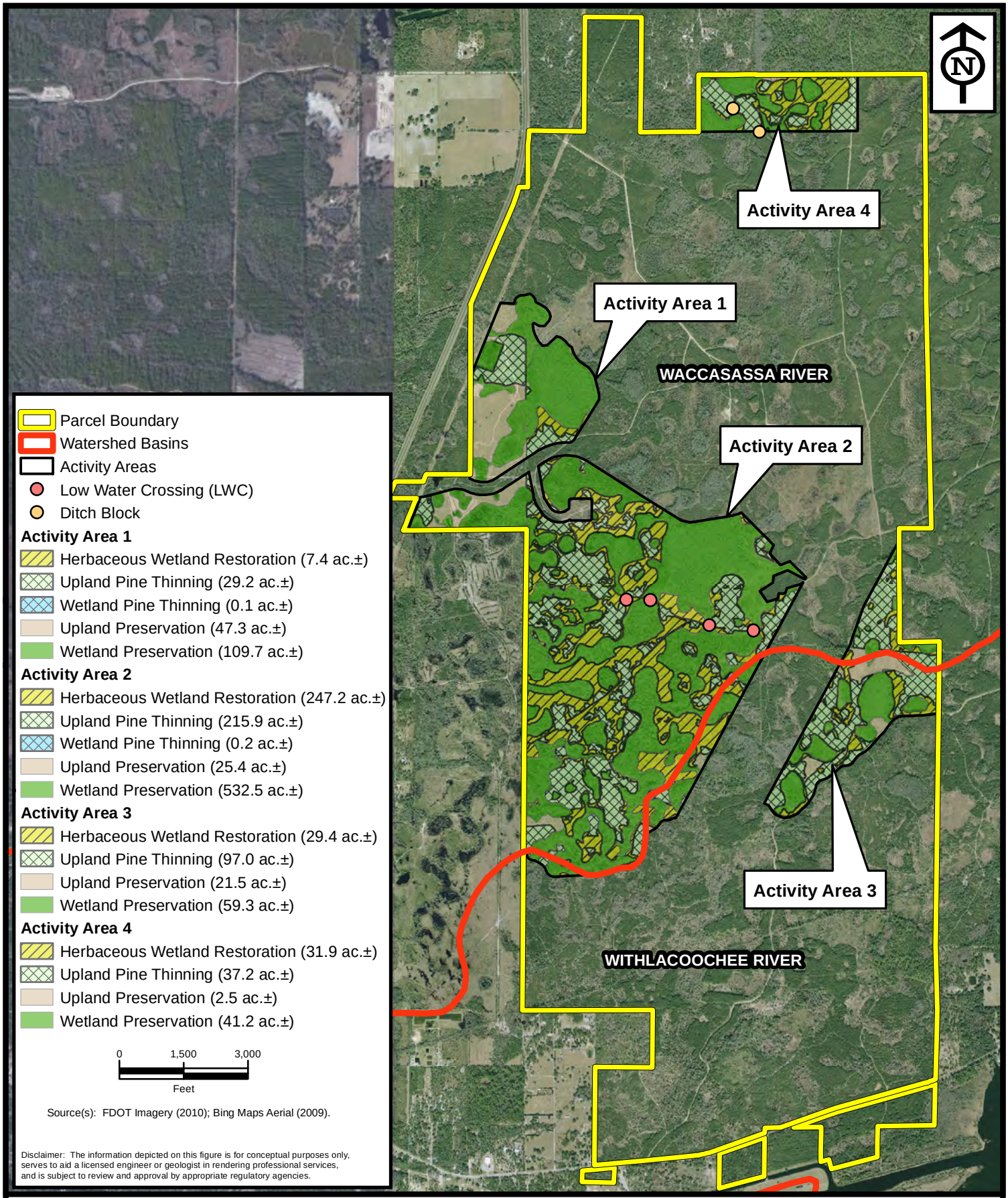
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Table 3-2. LNP on-site soil types

NRCS Soil Type	Hydric	Acreage
2 Tavares Fine Sand	No	59.8
8 Smyrna Fine Sand	No	2,874.3
9 Pomona Fine Sand	No	121.3
11 Placid and Samsula Soils, depressional	Yes	1,184.7
13 Wekiva Fine Sands	Yes	110.9
16 Chobee-Gator Complex, frequently flooded	Yes	300.1
17 Adamsville Fine Sand; 0-5% slopes	No	262.3
18 Wauchula Fine Sand	No	292.0
23 Zolfo Sand	No	36.8
27 Placid and Popash Soils, depressional	Yes	3.5
34 Cassia-Pomello Complex	No	142.2
38 Myakka Sand	No	69.5
74 Arents, 0-5% slopes	No	3.7
99 Water	Yes	4.8

3.4 Mitigation Plan

The mitigation plan for LNP is a mixture of hydrologic enhancement to restore natural flow patterns and targeted pine thinning and clearing in silvicultural areas to restore normal pine community densities with embedded depressional hardwood forested and cypress swamps and herbaceous wetland habitat (Figure 3-7 through 3-7d).



Source(s): FDOT Imagery (2010); Bing Maps Aerial (2009).

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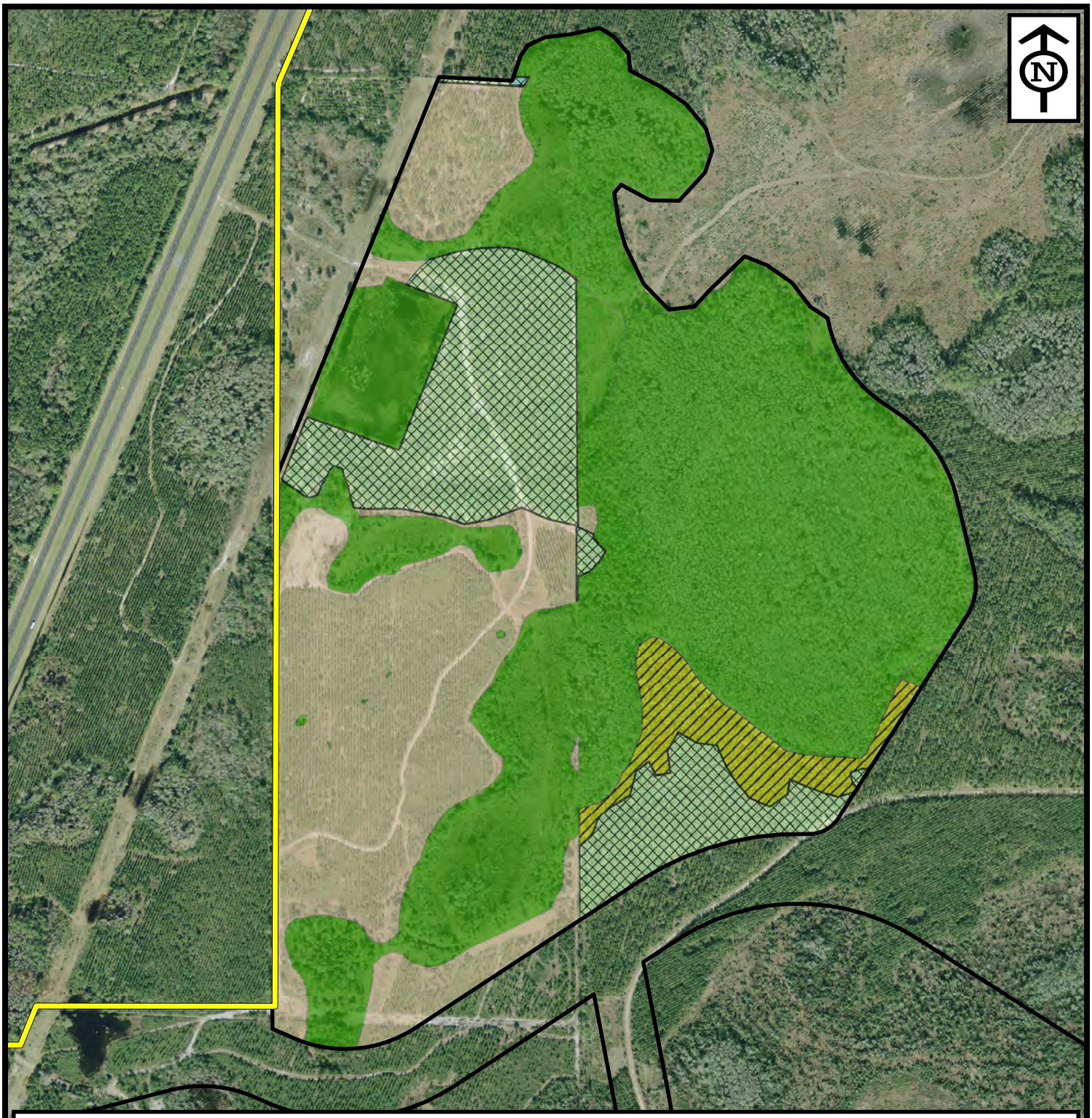
Mitigation Activity Areas

Levy Nuclear Plant Site

Levy County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JRN/JGB
Figure:	3-7

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Feet

Source(s): FDOT Imagery (2010); Bing Maps Aerial (2009).

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- Parcel Boundary
- Activity Areas
- Low Water Crossing (LWC)
- Ditch Block

Activity Area 1

- Herbaceous Wetland Restoration (7.4 ac.±)
- Upland Pine Thinning (29.2 ac.±)
- Wetland Pine Thinning (0.1 ac.±)
- Upland Preservation (47.3 ac.±)
- Wetland Preservation (109.7 ac.±)

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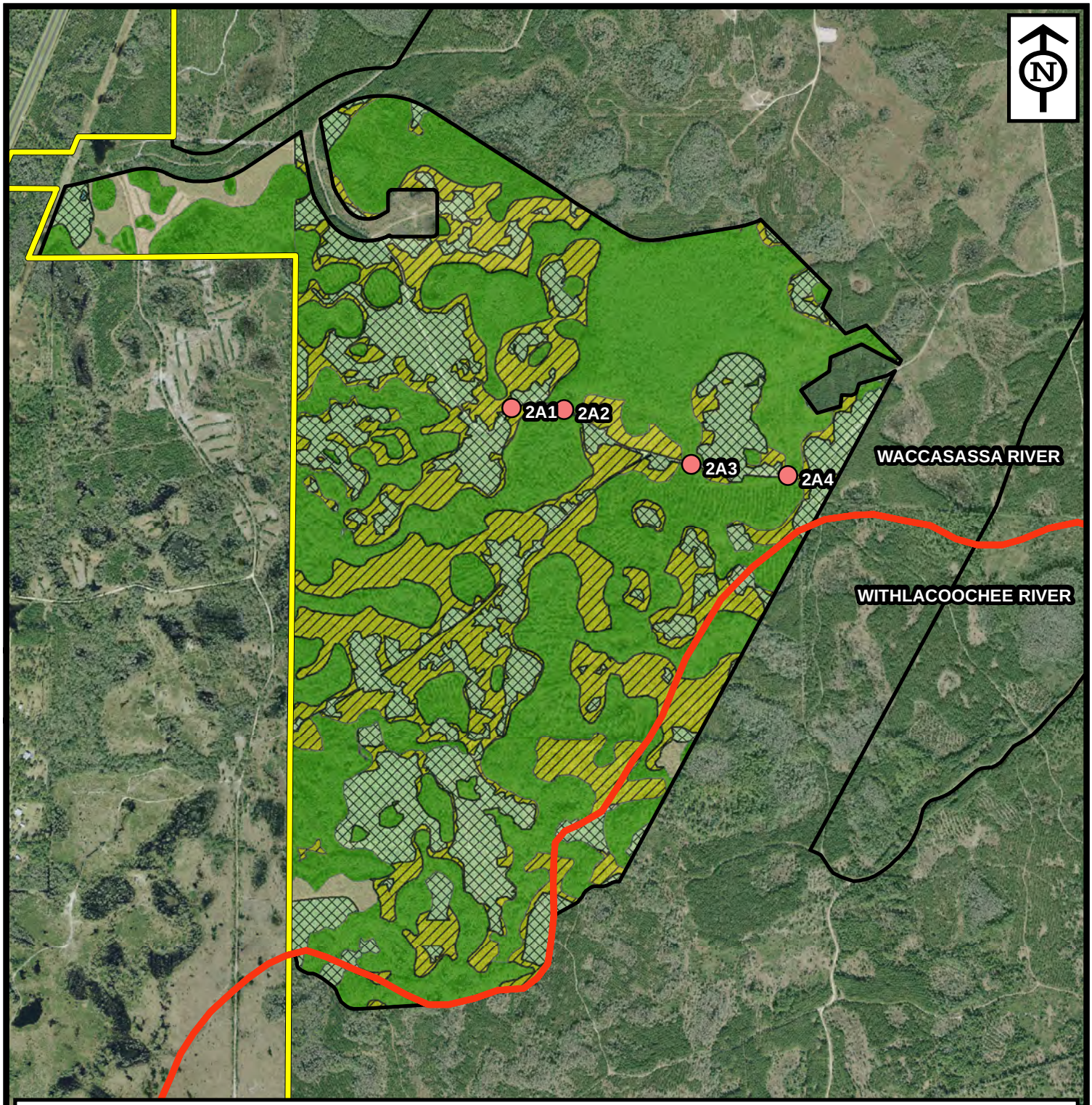
Mitigation Activity Area 1

Levy Nuclear Plant Site

Levy County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JRN/JGB
Figure:	**3-7a**

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Feet

Source(s): FDOT Imagery (2010); Bing Maps Aerial (2009).

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- Parcel Boundary
- Watershed Basins
- Activity Areas
- Low Water Crossing (LWC)
- Ditch Block

Activity Area 2

- Herbaceous Wetland Restoration (247.2 ac.±)
- Upland Pine Thinning (215.9 ac.±)
- Wetland Pine Thinning (0.2 ac.±)
- Upland Preservation (25.4 ac.±)
- Wetland Preservation (532.5 ac.±)

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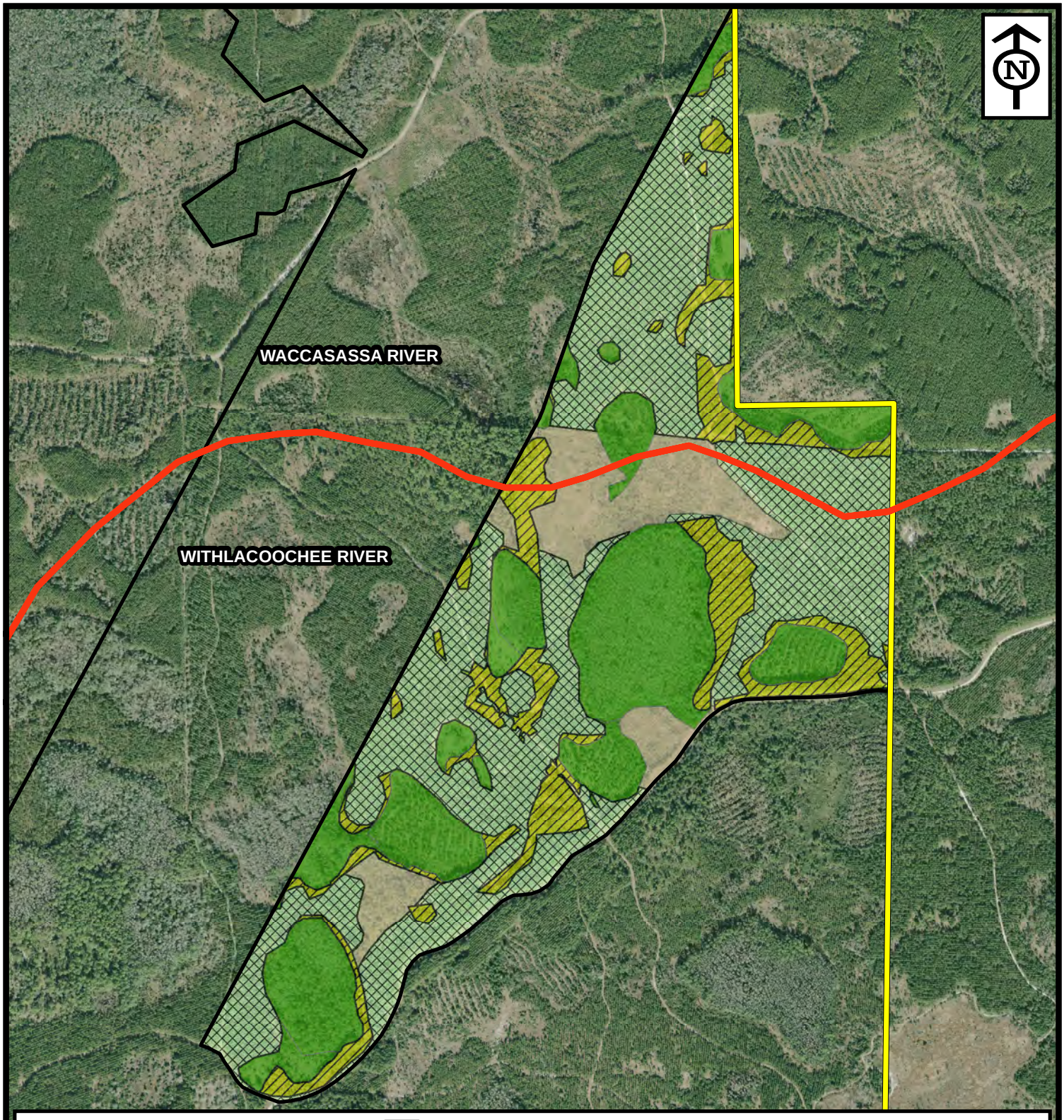
Mitigation Activity Area 2

Levy Nuclear Plant Site

Levy County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JRN/JGB
Figure:	**3-7b**

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Feet

Source(s): FDOT Imagery (2010); Bing Maps Aerial (2009).

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- Parcel Boundary
- Watershed Basins
- Activity Areas
- Low Water Crossing (LWC)
- Ditch Block

Activity Area 3

- Herbaceous Wetland Restoration (29.4 ac.±)
- Upland Pine Thinning (97.0 ac.±)
- Upland Preservation (21.5 ac.±)
- Wetland Preservation (59.3 ac.±)

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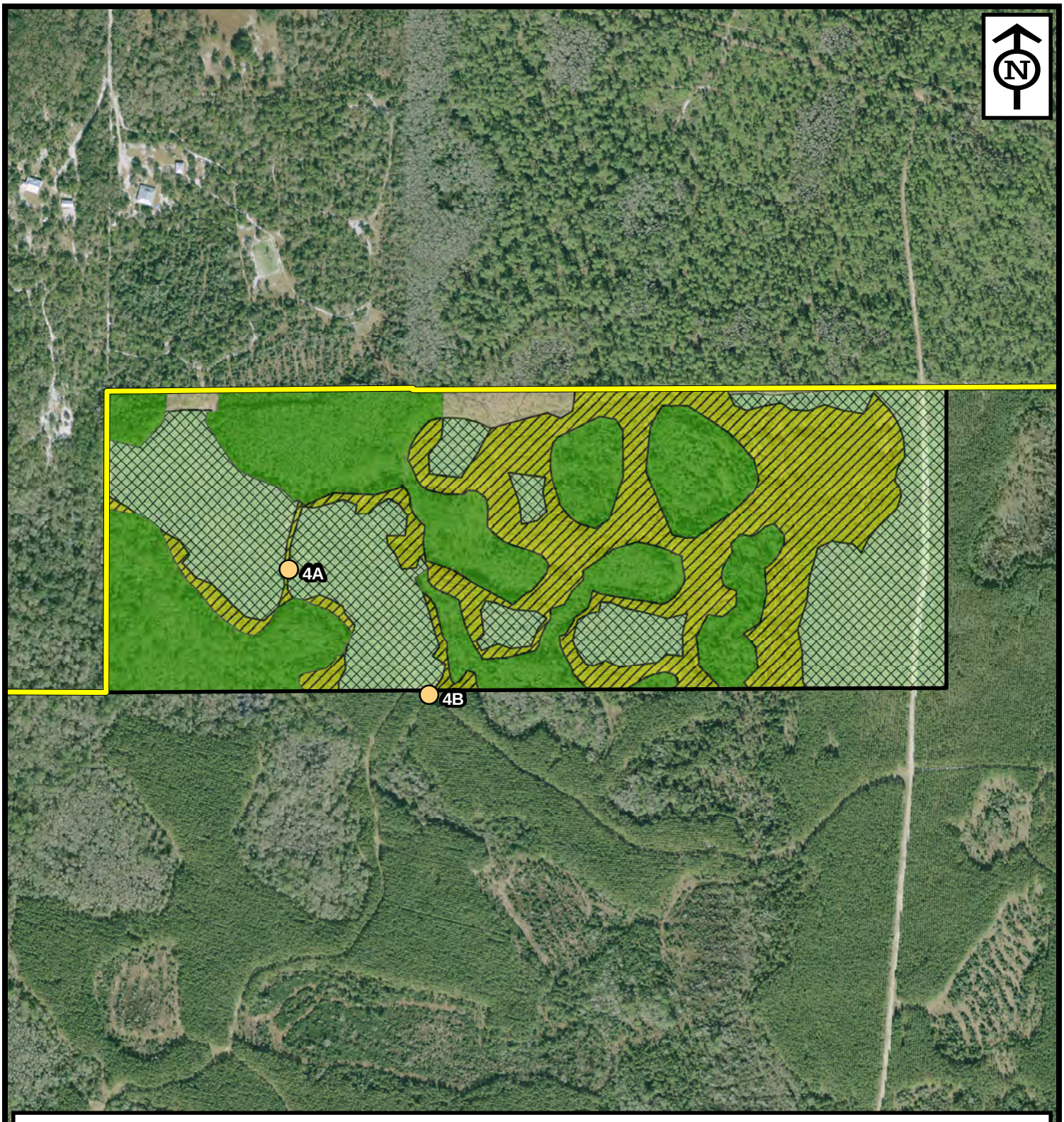
Mitigation Activity Area 3

Levy Nuclear Plant Site

Levy County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JRN/JGB
Figure:	**3-7c**

Path: Q:_Projects\EJ\2011\021\00\fig\LNP_Plant\Report\Pro_MitAct_AA3.mxd Date: 9/14/2011 5:03:03 PM



0 300 600
Feet

Source(s): FDOT Imagery (2010); Bing Maps Aerial (2009).

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- Parcel Boundary
- Activity Areas
- Low Water Crossing (LWC)
- Ditch Block

Activity Area 4

- Herbaceous Wetland Restoration (31.9 ac.±)
- Upland Pine Thinning (37.2 ac.±)
- Upland Preservation (2.5 ac.±)
- Wetland Preservation (41.2 ac.±)

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Mitigation Activity Area 4

Levy Nuclear Plant Site

Levy County, Florida

Project:	EJ11021.00
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Figure:	**3-7d**

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1. Wetland and Upland Preservation. All uplands and wetlands within the four established mitigation activity areas will be preserved under the protection of a conservation easement. This preservation will allow these communities to continue to grow and mature while eliminating most, if not all, non-natural disturbances. One of the primary benefits of the conservation easements will be the cessation of selected silvicultural activities, including; non-selective broadcast herbicide application, planting in rows, bedding, plowing, disking, and any other intensive management or site disturbing activity. However, beneficial habitat management activities such as prescribed burning and selected thinning could still be conducted to ensure continued success of the enhancement activities. Additionally, the conservation easements will prevent additional development from occurring on the protected areas.

2. Wetland Hydrologic Enhancement. The proposed hydrologic enhancement is located within Activity Areas 2 and 4. Enhancement activities within Activity Area 2 (large mitigation activity area in the southwestern portion of the project area) will consist of modifying the existing grade of multiple road sections to enhance and restore historic sheet flow during storm events.

Enhancement activities within activity area 4 (small mitigation activity area located at the northern extent of the property) will consist of multiple ditch blocks and raised road segments. Both of these activities will be used to restrict the flow of water across sub-basin boundaries where artificial ditching allows the exchange of water during flood events. For details of the proposed hydrologic enhancement, please see Section 3.11 for Engineering Detail Drawings.

3. Wetland Pine Thinning. Along with the cessation of selected silvicultural activities, high density pine plantations across the mitigation activity areas will be thinned to levels appropriate for wet pine flatwoods and hardwood forested and cypress swamp communities. Specifically, 0.1 acre of Activity Area 1 and 0.2 acre of Activity Area 2 will be thinned using the following method.

The slash pine plantations will be thinned to a density between 50 and 200 trees per acre. During the thinning it will be important to try and remove as much of the bedding to enable more natural sheet flow to the restored area. The mature pine stands will be thinned and most of the debris removed. Desired species of hardwoods and cypress will be avoided during the operation. The thinning should also open up the ground to help facilitate recruitment of target species from seed sources within and along the edges of the stand. In the event that the pine canopy becomes too dense (over ±90 sq. ft. of basal area per acre) these stands may require additional thinning (to ±60 sq. ft. of basal area per acre) to maintain their health.

Initially the plan proposes thinning to densities at or below 200 stems per acre. Mature pine flatwoods have fewer trees per acre, but have significantly individual larger trees, resulting in comparable basal areas. Thus, the densities proposed are focused on achieving the target basal area. Additionally, these higher densities are designed to create a healthy, sustainable population that is less susceptible to catastrophic mortality due to natural disasters (storms, fires, disease, etc.). Fully mature wet pine flatwoods will have significantly lower tree densities, but significantly larger basal area trees. This differential is being compensated by cutting the trees to a target basal area (90 sq. ft. per acre) and thinning when necessary. If at any point in the future, the density of the basal area in the planted pine areas exceeds ±90 sq. ft. per acre, thinning will occur to a density of ±60 sq. ft. per acre. Therefore, the goal is to achieve the final density through a top-down method of thinning and natural reduction to the target instead of over-thinning or suffering catastrophic mortality and having to rely on new growth.

4. Herbaceous Wetland Restoration. Along with the cessation of silvicultural activities, high density pine plantations across the mitigation activity areas will be cleared and converted to herbaceous wetland systems. Specifically, 7.4 acres of Activity Area 1, 245.2 acres of Activity Area 2, 29.4 acres of Activity Area 3, and 31.9 acres of Activity Area 4 will be cleared using the following method.

The slash pine plantations will be cleared and removed prior to establishing a herbaceous wetland system. Once the trees have been removed, the land will be graded to match adjacent wetland elevations and left to naturally regenerate. The locations of the proposed herbaceous restoration areas were selected so that surrounding, established herbaceous communities would provide a significant seed source for the recruitment of desirable species. The goal of this activity is to keep disturbance to a minimum after the clearing operation. The maintenance and monitoring, along with an adaptive management plan, will ensure successful repopulation of desirable herbaceous species.

5. Upland Pine Thinning. Along with the cessation of silvicultural activities, high density pine plantations across the mitigation activity areas will be thinned to levels appropriate for pine flatwoods. Specifically, 29.2 acres of Activity Area 1, 215.9 acres of Activity Area 2, 97.0 acres of Activity Area 3, and 37.2 acres of Activity Area 4 will be thinned using the following method.

The slash pine plantations will be thinned to a density between 50 and 200 trees per acre. During the thinning it will be important to try and remove as much of the bedding to enable more natural sheet flow to the restored area. The mature pine stands will be thinned and most of the debris removed. Desired species of hardwoods will be avoided during the operation. The thinning should also open up the ground to help facilitate recruitment of target species from seed sources

within and along the edges of the stand. In the event that the pine canopy becomes too dense (over ±90 sq. ft. of basal area per acre) these stands may require additional thinning (to ±60 sq. ft. of basal area per acre) to maintain their health.

Initially the plan proposes thinning to densities at or below 200 stems per acre. Mature pine flatwoods have fewer trees per acre, but have significantly individual larger trees, resulting in comparable basal areas. Thus, the densities proposed are focused on achieving the target basal area. Additionally, these higher densities are designed to create a healthy, sustainable population that is less susceptible to catastrophic mortality due to natural disasters (storms, fires, disease, etc.). Fully mature pine flatwoods will have significantly lower tree densities, but significantly larger basal area trees. This differential is being compensated by cutting the trees to a target basal area (±90 sq. ft. per acre) and thinning when necessary. If at any point in the future the density of the basal area in the planted pine areas exceeds ±90 sq. ft. per acre, thinning will occur to a density of ±60 sq. ft. per acre. Therefore, our goal is to achieve the final density through a top-down method of thinning and natural reduction to the target instead of over-thinning or suffering catastrophic mortality and having to rely on new growth.

3.5 Hydrology & Hydraulics

3.5.1 Objective

A hydrologic and hydraulic engineering analysis for the LNP watershed was performed to analyze the effects of proposed mitigation modifications - including low water crossings and ditch plugging at several sites within LNP. The analysis was used to demonstrate benefits of the proposed mitigation modifications in terms of rainfall runoff conveyance and flow pattern improvements that correlate more closely with historic, unaltered conditions. To make comparisons between existing conditions and proposed conditions two model scenarios were considered. The LNP site does not currently have the nuclear power plant constructed, however for model comparison purposes it is assumed that the nuclear power plant is fully constructed in the existing condition model.

3.5.2 Model Setup

The ICPR Version 3.10 with service pack 3, 2002, was used to simulate rainfall runoff, conveyance, and flooding conditions in the LNP watershed. The modeled watershed includes more than 4,800 acres – encompassing areas beyond the actual LNP project site boundary.

This section describes the calculation of ICPR input parameters including basin area, time of concentration, curve number, interconnectivity, stage-storage relationships, and boundary forcing conditions.

Sub-basin Area

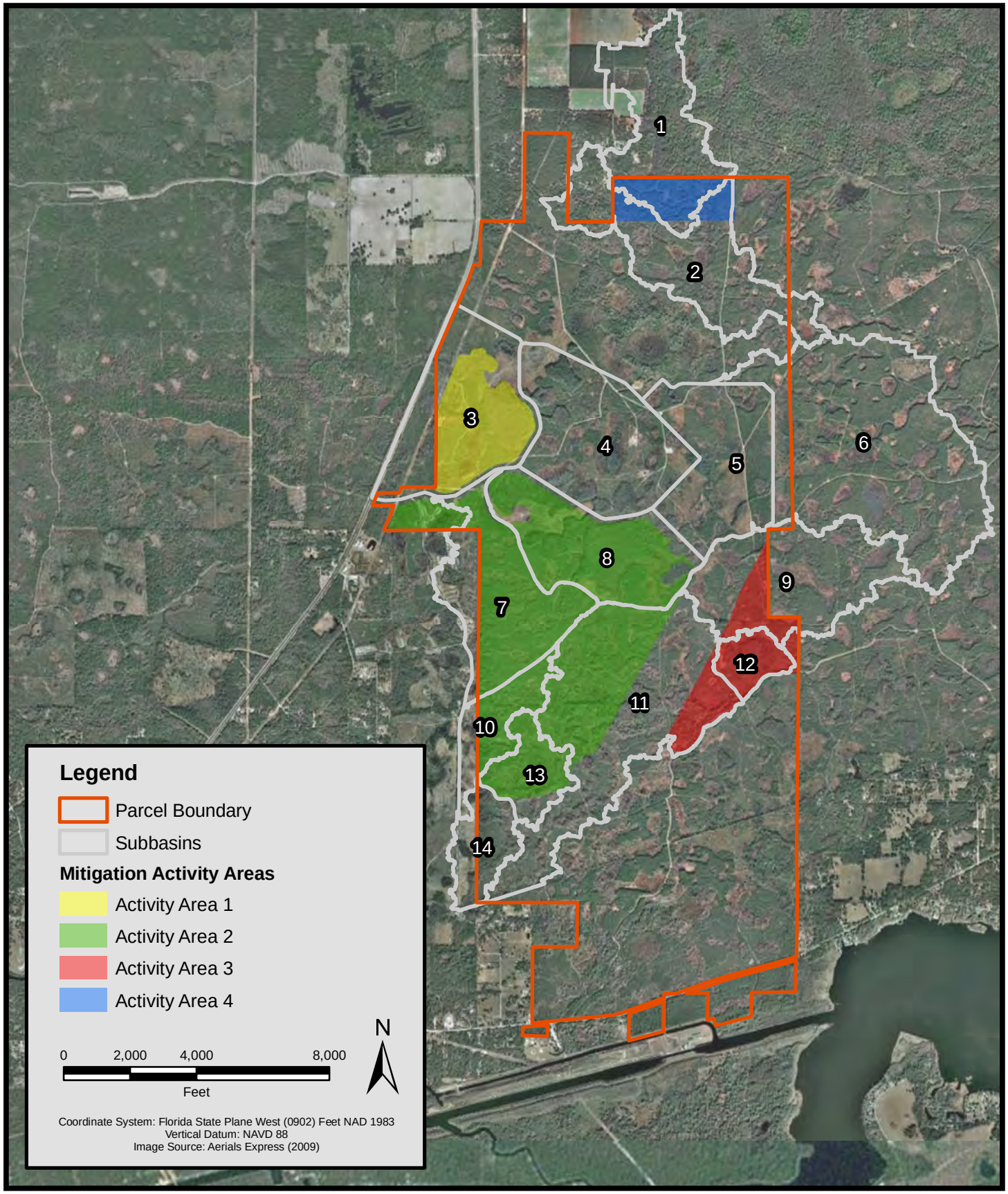
Sub-basin boundaries and areas were defined using a combination of SWFWMD GIS basin coverage, USGS DEMs, FDEM LiDAR data (2006) and LNP site plan. The overall watershed included 14 sub-basins as shown in Figure 3-8. Notably, sub-basin boundaries coincide with locations of mitigation sites and LNP infrastructure to facilitate analyses of modifications to improve basin flow.

Curve Number

The U.S. Soil Conservation Service Curve Number (CN) generally represents a sub-basin's rainfall runoff characteristics – its ability to store or shed rainfall – and is a function of the soil properties and land cover/use. GIS tools were applied to SWFWMD digital soil and land use coverages to determine the CNs. CN calculation assumes an antecedent rainfall condition corresponding to SCS Type II – or typical, mean conditions.

Time of Concentration

Time of concentration is a characteristic of the response of a watershed to a rainfall event and represents the time required for a drop of water to travel from the most hydraulically remote location within a sub-basin. It is a function of the sub-basin slope, length, and CN. For each sub-basin, average slope was calculated based on LiDAR and DEM topographic data. Time of concentration was calculated using these properties following the SCS lag method. Table 3-3 summarizes the calculated drainage area, curve number and time of concentration for each sub-basin.



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Hydrologic Subbasins
Levy Nuclear Plant Site
Levy County, Florida

PROJECT	C2011-025
FIGURE	3-8
DRAWN BY	JK
DATE	JULY 2011

Table 3-3. LNP ICPR model hydrologic input parameters

Sub-basin	Area (acres)	Curve Number	Time of Concentration (mins.)
1	317	76	623
2	381	83	310
3	400	84	269
4	402	94	287
5	334	90	417
6	810	83	679
7	344	85	326
8	346	87	366
9	388	82	1,023
10	127	81	926
11	654	83	304
12	70	84	138
13	120	83	254
14	119	80	271

Sub-basin Interconnectivity

Sub-basins were linked in the ICPR model to reflect the natural movement of water in the system. Sub-basin linkages included weirs and ditches. Weirs include natural sections such as sub-basin divides and man-made sections such as roadways.

Stage-Storage Relationships

Volumetric capacity of each sub-basin was determined using LiDAR and USGS DEM topographic data. ICPR accounts for this storage capacity by means of a user input stage-area curve for each sub-basin. These stage-area curves allow ICPR to simulate the rate at which each sub-basin will be inundated from rainfall runoff.

Boundary Conditions

Two types of boundary conditions were applied within the model. One boundary condition was applied to the most downstream outlet of the watershed (the outlet of sub-basin 14). Sub-basin 14 is located far enough downstream from the proposed mitigation sites such that its boundary condition has little influence on upstream stages. The outlet from sub-basin 14 is defined by a roadway weir section in ICPR. Downstream of this weir a static water level boundary was set based on a limited sensitivity analysis. Table 3-4 summarizes water level results from the limited sensitivity analysis. As shown by the results, a static water level

above 31ft-NGVD at the boundary begins producing a back-water effect on sub-basin 14. Therefore, a water level equal to 31 ft-NGVD was determined as the limit to which upstream water levels were affected and a good candidate for the boundary condition.

Table 3-4. Limited sensitivity analysis: water level at sub-basin 14

	Boundary Condition			
Event	**32 ft. NGVD**	**31ft. NGVD**	**30 ft. NGVD**	**29 ft. NGVD**
2.33	32.07	31.28	31.12	31.12
10	32.20	31.83	31.83	31.83
25	32.39	32.24	32.24	32.24
50	32.52	32.44	32.44	32.44
100	32.74	32.72	32.72	32.72

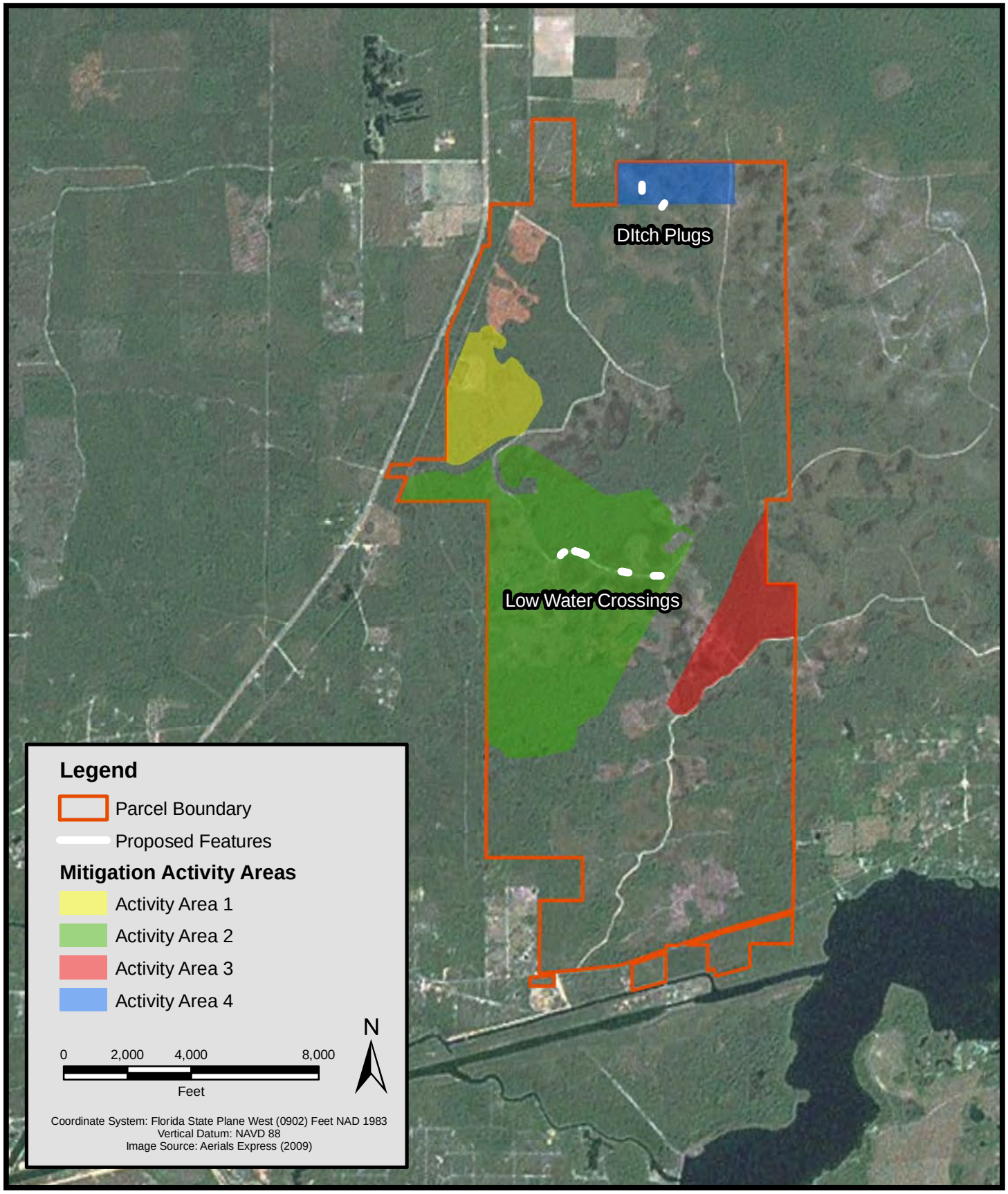
The second boundary condition was rainfall (volume and temporal distribution) applied at each sub-basin. The SCS Type II, Florida Modified, 24-hour distribution was applied with the 24 hour rainfall depths shown in Table 3-5 for the five rainfall events simulated (according to the Southwest Florida Water Management District Environmental Resource Permitting Information Manual - Part D Project Design Aids - July 1996).

Table 3-5. LNP ICPR model 24-hour rainfall depths

Recurrence Interval (years)	Rainfall Depth (inches)
2.33	4.8
10	6.7
25	8.5
50	9.5
100	11.2

3.5.3 Model Application Results

The ICPR model setup described above was applied to the system for five rainfall events representing the 2.33-, 10-, 25-, 50-, and 100-year return periods. The model was applied to existing and proposed conditions. The proposed conditions model includes the mitigation modifications at several candidate sites (shown in Figure 3-9) within the system (more details about the modifications are provided in the civil design section of this report). Comparison between the existing and proposed model results at each site demonstrate the improved flow conveyance gained from the cumulative effect of all modifications. These results are presented in Table 3-6 and described below for each site.



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Proposed Features
Levy Nuclear Plant Site
Levy County, Florida

PROJECT	C2011-025
FIGURE	3-9
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DATE	JULY 2011

Table 3-6. Existing and proposed peak flows at LNP site of interest

(Upstream – Downstream)	2.33-YR			
	Existing Flow (cfs)	Proposed Flow (cfs)	Difference (cfs)	Percent Change
2-1	0	0	0	0%
8-7	136	116	-20	-15%
8-11	37	128	91	244%
13-14	15	15	0	1%

(Upstream – Downstream)	25-YR			
	Existing Flow (cfs)	Proposed Flow (cfs)	Difference (cfs)	Percent Change
2-1	4	0	-4	-100%
8-7	416	249	-167	-40%
8-11	77	274	198	257%
13-14	63	59	-3	-5%

(Upstream – Downstream)	50-YR			
	Existing Flow (cfs)	Proposed Flow (cfs)	Difference (cfs)	Percent Change
2-1	6	0	-6	-100%
8-7	492	286	-206	-42%
8-11	85	386	301	354%
13-14	80	74	-6	-7%

(Upstream – Downstream)	100-YR			
	Existing Flow (cfs)	Proposed Flow (cfs)	Difference (cfs)	Percent Change
2-1	9	0	-9	-100%
8-7	621	350	-271	-44%
8-11	98	386	288	292%
13-14	111	100	-11	-10%

Ditch Plugging

Modifications between sub-basin 1 and sub-basin 2 include plugging two drainage ditches that serve as artificial hydrologic connections. Historically a ridge of relatively higher topographic elevations restricted inter-basin flow. The two ditches allow water to flow from sub-basin 2 into sub-basin 1 for rainfall events larger than the 2.33 year recurrence interval. Model results show a maximum inter-basin flow of 9 cfs for the 100 year rainfall event for existing conditions and 0 cfs after the proposed ditch plugging – thereby restoring the unaltered hydrologic flow regime.

Low Water Crossings

Sub-basin 8 is confined on its boundary by roads that are built along the naturally higher topographic ridge. Before human influence (road construction), water would flow out of sub-basin 8 through various topographically low wetland sloughs into sub-basins 7 and 11. The roads confining sub-basin 8 are blocking these natural flow paths – causing water levels to rise higher than historic conditions within sub-basin 8. The model results show that these higher water levels allow for a larger fraction of water to flow from sub-basin 8 to sub-basin 7 than historically. Also, model results show that by reopening these natural flow paths the fraction of water flow from sub-basin 8 to 7 reduces while the fraction of water flowing into sub-basin 11 increases substantially. By grading the road elevations at the key flow path locations, a more natural hydro-pattern is restored to sub-basins 7, 8, 10, 11, 13, and 14. A reduction in flow fraction from sub-basin 8 to 7 to 13 to 14 is shown by model results. By reopening the wetland slough flow paths, a greater flow fraction is conveyed from sub-basin 8 to 11 to 14 – thereby reducing the total amount of flow into sub-basin 13. In General, by implementing the flow path openings, flows are increased into sub-basins 11 and 14 while flows are decreased into sub-basins 7, 10, and 13.

3.6 UMAM Score

The proposed mitigation plan for LNP will provide for 372.9 units of functional lift to offset the herbaceous and forested impacts within the Waccasassa and Withlacoochee Watersheds (Table 3-7), while the balance of the impacts will be mitigated for at the Goethe site. The scoring system utilized during the UMAM process is outlined in the UMAM handbook and its scoring requirements.

Scores for existing communities that were assessed ranged from 4 to 7, pursuant to the UMAM process described above. Target UMAM scores presented in Table 3-7 ranged from 7 to 9 in accordance with the UMAM scoring parameters based on the target results of each of the mitigation activities outlined in this plan. A score of 0 was assigned to upland areas under the "Water" category that will not receive any water related enhancement.

Table 3-7. LNP mitigation plan proposed UMAM score summary

Area	Location		Water		Community		Acreage	Risk	Time Lag	RFG[1]	FG[2]
	Current	With	Current	With	Current	With					
Waccasassa Watershed											
Activity Area 1											
Wetland Preservation	7	7	5	5	7	8	109.7	1	1	0.02	2.2
Wetland Hydrologic Enhancement	7	7	5	9	7	7	117.2	1.25	1.14	0.09	10.5
Wetland Pine Thinning	7	8	5	5	6	9	0.1	1.25	1.25	0.09	0.1
Herbaceous Wetland Restoration	6	7	5	5	6	9	7.4	1.25	1.92	0.06	0.4
Upland Preservation	0	7	0	0	0	7	47.3	1	1	0.42	19.9
Upland Pine Thinning	0	8	0	0	0	8	29.2	1.25	1.25	0.51	14.9
Activity Area 2											
Wetland Preservation	7	7	5	5	7	8	532.5	1	1	0.02	10.7
Wetland Hydrologic Enhancement	7	7	5	9	7	7	779.9	1.25	1.14	0.09	73.0
Wetland Pine Thinning	7	8	5	5	6	9	0.2	1.25	1.25	0.09	0.1
Herbaceous Wetland Restoration	6	7	5	5	6	9	247.2	1.25	1.92	0.06	13.7
Upland Preservation	0	7	0	0	0	7	25.4	1	1	0.42	10.7
Upland Pine Thinning	0	8	0	0	0	8	215.9	1.25	1.25	0.51	110.5

Table 3-7. LNP mitigation plan proposed UMAM score summary cont.

Area	Location		Water		Community		Acreage	Risk	Time Lag	RFG[1]	FG[2]
	Current	With	Current	With	Current	With					
Activity Area 3											
Wetland Preservation	7	7	5	5	7	8	9.9	1	1	0.02	0.2
Wetland Hydrologic Enhancement	7	7	5	9	7	7	18.0	1.25	1.14	0.09	1.6
Herbaceous Wetland Restoration	6	7	5	5	6	9	8.1	1.25	1.92	0.06	0.5
Upland Preservation	0	7	0	0	0	7	3.1	1	1	0.42	1.3
Upland Pine Thinning	0	8	0	0	0	8	34.3	1.25	1.25	0.51	17.5
Activity Area 4											
Wetland Preservation	7	7	5	5	7	8	41.2	1	1	0.02	0.8
Wetland Hydrologic Enhancement	7	7	5	9	7	7	73.1	1.25	1.14	0.09	6.6
Herbaceous Wetland Restoration	6	7	5	5	6	9	31.9	1.25	1.92	0.06	1.9
Upland Preservation	0	7	0	0	0	7	2.5	1	1	0.42	1.1
Upland Pine Thinning	0	8	0	0	0	8	37.2	1.25	1.25	0.51	18.9
Subtotal Herbaceous							**294.6**				**16.5**
Subtotal Forested							**1088.5**				**300.6**
Waccasassa Totals							**1383.1**				**317.1**
Withlacoochee Watershed											
Activity Area 2											
Wetland Preservation	7	7	5	5	7	8	30.2	1	1	0.02	0.6

Table 3-7. LNP mitigation plan proposed UMAM score summary cont.

Area	Location		Water		Community		Acreage	Risk	Time Lag	RFG[1]	FG[2]
	Current	With	Current	With	Current	With					
Wetland Hydrologic Enhancement	7	7	5	9	7	7	48.9	1.25	1.14	0.09	4.4
Herbaceous Wetland Restoration	6	7	5	5	6	9	18.7	1.25	1.92	0.06	1.1
Upland Preservation	0	7	0	0	0	7	1.8	1	1	0.42	0.8
Upland Pine Thinning	0	8	0	0	0	8	396.5	8.7	1.25	0.51	4.4
Activity Area 3											
Wetland Preservation	7	7	5	5	7	8	49.5	1	1	0.02	1.0
Wetland Hydrologic Enhancement	7	7	5	9	7	7	70.8	1.25	1.14	0.09	6.4
Herbaceous Wetland Restoration	6	7	5	5	6	9	21.3	1.25	1.92	0.06	1.3
Upland Preservation	0	7	0	0	0	7	18.4	1	1	0.42	7.8
Upland Pine Thinning	0	8	0	0	0	8	62.7	1.25	1.25	0.51	32.0
Subtotal Herbaceous							**40.0**				**2.4**
Subtotal Forested							**171.3**				**53.4**
Withlacoochee Totals							**211.3**				**55.8**
LNP Total							**1594.4**				**372.9**

[1]Relative Functional Gain
[2]Functional Gain

For Location and Landscape Support, the proposed scores range from 7 to 8 based on the UMAM scoring methodology. These scores were derived by assessing the existing communities on site and identifying the main characteristics that these habitats were deficient in, such as habitat availability, wildlife access barriers, land use impacts and several others. This information was then used to incorporate those criteria into the proposed mitigation activities. By introducing increased habitat availability and the other criteria mentioned above, the proposed mitigation plan will "increase" the value of the existing on-site habitats and site functionality as defined in the methodology. The scores of 7 and 8 were assigned after reviewing the UMAM scoring requirements and the description of each scoring tier where a 7 is defined as having appropriate habitat diversity, but not a high overall diversity and still may contain some invasive/exotic species; provides some support for fish and wildlife, but is not quite optimal and there is a generally effective land management plan in place. An 8 score was defined as providing slightly higher habitat diversity than the areas that were scored as a 8 with most the majority of plants native and desirable, but still not as diverse as habitats scored as a 10; increased support for fish and wildlife and a land management plan that is more specified to address such issues as invasive/exotic species management.

For the Water category, proposed scores for hydrologic enhancement go from 5 to 9, expect for the upland berm area, as mentioned above. A score of 9 represents that the assessment area will provide adequate habitat for both aquatic vegetation and wildlife, will aid in the hydroperiod of the area and assist in storage capacity and attenuation, will increase water flow through the area resulting in better water quality and that the area will remain inundated under normal circumstances so that the other improvements will function as designed. In addition, the proposed mitigation project directly to the north of the LNP site (Goethe State Forest) will restore natural hydrology to Ten Mile Creek and associated wetlands and significantly increase water flow through that system. The PEF plan has incorporated the details of that project into its project design and will provide the same benefits as it relates to the water community.

For Community Structure, the scores go from 6 to 9 in areas where pine trees are being thinned or cleared to represent the conversion of an artificial community (pine plantation) to a natural community (pine flatwood or herbaceous wetland). The community structure score within the wetland preservation areas goes from 7 to 8 to represent the maturing of the forested areas, natural recruitment, and natural succession of the plant community. The community structure score within the upland preservation areas goes from 0 to 7 to represent the benefit gained by preserving an area that is currently susceptible to development. The community structure will be improved in all habitat types as plant diversity will be significantly increased, in addition to removing a well-established population of invasive/exotic species. The proposed pine thinning methodology is designed to support a healthy and age-diverse stand of pine flatwoods. The PEF plan will provide for additional habitat for aquatic vegetation and wildlife and will represent significant improvement over existing conditions.

Risk and Time Lag were the other parameters assessed during the UMAM scoring of the LNP project. The Risk parameter is examined to assess the potential risk the proposed activity has of not fully maturing and developing into the proposed habitat. Factors such as the project's location in proximity to other existing structures such as housing developments or major roadways, access to the site (both public and private), general environmental conditions compared to the proposed activity, and the amount of effort required to build and maintain a functioning habitat are all considered when assessing the Risk for a particular project. Due to the limited access to the LNP site, the score of 1.25 was assigned to all proposed activities at LNP. All of the proposed work is enhancement or restoration in nature and will not significantly alter the existing habitat in regard to hydrology, wildlife usage, etc.; it will only improve or restore existing wetland communities, so the 1.25 score represents a conservative but realistic expectation of the proposed work.

Time Lag is examined to determine an appropriate time frame that can be expected for a given activity to reach its full potential and provide the functions and values of a mature system. Forested communities typically take longer to establish, given the complex structure of a hardwood wetland community. Conversely, herbaceous systems typically become well established in a shorter time frame due to the limited complexity of habitat structure and the general hardiness of the plants found within. Scores for the LNP site ranged from 1.14 for the hydrologic restoration to 1.92 for the proposed herbaceous wetland restoration. The 1.14 score for the hydrologic enhancement represents a low time lag, because once the construction is complete, the water should return to historic flow patterns within the first rainy season. Some of the proposed mitigation plan will enhance or restore already existing pine habitat, indicating that the proper conditions currently exist to support such a community. The proposed pine flatwood habitats received time lag scores of 1.25 to represent the time it will take to after initial clearing to generate new subcanopy growth. Finally, the areas proposed to be cleared of pines and restored to herbaceous wetlands received a time lag of 1.92 to represent the amount of time necessary to fully establish a desirable and sustainable herbaceous community.

3.7 Engineering

The mitigation plan described in Section 3.4 and the modeling described in Section 3.5 form the basis of the engineering design. In general, the proposed LNP engineering plan consists of modifying the existing roads or ditches. The paragraphs below summarize the engineering design by mitigation activity area.

Activity Area 2 – In Area 2A1, the contractor will grade the area shown on Sheet 11 and 12 of 22 in Section 3.11 to 40.7 ft. NAVD, which is approximately 1 ft. below the existing grade. The Area 2A2, 2A3, and 2A4 proposed plans call for excavating the existing grades to 40 ft. NAVD (Section 3.11, Sheets 13-20 of 22). For the above areas, the

contractor will slope the fill material at 10H:1V on the road and 4H:1V along the edges of the road. The contractor will remove approximately 1547 cy of fill from the area. If geotechnical testing shows this material is suitable as fill, the contractor could use the excavated material as fill for Activity Area 4.

Activity Area 4 – The Area 4 proposed plan requires the contractor to fill areas along the existing ditch or road. In Area 4A (Section 3.11, Sheet 28 of 22), the contractor will construct a ditch block by placing and compacting approximately 5 cy of fill, with 4H:1V side slopes, in a 25-ft section of the existing ditch. As shown in Section 3.11, Sheet 19 and 20 of 22, the Area 4B proposed plan calls for approximately 11 cy of compacted fill, with 4H:1V side slopes, along an 80-ft section of the existing road. The contractor may use the excavated material from Activity Area 2 if geotechnical borings during final design show the material is suitable for construction fill and is free of muck, roots, and other large debris.

3.8 Implementation Schedule

The construction on the LNP site will begin within 90 days of commencement of construction and wetland impacts of the plant and associated transmission lines for the LNP project. The mitigation plan will be implemented in phases, as some activities, such as the pine thinning, are dependent on other factors and can only be completed under appropriate favorable conditions. The restoration of on-site hydrology has the highest priority, with the pine plantation thinning having the lowest priority. The construction sequencing will follow the above priorities. However, in Activity Areas 2 and 4 the thinning will be conducted prior to the hydrologic improvements to ensure that the thinning activities do not damage the ditch plugs or LWCs.

As with any construction project, natural conditions and weather patterns will be observed and activities will be planned to best coincide with suitable weather conditions. Prior to any land disturbance, appropriate erosion and sedimentation control measures will be installed, including silt fence around all disturbed areas and sediment curtains in the channel (LNP Engineering Detail Drawings show erosion control plans). Excavation will occur during the dry season (October-March) and pine thinning will occur once excavation is complete and the area has been constructed properly and approved. Maintenance for invasive/exotic species will be conducted year-round, with manual, mechanical and/or chemical removal methodologies to be utilized throughout the year to ensure the best results (Section 3.9).

Based on the above-referenced priorities, an implementation schedule of the mitigation activities is listed below:

Activity Area 1	Timeframe
Mobilization of contractor and equipment	Week 1
Establish all turbidity/erosion control measures	Week 2
Thin pine plantation areas	Weeks 2-4
Begin 5 year monitoring and maintenance period	Week 5

Activity Area 2	Timeframe
Mobilization of contractor and equipment	Week 1
Establish all turbidity/erosion control measures	Week 2
Thin pine plantation areas	Weeks 2-19
Clear and excavate ditch block and regrading areas and begin construction	Weeks 19-21
Generate and review as-built surveys	Week 22
Begin 5 year monitoring and maintenance period	Week 23

Activity Area 3	Timeframe
Mobilization of contractor and equipment	Week 1
Establish all turbidity/erosion control measures	Week 2
Thin pine plantation areas	Weeks 2-5
Begin 5 year monitoring and maintenance period	Week 6

Activity Area 4	Timeframe
Mobilization of contractor and equipment	Week 1
Establish all turbidity/erosion control measures	Week 2
Thin pine plantation areas	Weeks 2-4
Clear and excavate ditch block and regrading areas and begin construction	Weeks 4-5
Generate and review as-built surveys	Week 5
Begin 5 year monitoring and maintenance period	Week 6

The above is a general timeline of the basic implementation of the proposed mitigation activities. Additional planning and specifics may need to be established once the transmission line construction schedule is finalized.

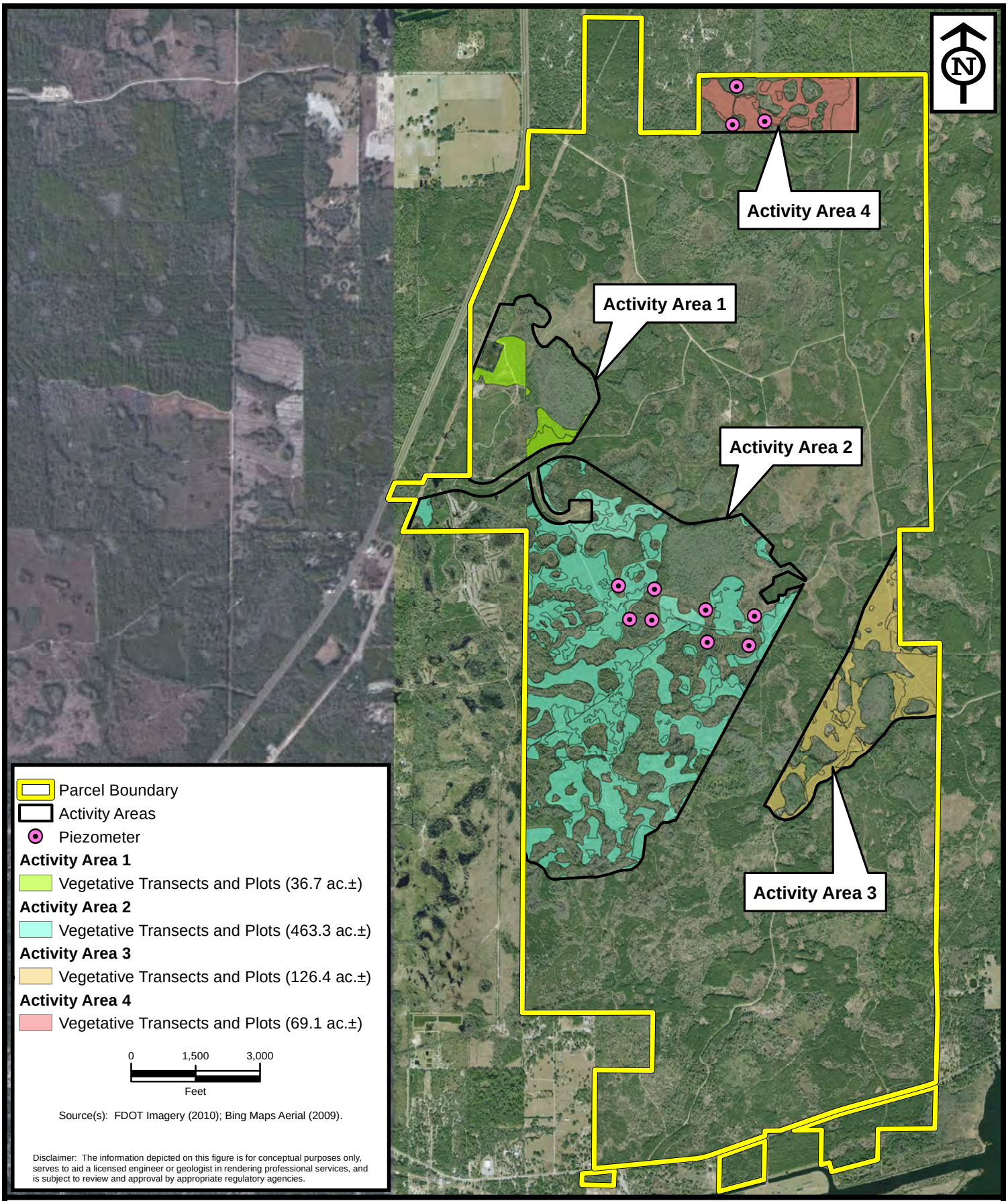
3.9 Monitoring and Maintenance Requirements

The wetland enhancement/restoration areas will be monitored on an annual basis and maintained quarterly to ensure their success. Monitoring will document that each habitat type is naturally progressing to resemble its intended target community in regard to plant species and composition. In addition, wildlife utilization, hydrologic conditions, presence of invasive/exotic species and any other management issues will be noted and addressed.

The quantitative monitoring of the herbaceous and forested wetland mitigation activity areas will consist of establishing fixed linear transects covering approximately 1.0 acre in area. For some of the smaller community types, 0.1 acre plots may be established instead of transects. The transects will be 25 ft. wide and will average 900 ft. long. Hydrology will be observed through the use of continuously recording piezometers installed strategically throughout the site (Figure 3-10 through 3-10d). The data that will be observed and recorded within each transect/plot will include:

- total coverage and survivorship of desirable planted species and any other dominant species;
- for the 0.1 acre plot, the presence of naturally recruited trees present within each stratum;
- the presence and overall coverage of any listed invasive/exotic species;
- success of any previously recommended treatment methods and any future methods proposed;
- any areas of mortality of natural species;
- current hydrologic conditions, water depths, and hydric soils observed;
- any evidence of wildlife presence or utilization;
- any maintenance needs in regard to stabilization, erosion, vandalism etc. and suggested corrective actions.

A baseline monitoring event will be conducted at the LNP no less than 60 days after the completion of the initial thinning event. The baseline event will help to establish the initial conditions after construction and will be used as a reference to assess progression during future monitoring events. The annual monitoring will commence after the baseline event and will be submitted to FDEP and ACOE in the fall (September/October) of each year. The report will consist of a narrative describing the site conditions, the management activities that have occurred, photographs taken from fixed location points and maps depicting the mitigation activity area. The forested enhancement area will be monitored for five years. The monitoring period may be adjusted based upon the performance of the vegetation.



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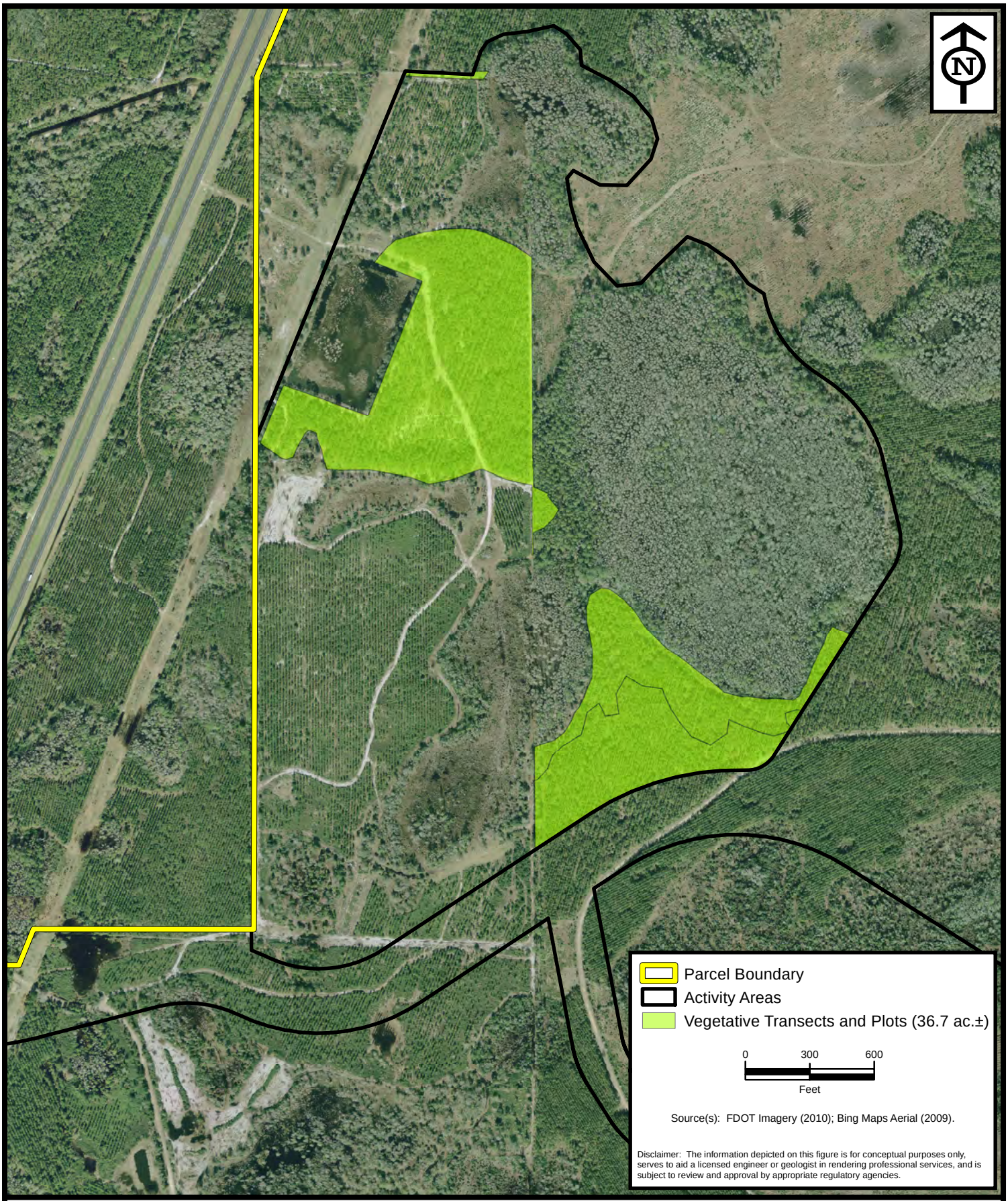
Monitoring Stations

Levy Nuclear Plant Site

Levy County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JRN/JGB
Figure:	**3-10**

Path: Q:_Projects\EJ\2011\021\00\fig\LNP_Plant\Report\Pro_MonAct_Key.mxd Date: 8/9/2011 6:19:42 PM



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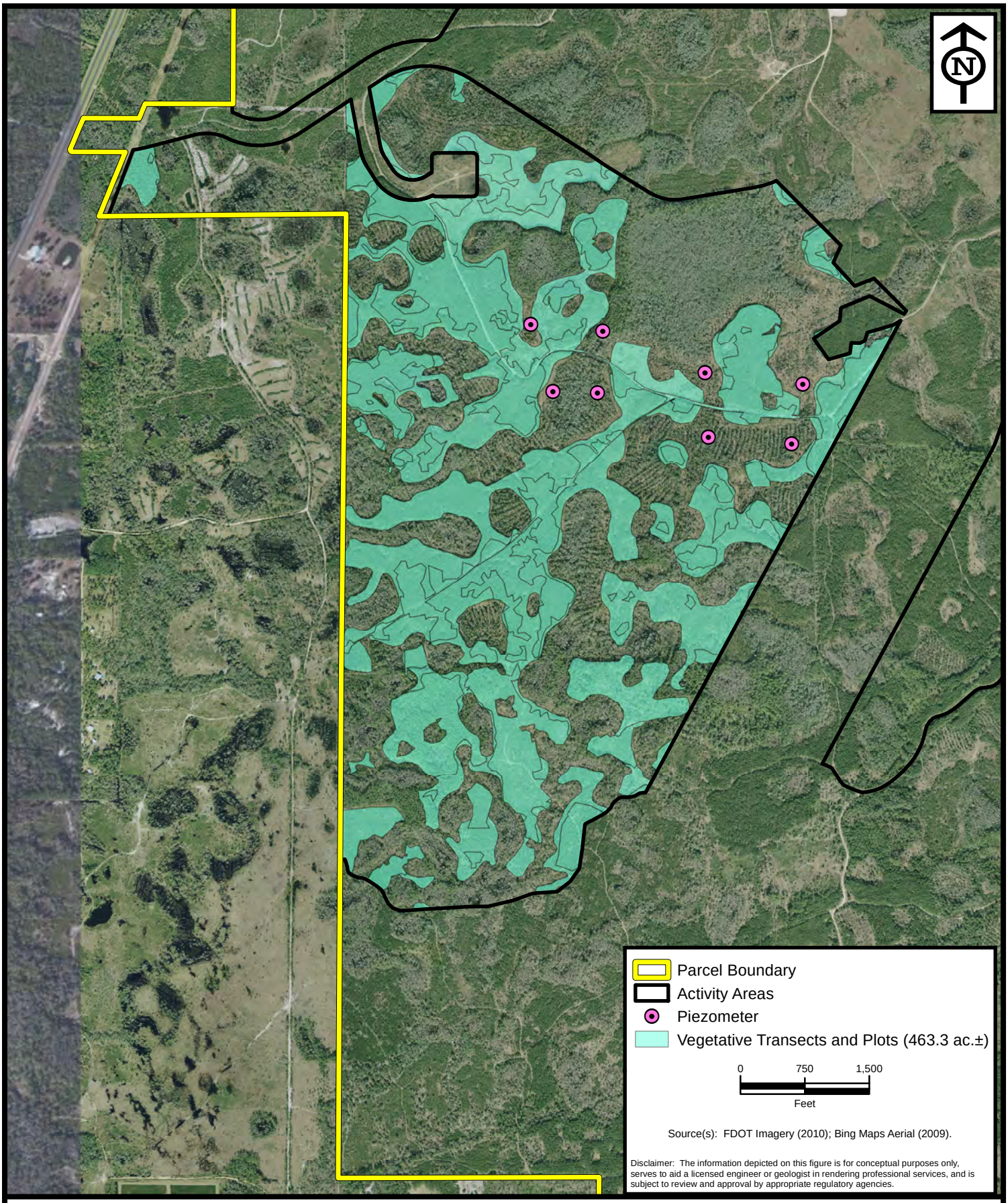
Monitoring Stations - Activity Area 1

Levy Nuclear Plant Site

Levy County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JRN/JGB
Figure:	**3-10a**

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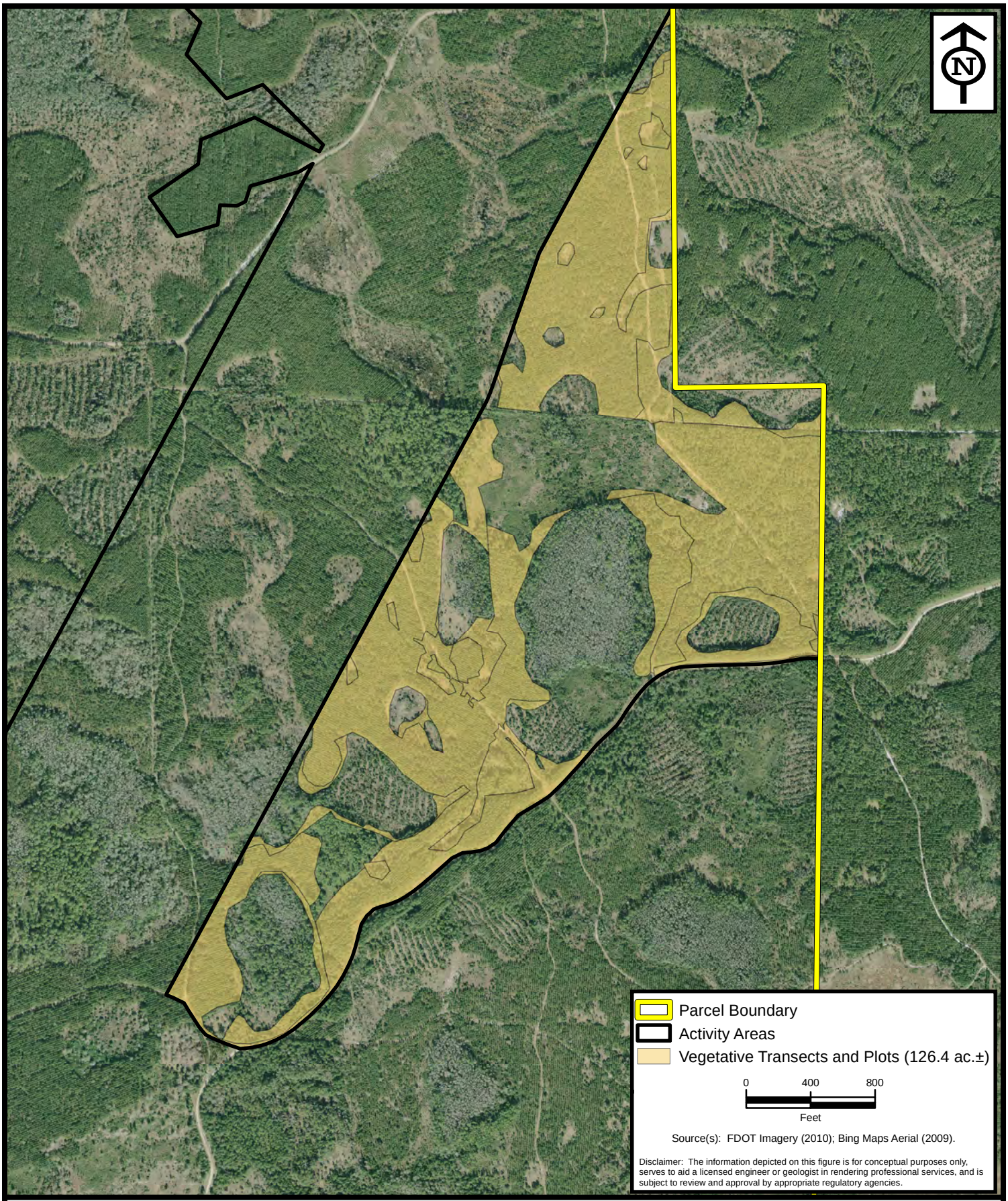
Monitoring Stations - Activity Area 2

Levy Nuclear Plant Site

Levy County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JRN/JGB
Figure:	**3-10b**

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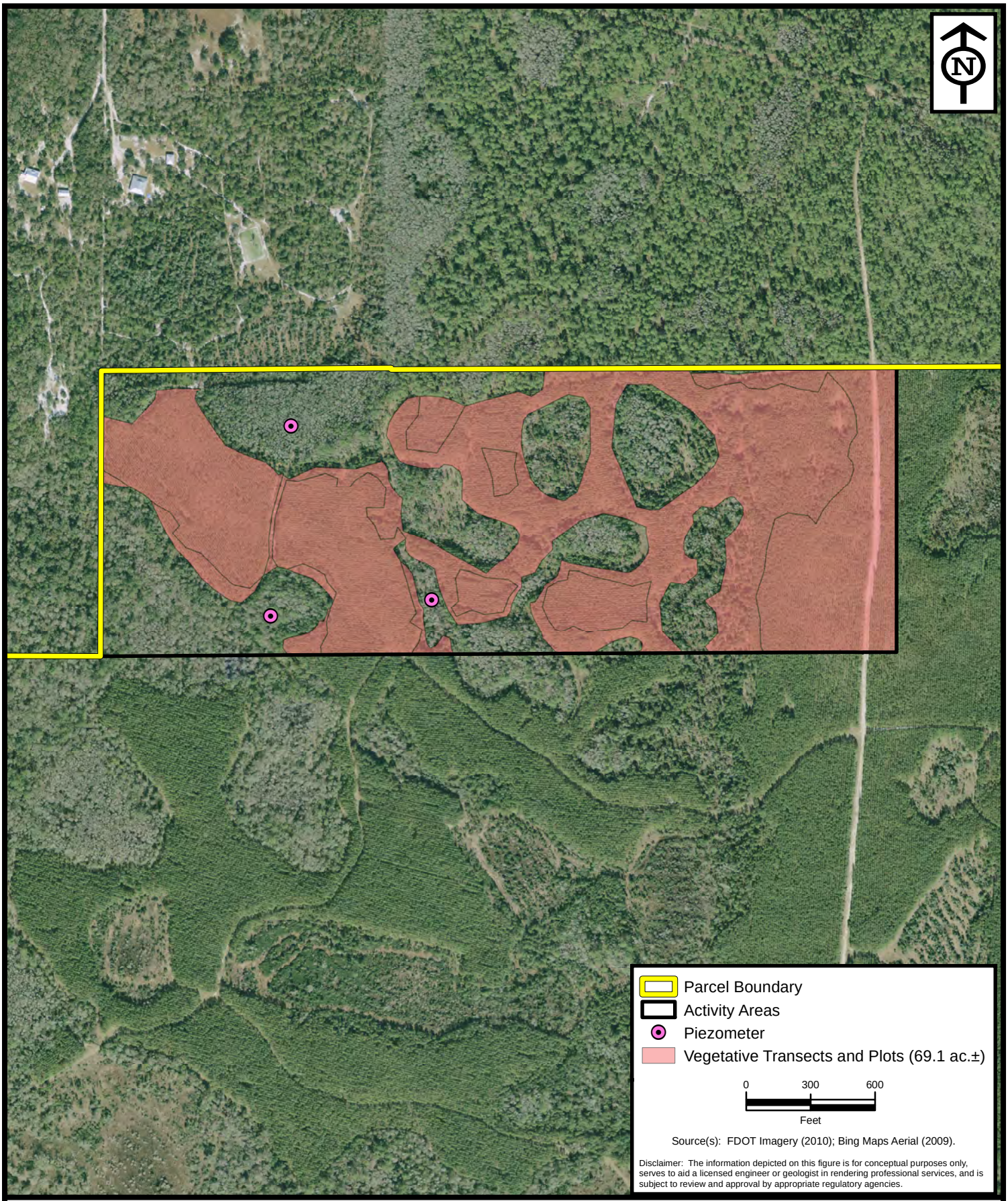
Monitoring Stations - Activity Area 3

Levy Nuclear Plant Site

Levy County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JRN/JGB
Figure:	**3-10c**

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Monitoring Stations - Activity Area 4

Levy Nuclear Plant Site

Levy County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JRN/JGB
Figure:	**3-10d**

Path: Q:_Projects\EJ\2011\021\00\fig\LNP_Plant\Report\Pro_MonAct_AA4.mxd Date: 7/8/2011 3:21:02 PM

3.10 Success Criteria

Specific success criteria outlined below will ensure that the proposed mitigation activities achieve their intended design and function. The main focus of the success criteria for LNP will emphasize the establishment of historic hydrology and the restoration of natural pine densities. Regular monitoring as described above and maintenance implementation is important to ensuring success at the LNP site. The mitigation activity area will be considered successful when the following criteria have been met within the required monitoring time frame:

Wetland Hydrologic Enhancement Areas:

- 75% coverage of native/desirable wetland vegetation;
- 5% or less total coverage of any invasive/exotic species;
- hydrology is well established and visibly apparent based on the hydrologic indicators as defined by Rule 62-340 F.A.C.;
- the above criteria must be met within the five years of annual monitoring.

Upland and Wetland Pine Thinning Area:

- 75% coverage of native/desirable species for the vegetative community;
- the appropriate slash pine density for the vegetative community has been reached;
- 5% or less total coverage of any invasive/exotic species;
- hydrology is well established and visibly apparent based on the hydrologic indicators as defined by Rule 62-340, Florida Administrative Code (F.A.C.);
- the above criteria must be met within the five years of annual monitoring.

Herbaceous Wetland Restoration Area:

- 75% coverage of native/desirable herbaceous wetland vegetation;
- 5% or less total coverage of any invasive/exotic species;
- hydrology is well established and visibly apparent based on the hydrologic indicators as defined by Rule 62-340, Florida Administrative Code (F.A.C.);
- the above criteria must be met within the three years of annual monitoring.

The progress of the mitigation activity area towards reaching success will be tracked through the monitoring reports that will be submitted annually to FDEP and ACOE for review and approval. In the event that the above criteria are not met at the end of the monitoring period, or it is becoming obvious during annual monitoring that an area will not meet the established success criteria, then PEF will work closely with FDEP and ACOE staff in order to identify and correct any problems. Once the success criteria outlined above are met, the mitigation effort will be deemed a success and the monitoring of the mitigation activity area will be terminated.

3.11 Engineering Detail Drawings

Please see the attached engineering detail drawings.

PROGRESS ENERGY MITIGATION PROJECT
LEVY NUCLEAR PLANT SITE
LEVY COUNTY, FLORIDA

DRAWING INDEX

SHEET 1	TITLE SHEET
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SHEET 3	PROJECT OVERVIEW
SHEET 4	EXISTING CONDITIONS - AREA 2A1
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SHEET 6	EXISTING CONDITIONS - AREA 2A3
SHEET 7	EXISTING CONDITIONS - AREA 2A4
SHEET 8	EXISTING CONDITIONS AREA 4A
SHEET 9	EXISTING CONDITIONS AREA 4B
SHEET 10	LOW WATER CROSSING AREA 2A1 - PLAN & PROFILE
SHEET 11	LOW WATER CROSSING AREA 2A1 - CROSS SECTIONS
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SHEET 16	LOW WATER CROSSING AREA 2A4 - PLAN & PROFILE
SHEET 17	LOW WATER CROSSING AREA 2A4 - CROSS SECTIONS
SHEET 18	DITCH BLOCK AREA 4A - PLAN, PROFILE & CROSS SECTION
SHEET 19	DITCH BLOCK AREA 4B - PLAN & PROFILE
SHEET 20	DITCH BLOCK AREA 4B - CROSS SECTIONS
SHEET 21	EROSION CONTROL NOTES
SHEET 22	EROSION CONTROL DETAILS



LOCATION MAP
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TITLE SHEET
PROGRESS ENERGY MITIGATION PROJECT
LEVY NUCLEAR PLANT SITE
LEVY COUNTY, FLORIDA

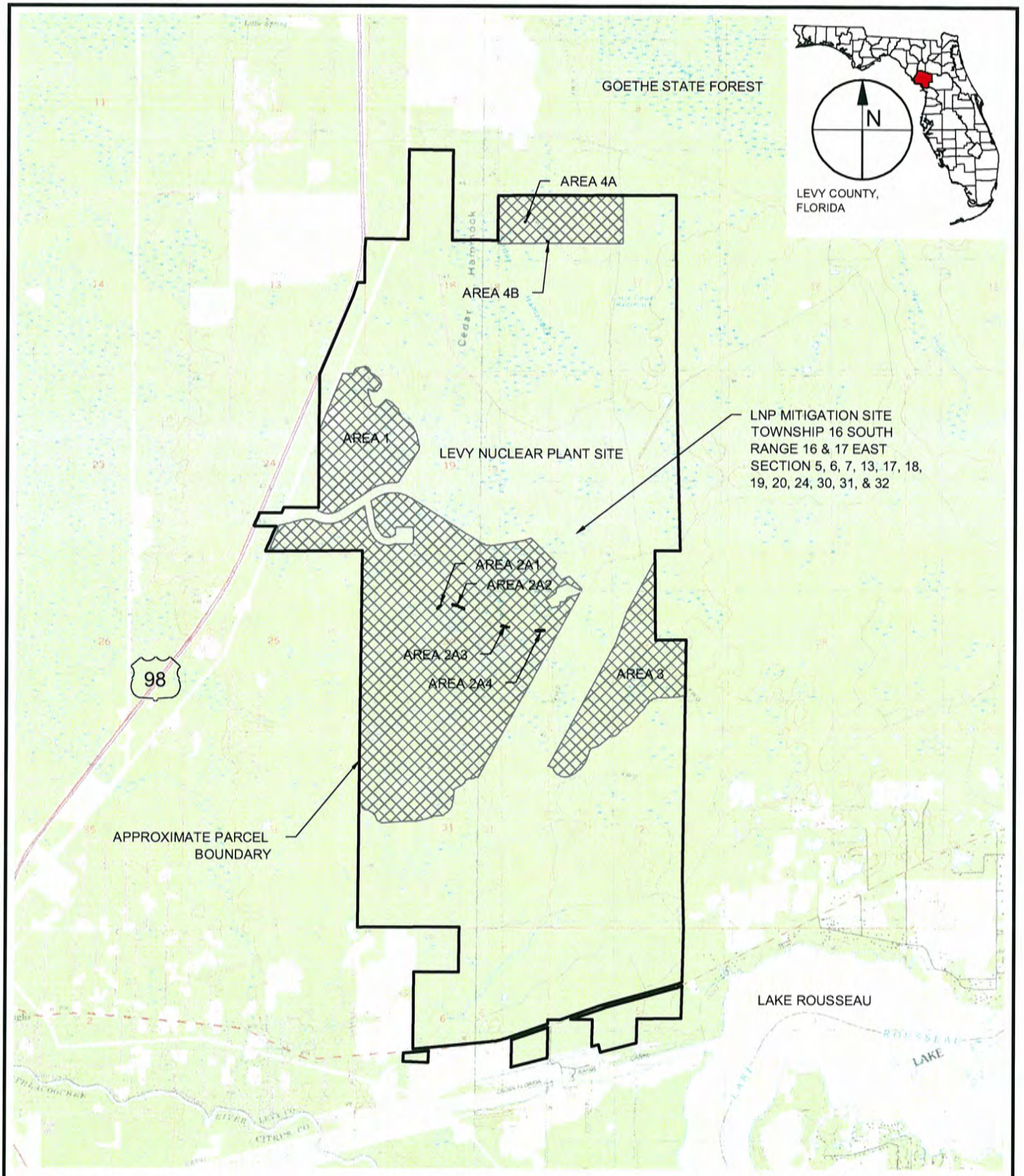
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SHEET	1 of 22
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PROJECT LOCATION MAP
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LEVY COUNTY, FLORIDA

PROJECT	DRAWN BY	SHEET	DATE
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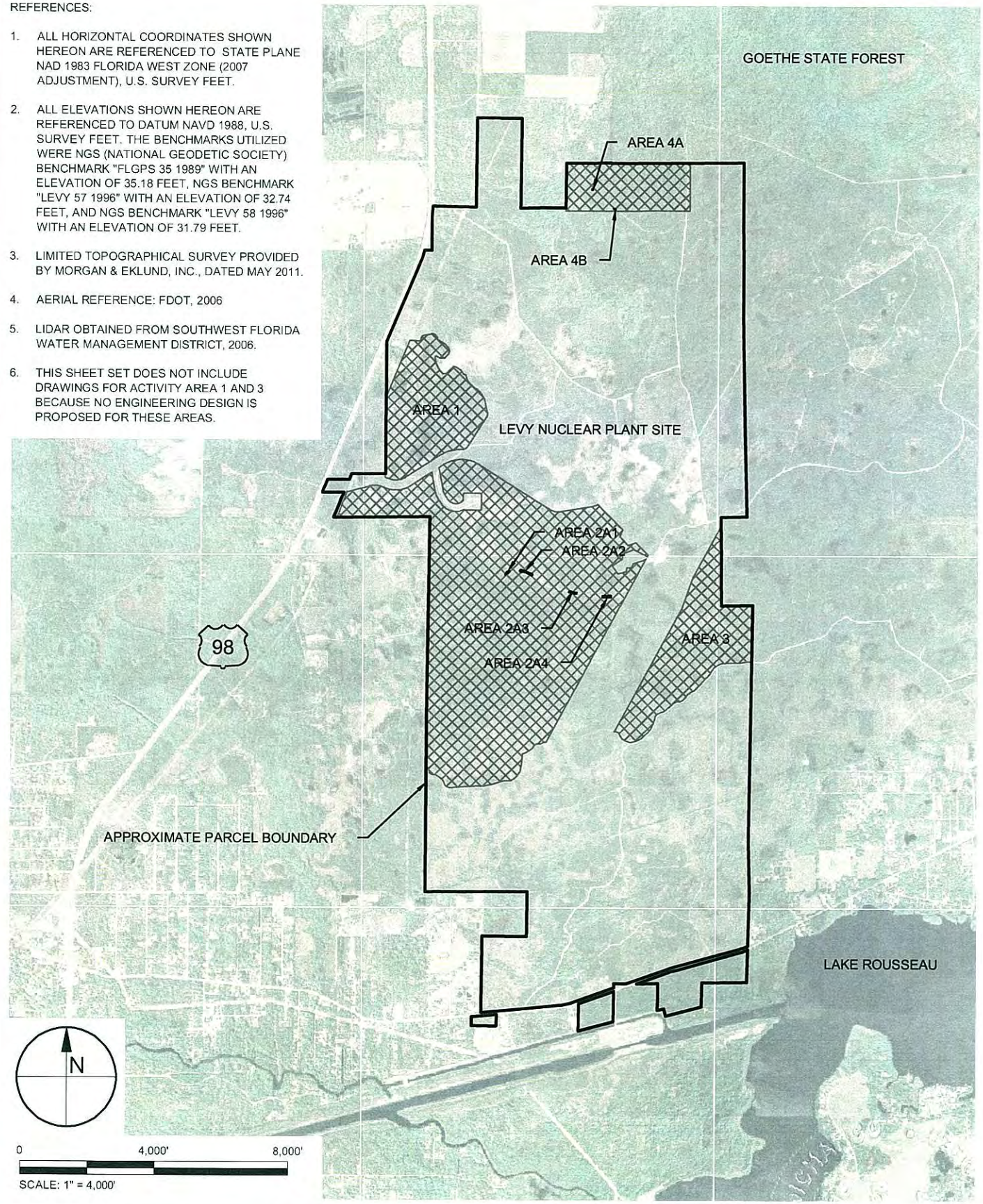
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REFERENCES:

1. ALL HORIZONTAL COORDINATES SHOWN HEREON ARE REFERENCED TO STATE PLANE NAD 1983 FLORIDA WEST ZONE (2007 ADJUSTMENT), U.S. SURVEY FEET.
2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO DATUM NAVD 1988, U.S. SURVEY FEET. THE BENCHMARKS UTILIZED WERE NGS (NATIONAL GEODETIC SOCIETY) BENCHMARK "FLGPS 35 1989" WITH AN ELEVATION OF 35.18 FEET, NGS BENCHMARK "LEVY 57 1996" WITH AN ELEVATION OF 32.74 FEET, AND NGS BENCHMARK "LEVY 58 1996" WITH AN ELEVATION OF 31.79 FEET.
3. LIMITED TOPOGRAPHICAL SURVEY PROVIDED BY MORGAN & EKLUND, INC., DATED MAY 2011.
4. AERIAL REFERENCE: FDOT, 2006
5. LIDAR OBTAINED FROM SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, 2006.
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PROJECT OVERVIEW
PROGRESS ENERGY MITIGATION PROJECT
LEVY NUCLEAR PLANT SITE
LEVY COUNTY, FLORIDA

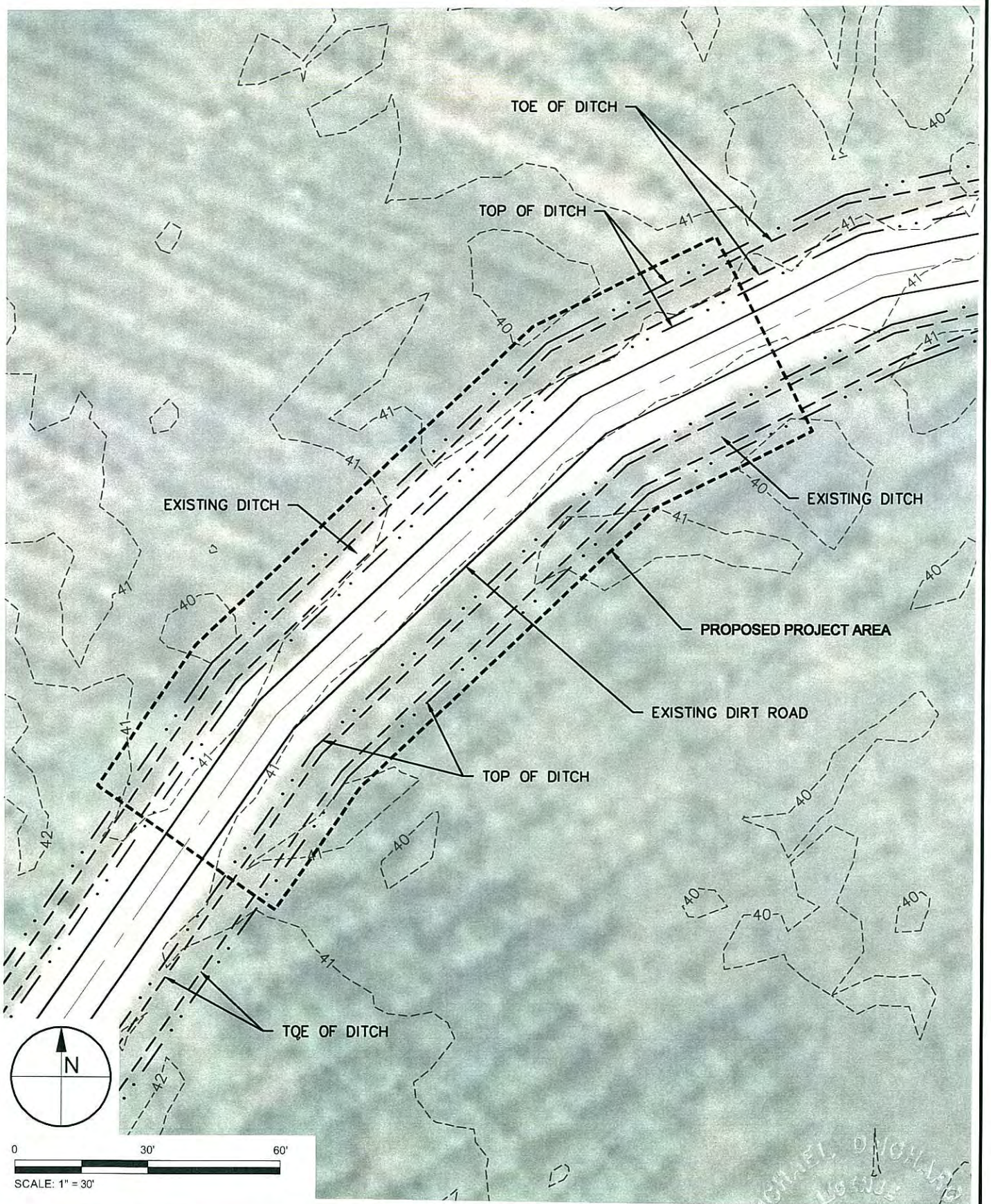
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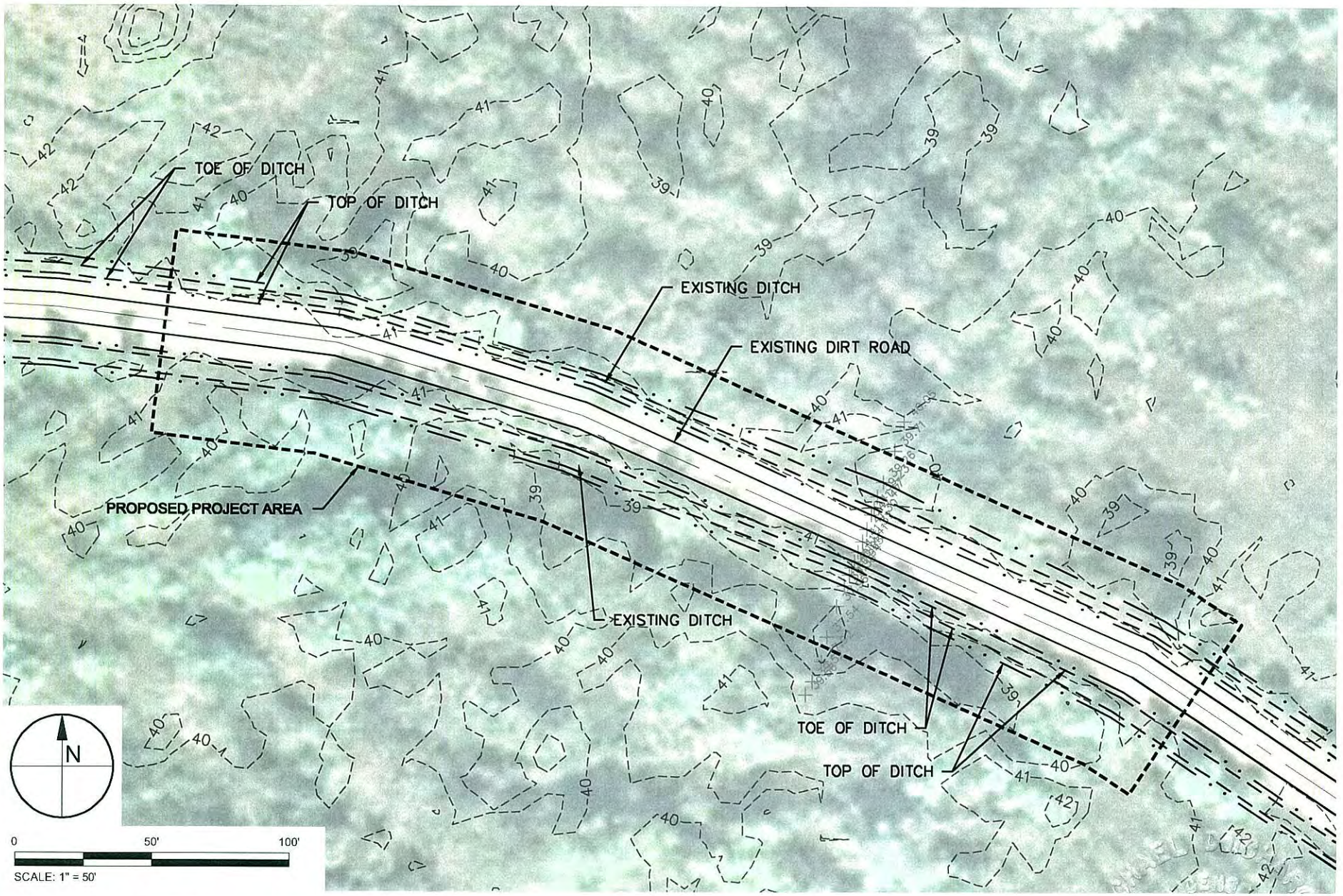
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PROGRESS ENERGY MITIGATION PROJECT
LEVY NUCLEAR PLANT SITE
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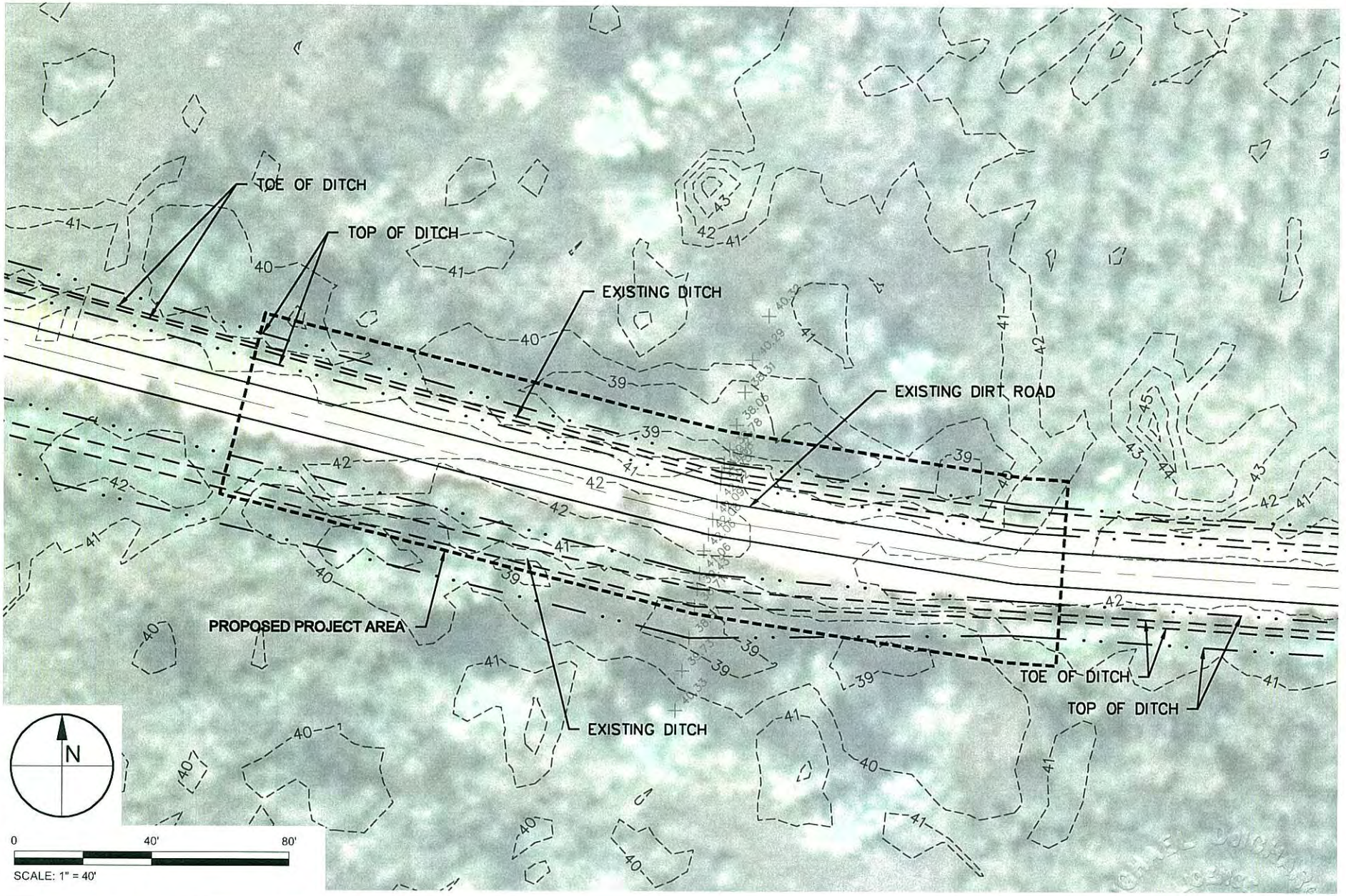
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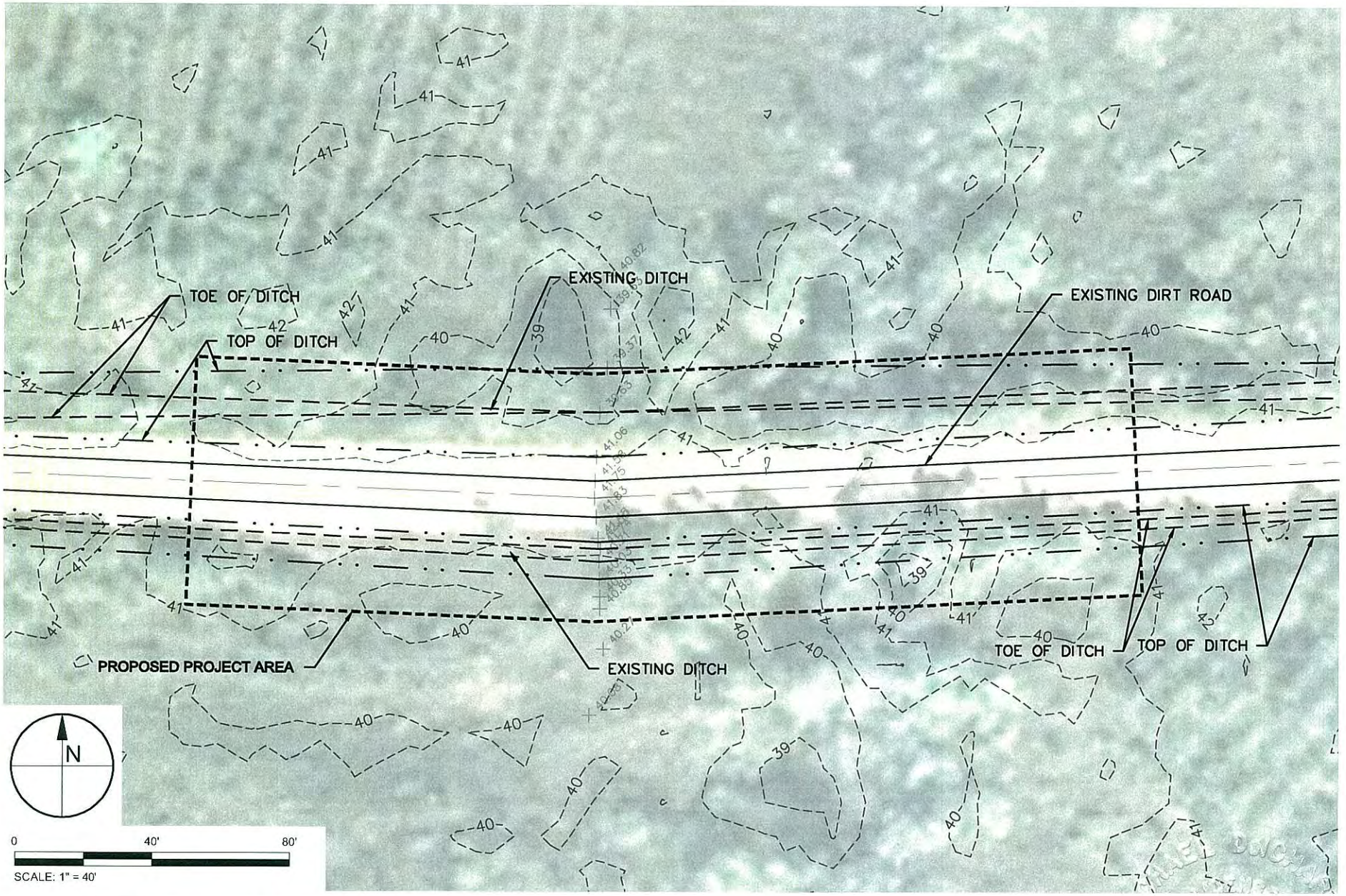
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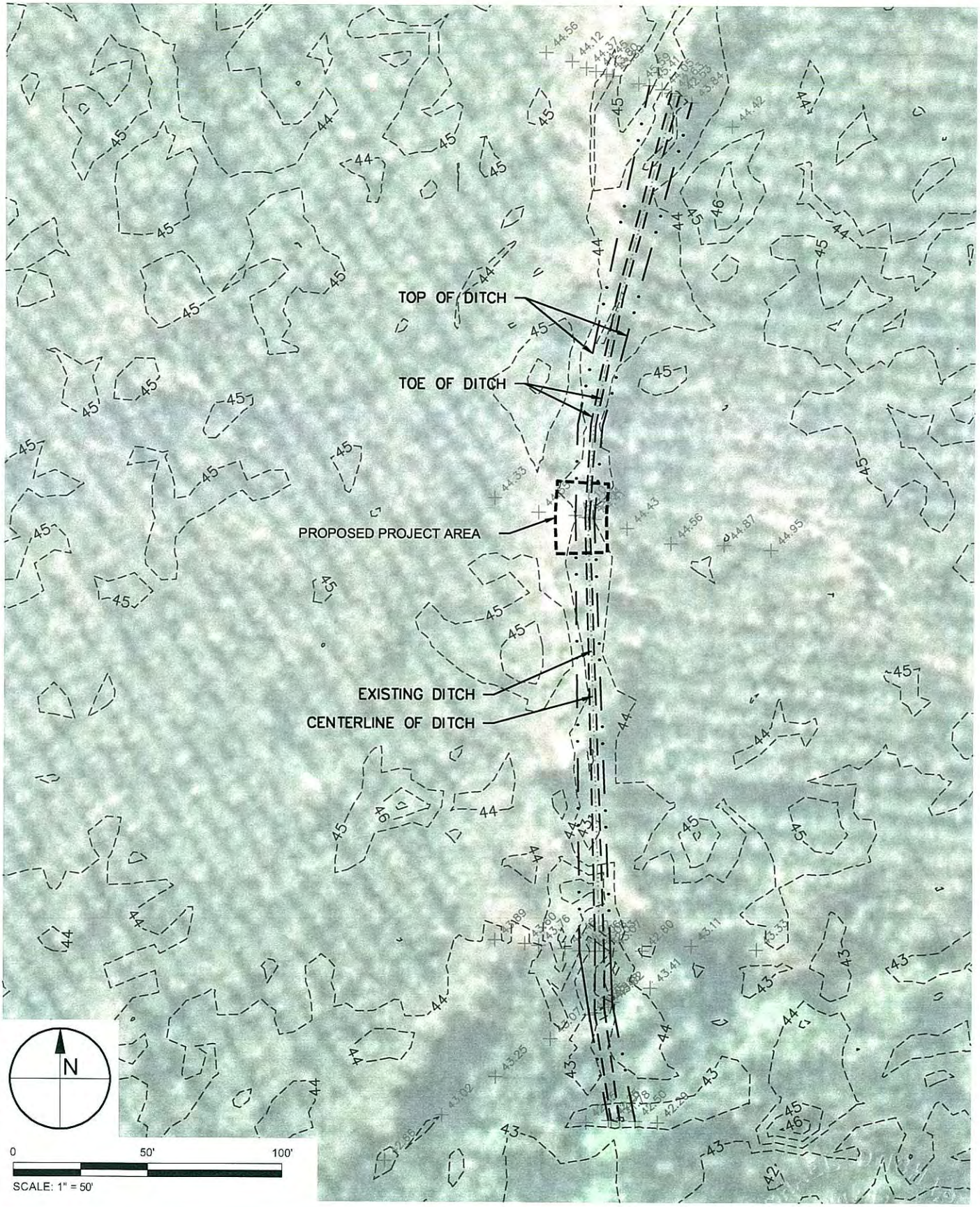
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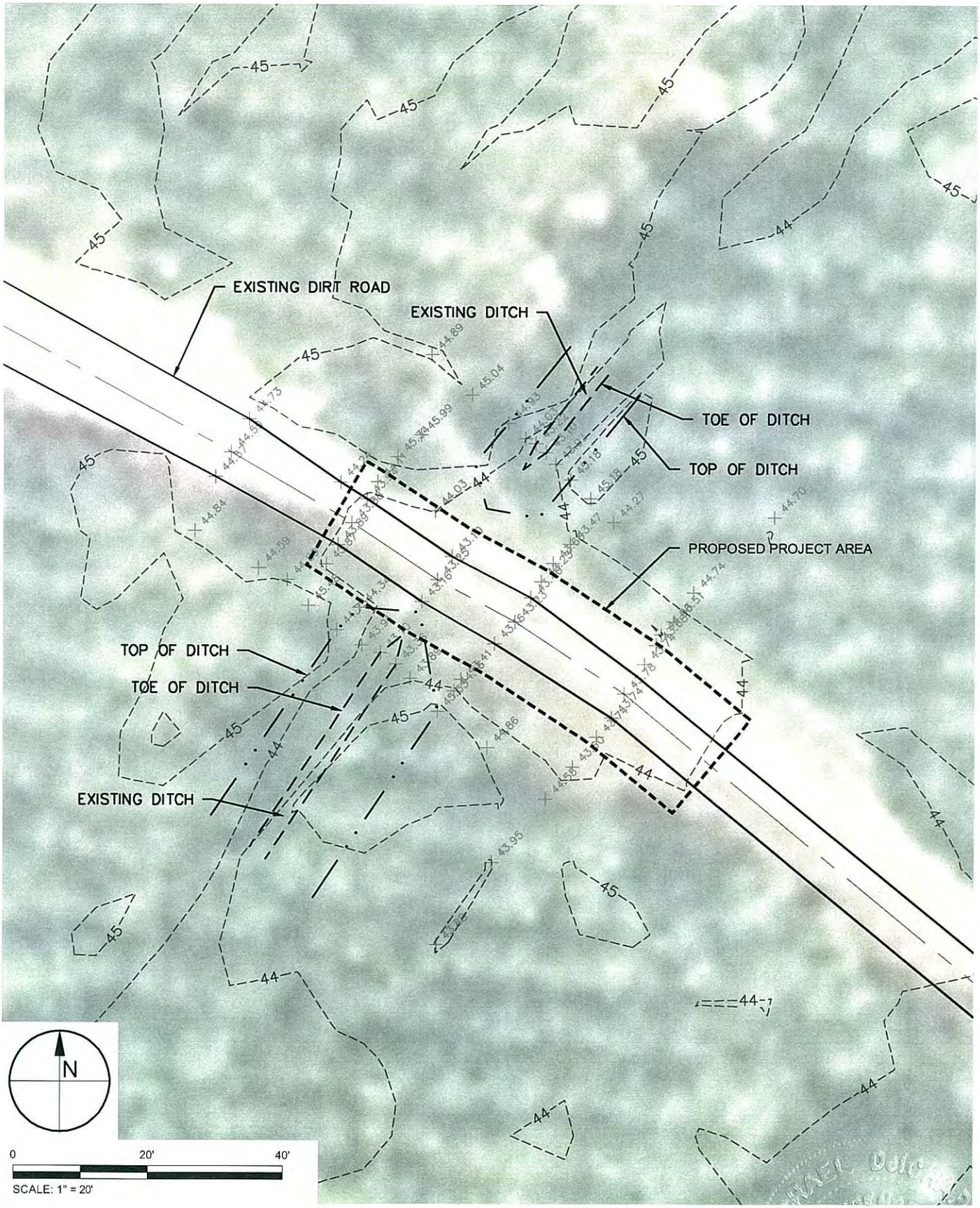
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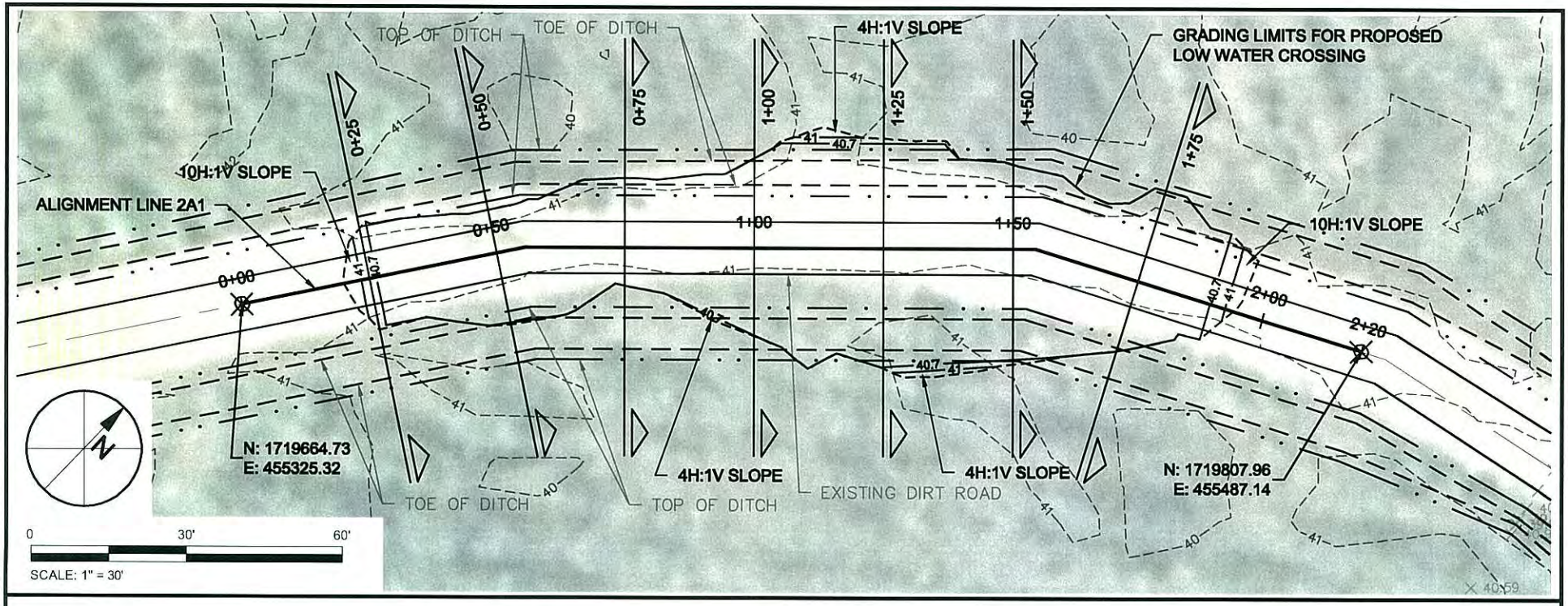
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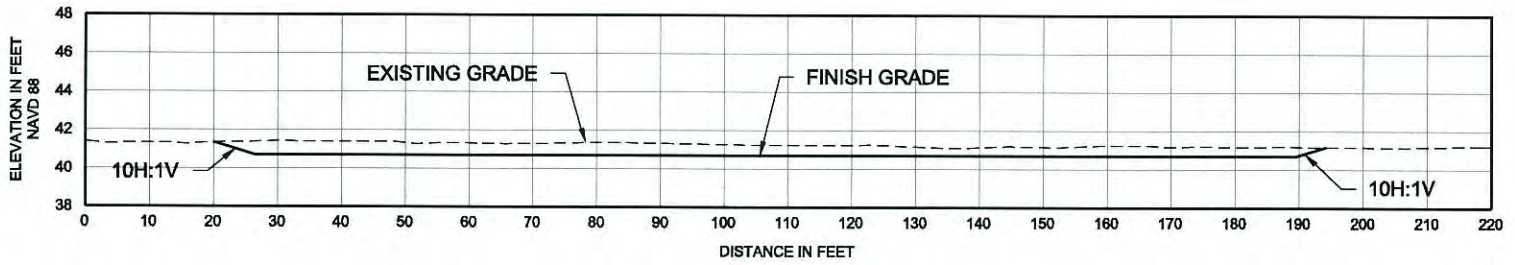
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LOW WATER CROSSING AREA 2A1 - PROFILE ALONG ALIGNMENT LINE 2A1

SCALE: 1" = 30'
V-SCALE: 1" = 10'

0 30'

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LOW WATER CROSSING AREA 2A1 - PLAN & PROFILE
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LEVY COUNTY, FLORIDA

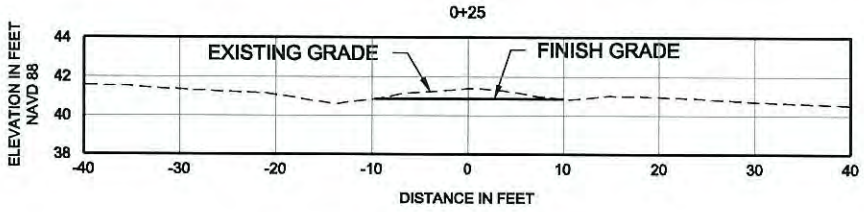
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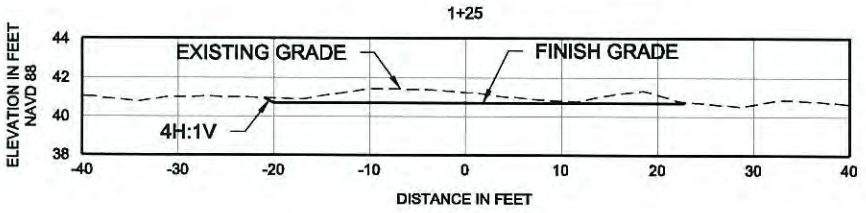
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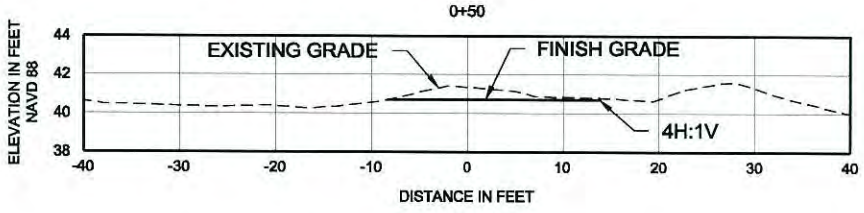
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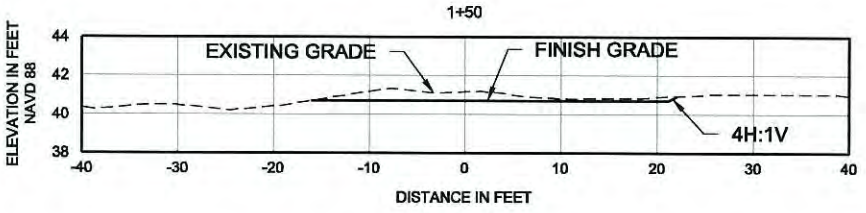
PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

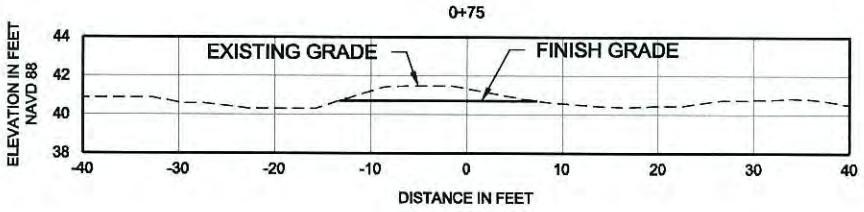
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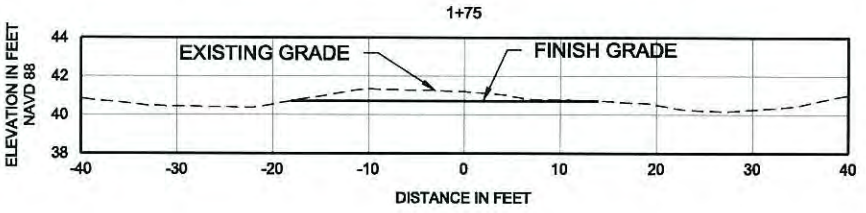


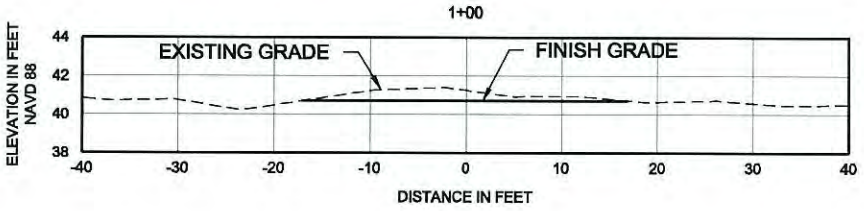












LOW WATER CROSSING AREA 2A1 CROSS SECTIONS

SCALE: 1" = 20'
V-SCALE: 1" = 10'

0 20'

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
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JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

LOW WATER CROSSING AREA 2A1 - CROSS SECTIONS
PROGRESS ENERGY MITIGATION PROJECT
LEVY NUCLEAR PLANT SITE
LEVY COUNTY, FLORIDA

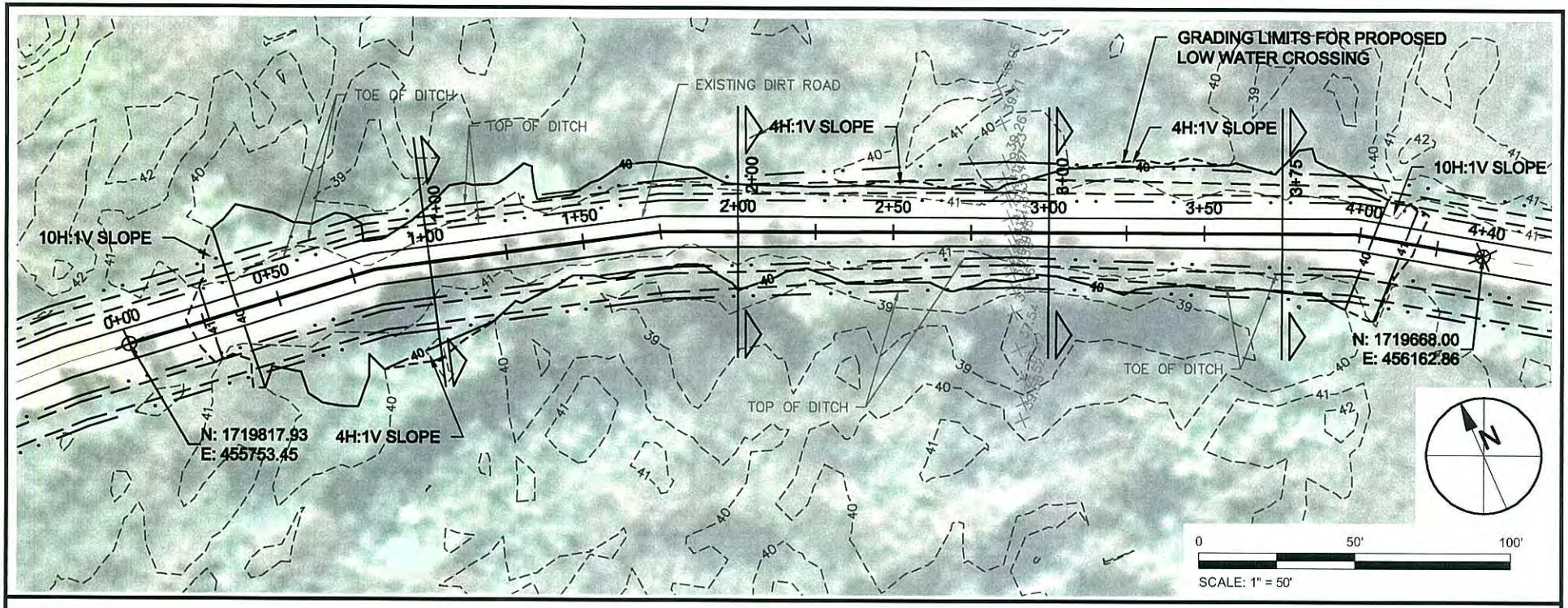
PROJECT	2011-025
DRAWN BY	RLJ/CAS
SHEET	11 of 22
DATE	JULY 2011

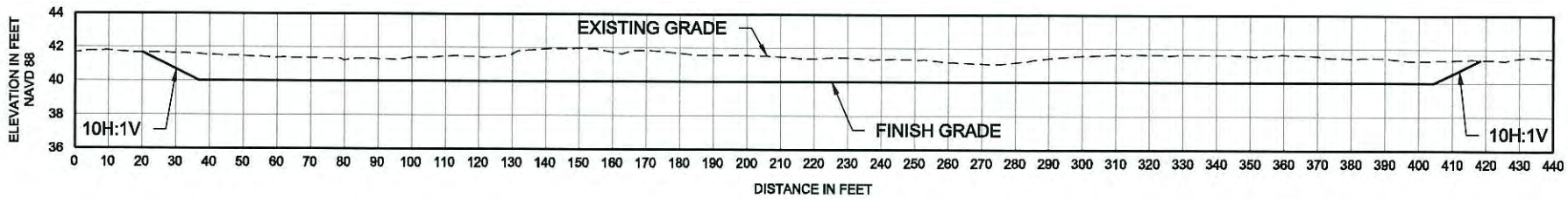
SEAL

MICHAEL J. DELCHARCO P.E. # 57423 DATE

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

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LOW WATER CROSSING AREA 2A2 - PROFILE ALONG ALIGNMENT LINE 2A2

SCALE: 1" = 50'
V-SCALE: 1" = 10'

0 50'

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CERTIFICATE OF AUTHORIZATION # 4815

LOW WATER CROSSING AREA 2A2 - PLAN & PROFILE
PROGRESS ENERGY MITIGATION PROJECT
LEVY NUCLEAR PLANT SITE
LEVY COUNTY, FLORIDA

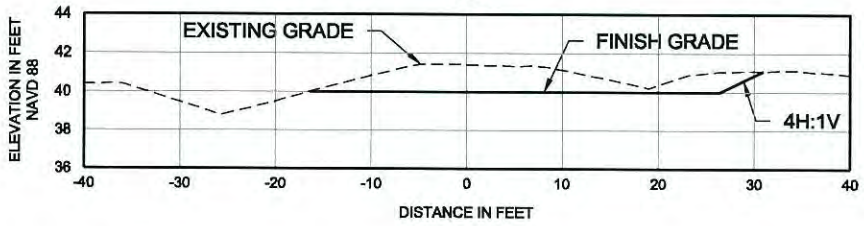
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DRAWN BY	RLJ/CAS
SHEET	12 of 22
DATE	JULY 2011

SEAL
MICHAEL J. DELCHARCO P.E. # 57423 DATE

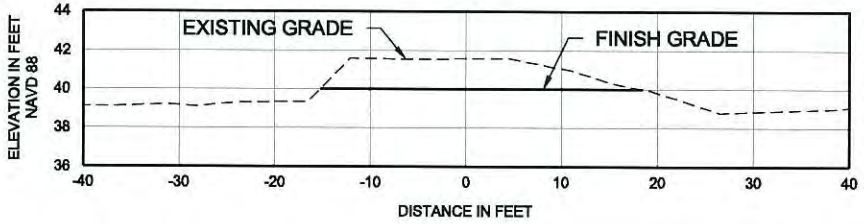
PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

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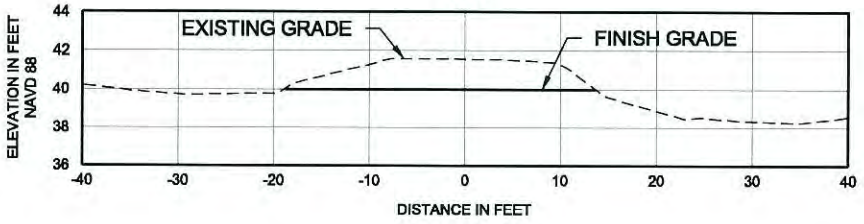
1+00



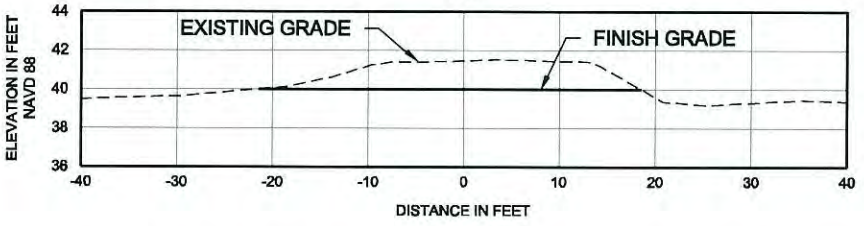
2+00



3+00



3+75



LOW WATER CROSSING AREA 2A2 - CROSS SECTIONS

SCALE: 1" = 20'
V-SCALE: 1" = 10'

0 20'

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JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

LOW WATER CROSSING AREA 2A2 - CROSS SECTIONS
PROGRESS ENERGY MITIGATION PROJECT
LEVY NUCLEAR PLANT SITE
LEVY COUNTY, FLORIDA

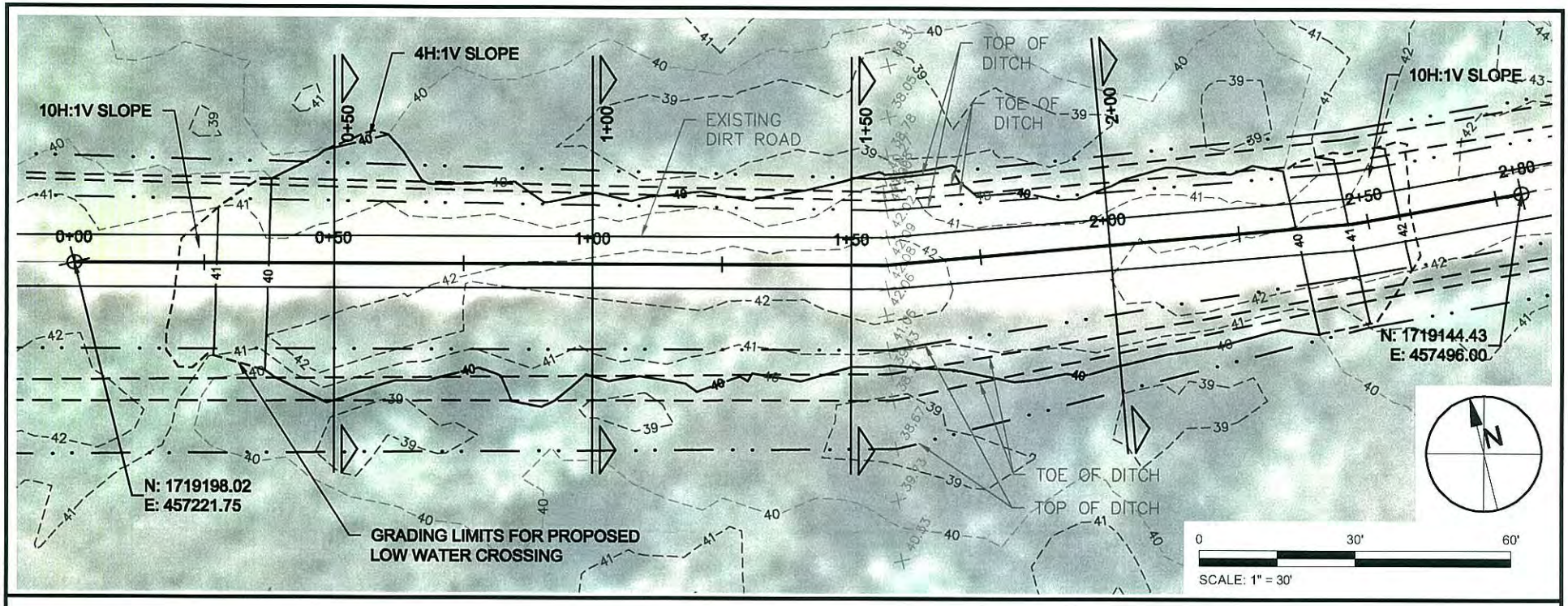
PROJECT	2011-025
DRAWN BY	RLJ/CAS
SHEET	13 of 22
DATE	JULY 2011

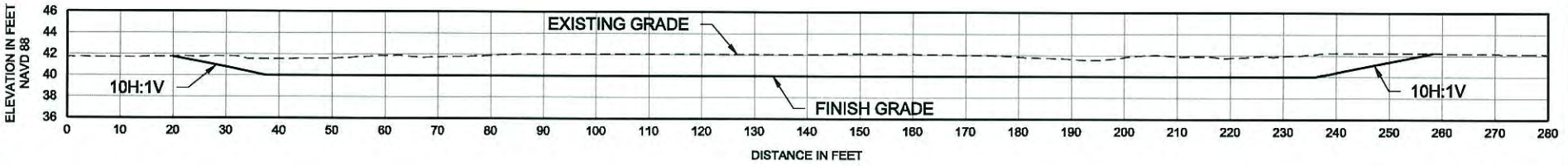
SEAL

MICHAEL J. DELCHARCO, P.E. #57423 DATE

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CATHY SHELL X:\SYS\PROJECTS\C2011-025 PROGRESS ENERGY PERMIT\LNP\C2011-025-P-LNP-GRADING PLAN SITE B-2.DWG 8/10/2011 10:20:58 AM





LOW WATER CROSSING AREA 2A3 - PROFILE ALONG ALIGNMENT LINE 2A3

SCALE: 1" = 30'
V-SCALE: 1" = 15'

0 30'

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10151 DEERWOOD PARK BLVD.
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JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

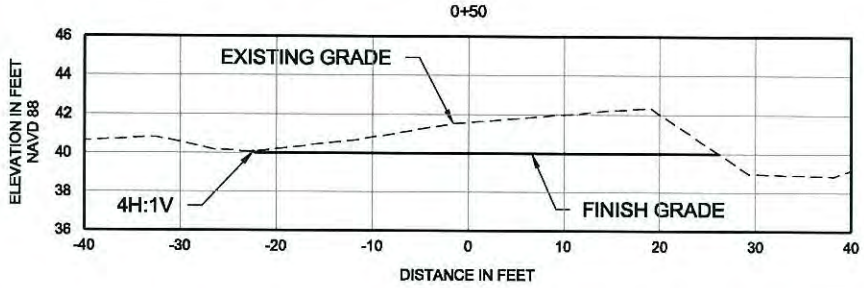
LOW WATER CROSSING AREA 2A3 - PLAN & PROFILE
PROGRESS ENERGY MITIGATION PROJECT
LEVY NUCLEAR PLANT SITE
LEVY COUNTY, FLORIDA

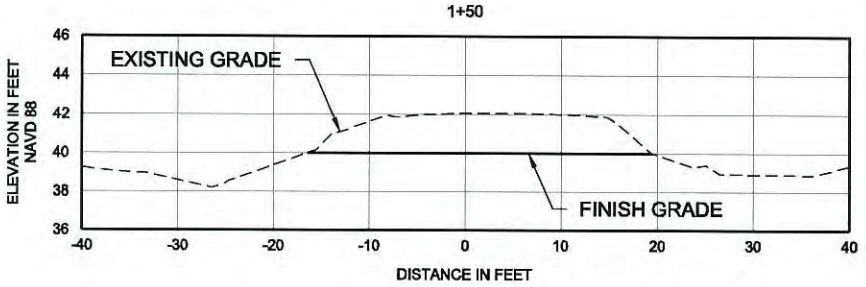
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DRAWN BY	RLJ/CAS
SHEET	14 of 22
DATE	JULY 2011

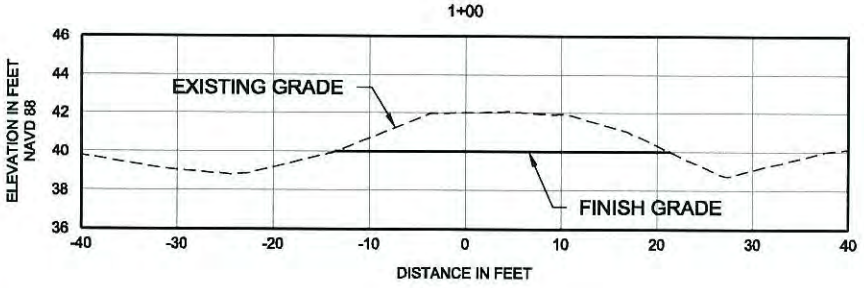
SEAL
MICHAEL V. DELCHARCO P.E. # 57423
9/20/11
DATE

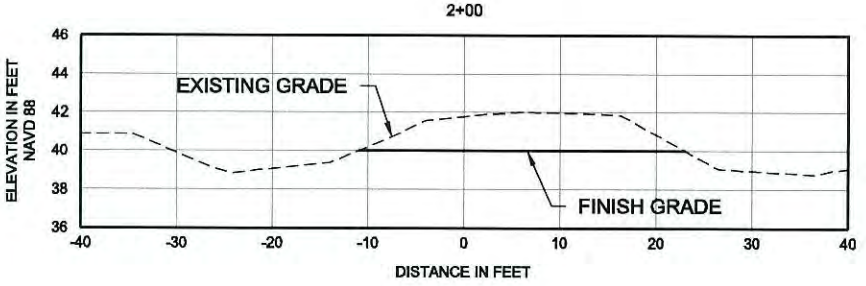
PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

CATHY SHELL X:\SYS\PROJECTS\C2011-025 PROGRESS ENERGY\PERMITTING\C201-025-P-LNP-GRADING PLAN SITE B-3.DWG 8/10/2011 10:21:28 AM









LOW WATER CROSSING AREA 2A3 CROSS SECTIONS

SCALE: 1" = 20'
V-SCALE: 1" = 10'

0 20'

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
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JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

LOW WATER CROSSING AREA 2A3 - CROSS SECTIONS
PROGRESS ENERGY MITIGATION PROJECT
LEVY NUCLEAR PLANT SITE
LEVY COUNTY, FLORIDA

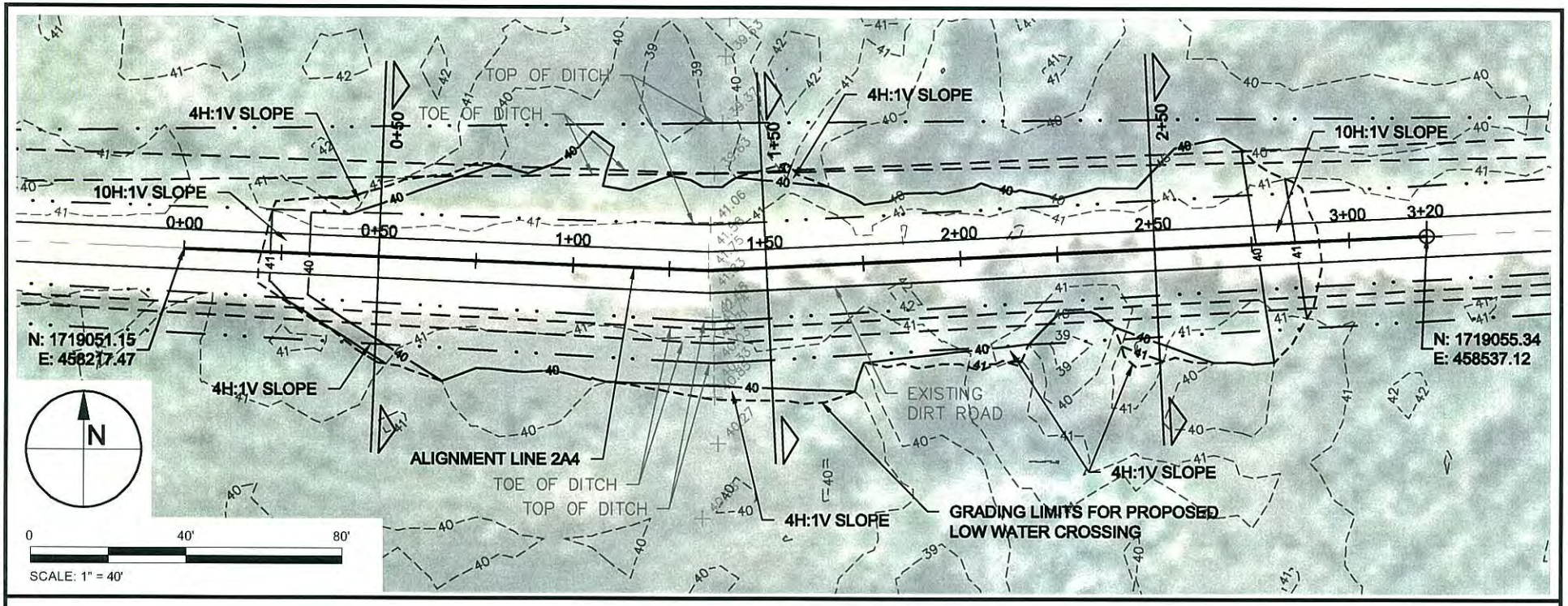
PROJECT	2011-025
DRAWN BY	RLJ/CAS
SHEET	15 of 22
DATE	JULY 2011

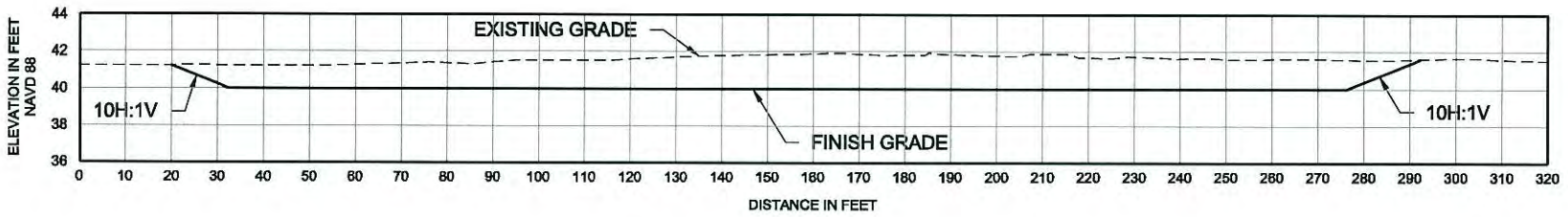
SEAL

MICHAEL J. DELCHARCO P.E. # 57423 DATE 9/20/11

CATHY SHELL X:\SYS\PROJECTS\C2011-025 PROGRESS ENERGY\PERMIT\LNP\C201-1-025-P-LNP-GRADING PLAN SITE B-3.DWG 8/10/2011 10:21:33 AM

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.





LOW WATER CROSSING AREA 2A4 - PROFILE ALONG ALIGNMENT LINE 2A4

SCALE: 1" = 40'
V-SCALE: 1" = 10'

0 40'

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
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JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

LOW WATER CROSSING AREA 2A4 - PLAN & PROFILE
PROGRESS ENERGY MITIGATION PROJECT
LEVY NUCLEAR PLANT SITE
LEVY COUNTY, FLORIDA

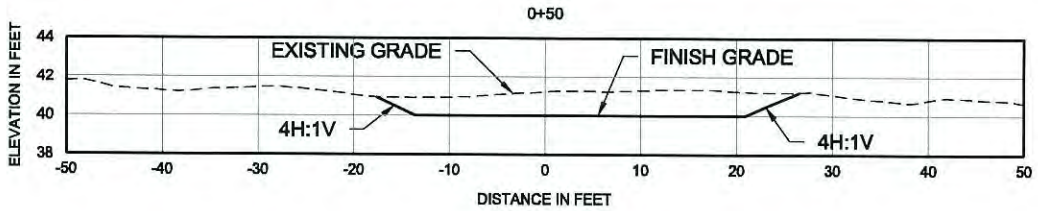
PROJECT	2011-025
DRAWN BY	RLJ/CAS
SHEET	16 of 22
DATE	JULY 2011

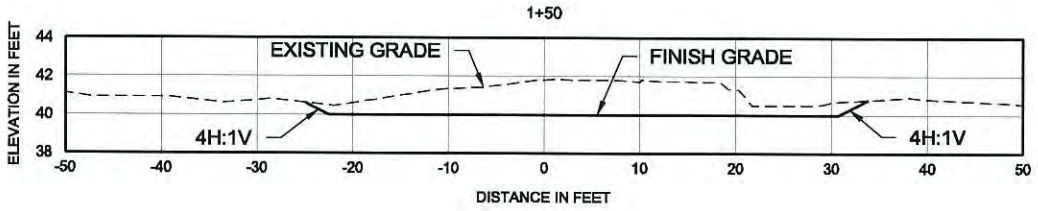
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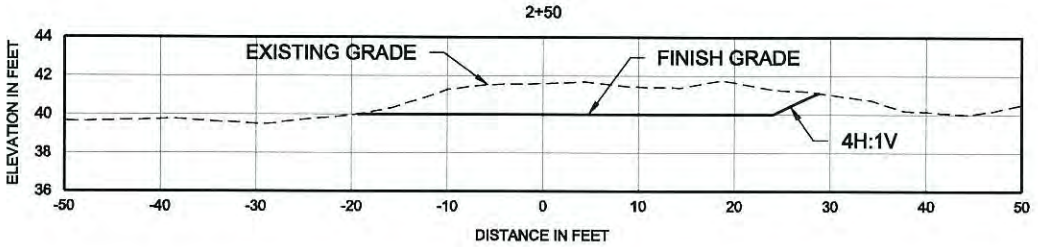
MICHAEL J. DELCHARCO P.E. #57423 DATE 9/2/11

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

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CATHY SHELL X:\SYS\PROJECTS\C2011-025\PROGRESS ENERGY\PERMITTING\C201-1025-P-LWP-GRADING PLAN SITE 8-4.DWG







LOW WATER CROSSING AREA 2A4 - CROSS SECTIONS

SCALE: 1" = 20'
V-SCALE: 1" = 10'

0 20'

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10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

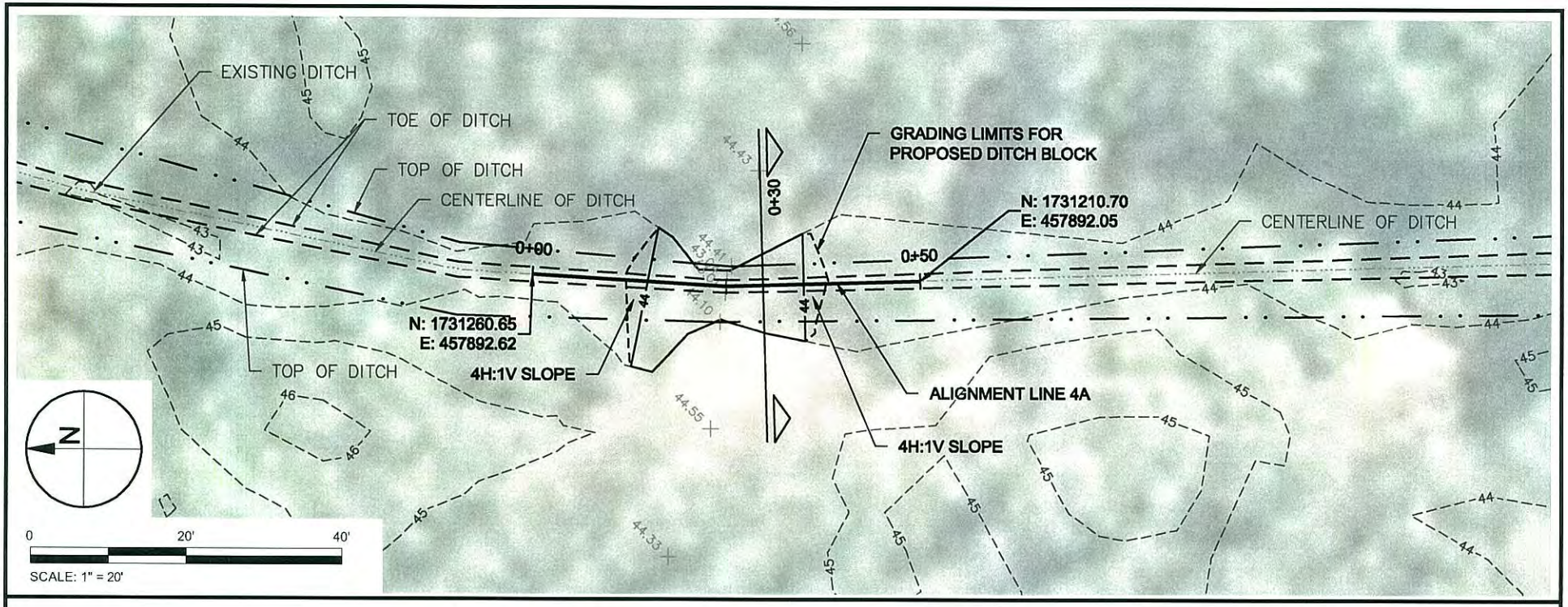
LOW WATER CROSSING AREA 2A4 - CROSS SECTIONS
PROGRESS ENERGY MITIGATION PROJECT
LEVY NUCLEAR PLANT SITE
LEVY COUNTY, FLORIDA

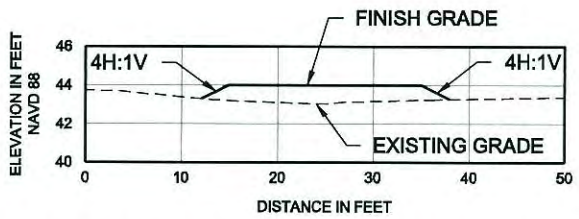
PROJECT	2011-025
DRAWN BY	RLJ/CAS
SHEET	17 of 22
DATE	JULY 2011

SEAL
MICHAEL J. DECONDICO P.E. # 57423
DATE

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

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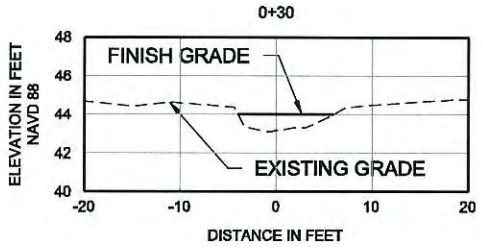




DITCH BLOCK AREA 4A
PROFILE ALONG ALIGNMENT LINE 4A

SCALE: 1" = 20'
V-SCALE: 1" = 10'

0 20'



DITCH BLOCK AREA 4A CROSS SECTION

SCALE: 1" = 20'
V-SCALE: 1" = 10'

0 20'

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
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JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

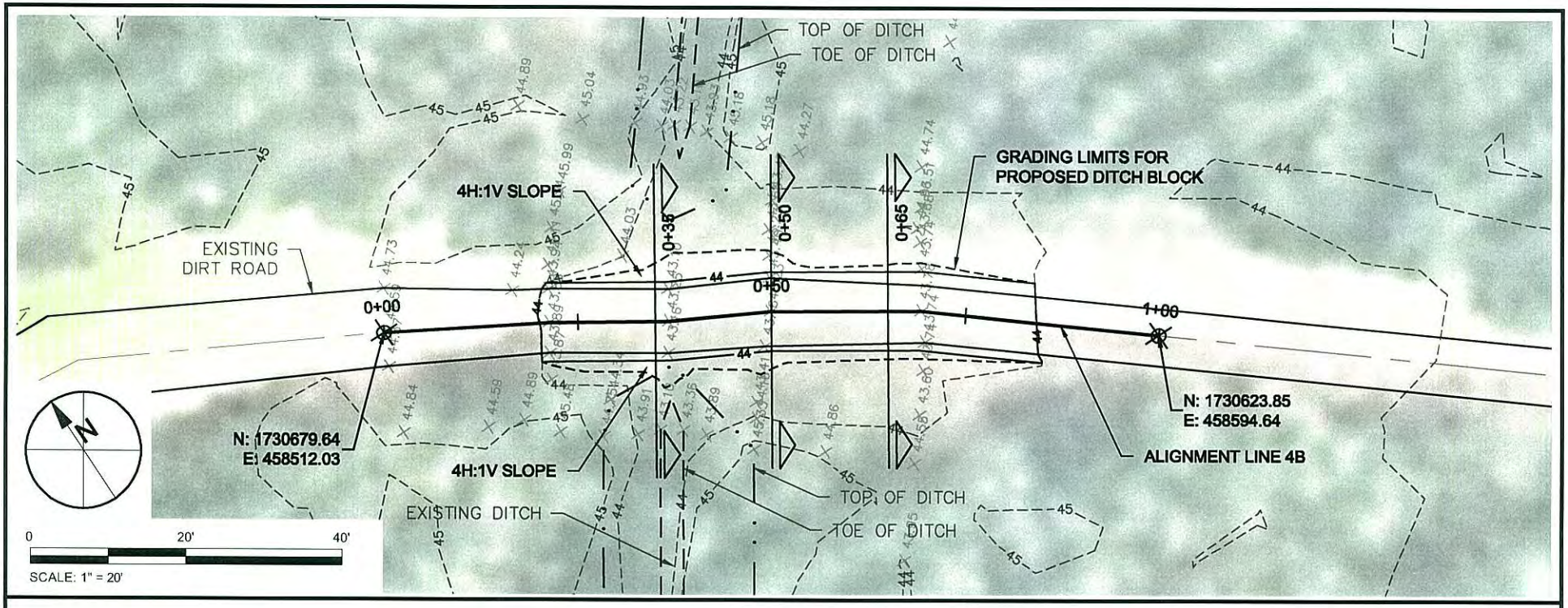
DITCH BLOCK AREA 4A - PLAN, PROFILE & CROSS SECTION
PROGRESS ENERGY MITIGATION PROJECT
LEVY NUCLEAR PLANT SITE
LEVY COUNTY, FLORIDA

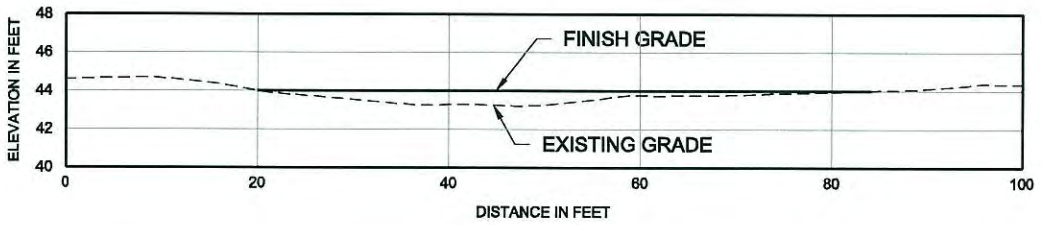
PROJECT	2011-025
DRAWN BY	RLJ/CAS
SHEET	18 of 22
DATE	JULY 2011

SEAL
MICHAEL V. DELCHARCO P.E. #57602
9/20/11
DATE

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

8/10/2011 10:22:21 AM
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DITCH BLOCK AREA 4B - PROFILE ALONG ALIGNMENT LINE 4B

SCALE: 1" = 20'
V-SCALE: 1" = 10'

0 20'

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10151 DEERWOOD PARK BLVD.
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JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

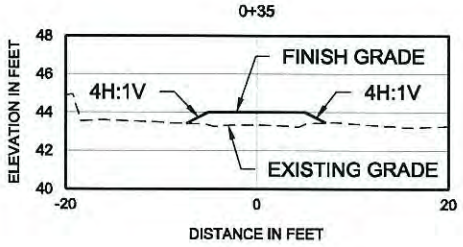
DITCH BLOCK AREA 4B - PLAN & PROFILE
PROGRESS ENERGY MITIGATION PROJECT
LEVY NUCLEAR PLANT SITE
LEVY COUNTY, FLORIDA

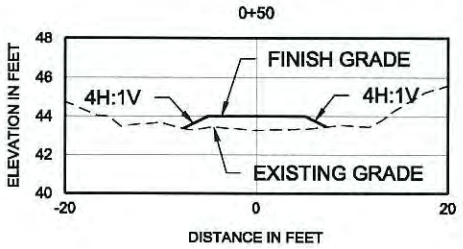
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DRAWN BY	RLJ/CAS
SHEET	19 of 22
DATE	JULY 2011

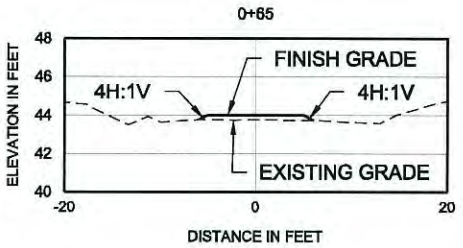
SEAL
MICHAEL J. DELCHARCO P.E.# 57423
DATE

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

8/10/2011 10:22:35 AM
CATHY SHELL X:\SYS\PROJECTS\2011-025 PROGRESS ENERGY\PERMIT\LNP\C2011-025-P-LNP-GRADING PLAN SITE11.DWG







DITCH BLOCK AREA 4B - CROSS SECTIONS

SCALE: 1" = 20'
V-SCALE: 1" = 10'

0 20'

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

DITCH BLOCK AREA 4B - CROSS SECTIONS
PROGRESS ENERGY MITIGATION PROJECT
LEVY NUCLEAR PLANT SITE
LEVY COUNTY, FLORIDA

PROJECT	2011-025
DRAWN BY	RLJ/CAS
SHEET	20 of 22
DATE	JULY 2011

SEAL
MICHAEL J. DELCARMEN P.E. # 57425
9/20/11
DATE

CATHY SHELL X:\SYS\PROJECTS\C2011-025 PROGRESS ENERGY\PERMIT\LNP\C2011-025-P-LNP-GRADING PLAN SITE11.DWG 8/10/2011 10:22:37 AM

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

EROSION CONTROL AND GENERAL VEGETATION NOTES:

1. THE CONTRACTOR SHALL IMPLEMENT AND MAINTAIN EROSION CONTROL MEASURES AS NECESSARY TO COMPLY WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS AND COMPLY WITH STATE WATER QUALITY CRITERIA FOR STORMWATER DISCHARGE. EROSION CONTROL MEASURES INCLUDE BUT ARE NOT LIMITED TO TURBIDITY SCREENS, MULCHING, HAY BALES, AND SILT FENCE. IF A WATER QUALITY VIOLATION OCCURS, THE CONTRACTOR SHALL BE WHOLLY RESPONSIBLE FOR ALL DAMAGE AND ALL COSTS WHICH MAY RESULT INCLUDING LEGAL FEES, CONSTRUCTION COSTS, AND FINES.

2. DISTURBED AREAS SHALL BE VEGETATED, FERTILIZED, MULCHED, AND MAINTAINED IN ACCORDANCE WITH PROJECT SPECIFICATIONS AND CITY, COUNTY, STATE, AND FEDERAL REQUIREMENTS.

3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING PERMANENT VEGETATION AT ALL DISTURBED AREAS PER NPDES FINAL STABILIZATION REQUIREMENTS.

4. EROSION CONTROL MEASURES SHALL BE MAINTAINED FOR THE ENTIRE DURATION OF THE PROJECT OR UNTIL PERMANENT VEGETATION IS ESTABLISHED.

5. EROSION CONTROL MEASURES SHALL BE PLACED TO CONTAIN ALL POINTS OF DISCHARGE TO SURFACE WATERS OR WETLANDS INCLUDING CURB INLETS, DITCH BOTTOM INLETS, DITCHES, AND DOWNSTREAM PORTIONS OF NATURAL DRAINAGE PATHWAYS, STREAMS, CANALS, AND TIDAL WATERS ADJACENT TO CONSTRUCTION.

6. 48 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION, THE CONTRACTOR WILL SUBMIT A "NOTICE OF INTENT" TO THE EPA IN ACCORDANCE WITH NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM RULES AND REGULATIONS.

7. THE SITE CONTRACTOR IS RESPONSIBLE FOR REMOVING THE TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES AFTER COMPLETION OF CONSTRUCTION AND ONLY WHEN AREAS HAVE BEEN STABILIZED.

8. SILT FENCES AND FILTER BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

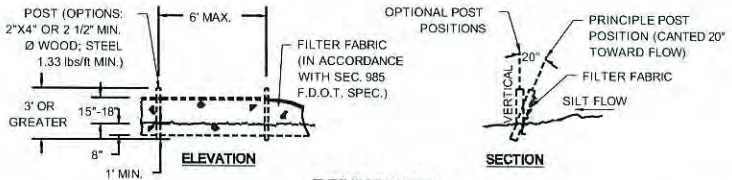
EROSION CONTROL NOTES
PROGRESS ENERGY MITIGATION PROJECT
LEVY NUCLEAR PLANT SITE
LEVY COUNTY, FLORIDA

PROJECT	2011-025
DRAWN BY	RLJ/CAS
SHEET	21 of 22
DATE	JULY 2011

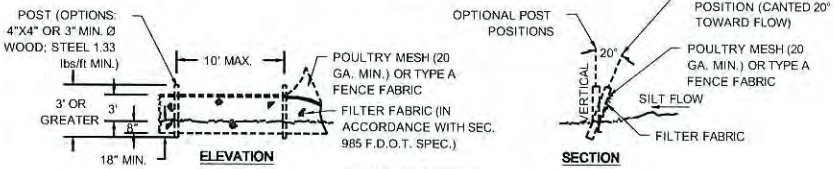
SEAL
MICHAEL J. DELCHANCO P.E. # 47423 DATE 9/20/11

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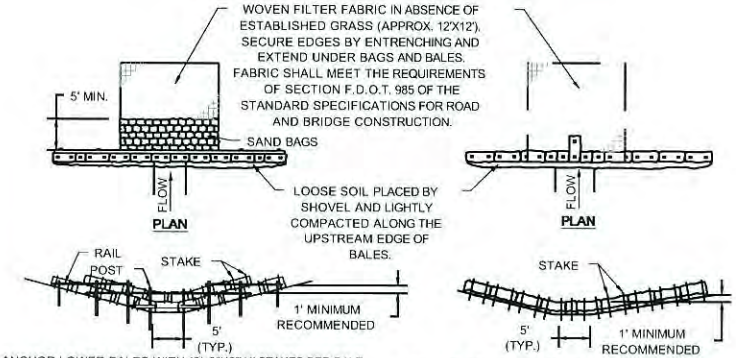
PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



TYPE III SILT FENCE



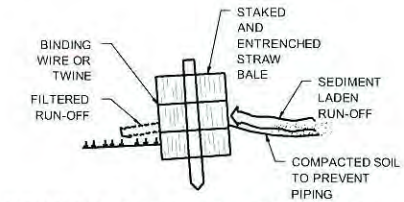
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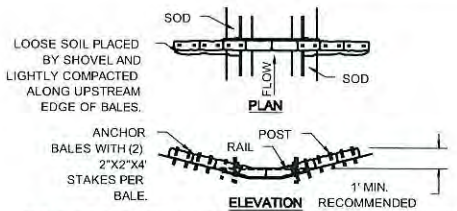
APPLICATION AND SPACING OF TYPES I & TYPES II HAY BALE BARRIERS SALL BE IN ACCORDANCE WITH SHEET 1 OF 3, F.D.O.T. INDEX NO. 102

TYPE II TYPE I

TYPICAL STRAW BALE DETAIL



CROSS SECTION OF A PROPERLY INSTALLED STRAW BALE



SPACING: BALE BARRIERS FOR PAVED DITCHES SHOULD BE SPACED IN ACCORDANCE WITH CHART I, SHEET 1 OF 3, INDEX NO. 102 OF THE F.D.O.T. ROADWAY AND TRAFFIC DESIGN STANDARDS.

STRAW BALE BARRIER FOR PAVED DITCH



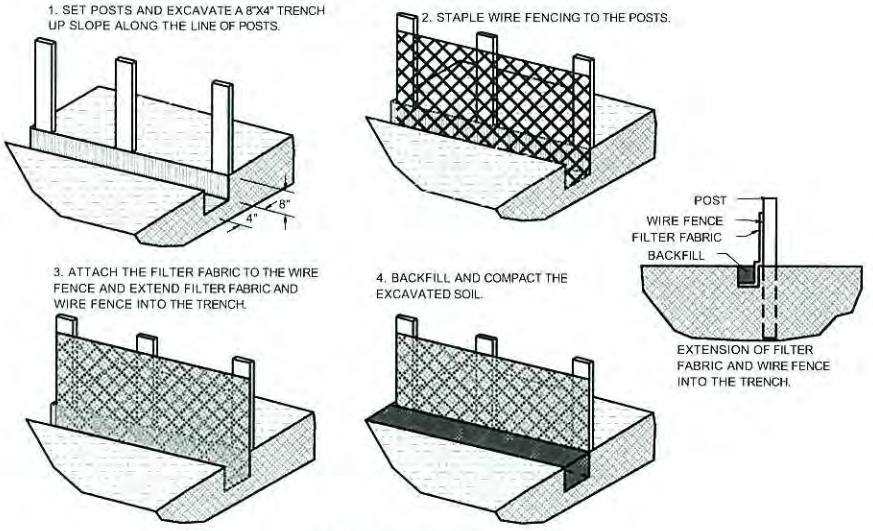
TYPE III OR TYPE IV SILT FENCE PROTECTION AROUND DITCH BOTTOM INLETS.

TYPE III AND IV SILT FENCE

DITCH INSTALLATION AND SPACING FOR TYPE III & TYPE IV FENCE TO BE IN ACCORDANCE WITH SHEET 1 OF 3, OF THE F.D.O.T. INDEX NO. 102

TYPE III OR TYPE IV SILT FENCE

DO NOT DEPLOY IN A MANNER THAT SILT FENCES WILL ACT AS A DAM ACROSS PERMANENT FLOWING WATERCOURSES. SILT FENCES ARE TO BE USED AT UPLAND LOCATIONS AND TURBIDITY BARRIERS USED AT PERMANENT BODIES OF WATER.



SILT FENCE INSTALLATION DETAILS

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

EROSION CONTROL DETAILS
PROGRESS ENERGY MITIGATION PROJECT
LEVY NUCLEAR PLANT SITE
LEVY COUNTY, FLORIDA

PROJECT	2011-025
DRAWN BY	RLJ/CAS
SHEET	22 of 22
DATE	JULY 2011

SEAL

MICHAEL J. DELCHARCO P.E. #57267 DATE 9/22/11

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PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

4.0 WITHLACOOCHEE AND HILLSBOROUGH WATERSHEDS – BOARSHEAD RANCH

4.1 Introduction

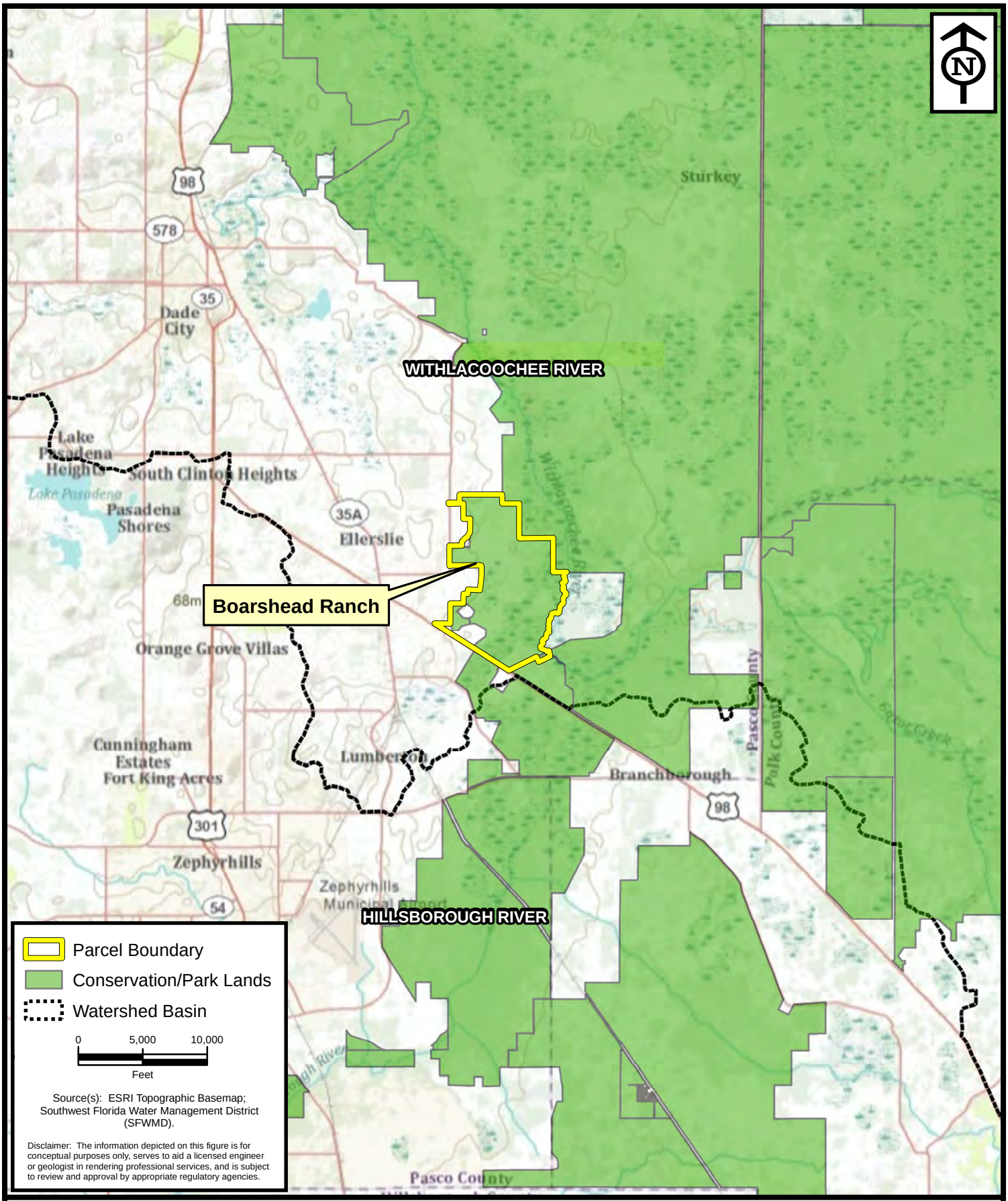
The mitigation plan for the 64.5 acres of impact from off-site transmission line impacts within the Withlacoochee and Hillsborough Watersheds (-35.6 total UMAM units; -25.5 herbaceous units and -10.0 forested units) is contained in this section. The proposed wetland impacts for LNP are summarized in Table 1-1. Mitigation for the impacts within the Withlacoochee Watershed and Hillsborough River Watershed (Figure 4-1) for off-site transmission line impacts will occur on Boarshead Ranch (BHR) (Figure 4-2). The detailed mitigation plan for on-site impacts to the LPN site within the Withlacoochee Watershed is provided in Section 3.0. BHR will produce 40.6 UMAM credits (11.0 wetland herbaceous, 9.6 wetland forested within the Withlacoochee Watershed and 19.0 wetland herbaceous, 1.0 wetland forested within the Hillsborough Watershed). This section of the overall mitigation plan provides the details for BHR.

The BHR mitigation site is located on a privately-owned parcel in Pasco County, Florida. This parcel is part of a corridor that is situated where the Hillsborough and Withlacoochee rivers diverge, and is adjacent to approximately 9 square miles of SWFWMD-owned Green Swamp property and other conservation lands located to the north, east and south (Figure 4-1). The enhancement/restoration activities proposed at BHR will improve wetland and ecosystem functions in the floodplains of the aforementioned rivers and will ultimately result in the removal of disturbances to native communities while creating habitat by enhancing the largest area of natural forest remaining in the upper Withlacoochee and Hillsborough Watersheds which allows for an ecologically improved and protected corridor between these two large systems. The enhancement will therefore have greater benefits than the site specific scores described herein.

4.2 Impact Summary

The wetland impacts within the Withlacoochee Watershed for LPN off-site transmission line impacts south of the Cross Florida Barge Canal total approximately 41.0 acres. These impacts will generate a total loss of 19.0 functional units (-9.8 herbaceous and -9.2 forested). The wetland impacts within the Hillsborough River Watershed total approximately 23.5 acres. These impacts will generate a total loss of 16.6 functional units (-15.7 herbaceous and -0.9 forested). The impact summary is provided on Table 4-1 (below). The majority of these impacts will be the result of permanently clearing and/or filling existing herbaceous and forested wetlands. The proposed mitigation plan will provide for 40.6 functional units of lift within the Withlacoochee and Hillsborough Watersheds, of which 20.6 functional lift units will be in the Withlacoochee Watershed and 20.0 functional lift units will be within the Hillsborough Watershed. Furthermore, within the Withlacoochee Watershed, 11.0 functional units of lift will be provided to

offset the herbaceous and open water impacts, while 9.60 functional units of lift will offset the forested wetland impacts. Within the Hillsborough Watershed 19.0 functional lift units will be provided to offset the herbaceous and open water impacts, while 1.0 functional lift units will offset forested wetland impacts within this watershed (Section 4.6 provides details of the UMAM scores).



Source(s): ESRI Topographic Basemap; Southwest Florida Water Management District (SFWMD).

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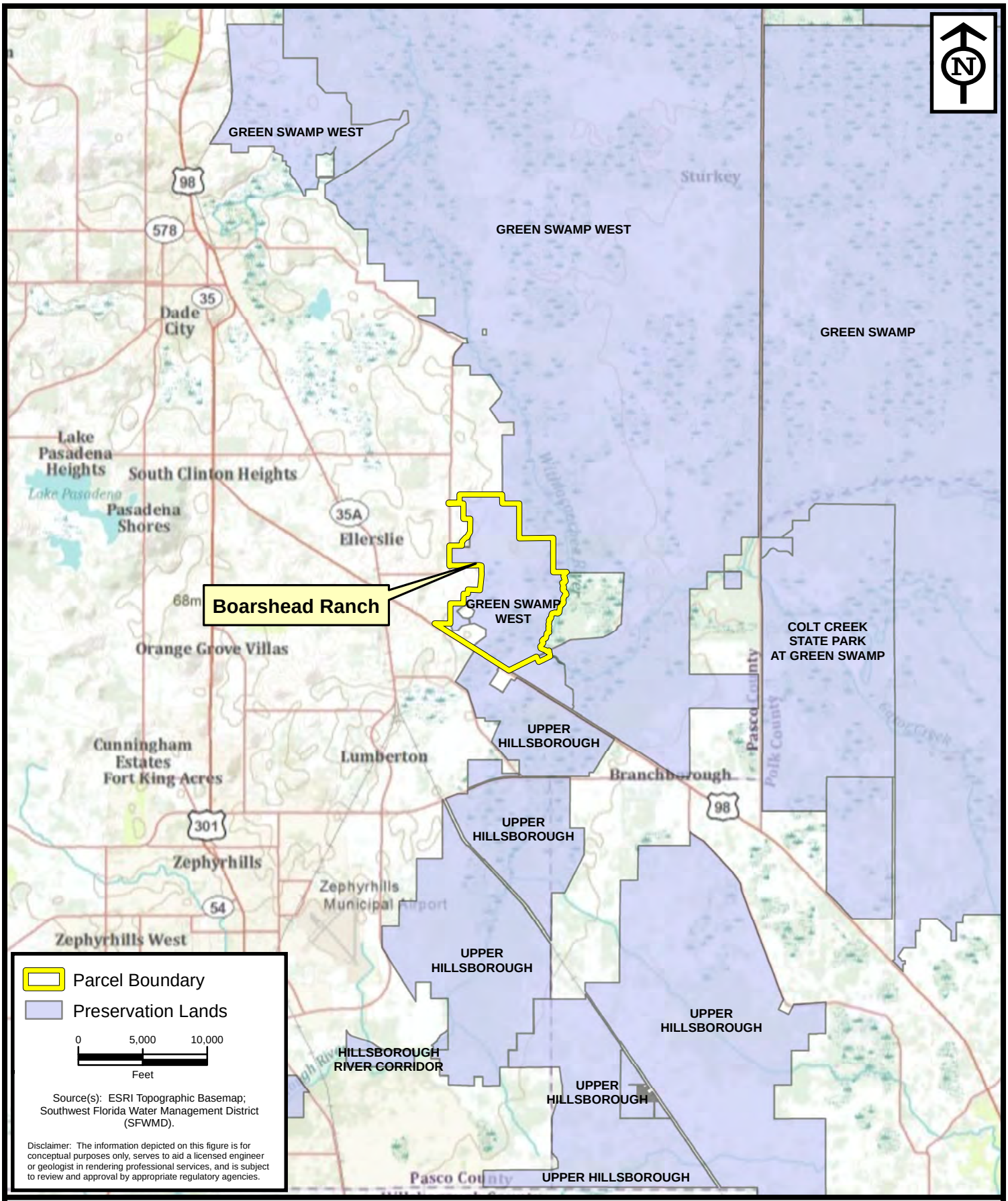
Withlacoochee River and Hillsborough River Watersheds

Boarshead Ranch

Pasco County, Florida

Project:	EJ11021.00
Date:	June 2011
Drwn/Chkd:	JGB/JRN
Figure:	**4-1**

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Regional Preservation Land

Boarshead Ranch

Pasco County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JGB/JRN
Figure:	**4-2**

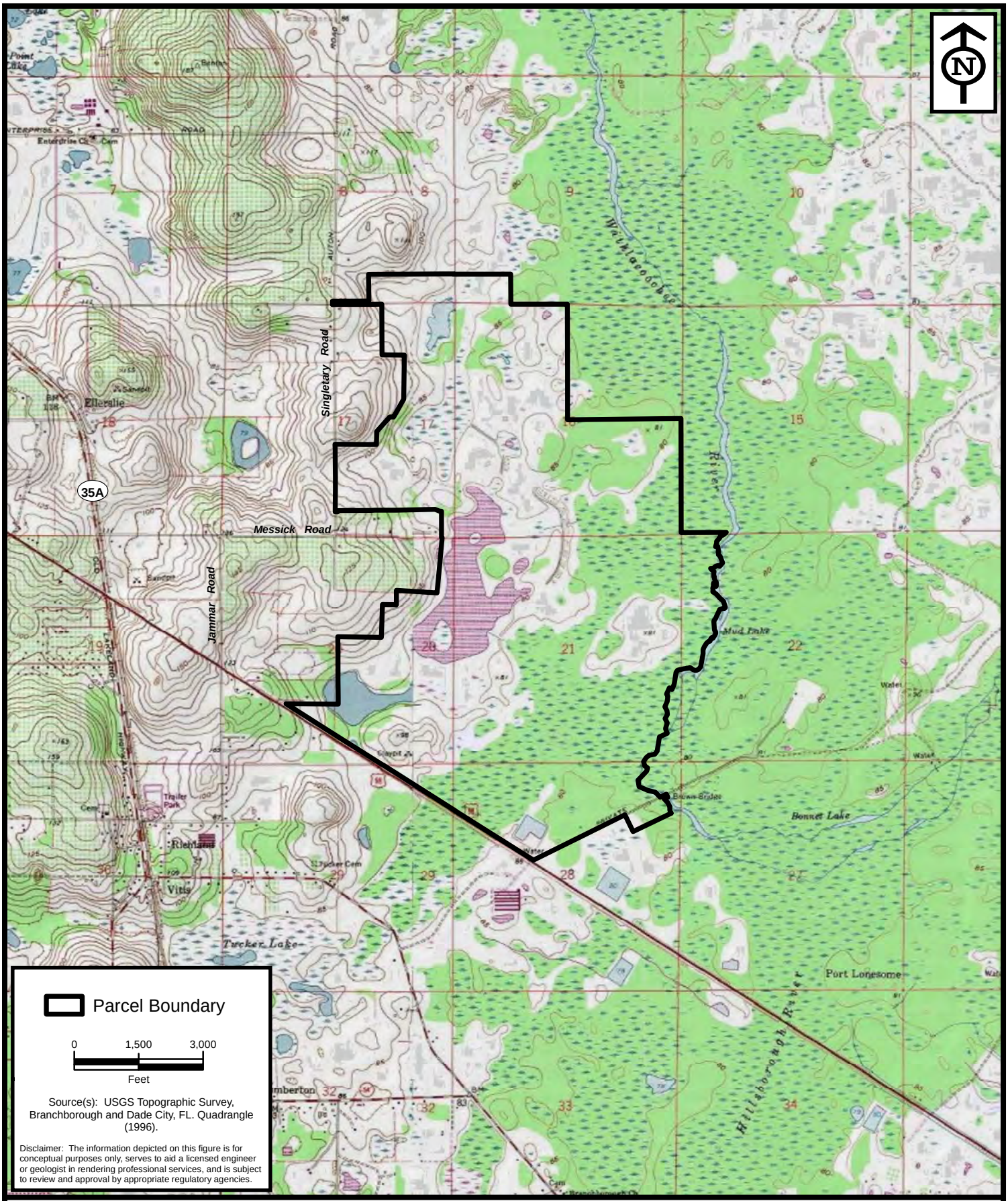
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Table 4-1. Withlacoochee and Hillsborough Watersheds (Boarshead Ranch) wetland impacts by UMAM functional loss/gain and acreage

Area	Herbaceous Wetland Acreage (including open water)	Herbaceous Wetland Functional Loss/Gain	Forested Wetland Acreage	Forested Wetland Functional Loss/Gain	Total Acres	Total Functional Loss/Gain
Withlacoochee Watershed						
Permanent Fill	13.8 acres	-9.8 units	1.9 acres	-1.4 units	15.7	-11.2
Permanent Clearing	None	None	25.3 acres	-7.8 units	25.3	-7.8
Total Impacts					**41.0**	**-19.0**
Hillsborough Watershed						
Permanent Fill	22.4 acres	-15.7 units	1.1 acres	-0.9 units	23.4	-16.6
Permanent Clearing	None	None	0	0	0	0
Total Impacts					**23.4**	**-16.6**
Combined Watershed Impacts					**64.4**	**-35.6**

4.3 Site Description

The BHR site is located in Sections 8, 9, 15, 16, 17, 20, 21, 22, 27, 28, and 29, Township 25S and Range 22E and is north and adjacent to U.S. Highway 98, west of S.R. 35A and east of S.R. 471 in Pasco County, FL (Figure 4-3). The total area of the BHR parcel is approximately 2,096.8 acres, yet the proposed enhancement/restoration activities for this project are scattered throughout the property limits and include approximately 236.7 acres. Water flows within BHR from the east as the two watersheds diverge, and from sheet flow associated with ridges to the west. The headwaters of the Hillsborough River flow southwestward through a natural channel of the Withlacoochee River, and the Withlacoochee River flows to the northwest. These two drainage basins interconnect in several locations by swamp channels and gaps in surrounding ridges. Based on an existing USGS Station (02311000), the Withlacoochee must stage to 2.9 feet before measurable discharge at an overflow feature near the southwest corner of BHR will measure the discharge from the Withlacoochee to the Upper Hillsborough Basin. Prior to reaching the 2.9 feet of staging at the overflow feature, the Withlacoochee may overflow and follow low areas throughout BHR. Under extreme rain events, portions of BHR have been flooded. A portion of the water leaves the site with slight flows to the southwest, with the remaining majority of the water left to naturally infiltrate the surface or recede with the rivers' water elevations.



Source(s): USGS Topographic Survey, Branchborough and Dade City, FL. Quadrangle (1996).

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Project Location

Boarshead Ranch

Pasco County, Florida

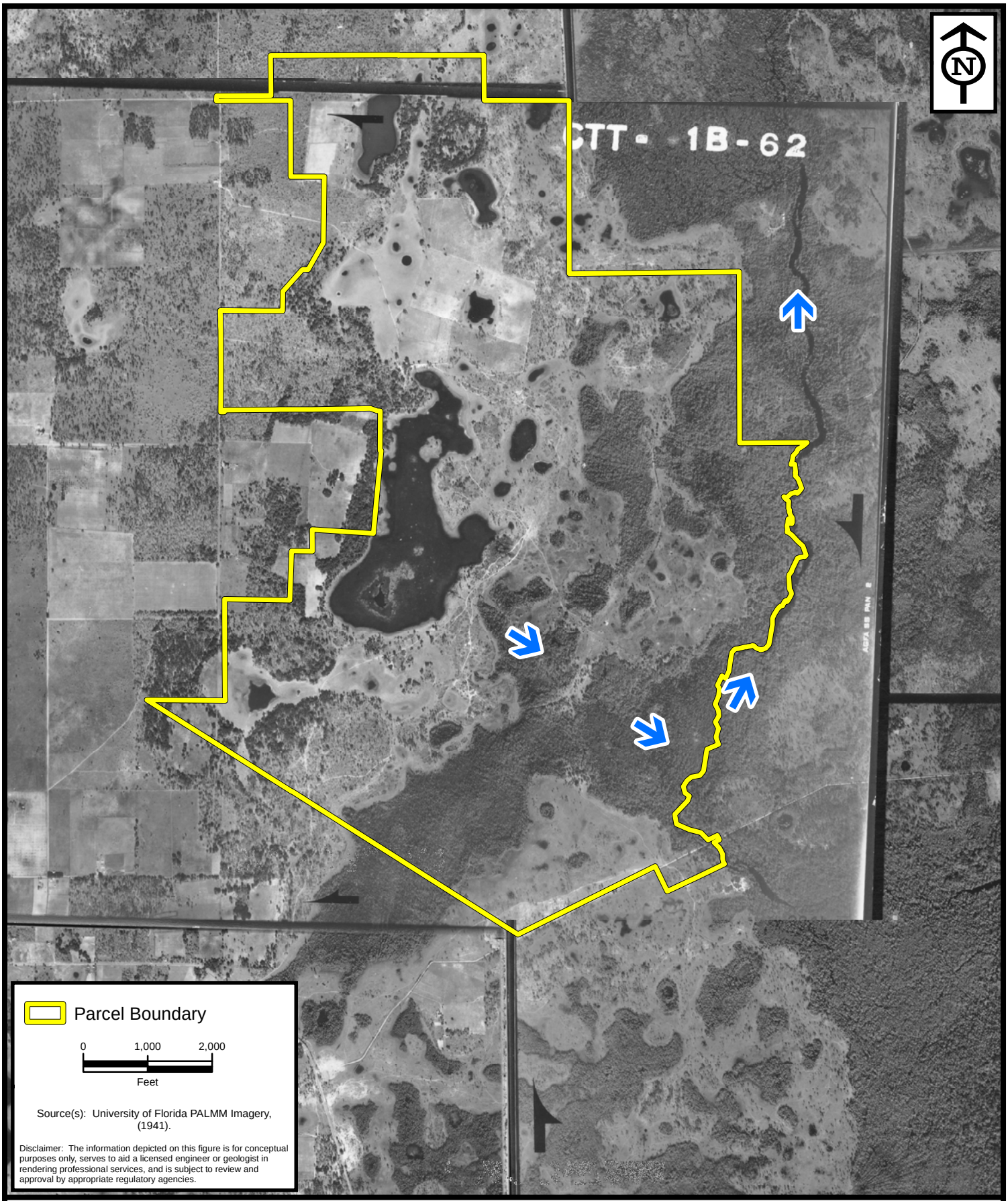
Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JGB/JRN
Figure:	**4-3**

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4.3.1 Historic Conditions

Historically, the BHR property was an extension of the Withlacoochee and Hillsborough River floodplains and consisted of a mosaic of forested wetlands and herbaceous marshes that sloped into flatwoods communities and open water systems. Sandhills were located to the west and various small broad ridges were scattered throughout the central portion of the site. The general footprint of the original floodplain system has been altered with the addition of agricultural areas and trail roads, and borrow areas that were developed to drain the land and improve access. The general hydrology of the floodplain has been altered to some extent, as floodwater historically entered the system from the north and east and generally moved toward the west and southwest direction (Figure 4-4).

Prior to 1941, northern portions of the site were converted to agricultural uses such as row crop and sod farming, and timber harvesting. The property was eventually used for borrow areas for constructing nearby roadways and harvesting clay, additional agricultural uses such as silviculture and cattle ranching, low density residential, and recreational hunting and fishing. Three large borrow pits were dug along U.S. Highway 98 and numerous marshes were excavated and converted to deep open water habitat or cattle ponds which significantly altered the hydrology of the north and western portion of BHR. Spoil piles and remnant uplands were colonized with invasive/exotic herbaceous species that have been managed and maintained. However, the aquatic invasive species, water hyacinth (*Eichhornia crassipes*) has invaded the northeastern-most pond, and no recent maintenance has been completed.



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1941 Historic Aerial Imagery

Boarshead Ranch

Pasco County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JGB/JRN
Figure:	**4-4**

Path: Q:_Projects\EJ\2011\021\00\fig\Boarshead\Report\Pro_historic.mxd Date: 8/5/2011 3:00:15 PM

4.3.2 Current Conditions

Various habitat types are present at the BHR site including the footprint of the Withlacoochee River. In addition, community types consist of low density residential areas, agricultural land, pine flatwoods, temperate hardwoods, hardwood conifer mixed, planted pine plantations, lakes and artificial waterbodies, stream and lake swamp, cypress domes, freshwater marshes, wet prairies, and improved trail roads (Figure 4-5). Most of the improved, non-natural habitats are highly degraded from historic land disturbances. Invasive/exotic species, such as water hyacinth and primrose-willow (*Ludwigia* spp.) have invaded the southern marsh areas and fringe areas of the open water ponds, and cogon grass (*Imperata cylindrica*) has invaded agricultural and altered upland areas, but is being maintained. Plant diversity and wildlife utilization appear to be high in undisturbed areas, but is low in areas that have been altered. The site has a variety of wildlife species and those observed include the protected gopher tortoise, American alligator, cottonmouth, slider/pond turtle, wild turkey, osprey, cormorant, red-tailed hawk, and protected sandhill crane were observed. Other known protected species that utilize BHR that were not observed include Sherman's fox squirrel, black bear, Florida panther, and various wading birds.

For the purposes of this project, all references to invasive/exotic species refer to those listed as Category I and II invasive exotic species, as defined by the Florida Exotic Pest Council.

FLUCFCS was used to determine the different community types on site. All habitat types located within the BHR property will be described. Please see Figure 4-6, for details of the specific community types associated with the mitigation/activity areas.

Uplands

1. Residential, Low Density, < 2 Dwellings/acre (FLUCFCS 110). There are two areas within BHR that contain single family residential dwellings. These upland community types are located southwestern portion of the ranch, adjacent to U.S. Highway 98 and the other is located in the northeastern section, just north of the crescent shaped pond. The residence in the southeast is dominated by bahia grass (*Paspalum notatum*), with a few live oaks (*Quercus virginiana*) and slash pine scattered throughout. The northeastern area is dominated by bahia grass, a live oak canopy, and various landscape species, most of which surround the perimeter of the dwellings.

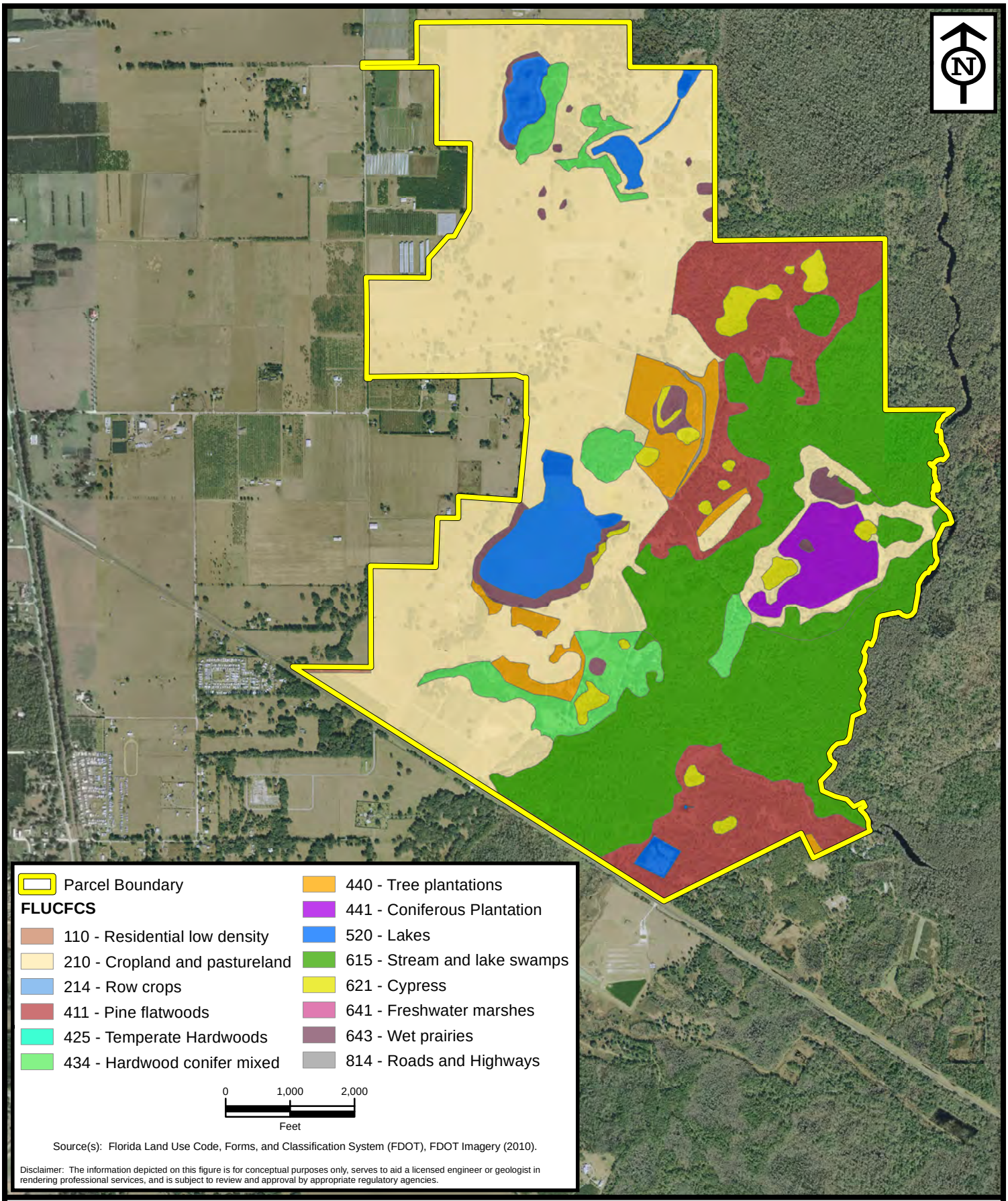
2. Cropland and Pastureland and Row Crops (FLUCFCS 210 and 214). This habitat type is composed of bahia grass, with scattered live oak, broomsedge, sour weed/sorrel (*Rumex acetosella*), and cogon grass. Historically, this area was used as improved pasture for cattle grazing; however it is now managed for the production of field crops grown in rotation.

3. Pine Flatwoods (FLUCFCS 411). The predominant species in this upland forest community is slash pine. Other common species in the community type include laurel oak (*Quercus laurifolia*), saw palmetto, broomsedge, bushy bluestem (*Andropogon glomeratus*), and blackberry (*Rubus* spp.). This habitat type is scattered throughout the BHR property on very slightly higher ridges and knolls adjacent to wetland areas, temperate hardwoods and hardwood conifer mixed communities.

4. Temperate Hardwoods (FLUCFCS 425). The upland forested community is dominated by various oak species, red bay (*Persea borbonia*), pignut hickory (*Carya glabra*), cabbage palm (*Sabal palmetto*), and southern red cedar (*Juniperus virginiana*). Understory vegetation is composed of saw palmetto, shiny blueberry, and yaupon holly (*Ilex vomitoria*). These community types are scattered on slightly higher broad ridges adjacent to pine flatwoods and wetland marsh and prairie communities.

5. Hardwood Conifer Mixed (FLUCFCS 434). This upland forested community type is dominated by live and laurel oak in conjunction with slash pine. The understory is dominated by saw palmetto, wiregrass, shiny blueberry, beggar's lice (*Desmodium* spp.), and milk pea (*Galactia* spp.). This community type is typically adjacent to freshwater marsh and wet prairie communities and sit higher in elevation on broad knolls.

6. Tree and Coniferous Plantations (FLUCFCS 440 and 441). These upland communities have been cleared and planted with cypress, oaks or slash pine. Due to a dense canopy and a heavy duff layer, few species other than minor, scattered grass species occur in the understory, the most prevalent being wiregrass.



Source(s): Florida Land Use Code, Forms, and Classification System (FDOT), FDOT Imagery (2010).

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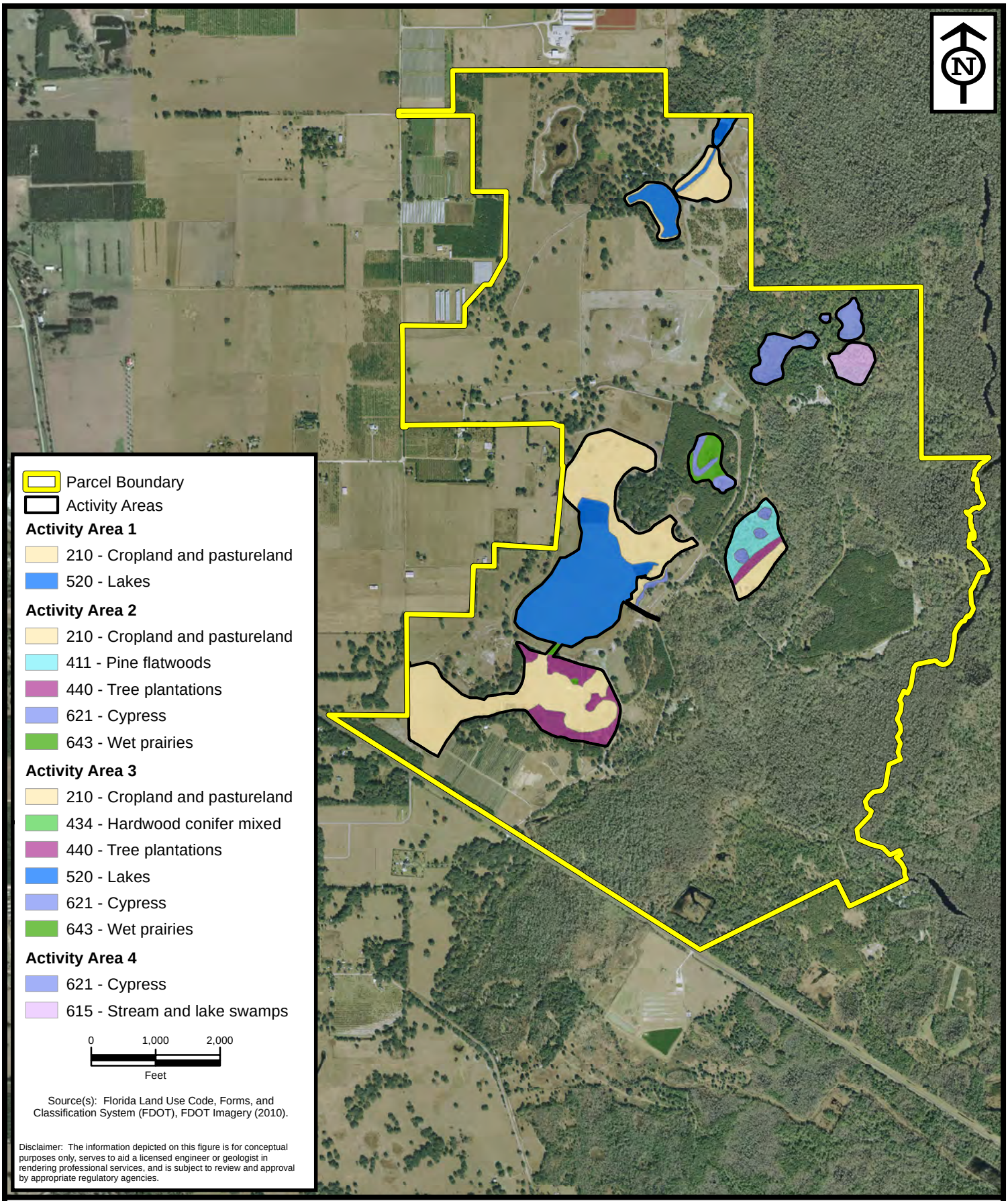
Existing Community Map

Boarshead Ranch

Pasco County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JGB/JRN
Figure:	**4-5**

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Mitigation Activity Area - Existing Community Map

Boarshead Ranch

Pasco County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JGB/JRN
Figure:	**4-6**

Path: Q:_Projects\EJ\2011\021\00\fig\Boarshead\Report\Pro_flucfcs.mxd Date: 8/5/2011 3:04:07 PM

7. Roads and Highways (FLUCFCS 814). This community type consists of rural, primitive yet graded, unimproved roads and trails that allow access throughout the property. Some of the trails are elevated and drained and act as a berm severing hydrologic connections. Certain roads will have culverts added and/or lowered to restore or enhance hydrologic connections. The only category shown on the existing community map is the elevated and drained trail road that contains the major improvements. However, it must be noted that numerous trails exist within the property boundary.

Wetlands

1. Lakes (FLUCFCS 520). Several areas within the property contain open water areas associated with existing borrow areas, farm ponds, historic depressions that were excavated, and connective ditching. The majority of the open water areas are hydrologically connected to the Withlacoochee River floodplain, and include water control structures to prevent flooding or enhance recreational fishing and birding. Emergent aquatic vegetation is present at the upper limits of the water bodies, with some shrub components in elevated islands within the interior of these areas. General open water species include Carolina willow (*Salix caroliniana*), young cypress, pickerelweed, pennywort (*Hydrocotyle umbellata*), smartweed (*Polygonum hydropiperoides*), needle rush, duck potato (*Sagittarria latifolia*), primrose willow, cattails, water lily (*Nymphaea* spp.) and marsh elder (*Iva* spp). Mitigation activities will include the creation of larger littoral shelves in some area to increase density of plant species, general flora and fauna biodiversity, and enhance water quality and restore hydrological conditions.

2. Stream and Lake Swamps (Bottomlands) (FLUCFCS 615). This wetland community type is represented by a dense canopy of hardwood tree species tolerant of hydric conditions. Dominant canopy species include sweetbay, red maple, pignut hickory, cabbage palm, and sweetgum. The shrub layer consists of gallberry, fetterbush, wax myrtle, and dahoon holly. This habitat type borders the Withlacoochee River.

3. Cypress (FLUCFCS 641). This wetland community type is dominated by cypress and is located in the central northeast and southern portions of the property. These areas are slightly lower in the landscape then the stream and lake swamps and are typically small depressions that are inundated with water. Swamp fern (*Blechnum serrulatum*), lizard's tail (*Saururus cernuus*), and chain fern (*Woodwardia* spp.) are present within

the understory. Given current drought conditions, several young slash pine were also present in the understory in Activity Area 4.

4. Freshwater Marshes (FLUCFCS 641). These wetland communities are currently minor components of the site as most have been altered by agricultural uses. These herbaceous systems contain smartweed, Paspalum, and various sedges. Lesser components include sesban (*Sesbania* spp.), carpetgrass (*Axonopus* spp.), and Burmuda grass (*Cynodon dactylon*).

5. Wet Prairie (FLUCFCS 643). These shallow marshes differ from freshwater marshes in that they are composed predominately of grassy vegetation with shorter hydroperiods and shorter herbage. These wetland communities are small isolated systems that are found throughout the property and may or may not have been altered by human activity. Dominant species in these systems is composed of maidencane, spikerush (*Eleocharis* spp.), yellow-eyed grass (*Xyris* spp.), beakrush (*Rhyncospora* spp.), and witchgrass (*Dicanthelium* spp.). Activity area 2 and 3 will expand these communities by re-establishing or enhancing historic wet prairies.

4.3.3 Soils

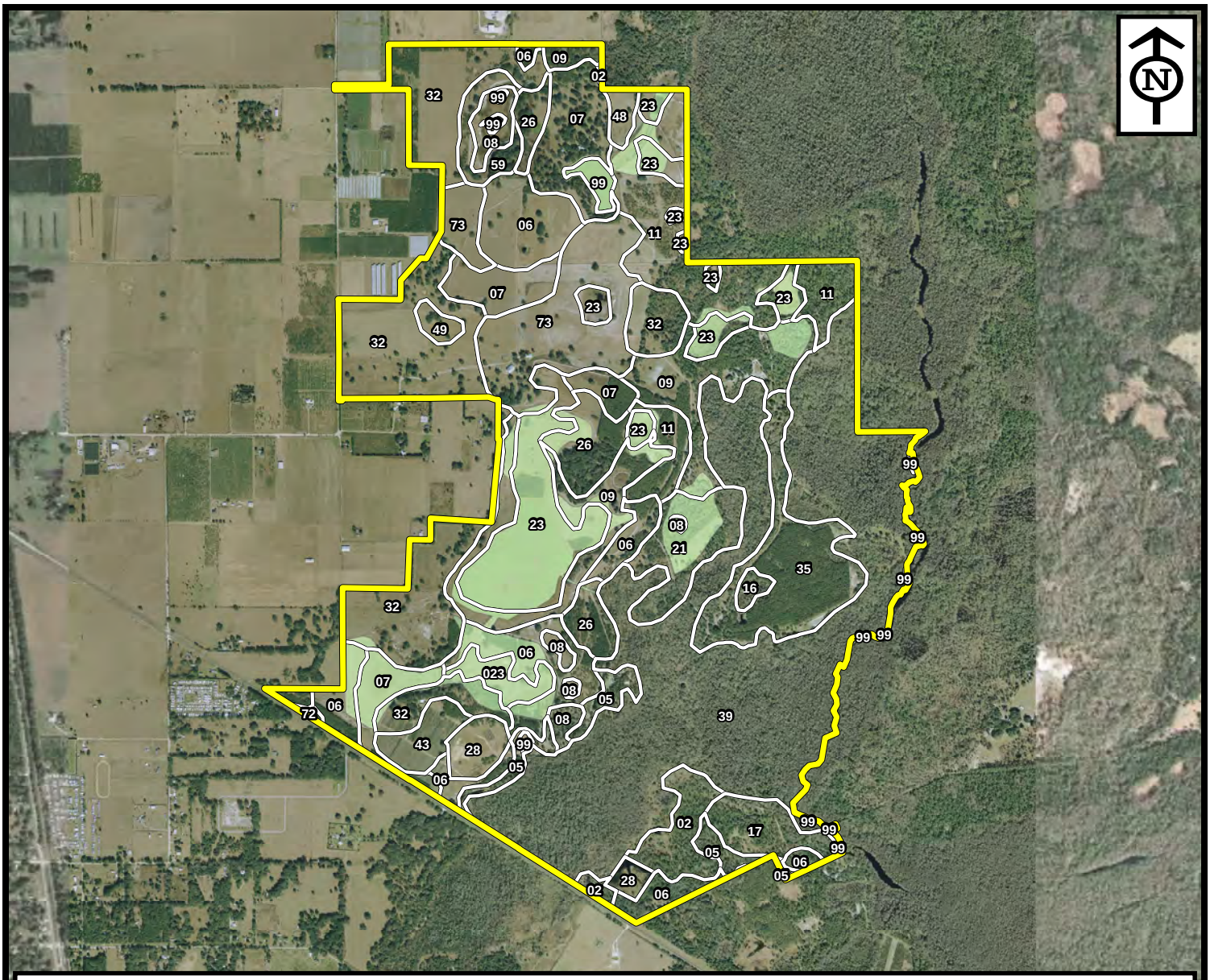
According to the NRCS soil map for Pasco County, 22 soil types and 1 water category are present within the BHR (Table 4-2). Figure 4-7 depicts all soil types within the BHR property. The NRCS soil map was produced prior to some of the depressions that were excavated into open water conditions, as some soil types are shown where there is currently open water. However, the remaining portions still reflect accurate soil conditions.

Table 4-2. Boarshead Ranch Soil Types

NRCS Soil Type	Hydric	Acreage
2 Pomona Fine Sand	No	34.0
5 Myakka Fine Sand	No	29.0
6 Tavares Sand, 0 to 5% slopes	No	136.4
7 Sparr Fine Sand, 0 to 5% slopes	No	105.9
8 Sellers Mucky Loamy Fine Sand	Yes	23.6
9 Ona Fine Sand	No	125.4
11 Adamsville Fine Sand	No	117.2
16 Zephyr Muck	Yes	5.1
17 Immokalee Fine Sand	No	28.9
21 Smyrna Fine Sand	No	45.5
23 Basinger Fine Sand, depressional	Yes	141.3
26 Narcoossee Fine Sand	No	55.3
28 Pits	N/A	23.1
32 Lake Fine Sand, 0 to 5% slopes	No	252.2

Table 4-2. Boarshead Ranch Soil Types cont.

NRCS Soil Type	Hydric	Acreage
35 Eaugallie Fine Sand	Yes	83.9
39 Chobee Soils, frequently flooded	Yes	489.0
43 Arredondo Fine Sand, 0 to 5% slopes	No	20.3
48 Lochloosa Fine Sand, 0 to 5% slopes	No	7.9
49 Blichton Fine Sand, 0 to 2% slopes	No	6.8
59 Newnan Fine Sand, 0 to 5% slopes	No	18.2
72 Orlando Fine Sand, 0 to 5% slopes	No	1.3
73 Zolfo Fine Sand	No	109.8
99 Water	N/A	11.4



Parcel Boundary

Proposed Activity Areas

Soils

02 - POMONA FINE SAND (34.0 ac.±)
05 - MYAKKA FINE SAND (29.0 ac.±)
06 - TAVARES SAND, 0 TO 5 PERCENT SLOPES (136.4 ac.±)
07 - SPARR FINE SAND, 0 TO 5 PERCENT SLOPES (105.9 ac.±)
08 - SELLERS MUCKY LOAMY FINE SAND (23.6 ac.±)
09 - ONA FINE SAND (125.4 ac.±)
11 - ADAMSVILLE FINE SAND (117.2 ac.±)
16 - ZEPHYR MUCK (5.1 ac.±)
17 - IMMOKALEE FINE SAND (28.9 ac.±)
21 - SMYRNA FINE SAND (45.5 ac.±)
23 - BASINGER FINE SAND, DEPRESSIONAL (141.3 ac.±)
26 - NARCOOSSEE FINE SAND (55.3 ac.±)
28 - PITS (23.1 ac.±)
32 - LAKE FINE SAND, 0 TO 5 PERCENT SLOPES (252.2 ac.±)
35 - EAUGALLIE FINE SAND (83.9 ac.±)
39 - CHOBEE SOILS, FREQUENTLY FLOODED (489.0 ac.±)
43 - ARREDONDO FINE SAND, 0 TO 5 PERCENT SLOPES (20.3 ac.±)
48 - LOCHLOOSA FINE SAND, 0 TO 5 PERCENT SLOPES (7.9 ac.±)
49 - BLICHTON FINE SAND, 0 TO 2 PERCENT SLOPES (6.8 ac.±)
59 - NEWNAN FINE SAND, 0 TO 5 PERCENT SLOPES (18.2 ac.±)
72 - ORLANDO FINE SAND, 0 TO 5 PERCENT SLOPES (1.3 ac.±)
73 - ZOLFO FINE SAND (109.8 ac.±)
99 - WATER (11.4 ac.±)

Source(s): FDOT Imagery (2010). USDA Soil Survey of Pasco County.

0 1,200 2,400
Feet

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NRCS Soils

Boarshead Ranch

Pasco County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JGB/JRN
Figure:	**4-7**

Path: Q:_Projects\EJ\2011\021\00\fig\Boarshead\Report\Pro_soils.mxd Date: 8/5/2011 3:13:29 PM

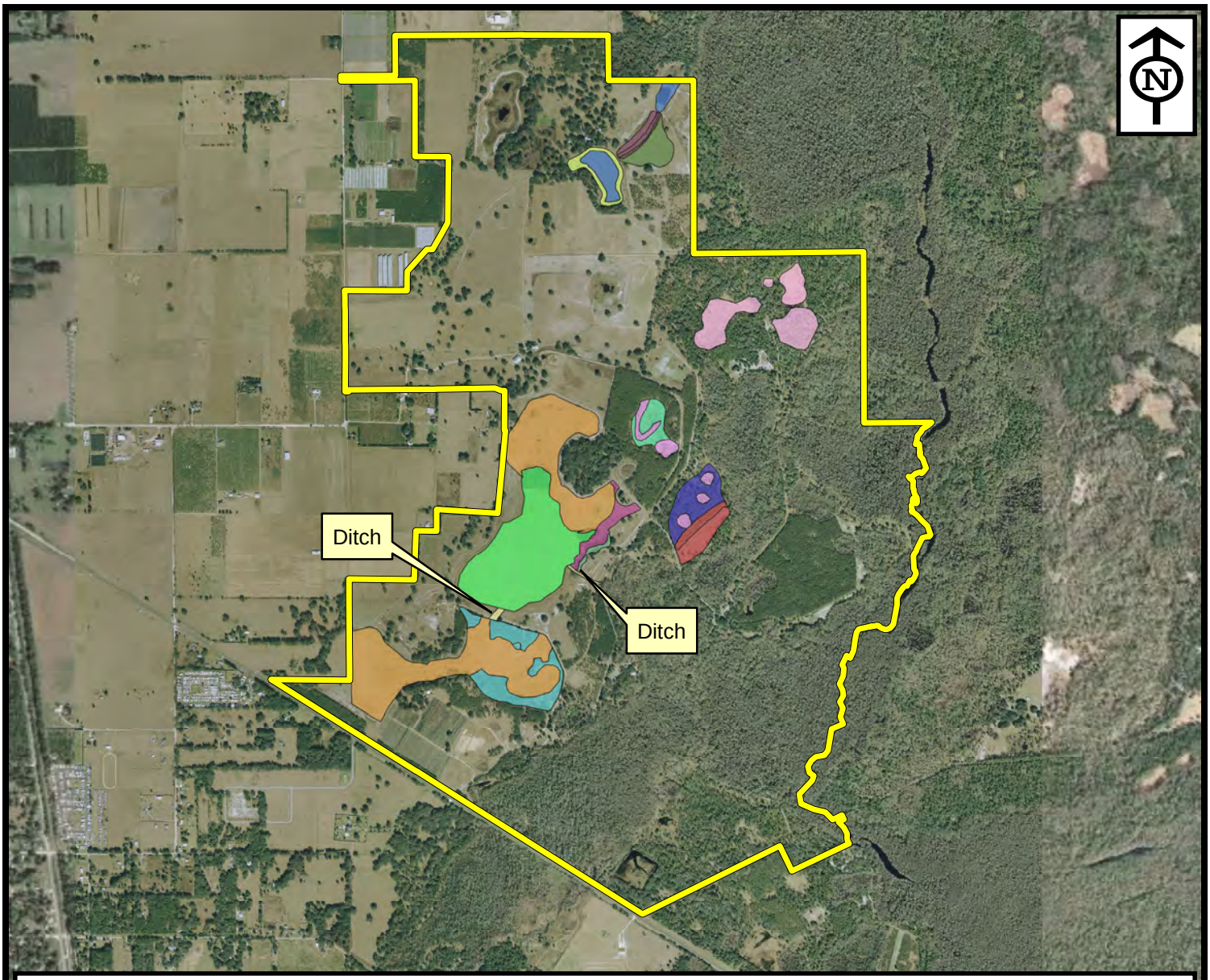
4.4 Mitigation Plan

The overall goal of the mitigation plan for BHR is to preserve, restore and enhance the condition of existing wetlands and lakes (open water systems) that have been impacted by ongoing agricultural activities, and to create additional wetlands from uplands that have been previously converted to silvicultural uses or pastureland. Proposed mitigation activities at BHR total 236.7 acres and include the following target communities: mixed wetland hardwoods/dome swamp hardwoods, cypress domes, stream and lake swamps/bottomlands, lakes, hydric pine flatwoods, and wet prairies with association to hydrological enhancements (Figure 4-8). For details of all proposed activity areas described below (with the exception of straight preservation), please see the proposed planting plan for BHR found within Section 4.11 Engineering and Planting Detail Drawings.

4.4.1 Activity Area 1

Activity Area 1 is located in the northeastern portion of the BHR property (Figure 4-6 and 4-8a). The current land uses in this area include Crop and Pastureland (6.8 acres) and Lakes (15.7 acres). Target Communities include mixed wetland hardwoods (6.8 acres), lakes (7.9 acres), one of which contains littoral shelves to mimic a fringe of wet prairie (4.2 acres), and freshwater marsh (3.6 acres). Primary mitigation in this area is forested and herbaceous wetland creation and enhancement, in addition to littoral shelf creation and planting. Water control structures will be altered to restore hydrological conditions to ensure mitigation success. For more detail on planting plans and water control structures, refer to Section 4.7 Engineering and Section 4.11 Engineering and Planting Detail Drawings.

1. Mixed Wetland Hardwood Creation. The proposed forested wetland creation (6.8 acres) is located along the southern edge of the BHR linear ditch/lake/open water system that connects the two larger lake systems. These lake/pond areas convey water from a wetland located directly off-site. The elevation of the agricultural area will be graded down approximately 8 to 10 feet to an elevation of 72 feet to establish a hydrological connection; therefore, creating a hardwood forested wetland system once planted. The area will be hydrated by the fluctuating level of flowing water in between the lakes and through the enhanced freshwater marsh area. During times of high flow, the water will meander through the adjacent ditch graded into a freshwater marsh, stage, and hydrate the lowered area. This will serve as an attenuation area for water by slowing the channelized flow between water control structures. This forested area will create a floodplain habitat that creates shallow wading bird habitat as well increased biodiversity and wildlife cover.



Parcel Boundary

Activity Area 1

- Regrade Side Slopes to Create Littoral Zone (4.2 ac.±)
- Grade Area down to Create Forested Wetland (6.8 ac.±)
- Lake Preservation (7.9 ac.±)
- Regrade Side Slopes to Create Marsh (3.6 ac.±)

Activity Area 2

- Cypress Hydrologic Enhancement (5.9 ac.±)
- Cypress Enhancement (5.6 ac.±)
- Wet Prairie Creation (8.5 ac.±)
- Create Wet Flatwoods (10.0 ac.±)

Activity Area 3

- Cypress Restoration (5.5 ac.±)
- Cypress Preservation (1.1 ac.±)
- Remove Pine and Create Herbaceous Wetland (15.6 ac.±)
- Ditch Hydrologic Enhancement (1.1 ac.±)
- Wet Prairie Restoration (87.1 ac.±)
- Lake Preservation/Berms to be Removed (52.1 ac.±)

Activity Area 4

- Forested Wetland Preservation (21.7 ac.±)

0 1,200 2,400

Feet

Source(s): FDOT Imagery (2010); Taylor Engineering.

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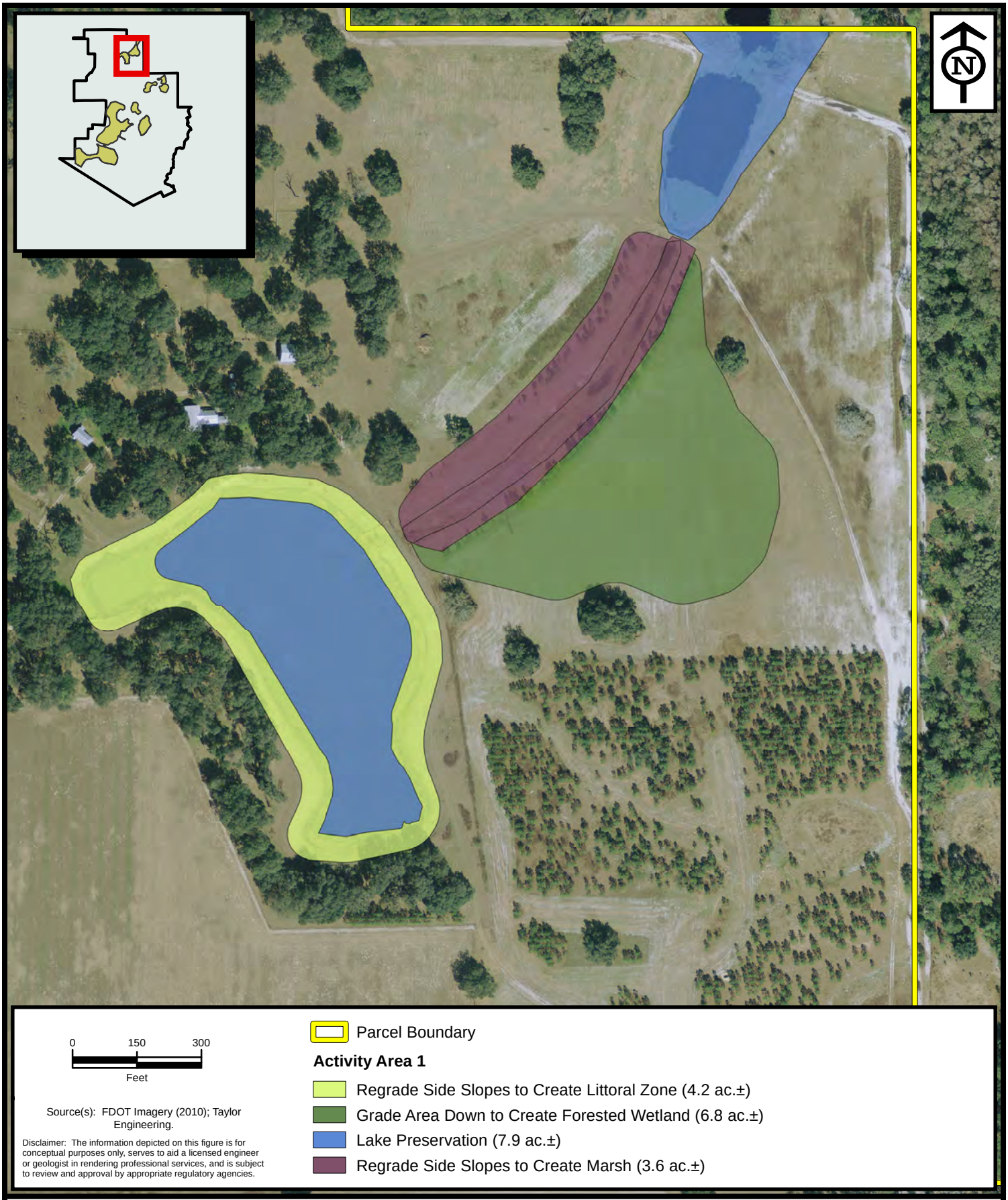
Mitigation Activity

Boarshead Ranch

Pasco County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JGB/JRN
Figure:	**4-8**

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Parcel Boundary

Activity Area 1

- Regrade Side Slopes to Create Littoral Zone (4.2 ac.±)
- Grade Area Down to Create Forested Wetland (6.8 ac.±)
- Lake Preservation (7.9 ac.±)
- Regrade Side Slopes to Create Marsh (3.6 ac.±)

Source(s): FDOT Imagery (2010); Taylor Engineering.

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Mitigation Activity Area 1

Boarshead Ranch

Pasco County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JGB/JRN
Figure:	**4-8a**

Path: Q:_Projects\EJ\2011\021\00\fig\Boarshead\Report\Pro_MitAct_aa1.mxd Date: 8/5/2011 3:15:59 PM

The mixed wetland hardwood area will be planted on ten-foot centers at a density of 440 stems/acre with 3-gallon size Florida native trees including:

Red maple
Water oak
Carolina ash

2. Lake Preservation and Enhancement. The proposed lake preservation encompasses the northernmost lake (2.4 acres) which includes existing wet prairie fringe. This lake is dominated with water hyacinth, and therefore, some enhancement will be needed to remove these exotic/invasive species to prevent spreading. The southern lake in Activity Area 1 will have 5.4 acres of open water, while the remaining outer limits (4.2 acres) will be graded to create a contiguous littoral zone. The existing littoral shelf will be regraded and extended out further into the water to create additional wading bird and forage habitat. The area will be graded to an elevation of 72 feet NVGD and planted with aquatic herbaceous vegetation.

The central lake region that resembles a linear ditch will be graded along the outer limits that are currently agricultural areas or large berms and the existing lake side slopes graded to a 4:1 to create varying depths for wetland plants that will be consistent with freshwater marsh systems. This area will total 3.6 acres and the area will be replanted to create additional wading bird and forage habitat.

The wetland herbaceous enhancement area and littoral zone will be planted on three-foot centers at a density of 4,840 stems/acre with bare-root size Florida native aquatic plants including:

Pickerelweed
Arrowhead
Bulrush
Maidencane
Fire flag (*Thalia geniculata*)

4.4.2 Activity Area 2

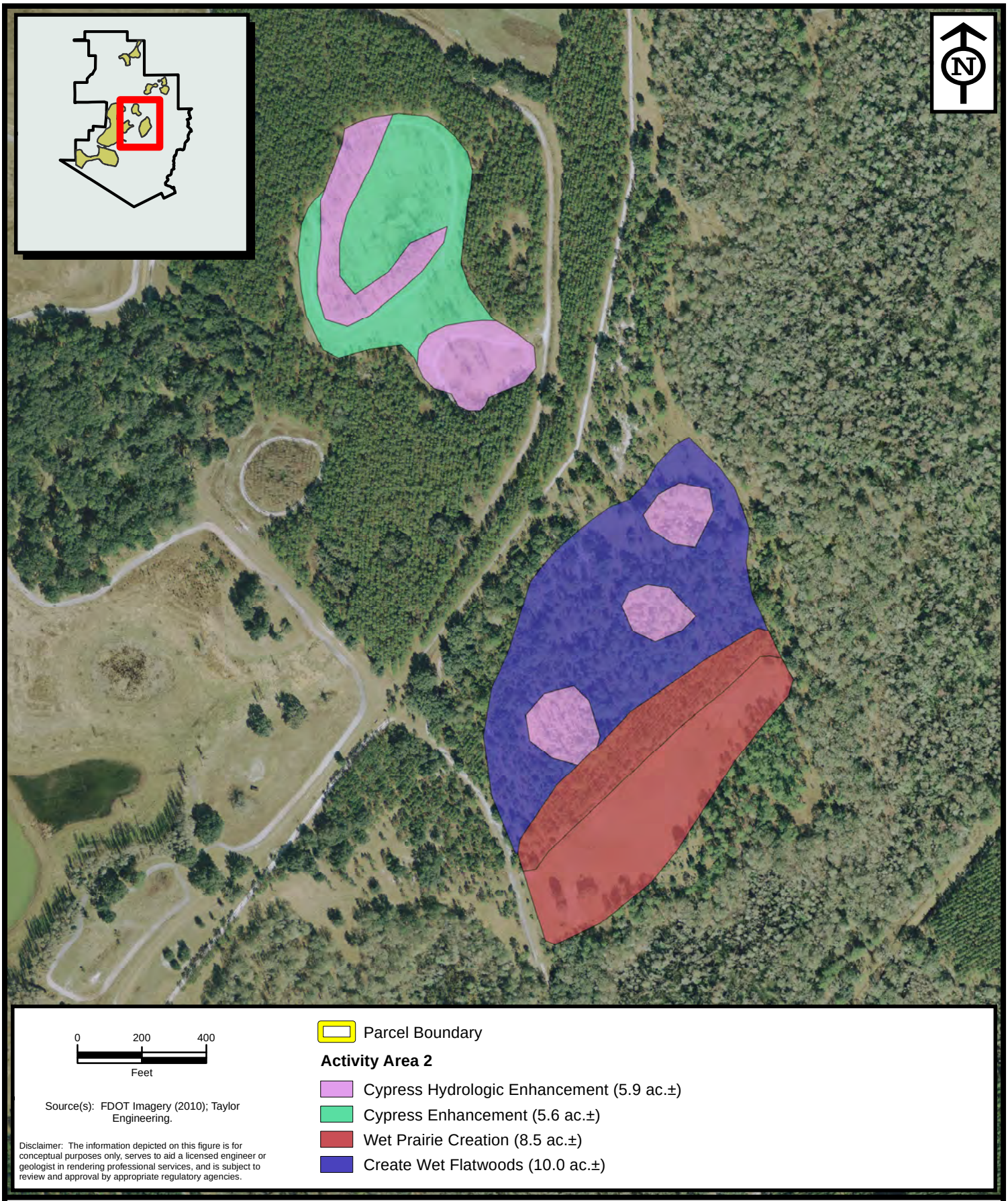
Activity Area 2 is located in the east central portion of BHR and consists of two areas that total 30.0 acres (Figure 4-6 and 4-8b). The current land use in these two areas consists of 5.7 acres of cropland and pastureland, 10.0 acres of pine flatwoods, 2.8 acres of pine plantation (planted), 5.9 acres of cypress, and 5.6 acres of wet prairie. The proposed work within Activity Area 2 consists of herbaceous wetland creation (8.5 acres) and forested wetland enhancement (21.5 acres) via hydrologic improvements, pine thinning, and reforestation.

1. Wet Prairie Creation. The herbaceous wetland creation area consists of two adjacent areas that total 8.5 acres; one area is currently planted pines and the other is a maintained pasture. Both areas will be cleared of existing vegetation and excavated to 75 feet NGVD and planted with aquatic herbaceous vegetation.

The wetland herbaceous areas will be planted on three-foot centers at a density of 4,840 stems/acre with bare-root size Florida native aquatic plants including:

Maidencane
Cordgrass (*Spartina bakeri*)
St. Johns wort (*Hypericum* spp.)
Sawgrass (*Cladium jamaicensis*)

2. Wet Flatwoods Enhancement and Cypress Hydrological Enhancement. Immediately adjacent to the proposed herbaceous wetland creation area is an existing pine flatwoods area that totals approximately 10.0 acres. Within the interior of this flatwoods area are three small cypress domes totaling 2.2 acres (from north to south each cypress dome is 0.7, 0.6, and 0.9 acre respectively). The flatwoods area will be thinned of existing pine trees to a density of 50 stems/acre. This will provide both hydrologic and vegetative enhancement, as the machinery used to thin the pines will aid in flattening existing knolls and pine removal will result in less water being drawn from the ground. The result should promote an elevated water table and additional sheet flow throughout the area. It will also thin the existing canopy and allow for more sunlight penetration to understory vegetation and reduce the duff layer present. This hydrologic and vegetative enhancement will help to improve the hydrology within the cypress domes and should allow for the existing seed source to better populate the surrounding area. In addition, the second area to the west includes cypress enhancement (5.6 acres) and cypress hydrological enhancement (3.7 acres). This enhancement will



Source(s): FDOT Imagery (2010); Taylor Engineering.

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Mitigation Activity Area 2

Boarshead Ranch

Pasco County, Florida

Project:	EJ11021.00
Date:	June 2011
Drwn/Chkd:	JGB/JRN
Figure:	**4-8b**

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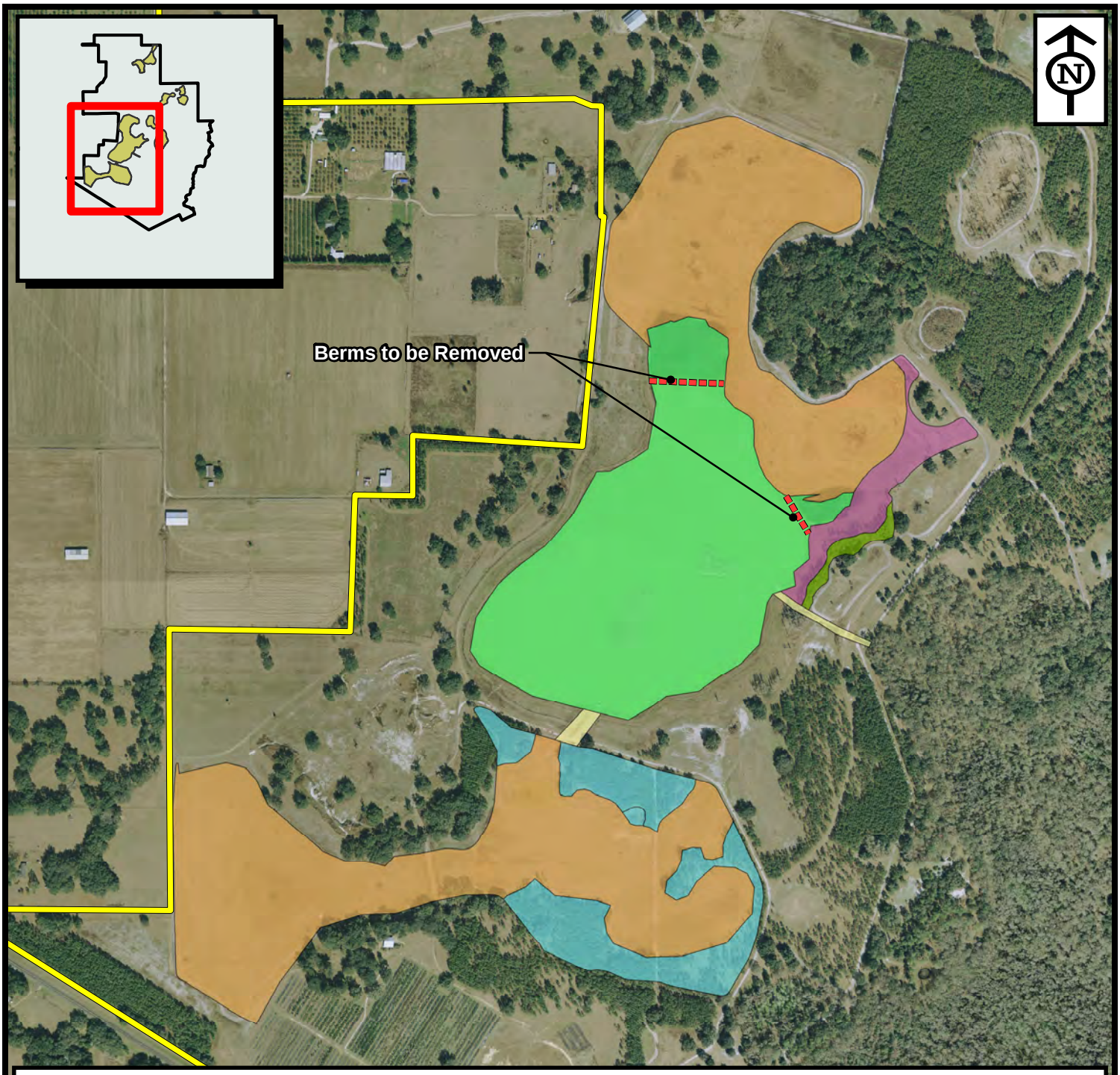
occur by altering an existing culvert to the south, just north of the northernmost creation area within Activity Area 2. The existing 24 inch culvert will be lowered to an elevation of 74 feet to improve the hydrological connection and flow into this area and restore historic conditions. Existing cypress occur in both areas, and therefore, improvements to hydroperiods will allow for improved growing conditions for both canopy and understory species.

The western cypress area (5.6 acres) will be planted on ten-foot centers at a density of 440 stems/acre with 3-gallon size Florida native trees including:

Cypress

4.4.3. Activity Area 3

Activity Area 3 represents a large portion of the mitigation provided at BHR and consists entirely of herbaceous wetland creation, hydrologic enhancement, and lake preservation (Figure 4-6 and 4-8c). This area is located in the southwest portion of BHR and is approximately 162.5acres. A man-made lake exists in this area and was excavated in historic wetland areas (52.2 acres of lake and 1.1 acres of connected ditch to total 53.2 acres). This lake acts as additional storage for peak flows from the Withlacoochee River and associated floodplain. The existing lake appears to be groundwater driven, yet water normally flows south. Under high volume circumstance, the water stages up in the river and floodplain, and is forced west into a ditch containing water control structures that convey the water further into the lake. This lake was designed at different elevations and contains deep water portions as well as shallower, freshwater marsh habitat. The water is then further conveyed through another ditch and control structure along the southern edge of the lake. Both ditch systems will have alterations to control structures to enhance hydrology. In addition, two berms will be removed from the pond to permanently hydrologically connect isolated areas. These enhancement acreages are included in the lake preservation total. Any excess water flows through the southern ditch structure into a large, low-lying pasture (49.8 acres), planted pine areas (15.7 acres), and a small wet prairie (0.2 acre). Water may also stage to a level that also forces water north into existing agricultural areas which are already relatively low lying (41.1 acres) that will become herbaceous wetlands.



0 400 800
Feet

Source(s): FDOT Imagery (2010); Taylor Engineering.

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Parcel Boundary

Activity Area 3

- Cypress Restoration (5.5 ac.±)
- Cypress Preservation (1.1 ac.±)
- Remove Pine and Create Herbaceous Wetland (15.6 ac.±)
- Ditch Hydrologic Enhancement (1.1 ac.±)
- Wet Prairie Restoration (87.1 ac.±)
- Lake Preservation/Berms to be Removed (52.1 ac.±)

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Mitigation Activity Area 3

Boarshead Ranch

Pasco County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JGB/JRN
Figure:	**4-8c**

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1. Wet Prairie Restoration. The proposed herbaceous restoration totals 87.1 acres and consists of lowering current elevations to 73 feet to encroach upon the water table to ensure hydric conditions. Additional hydration will occur from lake overflow during peak staging events to further the restoration of historical hydrological conditions. All vegetation will be removed, the area excavated and planted with aquatic herbaceous vegetation to mimic wet prairie and marsh conditions. Please see the engineering and planting detail drawings in Section 4.11 for details of this proposed excavation and planting. In the southwestern most restoration area, a berm will be created to an elevation of 80 feet, and will tie into an existing 80 foot contour elevation line to ensure that restoration activities do not have negative flooding effects on adjacent property owners. This berm will be sodded to prevent erosion. The details of this berm can be found in Section 4.11 Engineering and Planting Detail Drawings.

The wetland herbaceous areas will be planted on three-foot centers at a density of 4,840 stems/acre with bare-root size Florida native aquatic plants including:

Maidencane
Cordgrass
St. Johns wort
Sawgrass

2. Cypress Restoration. A small area of cypress restoration is located in the eastern portion of Area 3 and adjacent to the proposed wet prairie restoration. This area historically contained additional cypress trees that were impacted during the construction of the adjacent lake. This area will be restored back to more natural conditions by planting additional cypress trees to achieve a cypress dome habitat.

The cypress restoration area will be planted on twenty-foot centers at a density of 440 stems/acre with 3-gallon size Florida native trees including:

Cypress

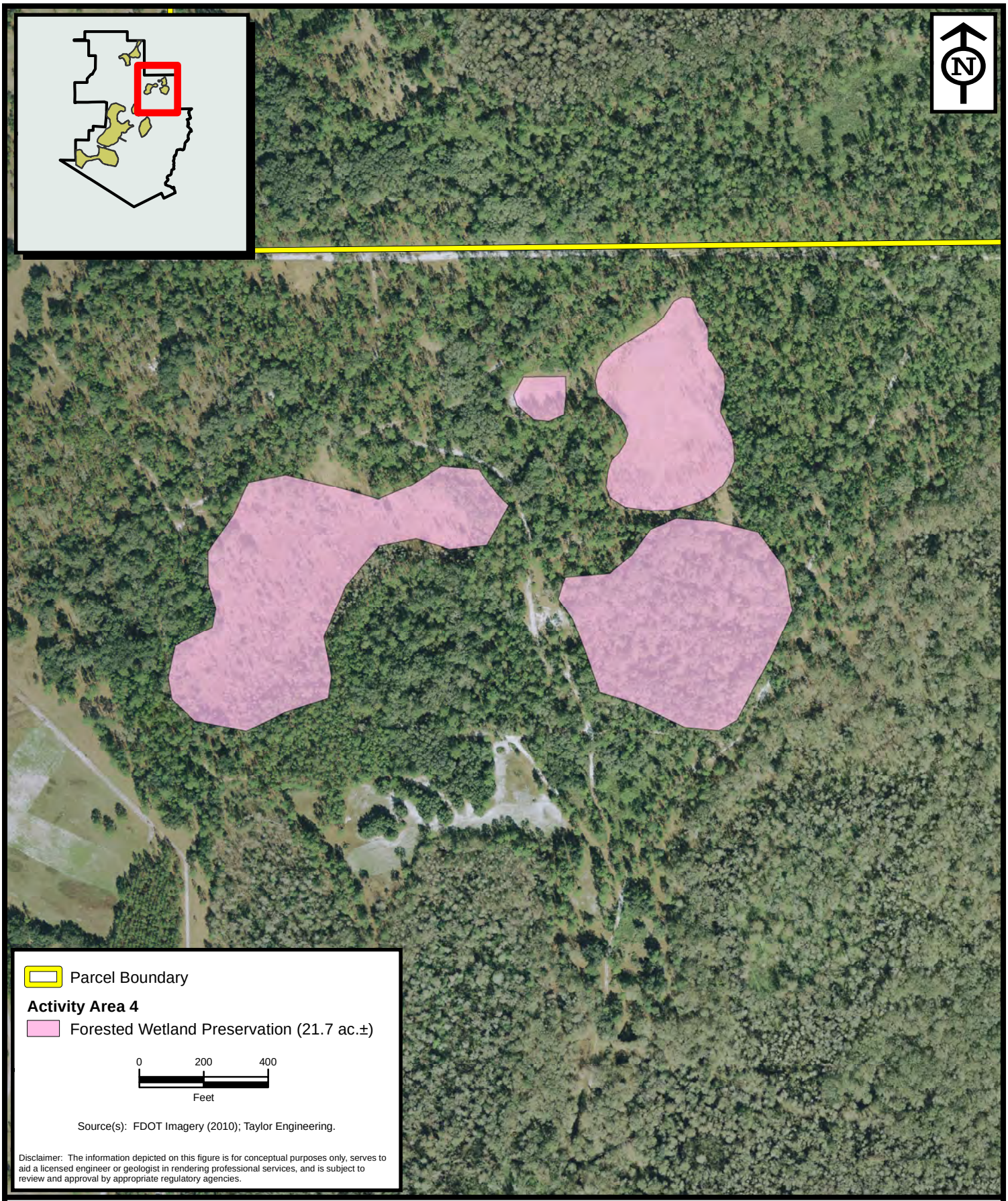
3. Cypress Preservation. A small area of cypress preservation is located in the eastern portion of Area 3 and adjacent to the proposed wet prairie and cypress restoration. The existing cypress trees will be preserved, along with the restoration planting, to achieve a cypress dome habitat.

4. Hydrological Enhancement. The proposed hydrologic enhancement (1.0 acre) consists of lowering the level of the existing inflow and outflow structures associated with the lake. The eastern inlet/control structure will be set at an elevation of 75 feet. The outflow/control structure to the south will be set at an elevation of 73.5 feet in order to maintain lake conditions, while allowing for additional flow into herbaceous restoration areas to the south and southwest. In addition, two berms within the northeastern lake area will be removed to further enhance hydrology to the north and east. Finally, an existing culvert under a trail road that bisects the southern pasture area will also be lowered to an elevation of 73 feet to promote hydrologic flow between the two areas.

5. Lake Preservation. Approximately 52.1 acres of the open water (lake) amid the proposed mitigation activities will be preserved. This acreage includes the lake ditch /hydrologic enhancements that will occur after retrofitting control structures. The open water area will be enhanced by the addition of proposed herbaceous wetland enhancement which will improve forage areas, primary productivity, and habitat for small fish, invertebrates, reptiles, and amphibians. The existing lake was designed with deep water portions and shallow marsh areas to mimic more natural conditions and provide for greater biodiversity. Therefore, preservation of this area will ensure continued flood attenuation, while aiding in the success of surrounding creation and enhancement areas. Water quality is also expected to improve as a result of the complete wetland mitigation plan in this activity area.

4.4.4 Activity Area 4

Activity Area 4 consists entirely of preserving wetlands within the floodplain of the Withlacoochee River (Figure 4-8d). These preservation areas include 14.3 acres of cypress and 7.5 acres of stream and lake swamp/bottomlands located within the northeastern corner of BHR that is dominated by existing forested habitats and bottomlands associated with the floodplain. Preservation of these areas will help ensure that they remain functioning and continue to provide diverse wetland habitat within the floodplain.



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Mitigation Activity Area 4

Boarshead Ranch

Pasco County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JGB/JRN
Figure:	**4-8d**

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4.5 Hydrology & Hydraulics

4.5.1 Objective

BHR is adjacent to the Withlacoochee River near the confluence with the Hillsborough River. The primary source of flooding on the BHR site is overflow from the Withlacoochee River. The primary objective of the hydraulic modeling is to determine the extent of on-site flooding due to overflow of the riverine system. To meet this objective two flood events were modeled, August 2003 and September 2009, with historic USGS data.

4.5.2 Model Setup

Modeling was done with the ICPR model Version 3.10 with service pack 3, 2002, to simulate the flooding conditions in the Withlacoochee River and subsequent inundation of the BHR site. This section describes the calculation of ICPR input parameters including basin areas, interconnectivity, stage-storage relationships, and boundary forcing conditions.

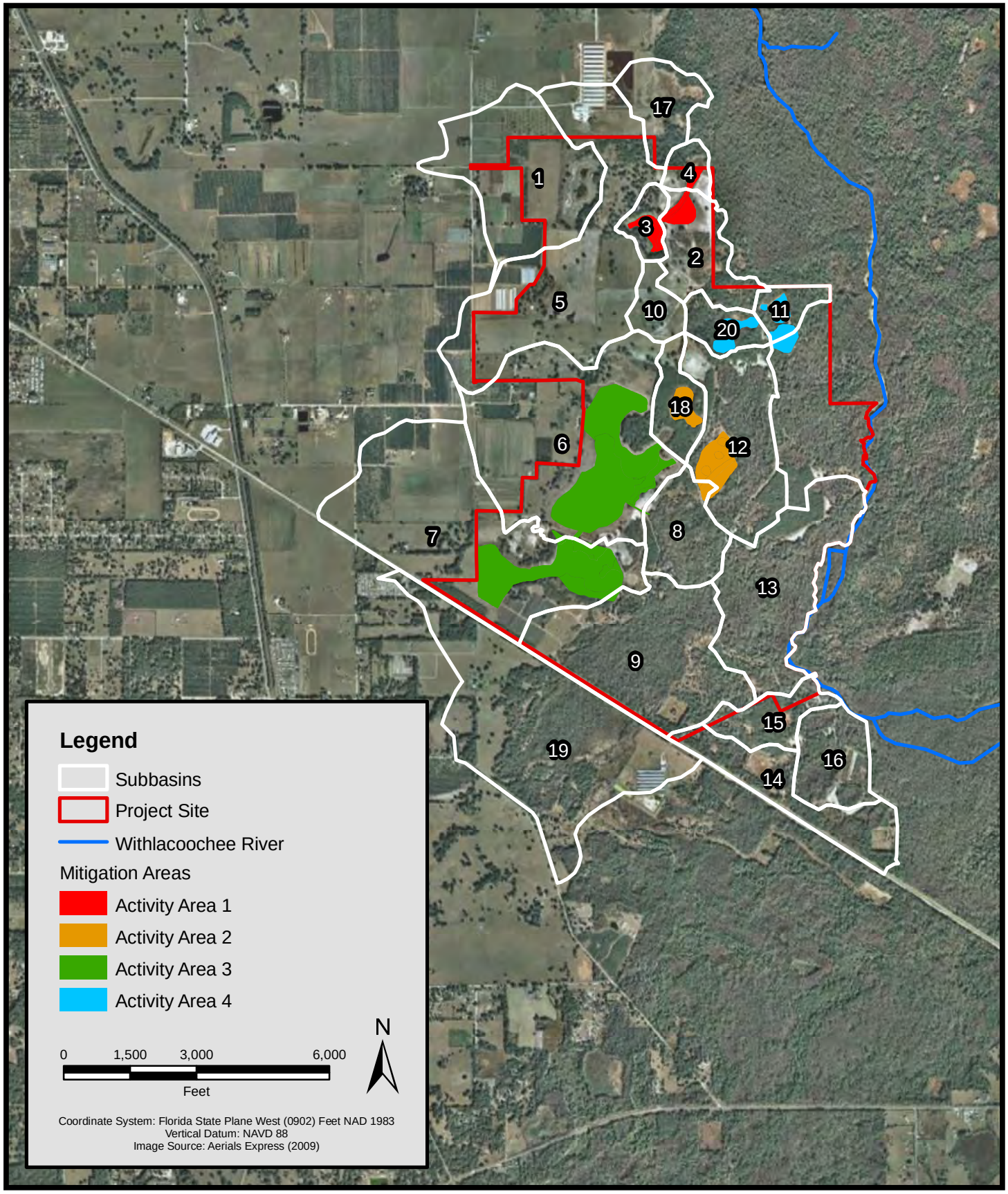
Basin Areas

Contributing basin boundaries were determined from a combination of a SWFWMD GIS basin coverage and LiDAR data. The 20 subbasins, defined following the SWFWMD's watershed management program guidelines and specifications, are presented in Figure 4-9.

Connectivity

The ICPR model reflected the natural movement of water in the system by linking the subbasins through existing flow channels, swales, and culverts. High topographic elevations and roads can block flow paths.

Notably, the Hillsborough and Withlacoochee River basins connect at the interface between subbasins 9 and 19. At that interface, inter-basin communication occurs through a culvert under Hwy 98 and, during major storm events, over the road. Both of these communication mechanisms are included in the model.



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Hydrologic Subbasins
Boarshead Ranch
Pasco County, Florida

PROJECT	C2011-025
FIGURE	4-9
DRAWN BY	JK
DATE	JUNE 2011

The connectivity in the ICPR model, set at existing conditions, shows flooding without improvements to culverts, channels, and graded areas. For example, the culvert inverts and channels for mitigation Activity Area 1 show limited flooding in the area between the ponds. This area will be scraped and graded and, therefore, will flood more area after mitigation areas are complete.

Stage-Storage Relationships

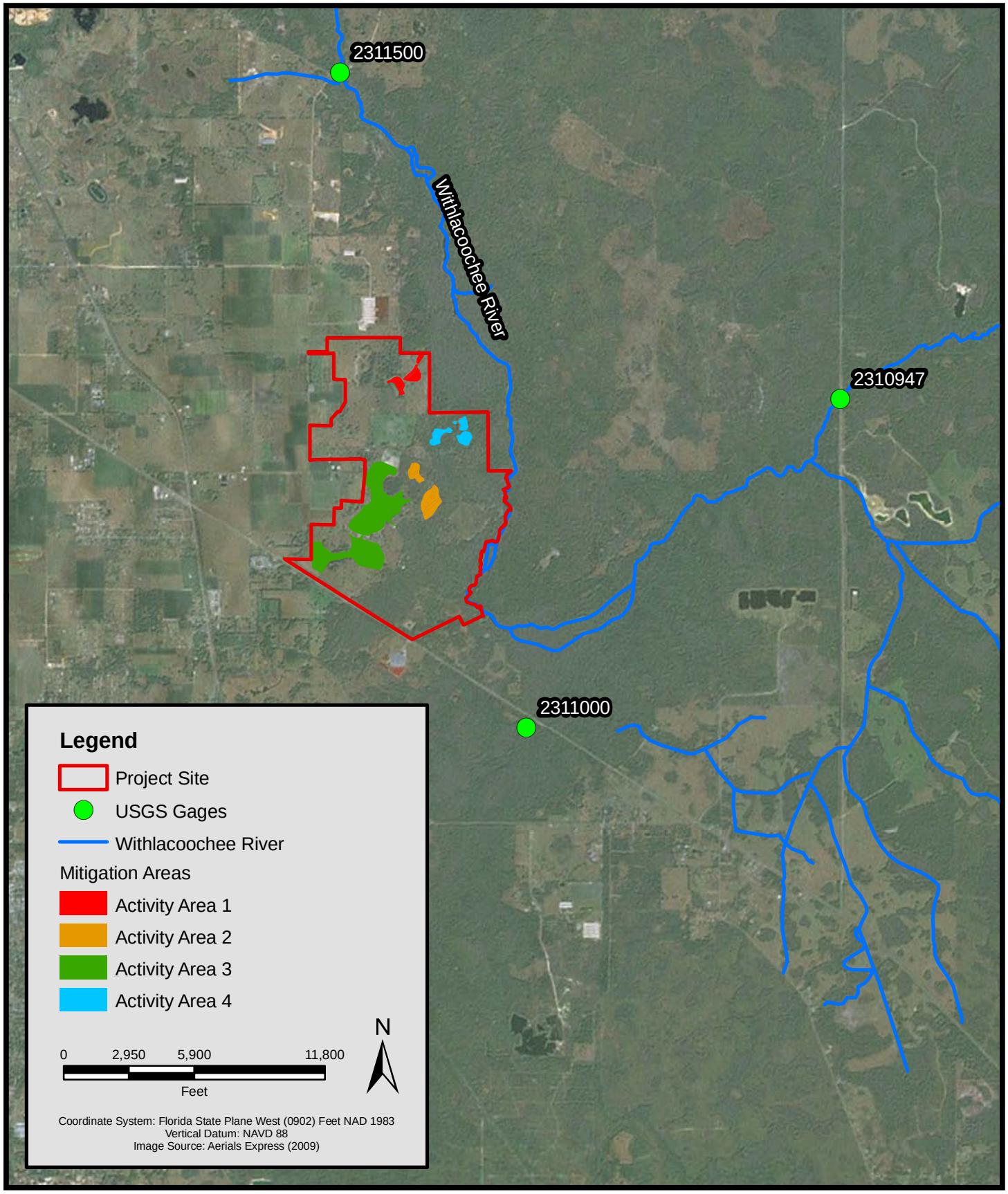
The ICPR model applies stage/storage relationships, calculated at 1 foot vertical intervals, at each node. These nodes, which represent each subbasin, simulate the rate of inundation from the Withlacoochee River. Model results identify the peak water surface elevations at each node.

Boundary Conditions

The BHR site is located near three USGS gages, identified by site ID's 02311500, 02310947 and 02311000, shown in Figure 4-10. Gage 02311000 is southeast of the project site, under the bridge at US 98.

The model boundary conditions applied flood stages measured on the Withlacoochee River at basins 4, 11, 12, 13, and 15/16. Using straight-line interpolation, gage data from 02310947 and 02311500 provided the time vs. stage input for model runs. Comparison of these interpolated data to the gage under HWY 98 (02311000) show good agreement. It is not possible to make a direct application of the gage under HWY 98 to the model since there is a loss of hydraulic head under the HWY 98 Bridge. A report by the USGS (Lewelling 2004) showed the upstream side of the bridge had water surface elevations about 0.75 ft. higher than downstream of the bridge. The interpolated data applied in this study peaked at approximately 0.70 ft. higher than under the HWY 98 Bridge (at the 02311000 gage). Therefore, it is reasonable to expect water surface elevations at the BHR to be about ¾ of a foot higher than the data collected at 02311000.

As detailed by the Wetland Mitigation Plan (April 2010), the Withlacoochee River reaches stage overflow threshold at about 77.46 ft. NGVD88, as measured at 02311000. This means when the USGS gage measures a stage above 77.46 ft. NAVD88, the Withlacoochee drainage divide is overtopped and the system begins to flood into the Hillsborough River (detailed in a January 22, 2010 memo from ENTRIX).



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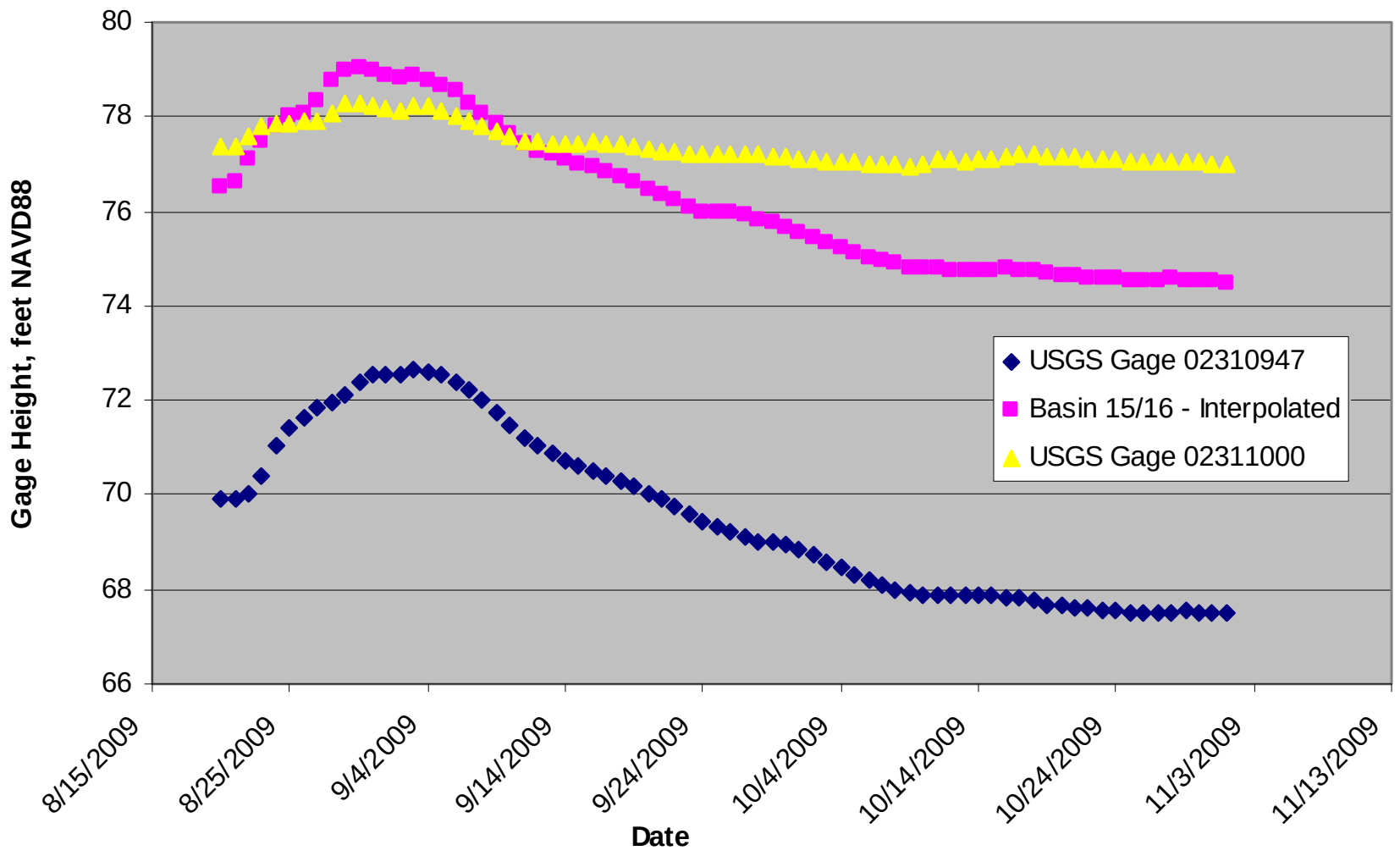
USGS Gage Locations
Boarshead Ranch
Pasco County, Florida

PROJECT	C2011-025
FIGURE	4-10
DRAWN BY	JK
DATE	JUNE 2011

Model Runs

To examine the flooding of the BHR, the ICPR model simulated two events: 1) a 2009 event that occurred between August 20 to November 1 that reached a moderate peak elevation, and 2) a 2003 event that occurred in August and reached a high peak elevation.

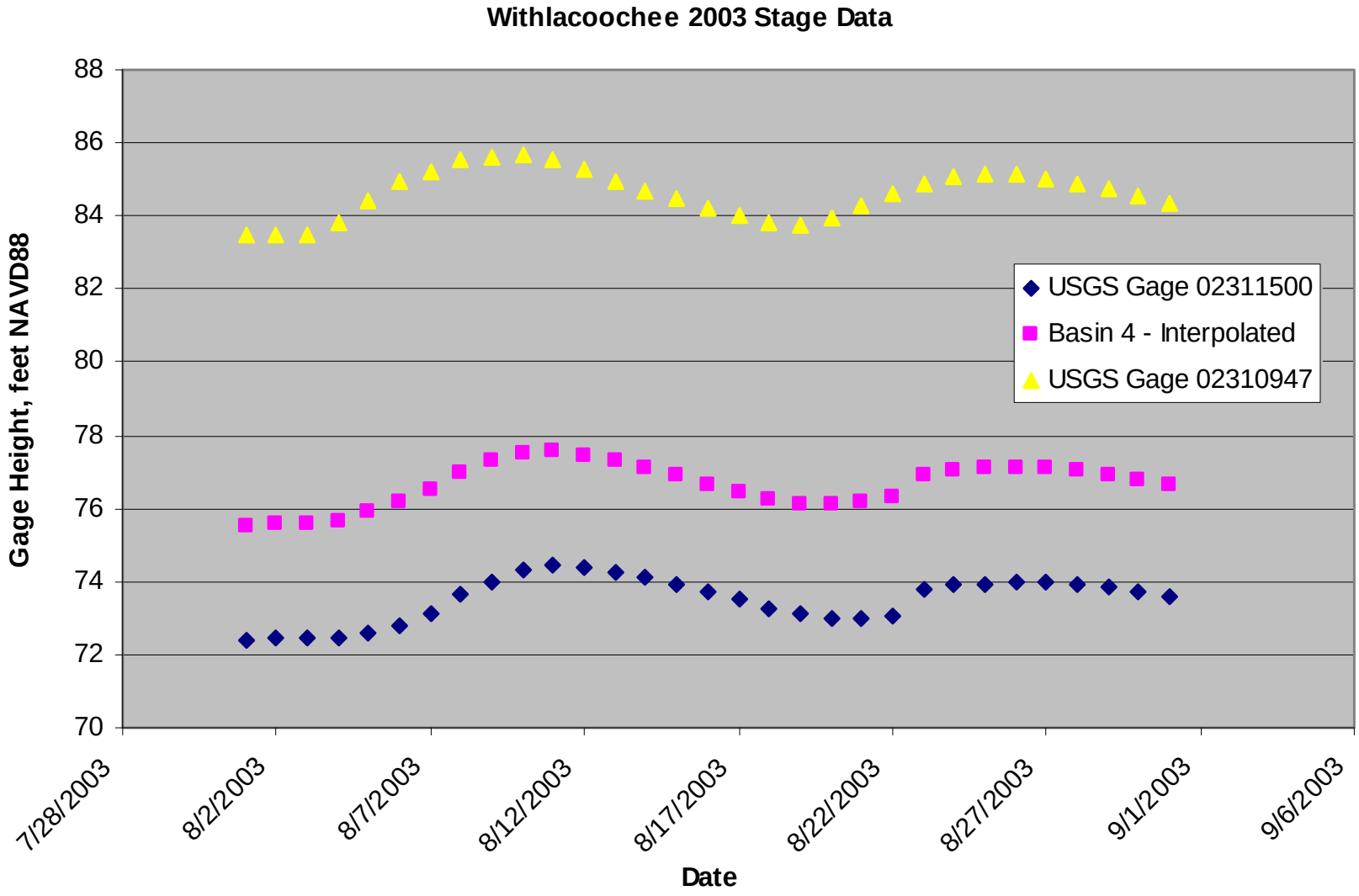
The stage data applied for 2009, shown in Figure 4-11, represent a storm that would occur over 8% of the time, or 30 days a year. USGS 02311000 under Hwy 98 is shown to compare the stages used in model runs to interpolated data from upstream and downstream gages. The stage data applied for 2003, shown in Figure 4-12, represents a storm that would occur only 1.8% of the time, or 6 - 7 days a year.



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Withlacoochee 2009 Stage Data Used for Model Simulation
(USGS Gage 02311000 at Hwy 98 Shown for Comparison)
Boarshead Ranch
Pasco County, Florida

PROJECT	C2011-025
FIGURE	4-11
DRAWN BY	JK
DATE	JUNE 2011



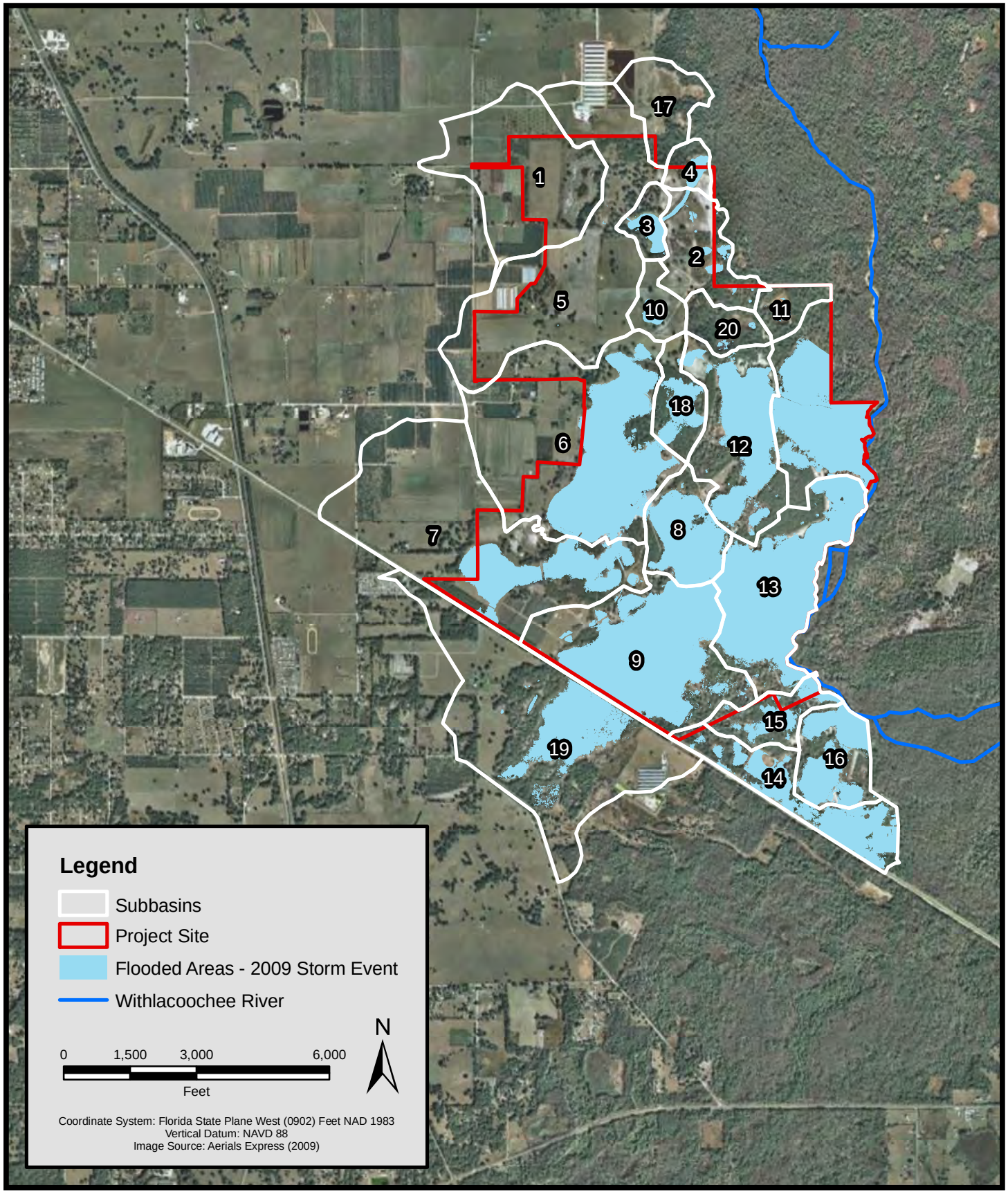
TAYLOR ENGINEERING, INC.

Withlacoochee 2003 Stage Data Used for Model Simulation
Boarshead Ranch
Pasco County, Florida

PROJECT	C2011-025
FIGURE	4-12
DRAWN BY	JK
DATE	JUNE 2011

4.5.3 Results

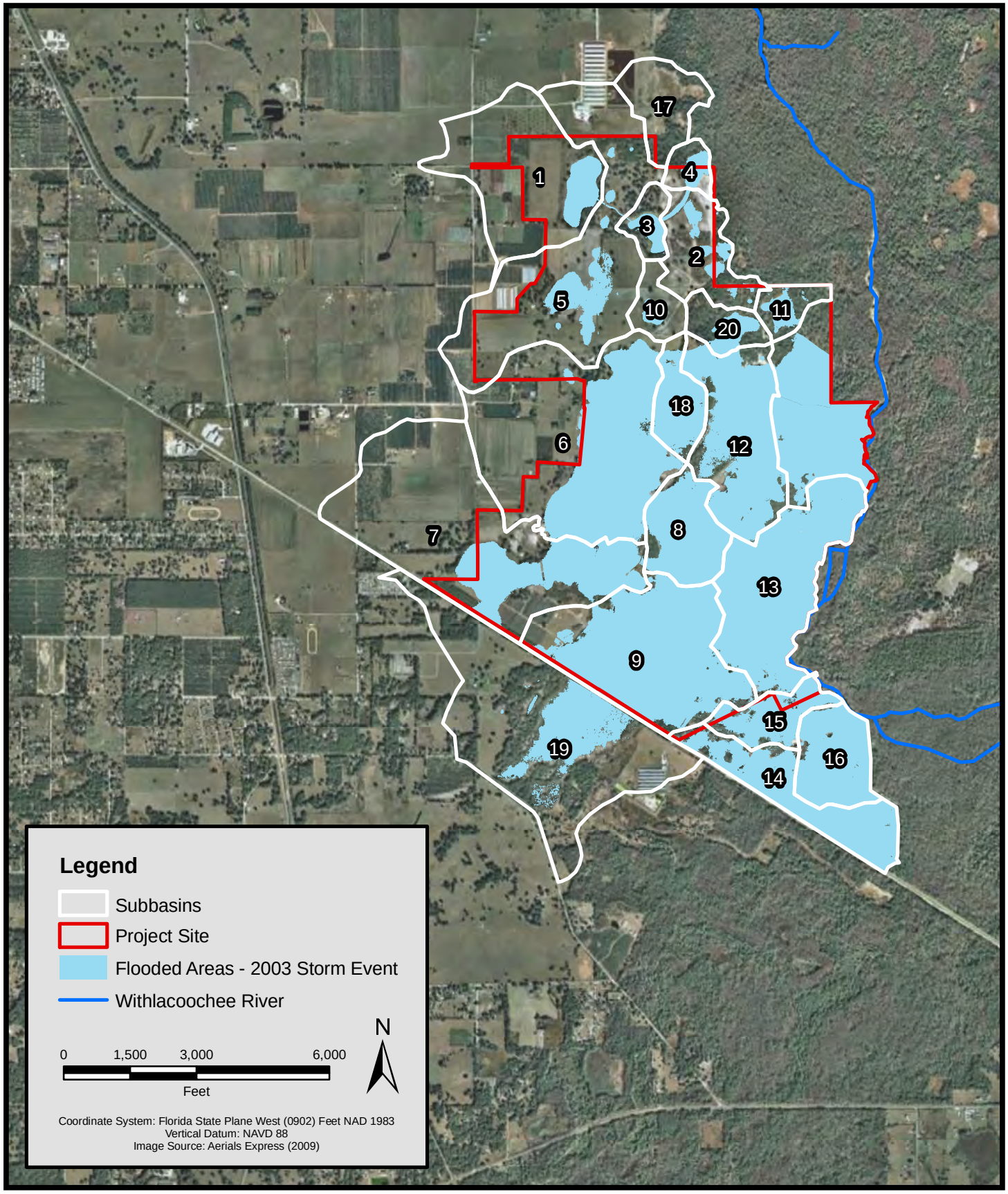
Model results, shown in the figures below (Figures 4-13 and 4-14), indicate the flooding for both moderate and large events (2009 and 2003, respectively) cover the majority of the subbasins in the lower end of the basin (6, 8, 9,12, 13, 14, 15, 16, and 18). Flooding in subbasins 4 and 3 – which include mitigation Activity Area 1 – is contained to the channels and ponds. The model results for the 2009 event show the Withlacoochee just beginning to fill Activity Area 1 while the 2003 event shows the flooding from Activity Area 1 up into the intermittently connected pond in subbasin 1.



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Flooded Areas - 2009 Storm Event
Boarshead Ranch
Pasco County, Florida

PROJECT	C2011-025
FIGURE	4-13
DRAWN BY	JK
DATE	JUNE 2011



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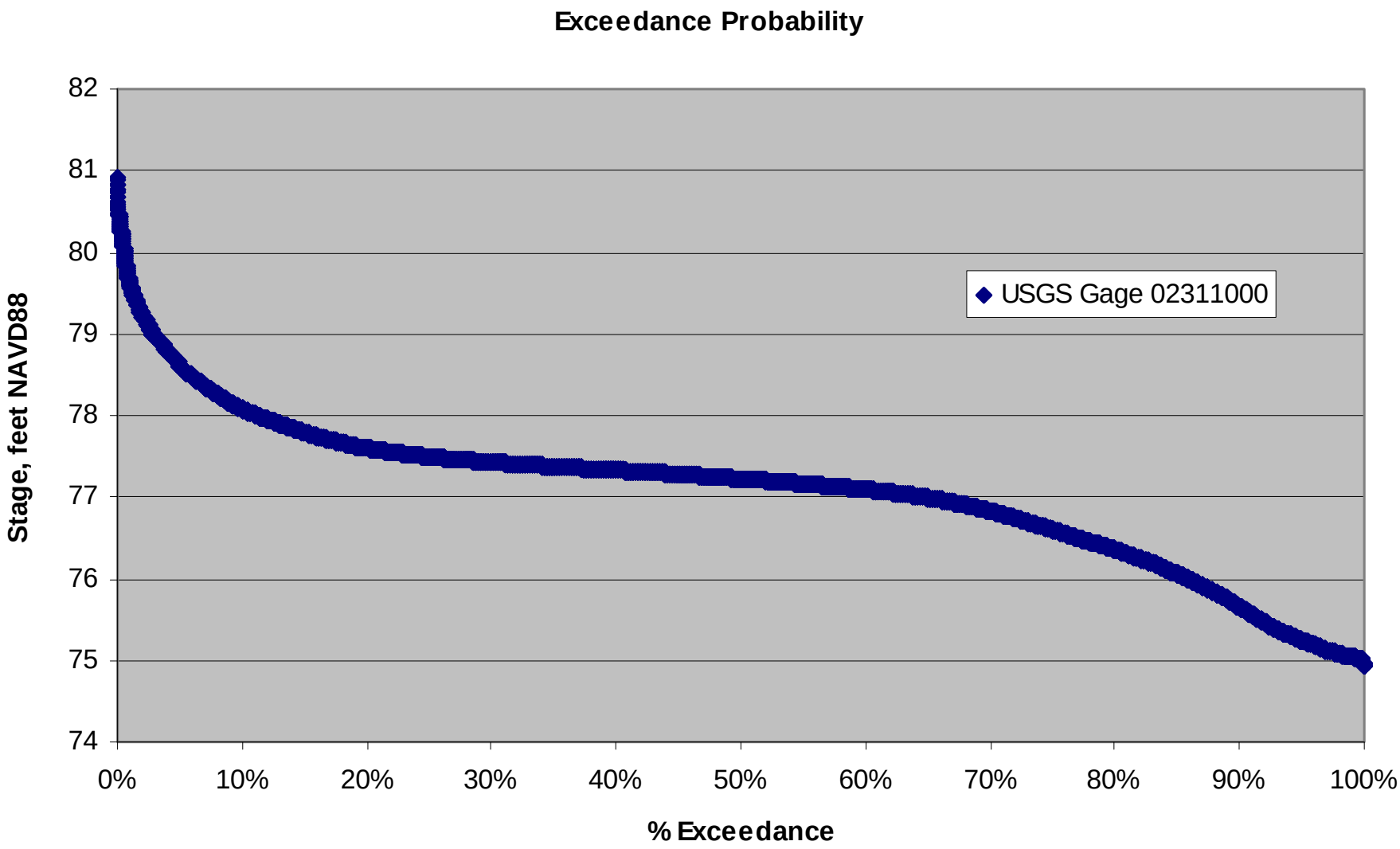
Flooded Areas - 2003 Storm Event
Boarshead Ranch
Pasco County, Florida

PROJECT	C2011-025
FIGURE	4-14
DRAWN BY	JK
DATE	JUNE 2011

Additional Comments

In order to understand the frequency of flooding for the BHR area, the daily stage data for the USGS Gage #02311000 for the period of April 25, 1960 to June 14, 2011 were examined. The Wetland Mitigation Plan (April 2010) presented the data in a time series, discussed the interconnected system, and presented a gage elevation (for station #02311000) at which the BHR property would flood. The stage overflow threshold is at about 77.46 ft. NGVD88. This means when the USGS gage measures a stage above 77.46 ft. NAVD88, the Hillsborough – Withlacoochee drainage divide is overtopped and the system begins to flood (detailed in a January 22, 2010 memo from ENTRIX).

To examine the frequency of this occurrence the daily stage data were used (gage #02311000) to create a stage-exceedance curve. This curve (shown in Figure 4-15 below) shows that the overflow threshold is exceeded about 25% of the time. However, as presented in the Wetland Mitigation Plan (April 2010) there are periods of months and years where the threshold elevation is not exceeded and the only water on the BHR site will be from small rainfall events and ground water.



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Exceedance of Stage Data for Gage 0231100 Near Hwy 98
Boarshead Ranch
Pasco County, Florida

PROJECT	C2011-025
FIGURE	4-15
DRAWN BY	JK
DATE	JUNE 2011

4.6 UMAM Score

The scoring system utilized during the UMAM process is outlined in the UMAM handbook and its scoring requirements. The proposed mitigation plan for BHR will provide for 40.6 units of functional lift to offset the forested, herbaceous and open water off-site transmission line impacts within the Withlacoochee and Hillsborough watersheds (Table 4-3).

Scores for existing communities that were assessed on BHR ranged from 0 to 8, pursuant to the UMAM process. Target UMAM scores presented in Table 4-3 ranged from 0 to 8 in accordance with the UMAM scoring parameters based on the target results of each of the mitigation activities outlined in this plan.

For Location and Landscape Support, the proposed scores were all assessed as an 8 based on the UMAM scoring methodology. These scores were derived by assessing the existing communities on site and identifying the main characteristics that these habitats were deficient in, such as habitat availability, wildlife access barriers, land use impacts and several others. This information was then used to incorporate those criteria into the proposed mitigation activities. By introducing increased habitat availability and the other criteria mentioned above, the proposed mitigation plan will "increase" the value of the existing on-site habitats and site functionality as defined in the methodology. The score of 8 was assigned after reviewing the UMAM scoring requirements and the description of each scoring tier where an 8 is defined as having appropriate and slightly higher habitat diversity than a 7, with the majority of plants native and desirable, but still not as diverse as habitats scored as a 9 or 10; with most increased support for fish and wildlife and a land management plan that is more specified to address such issues as invasive/exotic species management.

For the Water category, proposed scores range from 6 to 8. A score of 6 means that the hydrology and water quality support 60% of the optimal capacity or are slightly lower than moderate conditions that would be scored a 7. Water levels and flows lower than expected and soils are drier than expected. Soils may also show signs of alteration and the vegetative component is not appropriate for the type of system, lending to minimal diversity or vegetative die-back which can yield in depleted wildlife use. A score of 7 represents moderate conditions where water levels are slightly lower than expected, and soils are slightly drier than expected. Certain vegetative strata may be inappropriate for the given area, animal species with hydrological requirements are less than expected, and inappropriate species are becoming present. A score of 8 is slightly better than moderate and represents that the assessment area will provide adequate habitat for both aquatic vegetation and wildlife, will aide in the hydro period of the area and assist in storage capacity and attenuation, will increase water flow through the area resulting in better water quality and that the area will remain inundated under normal circumstances so that the other improvements will function as designed.

The Community Structure assessment areas were scored between 7 and 8. The community structure will be improved in all habitat types as plant diversity will be significantly increased, in addition to removing invasive/exotic species. A score of 7 or 8 is achieved as there becomes a dominance and diversity of appropriate vegetation that appears to be regenerating and/or recruiting naturally and are in good health. Exotic or invasive species are minimal and very little is impeding plant growth. The PEF plan will provide for additional habitat for aquatic vegetation and wildlife and will represent significant improvement over existing conditions.

Table 4-3. Boarshead Ranch mitigation plan proposed UMAM score summary.

Area	Type	Location		Water		Community		Acreage	Risk	Time Lag	PAF[1]	RFG[2]	FG[3]
		Current	With	Current	With	Current	With						
Withlacoochee Basin													
Activity Area 1													
Lake (North)	Herbaceous Preservation/ WQ Enhancement	7	8	6	7	6	8	2.4	1.00	1.14	0.7	0.0819	0.2
Cropland and Pastureland	Forested Creation	0	8	0	8	0	8	6.8	1.50	1.92	1.0	0.2778	1.9
Cropland and Pastureland	Herbaceous Creation/ Enhancement	0	8	0	7	0	8	2.4	1.75	1.14	1.0	0.3843	0.9
Lakes (Central)	Herbaceous Preservation	7	8	6	7	7	8	1.2	1.50	1.14	0.7	0.0409	0.1
Lakes	Herbaceous Enhancement/ Littoral Shelf	7	8	5	7	5	7	4.2	1.50	1.14	1.0	0.0975	0.4
Lakes (South)	Herbaceous Preservation/ WQ Enhancement	7	8	5	6	5	7	5.4	1.00	1.14	1.0	0.1170	0.6
Activity Area 2													
Wet Prairie (West)	Forested Enhancement	6	8	5	7	5	8	5.6	1.00	1.14	1.0	0.2047	1.2
Cypress (West/South)	Forested Enhancement	6	8	5	7	5	8	1.7	1.00	1.14	1.0	0.2047	0.3
Cypress (West/North)	Forested Enhancement	6	8	5	7	5	8	2.0	1.00	1.14	1.0	0.2047	0.4
Cypress (East/North)	Forested Enhancement	6	8	4	7	5	8	0.7	1.00	1.25	1.0	0.2133	0.2
Cypress (East/Central)	Forested Enhancement	6	8	4	7	5	8	0.6	1.00	1.25	1.0	0.2133	0.1
Cypress (East/South)	Forested Enhancement	6	8	4	7	5	8	0.9	1.00	1.25	1.0	0.2133	0.2
Pine Plantation	Herbaceous Creation	0	8	0	7	0	8	2.8	1.75	1.46	1.0	0.3001	0.8
Cropland and Pastureland	Herbaceous Creation	0	8	0	7	0	8	5.7	1.75	1.46	1.0	0.3001	1.7
Pine Flatwoods	Forested Enhancement	0	8	0	7	0	8	10.0	1.50	1.92	1.0	0.2662	2.7

Table 4-3. Boarshead Ranch mitigation plan proposed UMAM score summary continued.

Area	Type	Location		Water		Community		Acreage	Risk	Time Lag	PAF[1]	RFG[2]	FG[3]
		Current	With	Current	With	Current	With						
Activity Area 3													
Lake (Open Water) Includes ditches	Herbaceous Enhancement	7	8	5	7	5	7	53.2	1.25	1.14	1.0	0.1170	6.2
Activity Area 4													
Cypress (Southwest)	Forested Preservation	7	8	5	6	4	8	9.3	1.00	1.14	0.7	0.1228	1.1
Cypress (Central)	Forested Preservation	7	8	5	6	4	8	0.4	1.00	1.25	0.7	0.1120	0.1
Cypress (North)	Forested Preservation	7	8	5	6	4	8	4.6	1.00	1.14	0.7	0.1228	0.6
Stream and Lake Swamp/Bottomlands	Forested Preservation	7	8	7	8	4	8	7.5	1.00	1.14	0.7	0.1228	0.9
Subtotal	**Herbaceous**							**77.5**					**11.0**
Subtotal	**Forested**							**50.0**					**9.6**
Withlacoochee Total								**127.5**					**20.6**
Hillsborough Basin													
Activity Area 3													
Crop and Pastureland (North)	Herbaceous Restoration	6	8	3	7	4	7	37.2	1.25	1.25	1.0	0.1920	7.1
Crop and Pastureland (South)	Herbaceous Restoration	6	7	5	7	4	7	50.0	1.1.25	1.25	1.0	0.1280	6.4
Pine Plantation (West)	Herbaceous Creation	0	8	0	7	0	7	1.4	1.50	1.46	1.0	0.3349	0.5
Pine Plantation (North)	Herbaceous Creation	0	8	0	7	0	8	4.3	1.50	1.46	1.0	0.3501	1.5
Pine Plantation (South)	Herbaceous Creation	0	8	0	7	0	8	10.0	1.50	1.46	1.0	0.3501	3.5
Wet Prairie	Herbaceous Enhancement	6	8	5	7	6	8	0.2	1	1.25	1.0	0.1600	0.0

Table 4-3. Boarshead Ranch mitigation plan proposed UMAM score summary continued.

Area	Type	Location		Water		Community		Acreage	Risk	Time Lag	PAF[1]	RFG[2]	FG[3]
		Current	With	Current	With	Current	With						
Cypress Preservation	Forested Preservation	6	8	5	7	4	8	1.1	1	1.14	0.7	0.1637	0.1
Cypress Restoration	Forested Restoration	6	8	5	7	4	8	**5.5**	1.25	1.25	1.0	0.1707	0.9
Subtotal	**Herbaceous**							**103.1**					**19.0**
Subtotal	**Forested**							**6.6**					**1.0**
Hillsborough Total								**109.7**					**20.0**
BHR Total								**237.2**					**40.6**

[1] Preservation Adjustment Factor
[2] Relative Functional Gain
[3] Functional Gain

4.7 Engineering

The mitigation plan and the June 2011 surveyed pond water elevations described in Section 4.4 form the basis of the engineering design. In general, the proposed engineering design consists of excavation and culvert installation. The paragraphs below summarize the engineering design by activity area. For the areas below, the contractor will place unused excavated material on the existing property stockpile area, located north of Area 3B (Section 4.11, Sheet 16 of 31).

Activity Area 1 – As shown on Sheet 7 of 31 in Section 4.11, the contractor will excavate the majority of Area 1A to an elevation of 73.0 NAVD, with 10H:1V plateau transitions. The area will also contain a few regions excavated to a depth of 71.0 NAVD. The contractor will replace the three existing culverts connecting Lake North and Area 1A with three 24–in. diameter, 60-ft HDPE pipes at inverts of 73.0-ft NAVD (Section 4.11, Sheet 10 of 31). One 24-in diameter, 164-ft, HDPE pipe at invert 73.0-ft NAVD will replace the existing pipe connecting Area 1A to Lake South (Section 4.11, Sheet 11 of 31). In Area 1B, the contractor will construct the littoral shelf by grading 4H:1V or 8H:1V transitions to the 72.0-ft NAVD plateau (Section 4.11, Sheet 7 of 31). The 72.0-ft NAVD plateau will then transition to the pond bottom with 3H:1V side slopes. The contractor will remove approximately 68,900 cy of material from Area 1A and place approximately 3,100 cy of fill into Area 1B.

Activity Area 2 - As shown in Section 4.11, Sheet 14 of 31, the contractor will install two 18-in. diameter, 38-ft HDPE pipes, with inverts at 78.0 NAVD, at the northern end of the road. The contractor will place fill on the road in the area shown to provide 2-ft of cover for the pipe. In Area 2, the contractor will remove the existing vegetation by clearing and grubbing and then excavate the area to the 75.0-ft NAVD plateau with 4H:1V side slopes (Section 4.11, Sheet 12 of 31). The contractor will remove approximately 5,200 cy of material from Area 2.

Activity Area 3 – The contractor will excavate Area 3A to 73.0-ft NAVD with 10H:1V side slopes (Section 4.11, Sheet 15 of 31). As shown in Section 4.11, Sheet 16 of 31, the plan for Area 3B includes a plateau at 73-ft and 74-ft NAVD with 10H:1V slope transitions. On the western edge of Area 3B, the contractor will construct a berm with a crest elevation of 80.0-ft NAVD and 3H:1V side slopes. In addition, the contractor will replace several existing culverts with HDPE pipes. Two 18-in., 60-ft HDPE pipes at 76-ft NAVD inverts will replace the existing pipes in the Culvert 3A1 area (Section 4.11, Sheet 23 of 31). In the Culvert 3A2 area, the contractor will remove a ditch block and replace the existing pipe with a 36-in., 30-ft HDPE pipe at 75-ft NAVD inverts (Section 4.11, Sheet 24 of 31). A 30-in., 112-ft HDPE pipe at 73-ft NAVD inverts will replace the existing pipe on Section 4.11, Sheet 25 of 31. The contractor will replace the existing pipes connecting the 3B areas with two 24-in. diameter, 136-ft HDPE pipes at 73-ft NAVD inverts (Section 4.11, Sheet

26 of 31). The contractor will remove approximately 206,700 cy of material from Area 3A and 276,700 cy of material from Area 3B.

4.8 Implementation Schedule

The construction of the BHR site will begin within 90 days of commencement of construction authorization and wetland impacts of the associated off-site transmission lines for the Levy County Plant. The mitigation plan will be implemented in phases, as some activities, such as the excavation and planting, are seasonal in nature and can only be completed under appropriate favorable conditions. The restoration of herbaceous wetlands within and adjacent to the floodplain have the highest priority, with the enhancement (herbaceous and forested) having the next highest priority, and the creation of the littoral shelf and straight preservation having the lowest priority. The construction sequencing will follow the above priorities.

As with any construction project, natural conditions and weather patterns will be observed and activities will be planned to best coincide with suitable weather conditions. Prior to any land disturbance, appropriate erosion and sedimentation control measures will be installed, including silt fence around all disturbed areas and sediment curtains in open water areas (BHR Engineering and Planting Detail Drawings show erosion control plans). Any other applicable compliance items, such as County land clearing permits or any other local permit requirements, will also be obtained by the contractor or PEF before the construction aspect begins. Excavation will occur during the dry season (October-March) and wetland plantings will occur once excavation is complete and the area has been constructed properly and approved. Maintenance for invasive/exotic species will be conducted year-round, with manual, mechanical and/or chemical removal methodologies to be utilized throughout the year to ensure the best results (Section 4.9).

Based on the above-referenced priorities, an implementation schedule of the mitigation activities is listed below:

Activity Area 1	Timeframe
Acquire local land disturbance permits, tree removal permits, etc.	
Mobilization	Week 1
Establish all turbidity/erosion control measures	Week 2
Excavate Area 1A areas and haul fill material to borrow site	Weeks 3-11
Place fill to create littoral shelf in Area 3B	Week 11
Install 344 LF of pipe	Week 12
Finish site grading	Weeks 12-14
Generate and review as-built surveys	Weeks 14-15
Plant all wetland areas and treat exotics (optimal season for herbaceous planting species is March through October, forested species is October through March)	Weeks 16-17
Begin 5 year monitoring and maintenance period	Week 18

Activity Area 2	Timeframe
Acquire local land disturbance permits, etc.	
Mobilization	Week 1
Establish all turbidity/erosion control measures	Week 2
Clear and remove vegetation	Weeks 2-3
Excavate Area 2 and haul fill to borrow area	Weeks 4-5
Install 76 LF of pipe	Weeks 6
Finish site grading	Week 6-7
Generate and review as-built surveys	Week 8
Plant all wetland/enhancement areas (Optimal planting season for forested species is March through October)	Weeks 8-12
Begin 5 year monitoring and maintenance period	Week 12

Activity Area 3	Timeframe
Acquire local land disturbance permits, etc.	
Mobilization	Week 1
Establish all turbidity/erosion control measures	Week 2
Excavate Area 3 in two sections A and B per drawings and haul fill to borrow area	Weeks 3-14 (A) Weeks 15-27 (B)
Construct Berm in southwest corner of Mitigation Area 3	Weeks 28-29
Install 721 LF of pipe	Weeks 30-31
Finish site grading	Weeks 31-32
Generate and review as-built surveys	Week 33-35
Plant all wetland/enhancement areas (optimal season for herbaceous planting species is March through October)	Weeks 35-39
Begin 5 year monitoring and maintenance period	Week 40

**Optimal planting season for herbaceous species is March through September, and October through March for forested species.*

The above is a general timeline of the basic implementation of the proposed mitigation activities. Preservation areas (Activity Areas 4 and 5) which do not require active mitigation will be placed under a conservation easement as appropriate to the construction transmission line impacts. Additional planning and specifics may need to be established once the transmission line construction schedule becomes more evident.

4.9 Monitoring and Maintenance Requirements

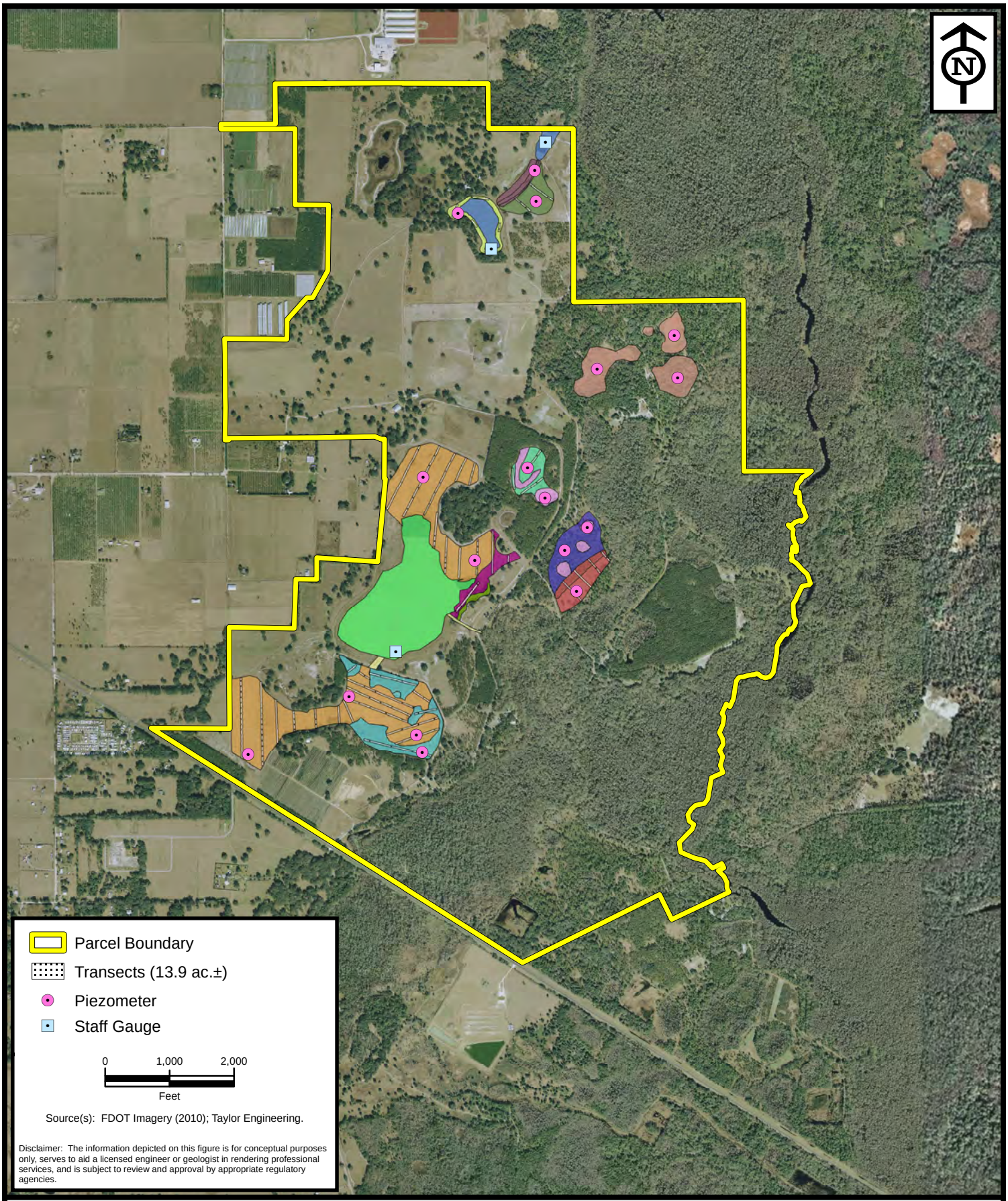
The wetland preservation, enhancement/restoration, and creation areas will be monitored on an annual basis and maintained quarterly to ensure their success. Monitoring will document that each habitat type is naturally progressing to resemble its intended target community in regard to plant species and composition. In addition, wildlife utilization, hydrologic conditions, presence of invasive/exotic species and any other management issues will be noted and addressed.

The quantitative monitoring of the herbaceous and forested wetland mitigation areas will consist of establishing fixed linear transects covering approximately 1.0 acre in Activity Area 1 (7 transects), 1.4 acres in Activity Area 2 (4 transects), and 11.1 acres in Activity Area 3 (29 transects). No transects will be required in Activity Areas 4 and 5. Please refer to Figures 4-16, and 4-16a to 4-16d). For some of the smaller community types, 0.1 acre plots may be established instead of transects. The transects will be 25 ft.

wide and will average 300 ft. long. Hydrology will be observed through the use of continuously recording piezometers installed strategically throughout the site (Figures 4-16, 4-16a through 4-16d). The data that will be observed and recorded within each transect/plot will include:

- date of installation and number and types of plants installed;
- total coverage and survivorship of desirable planted species and any other dominant species;
- for the 0.1 acre plot, the presence of planted and/or naturally recruited trees present within each stratum;
- the presence and overall coverage of any listed invasive/exotic species;
- success of any previously recommended treatment methods and any future methods proposed;
- any areas of mortality of planted or other natural species;
- current hydrologic conditions, water depths and hydric soils observed;
- any evidence of wildlife presence or utilization;
- any maintenance needs in regard to stabilization, erosion, vandalism etc. and suggested corrective actions.

A baseline monitoring event will be conducted at the BHR no less than 60 days after the completion of planting. The baseline event will help to establish the initial conditions after construction and will be used as a reference to assess progression during future monitoring events. The annual monitoring will commence after the baseline event and will be submitted to FDEP and ACOE in the fall (September/October) of each year. The report will consist of a narrative describing the site conditions, the management activities that have occurred, photographs taken from fixed location points and maps depicting the mitigation area. The herbaceous enhancement/restoration areas will be monitored for at least three years until they reach the criteria established above. The forested restoration area will be monitored for at least five years until the success criteria are met. The monitoring period may be adjusted based upon the performance of the vegetation establishment.



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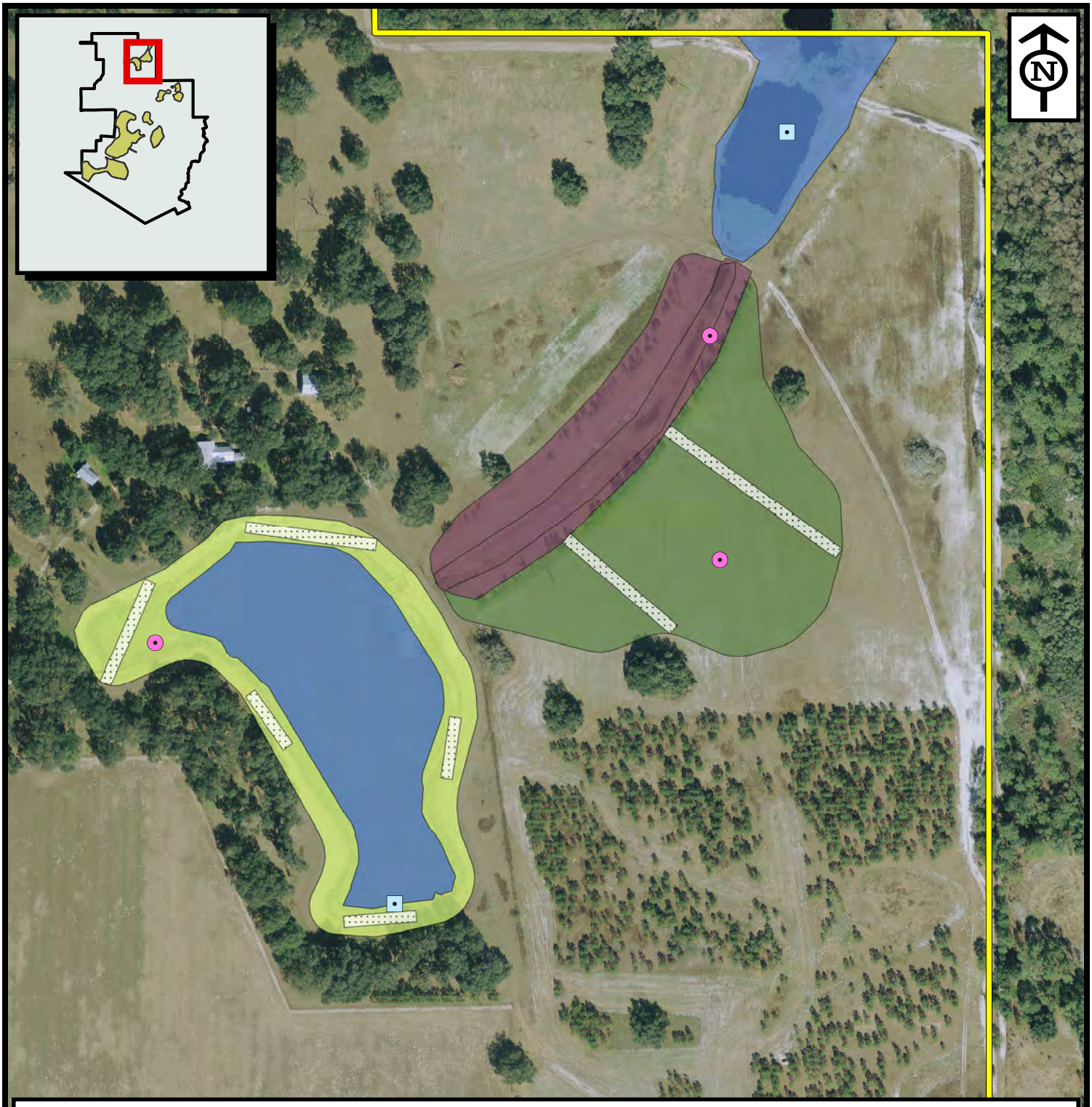
Monitoring Stations

Boarshead Ranch

Pasco County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JGB/JRN
Figure:	**4-16**

Path: Q:_Projects\EJ\2011\021\00\fig\Boarshead\Report\Pro_MonAct.mxd Date: 8/5/2011 3:22:30 PM



0 150 300

Feet

Source(s): FDOT Imagery (2010); Taylor Engineering.

Disclaimer: The information depicted on this figure is for conceptual purposes only, serves to aid a licensed engineer or geologist in rendering professional services, and is subject to review and approval by appropriate regulatory agencies.

- Parcel Boundary
- Transects (1.0 ac.±)
- Piezometer
- Staff Gauge

Activity Area 1

- Regrade Side Slopes to Create Littoral Zone (4.2 ac.±)
- Grade Area Down to Create Forested Wetland (6.8 ac.±)
- Lake Preservation (7.9 ac.±)
- Regrade Side Slopes to Create Marsh (3.6 ac.±)

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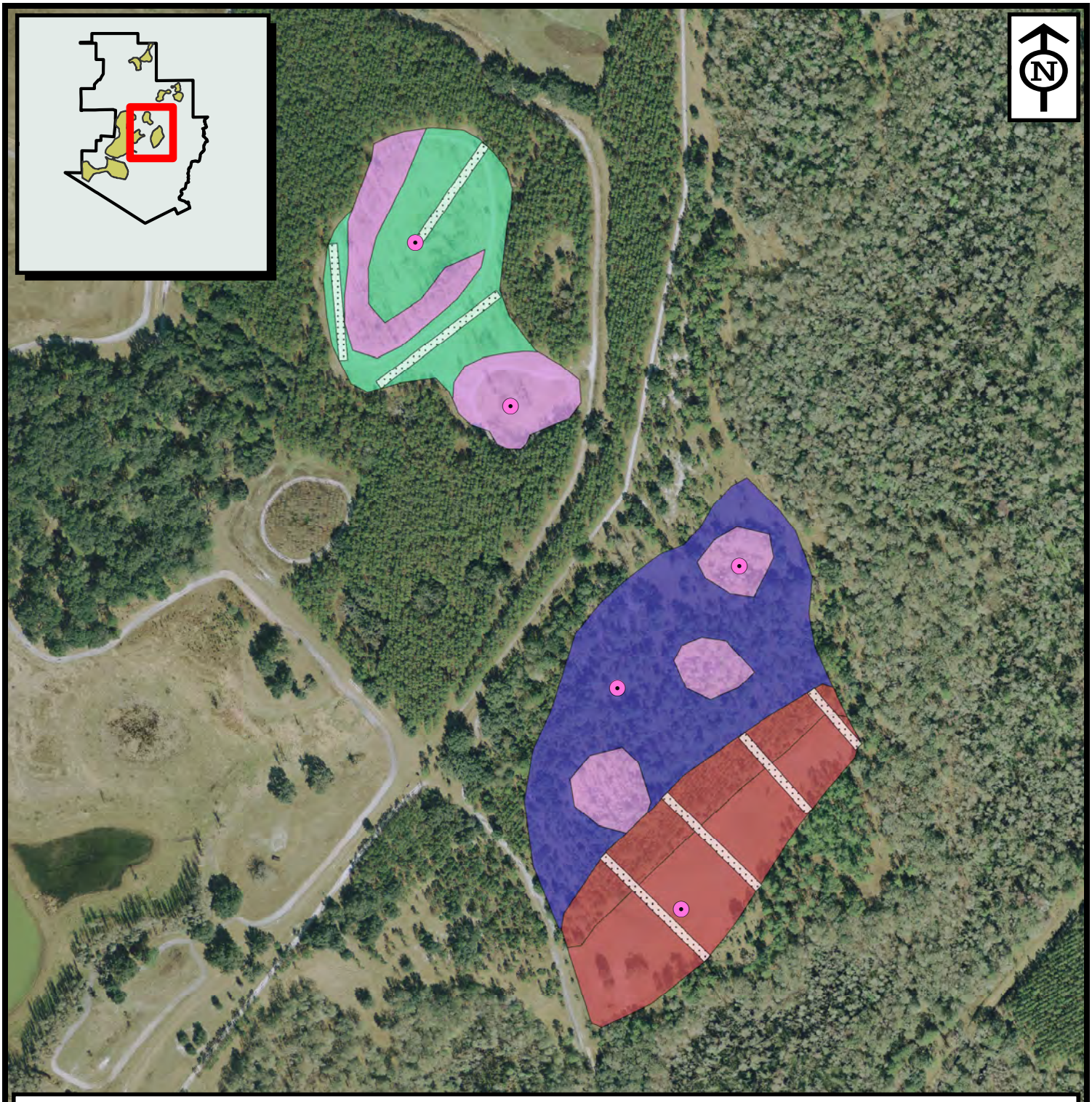
Monitoring Stations - Activity Area 1

Boarshead Ranch

Pasco County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JGB/JRN
Figure:	**4-16a**

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0 200 400
Feet

Source(s): FDOT Imagery (2010); Taylor Engineering.

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- Parcel Boundary
- Transects (1.4 ac.±)
- Piezometer
- Staff Gauge

Activity Area 2

- Cypress Hydrologic Enhancement (5.9 ac.±)
- Wet Prairie Creation (8.5 ac.±)
- Cypress Enhancement (5.6 ac.±)
- Create Wet Flatwoods (15.6 ac.±)

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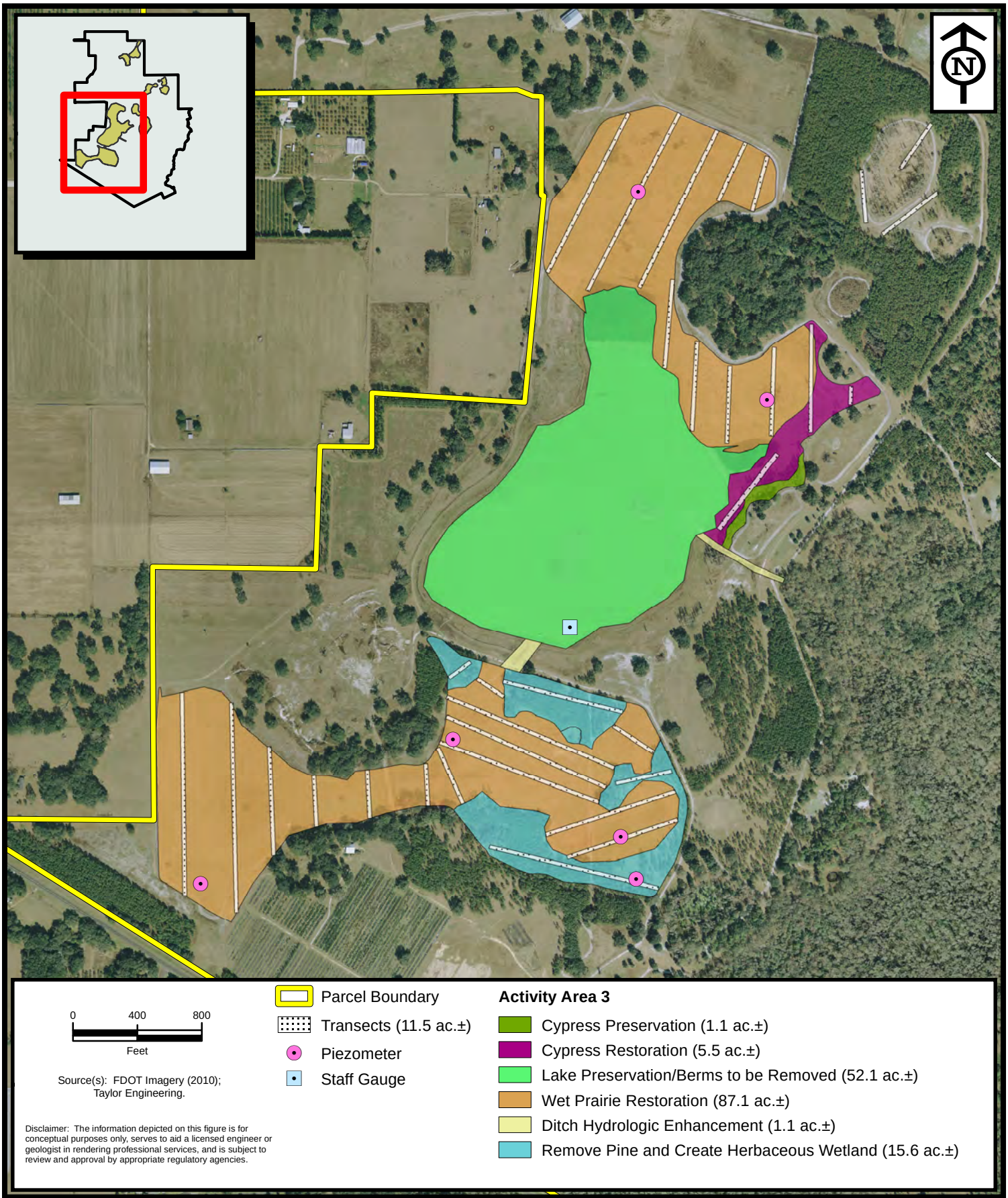
Monitoring Stations - Activity Area 2

Boarshead Ranch

Pasco County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JGB/JRN
Figure:	**4-16b**

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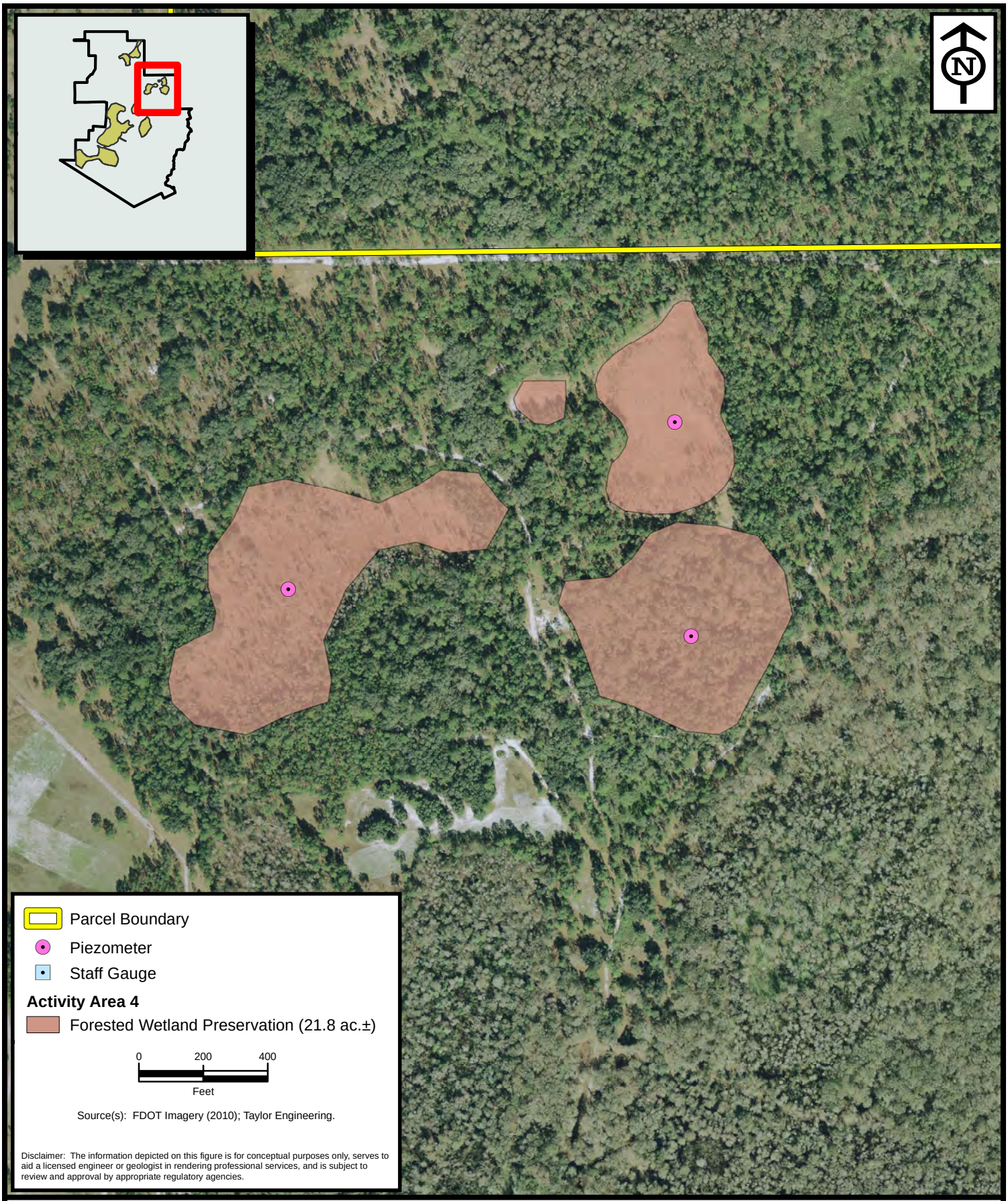
Monitoring Stations - Activity Area 3

Boarshead Ranch

Pasco County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JGB/JRN
Figure:	**4-16c**

Path: Q:_Projects\EJ\2011\021\00\fig\Boarshead\Report\Pro_MonAct_aa3.mxd Date: 8/5/2011 3:27:39 PM



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Monitoring Station - Activity Area 4

Boarshead Ranch

Pasco County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JGB/JRN
Figure:	**4-16d**

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4.10 Success Criteria

Specific success criteria outlined below will ensure that the proposed mitigation activities achieve their intended design and function. The main focus of the success criteria for BHR will emphasize the establishment of historic wetland and hydrologic conditions including wet prairie enhancement and restoration, fresh water marsh enhancement, cypress enhancement, hardwood and coniferous wetland enhancement, hydrological restoration via altered culverts and water control structures, and the control of invasive/exotic species. Regular monitoring as described above and maintenance implementation is important to ensuring success at the BHR site. The mitigation areas will be considered successful when the following criteria have been met within the required monitoring time frame:

Herbaceous Wetland Enhancement/Restoration Areas:

- 75% coverage of native/desirable herbaceous vegetation;
- 5% or less total coverage of any invasive/exotic species;
- hydrology is well established and visibly apparent based on the hydrologic indicators as defined by Rule 62-340 F.A.C.;
- the above criteria must be met within the three years of annual monitoring.

Forested Creation and Enhancement Areas:

- 80% survivorship/species composition of planted (or naturally recruited) wetland trees
- 5% or less total coverage of any invasive/exotic species;
- hydrology is well established and visibly apparent based on the hydrologic indicators as defined by Rule 62-340, Florida Administrative Code (F.A.C.);
- the above criteria must be met within the five years of annual monitoring.

The progress of the mitigation area towards reaching success will be tracked through the monitoring reports that will be submitted annually to FDEP and ACOE for review and approval. In the event that the above criteria are not met at the end of the monitoring period, or it is becoming obvious during annual monitoring that an area will not meet the established success criteria, then PEF will work closely with FDEP and ACOE staff in order to identify and correct any problems. Once the success criteria outlined above are met, the mitigation effort will be deemed a success and the monitoring of the mitigation area will be terminated.

4.11 Engineering and Planting Detail Drawings

Please see the attached engineering and planting detail drawings.

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SHEET 2	PROJECT LOCATION MAP
SHEET 3	EXISTING CONDITIONS - AREAS 1A & 1B
SHEET 4	EXISTING CONDITIONS - AREA 2
SHEET 5	EXISTING CONDITIONS - AREA 3A & 3B
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SHEET 7	GRADING PLAN - AREA 1A & 1B
SHEET 8	PROFILE ALIGNMENT LINE 1A
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SHEET 27	EROSION CONTROL NOTES
SHEET 28	EROSION CONTROL DETAILS
SHEET 29	PROPOSED PLANTING PLAN - ACTIVITY AREA 1
SHEET 30	PROPOSED PLANTING PLAN - ACTIVITY AREA 2
SHEET 31	PROPOSED PLANTING PLAN - ACTIVITY AREA 3

PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA



LOCATION MAP
N.T.S.

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TITLE SHEET
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ / CAS
SHEET	1 of 31
DATE	JUNE 2011

SEAL

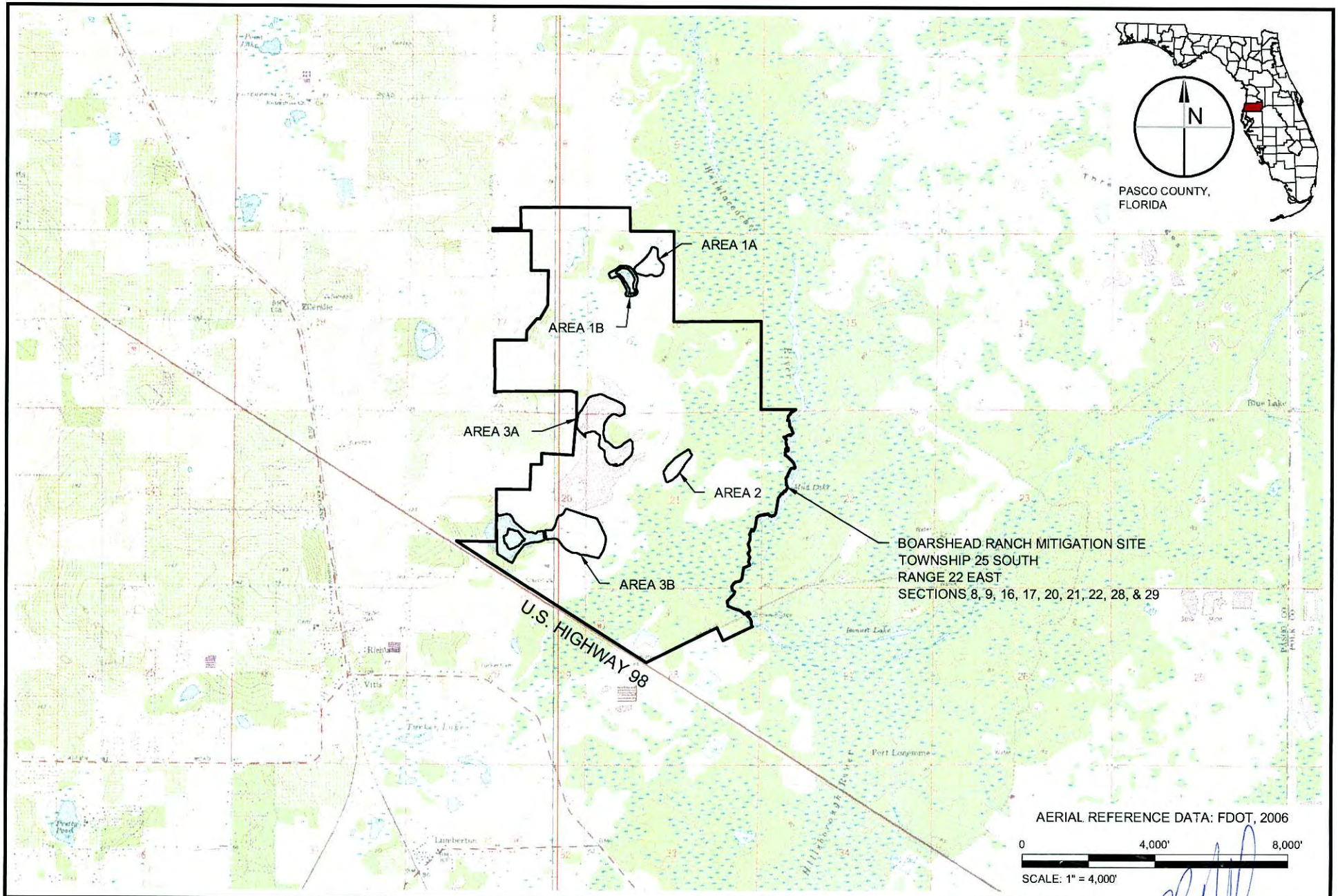
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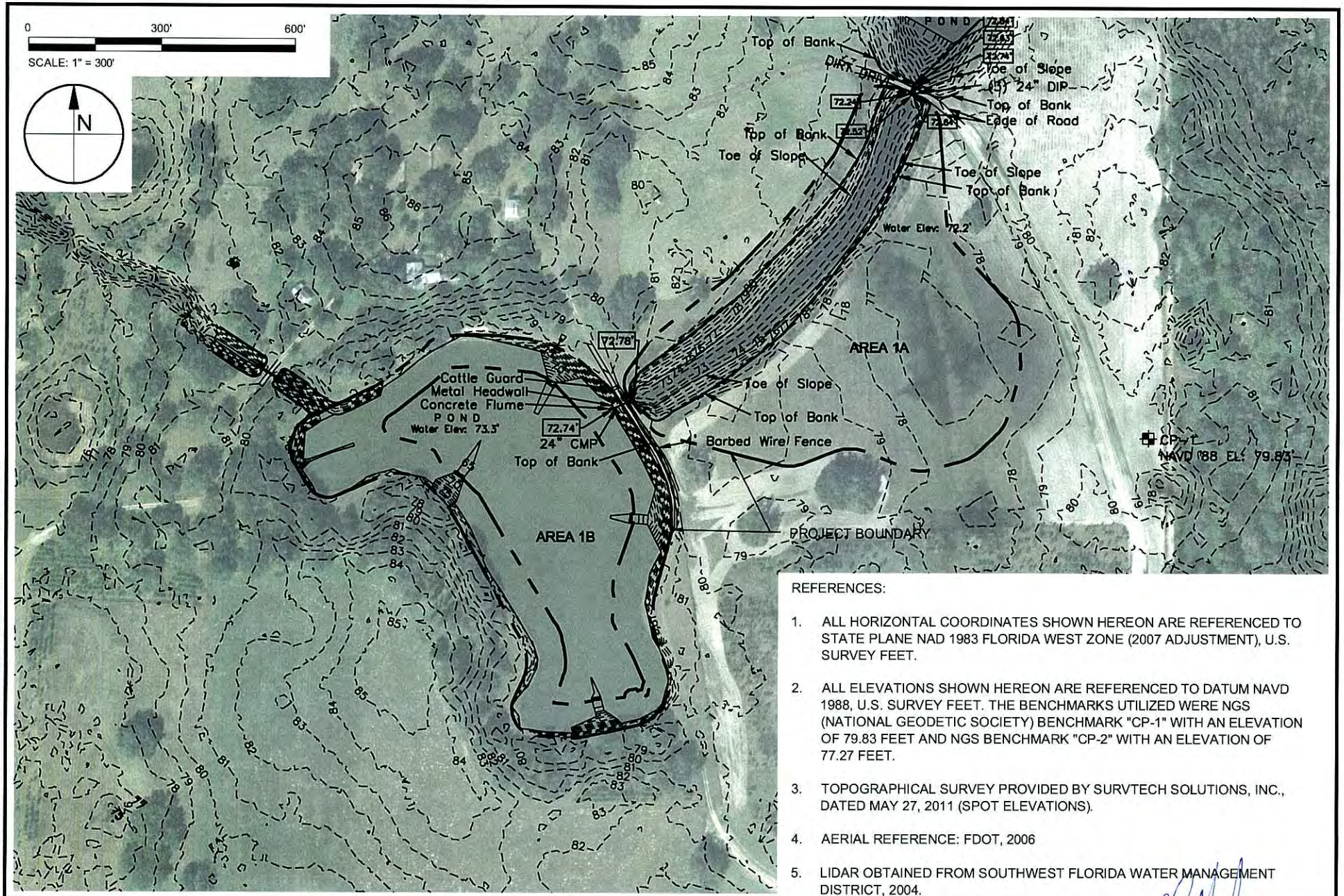
PROJECT LOCATION MAP
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
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SHEET	2 of 31
DATE	JUNE 2011

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REFERENCES:

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2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO DATUM NAVD 1988, U.S. SURVEY FEET. THE BENCHMARKS UTILIZED WERE NGS (NATIONAL GEODETIC SOCIETY) BENCHMARK "CP-1" WITH AN ELEVATION OF 79.83 FEET AND NGS BENCHMARK "CP-2" WITH AN ELEVATION OF 77.27 FEET.
3. TOPOGRAPHICAL SURVEY PROVIDED BY SURVTECH SOLUTIONS, INC., DATED MAY 27, 2011 (SPOT ELEVATIONS).
4. AERIAL REFERENCE: FDOT, 2006
5. LIDAR OBTAINED FROM SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, 2004.

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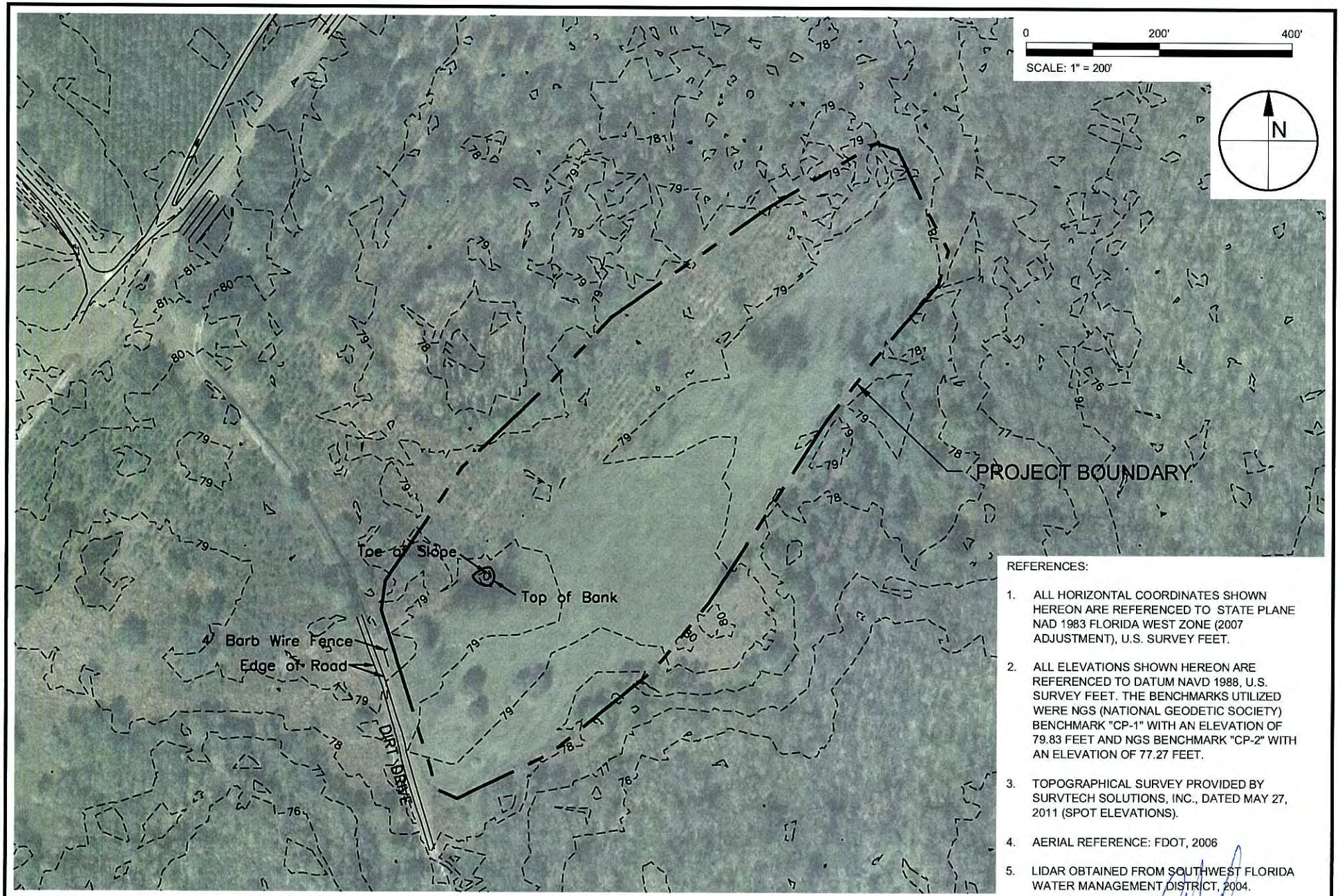
EXISTING CONDITIONS - AREAS 1A & 1B
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
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3. TOPOGRAPHICAL SURVEY PROVIDED BY SURVTECH SOLUTIONS, INC., DATED MAY 27, 2011 (SPOT ELEVATIONS).
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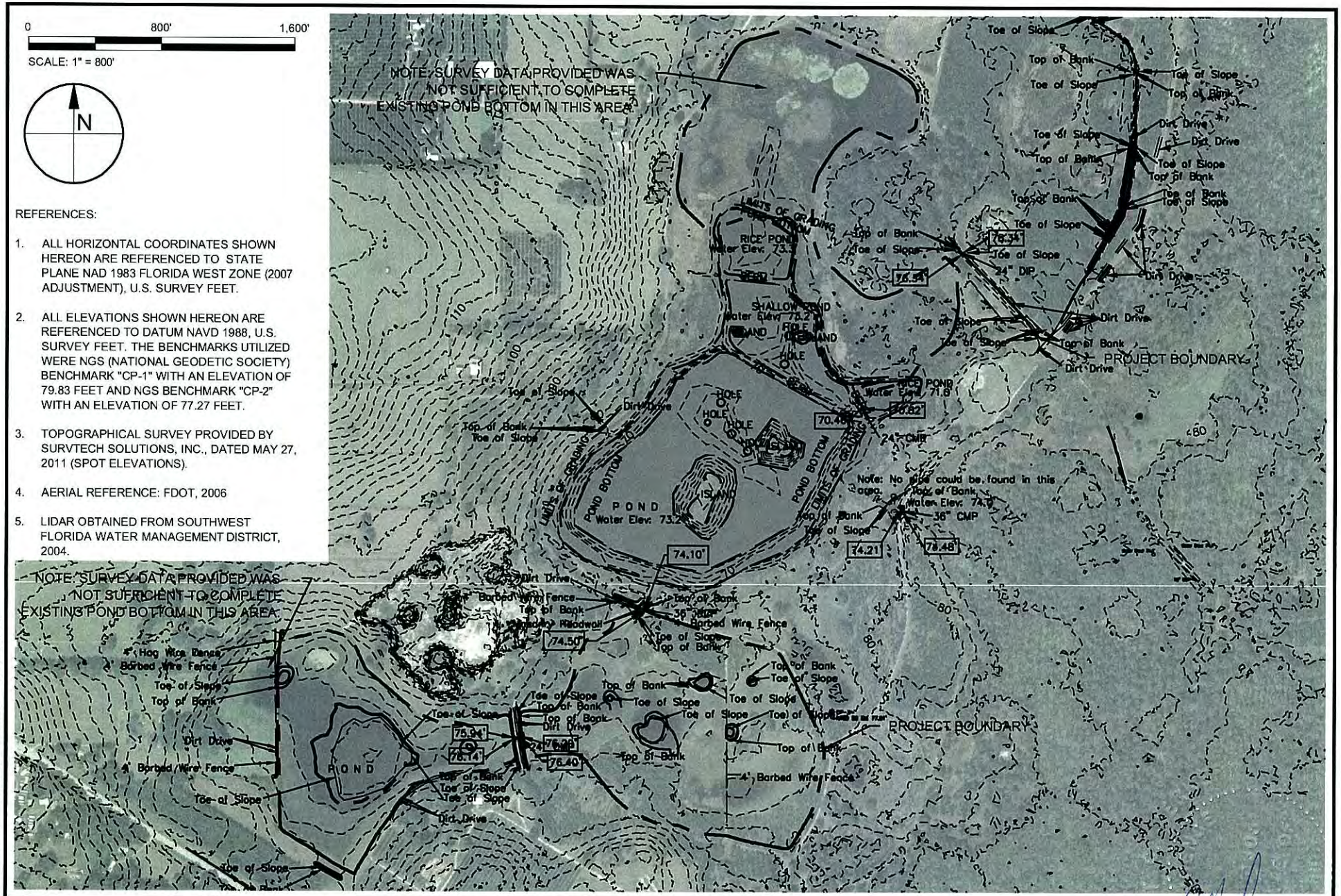
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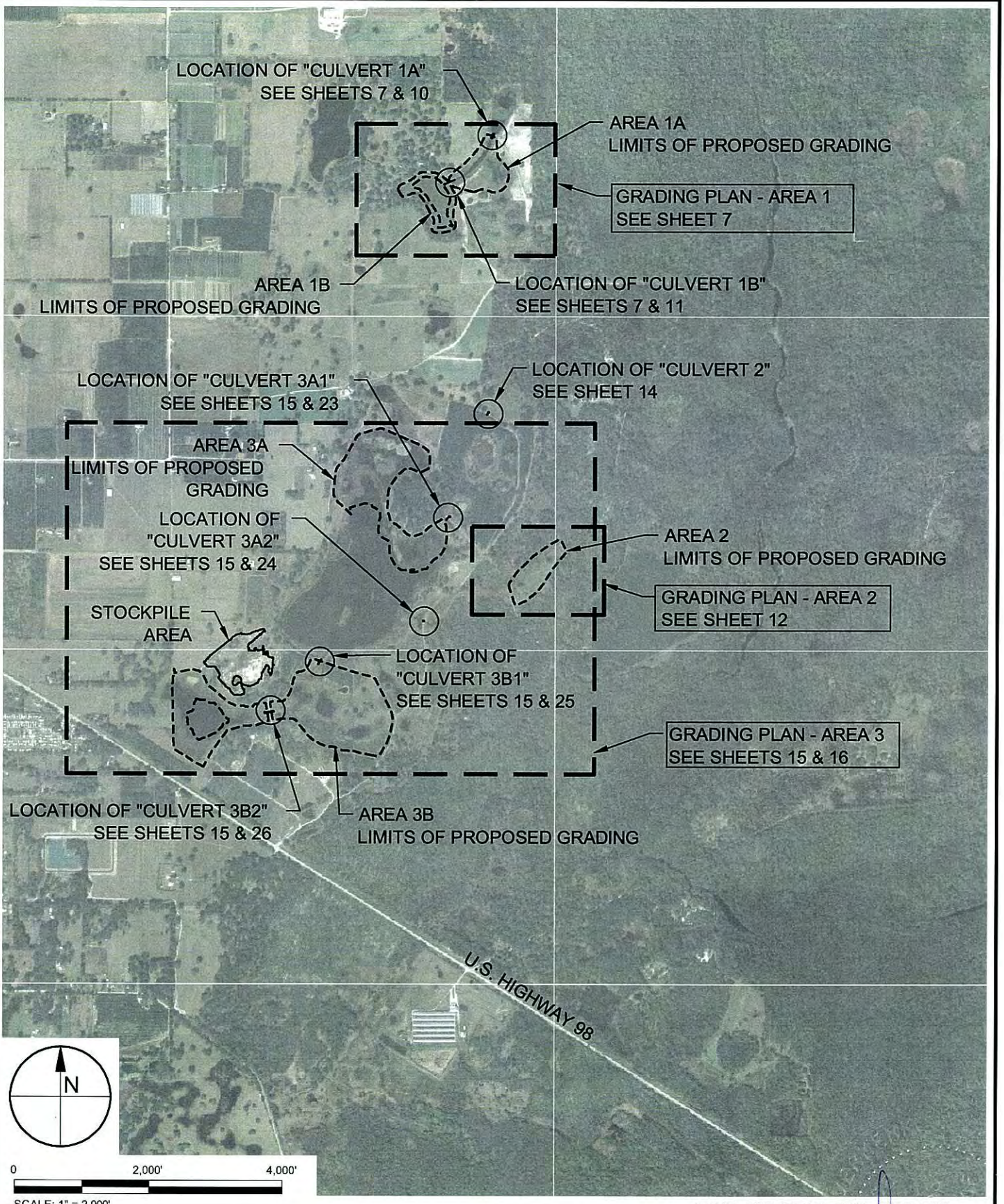
EXISTING CONDITIONS - AREA 3A & 3B
PROGRESS ENERGY MITIGATION PROJECT
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PASCO COUNTY, FLORIDA

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SCALE: 1" = 2,000'

AERIAL REFERENCE DATA: FDOT, 2006

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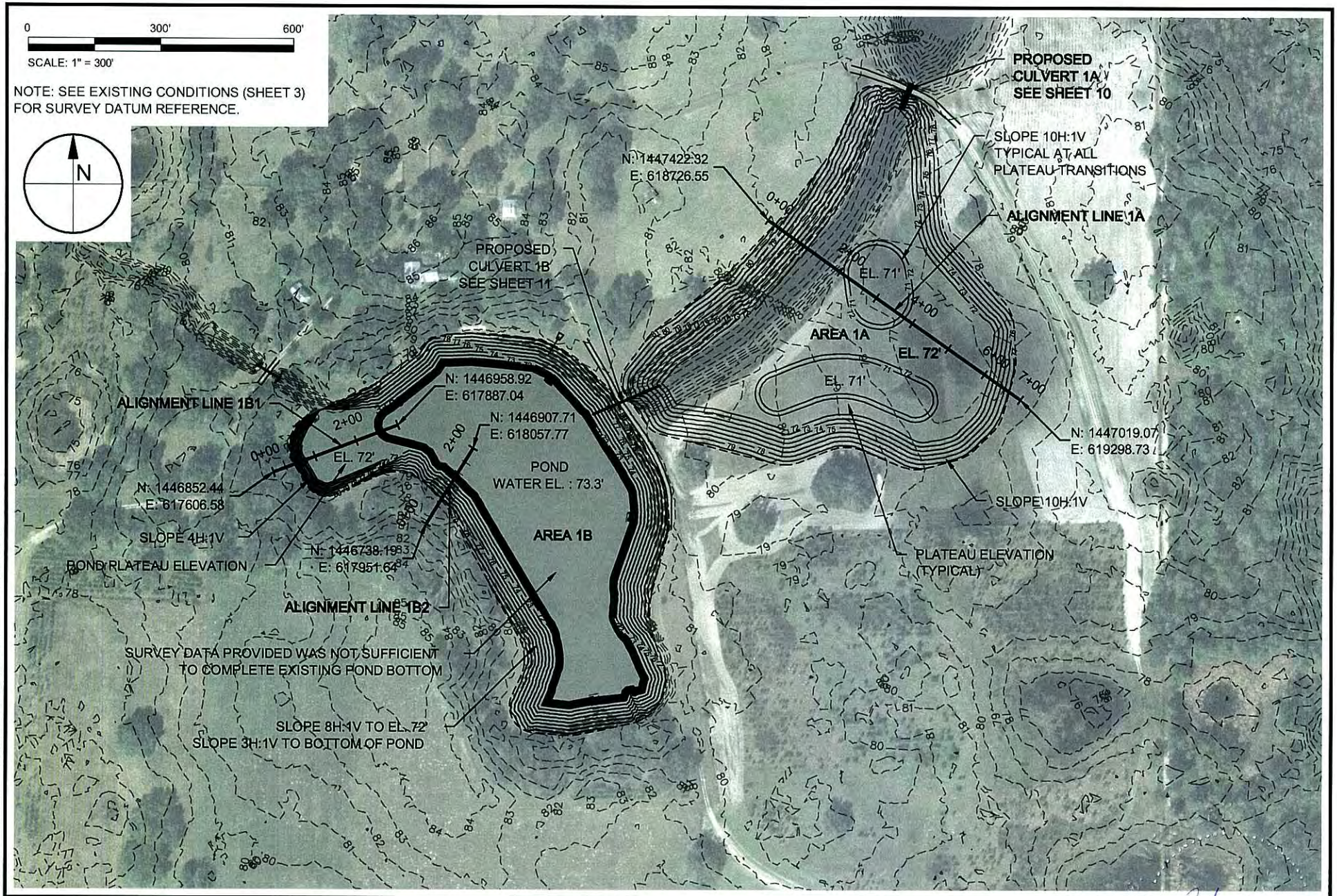
PROJECT SITE OVERVIEW
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

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GRADING PLAN - AREA 1A & 1B
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
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DATE	JUNE 2011

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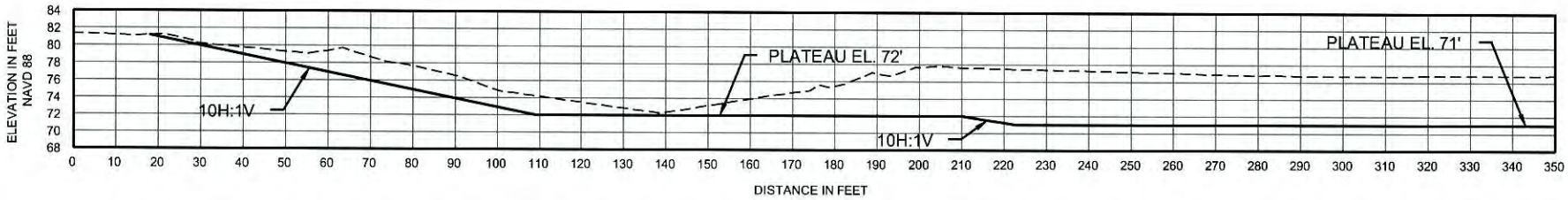
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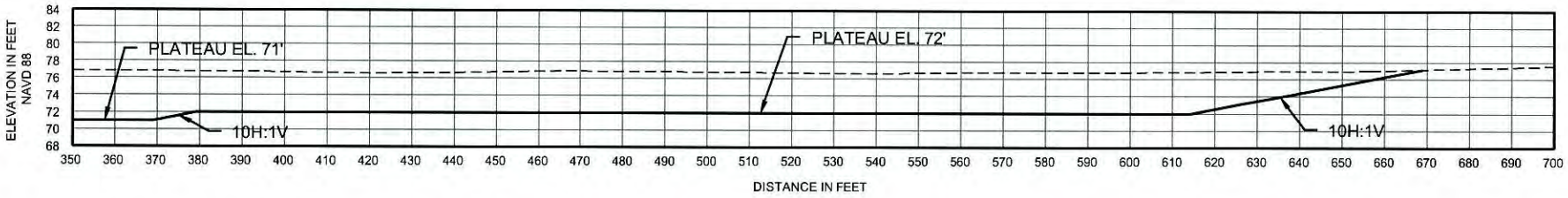
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1A
6

GRADING AREA 1A - PROFILE ALONG ALIGNMENT LINE 1A

SCALE: 1" = 40'
V-SCALE: 1" = 10'

0 40'

LEGEND:

EXISTING GRADE
PROPOSED GRADE

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PROFILE ALIGNMENT LINE 1A
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

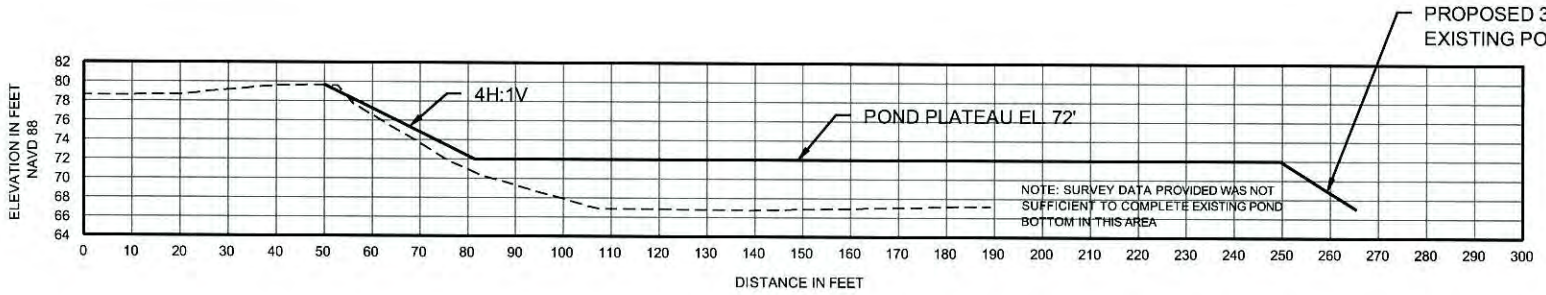
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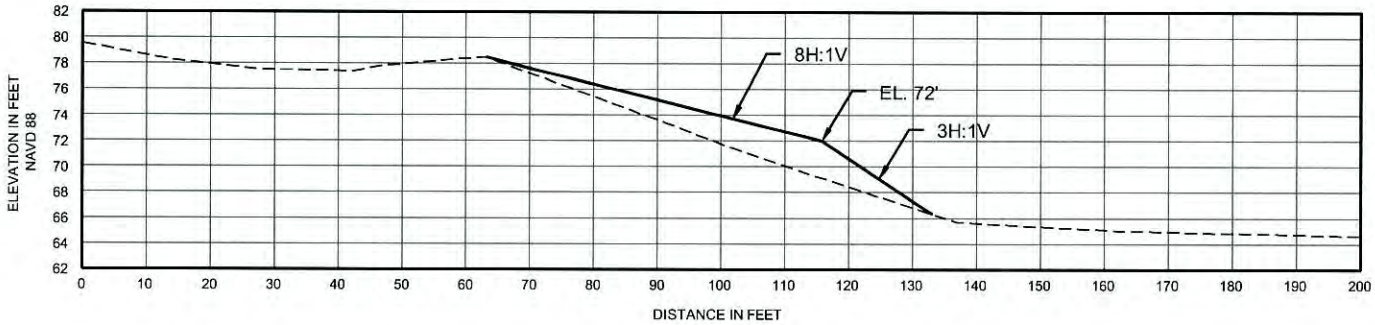


1B1 / 6

GRADING AREA 1B - PROFILE ALONG ALIGNMENT LINE 1B1

SCALE: 1" = 40'
V-SCALE: 1" = 15'

0 40'



1B2 / 6

GRADING AREA 1B - PROFILE ALONG ALIGNMENT LINE 1B2

SCALE: 1" = 30'
V-SCALE: 1" = 15'

0 30'

LEGEND:

EXISTING GRADE
PROPOSED GRADE

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PROFILE ALIGNMENT LINE 1B1 & 1B2
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
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DATE	JUNE 2011

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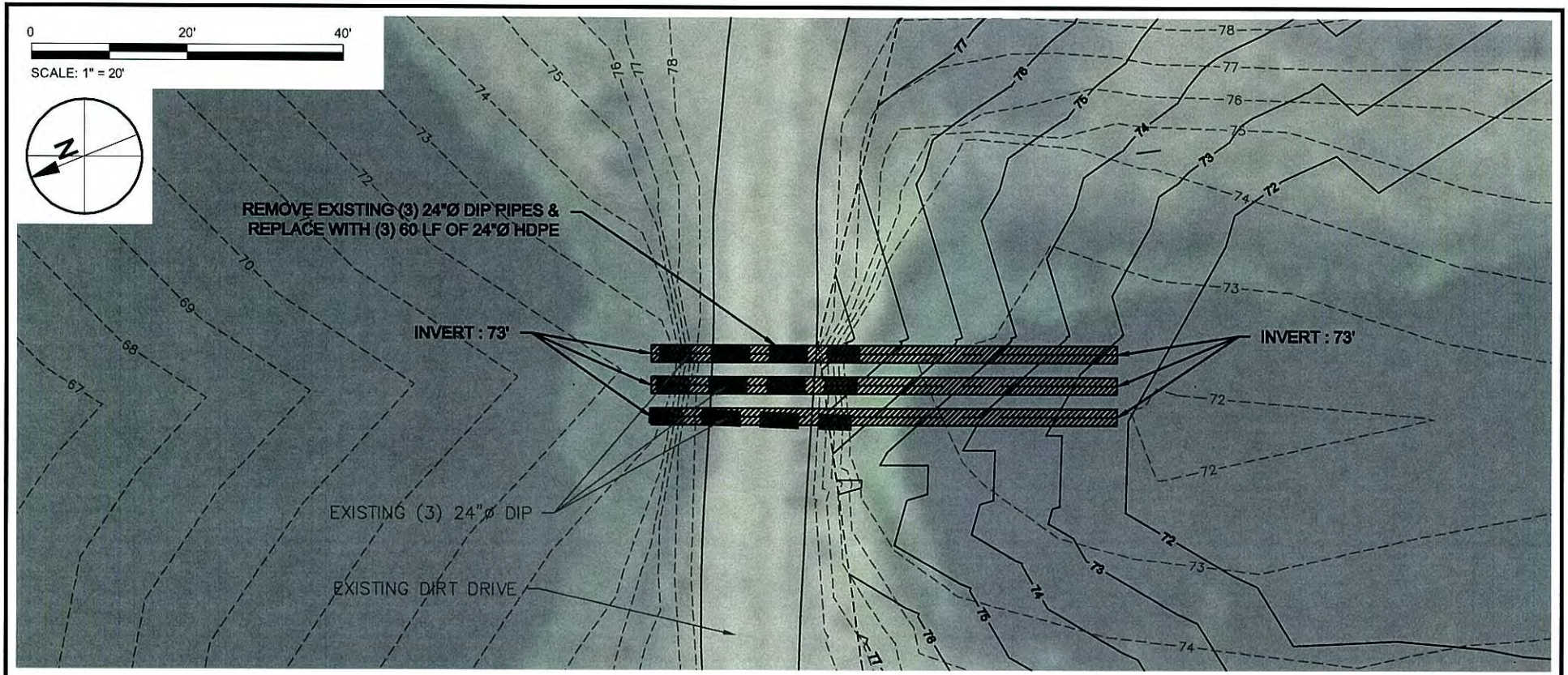
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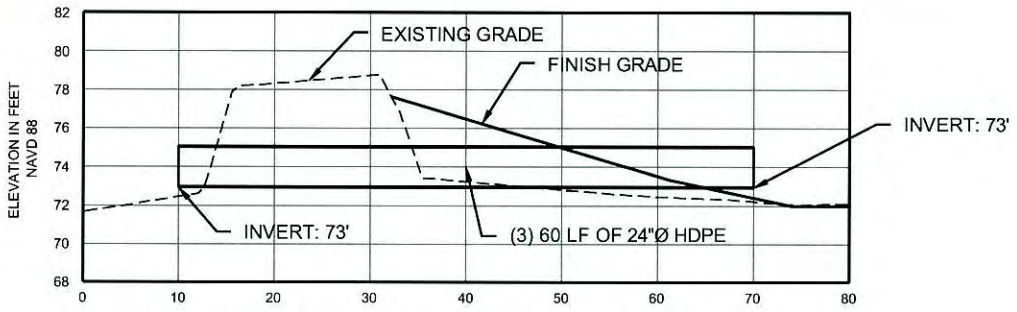
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CULVERT 1A PROFILE

SCALE: 1" = 20'
V-SCALE: 1" = 10'

0 20'

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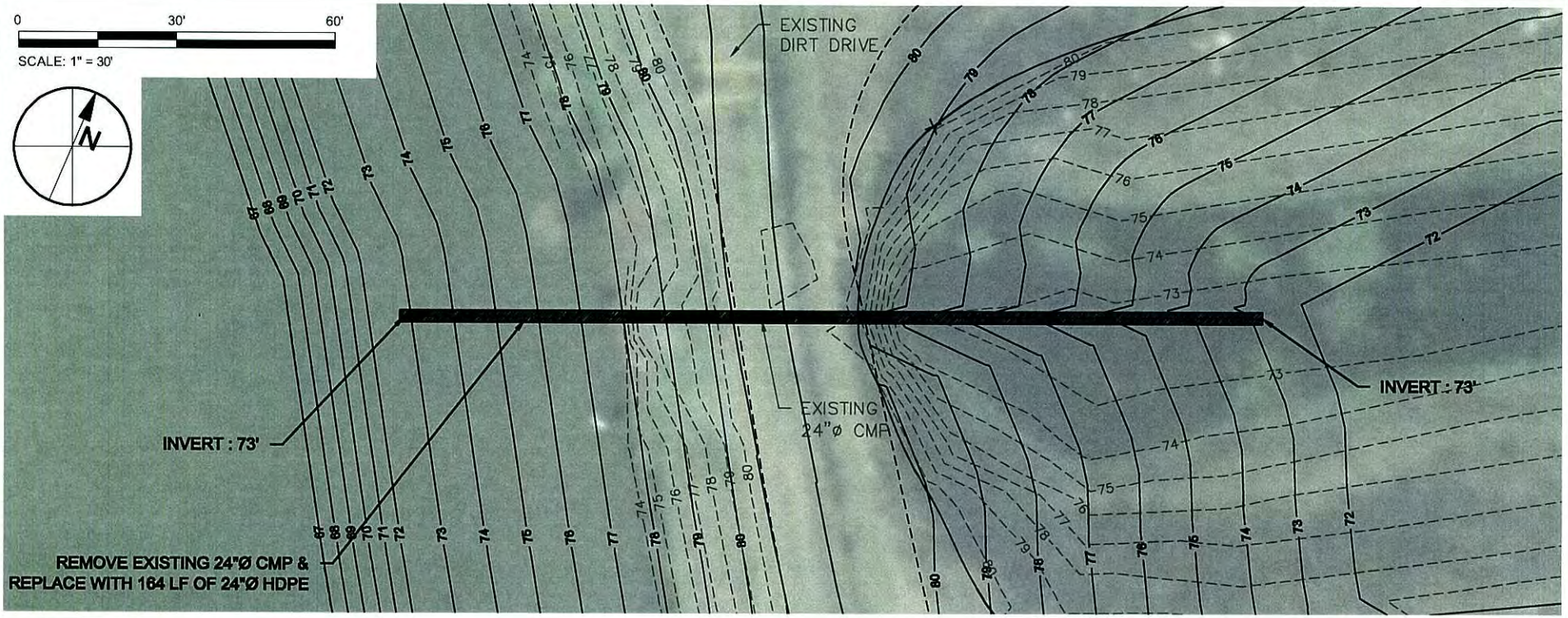
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PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

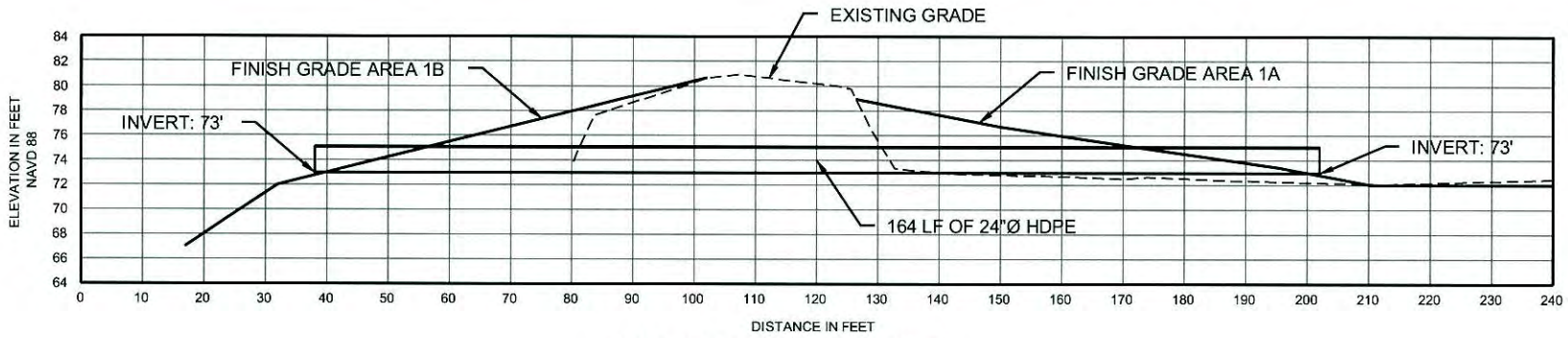
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CULVERT 1B - PROFILE

SCALE: 1" = 30'
V-SCALE: 1" = 15'
0 30'

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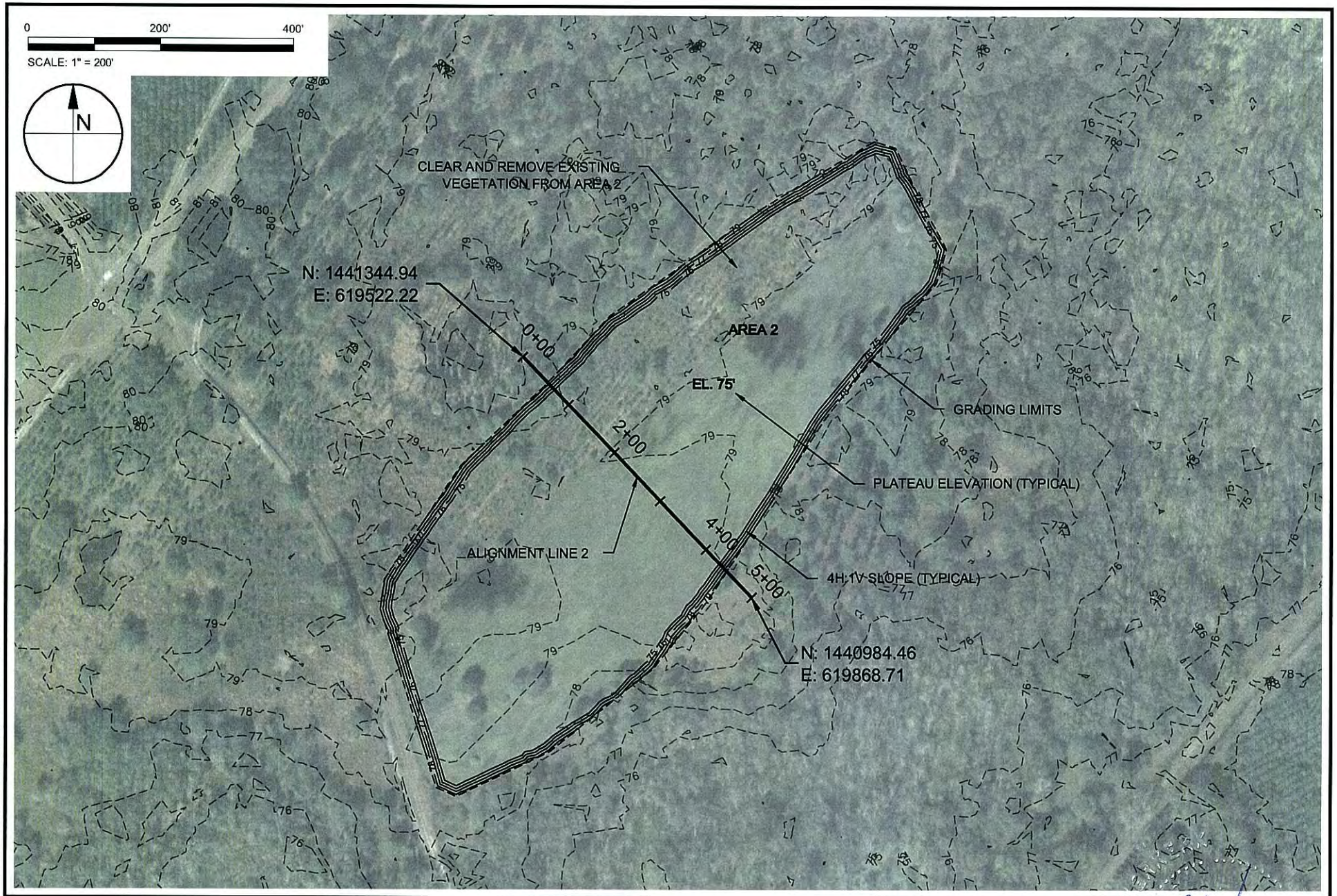
CULVERT 1B - AREA 1B
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
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GRADING PLAN - AREA 2
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
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SHEET	12 of 31
DATE	JUNE 2011

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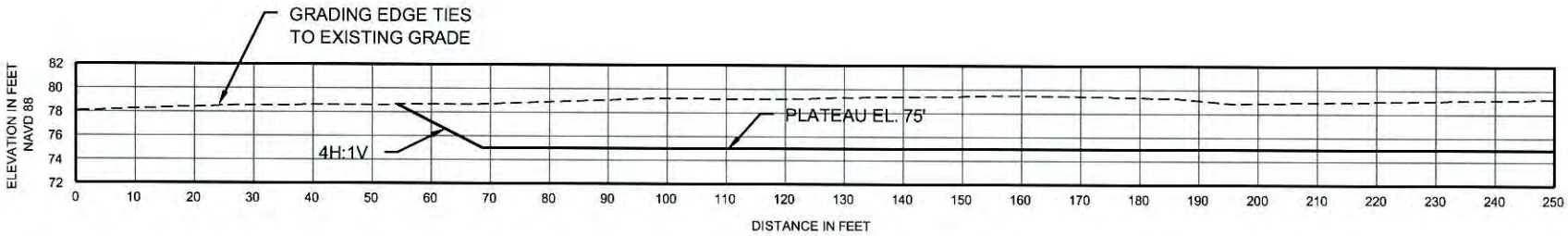
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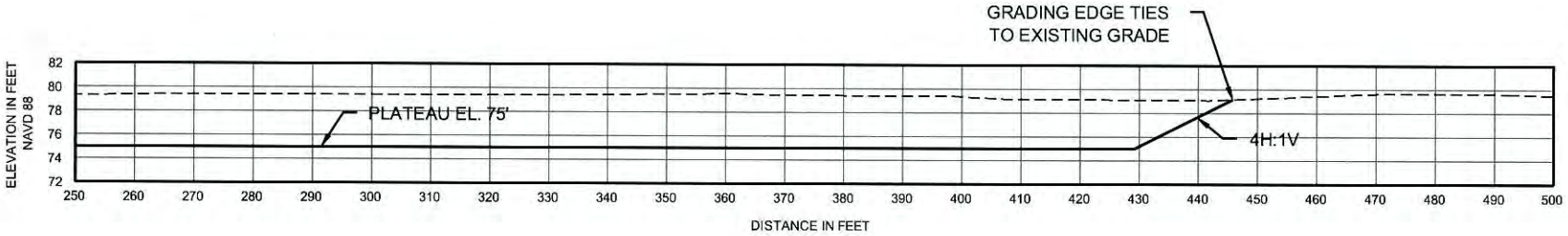
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2
11

GRADING AREA 2 - PROFILE ALONG ALIGNMENT LINE 2

SCALE: 1" = 30'
V-SCALE: 1" = 15'

0 30'

LEGEND:

EXISTING GRADE
PROPOSED GRADE

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PROFILE ALIGNMENT LINE 2
PROGRESS ENERGY MITIGATION PROJECT
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PASCO COUNTY, FLORIDA

PROJECT	C2011-025
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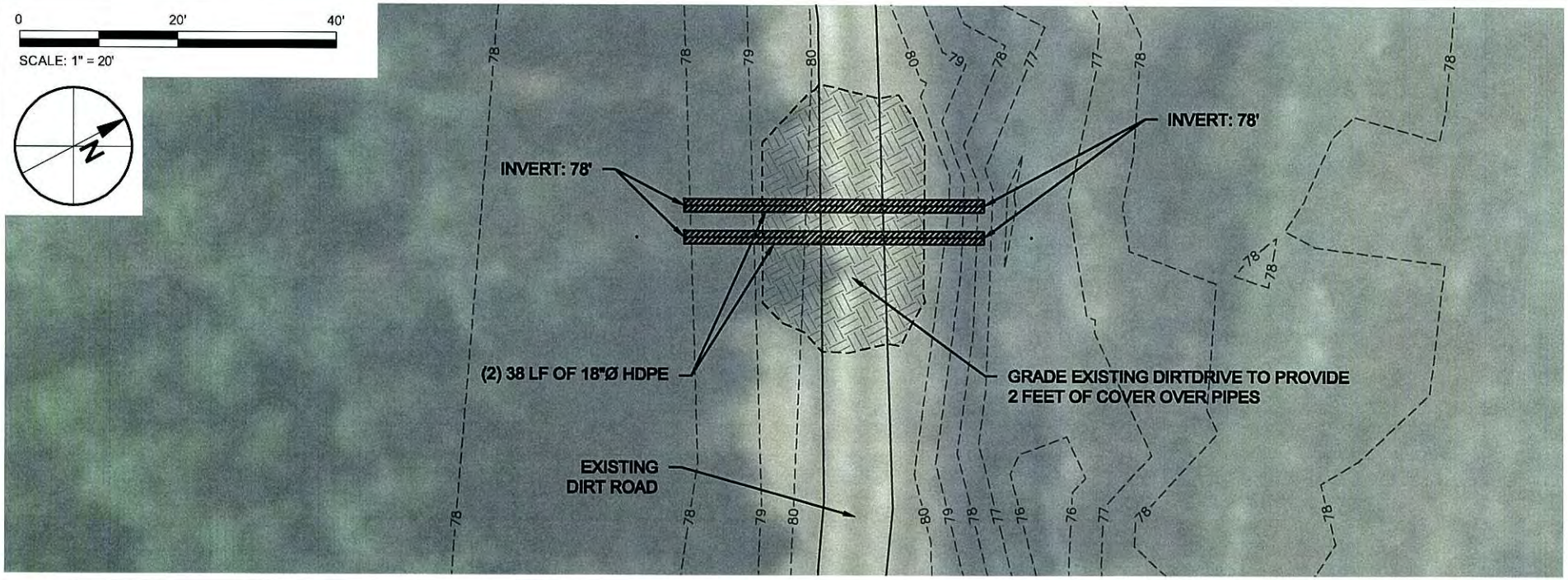
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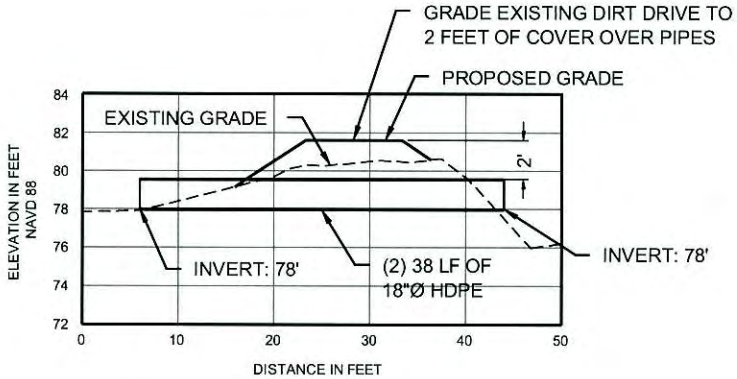
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CULVERT 2 - PROFILE

SCALE: 1" = 20'
V-SCALE: 1" = 10'

0 20'

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CULVERT 2 - AREA 2
PROGRESS ENERGY MITIGATION PROJECT
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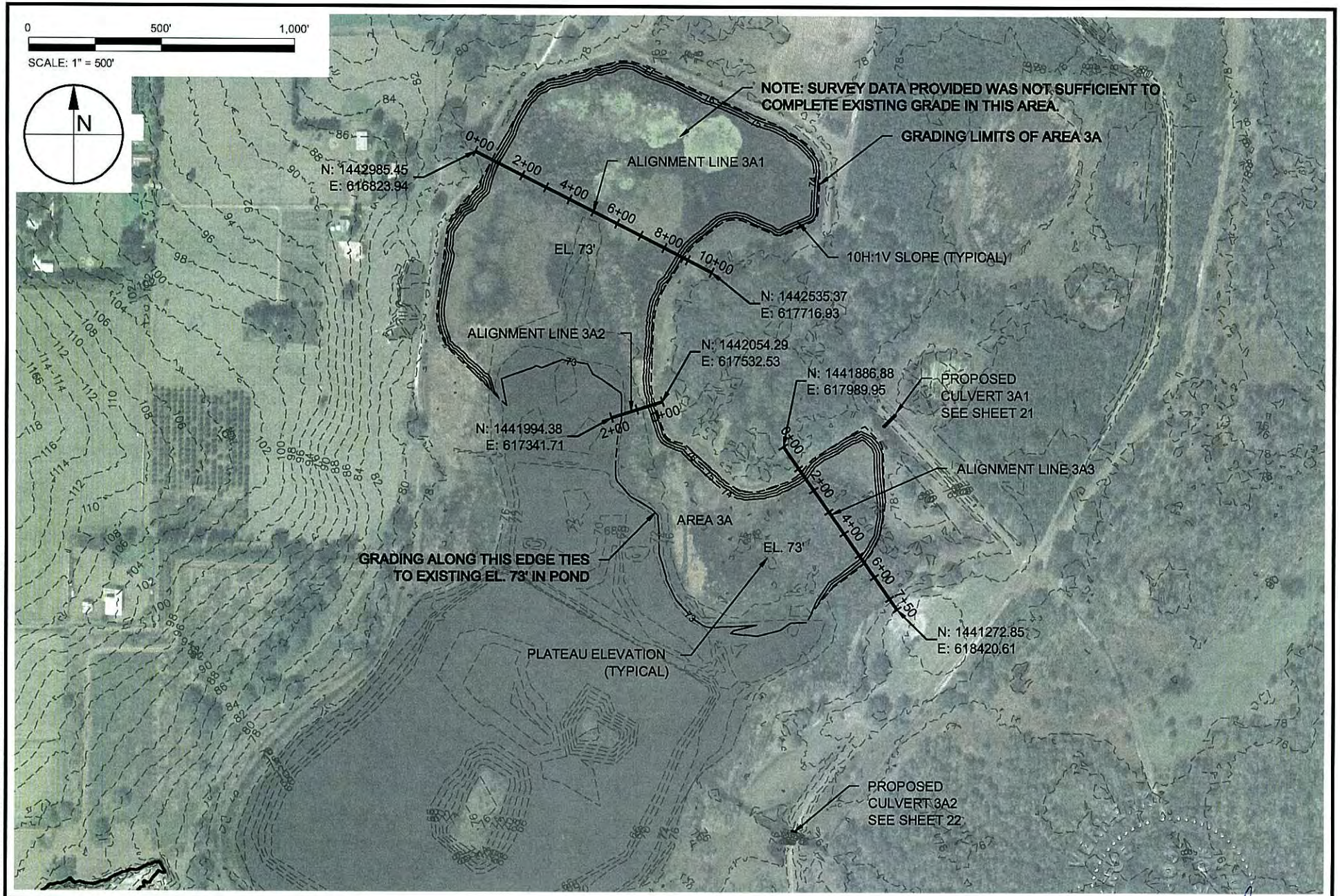
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HUGH C. VERKERK P.E. # 38031 DATE 9/26/11

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TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

GRADING PLAN - AREA 3A
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ / CAS
SHEET	15 of 31
DATE	JUNE 2011

SEAL

#28031

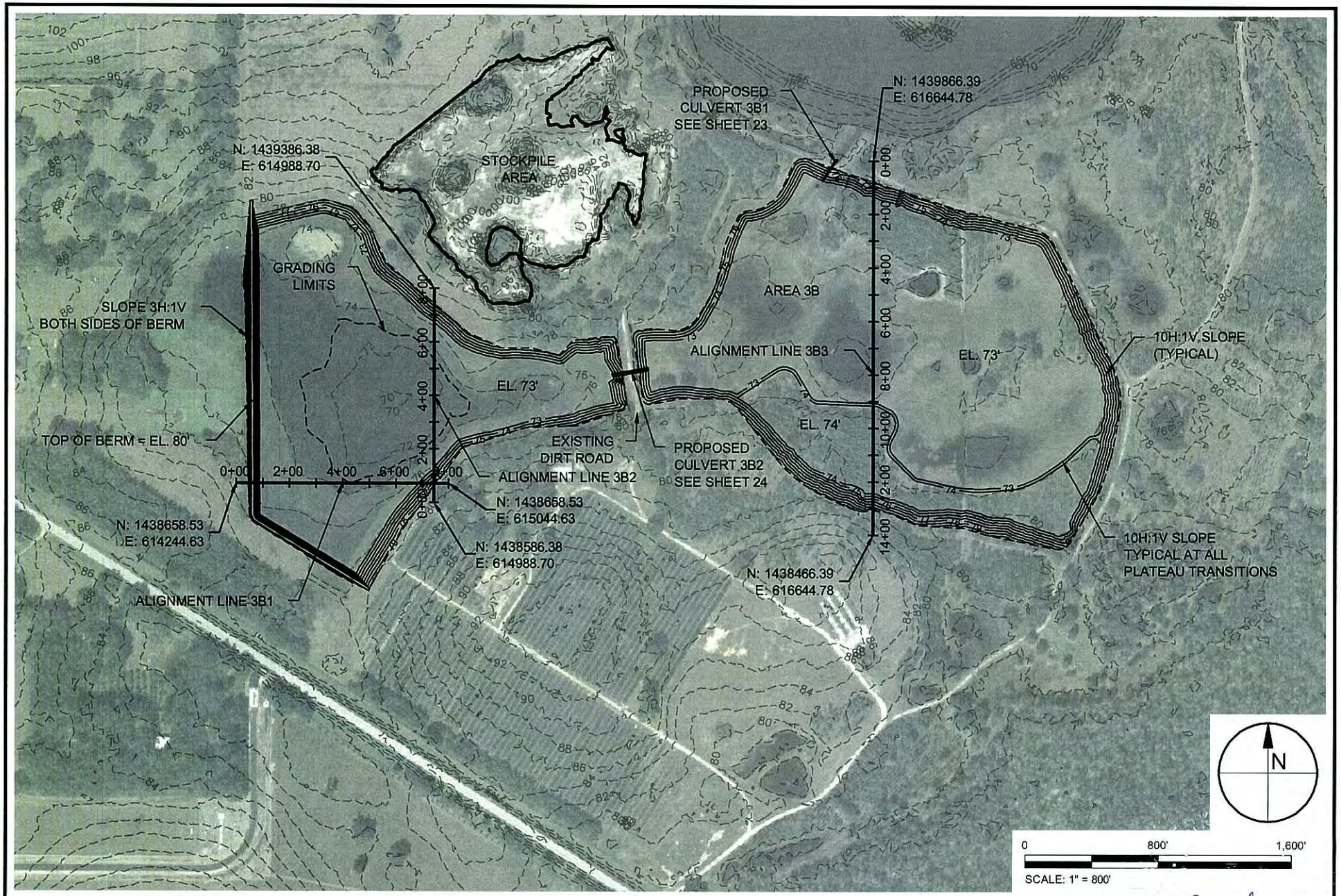
HUGH C. VERKERK P.E. #

9/20/11

DATE

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

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TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

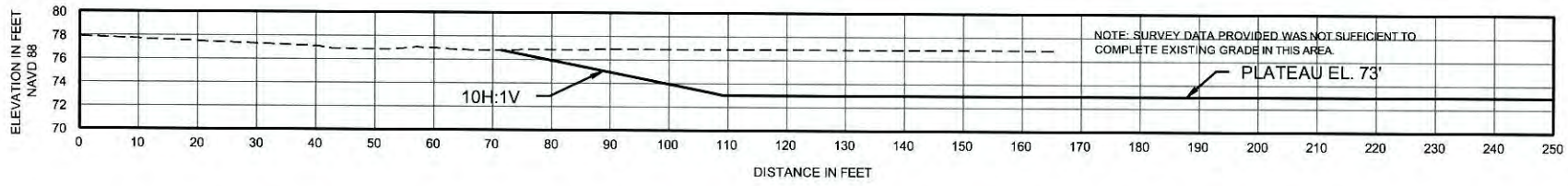
GRADING PLAN - AREA 3B
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

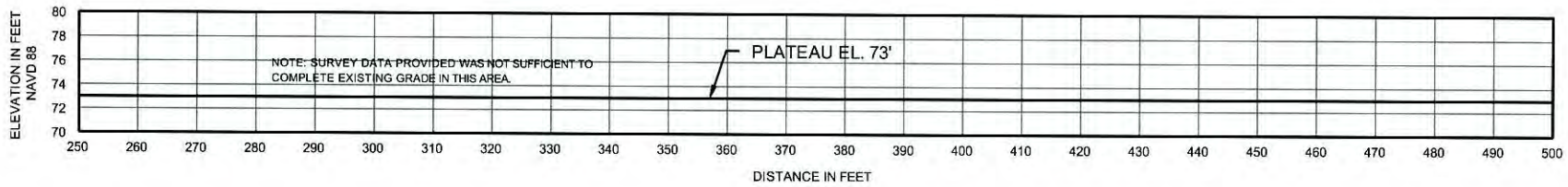
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DRAWN BY	RLJ / CAS
SHEET	16 of 31
DATE	JUNE 2011

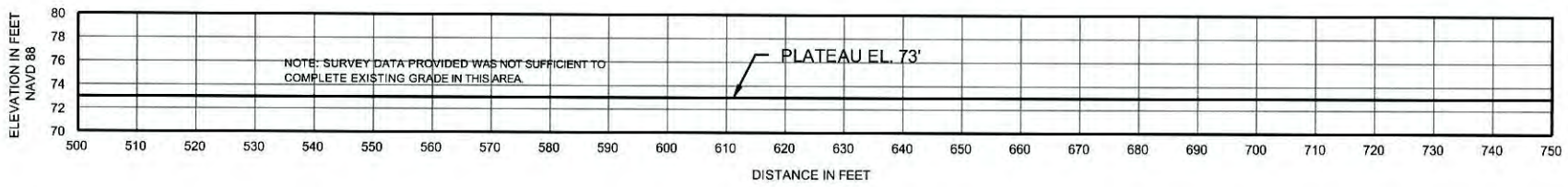
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#38031
9/20/11
HUGH C. VERKERK P.E. # DATE

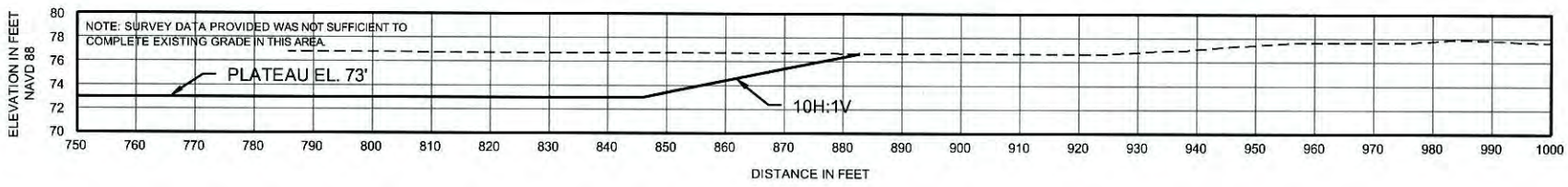
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PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.









3A1
14

GRADING AREA 3A - PROFILE ALONG ALIGNMENT LINE 3A1

SCALE: 1" = 30'
V-SCALE: 1" = 15'

0 30'

LEGEND:

EXISTING GRADE
PROPOSED GRADE

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

PROFILE ALIGNMENT LINE 3A1
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ / CAS
SHEET	17 of 31
DATE	JUNE 2011

SEAL

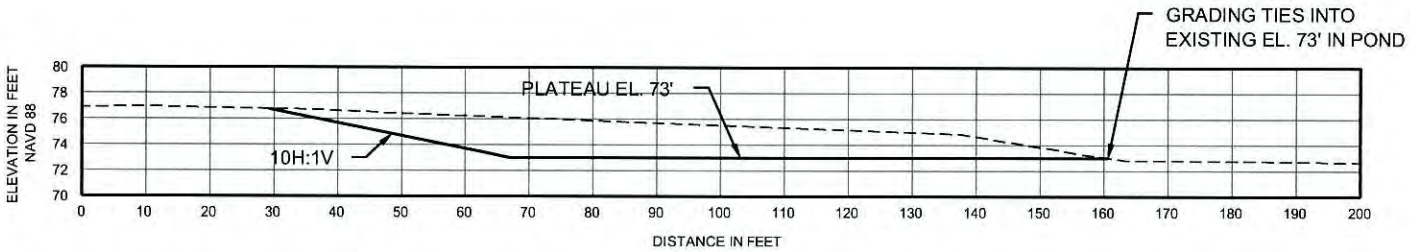
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9/26/11

HUGH C. KERKER P.E. # DATE

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3A2
14

GRADING AREA 3A - PROFILE ALONG ALIGNMENT LINE 3A2

SCALE: 1" = 30'
V-SCALE: 1" = 15'

0 30'

LEGEND:

--------- EXISTING GRADE
——————— PROPOSED GRADE

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10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

PROFILE ALIGNMENT LINE 3A2
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

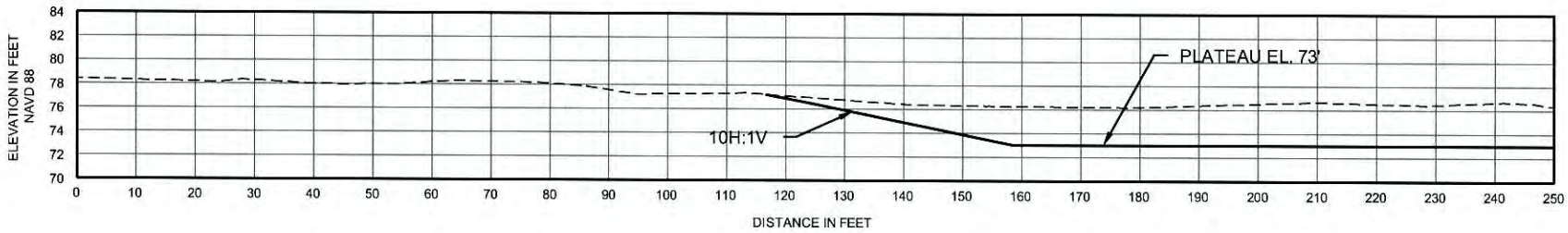
PROJECT	C2011-025
DRAWN BY	RLJ / CAS
SHEET	18 of 31
DATE	JUNE 2011

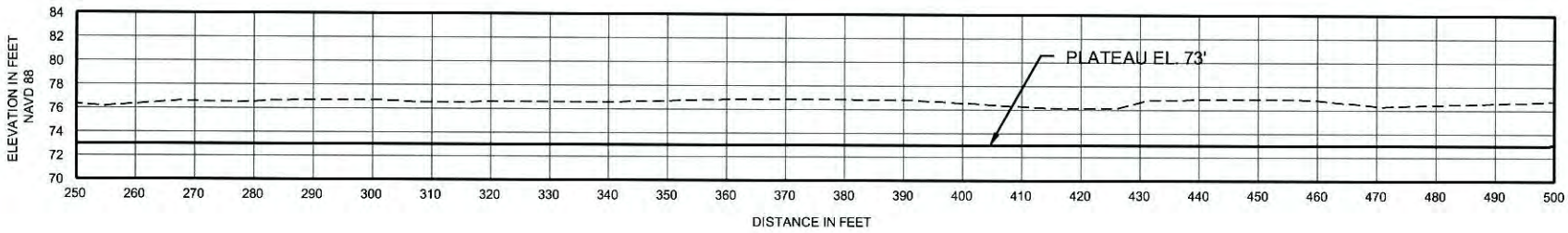
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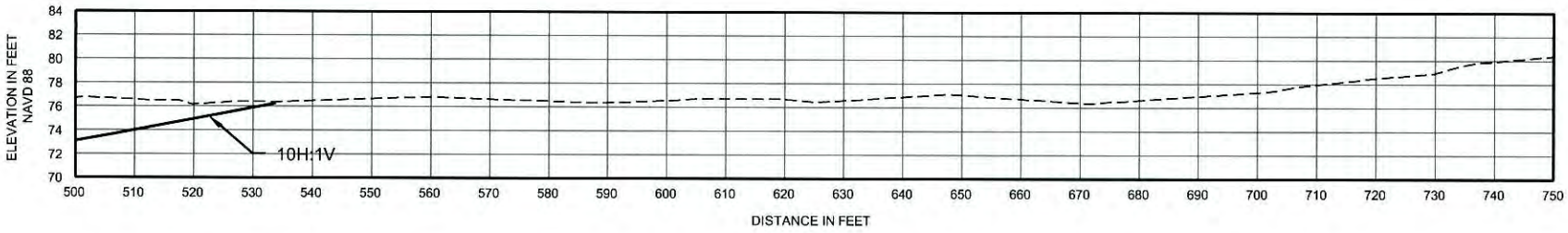
HUGH C. VERKERK P.E. # 38031 9/20/11 DATE

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3A3 / 14

GRADING AREA 3A - PROFILE ALONG ALIGNMENT LINE 3A3

SCALE: 1" = 30'
V-SCALE: 1" = 15'

0 30'

LEGEND:

EXISTING GRADE
PROPOSED GRADE

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

PROFILE ALIGNMENT LINE 3A3
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ / CAS
SHEET	19 of 31
DATE	JUNE 2011

SEAL

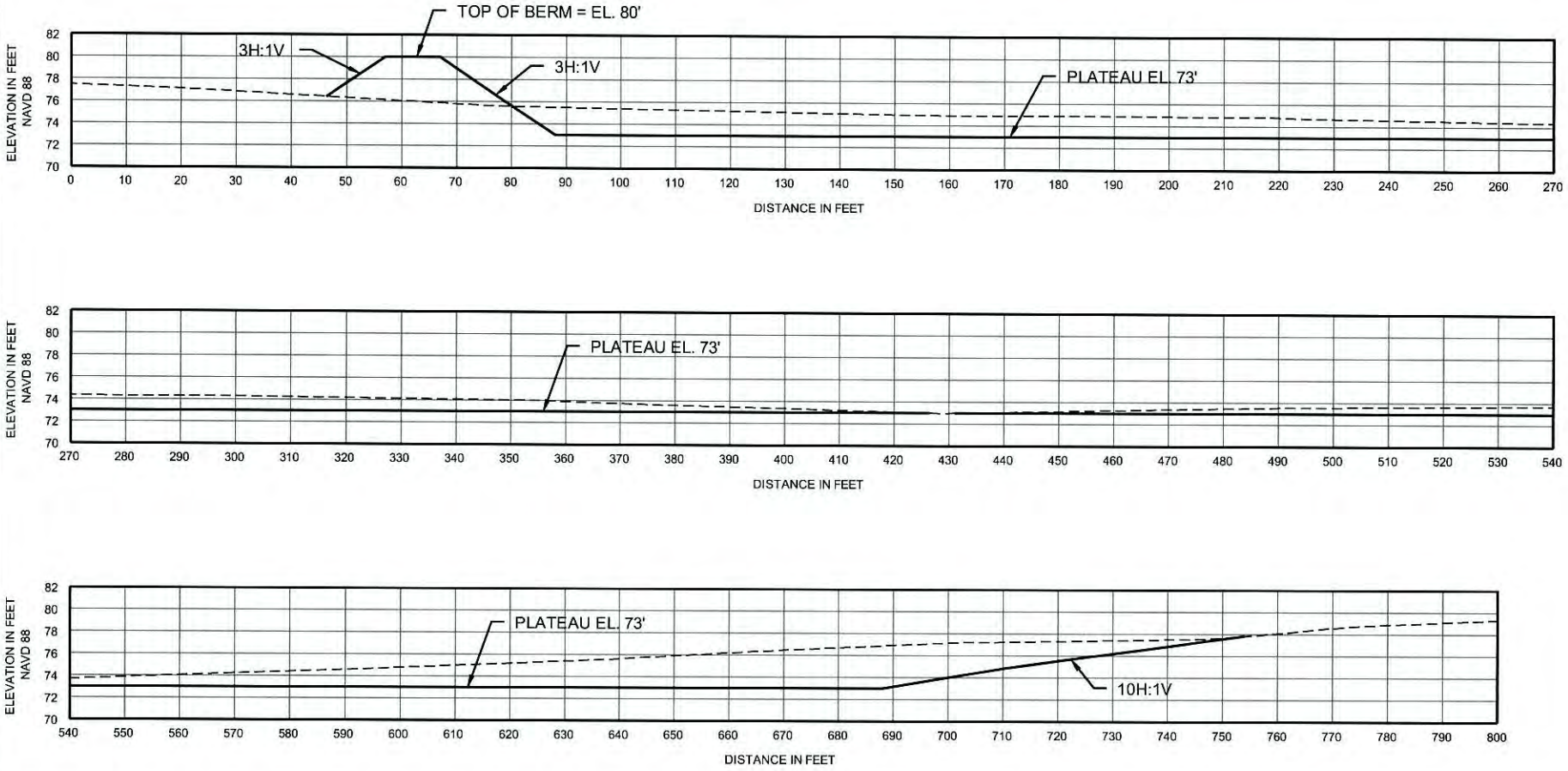
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9/26/11

HUGH C. VERKERK P.E. # DATE

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3B1 / 14

GRADING AREA 3B - PROFILE ALONG ALIGNMENT LINE 3B1

SCALE: 1" = 30'
V-SCALE: 1" = 15'

0 30'

LEGEND:

EXISTING GRADE
PROPOSED GRADE

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

PROFILE ALIGNMENT LINE 3B1
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

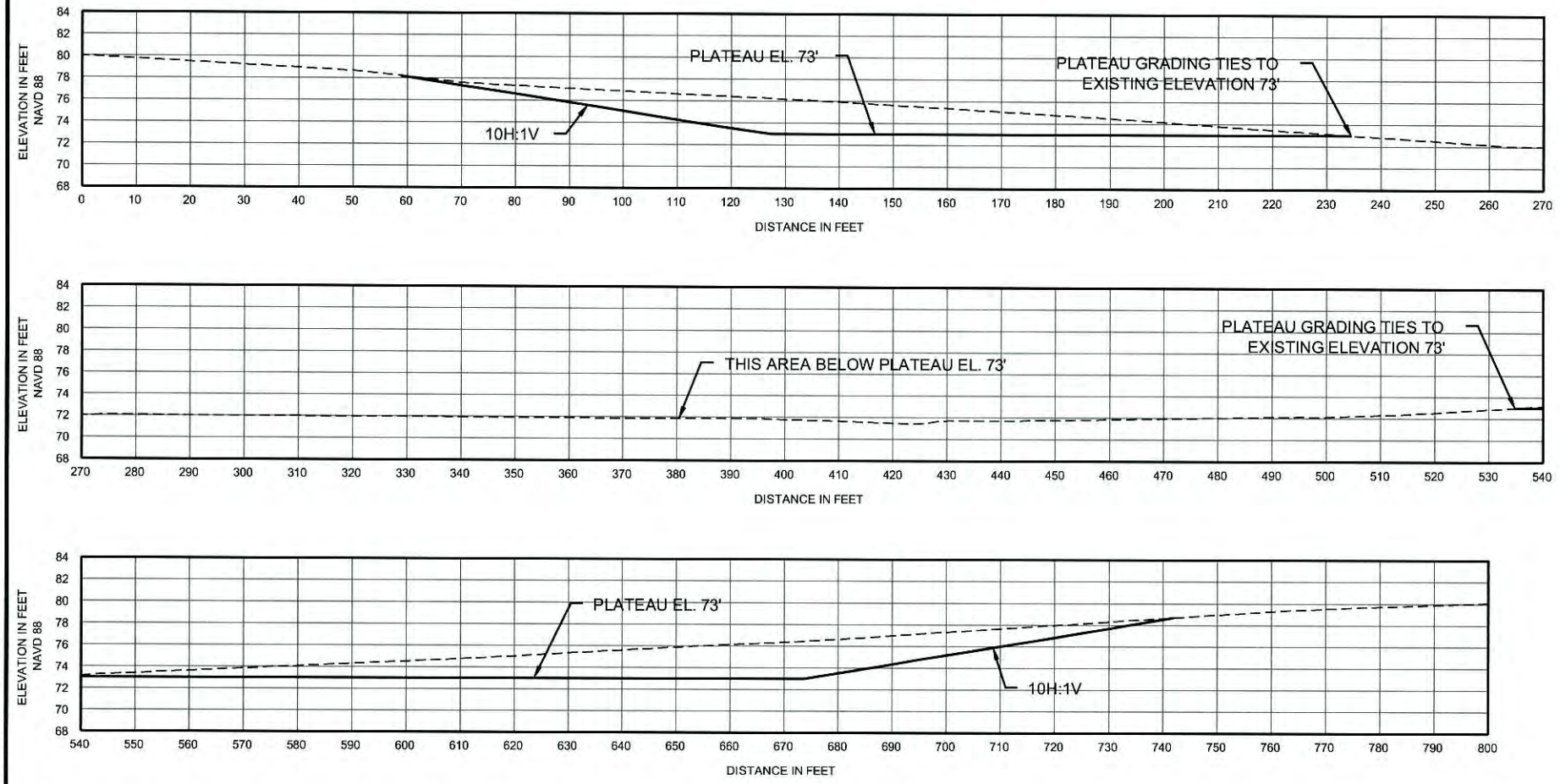
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DATE	JUNE 2011

SEAL

HUGH C. VERKERK P.E. # 48031 DATE 9/20/11

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3B2 / 14

GRADING AREA 3B - PROFILE ALONG ALIGNMENT LINE 3B2

SCALE: 1" = 30'
V-SCALE: 1" = 15'

0 30'

LEGEND:

EXISTING GRADE
PROPOSED GRADE

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

PROFILE ALIGNMENT LINE 3B2
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ / CAS
SHEET	21 of 31
DATE	JUNE 2011

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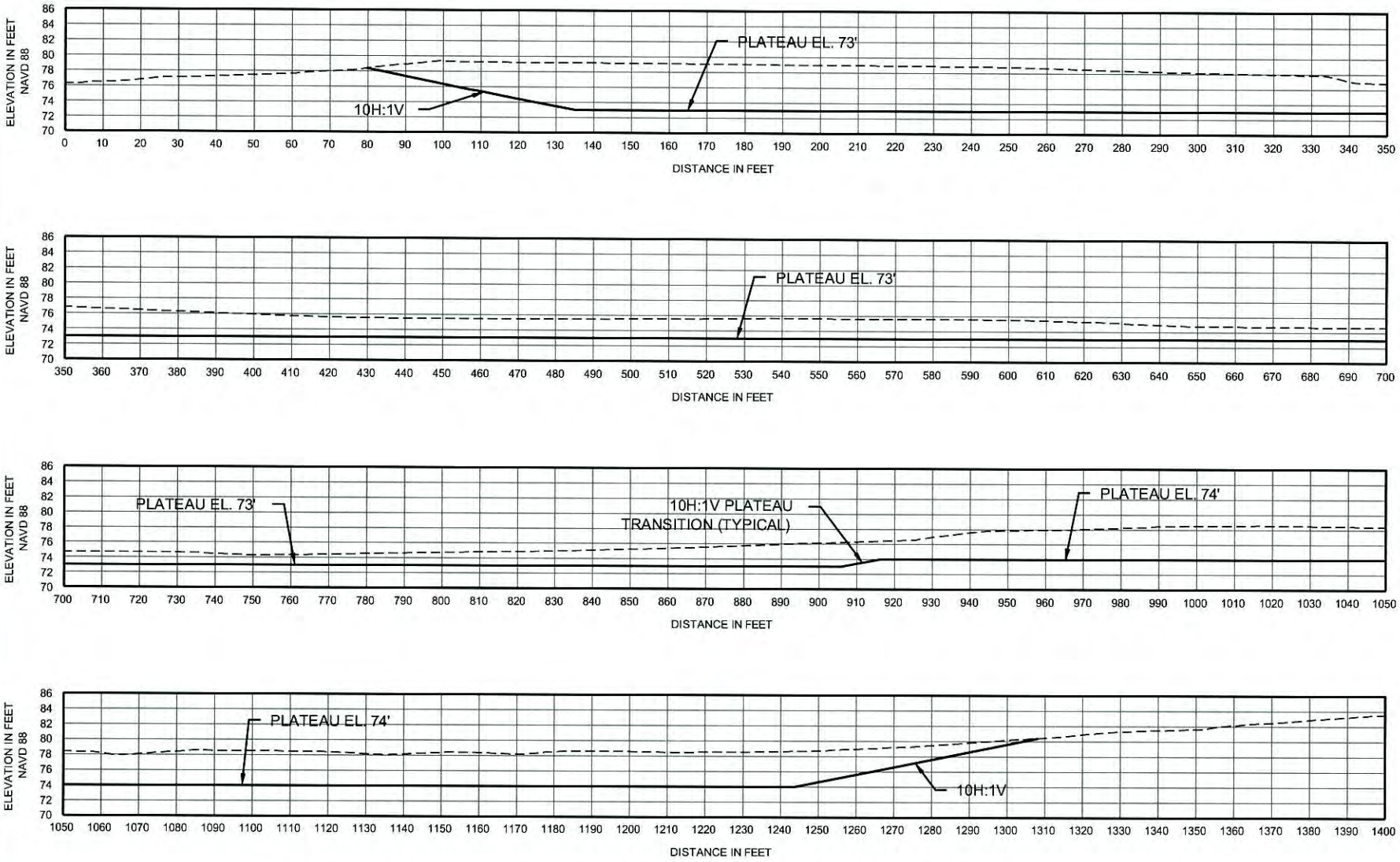
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HUGH C VERKERK P.E. #

9/20/11
DATE

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3B3 / 14

GRADING AREA 3B - PROFILE ALONG ALIGNMENT LINE 3B3

SCALE: 1" = 30'
V-SCALE: 1" = 15'

0 — 30'

LEGEND:

- EXISTING GRADE
- PROPOSED GRADE

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

PROFILE ALIGNMENT LINE 3B3
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

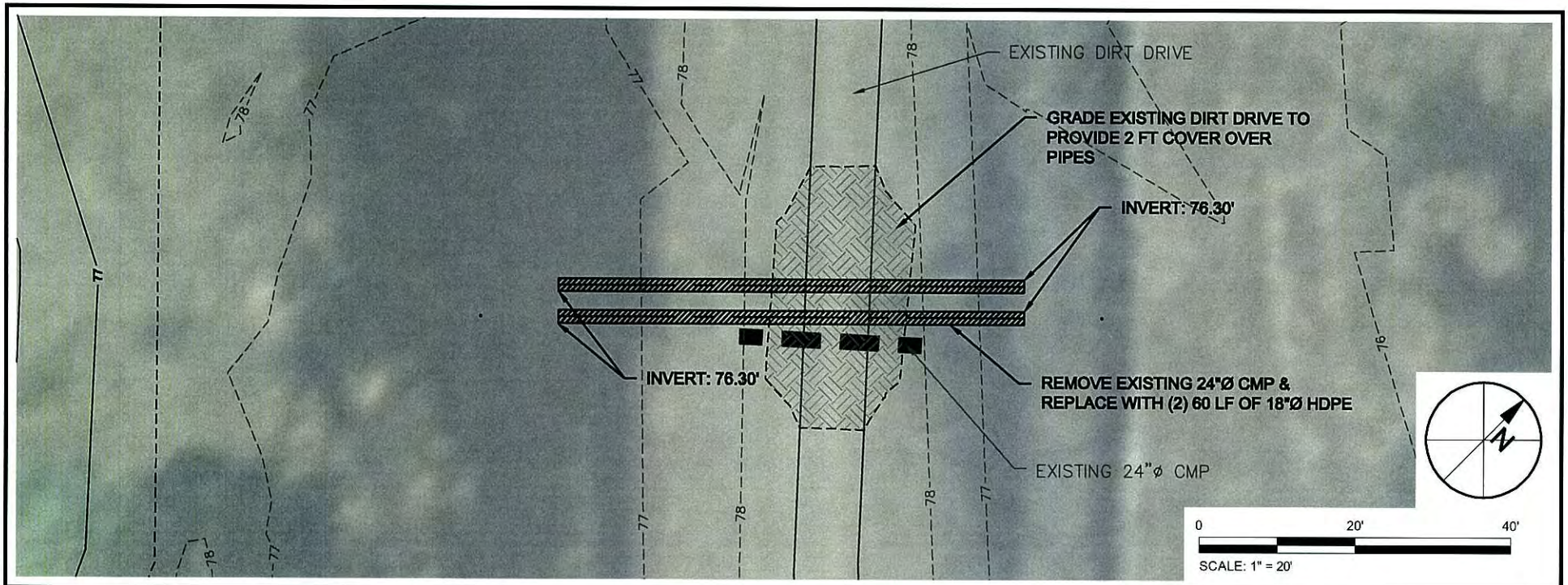
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SHEET	22 of 31
DATE	JUNE 2011

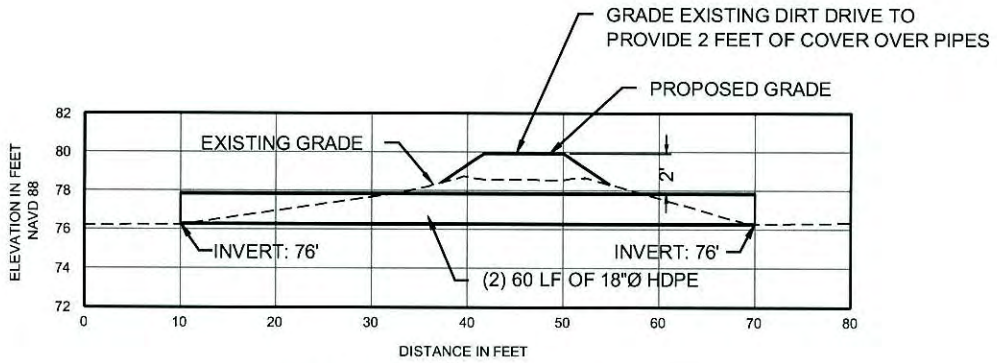
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HUGH C. VERKERK P.E. # 38031 — DATE 9/20/11

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CULVERT 3A1 - PROFILE

SCALE: 1" = 20'
V-SCALE: 1" = 10'

0 20'

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CULVERT 3A1 - AREA 3A
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

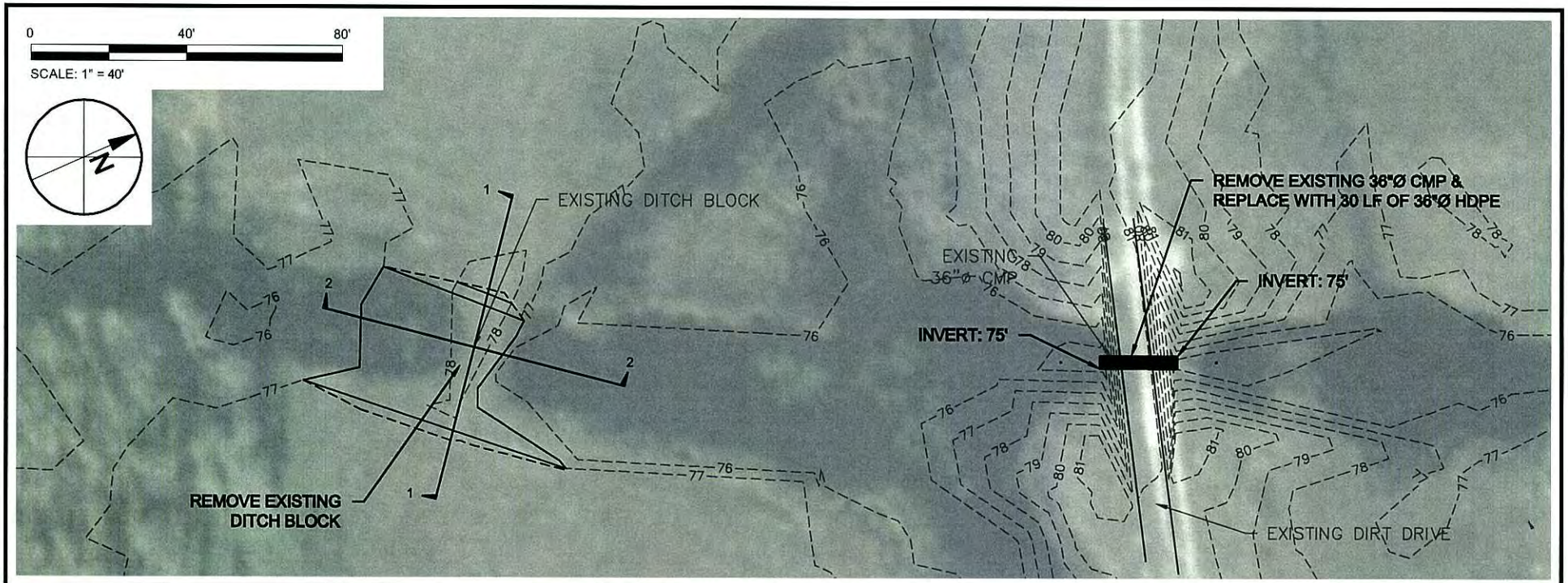
PROJECT	C2011-025
DRAWN BY	RLJ / CAS
SHEET	23 of 31
DATE	JUNE 2011

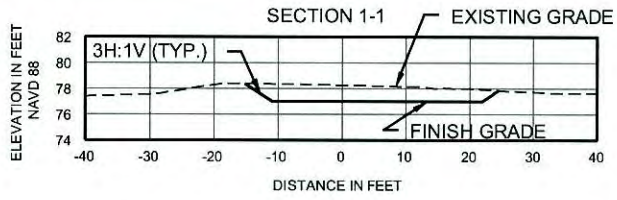
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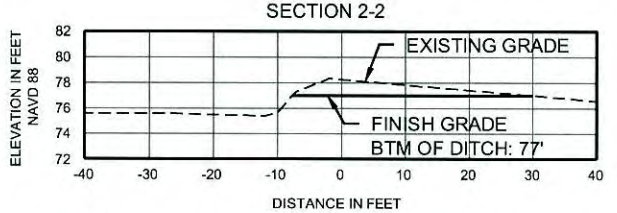
HUGH C. VERKERK P.E. # 38431 9/20/11 DATE

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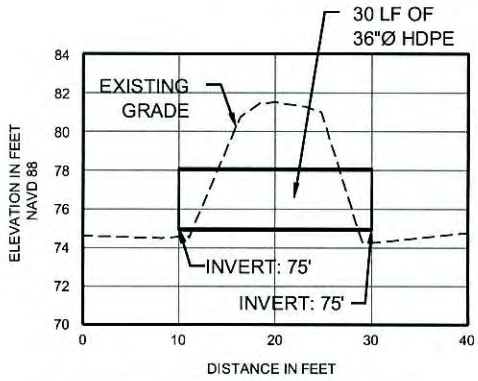






DITCH BLOCK REMOVAL SECTIONS

SCALE: 1" = 20'
V-SCALE: 1" = 10'
0 20'



CULVERT 3A2 - PROFILE

SCALE: 1" = 20'
V-SCALE: 1" = 10'
0 20'

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JACKSONVILLE, FL 32256
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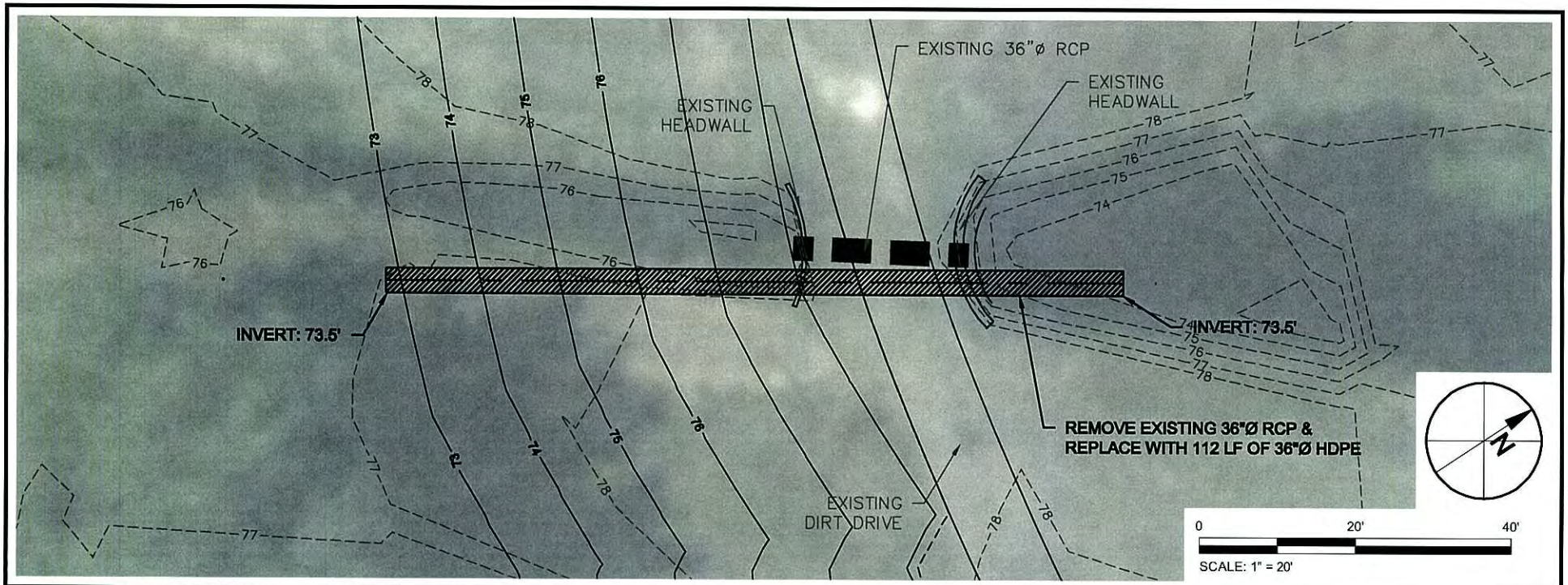
CULVERT 3A2 & DITCH BLOCK REMOVAL - AREA 3A
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

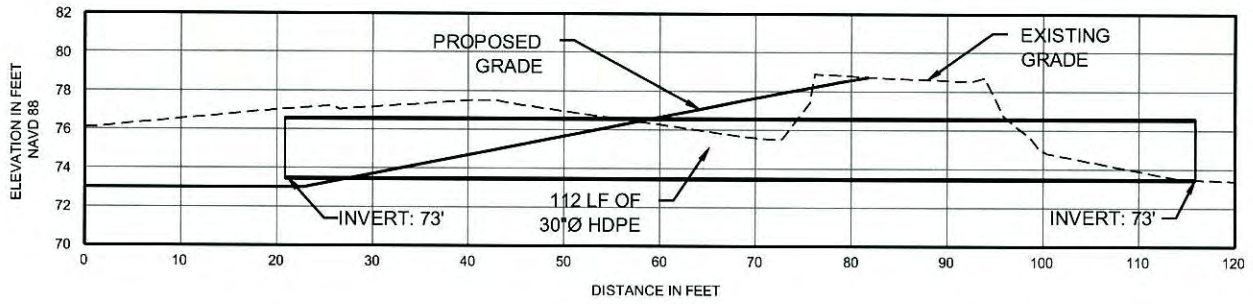
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DRAWN BY	RLJ / CAS
SHEET	24 of 31
DATE	JUNE 2011

SEAL
#58031
9/20/11
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CULVERT 3B1 - PROFILE

SCALE: 1" = 20'
V-SCALE: 1" = 10'
0 20'

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

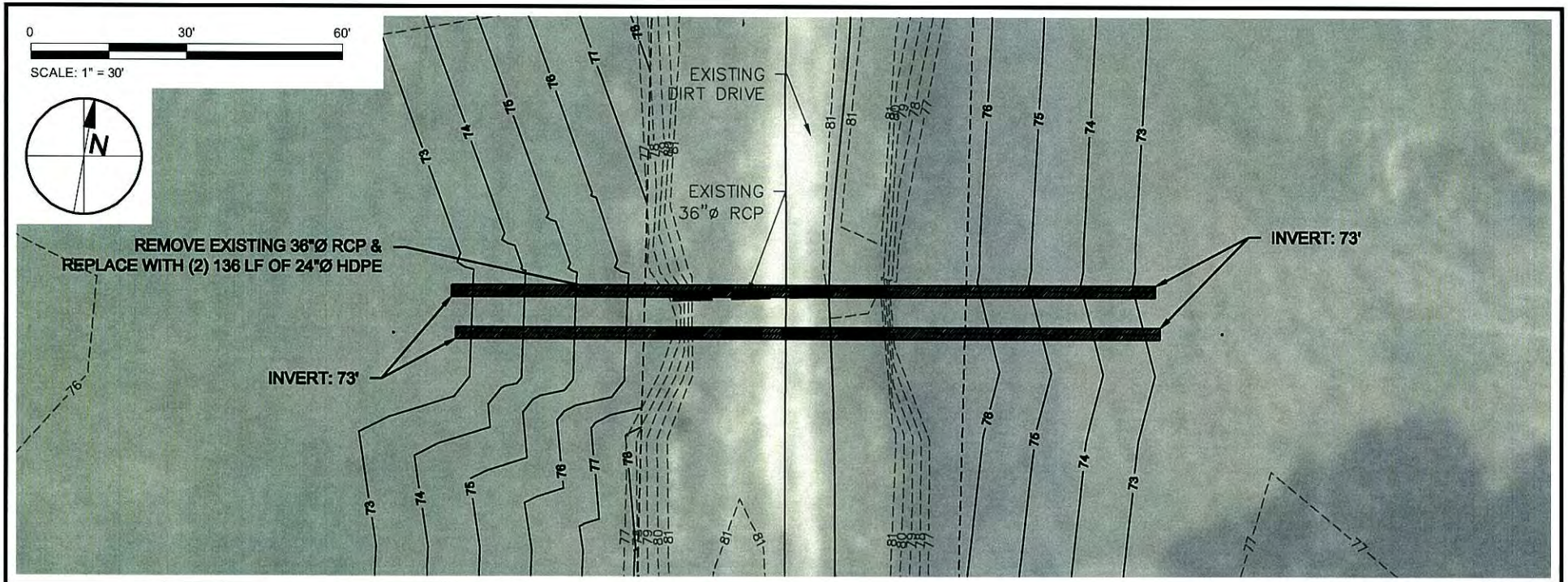
CULVERT 3B1 - AREA 3B
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

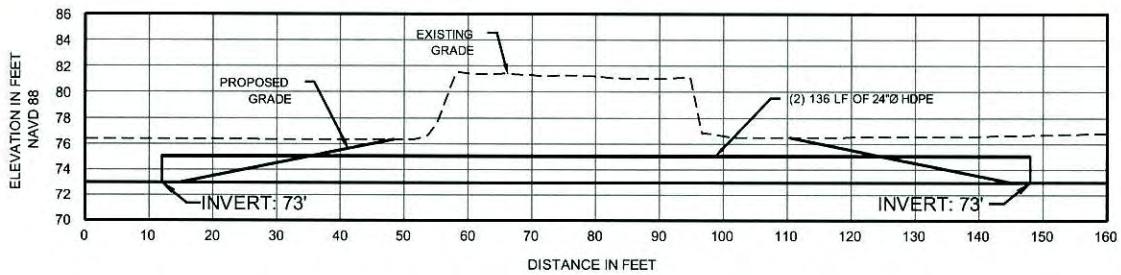
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SHEET	25 of 31
DATE	JUNE 2011

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#38034
9/20/11
HUGH C. VERKERK P.E. # DATE

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CULVERT 3B2 - PROFILE

SCALE: 1" = 30'
V-SCALE: 1" = 15'

0 30'

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10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

CULVERT 3B2 - AREA 3B
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ / CAS
SHEET	26 of 31
DATE	JUNE 2011

SEAL

#38031
9/20/11

HUGH C. VERKERK P.E. # DATE

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EROSION CONTROL AND GENERAL VEGETATION NOTES:

1. THE CONTRACTOR SHALL IMPLEMENT AND MAINTAIN EROSION CONTROL MEASURES AS NECESSARY TO COMPLY WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS AND COMPLY WITH STATE WATER QUALITY CRITERIA FOR STORMWATER DISCHARGE. EROSION CONTROL MEASURES INCLUDE BUT ARE NOT LIMITED TO TURBIDITY SCREENS, MULCHING, HAY BALES, AND SILT FENCE. IF A WATER QUALITY VIOLATION OCCURS, THE CONTRACTOR SHALL BE WHOLLY RESPONSIBLE FOR ALL DAMAGE AND ALL COSTS WHICH MAY RESULT INCLUDING LEGAL FEES, CONSTRUCTION COSTS, AND FINES.

2. DISTURBED AREAS SHALL BE VEGETATED, FERTILIZED, MULCHED, AND MAINTAINED IN ACCORDANCE WITH PROJECT SPECIFICATIONS AND CITY, COUNTY, STATE, AND FEDERAL REQUIREMENTS.

3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING PERMANENT VEGETATION AT ALL DISTURBED AREAS PER NPDES FINAL STABILIZATION REQUIREMENTS.

4. EROSION CONTROL MEASURES SHALL BE MAINTAINED FOR THE ENTIRE DURATION OF THE PROJECT OR UNTIL PERMANENT VEGETATION IS ESTABLISHED.

5. EROSION CONTROL MEASURES SHALL BE PLACED TO CONTAIN ALL POINTS OF DISCHARGE TO SURFACE WATERS OR WETLANDS INCLUDING CURB INLETS, DITCH BOTTOM INLETS, DITCHES, AND DOWNSTREAM PORTIONS OF NATURAL DRAINAGE PATHWAYS, STREAMS, CANALS, AND TIDAL WATERS ADJACENT TO CONSTRUCTION.

6. 48 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION, THE CONTRACTOR WILL SUBMIT A "NOTICE OF INTENT" TO THE EPA IN ACCORDANCE WITH NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM RULES AND REGULATIONS.

7. THE SITE CONTRACTOR IS RESPONSIBLE FOR REMOVING THE TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES AFTER COMPLETION OF CONSTRUCTION AND ONLY WHEN AREAS HAVE BEEN STABILIZED.

8. SILT FENCES AND FILTER BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

EROSION CONTROL NOTES
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ / CAS
SHEET	27 of 31
DATE	JUNE 2011

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#38031

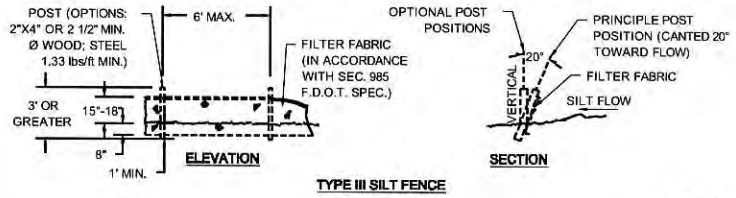
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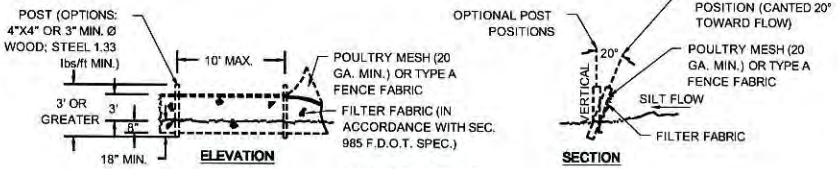
DATE

REBECCA JOHNSON X:\SYS\PROJECTS\C2011-025 PROGRESS ENERGY\PERMIT\BRIC\2011-025-P-BR-EROSION NOTES.DWG 9/20/2011 11:05:12 AM

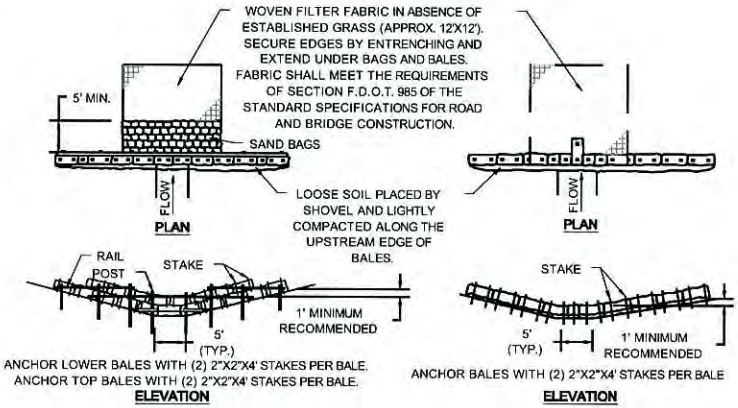
PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



TYPE III SILT FENCE



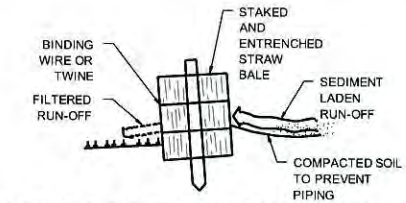
TYPE IV SILT FENCE



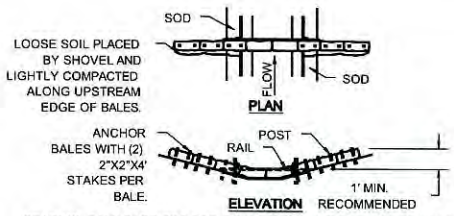
APPLICATION AND SPACING OF TYPES I & TYPES II HAY BALE BARRIERS SALL BE IN ACCORDANCE WITH SHEET 1 OF 3, F.D.O.T. INDEX NO. 102

TYPE II **TYPE I**

TYPICAL STRAW BALE DETAIL

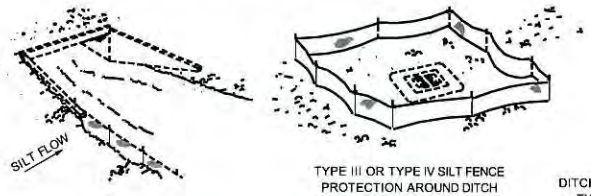


CROSS SECTION OF A PROPERLY INSTALLED STRAW BALE



SPACING: BALE BARRIERS FOR PAVED DITCHES SHOULD BE SPACED IN ACCORDANCE WITH CHART I, SHEET 1 OF 3, INDEX NO. 102 OF THE F.D.O.T. ROADWAY AND TRAFFIC DESIGN STANDARDS.

STRAW BALE BARRIER FOR PAVED DITCH



TYPE III OR TYPE IV SILT FENCE PROTECTION AROUND DITCH BOTTOM INLETS.

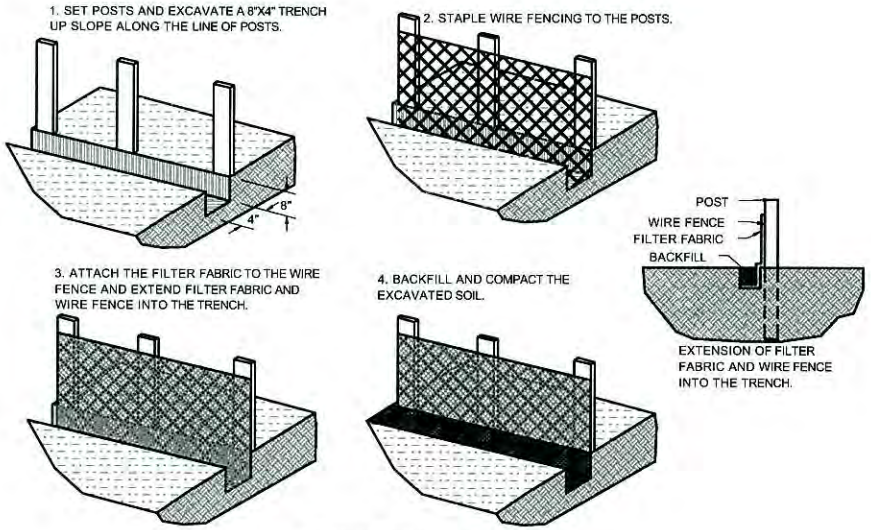
TYPE III OR TYPE IV SILT FENCE



TYPE III AND IV SILT FENCE

DITCH INSTALLATION AND SPACING FOR TYPE III & TYPE IV FENCE TO BE IN ACCORDANCE WITH SHEET 1 OF 3, OF THE F.D.O.T. INDEX NO. 102

DO NOT DEPLOY IN A MANNER THAT SILT FENCES WILL ACT AS A DAM ACROSS PERMANENT FLOWING WATERCOURSES. SILT FENCES ARE TO BE USED AT UPLAND LOCATIONS AND TURBIDITY BARRIERS USED AT PERMANENT BODIES OF WATER.



SILT FENCE INSTALLATION DETAILS

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10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

EROSION CONTROL DETAILS
PROGRESS ENERGY MITIGATION PROJECT
BOARSHEAD RANCH SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ / CAS
SHEET	28 of 31
DATE	JUNE 2011

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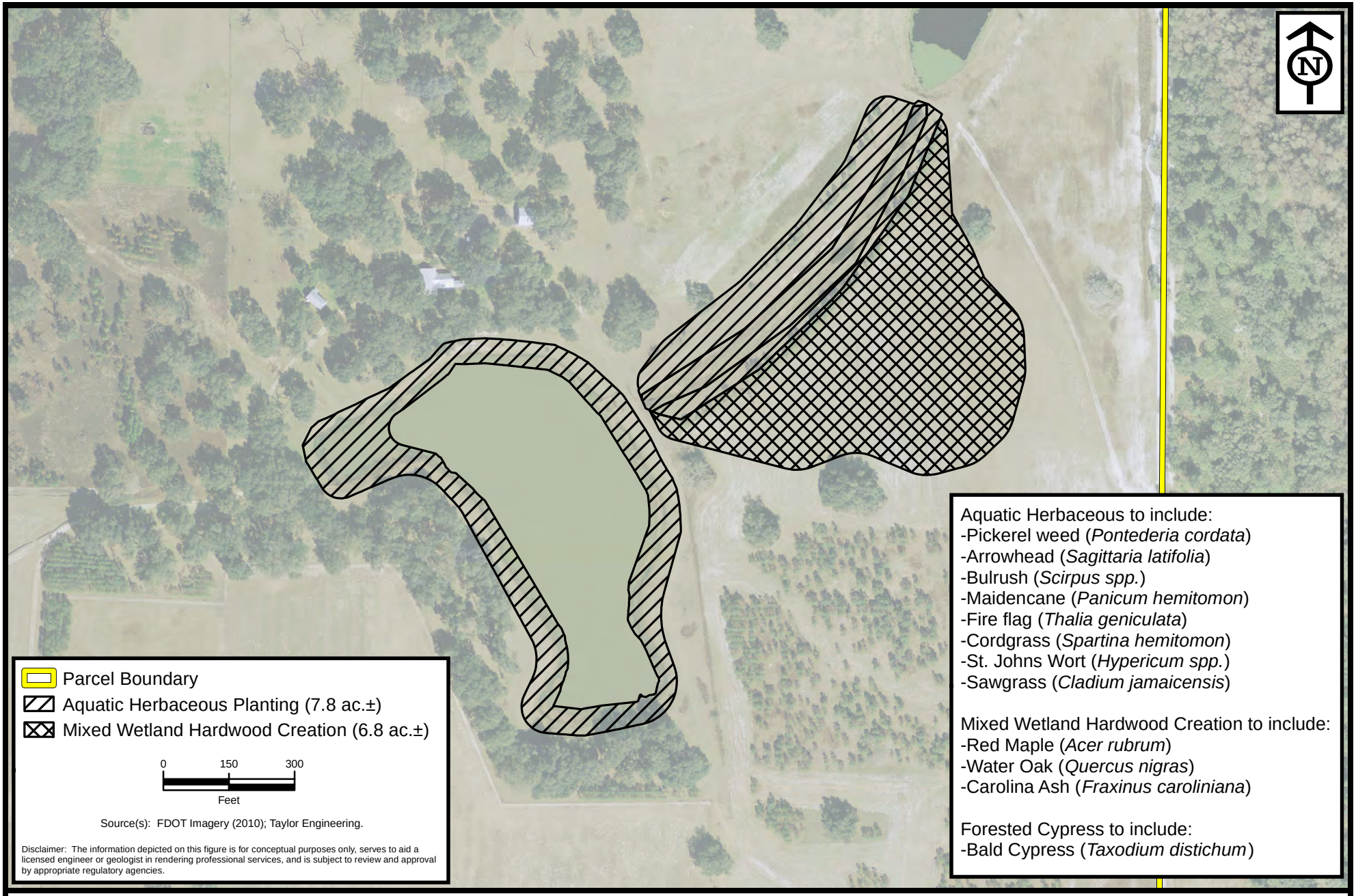
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HUGH C. VERKERK P.E. # DATE

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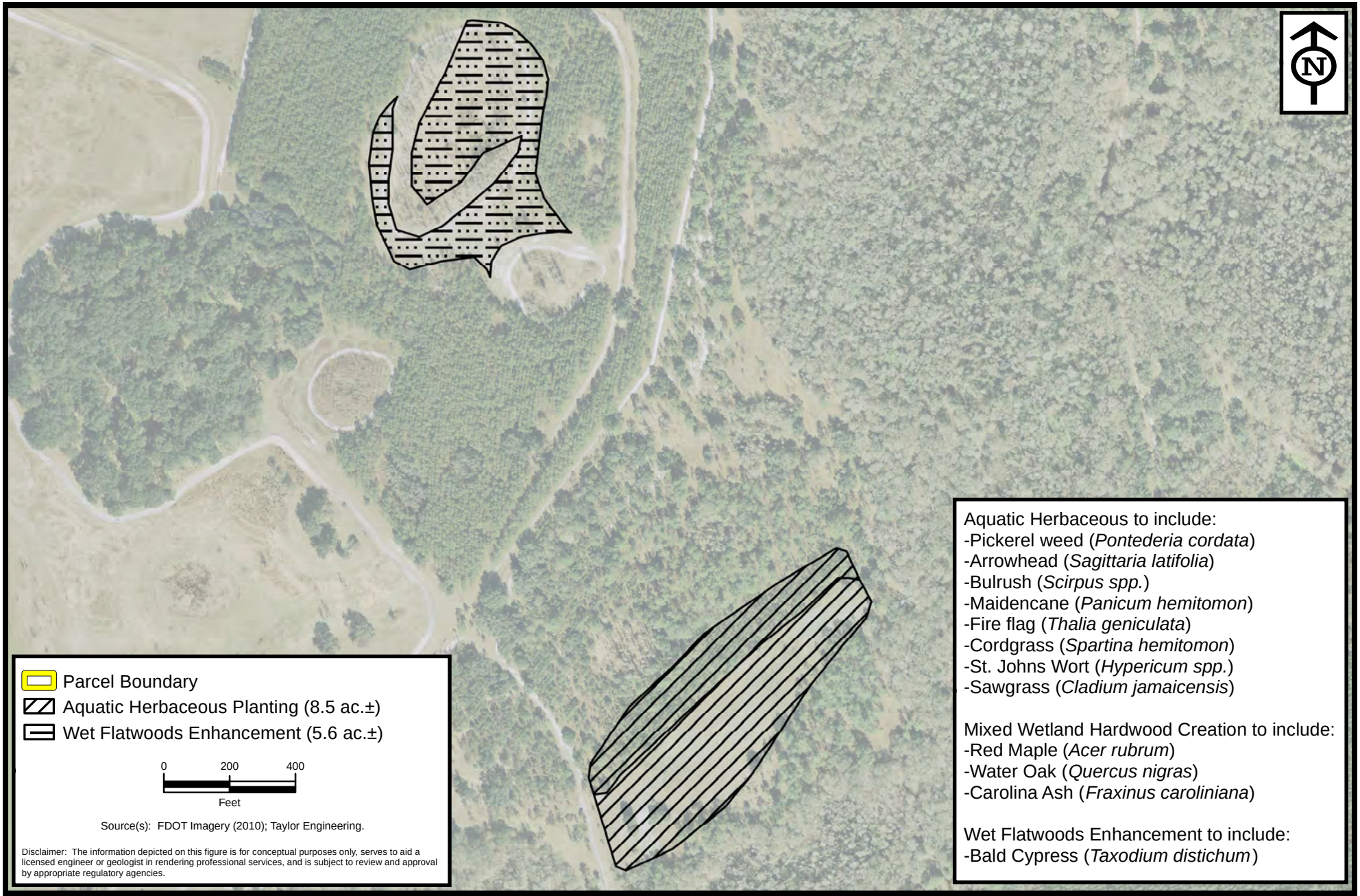
Proposed Planting Plan - Activity Area 1

Boarshead Ranch

Pasco County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JRN/SRJ
Sheet:	**29 of 31**

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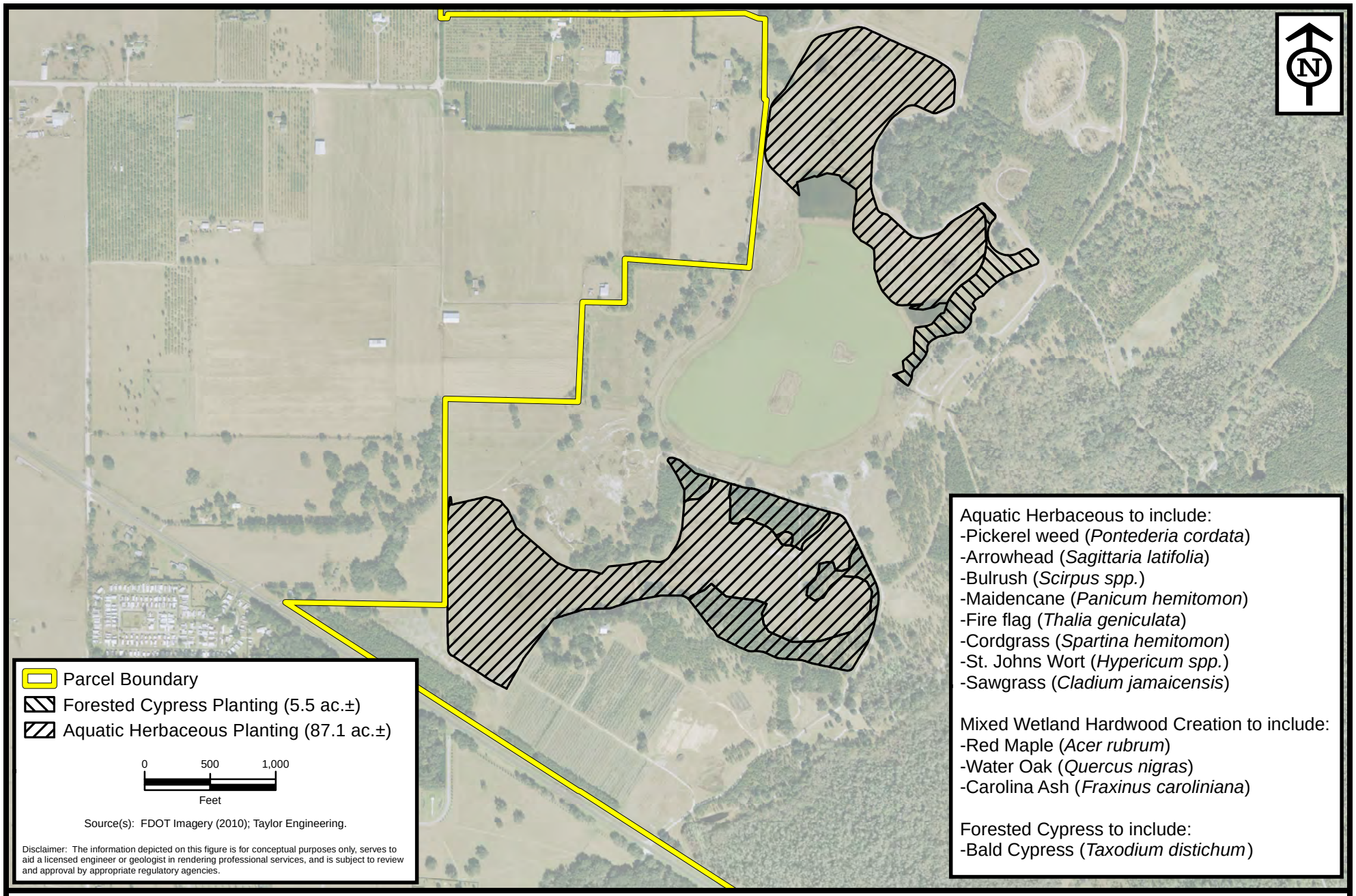
Proposed Planting Plan - Activity Area 2

Boarshead Ranch

Pasco County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JRN/SRJ
Sheet:	**30 of 31**

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Proposed Planting Plan - Activity Area 3

Boarshead Ranch

Pasco County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JRN/SRJ
Sheet:	**31 of 31**

Path: Q:_Projects\EJ\2011\021\00\fig\Boarshead\Report\Planting_AA3.mxd Date: 8/4/2011 2:33:27 PM

5.0 UPPER COASTAL WATERSHED – FIVE MILE CREEK SITE

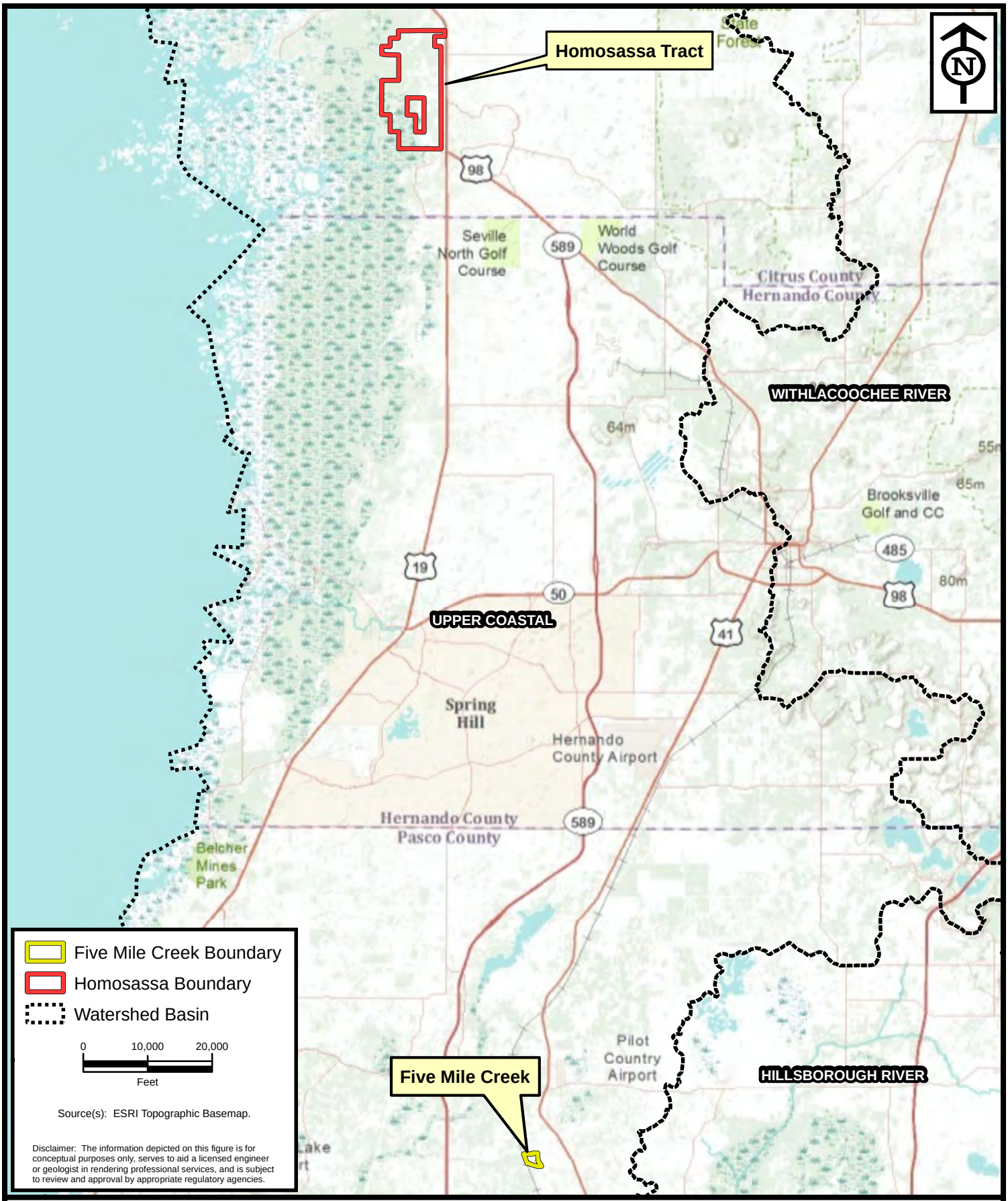
5.1 Introduction

The proposed wetland impacts for LNP are summarized in Table 1-1 and the mitigation plan for the 78.6 acres of impact (-34.3 UMAM units; -5.2 herbaceous units and -29.1 forested units) in the Upper Coastal Basin is partially contained in this section. Mitigation for the impacts within the Upper Coastal basin will occur on two sites – Five Mile Creek (FMC) and Homosassa Tract (Figure 5-1). FMC will produce 5.8 UMAM credits (5.5 wetland herbaceous, 0.2 wetland forested, 0.1 upland) and the Homosassa Tract will produce 55.6 credits (3.5 wetland herbaceous, 52.1 wetland forested). This section of the overall mitigation plan provides the details for FMC. The detailed mitigation plan for Homosassa Tract is provided in section 6.0.

The FMC mitigation site is located on a county-owned parcel in Pasco County, Florida. This parcel is part of a corridor that is situated between Connor Preserve, a 500-acre SWFWMD parcel to the east and Starkey Wilderness Preserve, a 19,000-acre SWFWMD wildlife preserve to the west (Figure 5-2). The enhancement/restoration activities proposed at FMC will improve the link between these two regionally significant preserves and will ultimately result in an ecologically improved and protected corridor between these two large systems.

5.2 Impact Summary

The wetland impacts within the Upper Coastal Watershed from the proposed LNP project total approximately 78.6 acres. These impacts will generate a total loss of 34.3 functional units (-5.2 herbaceous and -29.1 forested). The impact summary is provided on Table 5.1 (below). The majority of these impacts will be the result of permanently clearing and filling existing forested wetlands, with a smaller portion coming from clearing and filling of herbaceous wetlands and open water. The proposed mitigation plan will provide for 61.5 functional units of lift within the Upper Coastal Watershed; 5.8 units will be provided in the FMC site to offset the herbaceous and open water impacts (Section 5.6 provides details of the UMAM scores), while 55.6 functional units of lift will be derived from the Homosassa Tract which will offset the forested wetland impacts. An “excess” of 27.2 units will be generated and PEF requests permit provisions to utilize these UMAM units on future permittable projects within the Upper Coastal watershed.



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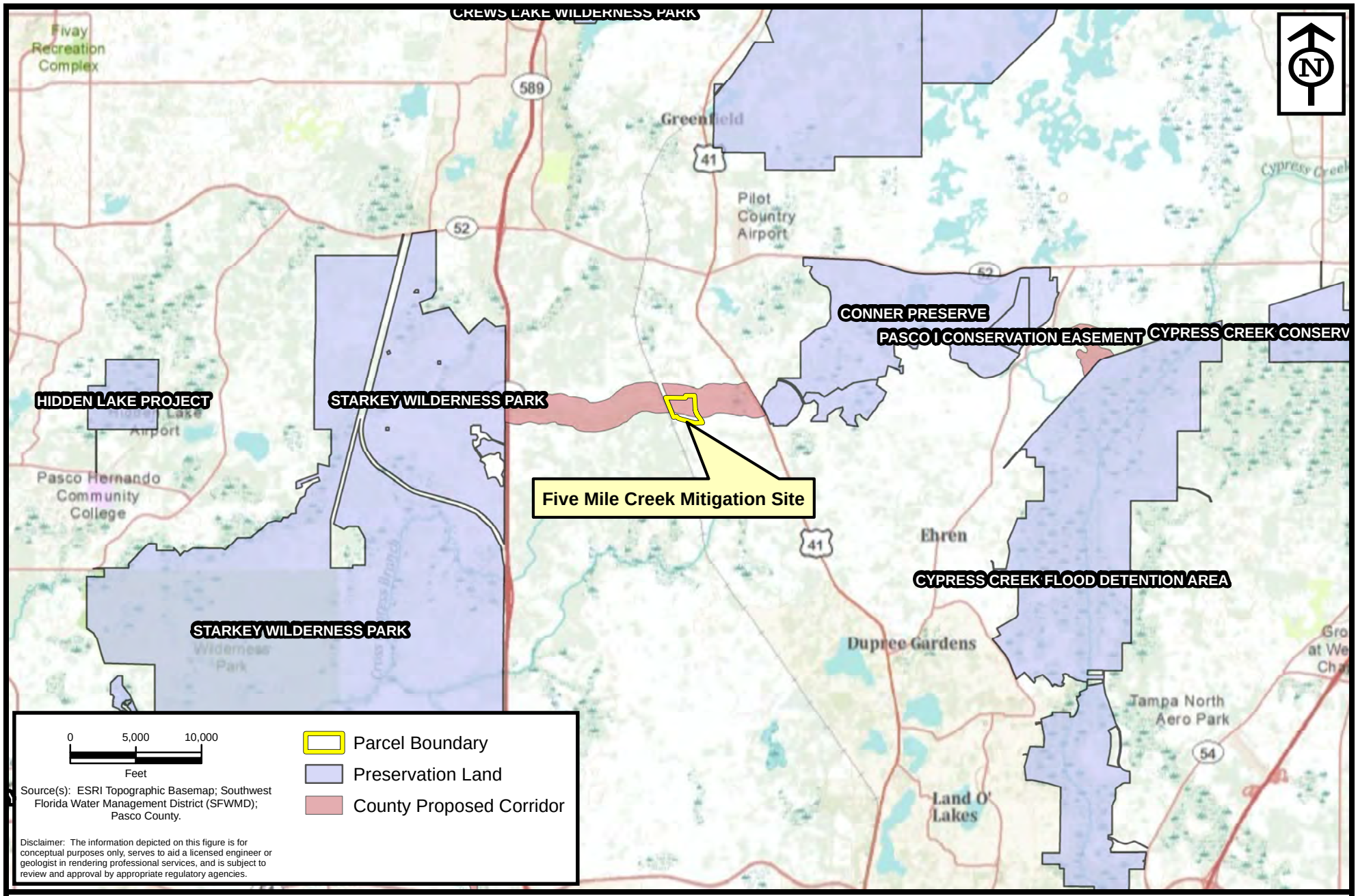
Upper Coastal Watershed - Proposed Mitigation Sites

Five Mile Creek

Pasco County, Florida

Project:	EJ11021.00
Date:	June 2011
Drwn/Chkd:	JGB/JRN
Figure:	**5-1**

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Regional Preservation Land

Five Mile Creek

Pasco County, Florida

Project:	EJ11021.00
Date:	June 2011
Drwn/Chkd:	JGB/JRN
Figure:	**5-2**

Path: Q:_Projects\EJ\2011\021\00\fig\FiveMile\Report\Pro_location.mxd Date: 7/1/2011 10:01:26 AM

Table 5-1. Upper Coastal Watershed wetland impacts by UMAM functional loss and acreage

Area	Herbaceous Wetland Acreage (including open water)	Herbaceous Wetland Functional Loss	Forested Wetland Acreage	Forested Wetland Functional Loss	Total Acres	Total Functional Loss
Permanent Fill	8.5 acres	-5.2 units	11.8 acres	-7.9 units	20.3	-13.1
Permanent Clearing	None	None	58.3 acres	-21.2 units	58.3	-21.2
Total					**78.6**	**-34.3**

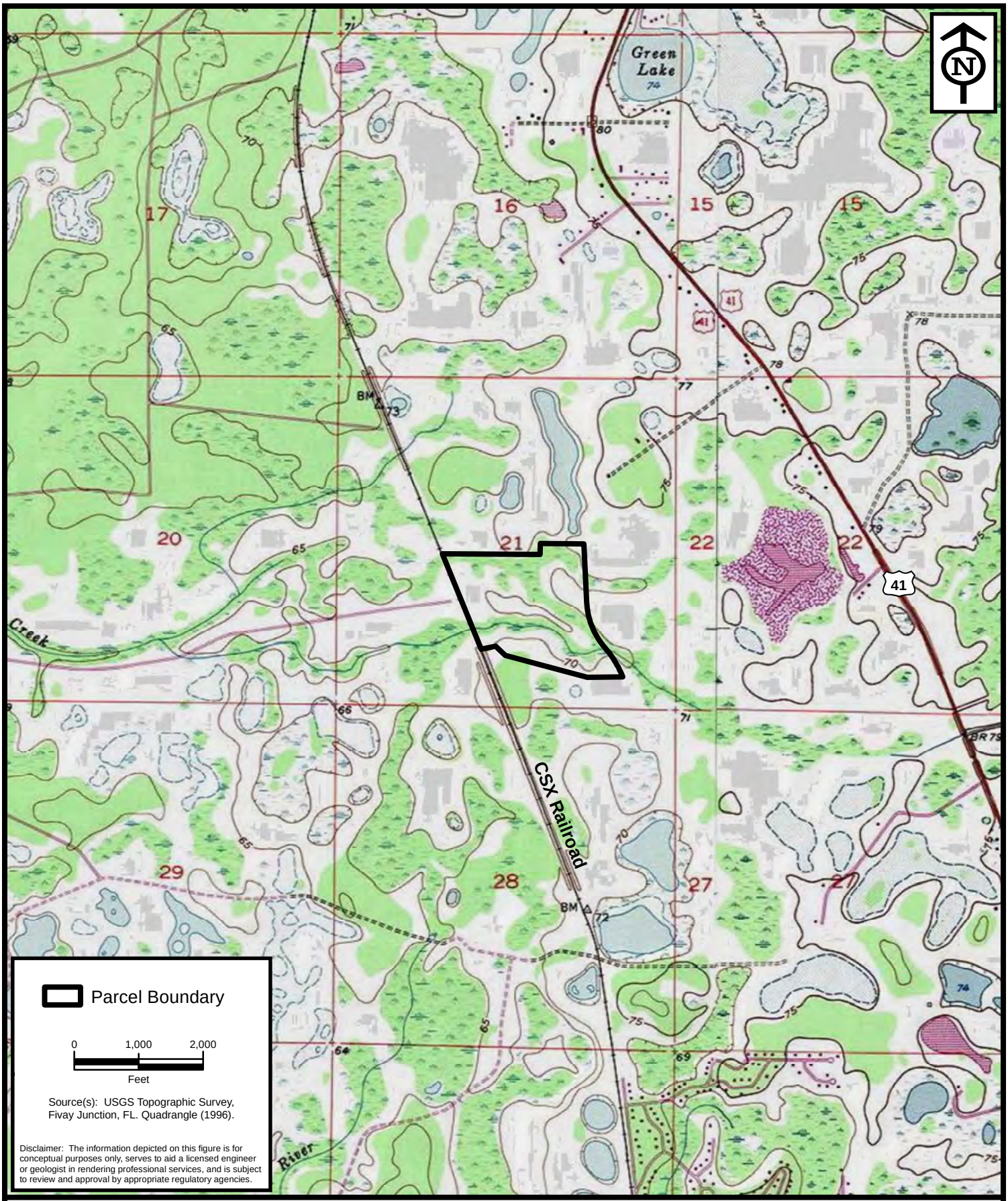
5.3 Site Description

The FMC site is located in Section 21, Township 25S and Range 18E and is west of U.S. 41 and south of S.R. 52 in Pasco County, FL (Figure 5-3). The total area of the FMC parcel is approximately 81.6 acres, but the proposed enhancement/restoration activities for this project are located primarily in the southern 27 acres. Water flows within FMC from east to west and enters the property from the southeastern corner (Figure 5-4). The main channel of FMC runs east-west through the central portion of the property, and there is a secondary channel along the northern border that provides for additional flow during high volume periods. The majority of the water leaves the site unimpeded under a raised railroad track along the western border of the site.

5.3.1 Historic Conditions

Historically, the property consisted primarily of the FMC slough system along with several associated cypress dominated depressions. These cypress depressions were surrounded by wet prairie and freshwater marsh habitats. The general footprint of the original slough system has not significantly changed, as water entered in the system from the southeast and generally moved from east to west, with additional tributaries flowing in the same general direction.

The property was used as a borrow area for constructing nearby roadways and subdivisions. Four large borrow pits were dug on the property which resulted in heavy alteration of natural site conditions, marshes were excavated and converted to deep open water habitat which significantly altered the hydrology of the site. Spoil piles and remnant uplands were colonized with invasive/exotic species and were generally not managed or maintained.



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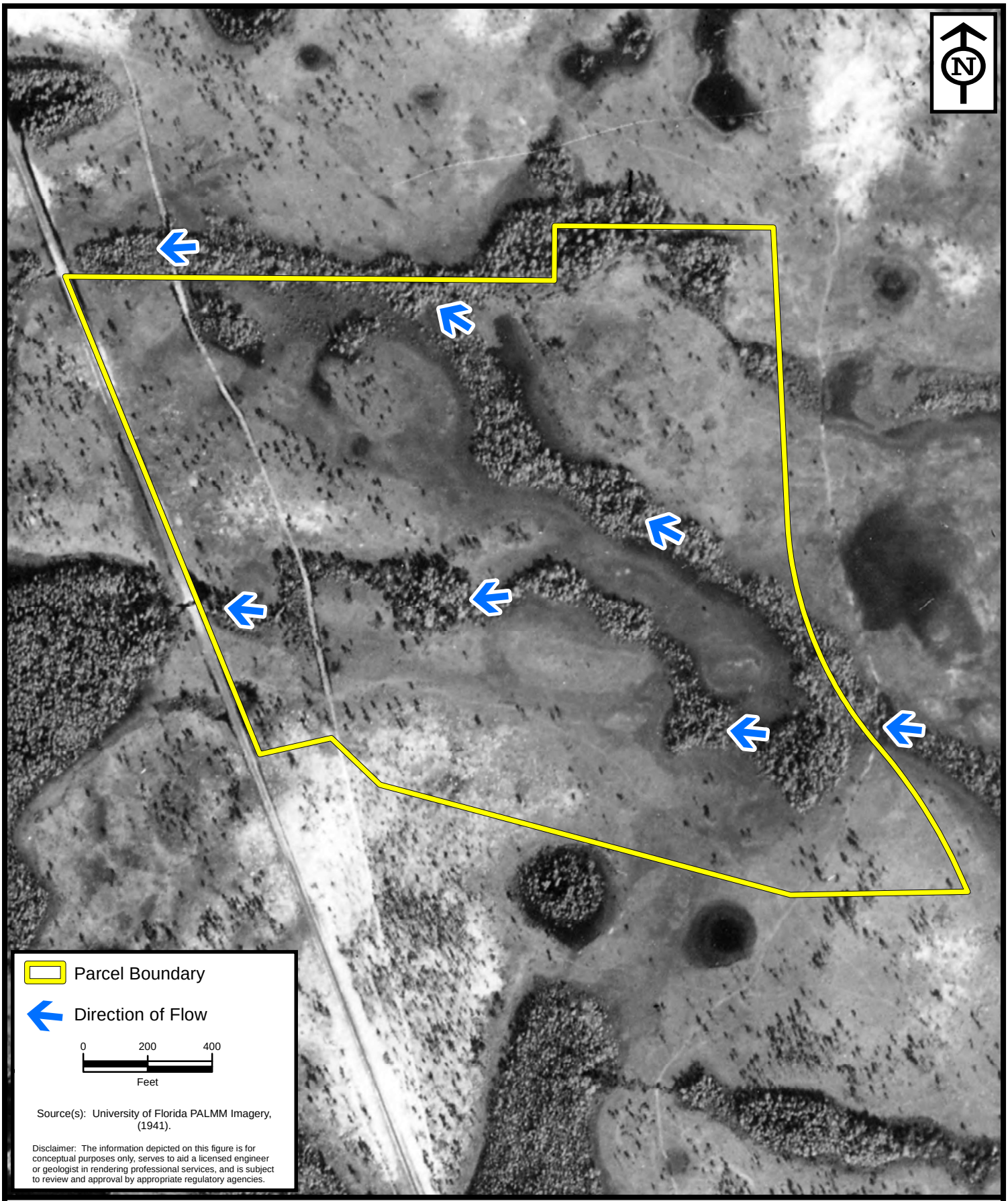
Project Location

Five Mile Creek

Pasco County, Florida

Project:	EJ11021.00
Date:	June 2011
Drwn/Chkd:	JGB/JRN
Figure:	**5-3**

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1941 Historic Aerial Imagery

Five Mile Creek

Pasco County, Florida

Project:	EJ11021.00
Date:	June 2011
Drwn/Chkd:	JGB/JRN
Figure:	**5-4**

Path: Q:_Projects\EJ\2011\021\00\fig\FiveMile\Report\Pro_historic.mxd Date: 6/22/2011 3:29:53 PM

5.3.2 Current Conditions

Various habitat types are present at the FMC site including the footprint of the creek, surrounding forested and herbaceous wetlands, and several open water borrow pits. Most of the existing habitats are highly degraded from historic land disturbances and invasion by noxious species. Numerous invasive/exotic species, such as primrose-willow and cogon grass dominate most of the herbaceous wetlands and upland areas. Plant diversity and wildlife utilization appear to be low as habitat quality is poor and few species were observed on site.

FLUCFCS was used to determine the different community types on site. Please see the Five Mile Creek Community Map (Figure 5-5) for details of the specific community locations.

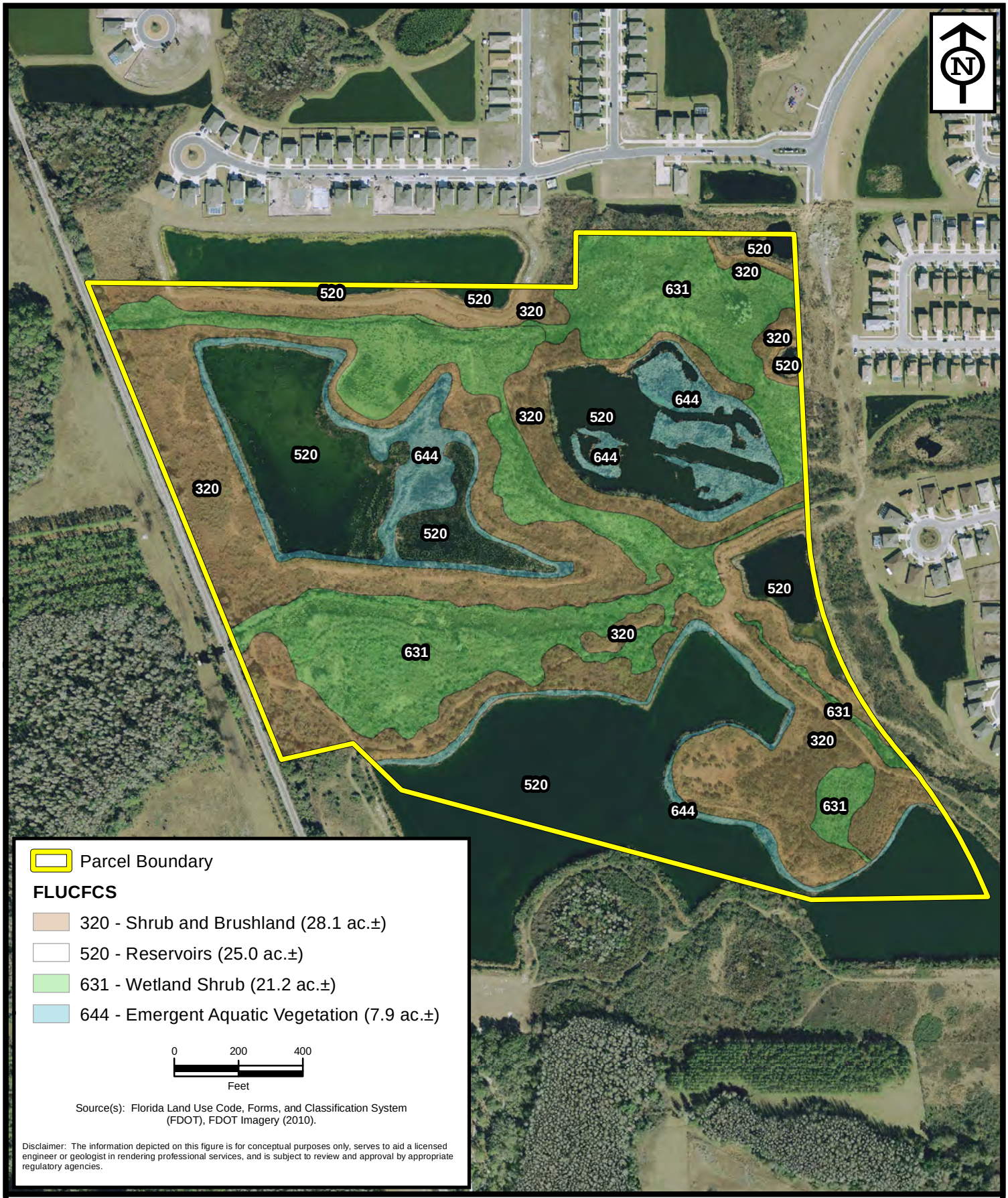
Uplands

1. Shrub and Brushland (FLUCFCS 320). The uplands on the FMC site are limited primarily to the upland berm along the northern edge of the borrow pit and portions of the peninsula. All of the uplands are of low quality and consist primarily of wax myrtle, broomsedge, salt bush (*Baccharis halimifolia*), cogon grass and various other grasses.

Wetlands

1. Lakes (FLUCFCS 520). A portion of the property is open water associated with the existing borrow mine pit. The lake has very steep side slopes and little vegetation due to extreme depth in most portions. The littoral edge contains mostly cattails and torpedo grass (*Panicum repens*) and various other submerged aquatic grasses.

2. Wetland Scrub (FLUCFCS 631). This community type represents the majority of the wetlands found on site and consists primarily of primrose-willow, willow (*Salix* spp.) wax myrtle and salt bush, along with various other grasses and shrubs. Most of the on-site wetlands consist of opportunistic colonizers that are indicative of disturbed sites resulting in wetlands considered to be low quality.



Parcel Boundary

FLUCFCS

320 - Shrub and Brushland (28.1 ac.±)

520 - Reservoirs (25.0 ac.±)

631 - Wetland Shrub (21.2 ac.±)

644 - Emergent Aquatic Vegetation (7.9 ac.±)

0 200 400

Feet

Source(s): Florida Land Use Code, Forms, and Classification System (FDOT), FDOT Imagery (2010).

Disclaimer: The information depicted on this figure is for conceptual purposes only, serves to aid a licensed engineer or geologist in rendering professional services, and is subject to review and approval by appropriate regulatory agencies.

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Existing Community Map

Five Mile Creek

Pasco County, Florida

Project:	EJ11021.00
Date:	June 2011
Drwn/Chkd:	JGB/JRN
Figure:	**5-5**

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3. Emergent Aquatic Vegetation (FLUCFCS 644). This community type represents the smallest community found on site and is located primarily around the edges of the existing lake. Species present include cattail and torpedo grass, both invasive, dominating species.

5.3.3 Soils

According to the NRCS soil map for Pasco County, five soil types are present on the FMC site (Figure 5-6). The NRCS soil map was produced prior to some of the borrow activities, as some soil types are shown where there is currently open water. However, the remaining portions still reflect accurate soil conditions.

Table 5-2. Five Mile Creek soil types

NRCS Soil Type	Hydric	Acreage
190 Smyrna Fine Sand	No	47.7
195 Narcoossee Fine Sand	No	2.3
216 Cassia Sellers Fine Sand	No	4.9
250 Sellers Mucky Loamy Fine Sand	Yes	4.8
252 Water	N/A	21.9

5.4 Mitigation Plan

The primary mitigation plan for FMC is herbaceous wetland enhancement, in addition to some herbaceous wetland restoration, littoral shelf creation, forested wetland restoration and upland enhancement. Another wetland enhancement project for a hospital expansion in Tampa is proposed adjacent to the PEF site and it will involve excavating the FMC channel to the north and east of this project (Figure 5-7). This project is known as Meres Crossing Phase III (ACOE file number SAJ- 2009-01024). The PEF mitigation plan will incorporate the details of this adjacent proposed project and construct one large, contiguous wetland enhancement project. The details of all of the proposed planting areas are described below, and the proposed planting plan for FMC can be found within Section 5.11 Engineering and Planting Detail Drawings.



Parcel Boundary

Soil Types

- 190 - SMYRNA FINE SAND (47.7 ac.±)
- 195 - NARCOOSSEE FINE SAND (2.2 ac.±)
- 216 - CASSIA FINE SAND, 0 TO 5 PERCENT SLOPES (4.9 ac.±)
- 250 - SELLERS MUCKY LOAMY FINE SAND (4.8 ac.±)
- 252 - WATER (21.8 ac.±)

0 200 400
Feet

Source(s): FDOT Imagery (2010). USDA Soil Survey of Pasco County (USGS).

Disclaimer: The information depicted on this figure is for conceptual purposes only, serves to aid a licensed engineer or geologist in rendering professional services, and is subject to review and approval by appropriate regulatory agencies.

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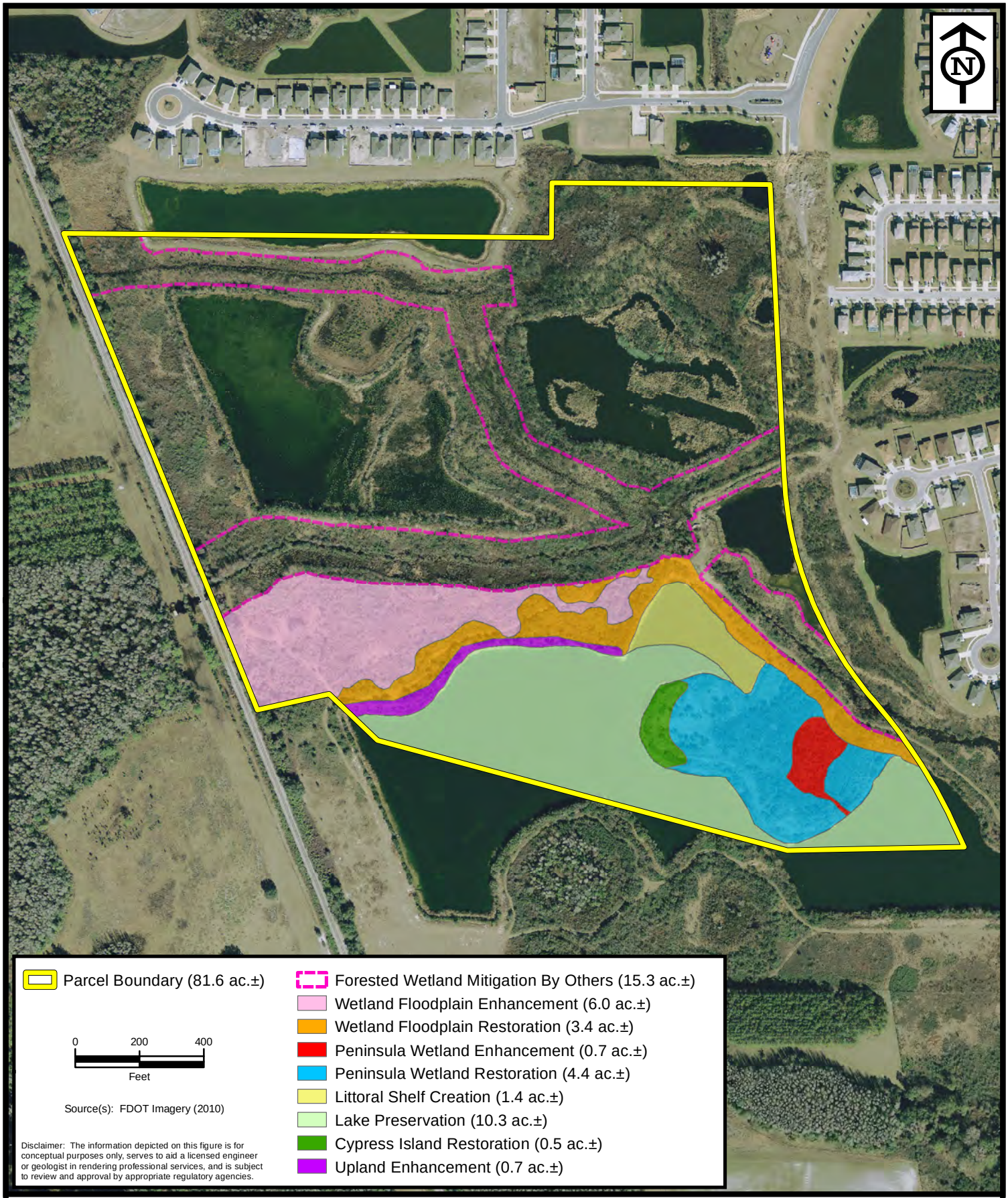
NRCS Soils

Five Mile Creek

Pasco County, Florida

Project:	EJ11021.00
Date:	June 2011
Drwn/Chkd:	JGB/JRN
Figure:	**5-6**

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Proposed Mitigation Activities

Five Mile Creek

Pasco County, Florida

Project:	EJ11021.00
Date:	June 2011
Drwn/Chkd:	JGB/JRN
Figure:	**5-7**

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1. Wetland Floodplain Enhancement. The proposed wetland enhancement is located along the southern edge of the FMC channel and totals 6.0 acres. The enhancement area will create an herbaceous marsh adjacent to the stream channel that will be hydrated by the fluctuating level of flowing water in FMC. During times of high flow, the water will meander through the FMC creating a floodplain habitat that will serve as an attenuation area for water by slowing the channelized flow. This floodplain area will create shallow wading bird habitat as well as prime freshwater marsh habitat. The enhancement areas will be cleared of existing vegetation and excavated to within 0.5 ft. of the seasonal high water mark (SHW). Details are provided in Section 5.7 Engineering.

This will help to eliminate the invasive/exotic species seed source within the upper soil level and will bring the soil surface closer to the water table.

The wetland floodplain enhancement areas will be planted on three-foot centers at a density of 4,840 stems/acre with bare-root size Florida native aquatic plants including:

Pickerelweed
Duck potato
Bulrush
Maidencane
Fire flag

A total of 28,847 plants will be installed within the wetland floodplain enhancement area.

2. Wetland Floodplain Restoration. The wetland floodplain restoration (3.4 acres) is proposed primarily along the eastern border of the site within the existing "peninsula" area, although there are small portions of restoration located within the enhancement area described above. The peninsula area, much like the enhancement areas, will be cleared of existing vegetation and excavated down to match the elevation of the adjacent enhancement area. After excavation, the area will then be planted with aquatic herbaceous plants to help create additional shallow marsh/wading bird habitat as described above.

The wetland floodplain restoration areas will be planted on three-foot centers at a density of 4,840 stems/acre with bare-root size Florida native aquatic plants including:

Pickerelweed
Duck potato
Bulrush
Maidencane
Fire flag

A total of 16,650 plants will be installed within the wetland floodplain restoration area.

3. Peninsula Wetland Enhancement. The existing peninsula area (0.7 acre) will be cleared of existing vegetation and excavated to match the elevation of the adjacent littoral shelf area. The area will then be planted with the same vegetation in an effort to extend the wet marsh and wading bird habitat.

The peninsula wetland enhancement area will be planted on three-foot centers at a density of 4,840 stems/acre with bare-root size Florida native aquatic plants including:

Pickerelweed
Duck potato
Bulrush
Maidencane
Fire flag

A total of 3,291 plants will be installed within the peninsula wetland enhancement area.

4. Peninsula Wetland Restoration. An existing herbaceous wetland (4.4 acres) on the peninsula will be restored by clearing the existing vegetation and excavating the existing elevation to match the adjacent enhancement area. The area will then be planted with the same aquatic vegetation as the adjacent enhancement area.

The peninsula wetland restoration area will be planted on three-foot centers at a density of 4,840 stems/acre with bare-root size Florida native aquatic plants including:

Pickerelweed
Duck potato
Bulrush
Maidencane
Fire flag

A total of 21,102 plants will be installed within the peninsula wetland restoration area.

5. Littoral Shelf Creation. A littoral shelf (1.4 acres) is proposed for the small inlet located northwest of the peninsula area described above. The littoral shelf will be created by utilizing the fill generated from excavating the peninsula. The

fill will be placed in the inlet in order to raise the elevation of the existing borrow pit bottom up to match the adjacent peninsula restoration area elevation. The area will then be planted with native aquatic plants to establish additional fresh water marsh habitat.

The littoral shelf creation area will be planted on three-foot centers at a density of 4,840 stems/acre with bare-root size Florida native aquatic plants including:

Pickerelweed
Duck potato
Bulrush
Maidencane
Fire flag

A total of 6,631 plants will be installed within the littoral shelf creation area.

6. Lake Preservation. Approximately 10.3 acres of the open water borrow pit adjacent to the proposed mitigation activities will be preserved. The open water area will be enhanced by the enhancement of littoral zones which will improve forage areas, primary productivity, and habitat for small fish, invertebrates, reptiles, and amphibians. The productivity of the littoral edges will support more wildlife and better water quality in the open water.

7. Cypress Island Restoration. A small "cypress island" is proposed adjacent to the littoral shelf utilizing the existing peninsula. Approximately 0.5 acre will remain 0.5 ft. higher than the rest of the area after excavation and will be planted with pond cypress, in an effort to create the cypress island which will provide for additional roosting and nesting habitat for the wading birds.

The cypress island area will be planted on ten-foot centers at a density of 440 stems/acre with 3-gallon size Florida native trees including:

Pond cypress

A total of 238 plants will be installed within the cypress island restoration area.

8. Upland Enhancement. An upland berm (0.70 acre) exists along the northern edge of the borrow pit. This berm is vegetated primarily by the invasive species cogon grass, in addition to scattered wax myrtle, red maple (*Acer rubrum*), salt bush, broomsedge and various other grasses. The berm will be enhanced by excavating approximately two feet from the surface, in order to remove the cogon grass and its rhizomes.

The upland enhancement area will be planted on ten-foot centers at a density of 440 stems/acre with 3-gallon size Florida native shrubs including:

Beauty berry (*Callicarpa americana*)
Saw palmetto

A total of 308 plants will be installed within the upland enhancement area.

5.5 Hydrology & Hydraulics

5.5.1 Objective

The objective of hydrologic and hydraulic modeling for the FMC site is to determine whether mitigation activities within and adjacent to the current borrow areas would cause adverse flooding impacts upstream or downstream. To address this need, a simple hydrologic analysis and hydraulic modeling of pre- and post-conditions simulated the mitigation area.

5.5.2 Hydrology

Hydrology for the FMC site employed regression equations presented in "Estimating the Magnitude and Frequency of Floods for Streams in West-Central Florida, 2001" published by the USGS. These equations require three variables: contributing drainage area, main channel slope, and percent of the total drainage area covered by lakes. The contributing basin area was developed with a combination of SWFWMD basin coverages, environmental resource permits, and lidar data. Main channel slope was calculated using lidar. GIS analysis of the SWFWMD's landuse data was used to estimate the percentage of lake area for the watershed. Lake area was assumed to include marshes, lakes, reservoirs, and wetland classifications. Table 5-3 summarizes the resulting regression analysis.

Table 5-3. Five Mile Creek regression analysis input and results

Basin Area (mi^2)	6.1
Channel Slope (ft/mi)	3.4
Lake %	18.3
Reoccurrence Intervals	**Flow(cfs)**
2-Year	32.6
25-Year	141.8
50-Year	183.0
100-Year	228.5

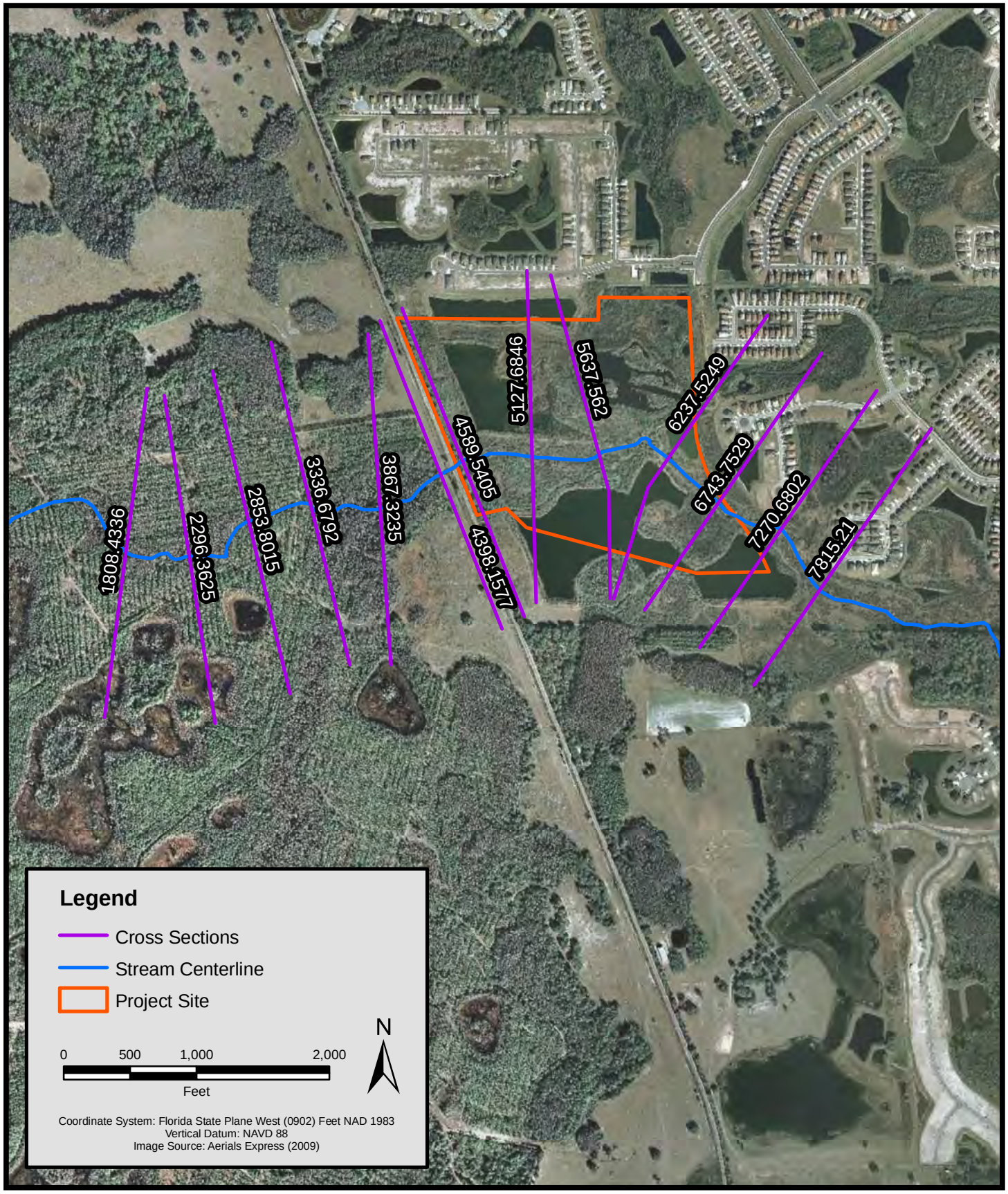
5.5.3 Hydraulics

The United States Army Corp's Hydrologic Engineering Centers River Analysis System (HEC- RAS) version 4.1 simulated the flow hydraulics through the system. Two model geometries, constructed based on existing conditions and proposed conditions simulated water surface elevations for several storm events. Storm events included the 50% annual chance event – or the event that has a 50% chance of occurrence every year – the 4%, 2%, and 1% events (or 2 –year, 25-year, 50-year, and 100-year events, respectively).

The watercourse remained unchanged and was based on data obtained from the SWFWMD website and refined using lidar and aerial photography. The existing conditions modeled cross sections applied a combination of lidar data and site surveys. while proposed conditions modeled cross sections applied conceptual construction drawings.. Changes in pre and post geometry were limited to the overbanks. Aerial photography and site reconnaissance determined channel and overbank roughness values. The model was extended approximately 2,781 feet downstream of the project site and normal depth was used for starting condition. Downstream of the project, the channel flows through culverts under the railroad. Figure 5-8 reflects the model setup.

5.5.4 Results

Simulation results, executed for four reoccurrence intervals indicated by Table 5-3, are present by Table 5-4. The analysis demonstrates that flood elevations are either maintained or decrease slightly downstream and upstream of the project site. Therefore, no adverse flooding impacts are expected as a result of the mitigation activities.



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Figure 5-8 - Hydraulic Model Setup
Five Mile Creek
Pasco County, Florida

PROJECT	C2011-025
FIGURE	5-8
DRAWN BY	JK
DATE	JUNE 2011

Table 5-4. Five Mile Creek hydraulic modeling results

Cross Section	Recurrence Interval	Existing Conditions Water Surface Elev. (ft.)	Proposed Conditions Water Surface Elev. (ft.)	Difference Water Surface Elev. (ft.)
7815.209	50%	69.90	69.83	-0.1
7815.209	4%	71.20	71.07	-0.1
7815.209	2%	71.49	71.35	-0.1
7815.209	1%	71.69	71.64	0.0
7270.68	50%	69.59	69.27	-0.3
7270.68	4%	70.71	70.36	-0.3
7270.68	2%	70.91	70.61	-0.3
7270.68	1%	71.11	70.87	-0.2
6743.752	50%	69.09	68.67	-0.4
6743.752	4%	70.02	69.72	-0.3
6743.752	2%	70.17	69.89	-0.3
6743.752	1%	70.35	70.13	-0.2
6237.524	50%	68.46	68.48	0.0
6237.524	4%	69.36	69.38	0.0
6237.524	2%	69.44	69.45	0.0
6237.524	1%	69.65	69.65	0.0
5637.562	50%	68.44	68.43	0.0
5637.562	4%	69.30	69.25	0.0
5637.562	2%	69.34	69.27	-0.1
5637.562	1%	69.53	69.46	-0.1
5127.684	50%	68.43	68.42	0.0
5127.684	4%	69.25	69.21	0.0
5127.684	2%	69.25	69.20	0.0
5127.684	1%	69.44	69.38	-0.1
4669.54	50%	68.41	68.41	0.0
4669.54	4%	69.17	69.17	0.0
4669.54	2%	69.13	69.13	0.0
4669.54	1%	69.29	69.29	0.0
4589.54	50%	68.41	68.41	0.0
4589.54	4%	69.17	69.17	0.0
4589.54	2%	69.13	69.13	0.0

Cross Section	Recurrence Interval	Existing Conditions Water Surface Elev. (ft.)	Proposed Conditions Water Surface Elev. (ft.)	Difference Water Surface Elev. (ft.)
4589.54	1%	69.29	69.29	0.0
4493.84			Railroad Crossing	
4398.157	50%	66.12	66.12	0.0
4398.157	4%	67.67	67.67	0.0
4398.157	2%	68.24	68.24	0.0
4398.157	1%	65.64	65.64	0.0
3867.323	50%	64.57	64.57	0.0
3867.323	4%	65.51	65.51	0.0
3867.323	2%	65.75	65.75	0.0
3867.323	1%	65.99	65.98	0.0
3336.679	50%	64.39	64.39	0.0
3336.679	4%	65.39	65.39	0.0
3336.679	2%	65.63	65.63	0.0
3336.679	1%	65.86	65.86	0.0
2853.801	50%	64.21	64.21	0.0
2853.801	4%	65.20	65.20	0.0
2853.801	2%	65.43	65.43	0.0
2853.801	1%	65.66	65.66	0.0
2296.362	50%	63.70	63.70	0.0
2296.362	4%	64.76	64.76	0.0
2296.362	2%	64.99	64.99	0.0
2296.362	1%	65.19	65.19	0.0
1808.433	50%	63.57	63.57	0.0
1808.433	4%	64.59	64.59	0.0
1808.433	2%	64.81	64.81	0.0
1808.433	1%	64.99	64.99	0.0

5.6 UMAM Score

The proposed mitigation plan for FMC will provide for 5.8 units of functional lift to offset the herbaceous and open water impacts within the Upper Coastal Watershed (Table 5-5), while the balance of the impacts will be mitigated for at the Homosassa Tract. The scoring system utilized during the UMAM process is outlined in the UMAM handbook and its scoring requirements.

Scores for existing communities that were assessed ranged from 2 to 7, pursuant to the UMAM process described above. Target UMAM scores presented in Table 5-5 ranged from 0 to 8 in accordance with the UMAM scoring parameters based on the target results of each of the mitigation activities outlined in this plan. A score of 0 was only assigned to upland areas under the "Water" category that will not receive any water related enhancement.

For Location and Landscape Support, the proposed scores range from 7 to 8 based on the UMAM scoring methodology. These scores were derived by assessing the existing communities on site and identifying the main characteristics that these habitats were deficient in, such as habitat availability, wildlife access barriers, land use impacts and several others. This information was then used to incorporate those criteria into the proposed mitigation activities. By introducing increased habitat availability and the other criteria mentioned above, the proposed mitigation plan will "increase" the value of the existing on-site habitats and site functionality as defined in the methodology. The scores of 7 and 8 were assigned after reviewing the UMAM scoring requirements and the description of each scoring tier where a 7 is defined as having appropriate habitat diversity, but not a high overall diversity and still may contain some invasive/exotic species; provides some support for fish and wildlife, but is not quite optimal and there is a generally effective land management plan in place. An 8 score was defined as providing slightly higher habitat diversity than the areas that were scored as a 7 with most the majority of plants native and desirable, but still not as diverse as habitats scored as a 9 or 10; increased support for fish and wildlife and a land management plan that is more specified to address such issues as invasive/exotic species management.

For the Water category, all proposed scores are 8, expect for the upland berm area, as mentioned above. A score of 8 represents that the assessment area will provide adequate habitat for both aquatic vegetation and wildlife, will aid in the hydroperiod of the area and assist in storage capacity and attenuation, will increase water flow through the area resulting in better water quality and that the area will remain inundated under normal circumstances so that the other improvements will function as designed. In addition, the proposed mitigation project directly to the north of the FMC site will dredge the existing creek bed and significantly increase water flow through that system. The PEF plan has incorporated the details of that project into its project design and will provide the same benefits as it relates to the water community.

The Community Structure assessment areas were all assigned a score of 7, except for the Lake Preservation portion, which was scored as a 3. The score of 3 is the same as the "Existing" community score, simply because there are no major improvements suggested from the open water portion of the lake that would affect the actual community structure. The community structure will be improved in all habitat types as plant diversity will be significantly increased, in addition to removing a well-established population of invasive/exotic species. However, some invasive/exotic species will inevitably return based on the topographic and hydrologic conditions in the surrounding areas, outside of the PEF management area, therefore preventing some of these areas being scored higher than a 7. The PEF plan will provide for additional habitat for aquatic vegetation and wildlife and will represent significant improvement over existing conditions.

Risk and Time Lag were the other parameters assessed during the UMAM scoring of the Five Mile Creek project. The Risk parameter is examined to assess the potential risk the proposed activity has of not fully maturing and developing into the proposed habitat. Factors such as the project's location in proximity to other existing structures such as housing developments or major roadways, access to the site (both public and private), general environmental conditions compared to the proposed activity, and the amount of effort required to build and maintain a functioning habitat are all considered when assessing the Risk for a particular project. Due to the limited access to the FMC site, the relative location between an existing railroad and several housing developments and the general nature of the proposed work, the score of 1.50 was assigned to all proposed activities at FMC. All of the proposed work is enhancement or restoration in nature and will not significantly alter the existing habitat in regard to hydrology, wildlife usage, etc.; it will only improve or restore existing wetland communities, so the 1.50 score represents a conservative but realistic expectation of the proposed work.

Time Lag is examined to determine an appropriate time frame that can be expected for a given activity to reach its full potential and provide the functions and values of a mature system. Forested communities typically take longer to establish, given the complex structure of a hardwood wetland community. Conversely, herbaceous systems typically become well established in a shorter time frame due to the limited complexity of habitat structure and the general hardiness of the plants found within. Scores for the FMC site ranged from 1.00 for the open water lake preservation to 1.25 for the proposed forested community. The 1.00 score for the open water lake preservation represents the lowest time lag, as there is very little actual work proposed for this area. Some of the proposed mitigation plan will enhance or restore already existing herbaceous habitat, indicating that the proper conditions currently exist to support such a community. Therefore, the proposed herbaceous habitats received lower time lag scores of 1.14 than the proposed forested or upland communities as they should take less time to become fully established.

Table 5-5. Five Mile Creek mitigation plan proposed UMAM score summary

Area	Location		Water		Community		Acreage	Risk	Time Lag	RFG[1]	FG[2]
	Current	With	Current	With	Current	With					
Wetland floodplain enhancement	4	7	6	8	3	7	5.95	1.50	1.14	0.17	1.0
Wetland floodplain restoration	0	7	0	8	0	7	3.45	1.50	1.14	0.43	1.5
Peninsula wetland enhancement	4	7	6	8	3	7	0.68	1.50	1.14	0.18	0.1
Peninsula wetland restoration	0	7	0	8	0	7	4.35	1.50	1.14	0.43	1.9
Littoral shelf creation	4	7	2	8	2	7	1.37	1.50	1.14	0.27	0.4
Lake preservation	4	7	7	8	3	3	10.26	1.50	1.00	0.05	0.6
Cypress Island restoration	0	7	0	8	0	7	0.54	1.50	1.25	0.39	0.2
Upland enhancement	4	7	0	0	3	7	0.69	1.50	1.25	0.19	0.1
Total							27.4				5.8

[1]Relative Functional Gain
[2]Functional Gain

5.7 Engineering

The engineering design for the FMC mitigation site relies on Seasonal High Water (SHW) elevation information documented for the site to guide development of an appropriate grading plan to sustain the proposed mitigation site. Additionally, the proposed mitigation site lies adjacent to the *Five Mile Creek Restoration* project permitted by ACOE (Permit No. SAJ-2009-01024) and SWFWMD (Permit No. 43-31945-004). The proposed project's grading plan interfaces with and ties into this previously permitted project's grades along the north and east boundaries of the project.

In general terms, the proposed grading design consists of a series of plateau elevations arranged to approximate the SHW elevation throughout the area. A gradual 10H:1V slope typically transitions from one plateau to the next.

Along its central west-to-east axis, Grading Area A (Section 5.11, Sheet 5 of 22) transitions from a low plateau elevation of 65 ft. NAVD 88 to a high elevation of 67.5 ft. NAVD 88. To achieve these grades, the contractor will clear and grub the existing grade and then excavate to the lines and grades shown on the drawings. Along the south edge of the site at the interface with the existing water body, the plan re-grades an existing berm to lower the berm crest elevation to 70 ft. NAVD 88 and maintains 4H:1V berm slopes. Along the north edge of the site, the proposed grading ties into the *Five Mile Creek Restoration* Project. In the areas between the north and south boundaries, the grading will eliminate an existing dirt road.

The existing water body dominates the site within Grading Area B (Section 5.11, Sheet 8 of 22). Here, the design calls for filling of the water body to generate a plateau at elevation 68 ft. NAVD 88. Within the water, the grading plan specifies a fill slope of 6H:1V. During fill placement, the contractor will place a turbidity barrier within the water body to protect existing water quality and provide control of sediment movement. On the northeast edge of the water body, the grading plan transitions to meet existing grade. Along this edge, the plan requires the contractor to remove vegetation and excavate to a minimum 1 ft. depth before regarding the slope down from the existing dirt road to the proposed plateau (elevation 68 ft. NAVD 88). In Grading Area B, the plan does not affect the existing dirt road which will remain in place.

On its central axis, running from northwest to southeast, Grading Area C (Section 5.11, Sheet 11 of 22) transitions from a plateau elevation of 68.5 ft. NAVD 88 down to a plateau elevation of 67.5 ft. NAVD 88. Along the south and southeast edges of this area, the grading plan cuts the existing berm along the water body down to a crest elevation of 70 ft. NAVD 88 which transition through a gradual slope (10H:1V) to the plateau elevation. On the northeast edge of the area, the grading plan transitions to meet existing grade. Along this edge, the plan requires the contractor to remove vegetation and excavate to a minimum 1 ft. depth before regrading the slope down from the

existing dirt road to the proposed plateau (elevation 67.5 ft. NAVD 88). In Grading Area C, the plan does not affect the existing dirt road which will remain in place.

Within Grading Areas A and C, the contractor must cut and remove existing soil materials to meet the required grades. In general, these two areas generate approximately 30,700 cubic yards of cut material. Grading Area B requires significant fill (approximately 44,200 cubic yards), much of it underwater, to construct the desired grades. The site-wide earthwork balance, therefore, indicates a deficit of fill material totaling approximately 13,500 cubic yards. Based on a 12-yard truck capacity, the project will require approximately 1,125 trucks of fill material.

The above earthworks assessment assumes that all materials removed from Grading Areas A and B (28,600 cubic yards) are suitable for fill placement. However, the work plan will require the contractor to strip the upper 12 inches of soils to eliminate exotic plant seed sources, and the contractor may not apply this topsoil material for surface grading within the project. Ideally, the contractor may place the stripped surface soils at the bottom of the fill template in Grading Area B. Here, the underwater placement will render the seed source unviable and remove the concern of exotic plant germination. However, at this time, the geotechnical properties of the soils are unknown. Final engineering design must evaluate the technical properties (organic content, fine content, and settlement and consolidation properties) and feasibility for placement of the topsoil fill material within Grading Area B. If concerns over the exotic plant seed sources or geotechnical properties render the surface soil materials as unsuitable for fill, the contractor must remove and landfill these surface soils. Based on the project area, surface soils comprise approximately 21,000 cubic yards of fill. If this quantity of soils is unsuitable, then the site-wide earthworks balance will require a total quantity of fill material equaling 34,500 cubic yards (2875 truckloads at 12 yards per truck) to construct the project.

5.8 Implementation Schedule

The construction of the FMC site will begin within 90 days of commencement of construction and wetland impacts of the associated transmission lines for the LNP project. The mitigation plan will be implemented in phases, as some activities, such as the excavation and planting, are seasonal in nature and can only be completed under appropriate favorable conditions. Pasco County officials and other local regulatory agencies have expressed their desire for which portions of the project should have the highest priority as it relates to existing management plans and other adjacent proposed projects. The restoration of FMC channel and the floodplain areas around it have the highest priority, with the restoration of the peninsula having the next highest priority and the creation of the littoral shelf having the lowest priority. The construction sequencing will follow the above priorities.

As with any construction project, natural conditions and weather patterns will be observed and activities will be planned to best coincide with suitable weather conditions. Prior to any land disturbance, appropriate erosion and sedimentation control measures will be installed, including silt fence around all disturbed areas and sediment curtains in the channel (Five Mile Creek engineering detail drawing Sheets 14 through 18). Any other applicable compliance items, such as County land clearing permits or any other local permit requirements, will also be obtained by the contractor or PEF before the construction aspect begins. Excavation will occur during the dry season (October-March) and wetland plantings will occur once excavation is complete and the area has been constructed properly and approved. Maintenance for invasive/exotic species will be conducted year-round, with manual, mechanical and/or chemical removal methodologies to be utilized throughout the year to ensure the best results (Section 5.9).

Based on the above-referenced priorities, an implementation schedule of the mitigation activities is listed below:

Activity	Timeframe
Acquire local land disturbance permits, mobilization of contractor and equipment	Week 1
Establish all turbidity/erosion control measures	Week 2
Clear and excavate wetland floodplain and restoration areas and begin construction of littoral shelf creation utilizing the fill material	Weeks 2-4
Excavate upland berm-grade approximately two feet- continue construction of littoral shelf creation utilizing the fill material	Weeks 3-4
Clear and excavate peninsula enhancement and restoration areas, in addition to cypress island area- continue construction of littoral shelf creation utilizing the fill material	Weeks 4-7
Finish creation of littoral shelf area utilizing additional fill material if necessary	Weeks 2-13
Generate and review as-built surveys	Week 14
Plant all wetland/upland restoration/enhancement areas	Weeks 15-18
Begin 5 year monitoring and maintenance period	Week 19

* Optimal planting season for herbaceous species is March through September, and October through March for forested species.

The above is a general timeline of the basic implementation of the proposed mitigation activities. Additional planning and specifics may need to be established once the transmission line construction schedule is finalized.

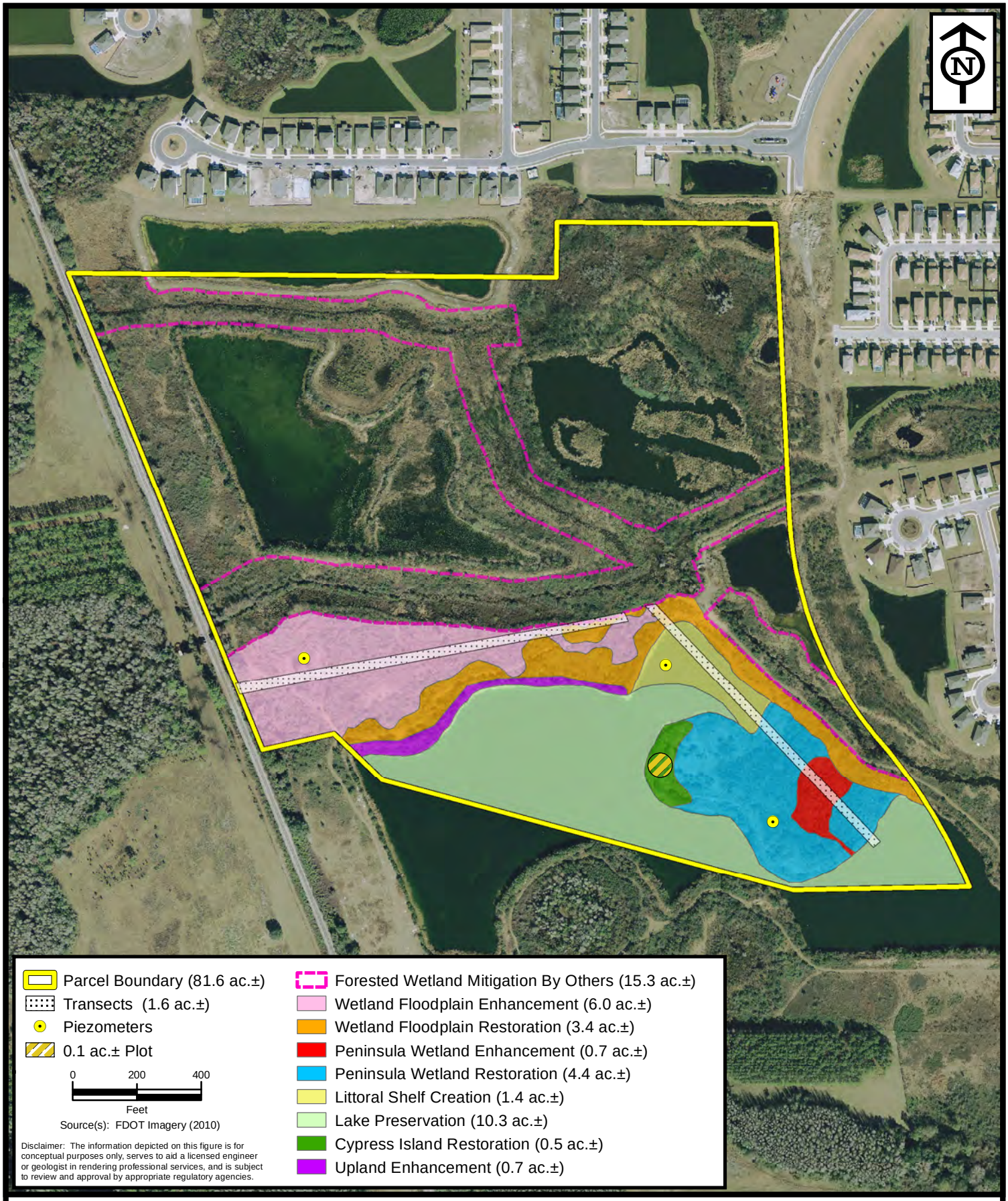
5.9 Monitoring and Maintenance Requirements

The wetland enhancement/restoration areas will be monitored on an annual basis and maintained quarterly to ensure their success. Monitoring will document that each habitat type is naturally progressing to resemble its intended target community in regard to plant species and composition. In addition, wildlife utilization, hydrologic conditions, presence of invasive/exotic species and any other management issues will be noted and addressed.

The quantitative monitoring of the herbaceous and forested wetland mitigation areas will consist of establishing fixed linear transects covering approximately 1.0 acre in area. For some of the smaller community types such as the forested restoration area, 0.1 acre plots may be established instead of transects. The transects will be 25 ft. wide and will average 900 ft. long. Two transects will be required to equal 1.0 ac. for the FMC site and one 0.1 acre plot will be established in the forested restoration area. Hydrology will be observed through the use of three (3) continuously recording piezometers installed strategically throughout the site (Figure 5-9). The data that will be observed and recorded within each transect/plot will include:

- date of installation and number and types of plants installed;
- total coverage and survivorship of desirable planted species and any other dominant species;
- for the 0.1 acre plot, the presence of planted and/or naturally recruited trees present within each stratum;
- the presence and overall coverage of any listed invasive/exotic species;
- success of any previously recommended treatment methods and any future methods proposed;
- any areas of mortality of planted or other natural species;
- current hydrologic conditions, water depths and hydric soils observed;
- any evidence of wildlife presence or utilization;
- any maintenance needs in regard to stabilization, erosion, vandalism etc. and suggested corrective actions.

A baseline monitoring event will be conducted at the FMC no less than 60 days after the completion of planting. The baseline event will help to establish the initial conditions after construction and will be used as a reference to assess progression during future monitoring events. The annual monitoring will commence after the baseline event and



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Proposed Monitoring Activities

Five Mile Creek

Pasco County, Florida

Project:	EJ11021.00
Date:	June 2011
Drwn/Chkd:	JGB/JRN
Figure:	**5-9**

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will be submitted to FDEP and ACOE in the fall (September/October) of each year. The report will consist of a narrative describing the site conditions, the management activities that have occurred, photographs taken from fixed location points and maps depicting the mitigation area. The herbaceous enhancement/restoration areas will be monitored for at least three years until they reach the criteria established below. The forested restoration area will be monitored for five years. The monitoring period may be adjusted based upon the performance of the vegetation.

5.10 Success Criteria

Specific success criteria outlined below will ensure that the proposed mitigation activities achieve their intended design and function. The main focus of the success criteria for FMC will emphasize the establishment of fresh water marsh and the control of invasive/exotic species. Regular monitoring as described above and maintenance implementation is important to ensuring success at the FMC site. The mitigation area will be considered successful when the following criteria have been met within the required monitoring time frame:

Herbaceous Wetland Enhancement/Restoration Areas:

- 75% coverage of native/desirable herbaceous vegetation;
- 5% or less total coverage of any invasive/exotic species;
- hydrology is well established and visibly apparent based on the hydrologic indicators as defined by Rule 62-340 F.A.C.;
- the above criteria must be met within the three years of annual monitoring.

Forested Restoration “Cypress Island” Area:

- 80% survivorship/species composition of planted (or naturally recruited) wetland trees including pond cypress, bald cypress, black gum or any other obligate (OBL) tree;
- 5% or less total coverage of any invasive/exotic species;
- hydrology is well established and visibly apparent based on the hydrologic indicators as defined by Rule 62-340, Florida Administrative Code (F.A.C.);
- the above criteria must be met within in five years of annual monitoring.

The progress of the mitigation area towards reaching success will be tracked through the monitoring reports that will be submitted annually to FDEP and ACOE for review and approval. In the event that the above criteria are not met at the end of the monitoring period, or it is becoming obvious during annual monitoring that an area will not meet the established success criteria, then PEF will work closely with FDEP and ACOE staff in order to identify and correct any problems. Once the success criteria outlined above are met, the mitigation effort will be deemed a success and the monitoring of the mitigation area will be terminated.

5.11 Engineering and Planting Detail Drawings

Please see the attached engineering and planting detail drawings.

PROGRESS ENERGY MITIGATION PROJECT
FIVE MILE CREEK SITE
PASCO COUNTY, FLORIDA

DRAWING INDEX

SHEET 1	TITLE SHEET
SHEET 2	PROJECT LOCATION MAP
SHEET 3	EXISTING CONDITIONS
SHEET 4	PROJECT SITE OVERVIEW
SHEET 5	GRADING PLAN - AREA A
SHEET 6	GRADING AREA A - PROFILE
SHEET 7	GRADING AREA A - CROSS SECTIONS
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SHEET 19	PLANTING PLAN OVERVIEW
SHEET 20	PLANTING PLAN SHEET A
SHEET 21	PLANTING PLAN SHEET B
SHEET 22	PLANTING PLAN SHEET C



LOCATION MAP
N.T.S.

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JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

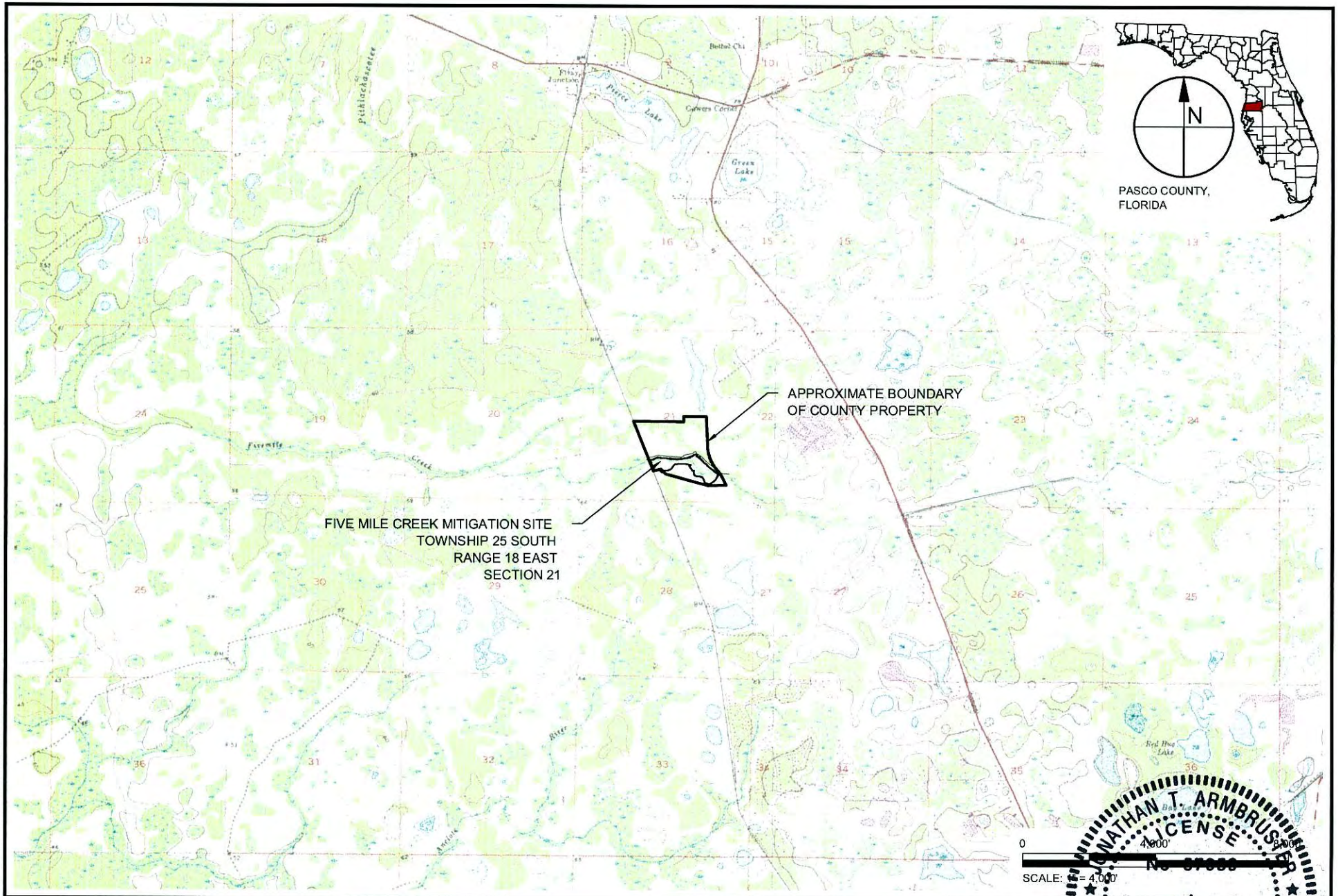
TITLE SHEET
PROGRESS ENERGY MITIGATION PROJECT
FIVE MILE CREEK SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RJ
SHEET	1 of 22
DATE	JUNE 2011

SEAL
JONATHAN T. CHRISTER, P.E. #57959
DATE

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

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PROJECT LOCATION MAP
PROGRESS ENERGY MITIGATION PROJECT
FIVE MILE CREEK SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RP
SHEET	2 of 22
DATE	JUNE 2011

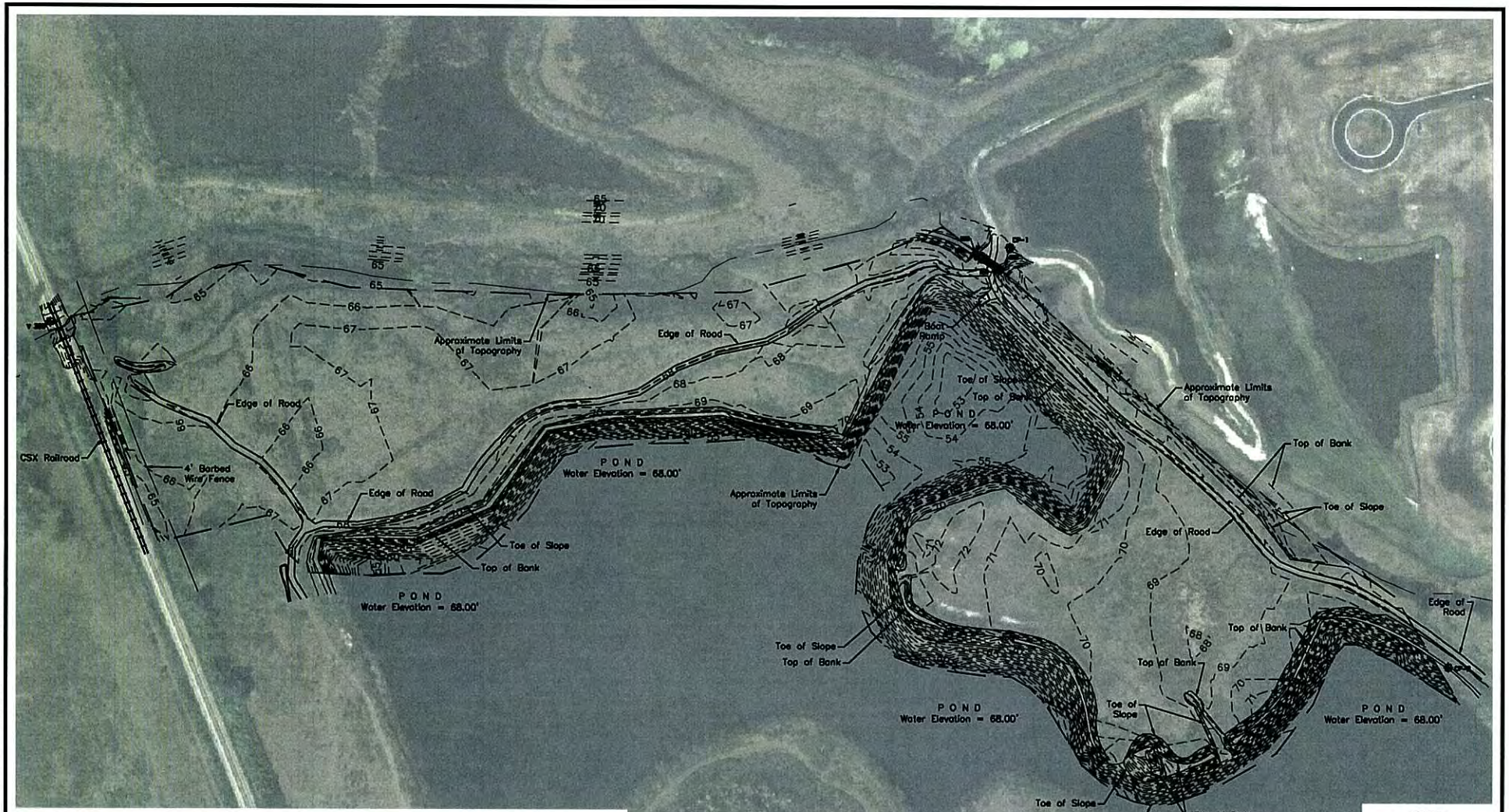
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REFERENCES:

1. ALL HORIZONTAL COORDINATES SHOWN HEREON ARE REFERENCED TO STATE PLANE NAD 1983 FLORIDA WEST ZONE (2007 ADJUSTMENT), U.S. SURVEY FEET.
2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO DATUM NAVD 1988, U.S. SURVEY FEET. THE BENCHMARK UTILIZED WAS NGS (NATIONAL GEODETIC SOCIETY) BENCHMARK "V 258" WITH AN ELEVATION OF 68.38 FEET.
3. TOPOGRAPHICAL SURVEY PROVIDED BY SURVTECH SOLUTIONS, INC., DATED APRIL 22, 2011.

JONATHAN T. ARMBRUSTER LICENSED No 57959 PROFESSIONAL ENGINEER STATE OF FLORIDA

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

EXISTING CONDITIONS
PROGRESS ENERGY MITIGATION PROJECT
FIVE MILE CREEK SITE
PASCO COUNTY, FLORIDA

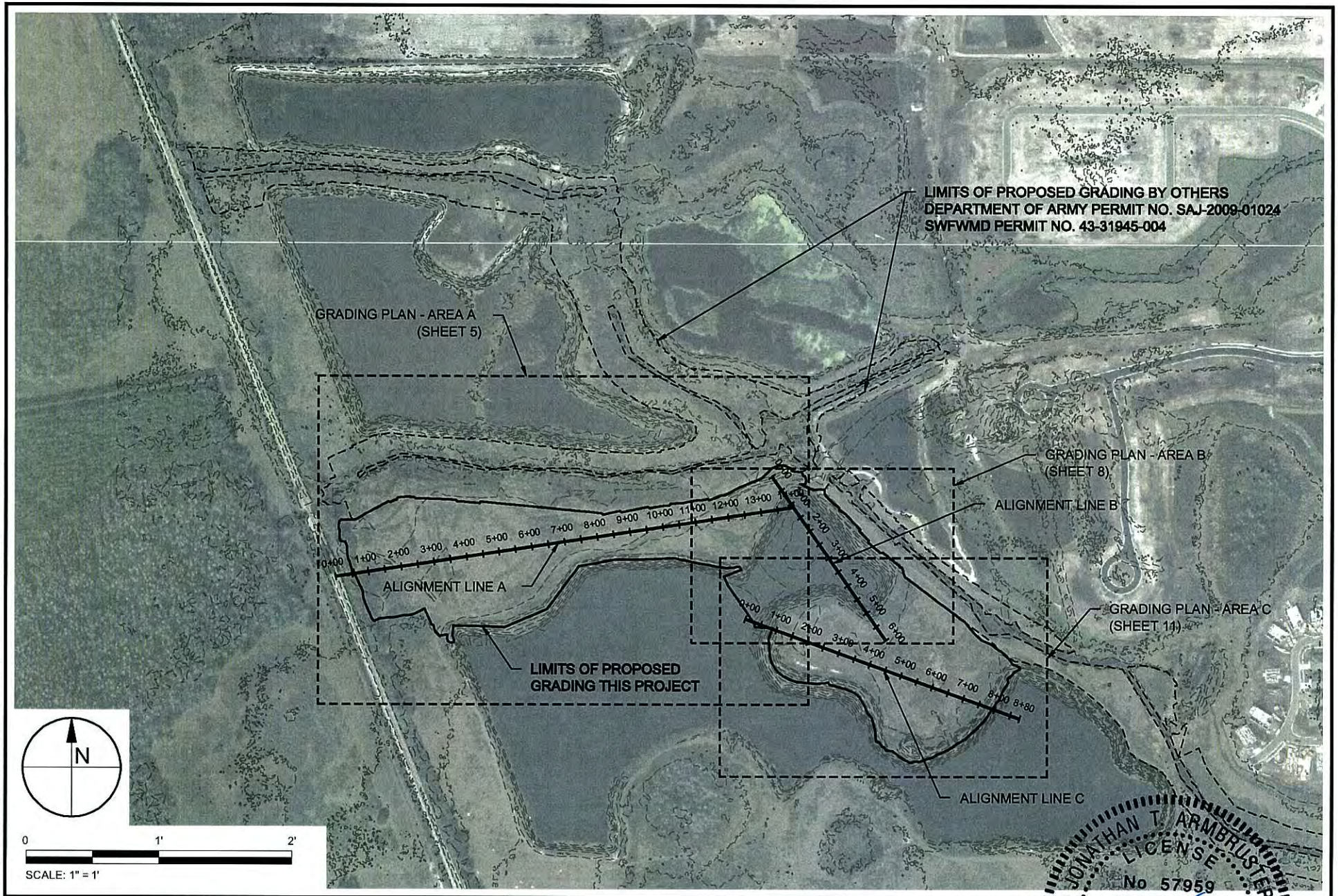
PROJECT	C2011-025
DRAWN BY	RJJ
SHEET	3 of 22
DATE	JUNE 2011

SEAL

JONATHAN T. ARMBRUSTER, P.E. # 57959 — DATE 6/21/11

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

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TAYLOR ENGINEERING INC.

10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

PROJECT SITE OVERVIEW
PROGRESS ENERGY MITIGATION PROJECT
FIVE MILE CREEK SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	
SHEET	4 OF 22
DATE	JUNE 2011

SEAL

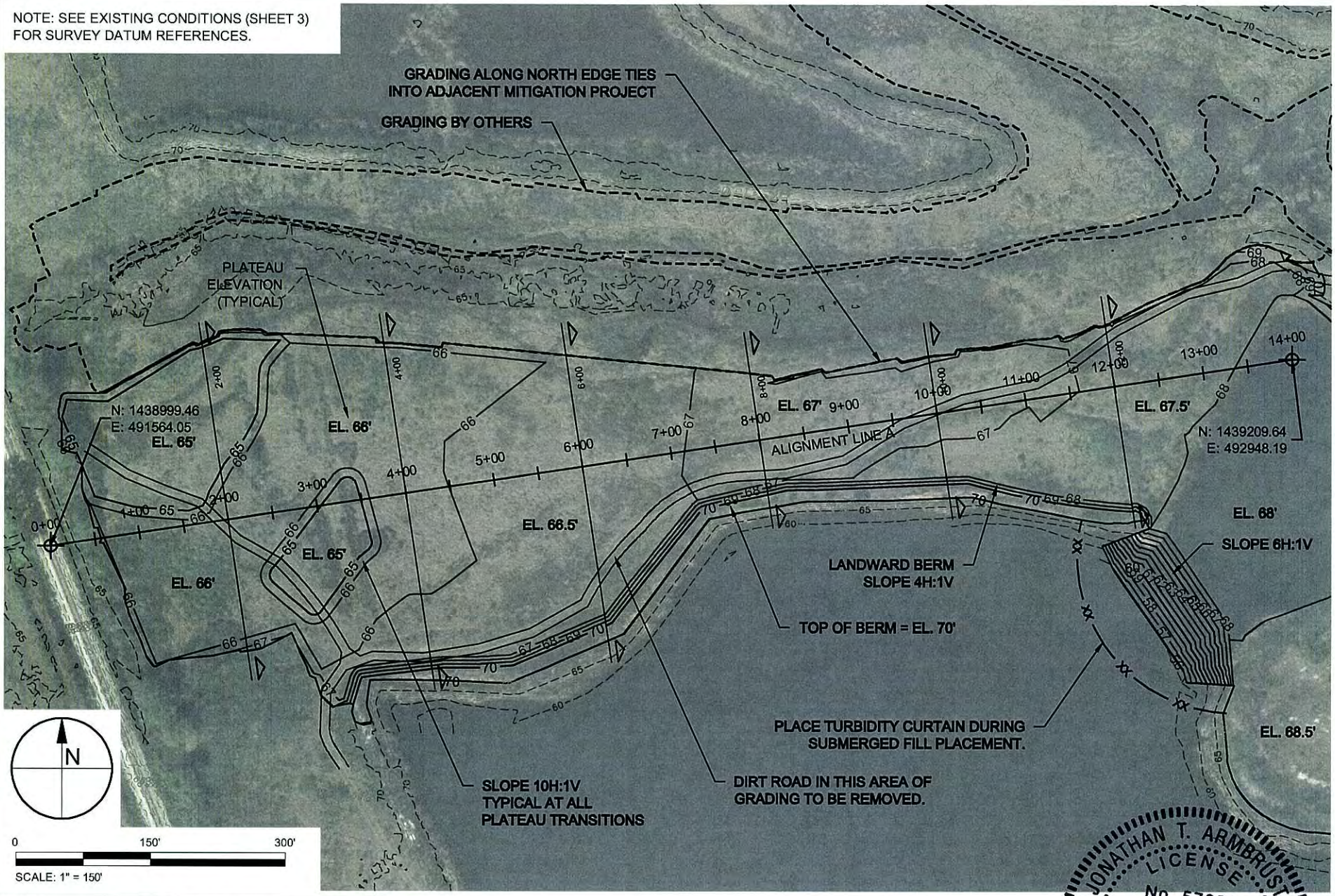
JONATHAN T. ARMBRUSTER LICENSE No 57959 STATE OF FLORIDA PROFESSIONAL ENGINEER

JONATHAN T. ARMBRUSTER, P.E. #57959 — DATE 6/21/11

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

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NOTE: SEE EXISTING CONDITIONS (SHEET 3) FOR SURVEY DATUM REFERENCES.



TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

GRADING PLAN - AREA A
PROGRESS ENERGY MITIGATION PROJECT
FIVE MILE CREEK SITE
PASCO COUNTY, FLORIDA

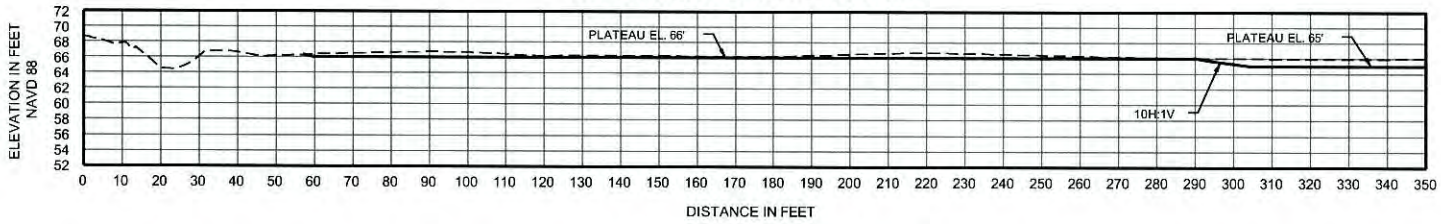
PROJECT	C2011-025
DRAWN BY	RP
SHEET	5 of 22
DATE	JUNE 2011

JONATHAN T. ARMBRUSTER LICENSE No 57059 STATE OF FLORIDA PROFESSIONAL ENGINEER
SEAL
JONATHAN T. ARMBRUSTER, P.E. #57059
DATE

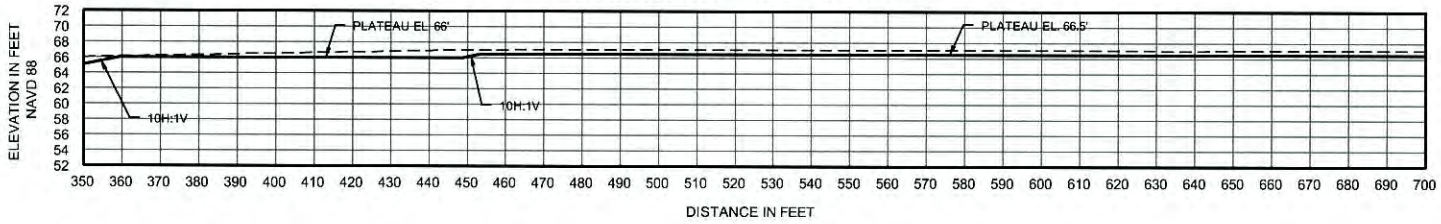
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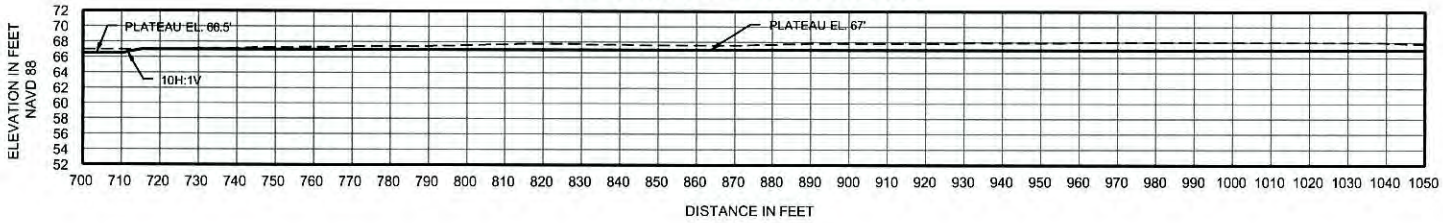
ALIGNMENT LINE A PROFILE



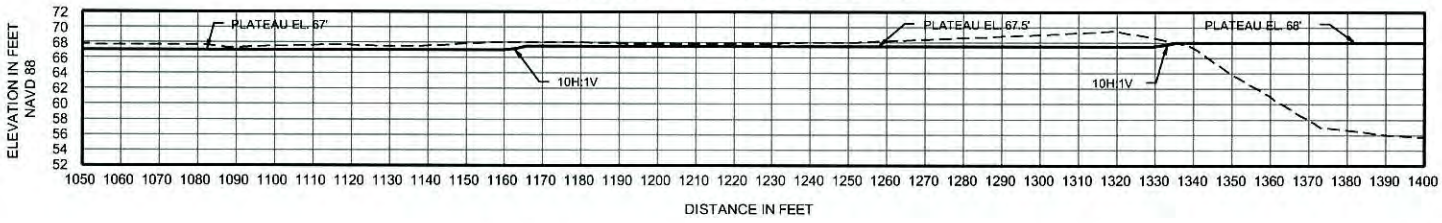
ALIGNMENT LINE A PROFILE



ALIGNMENT LINE A PROFILE



ALIGNMENT LINE A PROFILE



LEGEND:

EXISTING GRADE

PROPOSED GRADE

GRADING AREA A - PROFILE ALONG ALIGNMENT LINE A

SCALE: 1" = 50'

V-SCALE: 1" = 25'

0 50'

TAYLOR ENGINEERING INC.

10151 DEERWOOD PARK BLVD.

BLDG. 300, SUITE 300

JACKSONVILLE, FL 32256

CERTIFICATE OF AUTHORIZATION # 4815

GRADING AREA A - PROFILE

PROGRESS ENERGY MITIGATION PROJECT

FIVE MILE CREEK SITE

PASCO COUNTY, FLORIDA

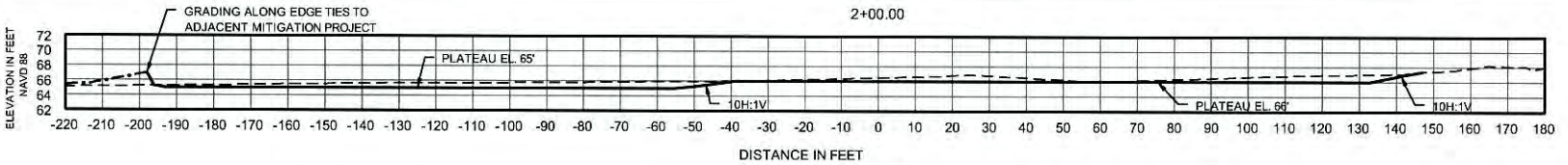
PROJECT	C2011-025
DRAWN BY	RP
SHEET	6 of 22
DATE	JUNE 2011

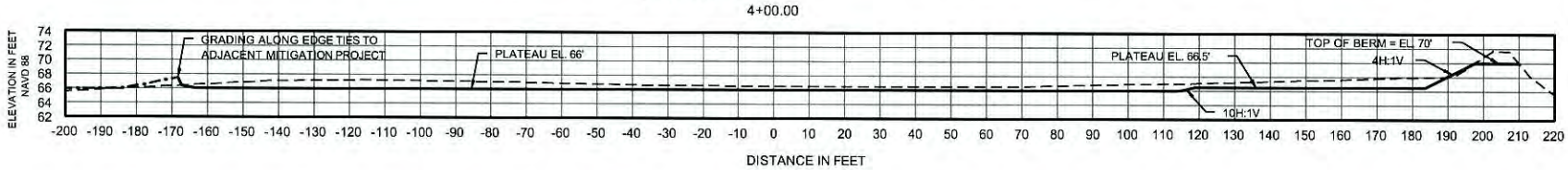
JONATHAN T. ARMBRUSTER LICENSE No 57959 STATE OF FLORIDA PROFESSIONAL ENGINEER

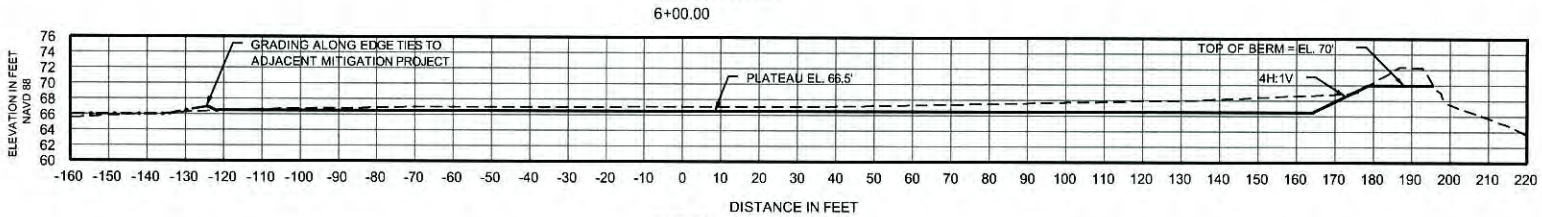
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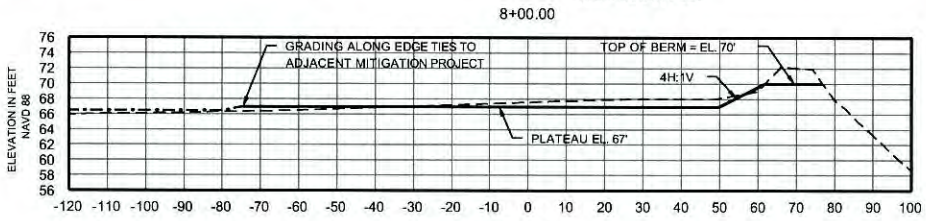
PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

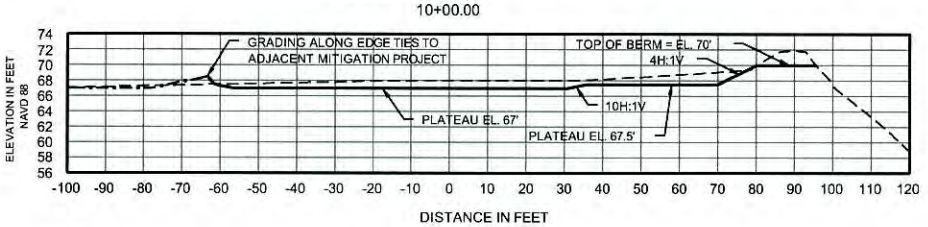
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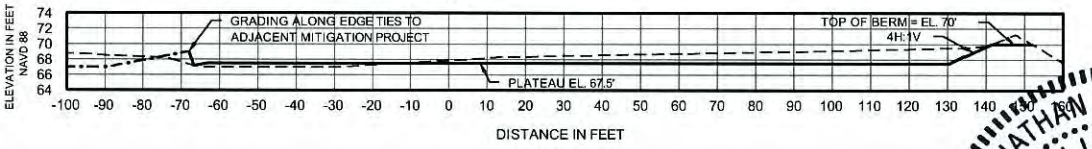












LEGEND:

- EXISTING GRADE
- PROPOSED GRADE
- GRADING BY OTHERS

GRADING AREA A - CROSS SECTIONS

SCALE: 1" = 50'
V-SCALE: 1" = 25'

0 50'

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

GRADING AREA A - CROSS SECTIONS
PROGRESS ENERGY MITIGATION PROJECT
FIVE MILE CREEK SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	BL
SHEET	7 of 21
DATE	JUNE 2011

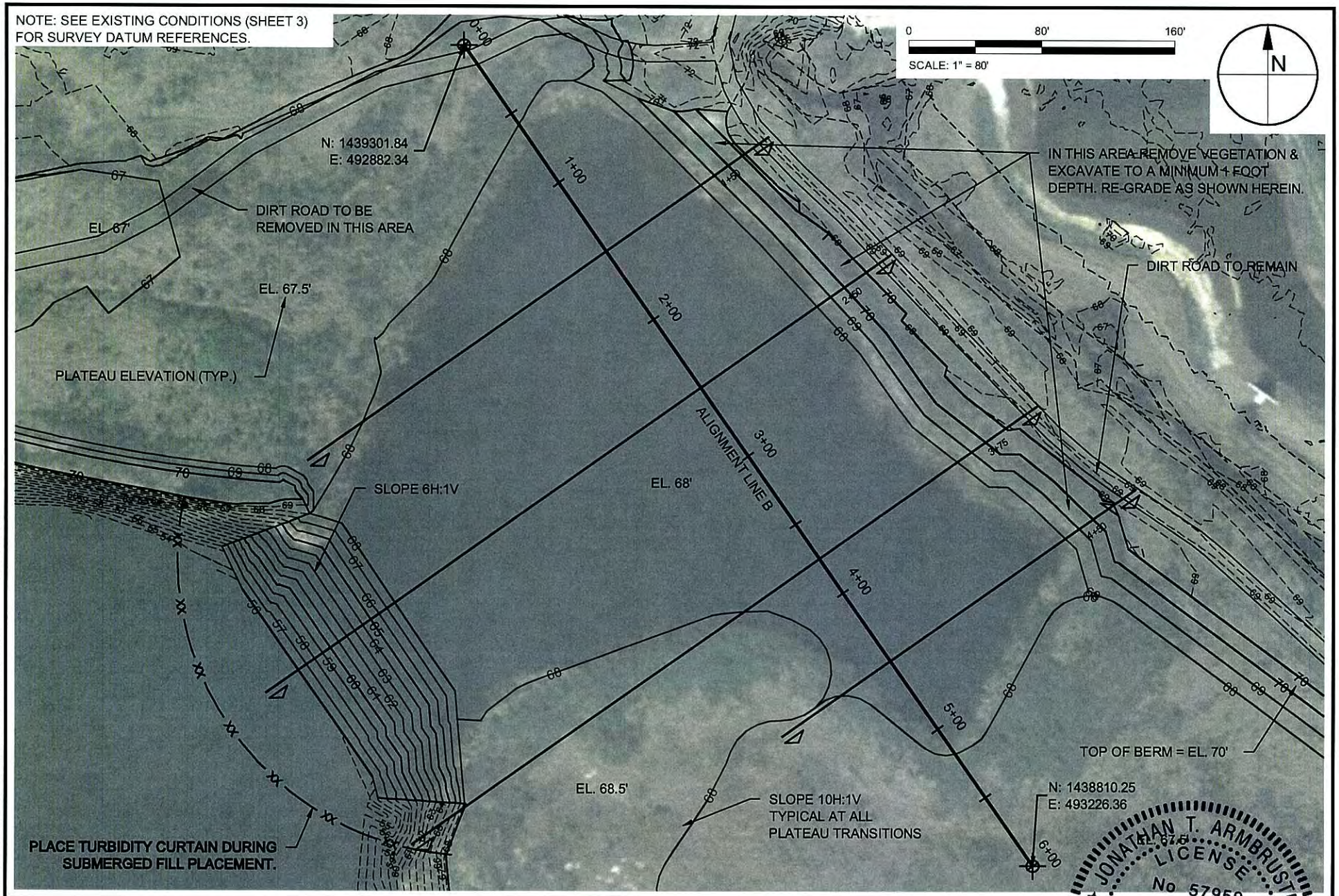
JONATHAN T. ARMBRUSTER LICENSE No 57959 STATE OF FLORIDA PROFESSIONAL ENGINEER

SEAL

SIGNATURE REGISTERED P.E. # 57959 DATE

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

CATHY SHELL X:\SYS\PROJECTS\C2011-025 PROGRESS ENERGY\PERMITS\MC2011-025-P-SM\CROSS SECTIONS.DWG 8/29/2011 9:36:59 AM



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TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

GRADING PLAN - AREA B
PROGRESS ENERGY MITIGATION PROJECT
FIVE MILE CREEK SITE
PASCO COUNTY, FLORIDA

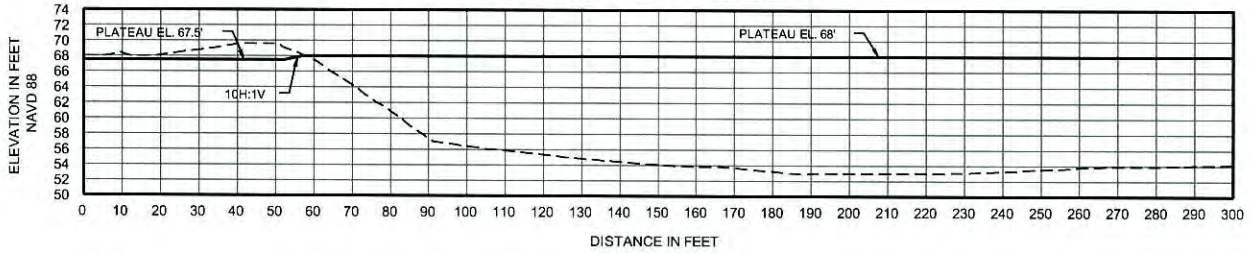
PROJECT	C2011-025
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DATE	JUNE 2011

JONATHAN T. ARMBRUSTER LICENSE No 57959 STATE OF FLORIDA PROFESSIONAL ENGINEER

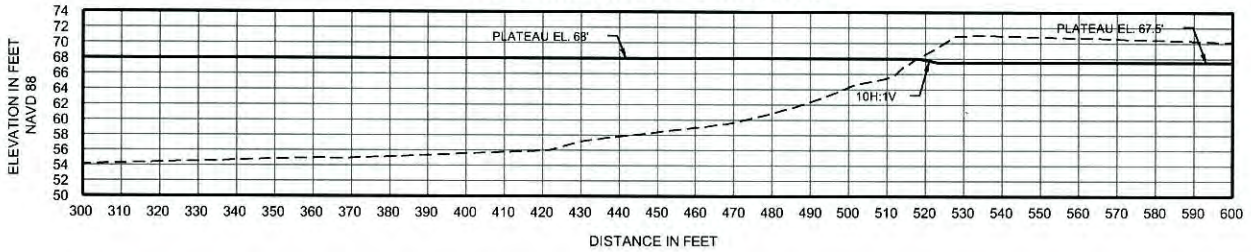
SIGNATURE: JONATHAN T. ARMBRUSTER P.E. #57959 DATE

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

ALIGNMENT LINE B PROFILE



ALIGNMENT LINE B PROFILE



GRADING AREA B - PROFILE ALONG ALINGMENT LINE B

SCALE: 1" = 50'
V-SCALE: 1" = 25'

0 50'

LEGEND:

EXISTING GRADE

PROPOSED GRADE

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

GRADING AREA B - PROFILE
PROGRESS ENERGY MITIGATION PROJECT
FIVE MILE CREEK SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	JTA
SHEET	9 of 22
DATE	JUNE 2011

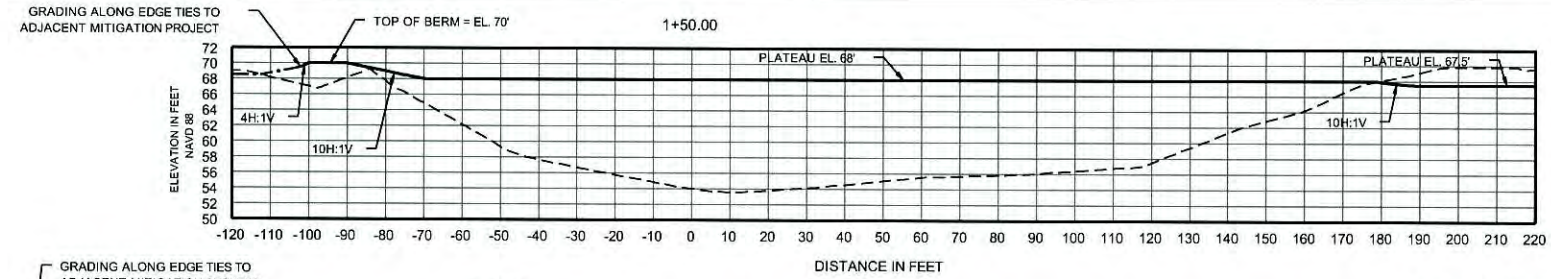
JONATHAN T. ARMBRUSTER LICENSE No 57959 STATE OF FLORIDA PROFESSIONAL ENGINEER

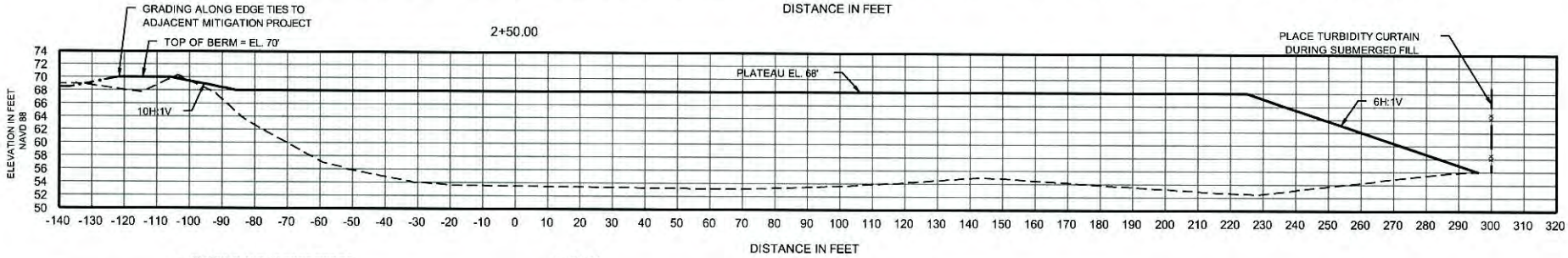
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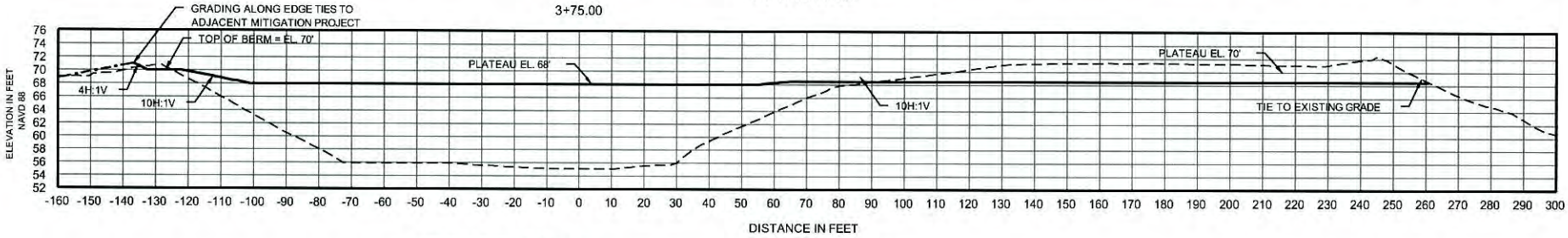
JONATHAN T. ARMBRUSTER, P.E. #57959 DATE

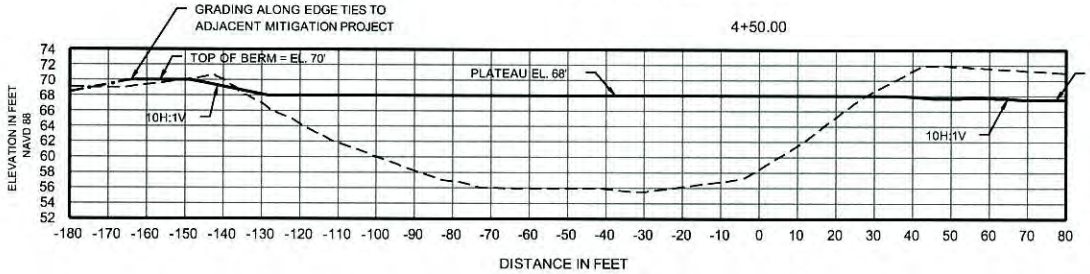
PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

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LEGEND:

EXISTING GRADE

PROPOSED GRADE

GRADING AREA B - CROSS SECTIONS

SCALE: 1" = 50'

V-SCALE: 1" = 25'

0 50'

TAYLOR ENGINEERING INC.

10151 DEERWOOD PARK BLVD.

BLDG. 300, SUITE 300

JACKSONVILLE, FL 32256

CERTIFICATE OF AUTHORIZATION # 4815

GRADING AREA B - CROSS SECTIONS

PROGRESS ENERGY MITIGATION PROJECT

FIVE MILE CREEK SITE

PASCO COUNTY, FLORIDA

PROJECT	C2011.025
DRAWN BY	RJ
SHEET	10 OF 20
DATE	JUNE 2011

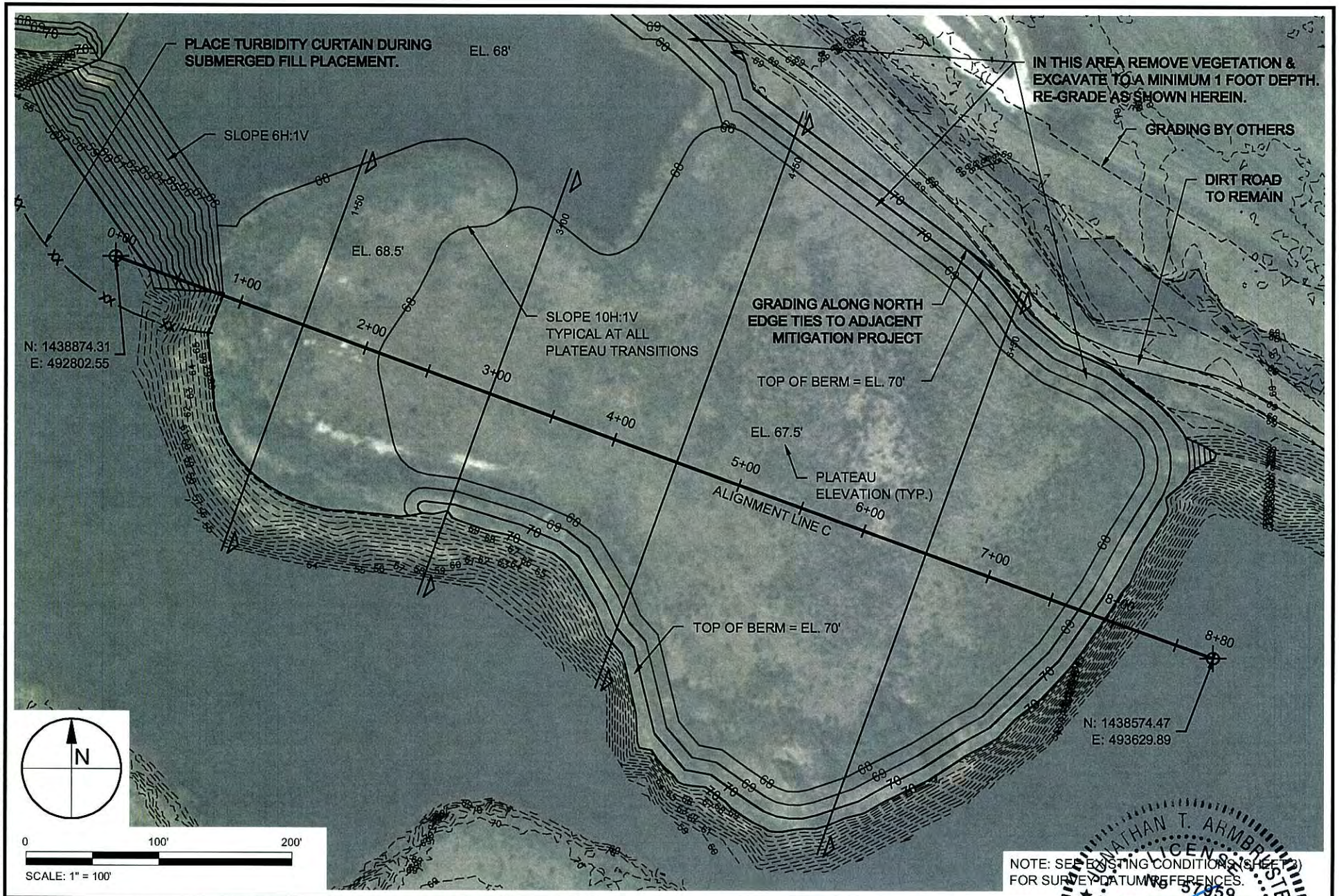
SEAL

JONATHAN T. ARMBRUSTER LICENSE No 57959 STATE OF FLORIDA PROFESSIONAL ENGINEER

JONATHAN T. ARMBRUSTER, FLORIDA LICENSE # 57959 DATE

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

CATHY SHELL X:\SYS\PROJECTS\C2011-025 PROGRESS ENERGY\PERMITS\MC2011-025-P-SM-CROSS SECTIONS.DWG 6/29/2011 9:37:24 AM



NOTE: SEE EXISTING CONDITIONS (SHEET 3) FOR SURVEY DATUM REFERENCES.

JONATHAN T. ARMBRUSTER LICENSE No. 57959 STATE OF FLORIDA PROFESSIONAL ENGINEER

TAYLOR ENGINEERING INC.

10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

GRADING PLAN - AREA C
PROGRESS ENERGY MITIGATION PROJECT
FIVE MILE CREEK SITE
PASCO COUNTY, FLORIDA

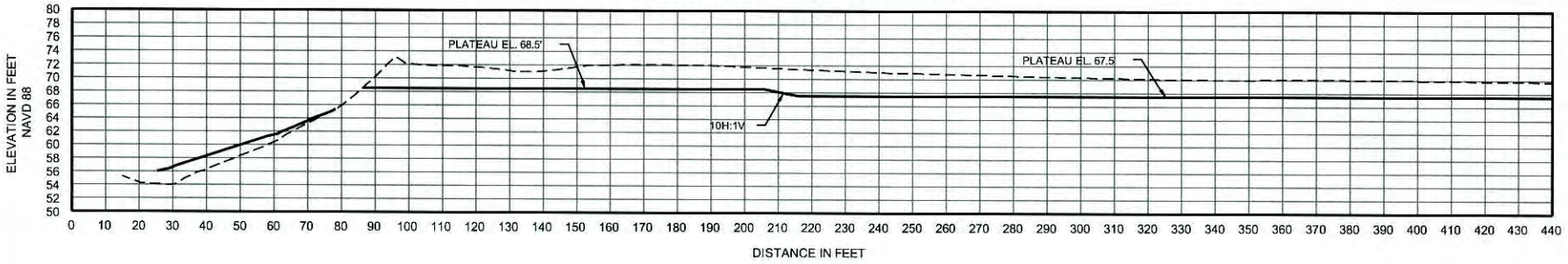
PROJECT	C2011025
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SHEET	11 of 22
DATE	JUNE 2011

JONATHAN T. ARMBRUSTER, P.E. # 57959 — SEAL — DATE

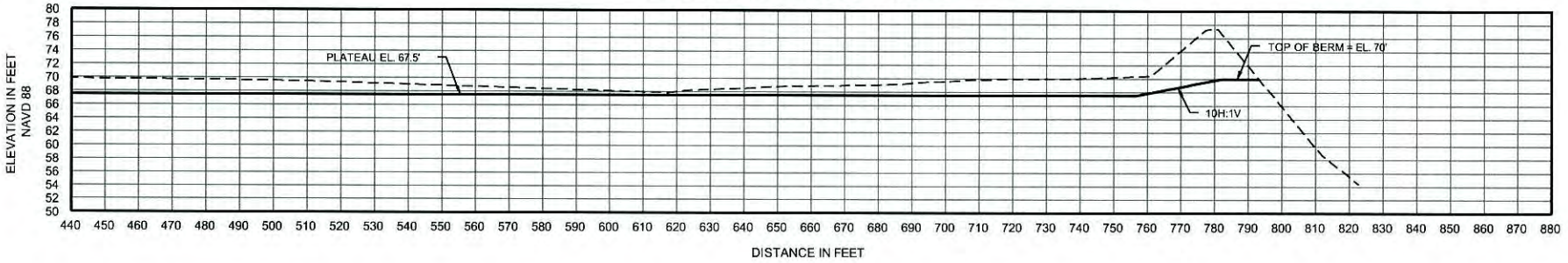
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CATHY SNELL X:\SY\SI\PROJECTS\C2011-025 PROGRESS ENERGY\PERMITS\MIC2011-025-F-SM-GRADING PLAN C.DWG 6/29/2011 9:37:38 AM

ALIGNMENT LINE C PROFILE



ALIGNMENT LINE C PROFILE



LEGEND:

- EXISTING GRADE
- PROPOSED GRADE

GRADING AREA C - PROFILE ALONG ALIGNMENT C

SCALE: 1" = 50'
V-SCALE: 1" = 30'

0 50'

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

GRADING AREA C - PROFILE
PROGRESS ENERGY MITIGATION PROJECT
FIVE MILE CREEK SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011025
DRAWN BY	BAJ
SHEET	12 of 22
DATE	JUNE 2011

SEAL

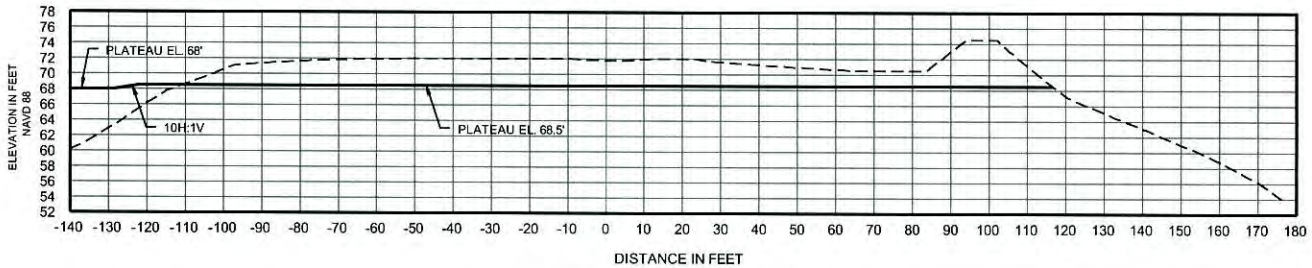
JONATHAN T. ARMBRUSTER LICENSE No 57959 STATE OF FLORIDA REGISTERED ENGINEER

JONATHAN T. ARMBRUSTER P.E.# 57959 — DATE 6/21/11

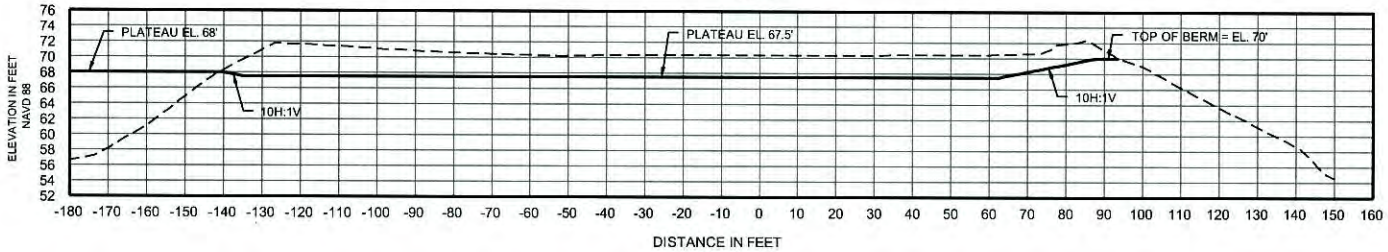
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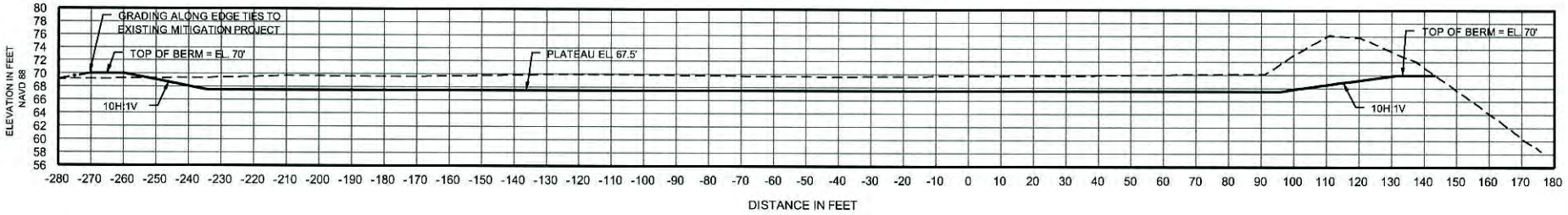
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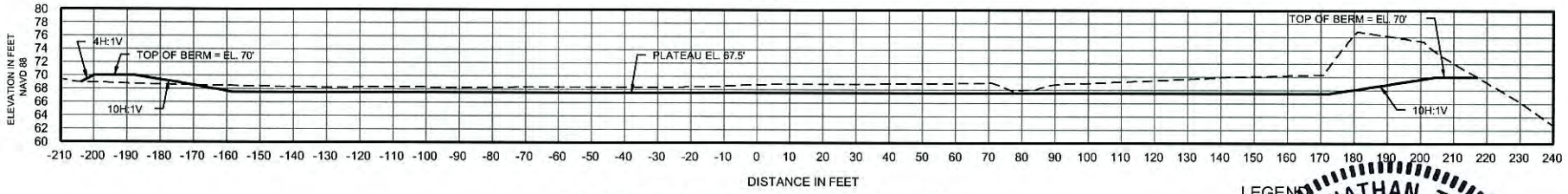
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4+50.00



6+50.00



GRADING AREA C - CROSS SECTIONS

SCALE: 1" = 50'
V-SCALE: 1" = 25'

0 50'

LEGEND:
- EXISTING GRADE
- PROPOSED GRADE
- GRADING BY OTHERS

JONATHAN T. AMBRUSTER LICENSE No. 57959 STATE OF FLORIDA PROFESSIONAL ENGINEER

9/21/11
JONATHAN T. AMBRUSTER, P.E. # 57959 DATE

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

GRADING AREA C - CROSS SECTIONS
PROGRESS ENERGY MITIGATION PROJECT
FIVE MILE CREEK SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RU
SHEET	13 OF 20
DATE	JUNE 2011
SEAL	

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

CATHY SHELL X:\SYS\PROJECTS\C2011-025 PROGRESS ENERGY\PERMITS\MC2011-025-P-SM-CROSS SECTIONS.DWG 6/29/2011 9:37:48 AM

EROSION CONTROL AND GENERAL VEGETATION NOTES:

1. THE CONTRACTOR SHALL IMPLEMENT AND MAINTAIN EROSION CONTROL MEASURES AS NECESSARY TO COMPLY WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS AND COMPLY WITH STATE WATER QUALITY CRITERIA FOR STORMWATER DISCHARGE. EROSION CONTROL MEASURES INCLUDE BUT ARE NOT LIMITED TO TURBIDITY SCREENS, MULCHING, HAY BALES, AND SILT FENCE. IF A WATER QUALITY VIOLATION OCCURS, THE CONTRACTOR SHALL BE WHOLLY RESPONSIBLE FOR ALL DAMAGE AND ALL COSTS WHICH MAY RESULT INCLUDING LEGAL FEES, CONSTRUCTION COSTS, AND FINES.

2. DISTURBED AREAS SHALL BE VEGETATED, FERTILIZED, MULCHED, AND MAINTAINED IN ACCORDANCE WITH PROJECT SPECIFICATIONS AND CITY, COUNTY, STATE, AND FEDERAL REQUIREMENTS.

3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING PERMANENT VEGETATION AT ALL DISTURBED AREAS PER NPDES FINAL STABILIZATION REQUIREMENTS.

4. EROSION CONTROL MEASURES SHALL BE MAINTAINED FOR THE ENTIRE DURATION OF THE PROJECT OR UNTIL PERMANENT VEGETATION IS ESTABLISHED.

5. EROSION CONTROL MEASURES SHALL BE PLACED TO CONTAIN ALL POINTS OF DISCHARGE TO SURFACE WATERS OR WETLANDS INCLUDING CURB INLETS, DITCH BOTTOM INLETS, DITCHES, AND DOWNSTREAM PORTIONS OF NATURAL DRAINAGE PATHWAYS, STREAMS, CANALS, AND TIDAL WATERS ADJACENT TO CONSTRUCTION.

6. 48 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION, THE CONTRACTOR WILL SUBMIT A "NOTICE OF INTENT" TO THE EPA IN ACCORDANCE WITH NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM RULES AND REGULATIONS.

7. THE SITE CONTRACTOR IS RESPONSIBLE FOR REMOVING THE TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES AFTER COMPLETION OF CONSTRUCTION AND ONLY WHEN AREAS HAVE BEEN STABILIZED.

8. SILT FENCES AND FILTER BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

EROSION CONTROL DETAILS
PROGRESS ENERGY MITIGATION PROJECT
FIVE MILE CREEK SITE
PASCO COUNTY, FLORIDA

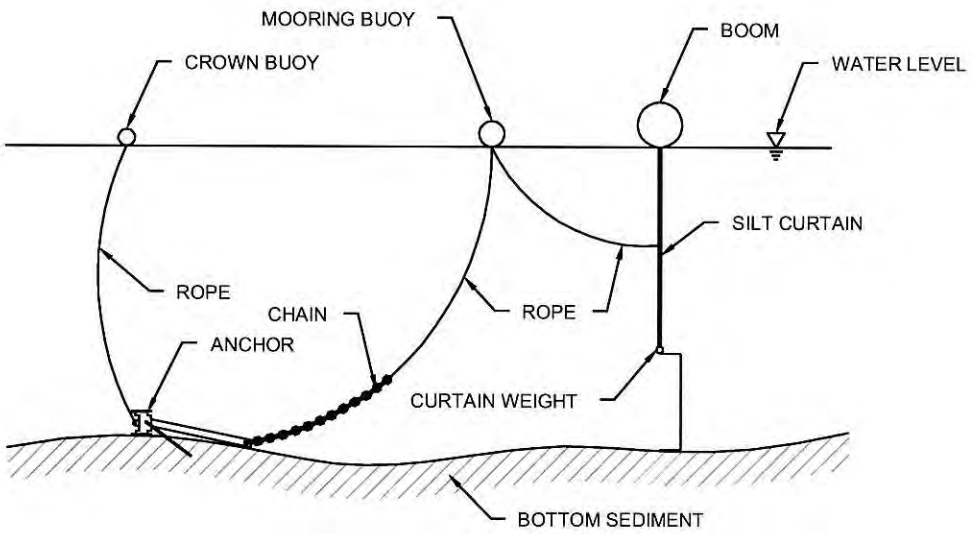
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SHEET	14 of 22
DATE	JUNE 2011

JONATHAN T. ARMBRUSTER P.E. # 57959 — DATE

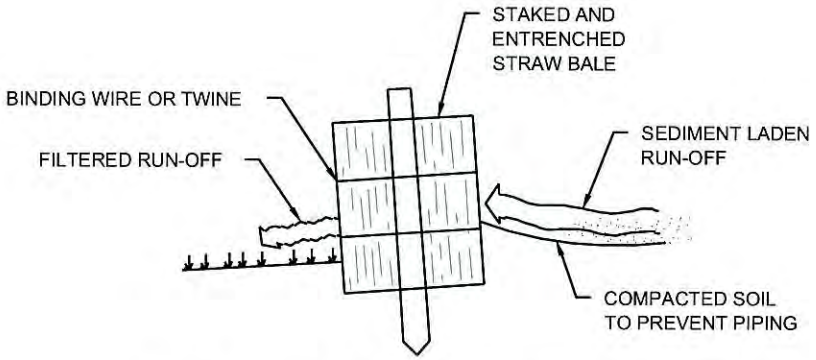
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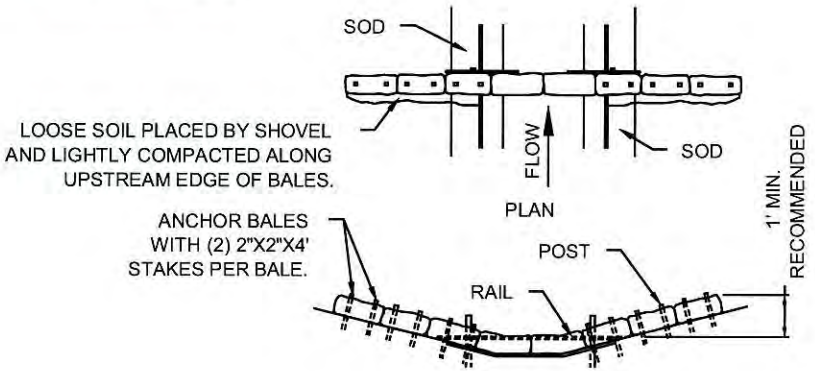
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TURBIDITY CURTAIN DETAIL



CROSS SECTION OF A PROPERLY INSTALLED STRAW BALE



SPACING: BALE BARRIERS FOR PAVED DITCHES SHOULD BE SPACED IN ACCORDANCE WITH CHART I, SHEET 1 OF 3, INDEX NO. 102 OF THE F.D.O.T. ROADWAY AND TRAFFIC DESIGN STANDARDS.

STRAW BALE BARRIER FOR PAVED DITCH

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10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
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CERTIFICATE OF AUTHORIZATION # 4815

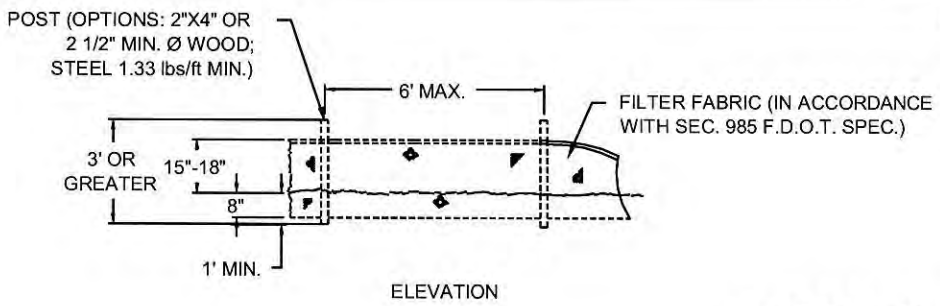
EROSION CONTROL DETAILS
PROGRESS ENERGY MITIGATION PROJECT
FIVE MILE CREEK SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011.025
DRAWN BY	
SHEET	15 of 22
DATE	JUNE 2011

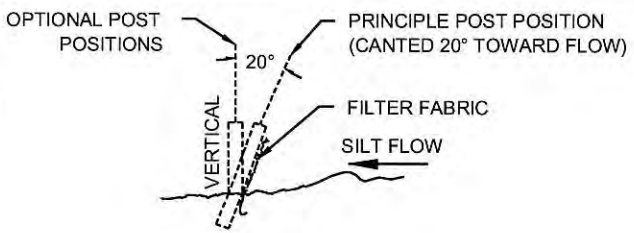
SEAL
JONATHAN T. ARMBRUSTER LICENSE No 57969 STATE OF FLORIDA PROFESSIONAL ENGINEER
JONATHAN T. ARMBRUSTER, P.E. #57969
DATE

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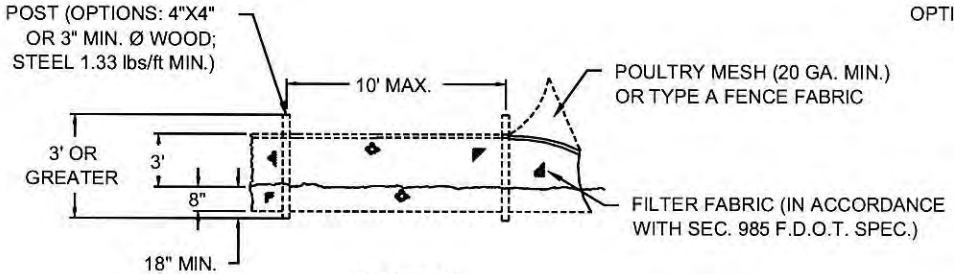


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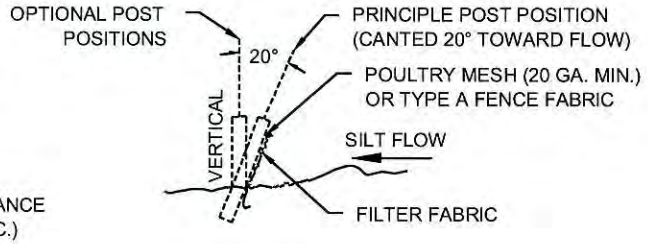


SECTION

TYPE III SILT FENCE

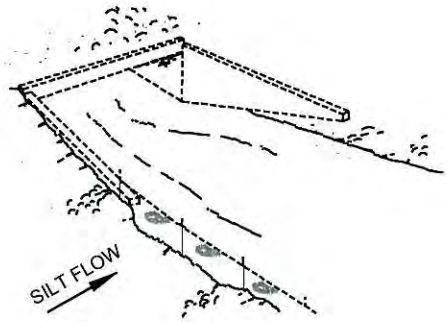


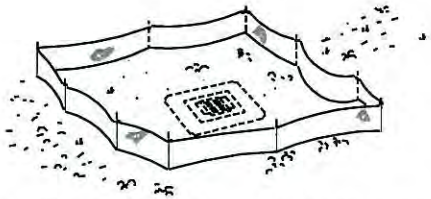
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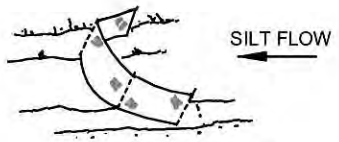
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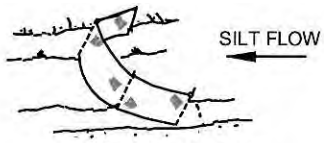




TYPE III OR TYPE IV SILT FENCE PROTECTION
AROUND DITCH BOTTOM INLETS.



TYPE IV SILT FENCE



TYPE III SILT FENCE

DITCH INSTALLATION AND SPACING FOR TYPE III & TYPE IV FENCE TO BE IN ACCORDANCE WITH SHEET 1 OF 3, OF THE F.D.O.T. INDEX NO. 102.

TYPE III OR TYPE IV SILT FENCE

DO NOT DEPLOY IN A MANNER THAT SILT FENCES WILL ACT AS A DAM ACROSS PERMANENT FLOWING WATERCOURSES. SILT FENCES ARE TO BE USED AT UPLAND LOCATIONS AND TURBIDITY BARRIERS USED AT PERMANENT BODIES OF WATER.

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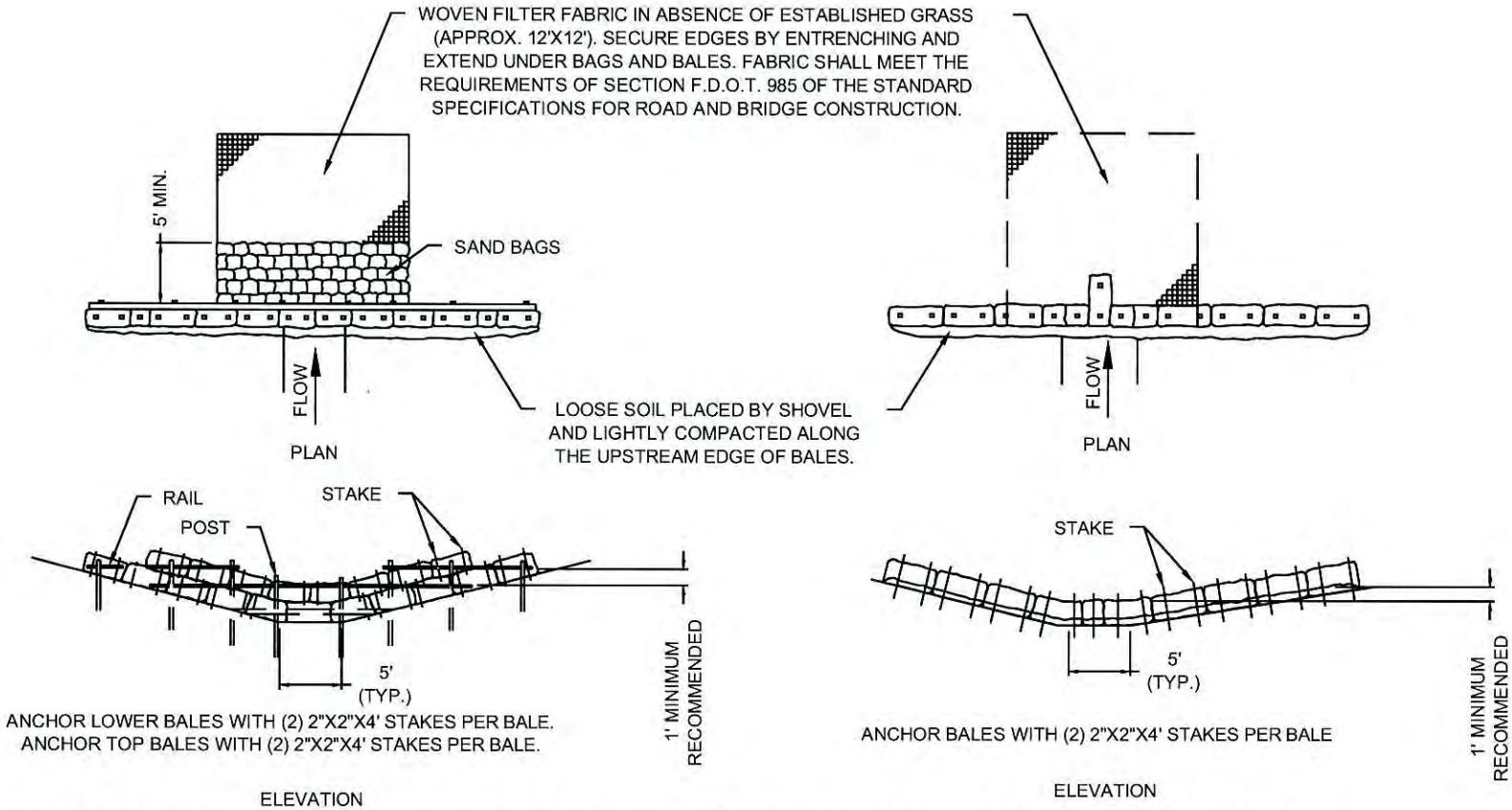
EROSION CONTROL DETAILS
PROGRESS ENERGY MITIGATION PROJECT
FIVE MILE CREEK SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ
SHEET	16 of 22
DATE	JUNE 2011

JONATHAN T. ARMBRUSTER LICENSE No 57959 STATE OF FLORIDA PROFESSIONAL ENGINEER
SEAL
JONATHAN T. ARMBRUSTER P.E.# 57959
DATE

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APPLICATION AND SPACING OF TYPES I & TYPES II HAY BALE BARRIERS SALL BE IN ACCORDANCE WITH SHEET 1 OF 3, F.D.O.T. INDEX NO. 102

TYPE II **TYPE I**

TYPICAL STRAW BALE DETAIL

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PROGRESS ENERGY MITIGATION PROJECT
FIVE MILE CREEK SITE
PASCO COUNTY, FLORIDA

PROJECT	C2011025
DRAWN BY	JRL
SHEET	12 of 22
DATE	JUNE 2011

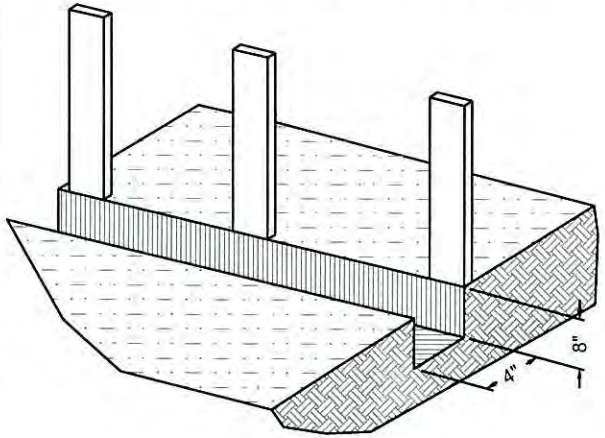
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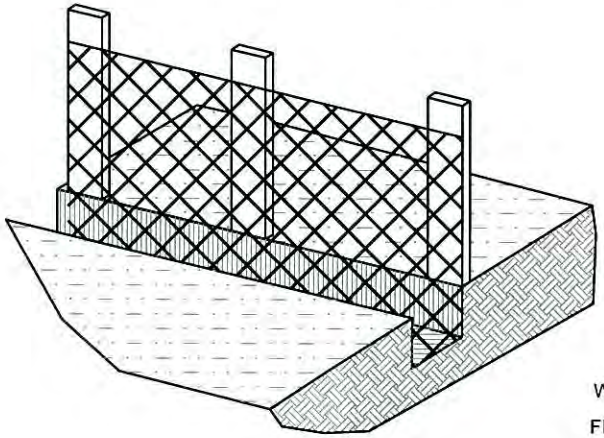
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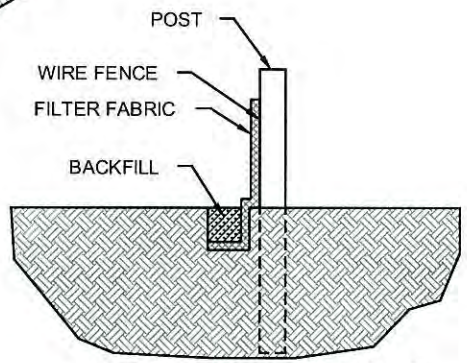
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1. SET POSTS AND EXCAVATE A 8"X4" TRENCH UP SLOPE ALONG THE LINE OF POSTS.



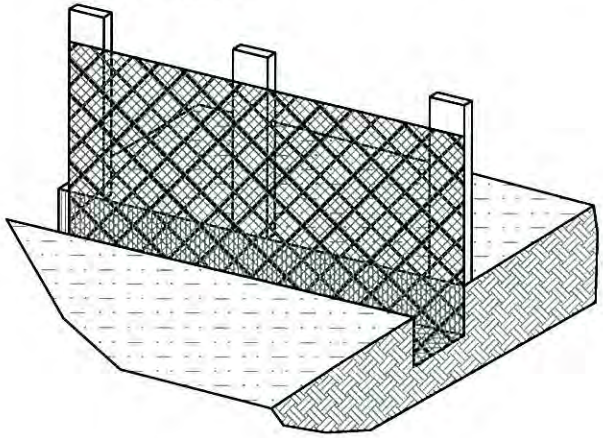
2. STAPLE WIRE FENCING TO THE POSTS.



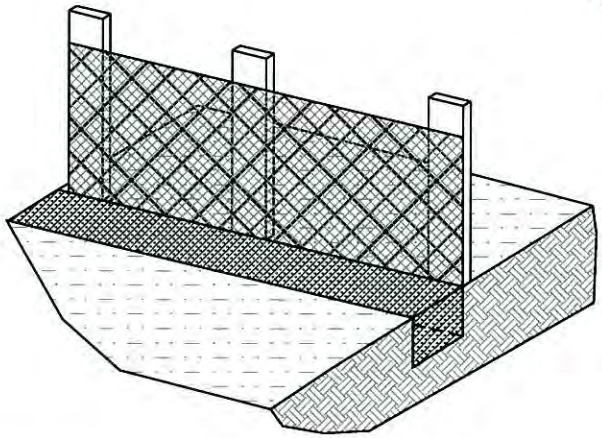


EXTENSION OF FILTER FABRIC AND WIRE FENCE INTO THE TRENCH.

3. ATTACH THE FILTER FABRIC TO THE WIRE FENCE AND EXTEND FILTER FABRIC AND WIRE FENCE INTO THE TRENCH.



4. BACKFILL AND COMPACT THE EXCAVATED SOIL.



SILT FENCE INSTALLATION DETAILS

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CERTIFICATE OF AUTHORIZATION # 4815

EROSION CONTROL DETAILS
PROGRESS ENERGY MITIGATION PROJECT
FIVE MILE CREEK SITE
PASCO COUNTY, FLORIDA

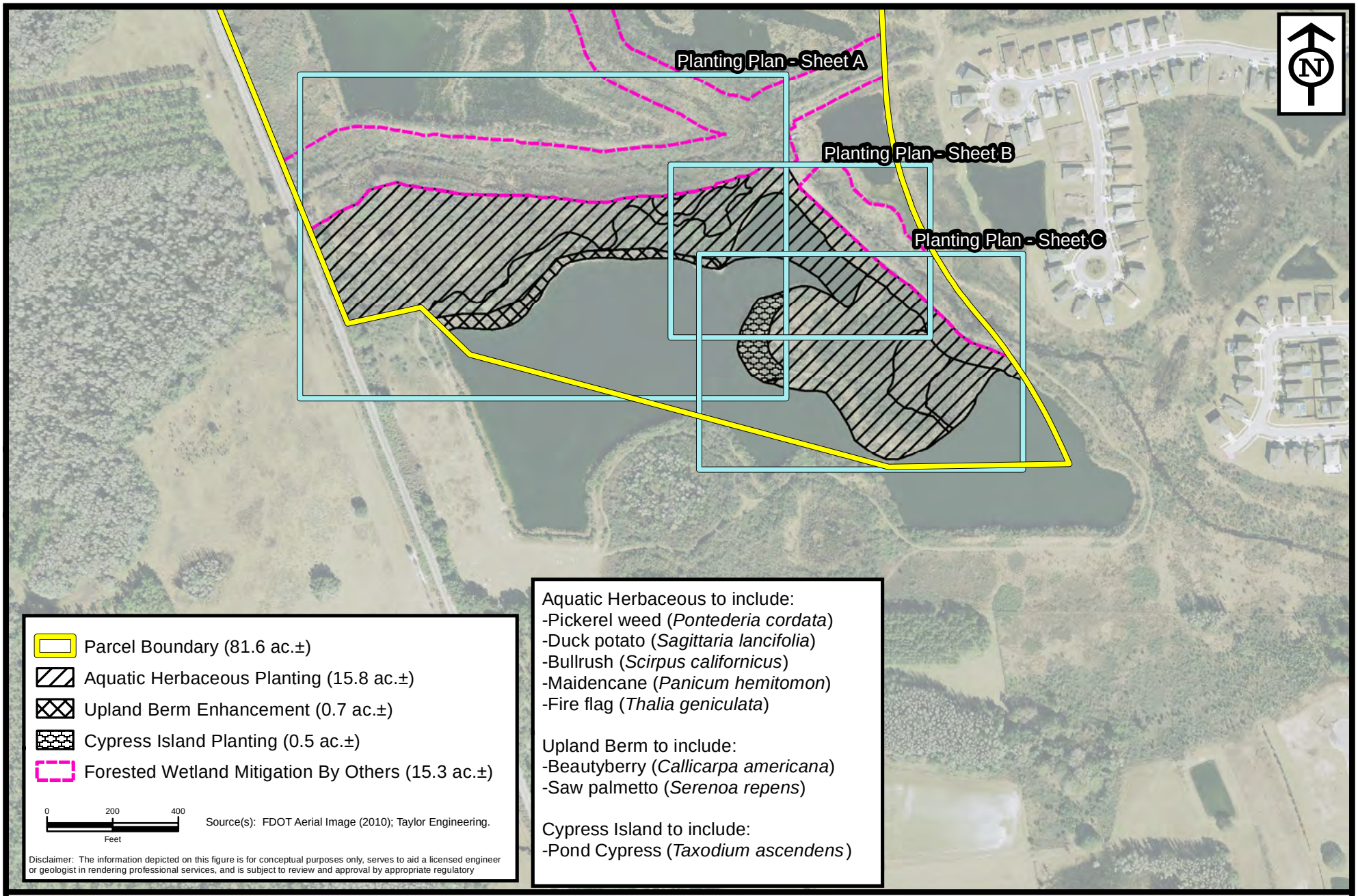
PROJECT	C2011-025
DRAWN BY	RJC
SHEET	18 of 22
DATE	JUNE 2011

JONATHAN T. ARMBRUSTER P.E. # 57959 — DATE

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- Parcel Boundary (81.6 ac.±)
- Aquatic Herbaceous Planting (15.8 ac.±)
- Upland Berm Enhancement (0.7 ac.±)
- Cypress Island Planting (0.5 ac.±)
- Forested Wetland Mitigation By Others (15.3 ac.±)

0 200 400
Feet

Source(s): FDOT Aerial Image (2010); Taylor Engineering.

Disclaimer: The information depicted on this figure is for conceptual purposes only, serves to aid a licensed engineer or geologist in rendering professional services, and is subject to review and approval by appropriate regulatory

Aquatic Herbaceous to include:
-Pickerel weed (*Pontederia cordata*)
-Duck potato (*Sagittaria lancifolia*)
-Bullrush (*Scirpus californicus*)
-Maidencane (*Panicum hemitomon*)
-Fire flag (*Thalia geniculata*)

Upland Berm to include:
-Beautyberry (*Callicarpa americana*)
-Saw palmetto (*Serenoa repens*)

Cypress Island to include:
-Pond Cypress (*Taxodium ascendens*)

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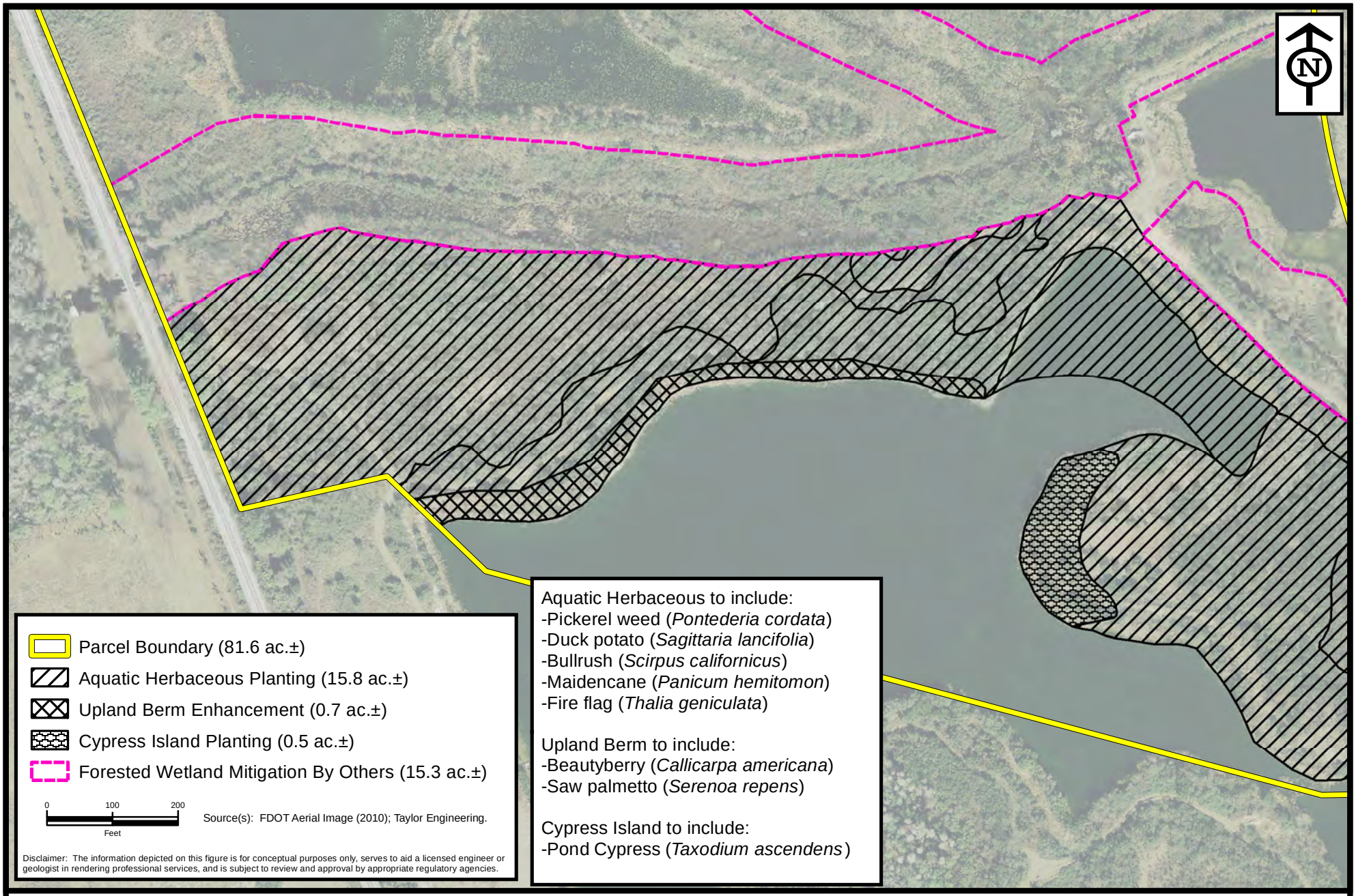
Proposed Planting Plan - Index

Five Mile Creek

Pasco County, Florida

Project:	EJ11021.00
Date:	June 2011
Drwn/Chkd:	JGB/JRN
Sheet:	**19 of 22**

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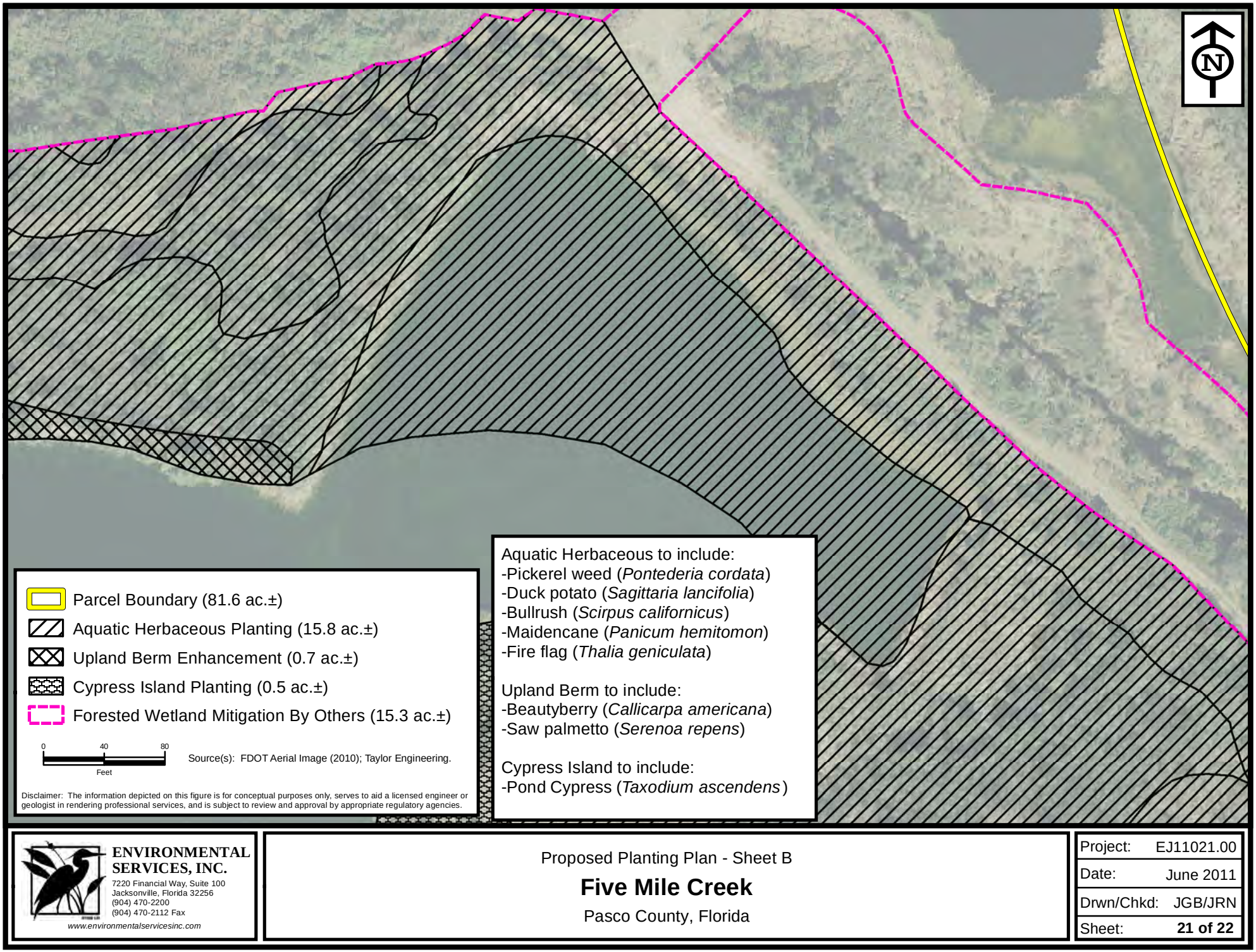
Proposed Planting Plan - Sheet A

Five Mile Creek

Pasco County, Florida

Project:	EJ11021.00
Date:	June 2011
Drwn/Chkd:	JGB/JRN
Sheet:	**20 of 22**

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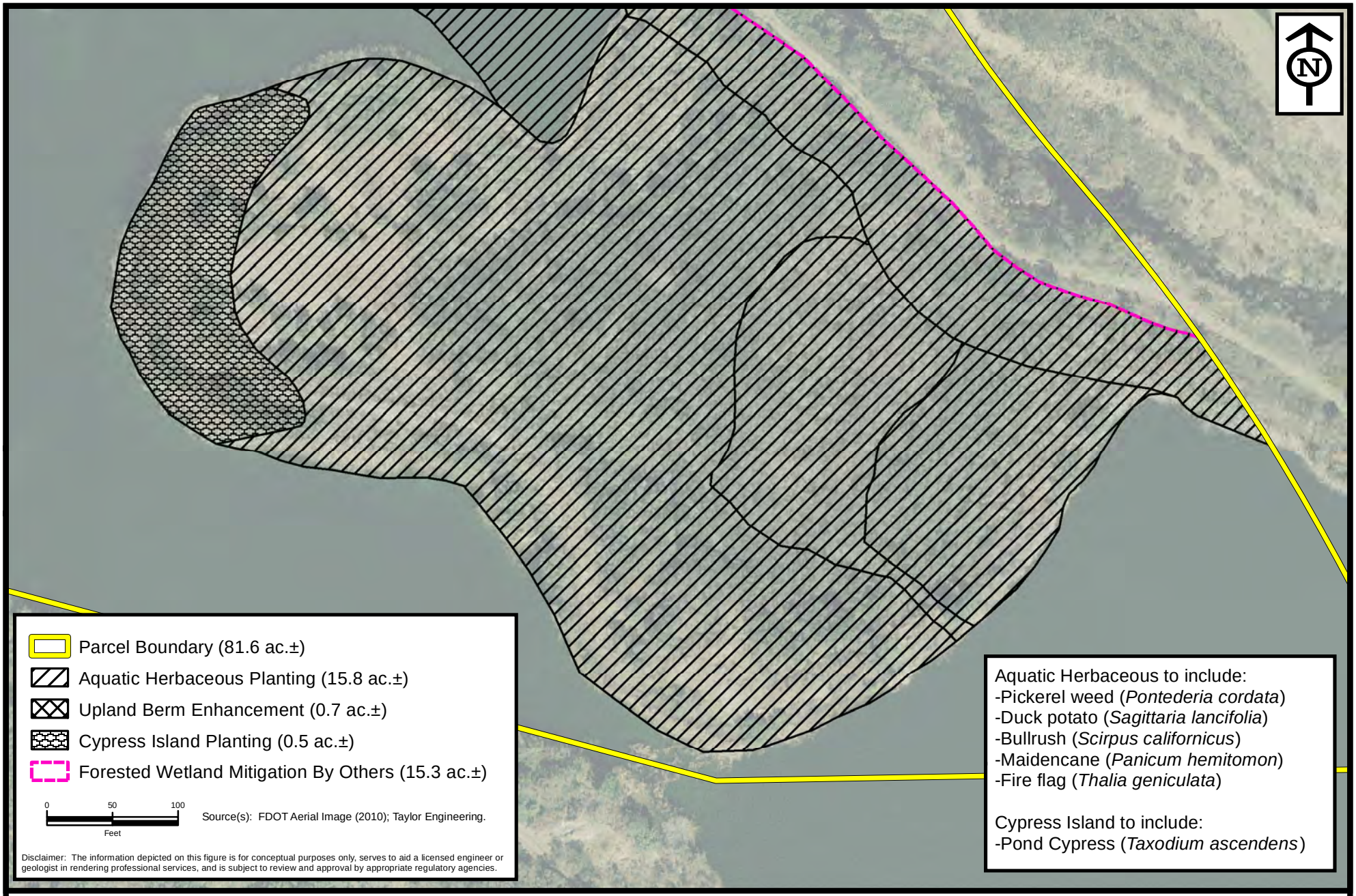
Proposed Planting Plan - Sheet B

Five Mile Creek

Pasco County, Florida

Project:	EJ11021.00
Date:	June 2011
Drwn/Chkd:	JGB/JRN
Sheet:	**21 of 22**

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Proposed Planting Plan - Sheet C

Five Mile Creek

Pasco County, Florida

Project:	EJ11021.00
Date:	June 2011
Drwn/Chkd:	JGB/JRN
Sheet:	**22 of 22**

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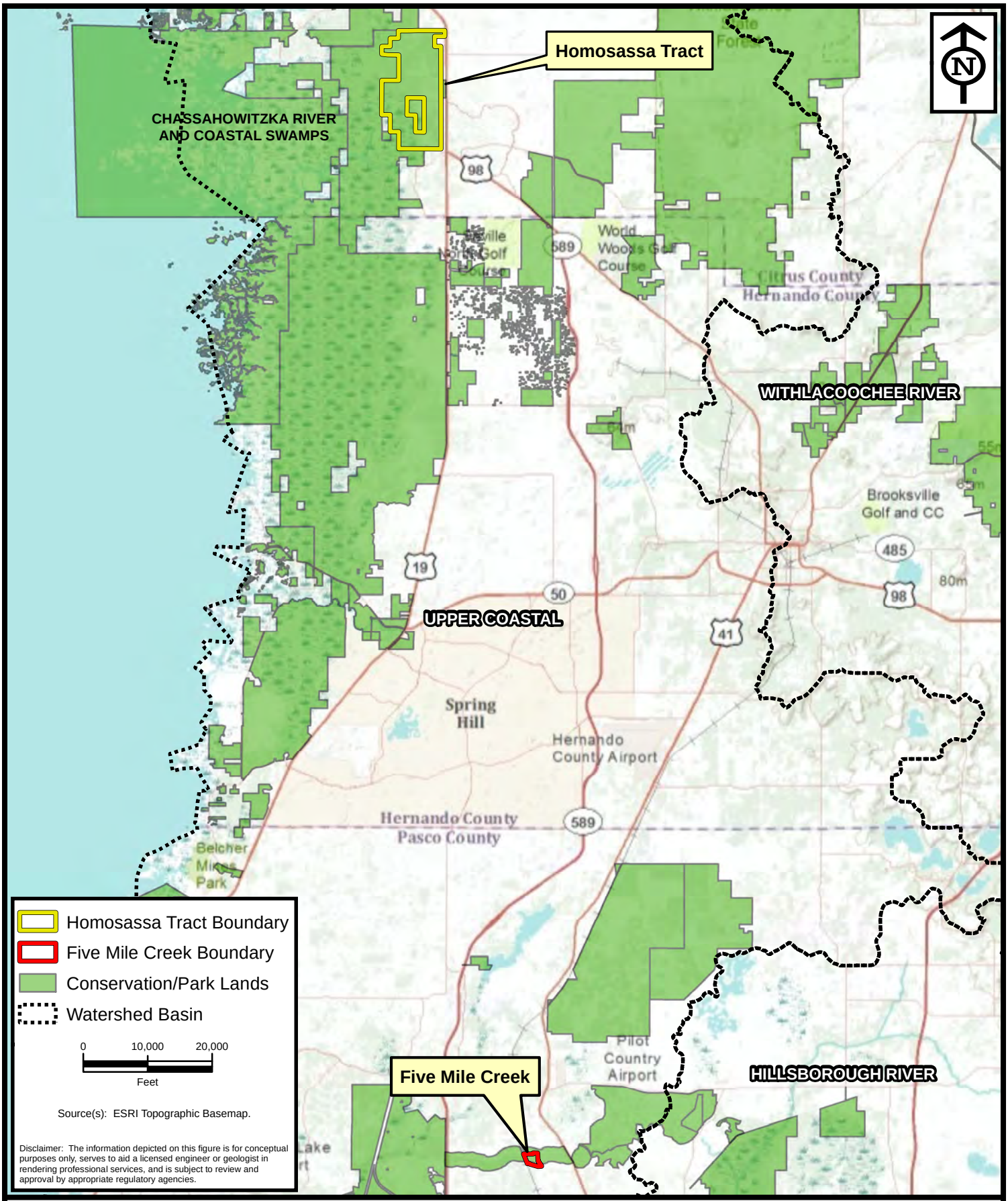
6.0 UPPER COASTAL WATERSHED – HOMOSASSA TRACT, WITHLACOOCHEE STATE FOREST

6.1 Introduction

The proposed wetland impacts for LNP are summarized in Table 1-1 and the mitigation plan for the 78.6 acres of impact (-34.3 UMAM units; -5.2 herbaceous units and -29.1 forested units) in the Upper Coastal Basin is partially contained in this section. Mitigation for the impacts within the Upper Coastal basin will occur on two sites – FMC and the Homosassa Tract (HT) within the Withlacoochee State Forest (Figure 6-1). FMC will produce 5.8 UMAM credits (5.5 wetland herbaceous, 0.2 wetland forested, 0.1 upland) and the HT will produce 55.6 UMAM credits (3.5 wetland herbaceous, 52.1 wetland forested). This section of the overall mitigation plan provides the details for the HT within the Withlacoochee State Forest.

Impacts to forested wetlands within the Upper Coastal Watershed total 70.1 acres and are associated with linear facilities, including pipelines and transmission lines. Mitigation for the impacts to forested wetlands within the Upper Coastal Watershed for the LNP transmission lines and pipelines will occur mainly on the HT of the Withlacoochee State Forest, with the exception of 0.2 forested credits generated at FMC. Herbaceous and open water impacts within the Upper Coastal Watershed will be offset with preservation and restoration/enhancement activities at Five Mile Creek as outlined in Section 5. The HT will produce 55.6 UMAM credits utilizing forested wetland restoration via the restoration of historic hydric conditions and restoration of a wet prairie.

The HT mitigation site is located on state owned lands managed by the FFS in Citrus County, Florida. This 5,529 acre parcel is part of the larger 157,479 acre Withlacoochee State Forest which is made up of 7 tracts. The parcel is located just west of U.S. 19 and lies between the Homosassa River and the Chassahowitzka River. It is situated in close proximity to other public conservation lands such as the Chassahowitzka National Wildlife Refuge, Chassahowitzka Wildlife Management Area, Crystal River Preserve State Park, Crystal River Archaeological State Park, and Homosassa Springs Wildlife State Park. It is adjacent to the Chassahowitzka Riverine Swamp Sanctuary (Figure 6-2). The HT is also adjacent to but not within an aquatic preserve or Area of Critical State Concern and the Chassahowitzka National Wildlife Refuge has designated a Migratory Bird Sanctuary in a portion of the Refuge that adjoins the HT.



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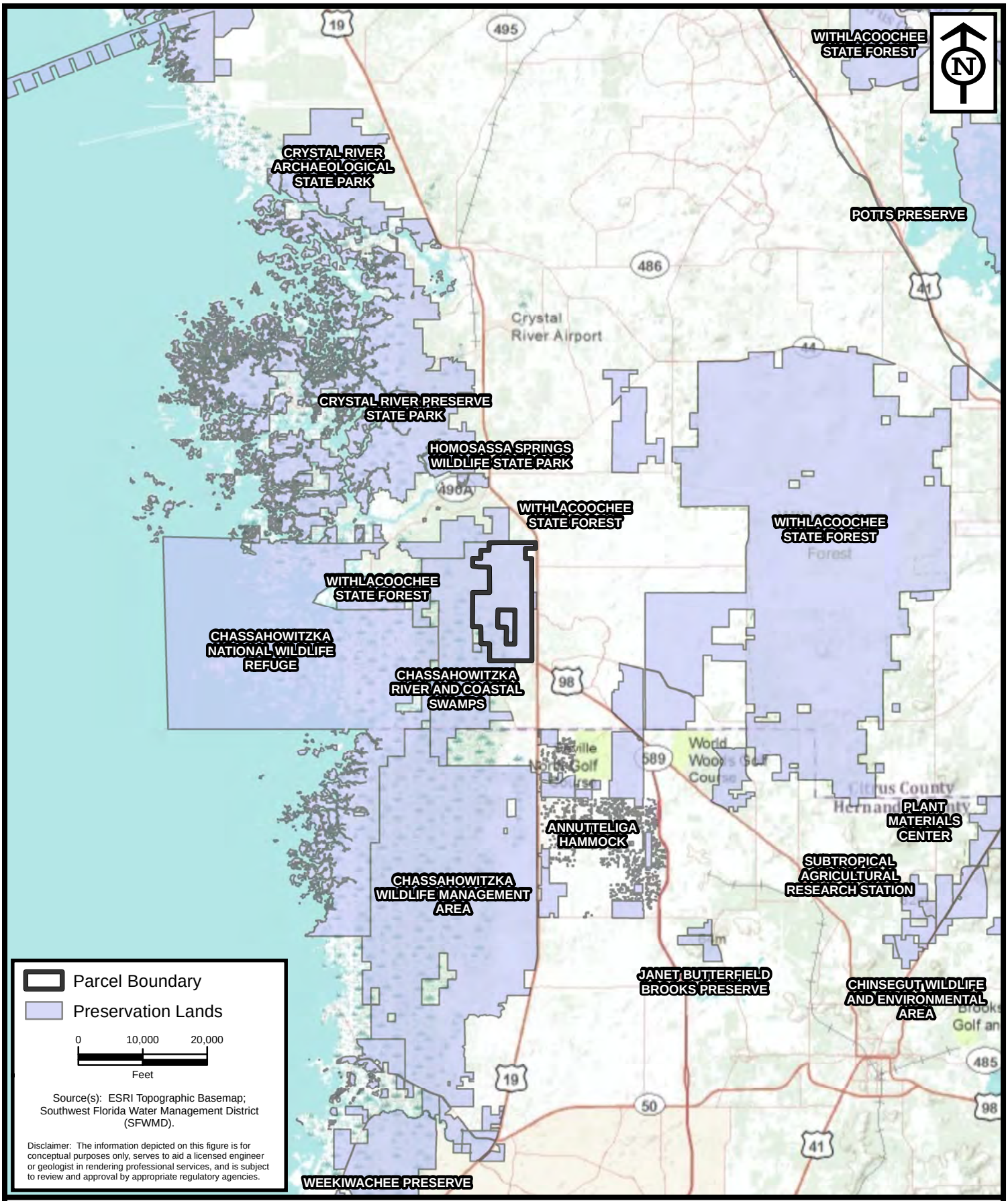
Upper Coastal Watershed - Proposed Mitigation Sites

Homosssa Tract

Citrus County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JGB/JRN
Figure:	**6-1**

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Regional Preservation Land

Homosassa Tract

Citrus County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JRN/SRJ
Figure:	**6-2**

Path: Q:_Projects\EJ\2011\021\00\fig\Homosassa\Report\reg_preservation.mxd Date: 7/19/2011 11:15:13 PM

The restoration activities proposed at HT will improve wetland and ecosystem functions between two physiographic zones, the coastal swamp and Gulf coastal lowlands. The forest wetland and hydrologic restoration will improve historic hydrological flow associated with the Chassahowitzka Swamp, the largest coastal hardwood swamp along the Gulf Coast of Florida south of the Suwannee River. The tract also encompasses floodplain portions of Mason Creek and Otter Creek. The herbaceous restoration will recreate natural conditions that have transitioned into wetland shrub.

6.2 Impact Summary

The wetland impacts within the Upper Coastal Watershed for LPN off-site transmission line impacts total approximately 78.6 acres. These impacts will generate a total loss of 34.3 functional units (-5.2 herbaceous and -29.1 forested). The impact summary is provided on Table 6-1 (below). The majority of these impacts will be the result of permanently clearing and/or filling existing herbaceous and forested wetlands. The proposed mitigation plan within the HT site will provide for 55.6 functional units of lift within the Upper Coastal Watershed which includes 52.1 forested and 3.5 herbaceous units from wetland restoration activities. (Section 6.6 provides details of the UMAM scores). Please note that an "excess" of 27.2 units is being provided for use on future projects in the Upper Coastal Watershed. Preliminary discussions with FFS have revealed priorities for unfunded wetland rehabilitation and hydrologic restoration work which differed from the original wetland mitigation proposal. However, the revised plan will yield significant UMAM functional lift with installation of LWC which require far less maintenance than culverts and will restore historic hydrological conditions within mixed forested wetland and basin swamp systems. Therefore, this mitigation plan is consistent with the goals and management objectives established by the FFS for the HT and will also satisfy FDEP and ACOE mitigation requirements.

Table 6-1. Upper Coastal Watershed wetland impacts by UMAM functional loss and acreage

Area	Herbaceous Wetland Acreage (including open water)	Herbaceous Wetland Functional Loss	Forested Wetland Acreage	Forested Wetland Functional Loss	Total Acres	Total Functional Loss
Permanent Fill	8.5 acres	-5.2 units	11.8 acres	-7.9 units	20.3	-13.1
Permanent Clearing	None	None	58.3 acres	-21.2 units	58.3	-21.2
Total					**78.6**	**-34.3**

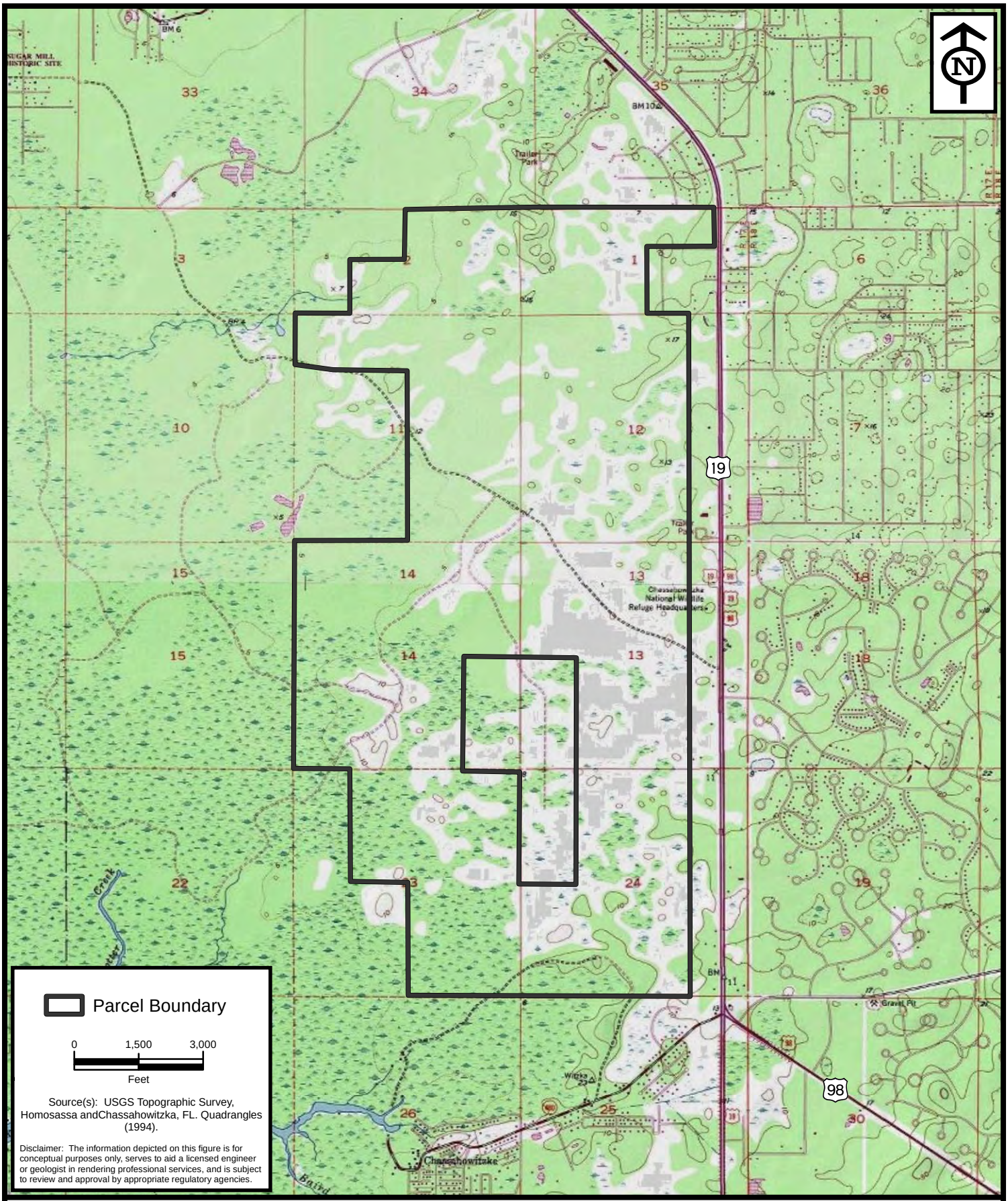
6.3 Site Description

The HT site is located in Sections 1, 2, 11, 12, 13, 14, 23, 24 and 25, Township 20S and Range 17E and is west of U.S. Highway 19 and north of the U.S. Highway 98 and U.S. Highway 19 intersection in Citrus County, FL (Figure 6-3). The total area of the HT parcel is approximately 5,529 acres, but the proposed restoration activities for this project are located primarily in the northeast and southwest portions of the main HT parcel. Water flows within HT primarily from northeast to southwest and enters the property through broad depressions along relic shorelines of the Homosassa and Chassahowitzka Rivers and associated creeks (Otter and Mason Creek). Due to sharp elevation changes, water leaves the site via surface flow toward the creeks and rivers or by groundwater infiltration. It is also important to note that during severe rain events backwater flow from the rivers and creeks may travel west as waters stage and move inland (Figure 6-4).

6.3.1 Historic Conditions

Historically, the property was a mosaic of intertwining forested and herbaceous wetlands grading to upland shrub and brushland, live oak sandhills, and mesic flatwoods. Historic aerials are primarily indicative of mesic flatwoods, wet flatwoods, and basin swamps with scattered dome swamps, and upland shrub/ brushland and sandhills. Logging swamp species began as early as 1900 when sawmills began processing old growth cypress and red cedar. Aerials from the 1940's show the presence of ditching and wetland fill roads (Figure 6-4), but have not yet significantly altered hydrologic conditions. Over time, upland and wet flatwood vegetation was removed and replaced with improved pasturelands and later planted pine. Land alterations continued as ditching and wetland fill roads were developed to assist with cattle management and logging activities.

After the property was acquired under the Conservation and Recreational Lands (CARL) program, several existing culverts were replaced in many of the wetland fill trail roads to improve hydrology, however, in most cases, these culverts are not large enough or properly placed and additional unfunded work is necessary to fully restore hydrologic conditions. As transitional areas were taken out of silviculture, monocultures of wax myrtle emerged, yet limited funding has prevented land management/restoration activities in these areas.



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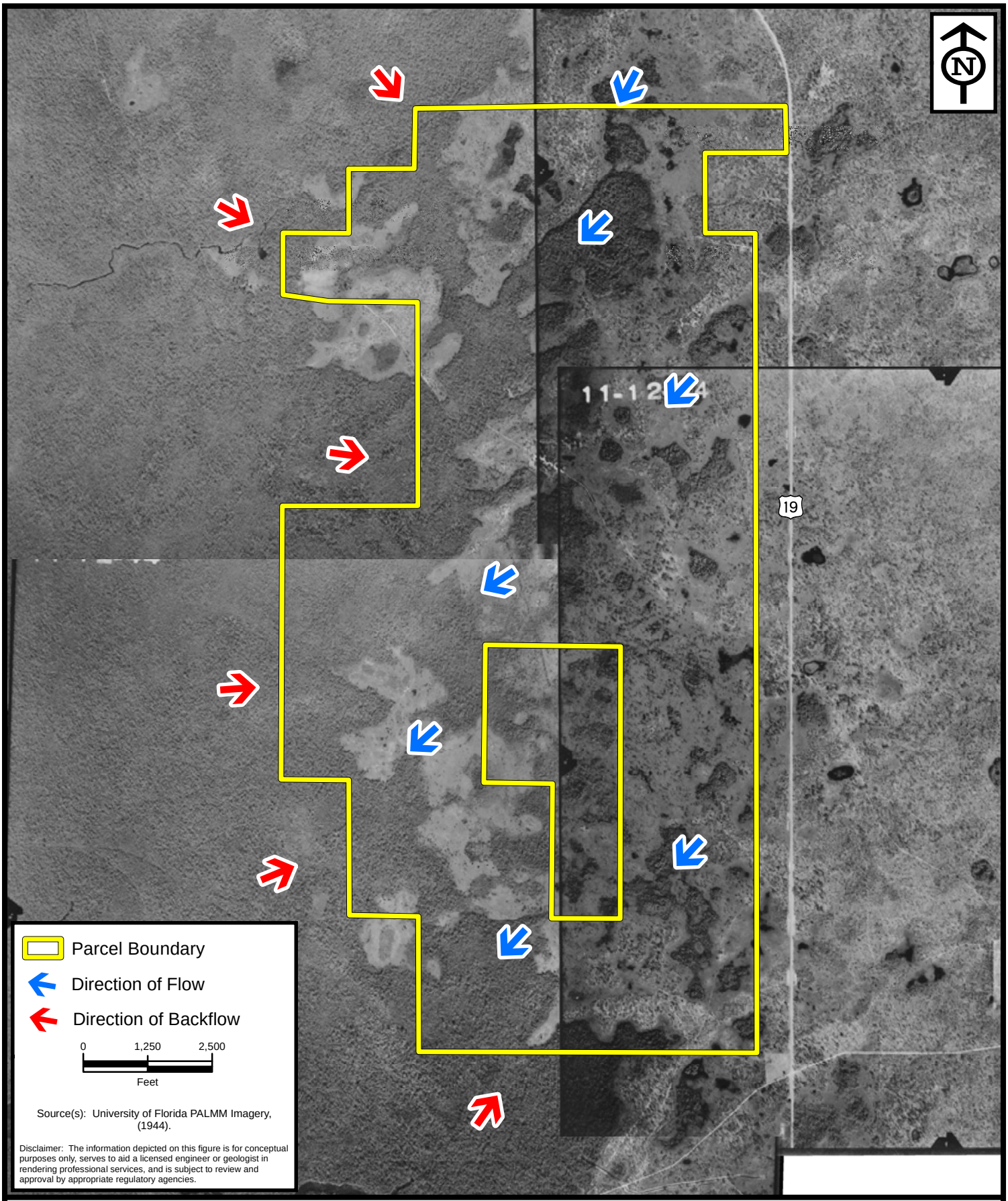
Project Location

Homosassa Tract

Citrus County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JRN/SRJ
Figure:	**6-3**

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1944 Historic Aerial Imagery

Homosassa Tract

Citrus County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JGB/JRN
Figure:	**6-4**

Path: Q:_Projects\EJ\2011\021\00\fig\Homosassa\Report\historic.mxd Date: 7/19/2011 11:09:18 PM

6.3.2 Current Conditions

While much of the upland habitat has been converted to improved pasture and silviculture, various upland and wetland habitat types are present at the HT parcel. These habitats include basin swamp, freshwater marsh, dome swamp, wetland shrub, improved pasture, planted pine (upland and wetland), pine flatwoods, live oak/sandhill, and shrub and brushland communities. Most of the existing habitats are altered from historic land disturbances and pine encroachment. However, plant diversity and wildlife utilization appear to be moderate given the extensive natural habitat surrounding this state forest.

FLUCFCS was used to determine the different community types on site. Please refer to the Homosassa Tract Community Map (Figure 6-5) for details of specific community locations. Please refer to Figure 6-7 and the information below for details of the specific community types associated with the mitigation activity areas of HT.

Uplands

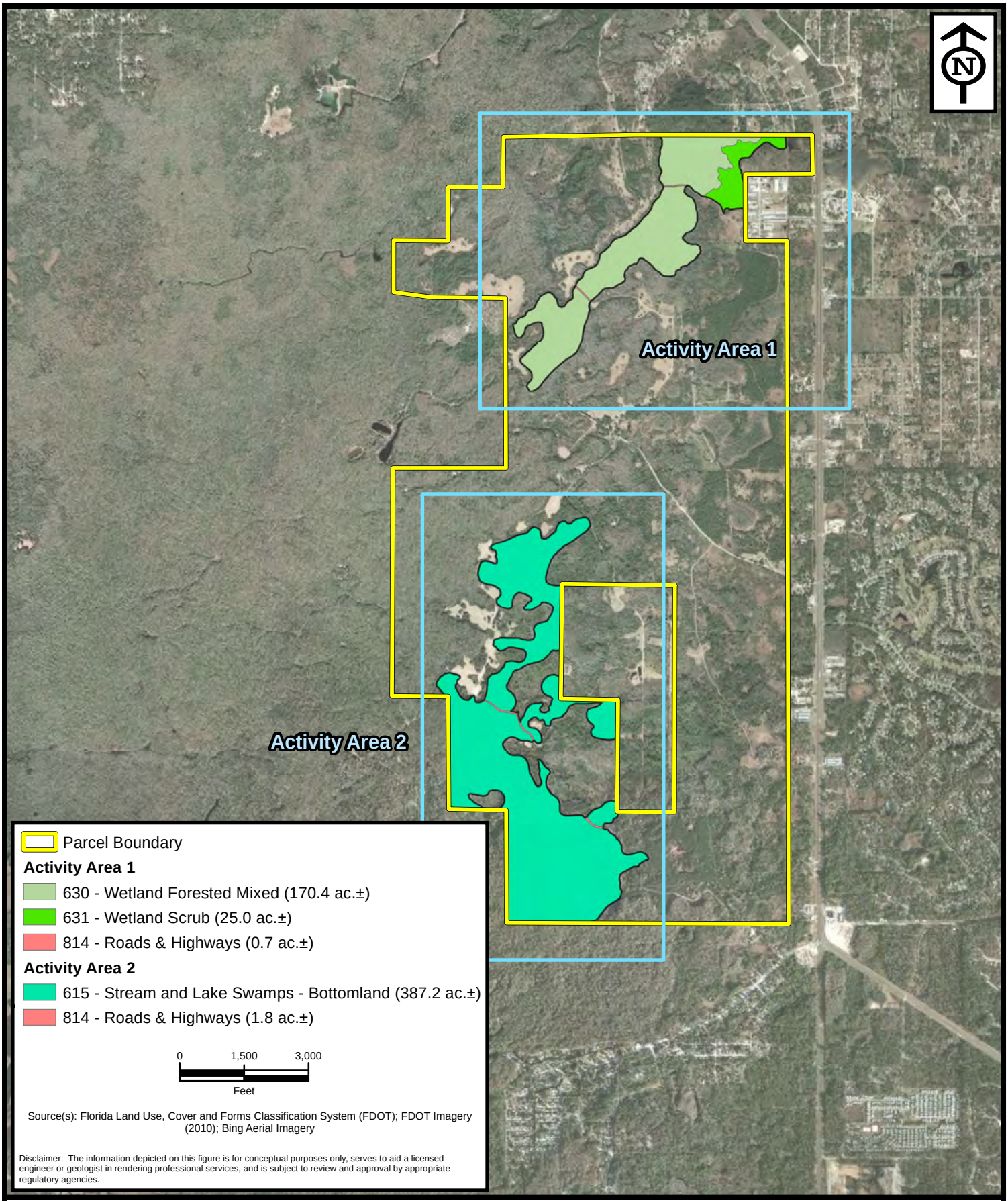
1. Trailroads (FLUCFCS 814). This community type is made up of cleared areas that were graded and drained for ease of mobility throughout the site. Trailroads are present in both activity areas. In many cases, these trail roads are elevated and culverted. Nevertheless, the trail roads placed through wetlands have significantly altered hydrology over time. In some cases, the holding back of water has increased soil subsidence and increased wetland acreage, especially in the southern portion of the property. Much of the mitigation on this site will encompass LWC to restore historic hydrology, reduce maintenance and vehicular traffic, and restore wetlands and native habitats.

Wetlands

1. Stream and Lake Swamps/Bottomland (FLUCFCS 615). Much of this deep swamp wetland community is located in the southern portion of the HT site (Activity Area 2) and is associated with Otter and Mason Creek which flow to the Chassahowitzka River. Three LWCs are proposed in this area. Typical canopy species include red maple, cypress, sweetgum, water hickory (*Carya aquatica*), American elm (*Ulmus americana*), and to a lesser extent sweet bay. The understory is generally sparse but does contain buttonbush, wax myrtle, with deep wet pockets containing pickerelweed and saw grass. Much of this habitat type will be restored via LWCs that will restore hydrologic conditions.

2. Wetland Forested Mixed (FLUCFCS 630). The wetland forested mixed community makes up the two large wetland restoration areas in Activity Area 1 located on the northern portion of the site. Two LWCs will restore hydrologic conditions and therefore assist with restoration of this community type. These areas are composed of red maple, laurel oak, sweetgum, sweetbay, cypress, and swamp tupelo. Pine has also encroached into some areas. Understory vegetation contains dahoon holly, cabbage palm, wax myrtle, and fetterbush. Ground cover species include various fern species, saw grass, and pickerelweed and fire flag in deeper areas with regular inundation. Soil oxidation was observed in many of the areas likely due to fill roads impeding flow. Therefore, two LWCs are proposed to restore hydrology and restore these forested wetlands.

5. Wetland Scrub (FLUCFCS 631). This community type consists primarily of wax myrtle and blackberry, along with various grasses and is associated with Activity Area 1 in the northeastern portion of the HT. The major difference between the upland category of shrub and brushland is that these conditions are mesic and there is a lack of saw palmetto. Most of the manipulated on-site wetlands consist of opportunistic colonizers that are indicative of disturbed sites resulting in wetlands considered to be of moderate to low quality. The northeastern corner of the HT site will be roller chopped to eliminate the dominance of wax myrtle and allow for prescribed burning and wetland herbaceous species regeneration.



Source(s): Florida Land Use, Cover and Forms Classification System (FDOT); FDOT Imagery (2010); Bing Aerial Imagery

Disclaimer: The information depicted on this figure is for conceptual purposes only, serves to aid a licensed engineer or geologist in rendering professional services, and is subject to review and approval by appropriate regulatory agencies.

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Existing Communities Map

Homosassa Tract

Citrus County, Florida

Project:	EJ11021.00
Date:	July 2011
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Figure:	**6-5**

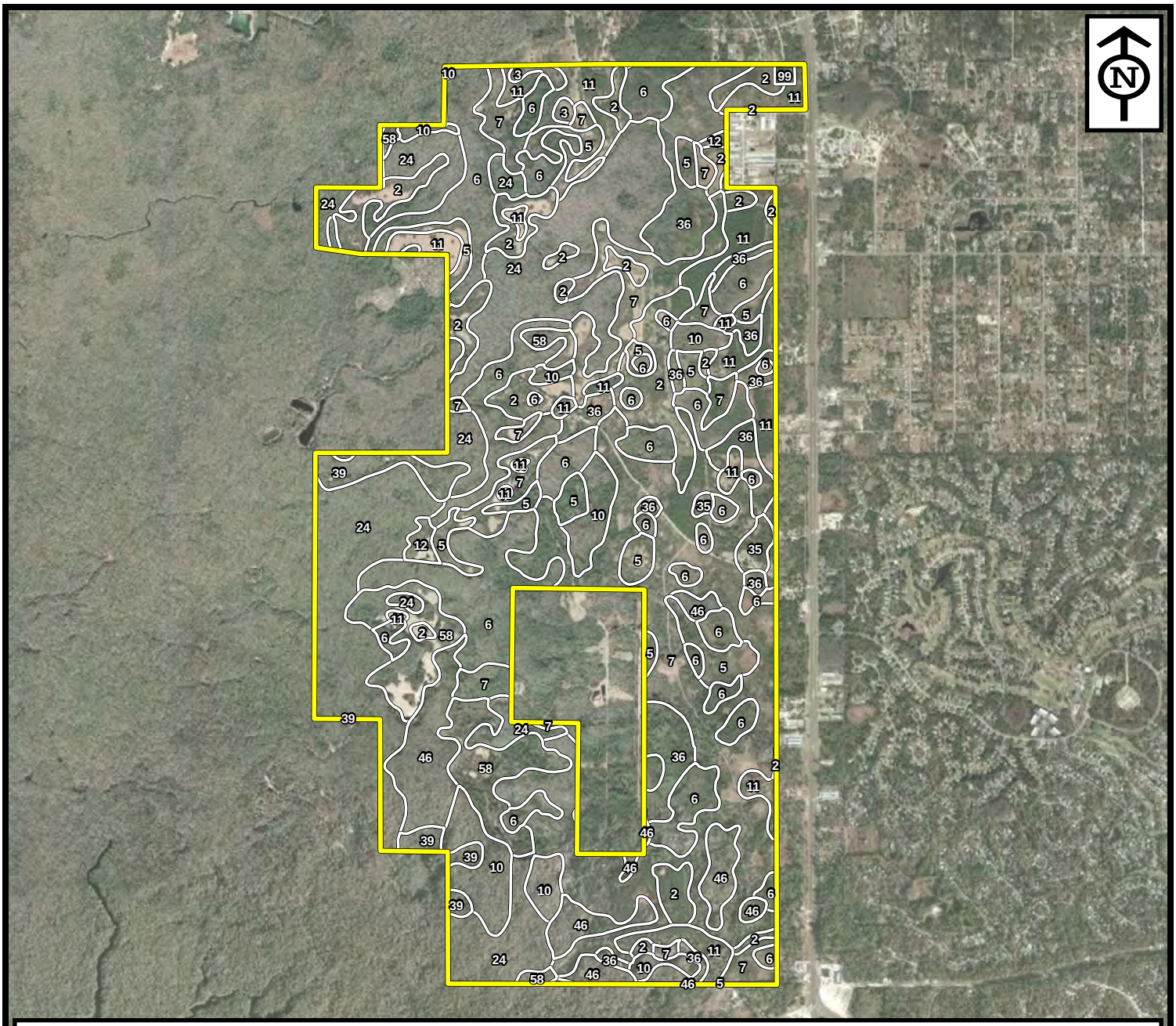
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6.3.3 Soils

According to the NRCS soil map for Citrus County, fourteen soil types and water are present on the HT site (Figure 6-6).

Table 6-2. Homosassa Tract soil types

NRCS Soil Type	Hydric	Acreage
2 Adamsville Fine Sand	No	218.7
3 Candler Fine Sand, 0-5% slopes	No	10.4
5 Basinger Fine Sand	Yes	131.8
6 Basinger Fine Sand, depressional	Yes	509.6
7 Myakka Fine Sand	Yes	666.7
10 Pompano Fine Sand, depressional	Yes	131.2
11 Tavares Fine Sand, 0-5% slopes	No	191.7
12 Immokalee Fine Sand	Yes	11.8
24 Okeelanta-Lauderhill-Terra Ceia Mucks	Yes	579.4
35 Sparr Fine Sand, 0-5% slopes	No	16.8
36 Eaugallie Fine Sand	Yes	186.7
39 Hallandale-Rock Outcrop Complex, rarely flooded	Yes	51.7
46 Eaugallie Fine Sand, depressional	Yes	146.7
58 Myakka, Limestone Substratum-Eaugallie, Limestone Substratum Complex	Yes	150.6
99 Water	N/A	3.4



Parcel Boundary

Soils

- 2 - Adamsville Fine Sand (218.7 ac.±)
- 3 - Candler Fine Sand, 0 to 5 Percent Slopes (10.4 ac.±)
- 5 - Basinger Fine Sand (131.8 ac.±)
- 6 - Basinger Fine Sand, Depressional (509.6 ac.±)
- 7 - Myakka Fine Sand (666.7 ac.±)
- 10 - Pompano Fine Sand, Depressional (131.2 ac.±)
- 11 - Tavares Fine Sand, 0 to 5 Percent Slopes (191.7 ac.±)
- 12 - Immokalee Fine Sand (11.8 ac.±)
- 24 - Okeelanta-Lauderhill-Terra Ceia Mucks (579.4 ac.±)
- 35 - Sparr Fine Sand, 0 to 5 Percent Slopes (16.8 ac.±)
- 36 - Eaugallie Fine Sand (186.7 ac.±)
- 39 - Hallandale-Rock Outcrop Complex, Rarely Flooded (51.7 ac.±)
- 46 - Eaugallie Fine Sand, Depressional (146.7 ac)
- 58 - Myakka, Limestone Substratum-Eaugallie, Limestone Substratum Comples (150.6 ac.±)
- 99 - Water (3.4 ac.±)

0 1,500 3,000

Feet

Source(s): USDA Soil Survey, Citrus County, Florida; Bing Imagery

Disclaimer: The information depicted on this figure is for conceptual purposes only, serves to aid a licensed engineer or geologist in rendering professional services, and is subject to review and approval by appropriate regulatory agencies.

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NRCS Soils

Homosassa Tract

Citrus County, Florida

Project:	EJ11021.00
Date:	July 2011
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Figure:	**6-6**

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6.4 Mitigation Plan

The primary mitigation plan for HT (Figure 6-7) is hydrologic enhancement to restore flow patterns to forested wetland systems and herbaceous wetland restoration within two activity areas (Activity Area 1 and Activity Area 2). The details of the proposed mitigation are described below, and the proposed hydrologic restoration plans for HT can be found within Section 6.7 Engineering and Section 6.11 Engineering Detail Drawings.

1. Hydrologic Restoration via LWCs. The proposed hydrologic restoration will be accomplished with 2 LWCs in Activity Area 1 of the HT site and 3 LWCs in Activity Area 2 of the HT tract. More detailed descriptions of the LWC hydrologic restoration of these structures can be found in Section 6.5 Hydrology and Hydraulics, and Section 6.7 Engineering.

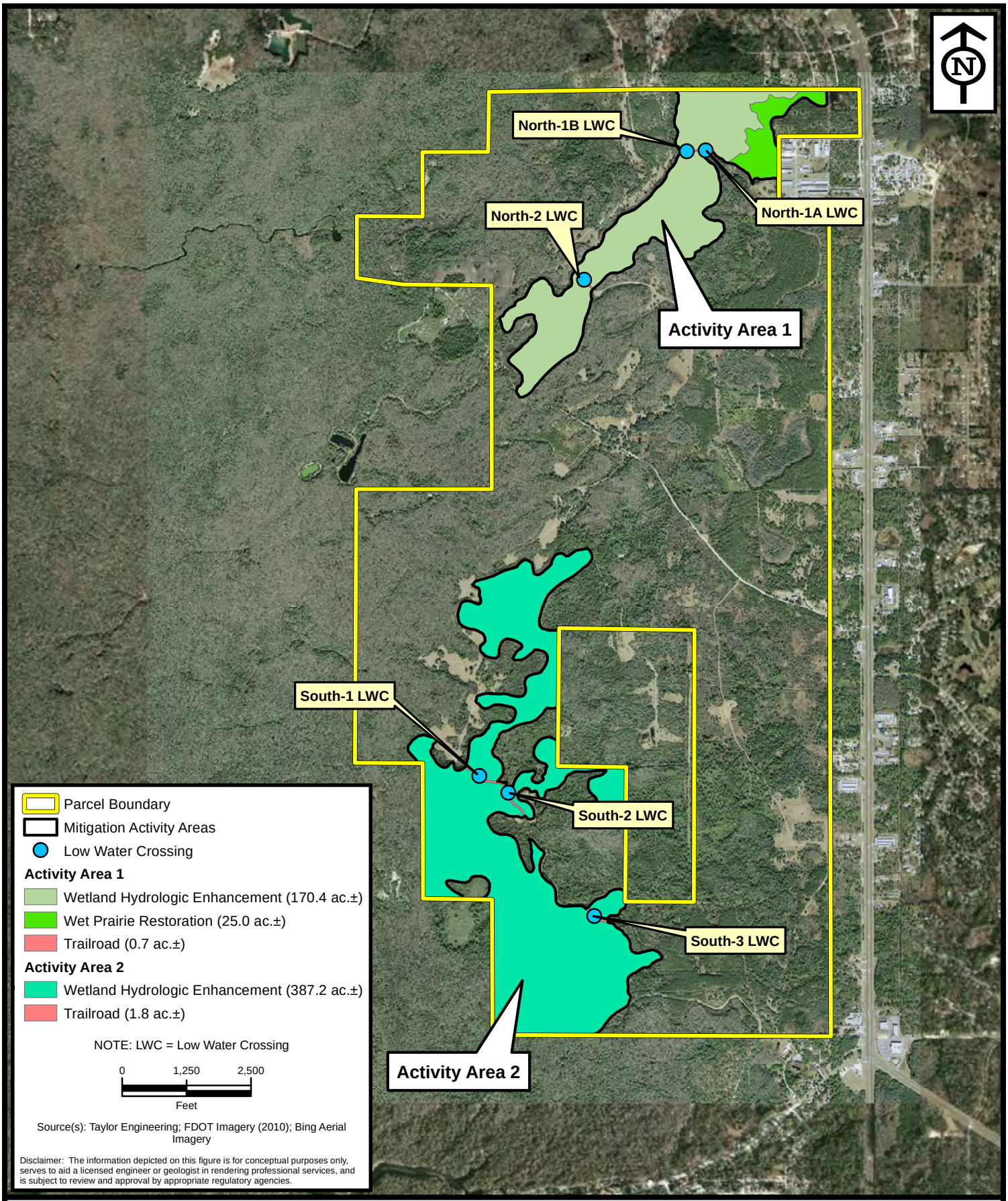
The large wetland forested mixed system in Activity Area 1 will be restored after two LWCs are installed to restore hydrologic flows. Of this large system, It is expected that approximately 170.4 acres of wetland forested mixed will be restored in association hydrologic improvements. Flows will be increased downstream alleviating soil oxidation issues. The upstream conditions do not suffer the same extent of soil oxidation; however, hydroperiods were historically longer. The addition of North-1 LWC (which has two stepped sections for maximizing flow) and North-2 LWC will eliminate the damming effect and allow more water to enter the system during heavy rain events thereby increasing flow and allowing for longer hydroperiods in the deeper pockets of the system. Longer hydroperiods and increased flow may also reduce some of the pine encroachment into the areas with slightly higher elevations. Overall, wetland quality will be improved.

LWCs in Activity Area 1 are known as North-1 LWC and North-2 LWC. North-1 LWC is located north of the central mixed forested wetland in the northern portion of the tract and is made up of a step approach with two flow areas. The elevated trail road is between 7.2 and 7.5 NVGD, and while culverted, the roadway has created a damming effect after heavy rainfall as the wetlands are 2 to 3 feet lower. The proposed stepped crossing will be set at an elevation of 6.2 and 6.6. The mixed forested wetland immediately to the south had historically wetter hydroperiods. Improving the flow to this wetland should restore historic hydrological conditions to the extent practicable. North-2 LWC is located in the southwest corner of this same wetland system in Activity Area 1. The elevated trail road contains culverts, some of which are broken or blocked, that have altered historic flow across this entire wetland area by channelizing flows. The current roadway is at an elevation of 7.5 feet and will be lowered to 5.5 feet to

allow continuous flow across the entire area and restore hydroperiods downstream.

The stream and lake swamp/bottomlands are part of the floodplain associated with Otter and Mason Creek in Activity Area 2. The installation of the three southern LWCs will aid in wetland floodplain restoration of approximately 387.2 acres. Restoration of historic flows will increase hydroperiods downstream and assist with alleviating soil oxidation issues, therefore improving wetland quality and function. The LWCs will also eliminate channelized flow through culverts, thereby restoring historic conditions upstream and allowing for vegetative recruitment in the understory.

South-1 LWC and South-2 LWC are located west of the existing outparcel. The current trailroad at South-1 LWC is elevated at 6.9 NVGD while the surrounding wetlands are at least 3 feet lower. The existing grade of the road will be set at an elevation of 5 feet. This will increase water flow and restore hydroperiods downstream, while historic hydrologic conditions will also be restored upstream. South-2 LWC is just south of South-1 LWC and has become an artificial channel at an elevation of 6.7 NVGD. The wetlands are 2 to 3 feet lower. This portion of the road will be lowered to an elevation of 5.2 feet and will increase flows and restore hydroperiods downstream while also restoring historic hydrologic conditions upstream. South-3 LWC is located southwest of the southwestern corner of the outparcel. This elevated road is at an elevation of 6.5 NVGD while surrounding wetlands are 1.5 feet lower. The LWC will be set at 5.5 feet. This road removal will also restore hydroperiods and historic hydrological flows by eliminating the damming effect of the elevated road by allowing greater flow downstream.



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Mitigation Activity

Homosassa Tract

Citrus County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JRN/SRJ
Figure:	6-7

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2. Wet Prairie Restoration. A wet shrub area exists in the northeast corner of the HT site as part of Activity Area 1 and has become a monoculture of wax myrtle. This area was historically wet prairie dominated by grasses adjacent to larger forested systems. The area to be restored is 25.0 acres. Restoration will be accomplished by roller chopping the area to eliminate the monoculture. Herbaceous seed sources already exist in the area; therefore, reducing the shading effect of the wax myrtle will allow for greater natural regeneration. Upon completion of the initial maintenance, the FFS will then reinstate their prescribed burn regime (whenever possible) to maintain the herbaceous areas as outlined in their overall management plan. The area will also be reseeded if natural regeneration and recruitment are not adequate to restore this wet prairie system. No planting is proposed with this mitigation activity, however vegetative maintenance is proposed quarterly to ensure success.

6.5 Hydrology and Hydraulics

6.5.1 Objective

The hydrologic and hydraulic engineering analysis for the HT simulated existing and proposed project (or mitigation/restoration) conditions. The results demonstrated improved rainfall runoff conveyance and flow patterns that better represent historic, unaltered conditions at sites within the tract. Figure 6-8 shows the HT parcel with five hydrologic restoration areas – North-1 LWC (A and B), North-2 LWC, South-1 LWC, South-2 LWC, and South-3 LWC. Each of these areas involves constructing a LWC to restore the historical sheet flow that existed within the tract. To demonstrate improved water movement, hydrologic and hydraulic modeling analysis was conducted as described below.

6.5.2 Model Setup

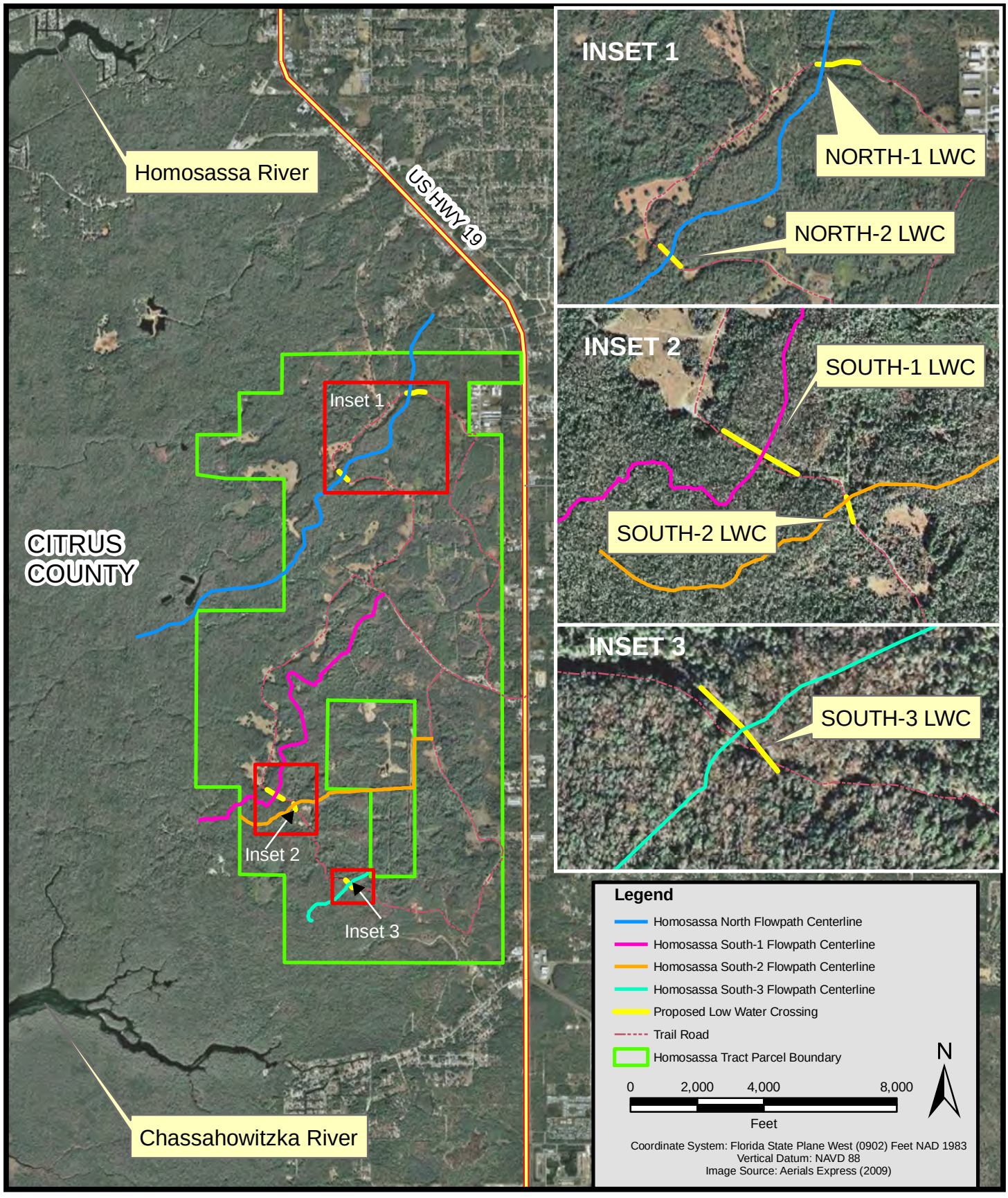
HEC-HMS version 3.4 and HEC-RAS version 4.1 models were used to simulate rainfall runoff, conveyance, and flooding conditions within the HT. SWFWMD provided a preliminary draft of the rainfall-runoff model for the Cardinal Lane watershed (SWFWMD, 2008). The Cardinal Lane watershed is located within the Upper Coastal watershed and encompasses an area of 38,045 acres (see Figure 6-9). The Cardinal Lane watershed includes areas that are within northern portion of the HT. Additionally, a part of the Cardinal Lane watershed drains into the southern portion of the HT. Hence, it is necessary to include the inflows from the Cardinal Lane watershed that drains into the HT mitigation activity areas.

SWFWMD utilized a one- dimensional dynamic rainfall-runoff simulation model – Interconnected Channel and Pond Routing (ICPR) - to model the hydrologic and hydraulic conditions within the Cardinal Lane watershed. The ICPR model

provided the 25- and 100-year inflow hydrographs for areas located upstream of the mitigation sites. However, the SWFWMD model did not include flow hydrographs for the 2-, 10- and 50-year storm events. Inflow hydrographs for the 2-, 10-, and 50-year events were derived by using peak inflows obtained from Florida-based USGS regression equations and by using the shape of the ICPR's 100-year hydrograph.

Since North-1 LWC and North-2 LWC restoration areas (Activity Area 1) are part of the same flow-way system, these sites were combined into one model. Individual models were created for each of the remaining restoration sites.

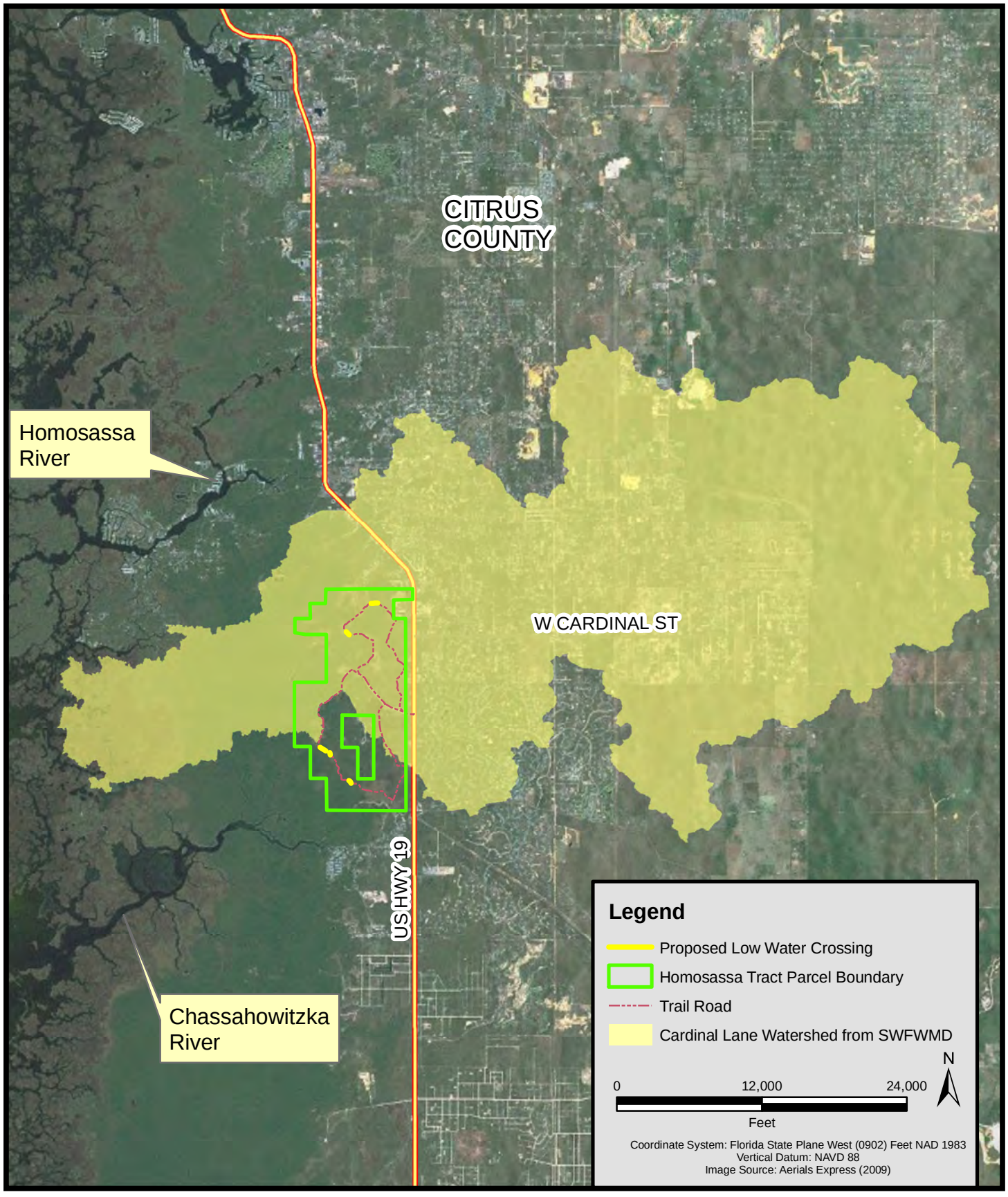
This section describes the calculation of HEC-HMS and HEC-RAS input parameters including sub-basin area, time of concentration, curve numbers, rainfall data, hydrology model setup, inflow hydrographs, hydraulic model geometry, and boundary conditions.



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Hydrologic and Hydraulic Study Area
Homosassa Tract Low Water Crossings
Citrus County, Florida

PROJECT	C2011-025
FIGURE	6-8
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DATE	JULY 2011



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Cardinal Lane Watershed
Homosassa Tract
Citrus County, Florida

PROJECT	C2011-025
FIGURE	6-9
DRAWN BY	RP
DATE	JULY 2011

Subbasin Area

Contributing basin boundaries and areas were determined from a combination of SWFWMD GIS basin coverage for areas located upstream of mitigation sites, and from the delineation of sub-basins within the mitigation sites. Sub-basins were delineated within the restoration site by analyzing the topographic LIDAR data (FDEM, 2007). Figure 6-10 to 6-12 shows the sub-basins for North LWC, South-1 LWC, South-2 LWC and South-3 LWC restoration sites, respectively.

Curve Number

The SCS CN generally represents the subbasin's rainfall runoff properties – its ability to store or shed rainfall – and is a function of the soil properties as well as land cover/use. GIS tools were applied to SWFWMD digital soil and land use coverages to calculate the CNs. The CN calculation assumes an antecedent rainfall condition corresponding to SCS Type II – or typical, mean conditions.

Time of Concentration

Time of concentration is a characteristic of the response of a watershed to a rainfall event and represents the time required for a drop of water to travel from the most hydrologically remote location within a subbasin to the outflow. It is a function of the subbasin slope, length, and CN. For each subbasin, the average watershed slope was calculated based on LiDAR topographic data. Lag time was calculated from the SCS lag time equation with this slope.

Rainfall Data

The hydrologic model (HEC-HMS) requires rainfall depths (volume and temporal distribution) at each subbasin for estimating the infiltration and runoff volumes. The SCS Type II, Florida Modified, 24-hour distribution was applied with the 24 hour rainfall depths shown in Table 6-3 for the five rainfall events simulated (SWFWMD, 1996).

Table 6-3. Homosassa Tract model 24-hour rainfall depths

Recurrence Interval (years)	Rainfall Depth (inches)
2	4.25
10	7.2
25	9.0
50	10.1
100	11.6

Table 6-4 provides the calculated drainage area, curve number, and lag time for sub-basins within each mitigation area.

Table 6-4. HEC-HMS model hydrologic input parameters

Restoration Area	Subbasin Name	Area (acres)	Weighted Curve Number	Lag Time, (min)
North-1 LWC and North-2 LWC	BASIN NA-0570	243.2	89	171
	BASIN NA0190	214.8	85	87
	BASIN NA-0220	707.2	94	324
South-1 LWC	BASIN 1	230.6	92	175
	BASIN 2	55	92	111
	BASIN 3	32	96	121
	BASIN 4	25.6	98	89
South-2 LWC	BASIN 1	41	87	90
	BASIN 2	100.5	89	77
	BASIN 3	108.8	88	217
	BASIN 4	15.4	92	23
South-3 LWC	BASIN 1	14.2	88	36.4
	BASIN 2	53.7	95	79.9

Hydrologic Model (HEC-HMS) Setup and Results

The HEC-HMS model requires the area of each sub-basin, curve numbers, lag-time and rainfall data as input parameters. Individual HEC-HMS models were created for each restoration area. The model uses SCS curve number and SCS unit hydrograph methods to estimate the runoff volume generated from each storm event. The SCS unit hydrograph method uses Delmarva's peak rate factor of 284 to transform the excessive rainfall into runoff. Each model was executed with a 2-, 10-, 25-, 50- and 100-year storm rainfall depth for a period of 48 hours to capture the falling and rising limb of the flow hydrographs. Table 6-5 shows the peak flows obtained from the model run for each sub-basin within the restoration areas.

Table 6-5. HEC-HMS model output peak flows for sub-basins

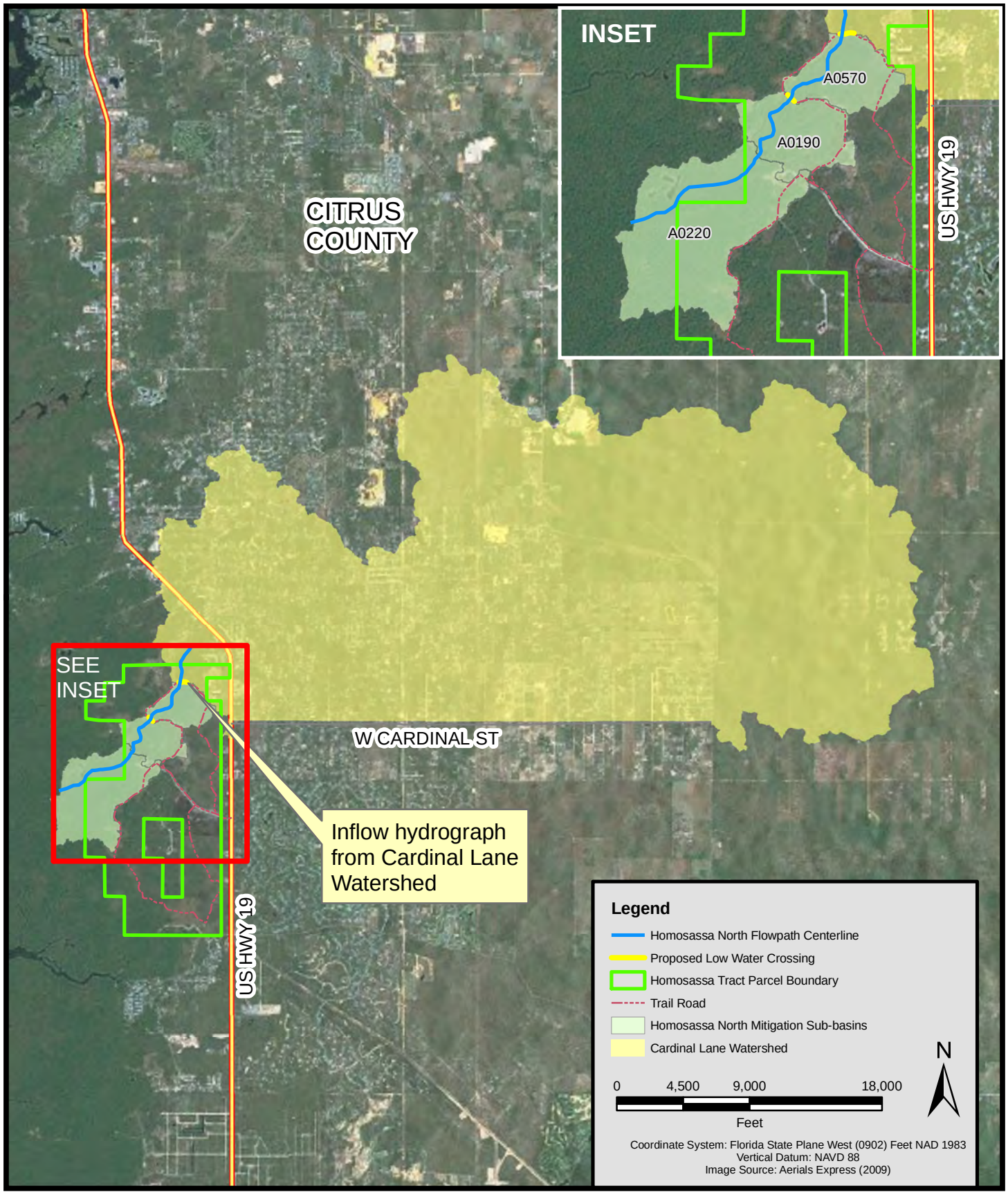
Restoration Area	Sub-basin Name	Peak Flow (cfs)				
		2-yr	10-yr	25-yr	50-yr	100-yr
North-1 LWC and North-2 LWC	BASIN NA-0570	85.6	175	230.2	264	310
	BASIN NA0190	70.3	135.8	176	200.5	233.9
	BASIN NA-0220	148.9	269.3	342.7	387.5	448.5
South-1 LWC	BASIN 1	16	31.7	41.4	47.3	55.4
	BASIN 2	50.3	96.2	124.1	141.1	164.3
	BASIN 3	25.5	50	65.1	74.4	87
	BASIN 4	12.2	22.2	28.2	31.9	36.9
South-2 LWC	BASIN 1	16	31.7	41.4	47.3	55.4
	BASIN 2	50.3	96.2	124.1	141.1	164.3
	BASIN 3	25.5	50	65.1	74.4	87
	BASIN 4	12.2	22.2	28.2	31.9	36.9
South-3 LWC	BASIN 1	16	31.7	41.4	47.3	55.4
	BASIN 2	50.3	96.2	124.1	141.1	164.3

Inflow Hydrographs

SWFWMD's preliminary ICPR model for Cardinal Lane watershed area provides inflow hydrographs for areas that drain upstream of the North LWCs, South-1 LWC, South-2 LWC and South-3 LWC restoration areas. Figure 6-10 shows the basin encompassing an area of 21,952 acres draining into Activity Area 1. Figure 6-11 shows the basin encompassing an area of 4,109 acres draining into the South-1 LWC restoration area. Figure 6-12 shows the basin encompassing an area of 1,100 acres draining into the South-2 LWC restoration area. Figure 6-13 shows the basin area draining ton the South-3 LWC restoration area. These figures also show the location of inflow hydrographs extracted from the ICPR model for the 25- and 100-year storm events. Since SWFWMD's model did not include the 2-, 10- and 50-year storm events, appropriate USGS regression equations for the State of Florida provided the peak flows for these missing storm events.

For Activity Area 1, peak flows were calculated using the 2001 USGS regression equations that require basin area, channel slope and percentage of lakes within the basin (USGS, 2001). For Activity Area 2, peak flows were calculated using the 1982 USGS regression equation that requires basin area and percentage of lakes within the basin (USGS, 1982). SWFWMD's sub-basin layer for Cardinal Lane watershed provided the basin areas. Assessment of aerial photographs provided an approximate percentage of lakes within the basin. Adjustments to the percentage of lake within the watershed were conducted to ensure the peak flows for 25- and 100-year storm events from the regression equations were within +/-15% of the ICPR peak flows.

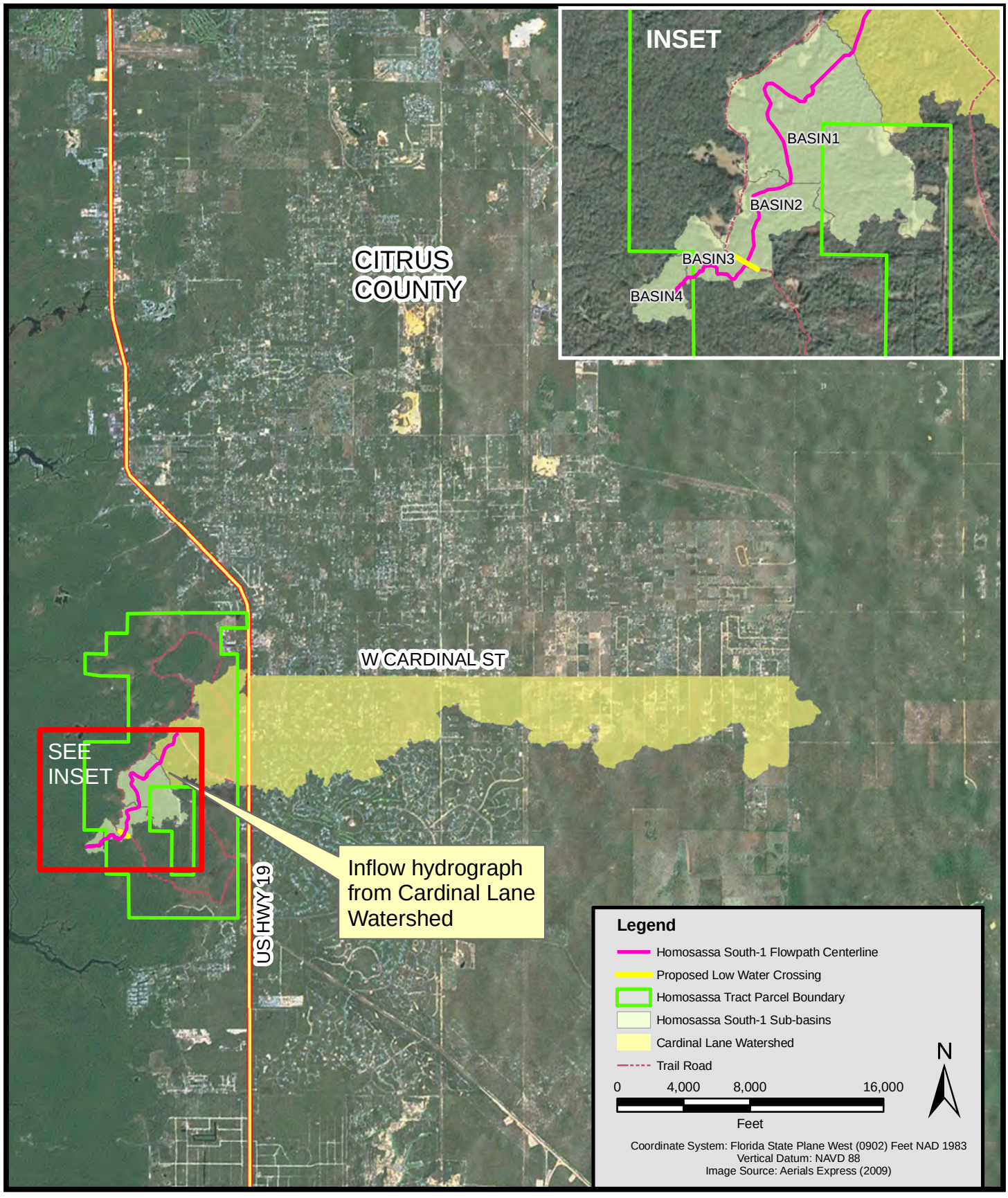
The flow hydrographs for the 2-, 10- and 50-year storm events were obtained by multiplying the USGS peak flows for these events with the ratio obtained by dividing the 100-year peak flow from ICPR model with the flow values for each time-step. Figure 6-14 – 6-16 shows the inflow hydrographs for 2-, 10-, 25-, 50- and 100-year storm event at the North LWCs, South-1 LWC and South-2 LWC restoration areas, respectively.



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North LWCS Sub-basins Map
Homosassa Tract
Citrus County, Florida

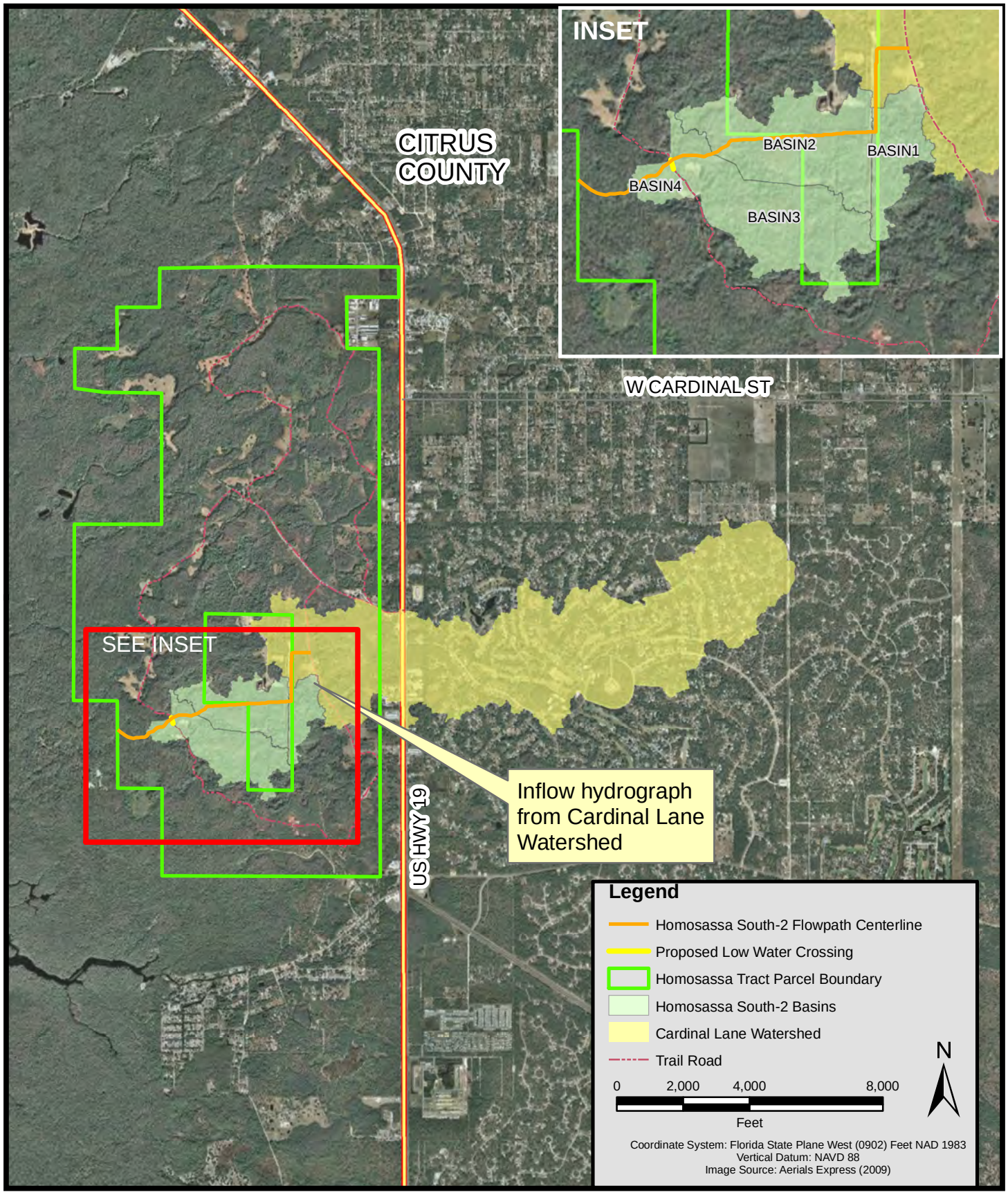
PROJECT	C2011-025
FIGURE	6-10
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DATE	JULY 2011



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South-1 LWC Sub-basins Map
Homosassa Tract
Citrus County, Florida

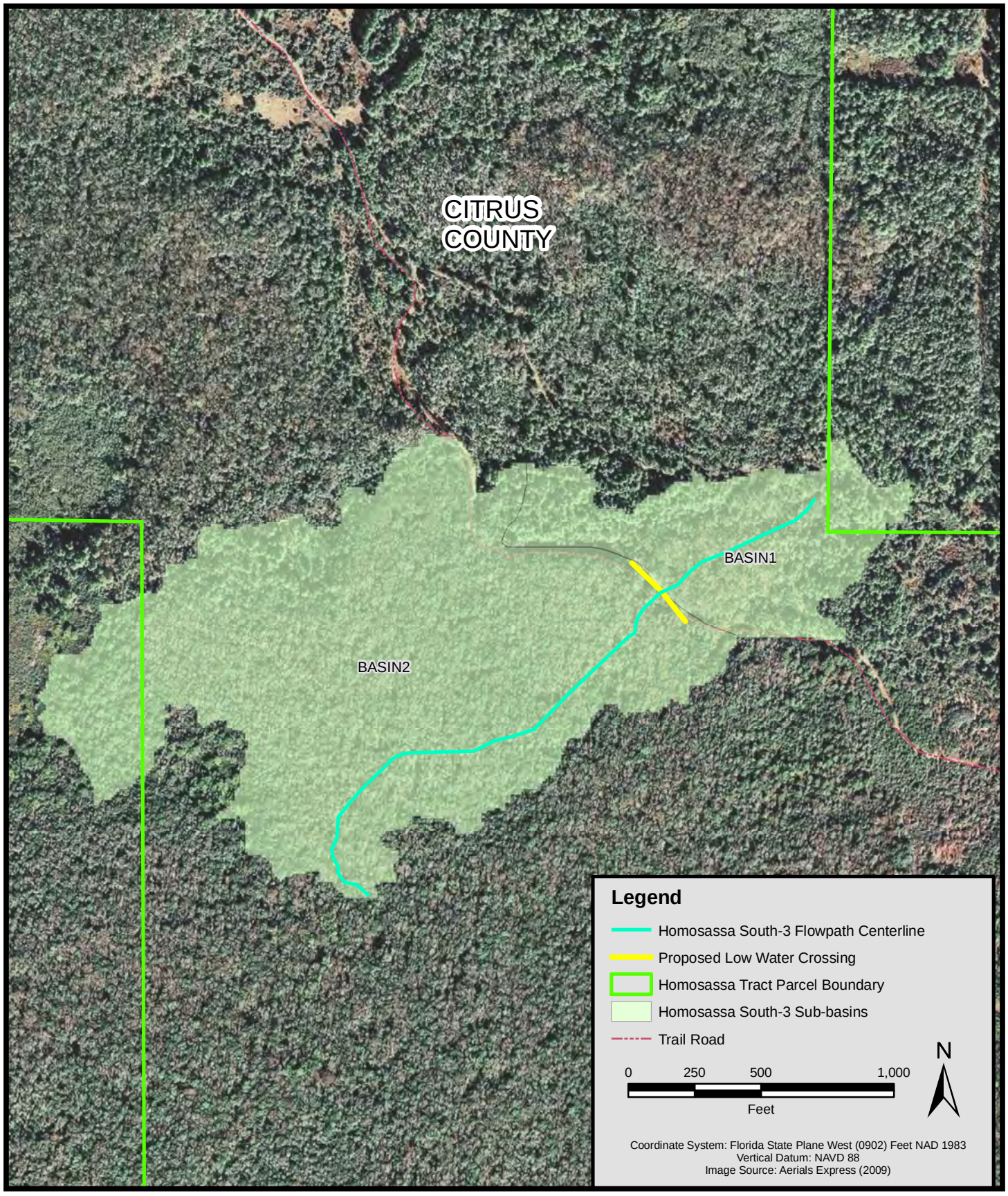
PROJECT	C2011-025
FIGURE	6-11
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South-2 LWC Sub-basins Map
Homosassa Tract
Citrus County, Florida

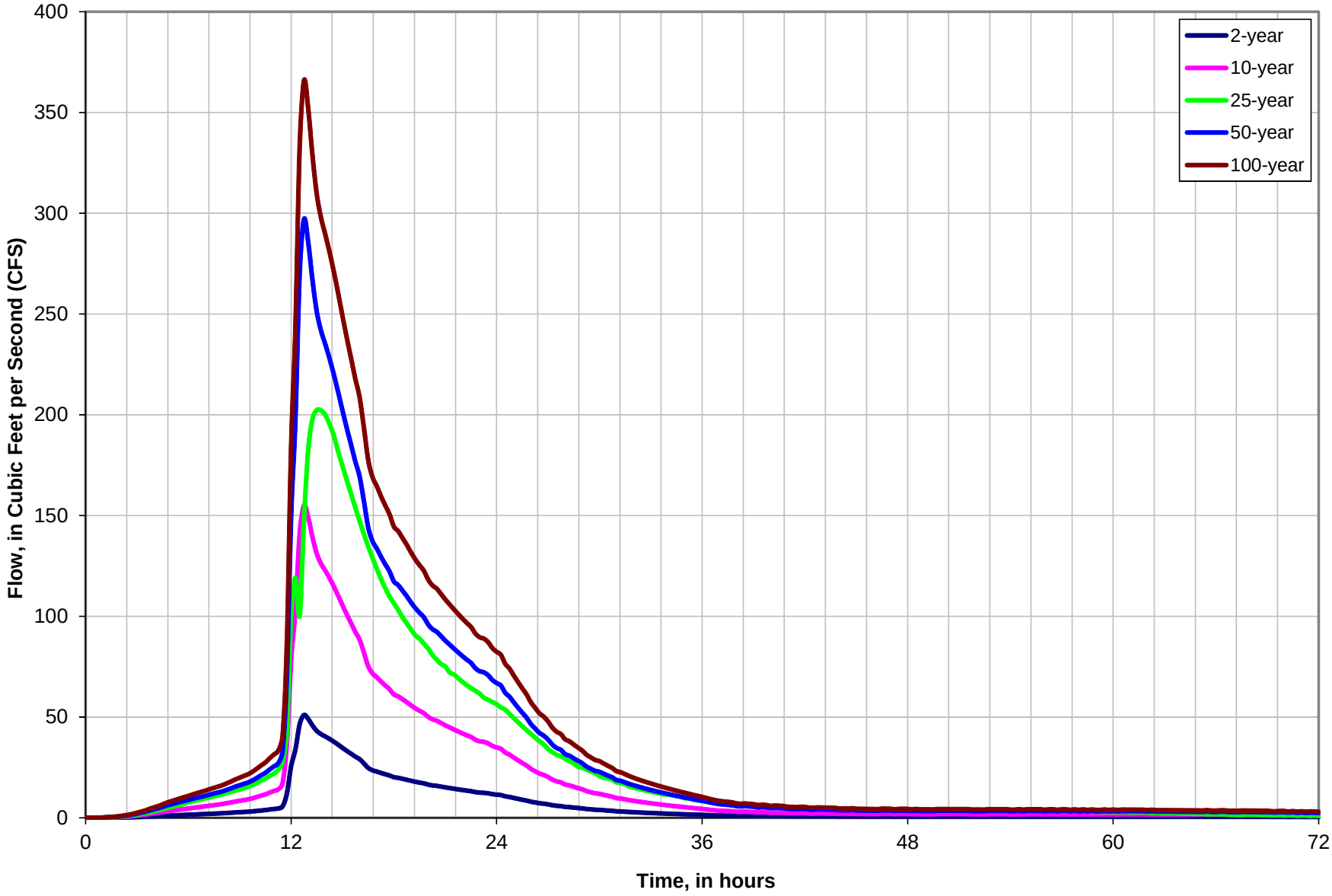
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South-3 Sub-basins Map
Homosassa Tract
Citrus County, Florida

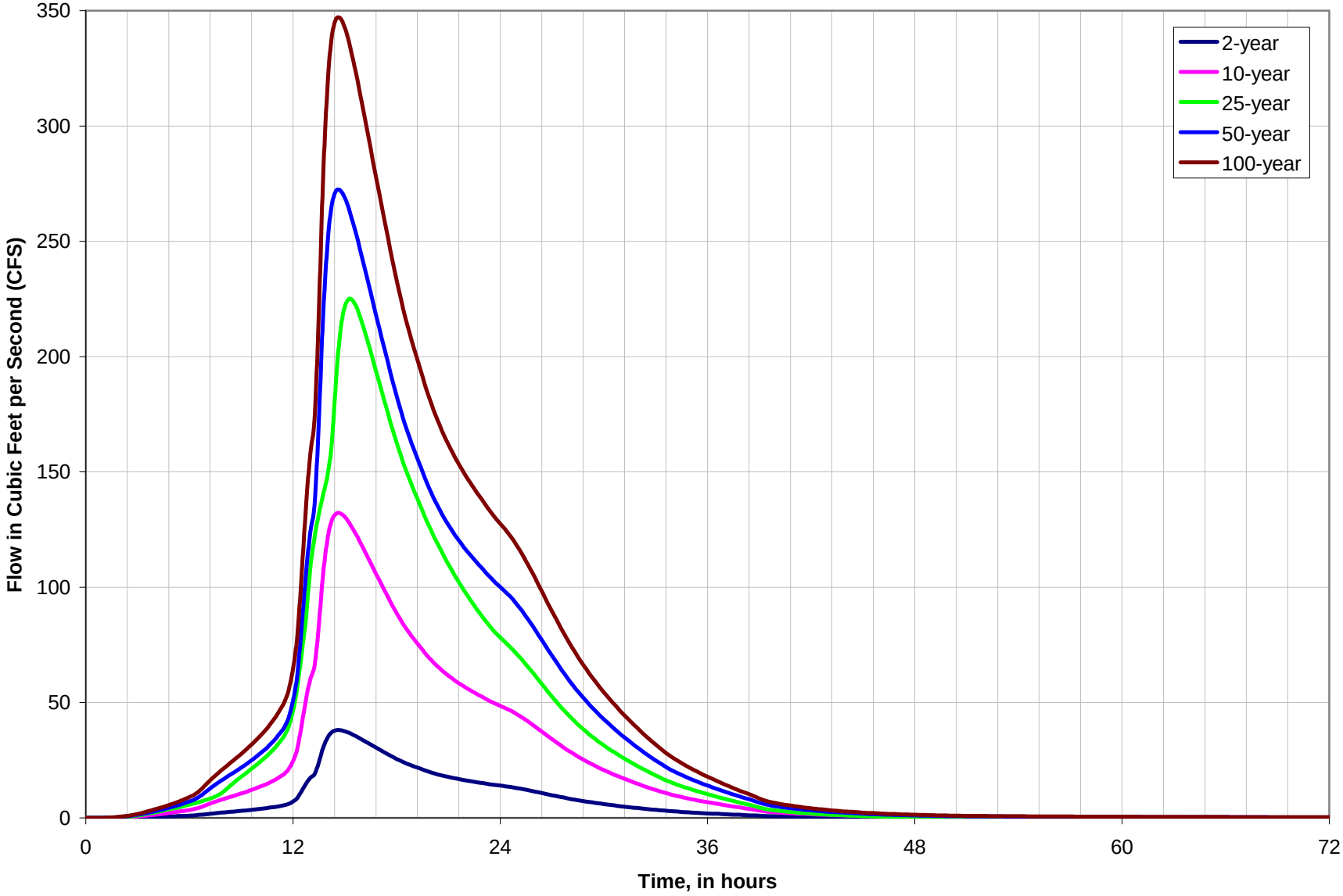
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North LWCS Inflow Hydrograph
Homosassa Tract
Citrus County, Florida

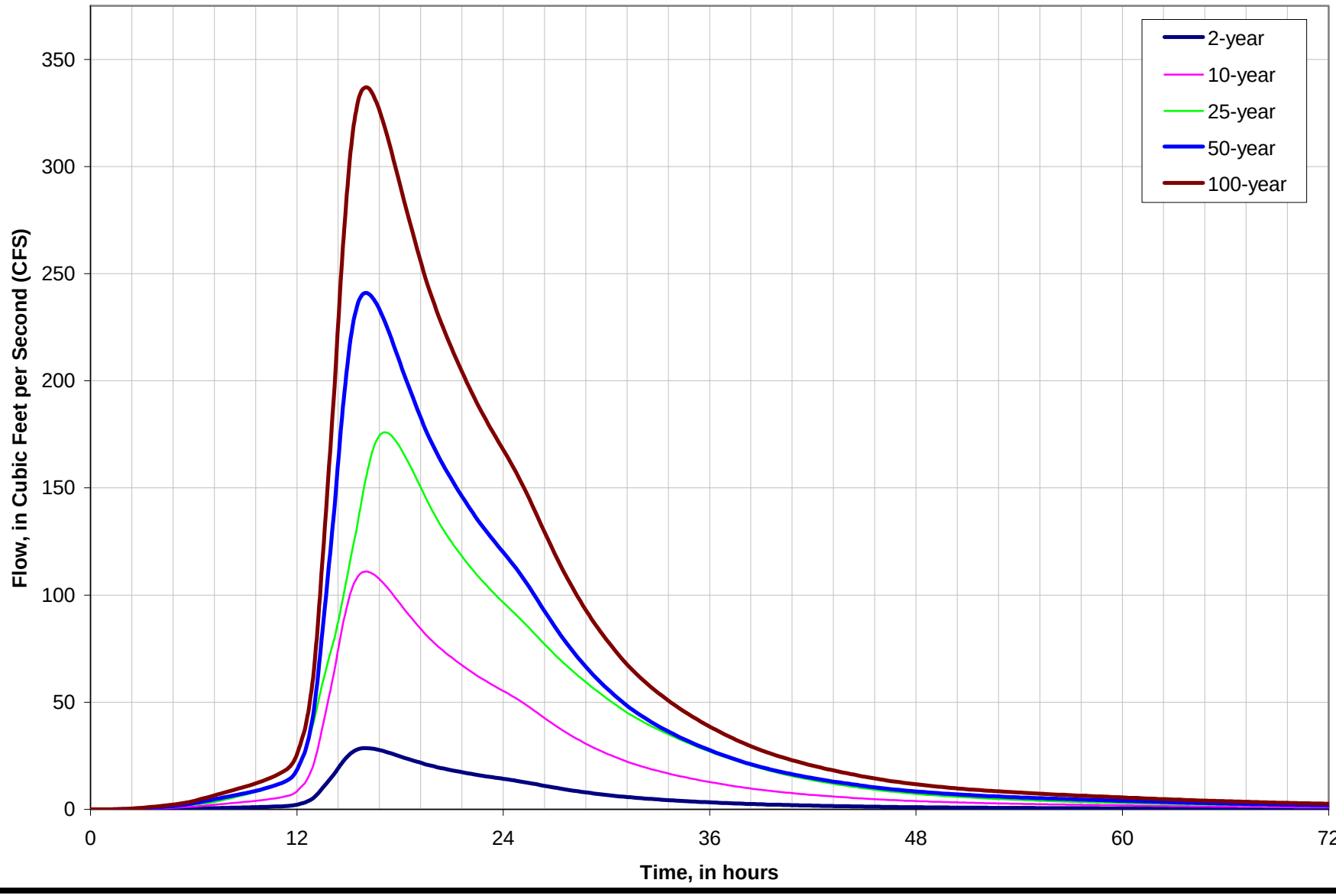
PROJECT	C2011-025
FIGURE	6-14
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DATE	JULY 2011



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South-1 LWC Inflow Hydrograph
Homosassa Tract
Citrus County, Florida

PROJECT	C2011-025
FIGURE	6-15
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South-2 LWC Inflow Hydrograph
Homosassa Tract
Citrus County, Florida

PROJECT	C2011-025
FIGURE	6-16
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Hydraulic Model (HEC-RAS) Geometry

The HEC-RAS model applies a defined flow path with cross sections at specified distances. The cross section elevations assigned within the model reflect the LIDAR data collected by Florida Division of Emergency Management in 2007 (FDEM, 2007) and survey data collected by Pardue Land Surveyors. Figure 6-17 – 6-20 shows the cross-section layout for the HEC-RAS model for North LWCs, South-1 LWC, South-2 LWC and South-3 LWC restoration areas, respectively. Typical values of overland roughness co-efficient (also referred to as Manning's N co-efficient) for the various land use segments within our study area were obtained from widely published USGS report on Manning's N co-efficient (UGSS, 1989).

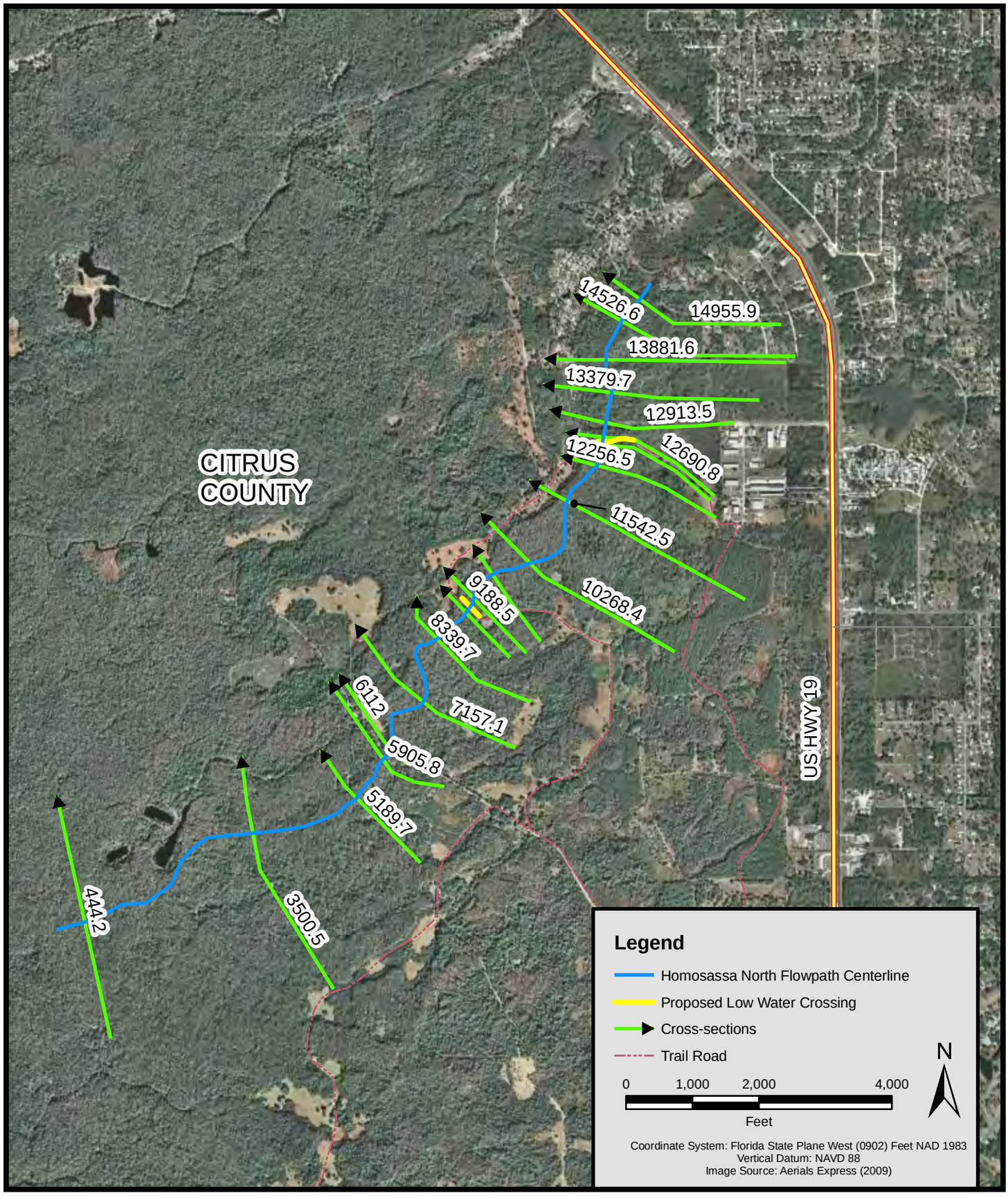
Boundary Conditions

Three types of boundary conditions were applied within the HEC-RAS model. One boundary condition was the tailwater condition at the model outlet. It was assumed that the areas draining south of each LWC would not affect the downstream boundary condition. Hence, a normal depth boundary condition corresponding to the slope of downstream area was used as a boundary condition at the model outlet.

The second boundary condition is the inflow hydrograph obtained from the SWFWMD's ICPR model and USGS regression equations (see Figure 6-14 – 6-16). These inflow hydrographs were applied at the upstream end of the model boundary. All LWC sites use this boundary condition except for South-3 LWC. South-3 LWC uses the sub-basin inflow hydrograph as a boundary condition.

The third boundary condition is the flow hydrographs from sub-basins located within the restoration areas. These inflow hydrographs were added as lateral inflow hydrographs at appropriate cross-sections within the model domain.

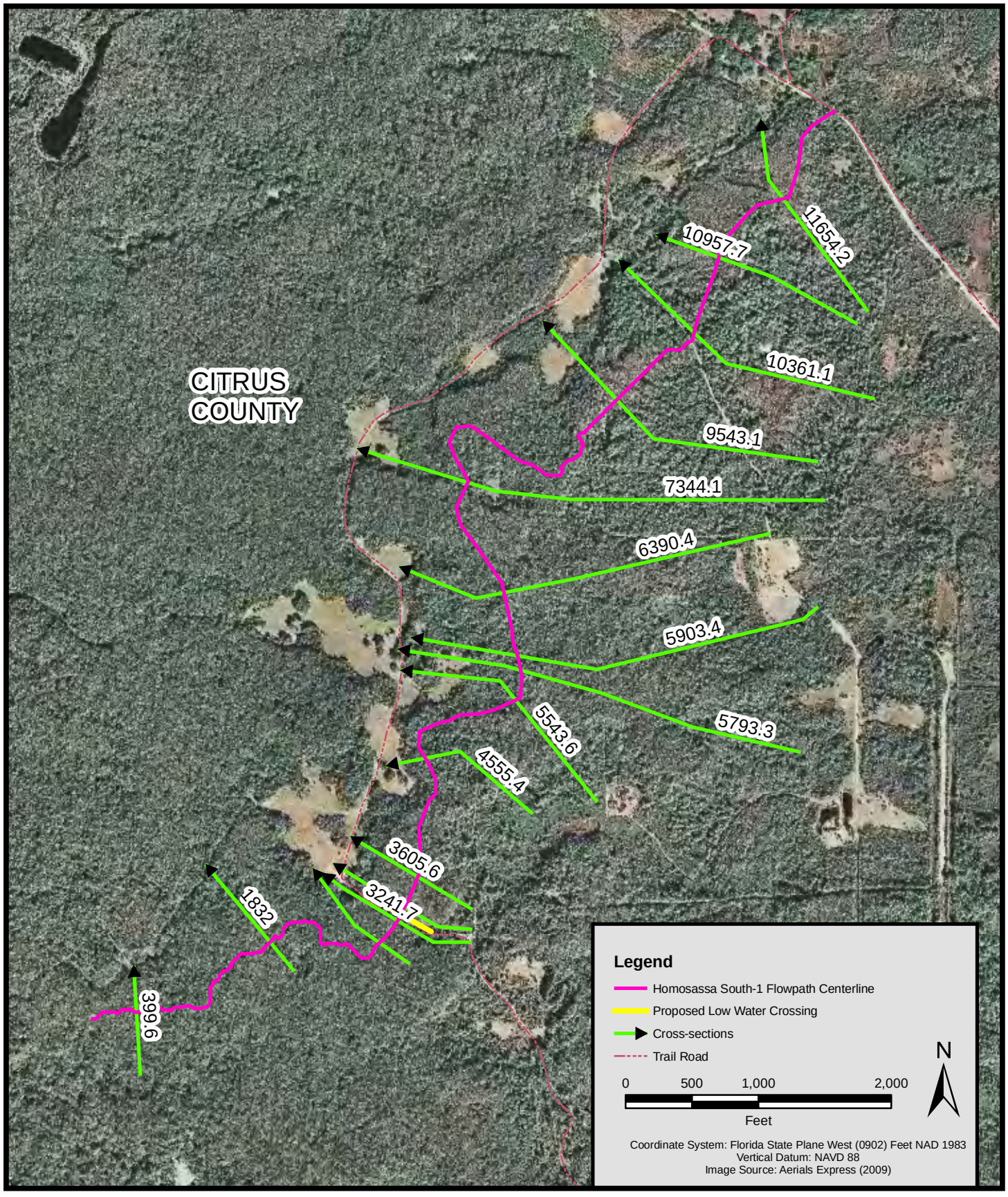
The HEC-RAS model routes the flows from these flow hydrographs to estimate the flow and stage at different cross-sections within the model domain.



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North LWCS HEC-RAS Model Layout
Homosassa Tract
Citrus County, Florida

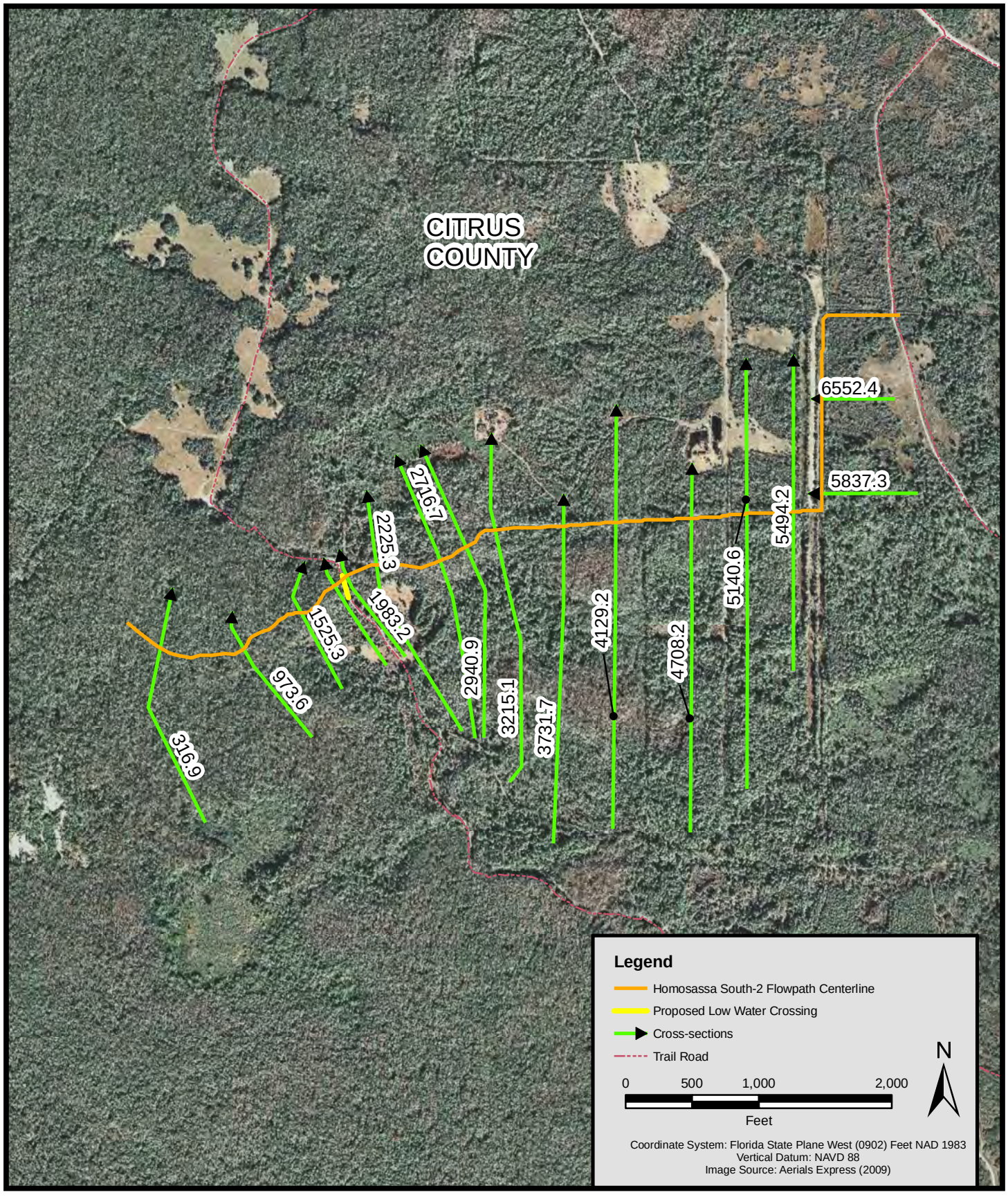
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FIGURE	6-17
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DATE	JULY 2011



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South-1 LWC HEC-RAS Model Layout
Homosassa South-1 Tract
Citrus County, Florida

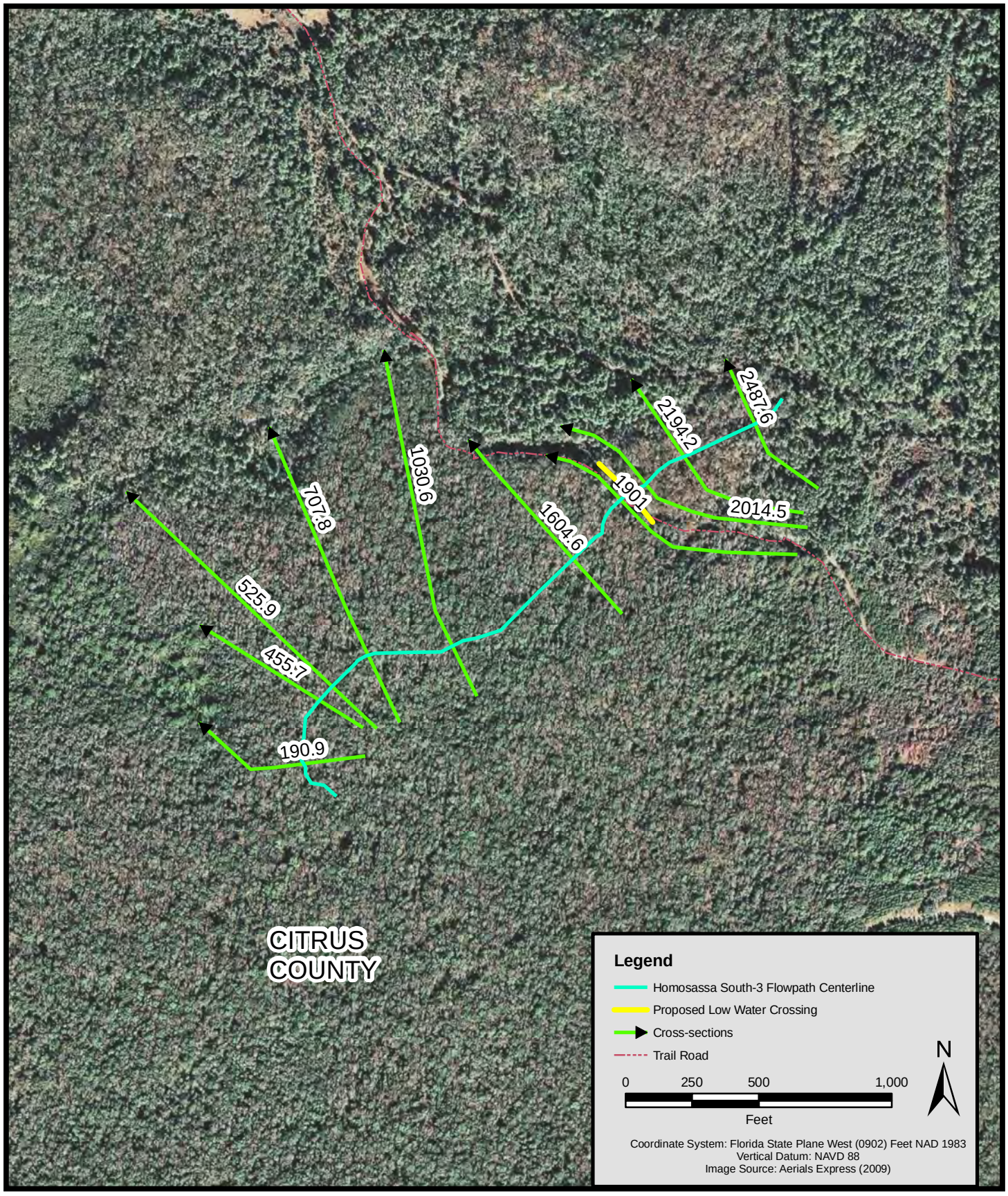
PROJECT	C2011-025
FIGURE	6-18
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South-2 LWC HEC-RAS Model Layout
Homosassa Tract
Citrus County, Florida

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South-3 LWC HEC-RAS Model Layout
Homosassa Tract
Citrus County, Florida

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FIGURE	6-20
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DATE	JULY 2011

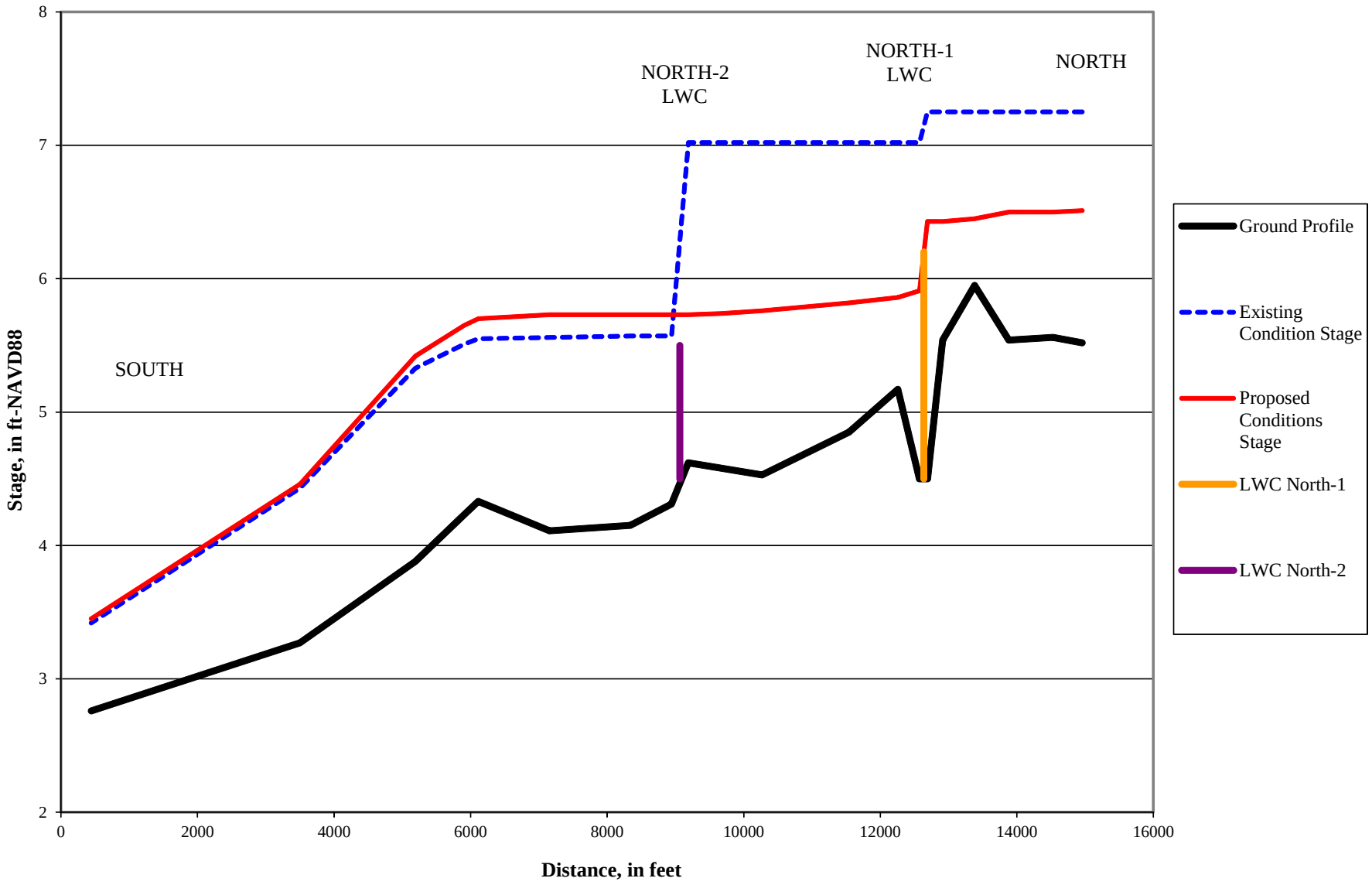
6.5.3 Model Application Results

The HEC-RAS model was applied to the each restoration area for five rainfall events representing the 2-, 10-, 25-, 50-, and 100-year return periods. The model was applied to both existing and proposed (mitigation or post-construction) conditions. The post-construction conditions represent the proposed LWC at each site within the system (more details about the modifications are provided in Section 6.7 Engineering). Comparison of the pre- and post-construction model results at each restoration area demonstrate the improved flow conveyance gained from the construction of LWC. A detailed description of the results for each restoration area is described in the following sections.

North-1 LWC and North-2 LWC (Activity Area 1)

In the existing conditions, the elevation of the trail road at both restoration areas is between 7.2’ NAVD and 7.5’ NAVD. The surrounding grade is at least 2’- 3’ lower than the road elevation. As a result, water back-ups behind the trail road and impedes the sheet flow of water that existed before the construction of the trail road. Modifications at North-1 LWC restoration area include a multi-step LWC. Details on the multi-step LWC can be found in Section 6.7 Engineering. The LWCs for this site have been shown as North 1A LWC and North 1B LWC in Section 6.11 Engineering Detail Drawings, to allow for ease of review. The multi-step LWC consists of two LWCs – a 75’ wide crossing at an elevation of 6.2’ NAVD (North-1A LWC) and another one is an 82’ wide crossing at an elevation of 6.6’ NAVD (North-1B LWC). Modifications at North-2 LWC restoration area site include a 375’ wide LWC at an elevation of 5.5’ NAVD.

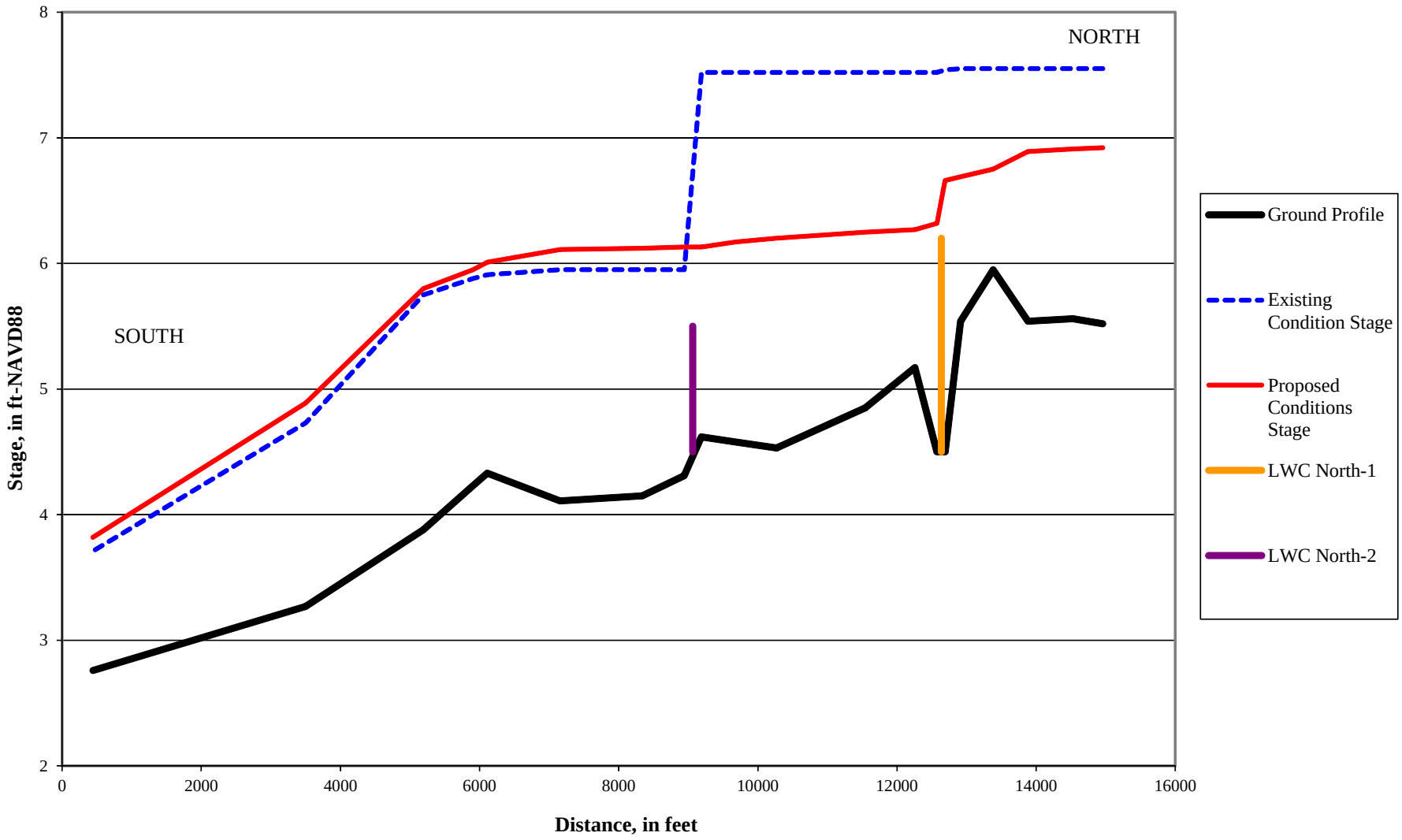
Figure 6-21 to 6-25 shows the water surface profile for the 2-, 10-, 25-, 50-, and 100-year storm events in existing and proposed conditions. As seen from Figure 6-21, by constructing the LWC, the head loss across the road decreases from 1.5’ to 0.1’ for the 2-year storm event at the North-2 LWC restoration area.



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North LWCS Profile of peak stages in Existing and Proposed Conditions for the 2-year storm event
Homosassa Tract
Citrus County, Florida

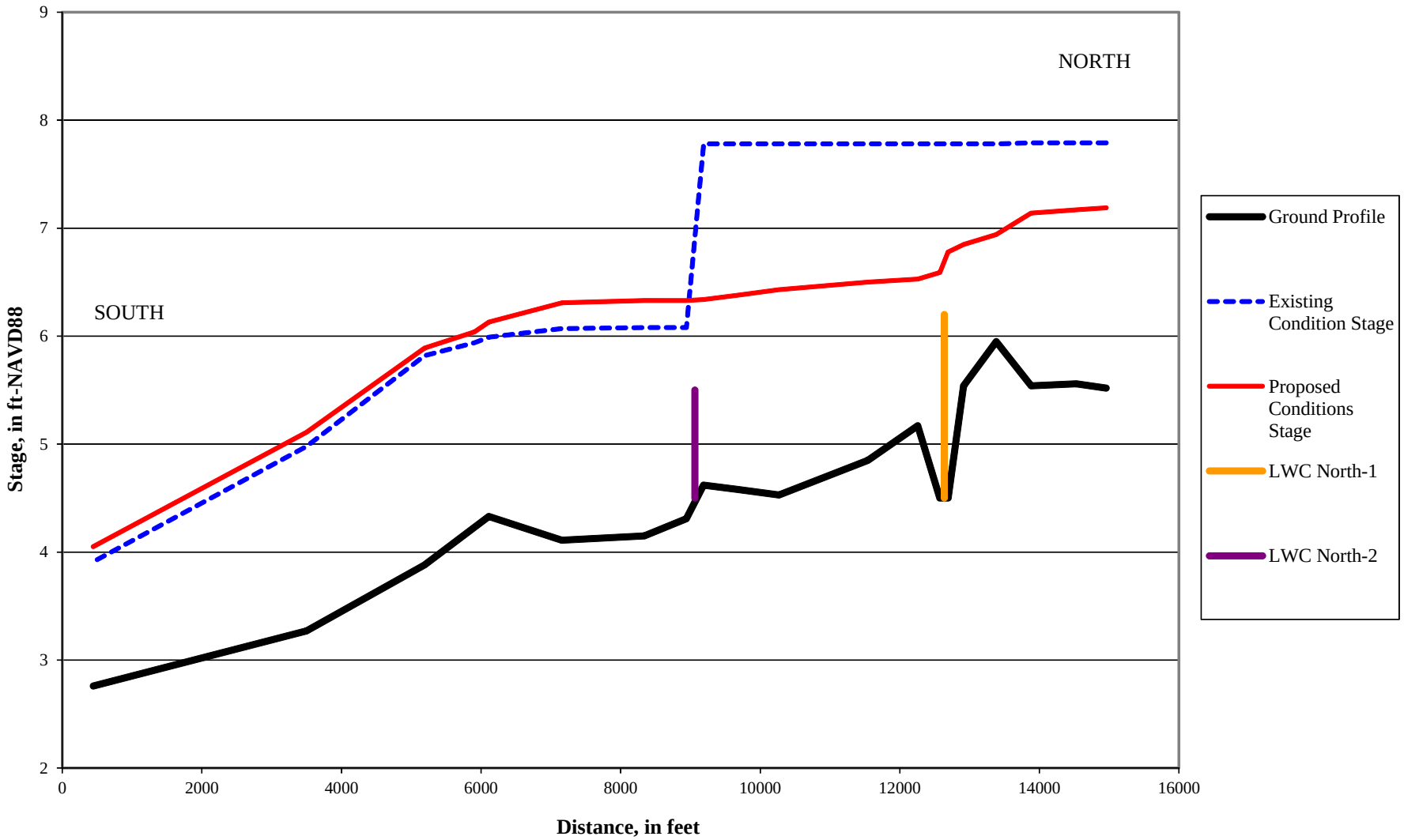
PROJECT	C2011-025
FIGURE	6-21
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North LWCS Profile of peak stages in Existing and Proposed Conditions for the 10-year storm event
Homosassa Tract
Citrus County, Florida

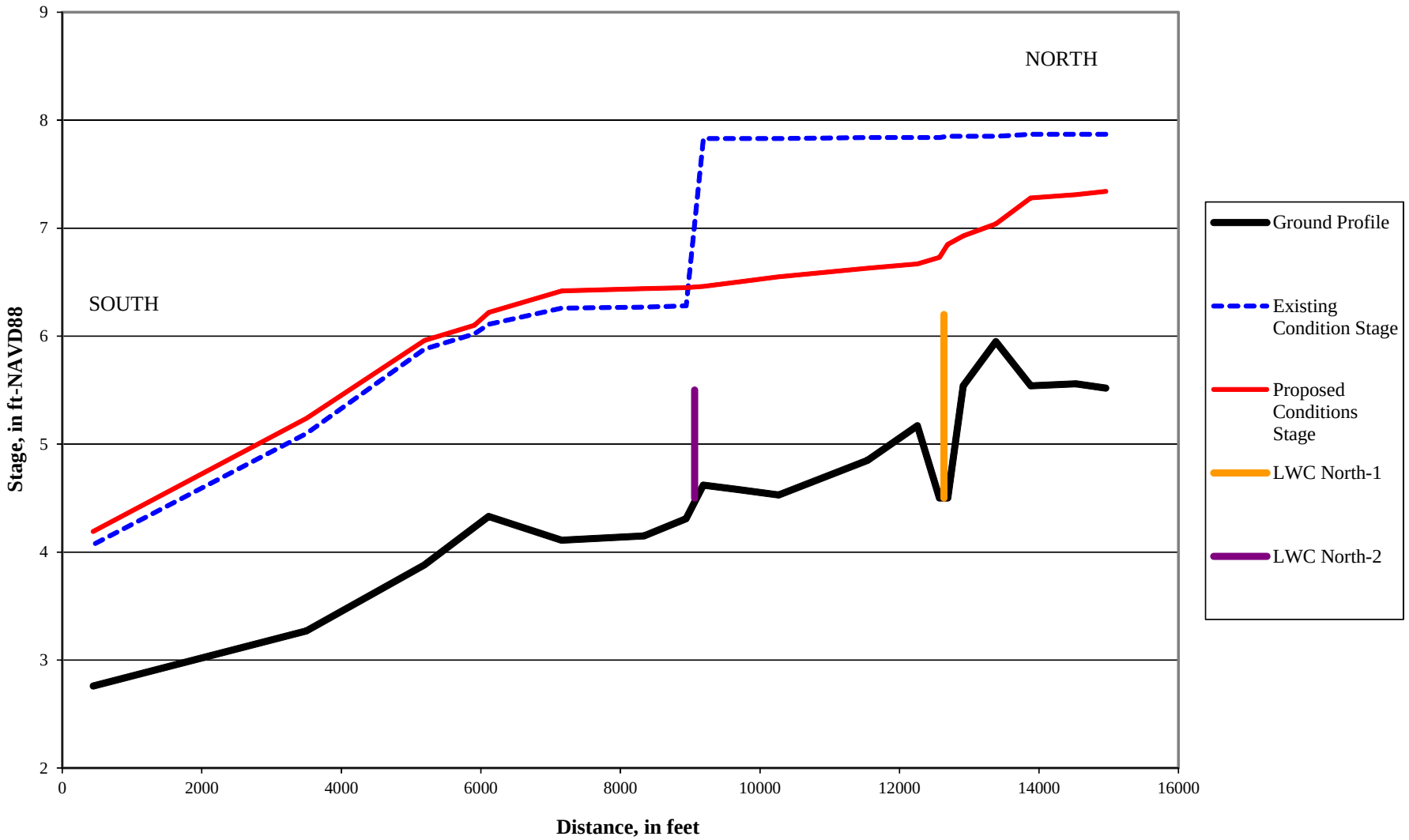
PROJECT	C2011-025
FIGURE	6-22
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DATE	JULY 2011



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North LWCS Profile of peak stages in Existing and Proposed Conditions for the 25-year storm event
Homosassa Tract
Citrus County, Florida

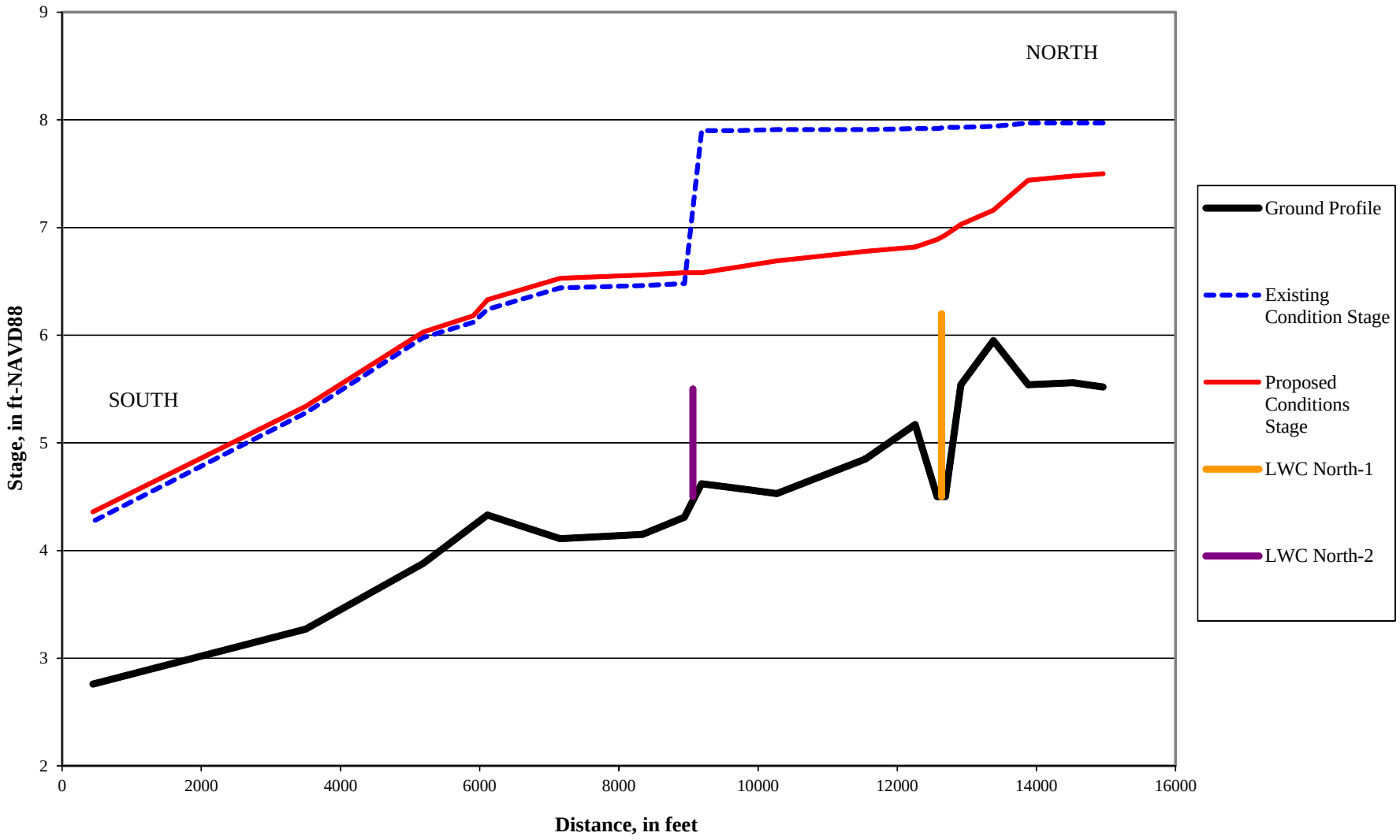
PROJECT	C2011-025
FIGURE	6-23
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DATE	JULY 2011



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North LWCS Profile of peak stages in Existing and Proposed Conditions for the 50-year storm event
Homosassa Tract
Citrus County, Florida

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FIGURE	6-24
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North LWCS Profile of peak stages in Existing and Proposed Conditions for the 100-year storm event
Homosassa Tract
Citrus County, Florida

PROJECT	C2011-025
FIGURE	6-25
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DATE	JULY 2011

Table 6-6 presents the peak flows along the proposed North-2 LWC restoration area in the existing and proposed conditions. As seen from this table, by constructing the LWC, the peak flow increases for by 246% for a 10-year storm event.

The LWC allows for additional volume of water to pass over the trail road to restore the natural sheet flow and, thereby reducing the back-up of water upstream of the trail road.

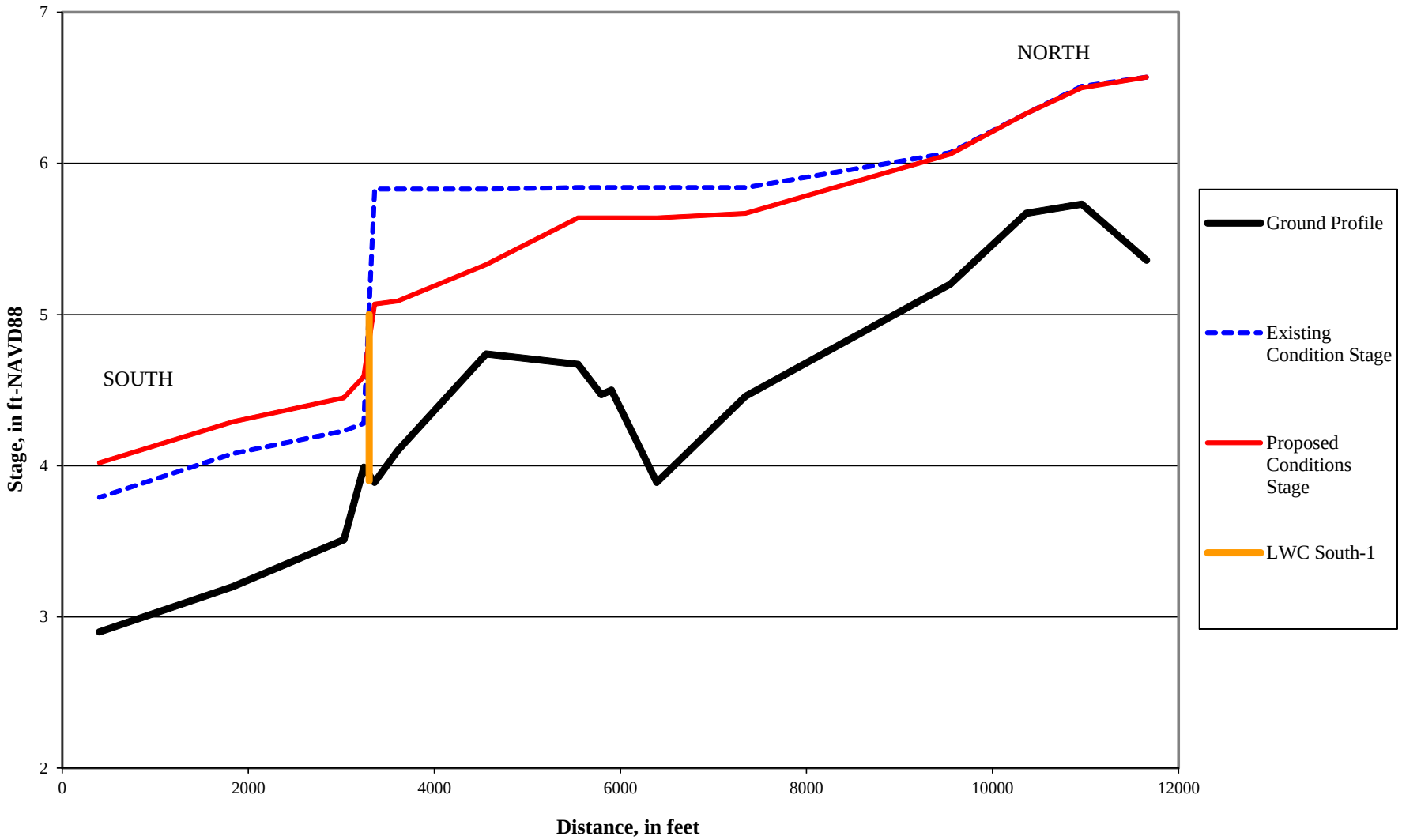
Table 6-6. Peak flows over the road at North-2 LWC in the existing and proposed conditions

	Peak flow for storm events (cfs)				
	2-year	**10-year**	**25-year**	**50-year**	**100-year**
Existing Conditions	15.2	25.7	56.9	107.8	169.1
Proposed Conditions	48.4	88.9	123.9	159.7	204.6
Increase	218%	246%	118%	48%	21%

South-1 LWC (Activity Area 2)

In the existing conditions, the elevation of the trail road at the South-1 LWC restoration area is at 6.9’ NAVD. The surrounding grade is at least 3’ lower than the road elevation. As a result, water back-ups behind the trail road and impedes the historic sheet flow. Modifications at South-1 LWC restoration area include a 550’ wide LWC at an elevation of 5’ NAVD.

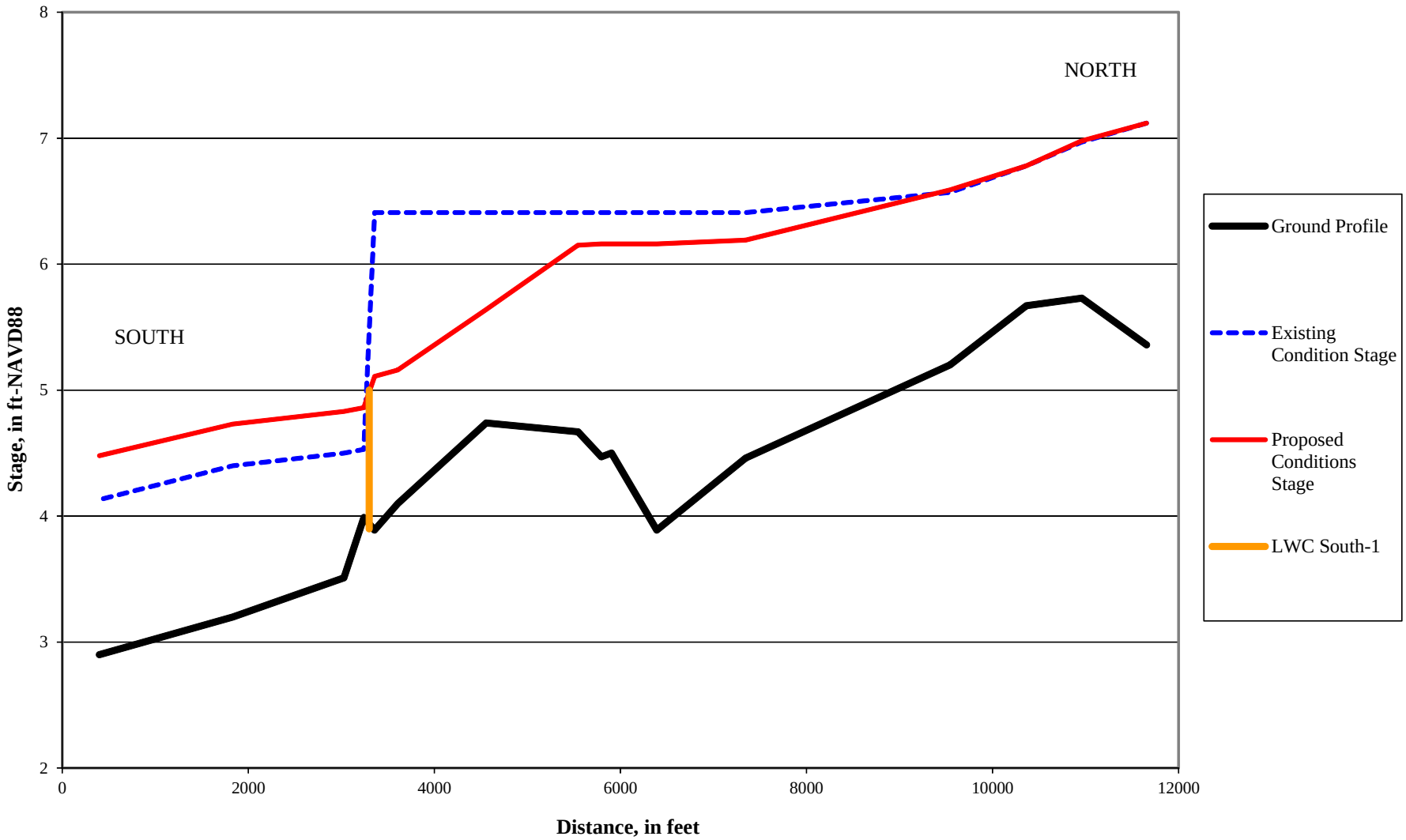
Figure 6-26 to 6-30 shows the water surface profile for the 2-, 10-, 25-, 50-, and 100-year storm events in existing and proposed conditions. As seen from Figure 6-26, by constructing the LWC, the head loss across the road decreases from 1.5’ to 0.5’ for the 2-year storm event.



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South-1 LWC Profile of peak stages in Existing and Proposed Conditions for the 2-year storm event
Homosassa Tract
Citrus County, Florida

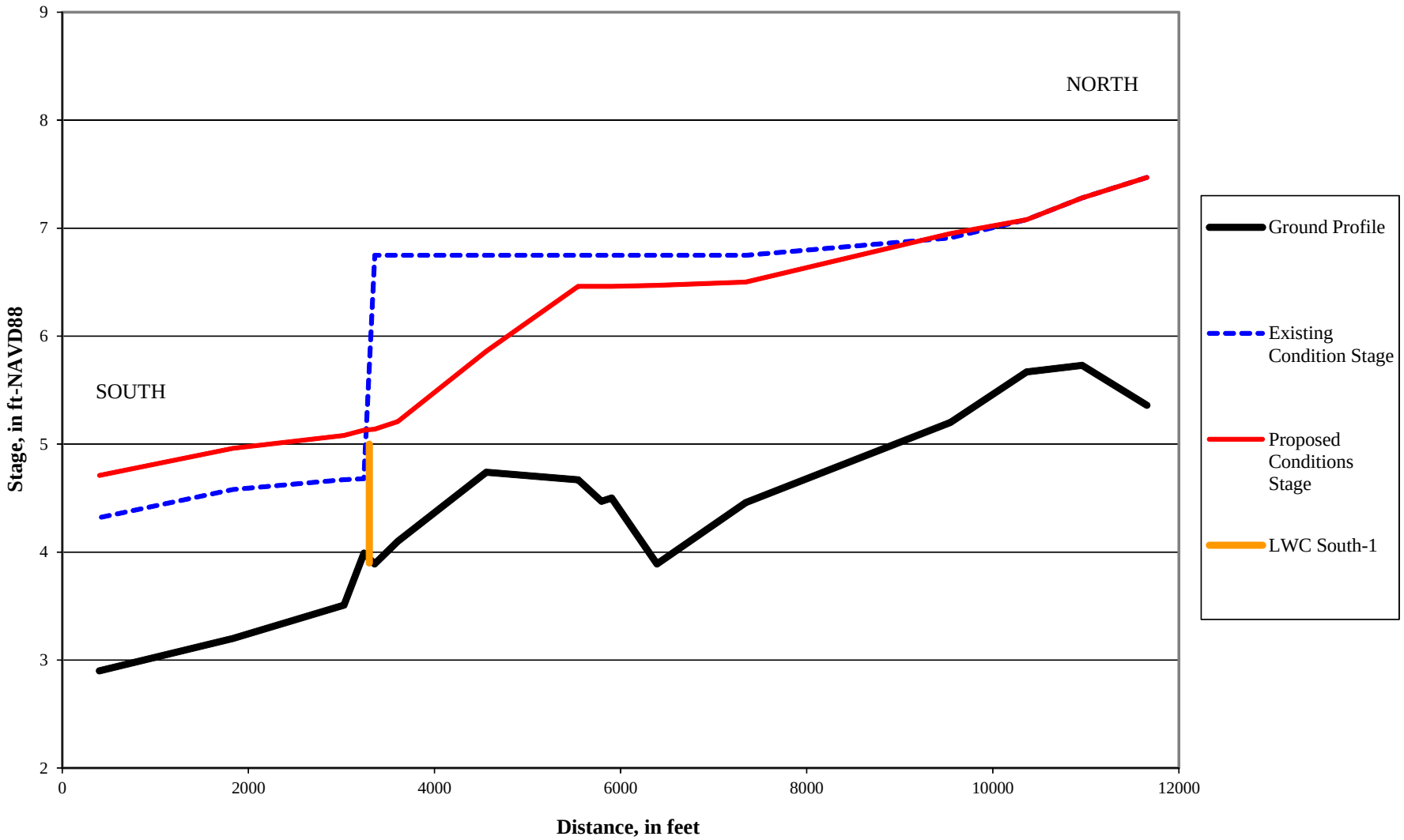
PROJECT	C2011-025
FIGURE	6-26
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DATE	JULY 2011



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South-1 LWC Profile of peak stages in Existing and Proposed Conditions for the 10-year storm event
Homosassa Tract
Citrus County, Florida

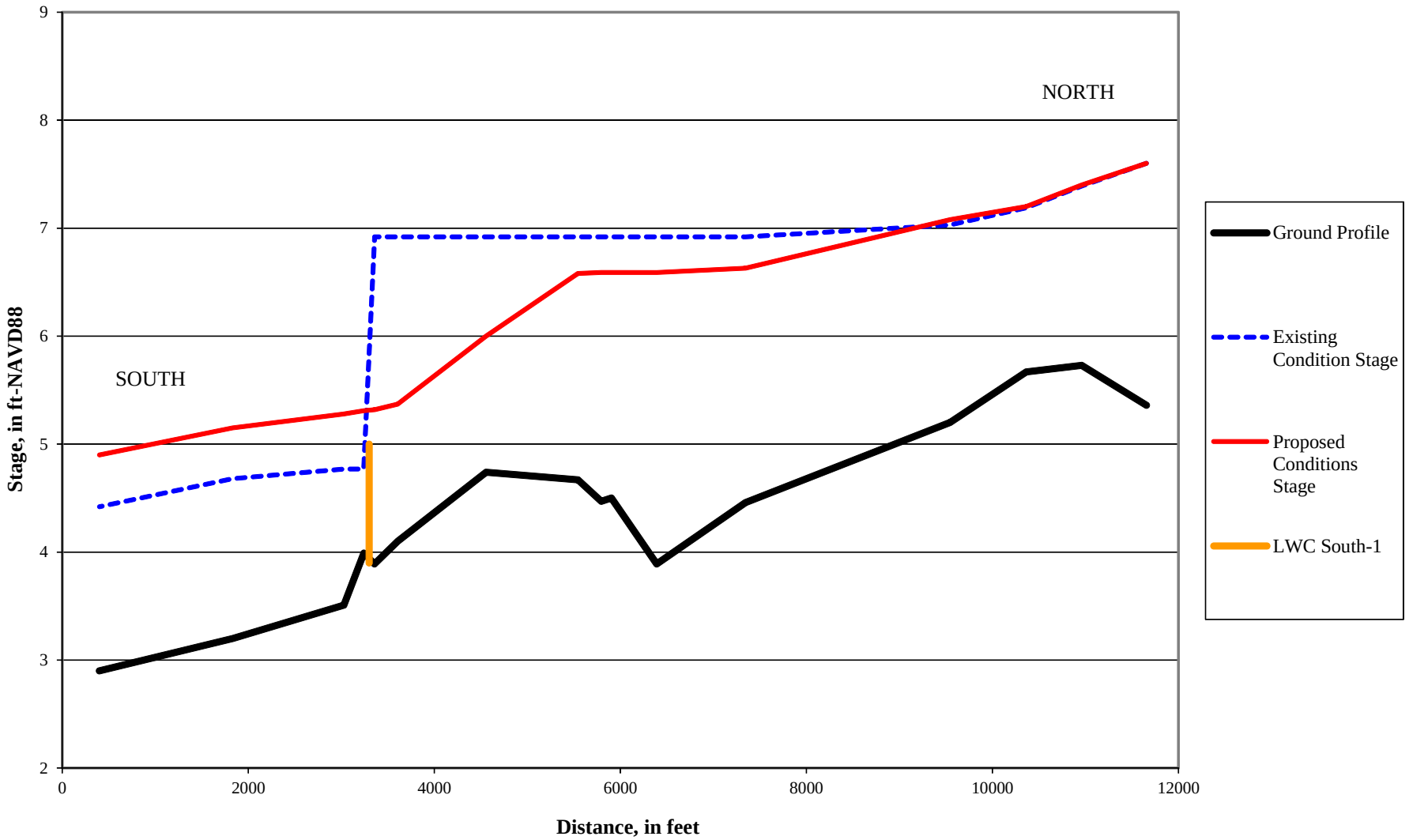
PROJECT	C2011-025
FIGURE	6-27
DRAWN BY	APS
DATE	JULY 2011



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South-1 LWC Profile of peak stages in Existing and Proposed Conditions for the 25-year storm event
Homosassa Tract
Citrus County, Florida

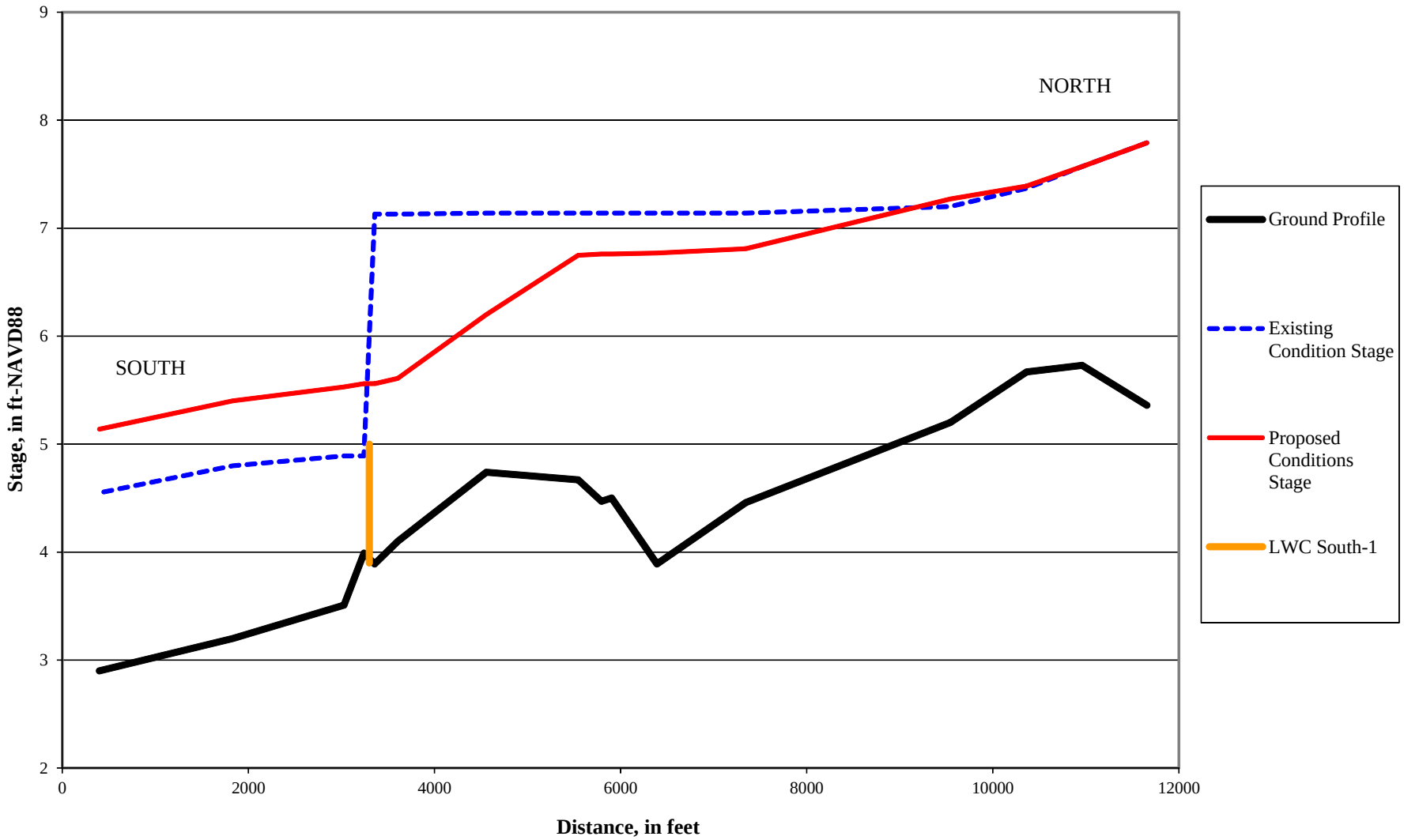
PROJECT	C2011-025
FIGURE	6-28
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DATE	JULY 2011



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South-1 LWC Profile of peak stages in Existing and Proposed Conditions for the 50-year storm event
Homosassa Tract
Citrus County, Florida

PROJECT	C2011-025
FIGURE	6-29
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DATE	JULY 2011



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South-1 LWC Profile of peak stages in Existing and Proposed Conditions for the 100-year storm event
Homosassa Tract
Citrus County, Florida

PROJECT	C2011-025
FIGURE	6-30
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Table 6-7 presents the peak flows along the proposed South-1 LWC restoration area in the existing and proposed conditions. As seen from this table, by constructing the LWC, the peak flow increases for by 478% for a 10-year storm event.

The LWC allows for additional volume of water to pass over the trail road to restore the natural sheet flow and, thereby reducing the back-up of water upstream of the trail road.

Table 6-7. Peak flows over the road at South-1 LWC in the existing and proposed conditions

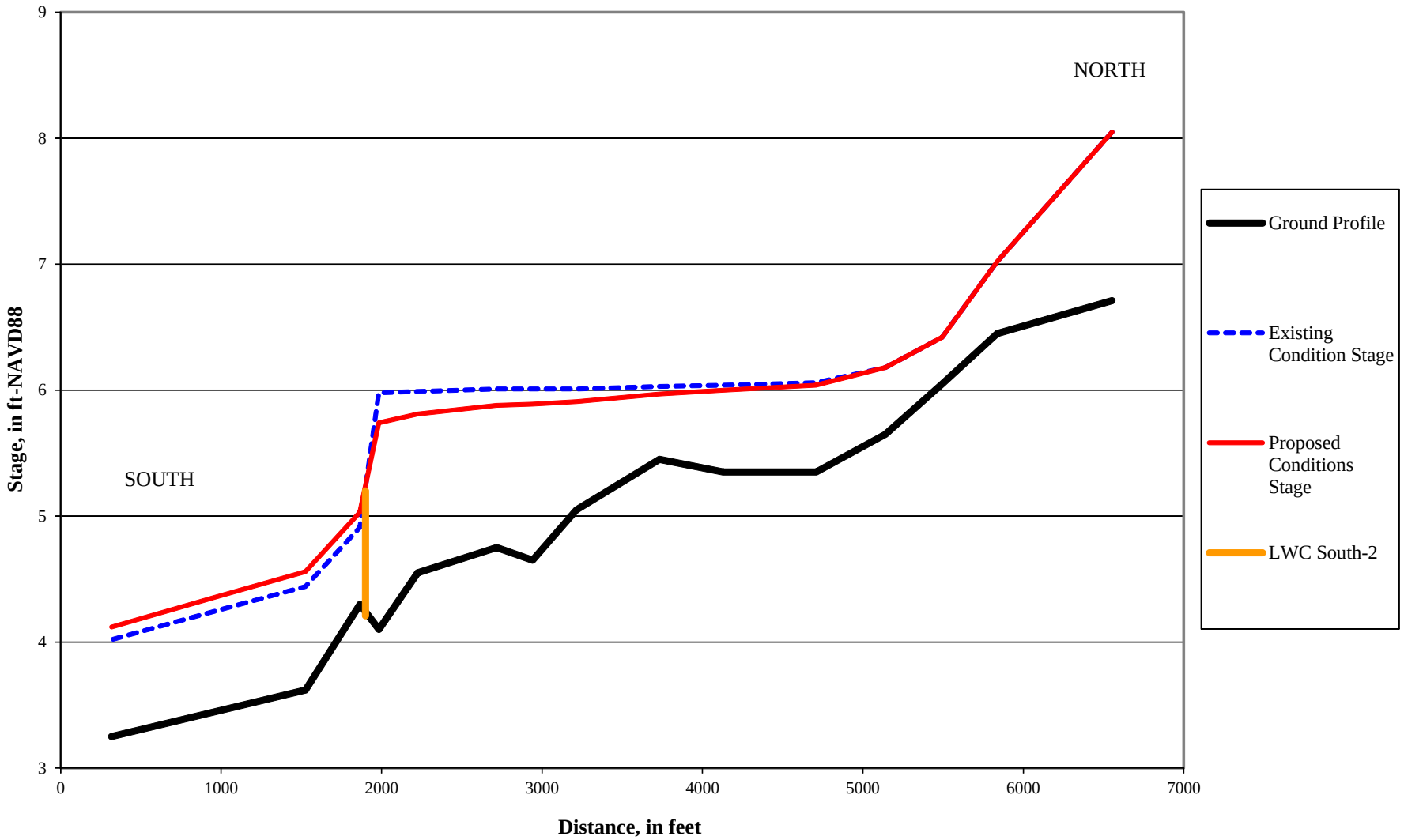
	Peak flow for storm events (cfs)				
	2-year	**10-year**	**25-year**	**50-year**	**100-year**
Existing Conditions	4.9	9.2	12	15.9	24.4
Proposed Conditions	27.8	53.2	69.3	84.2	111.5
Increase	467%	478%	478%	430%	357%

South-2 LWC (Activity Area 2)

In the existing conditions, the elevation of the trail road at the South-2 LWC restoration area is at 6.7’ NAVD. The surrounding grade is at least 2-3’ lower than the road elevation. The existing four 24-inch pipe culverts under the trail road are highly silted and are unable to pass adequate flow during normal rainfall conditions. As a result, water back-ups behind the trail road and impedes the sheet flow of water. Modifications at South-1 LWC mitigation site involve removing the existing culverts and constructing a 140’ wide LWC at an elevation of 5.2’ NAVD.

Figure 6-31 to 6-35 shows the water surface profile for the 2-, 10-, 25-, 50-, and 100-year storm events in existing and proposed conditions. Table 6-8 presents the peak flows along the proposed South-2 LWC restoration area in the existing and proposed conditions. Model results indicate that by constructing the LWC, the peak flow increases for by 106% for a 10-year storm event.

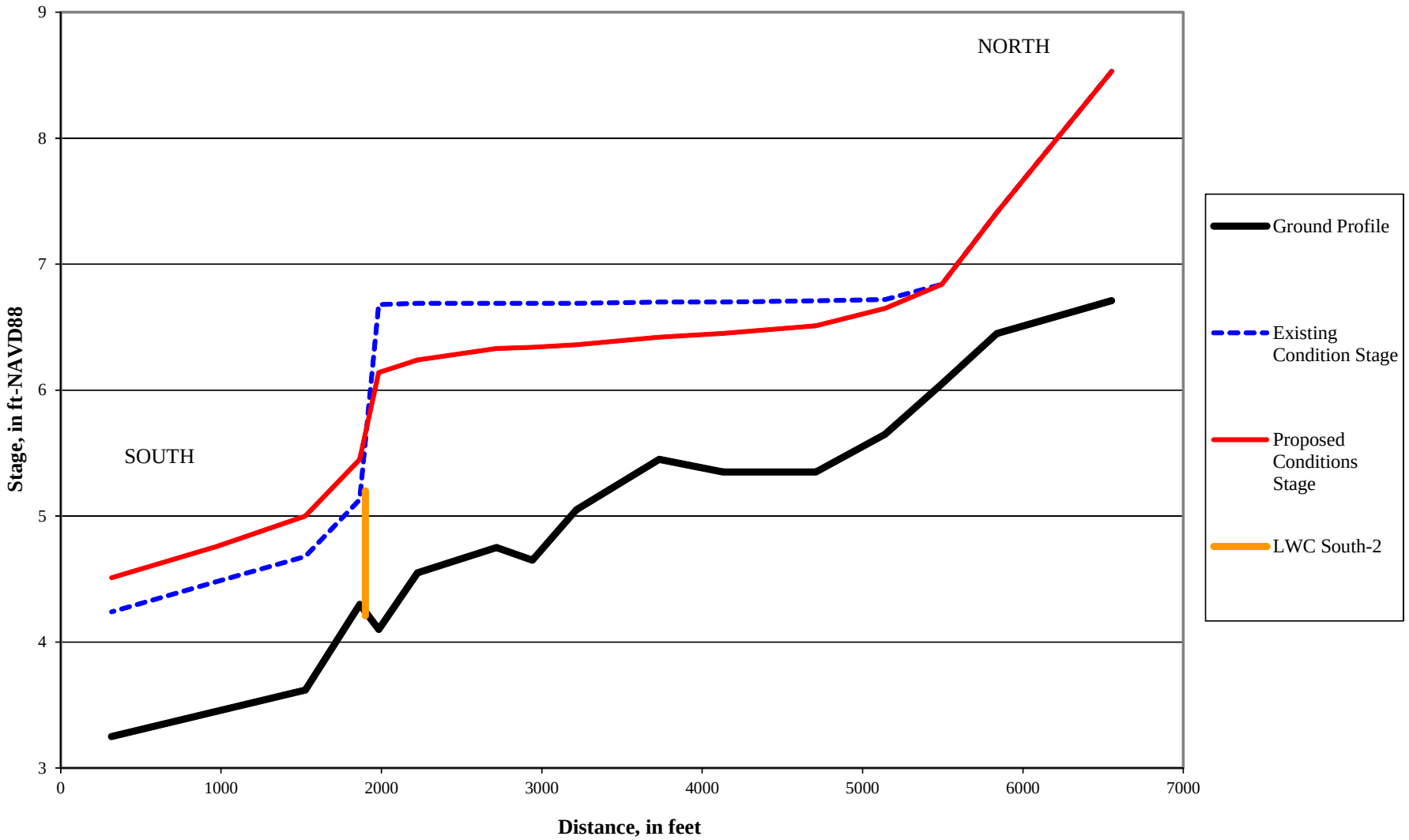
The LWC allows for additional volume of water to pass over the trail road to restore the natural sheet flow and, thereby reducing the back-up of water upstream of the trail road.



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South-2 LWC Profile of peak stages in Existing and Proposed Conditions for the 2-year storm event
Homosassa Tract
Citrus County, Florida

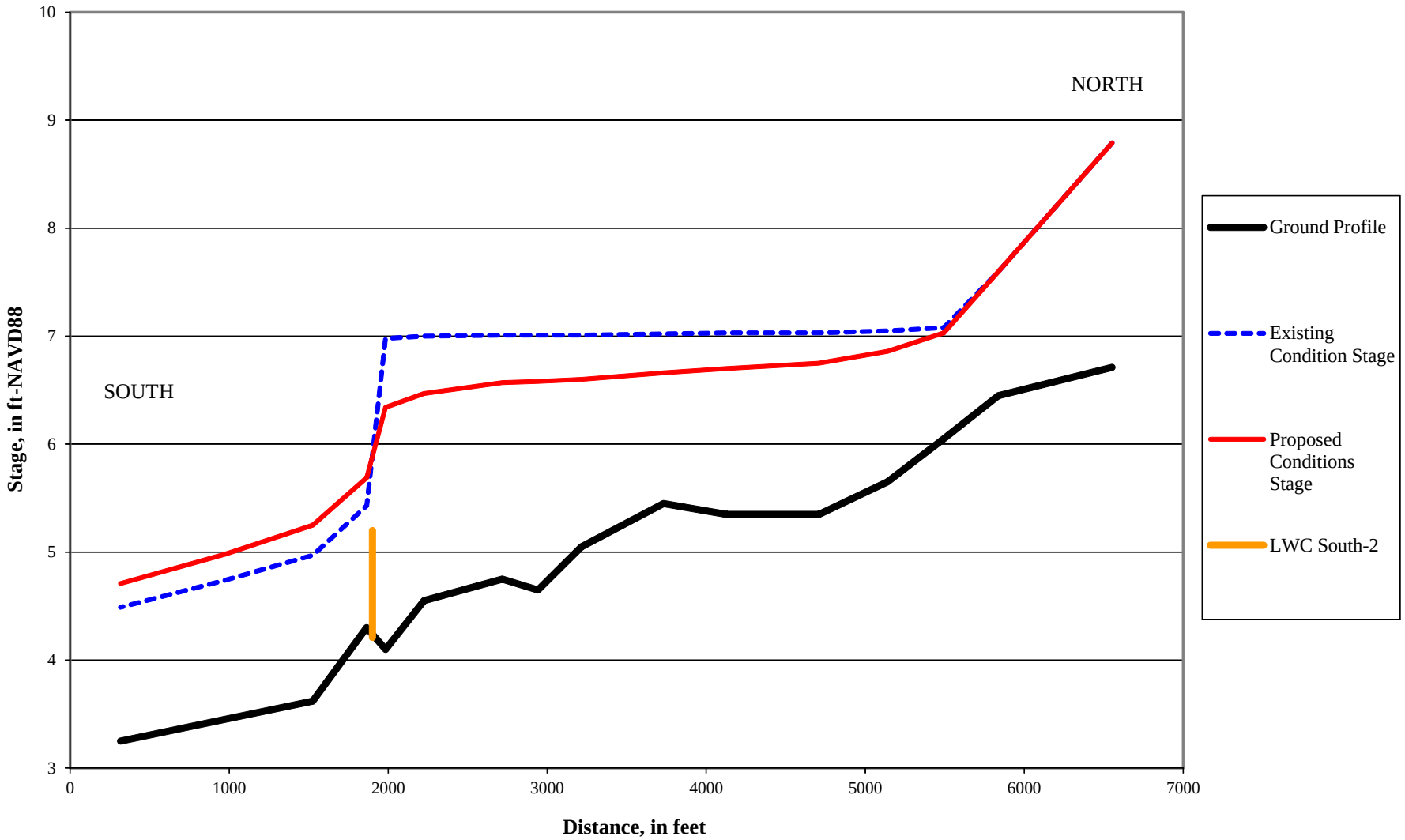
PROJECT	C2011-025
FIGURE	6-31
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South-2 LWC Profile of peak stages in Existing and Proposed Conditions for the 10-year storm event
Homosassa Tract
Citrus County, Florida

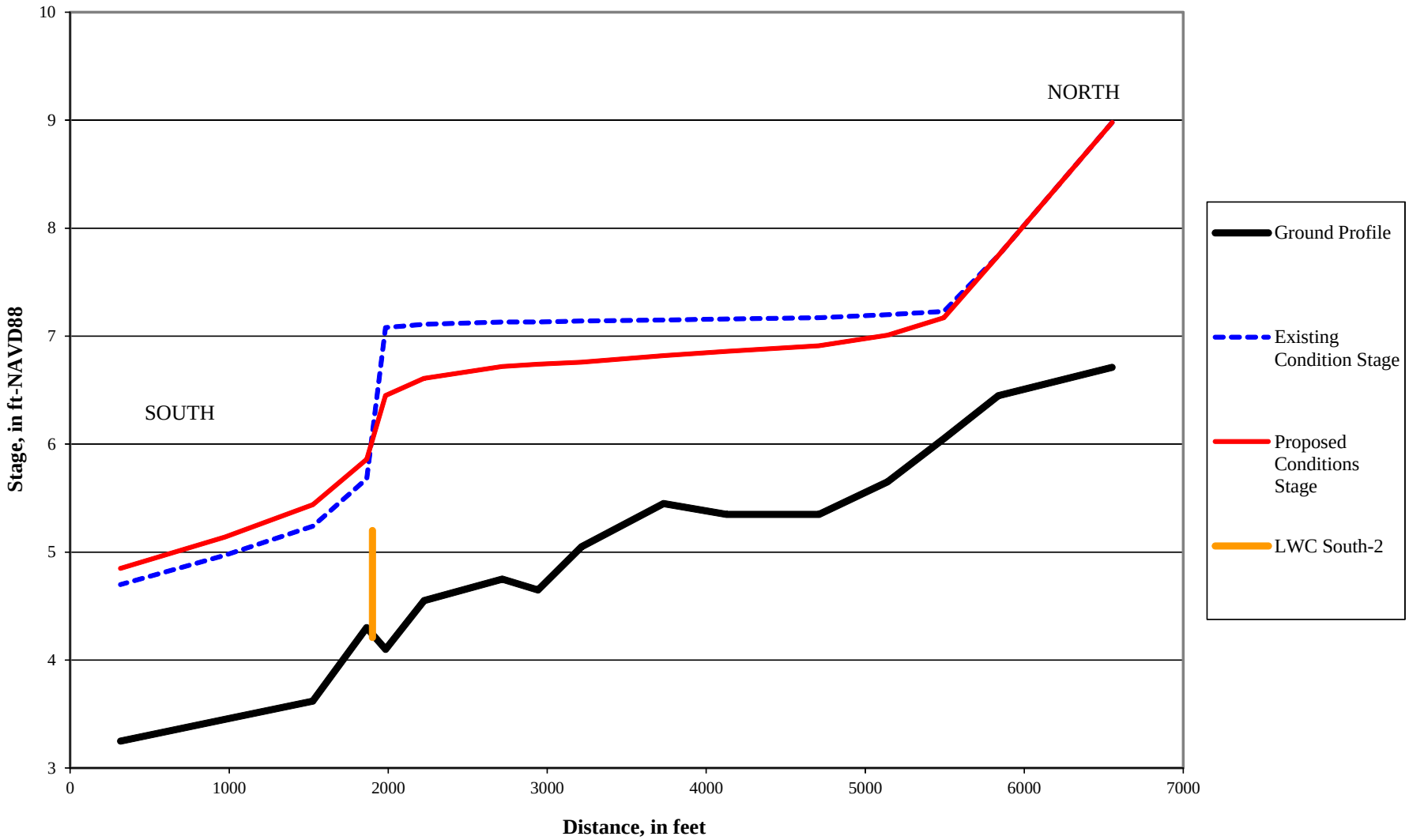
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FIGURE	6-32
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DATE	JULY 2011



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South-2 LWC Profile of peak stages in Existing and Proposed Conditions for the 25-year storm event
Homosassa Tract
Citrus County, Florida

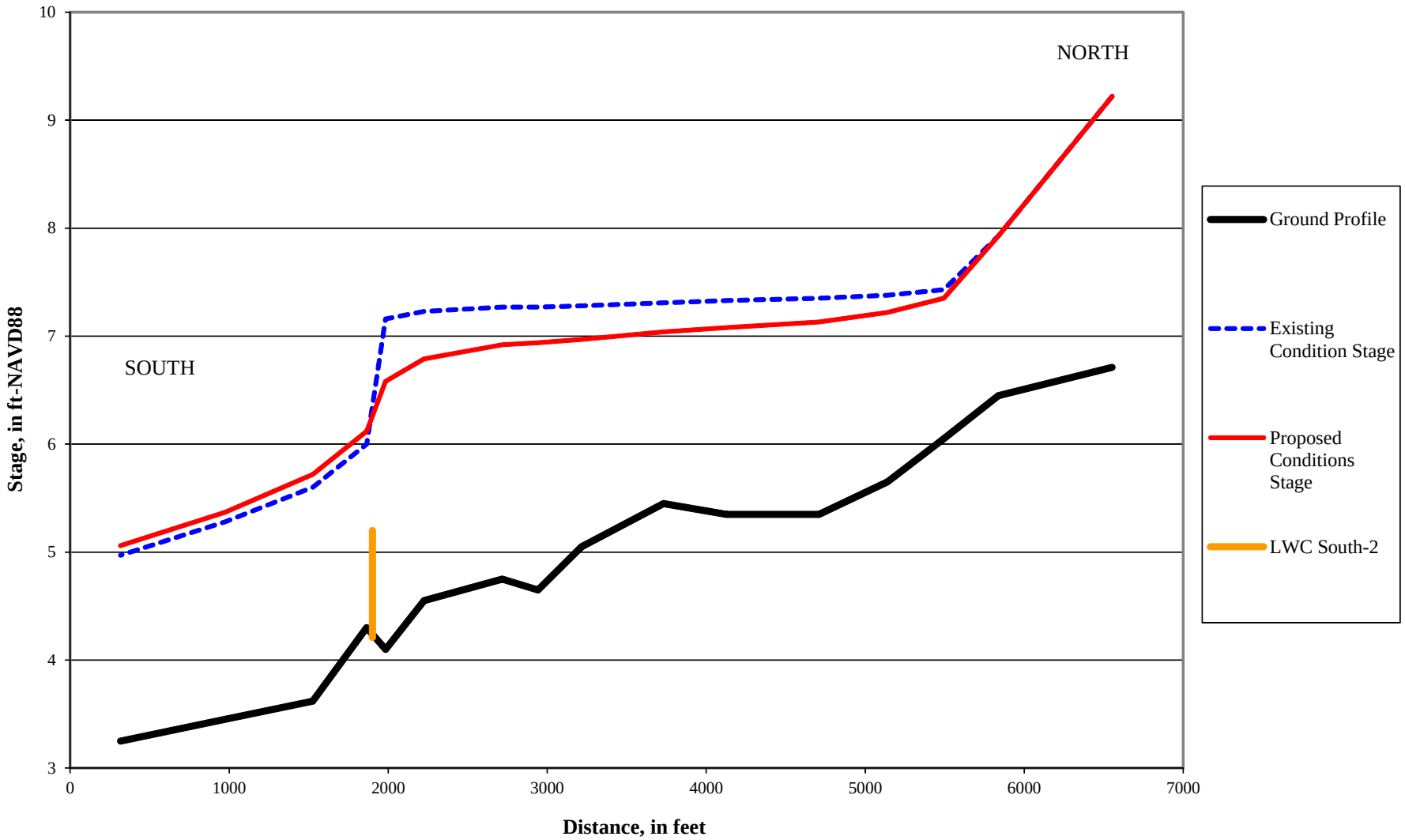
PROJECT	C2011-025
FIGURE	6-33
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South-2 LWC Profile of peak stages in Existing and Proposed Conditions for the 50-year storm event
Homosassa Tract
Citrus County, Florida

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South-2 LWC Profile of peak stages in Existing and Proposed Conditions for the 100-year storm event
Homosassa Tract
Citrus County, Florida

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FIGURE	6-35
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Table 6-8. Peak flows over the road at South-2 LWC in the existing and proposed conditions

	Peak flow for storm events (cfs)				
	2-year	10-year	25-year	50-year	100-year
Existing Conditions	34.4	60.9	118.4	180.3	287.5
Proposed Conditions	49.9	125.7	186.9	241.1	330
Increase	45%	106%	58%	34%	15%

South-3 LWC (Activity Area 2)

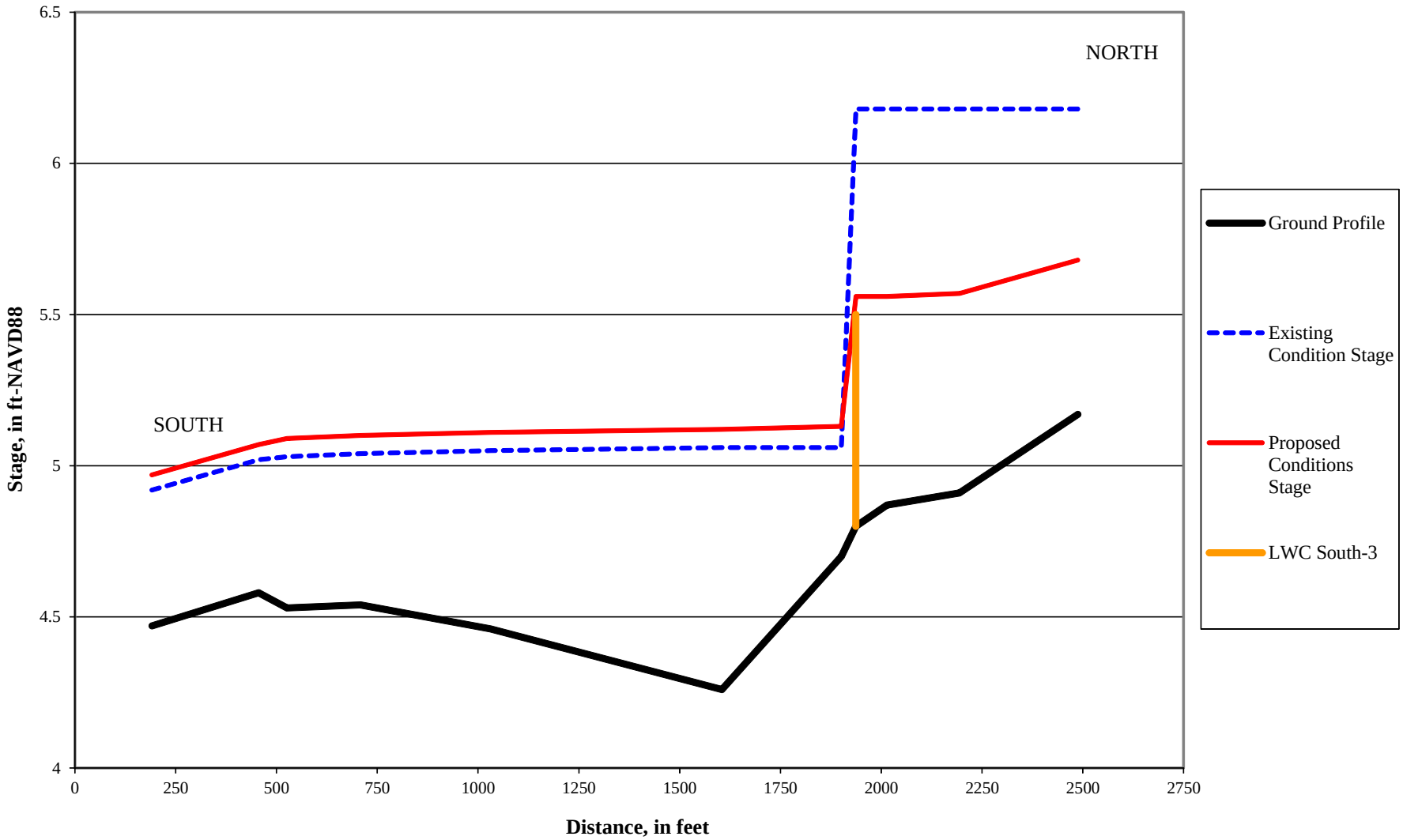
In the existing conditions, the elevation of the trail road at the South-3 LWC restoration area is at 6.5' NAVD. The surrounding grade is at least 1.5' lower than the road elevation. As a result, water back-ups behind the trail road and impedes the sheet flow of water. Modifications at South-3 LWC mitigation site involve removing the existing culverts and constructing a 300' wide LWC at an elevation of 5.5' NAVD.

Figure 6-36 to 6-40 shows the water surface profile for the 2-, 10-, 25-, 50-, and 100-year storm events in existing and proposed conditions. Table 6-9 presents the peak flows along the proposed South-3 LWC restoration area in the existing and proposed conditions. Model results show, as seen in this table, by constructing the LWC, the peak flow increases for by 1740% for a 10-year storm event.

The LWC allows for additional volume of water to pass over the trail road to restore the natural sheet flow and, thereby reducing the back-up of water upstream of the trail road.

Table 6-9. Peak flows over the road at South-3 LWC in the existing and proposed conditions

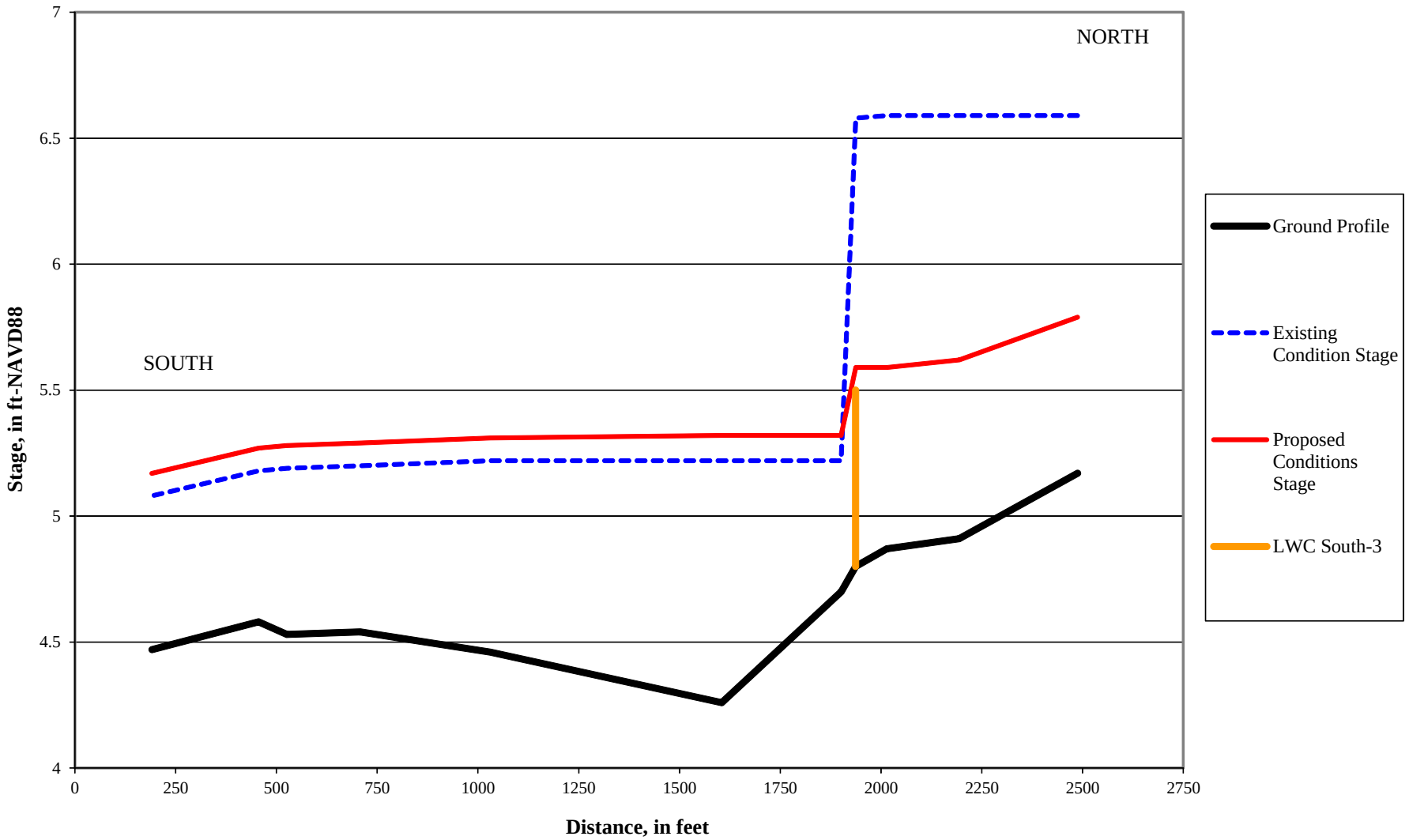
	Peak flow for storm events (cfs)				
	2-year	10-year	25-year	50-year	100-year
Existing Conditions	0	1	2.8	5	8.8
Proposed Conditions	9.4	18.4	23.8	27.1	31.7
Increase	N/A	1740%	750%	442%	260%



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South-3 LWC Profile of peak stages in Existing and Proposed Conditions for the 2-year storm event
Homosassa Tract
Citrus County, Florida

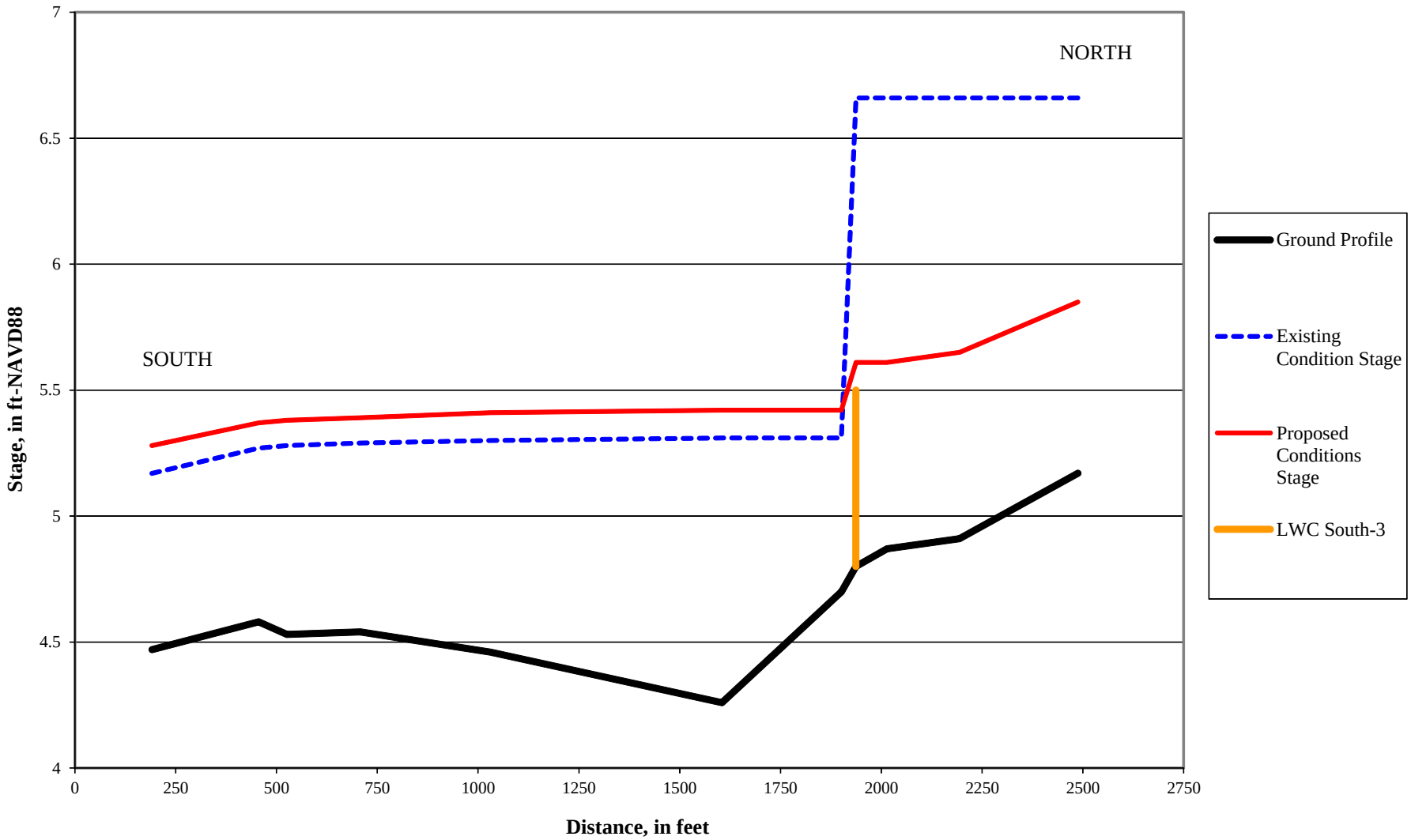
PROJECT	C2011-025
FIGURE	6-36
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South-3 LWC Profile of peak stages in Existing and Proposed Conditions for the 10-year storm event
Homosassa Tract
Citrus County, Florida

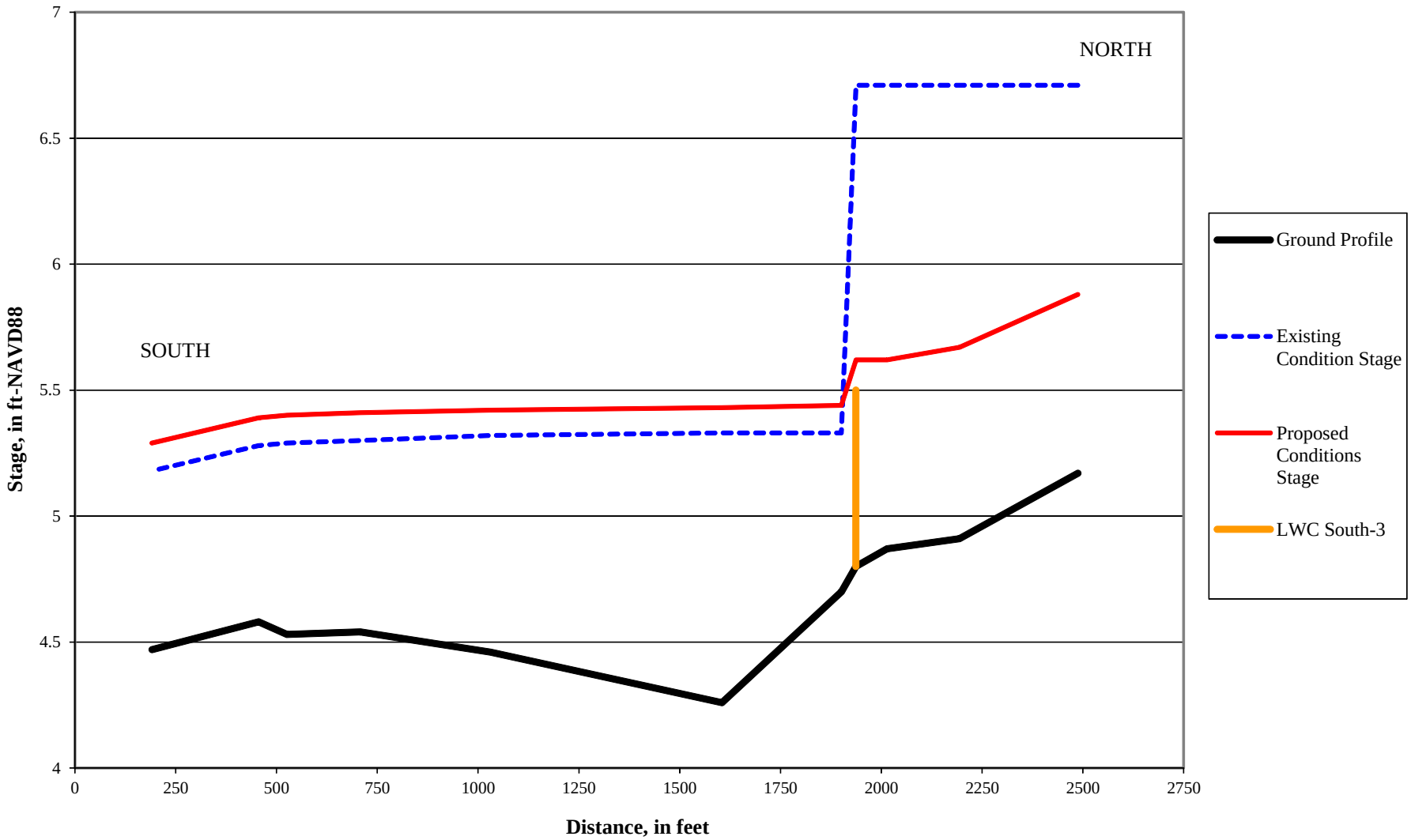
PROJECT	C2011-025
FIGURE	6-37
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South-3 LWC Profile of peak stages in Existing and Proposed Conditions for the 25-year storm event
Homosassa Tract
Citrus County, Florida

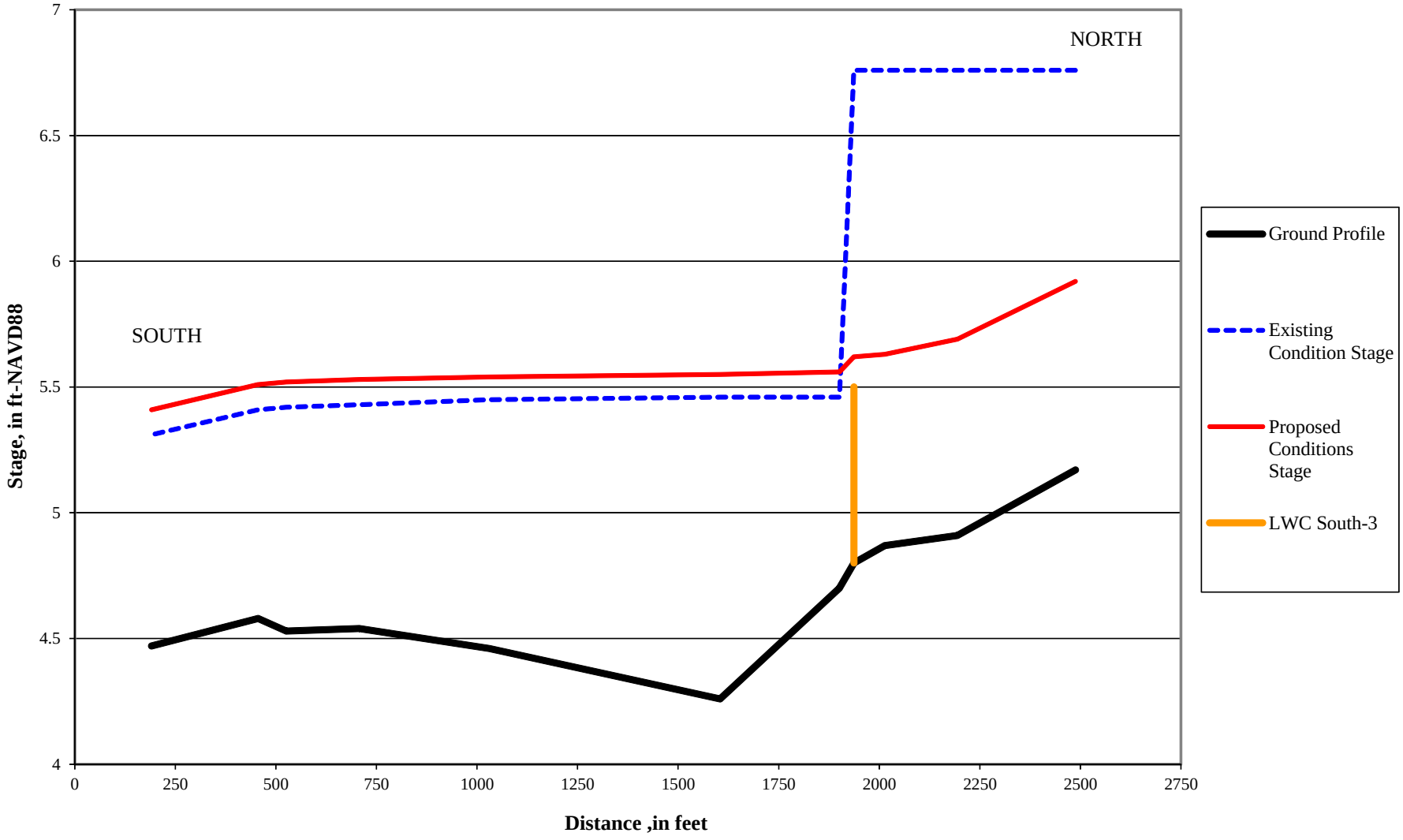
PROJECT	C2011-025
FIGURE	6-38
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South-3 LWC Profile of peak stages in Existing and Proposed Conditions for the 50-year storm event
Homosassa Tract
Citrus County, Florida

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FIGURE	6-39
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South-3 LWC Profile of peak stages in Existing and Proposed Conditions for the 100-year storm event
Homosassa Tract
Citrus County, Florida

PROJECT	C2011-025
FIGURE	6-40
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6.6 UMAM Score

The proposed mitigation plan for HT will provide for 55.6 units of functional lift to offset the forested impacts and a portion of herbaceous impacts within the Upper Coastal Watershed (Table 6-10), while the balance of the impacts will be mitigated for at the Five Mile Creek Site. The scoring system utilized during the UMAM process is outlined in the UMAM handbook and its scoring requirements.

Scores for existing communities that were assessed ranged from 4 to 7, pursuant to the UMAM process described above. Target UMAM scores presented in Table 6-10 ranged from 7 to 8 in accordance with the UMAM scoring parameters based on the target results of each of the mitigation activities outlined in this plan.

For Location and Landscape Support, the proposed scores were given a 7, (no change) based on the UMAM scoring methodology. These scores were derived by assessing the existing communities on site and identifying the main characteristics that these habitats were deficient in, such as habitat availability, wildlife access barriers, land use impacts and several others. This information was then used to incorporate those criteria into the proposed mitigation activities.

For the Water category, all proposed scores are 7 to 8. A score of 7 represents that the assessment area will provide adequate habitat for both aquatic vegetation and wildlife, will aid in the hydroperiod of the area and assist in storage capacity and attenuation, will increase water flow through the area resulting in better water quality and that the area will remain inundated under normal circumstances so that the other improvements will function as designed. A score of 8 represents that the assessment area will provide more than adequate habitat for both aquatic vegetation and wildlife, will aid in the hydroperiod of the area and also assist in storage capacity and attenuation, will increase water flow through the area resulting in better water quality and that the area will remain inundated under normal circumstances so that the other improvements will function as designed.

The Community Structure assessment areas were all assigned a score of 8. The community structure will be improved in all habitat types as hydroperiods are restored and plant diversity/retention will be increased from the reduction of soil oxidation. The PEF plan will provide for additional habitat for aquatic vegetation and wildlife and will represent improvement over existing conditions. The wet prairie system was increased from a score of 4 to an 8 due to the fact that as an existing monoculture of wax myrtle, the restoration of this area to herbaceous wetland grasses will increase vegetative diversity and allow for more frequent prescribed burning to maintain the habitat type. Given the hydroperiods of the area it may be necessary to seed these areas at times, and therefore, the score reflects these potential concerns.

Risk and Time Lag were the other parameters assessed during the UMAM scoring of the HT mitigation site. The Risk parameter is examined to assess the potential risk the proposed activity has of not fully maturing and developing into the proposed habitat. Factors such as the project's location in proximity to other existing structures such as housing developments or major roadways, access to the site (both public and private), general environmental conditions compared to the proposed activity, and the amount of effort required to build and maintain a functioning habitat are all considered when assessing the Risk for a particular project. Due to the limited access to the HT, the relative location amongst various conservation lands, and the general nature of the proposed work, the score of 1.00 was assigned to all proposed hydrologic and forest restoration at HT. The proposed work will not significantly alter the existing habitat or wildlife utilization in these areas, however it will restore historic flow patterns and hydroperiods, so the 1.00 score represents a conservative but realistic expectation of the proposed work. A score of 1.25 was given to the herbaceous restoration area as increased initial maintenance may be required. Long term management may also require burning and seeding, and therefore the risk is slightly greater.

Time Lag is examined to determine an appropriate time frame that can be expected for a given activity to reach its full potential and provide the functions and values of a mature system. Forested communities typically take longer to establish, given the complex structure of a hardwood wetland community, though the existing systems within the HT are already intact. Conversely, herbaceous systems typically become well established in a shorter time frame due to the limited complexity of habitat structure and the general hardiness of the plants found within. However, in this case, shrub components must be controlled in order for the herbaceous plants to become dominant. Scores for the HT site ranged from 1.07 for the hydrologic and forested wetland restoration to 1.14 for the proposed herbaceous community. The 1.07 score for the hydrologic and forested restoration represents the lowest time lag, because these are established systems that will be restored with the completion of the low water crossings, indicating that the proper conditions currently exist to support such a community. Therefore, the proposed herbaceous habitats received a time lag of 1.14 as the initial maintenance and establishment of this community will be slightly longer to fully establish.

Table 6-10. Homosassa Tract mitigation plan proposed UMAM score summary

Area	Location		Water		Community		Acreage	Risk	Time Lag	RFG[1]	FG[2]
	Current	With	Current	With	Current	With					
Activity Area 1											
Wetland Hydrologic Enhancement	7	7	6	8	7	8	170.4	1.00	1.07	0.09	15.9
Wet Prairie Restoration	7	8	6	7	4	8	25.0	1.25	1.14	0.14	3.5
Activity Area 2											
Wetland Hydrologic Enhancement	7	7	6	8	7	8	387.2	1.00	1.07	0.09	36.2
Subtotal	Herbaceous						25.0				3.5
Subtotal	Forested						557.1				52.1
Total							**582.6**				**55.6**

[1]Relative Functional Gain
[2]Functional Gain

6.7 Engineering

The proposed hydrologic restoration mitigation plan for HT consists of five LWCs. The five sites are North-1 (A and B), North-2, South-1, South-2, and South-3 LWCs. North-1 and North-2 are located in Activity Area 1, and South-1, South-2, and South-3 are located in Activity Area 3. The paragraphs below summarize the proposed improvements for each site.

North-1 LWC (Activity Area 1)

The contractor will construct a LWC within the designated road sections shown on Sheet 3 of 32 in Section 6.11. This LWC design consists of two segments to take advantage of the site's topography. Segment North-1A is 149-ft. long, with the level water crossing of 75 ft. (+6.2 ft. NAVD) centered on the existing historical flow path, with 32-ft. slopes upward from the leveled section to the existing road grades and 5-ft. freeboard (Section 6.11, Sheet 5 of 32). The existing road grade is at elevation+7.8 ft. NAVD. Segment North-1B is 140-ft. long, with the level water crossing of 82 ft. (+6.6 ft. NAVD) centered on the existing historical flow path, with 24-ft. slopes upward from the leveled section to the existing road grades, with 5-ft. freeboard (Section 6.11, Sheet 9 of 32). The existing road grade is at elevation+7.8 ft. NAVD. The contractor will remove any existing culverts, compact the existing sub-grade, place bedding stone, and install the roadway material. The contractor will adjust the surrounding grade with the low water crossings. The downstream side of the low water crossing has rip-rap protection to minimize edge erosion (Section 6.11, Sheets 5 and 9 of 32). The contractor will place the project signage in accordance with the design plans (Section 6.11, Sheets 29 and 30 of 32). The Contractor will place the appropriate erosion and sediment controls (Section 6.11, Sheets 31 and 32 of 32) throughout the project life, in accordance with the National Erosion Pollution Discharge Standards (NPDES).

North-2 LWC (Activity Area 1)

The contractor will construct a LWC within the designated road sections shown on Sheet 13 of 32 in Section 6.11. This LWC is 473-ft. long, with the level water crossing of 375 ft. (+5.5 ft. NAVD) centered on the existing historical flow path, with 44-ft. slopes upward from the leveled section to the existing road grades and 5-ft. freeboard (Section 6.11, Sheet 13 of 32). The existing road grade is at elevation+7.7 ft. NAVD. The contractor will remove any existing culverts, compact the existing sub-grade, place bedding stone, and install the roadway material. The contractor will adjust the surrounding grade with the LWCs. The downstream side of the LWC has rip-rap protection to minimize edge erosion (Section 6.11, Sheet 13 of 32). The contractor will place the project signage in accordance with the design plans (Section 6.11, Sheets 29 and 30 of 32). The Contractor will place the appropriate erosion and sediment controls (Section 6.11, Sheets 31 and 32 of 32) throughout the project life, in accordance with NPDES.

South-1 LWC (Activity Area 2)

The contractor will construct a LWC within the designated road sections shown on Sheet 17 of 32 in Section 6.11. This LWC is 640-ft. long, with the level water crossing of 550 ft. (+5.0 ft. NAVD) centered on the existing historical flow path, with 40-ft. slopes upward from the leveled section to the existing road grades and 5-ft. freeboard (Section 6.11, Sheet 17 of 32). The existing road grade is at elevation+7.0 ft. NAVD. The contractor will remove any existing culverts, compact the existing sub-grade, place bedding stone, and install the roadway material. The contractor will adjust the surrounding grade with the LWCs. The downstream side of the LWC has rip-rap protection to minimize edge erosion (Section 6.11, Sheet 17 of 32). The contractor will place the project signage in accordance with the design plans (Section 6.11, Sheets 29 and 30 of 32). The Contractor will place the appropriate erosion and sediment controls (Section 6.11, Sheets 31 and 32 of 32) throughout the project life, in accordance with the NPDES.

South-2 LWC (Activity Area 2)

The contractor will construct a LWC within the designated road sections shown on Sheet 21 of 32 in Section 6.11. This LWC is 106-ft. long, with the level water crossing of 40 ft. (+5.2 ft. NAVD) centered on the existing historical flow path, with 28-ft. slopes upward from the leveled section to the existing road grades and 5-ft. freeboard (Section 6.11, Sheet 21 of 32). The existing road grade is at elevation+6.6 ft. NAVD. The contractor will remove any existing culverts, compact the existing sub-grade, place bedding stone, and install the roadway material. The contractor will adjust the surrounding grade with the LWCs. The downstream side of the LWC has rip-rap protection to minimize edge erosion (Section 6.11, Sheet 21 of 32). The contractor will place the project signage in accordance with the design plans (Section 6.11, Sheets 29 and 30 of 32). The Contractor will place the appropriate erosion and sediment controls (Section 6.11, Sheets 31 and 32 of 32) throughout the project life, in accordance with the NPDES.

South-3 LWC (Activity Area 2)

The contractor will construct a LWC within the designated road sections shown on Sheet 25 of 32 in Section 6.11. This LWC is 378-ft. long, with the level water crossing of 300 ft. (+5.5 ft. NAVD) centered on the existing historical flow path, with 34-ft. slopes upward from the leveled section to the existing road grades and 5-ft. freeboard (Section 6.11, Sheet 25 of 32). The existing road grade is at elevation+7.2 ft. NAVD. The contractor will remove any existing culverts, compact the existing sub-grade, place bedding stone, and install the roadway material. The contractor will adjust the surrounding grade with the LWCs. The downstream side of the LWC has rip-rap protection to minimize edge erosion (Section 6.11, Sheet 25 of 32). The contractor will place the project signage in accordance with the design plans (Section 6.11, Sheets 29 and 30 of 32). The Contractor

will place the appropriate erosion and sediment controls (Section 6.11, Sheets 31 and 32 of 32) throughout the project life, in accordance with the NPDES.

6.8 Implementation Schedule

The construction of the HT restoration activities will begin within 90 days of commencement of construction and wetland impacts of the associated transmission lines for the LNP project. The mitigation plan will be implemented in phases, as some activities, such as the fill removal and grading work associated with LWC, are seasonal in nature and can only be completed under appropriate favorable conditions. FFS managers have expressed their desire for which portions of the project should have the highest priority as it relates to existing management plans and other annual events. The installation of the LWCs in the northern portion of HT (North-1 LWC and North-2 LWC) have the highest priority, with the installation of the LWCs in the southern bottomlands having the next highest priority and the restoration of wetland shrub to wet prairie wetlands having the lowest priority. The construction sequencing will follow the above priorities.

As with any construction project, natural conditions and weather patterns will be observed and activities will be planned to best coincide with suitable weather conditions. Prior to any land disturbance, appropriate erosion and sedimentation control measures will be installed, including silt fence around all disturbed areas (Homosassa Tract engineering detail drawing Sheets 31 and 32 of 32). Any other applicable compliance items, such as County land clearing permits or any other local permit requirements, will also be obtained by the contractor or PEF before the construction aspect begins. Road removal, grading, installation of LWCs, and roller chopping will occur during the dry season (October-March). While no invasive/exotic species were observed, maintenance for invasive/exotic species will be conducted quarterly if such species arise. Maintenance will be conducted with prescribed burning, and manual, mechanical and/or chemical removal methodologies to be utilized throughout the year to ensure the best results (Section 6.9). In addition, hydrological and vegetative monitoring will commence upon completion restoration activities.

Based on the above-referenced priorities, an implementation schedule of the mitigation activities is listed below:

Activity Area 1 and 2	Timeframe
North-1 LWC	
Acquire local land disturbance permits for all restoration areas, mobilization of contractor and equipment	Week 1
Establish all turbidity/erosion control measures	Week 1
Excavate elevated roadways	Weeks 1-3
Construct North-1 LWC, complete grading, and install signage	Weeks 3-9
Generate and review as-built surveys	Week 10
North-2 LWC	
Mobilization of contractor and equipment	Week 9
Establish all turbidity/erosion control measures	Week 9
Excavate elevated roadways	Weeks 9-11
Construct North-2 LWC, complete grading and install signage	Weeks 10-16
Generate and review as-built surveys	Week 17
South-1 LWC	
Mobilization of contractor and equipment	Week 17
Establish all turbidity/erosion control measures	Week 17
Excavate elevated roadways	Weeks 17-19
Construct South-1 LWC, complete grading and install signage	Weeks 19-25
Generate and review as-built surveys	Week 26

South-2 LWC	
Mobilization of contractor and equipment	Week 26
Establish all turbidity/erosion control measures	Week 26
Excavate elevated roadways	Week 27
Construct South-2 LWC, complete grading and install signage	Weeks 27-29
Generate and review as-built surveys	Week 30
South-3 LWC	
Mobilization of contractor and equipment	Week 29
Establish all turbidity/erosion control measures	Week 30
Excavate elevated roadways	Weeks 30-32
Construct South-3 LWC, complete grading and install signage	Weeks 33-37
Generate and review as-built surveys	Week 38
Wet Prairie Restoration	
Mobilize equipment for roller chopping and conduct roller chopping activity	Week 38
Begin 3 year monitoring and maintenance period	Week 40

The above is a general timeline of the basic implementation of the proposed mitigation activities. Additional planning and specifics may need to be established once the transmission line construction schedule is finalized.

6.9 Monitoring and Maintenance Requirements

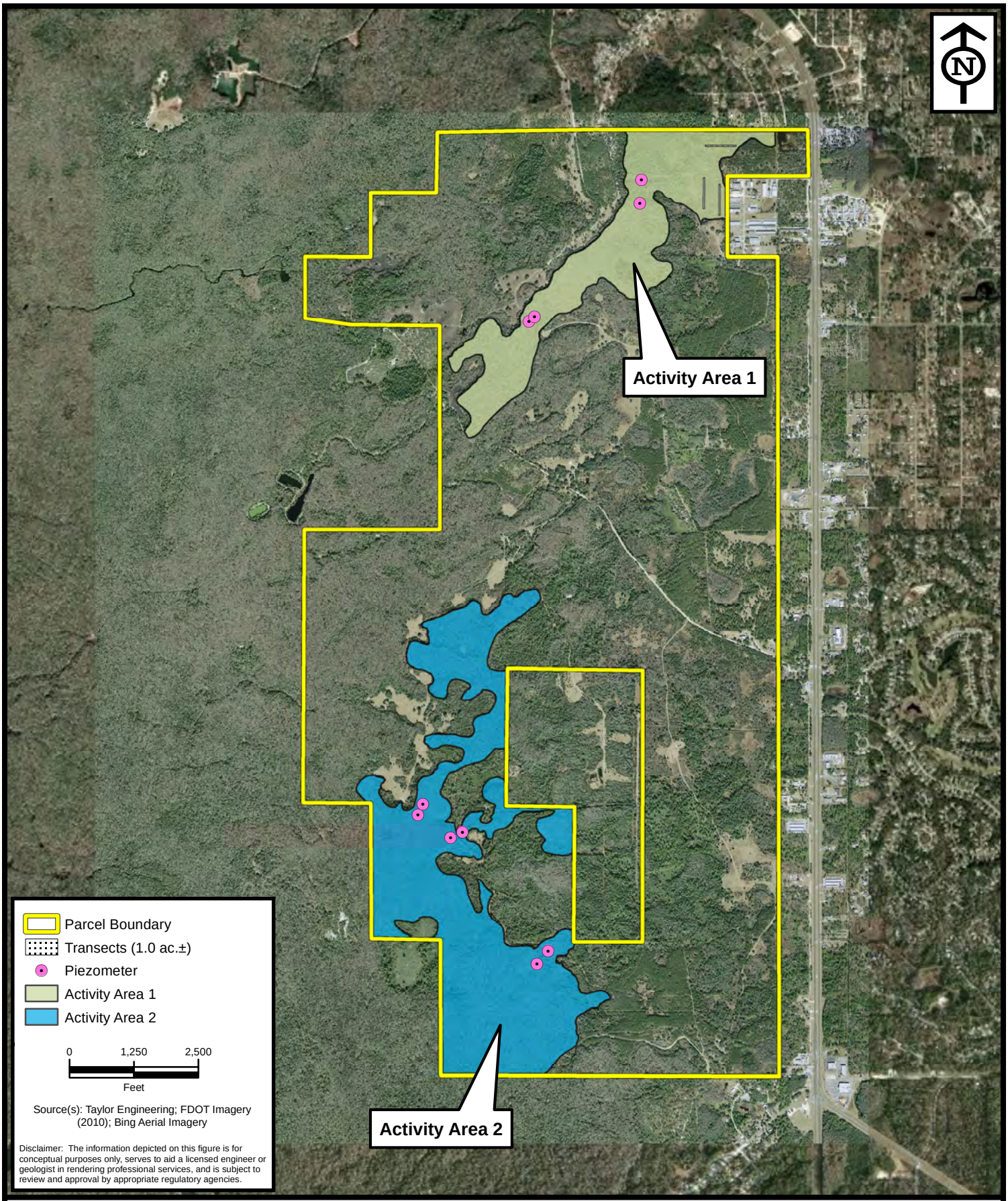
The hydrologic and wetland restoration areas will be documented annually, with quarterly hydrologic data collection and vegetative maintenance. The wet prairie restoration will be burned and seeded as outlined in management plans prepared and enacted by the FFS. Vegetative monitoring in this area will document that the habitat type is naturally progressing to resemble its intended improvement in regard to plant species and composition, wildlife utilization, hydrologic conditions, and the presence of invasive/exotic species. Any other management issues will be noted and addressed.

The quantitative monitoring of the wet prairie restoration area will consist of establishing fixed linear transects covering approximately 1.0 acre in area. The transects will be 25 ft. wide and will average 600 ft. long. Three transects will be required to equal 1.0 ac (Figure 6-41 and 6-41a). The data that will be observed and recorded within each transect/plot will include:

- total coverage and survivorship of desirable wetland species and any other dominant species;
- the presence and overall coverage of any listed invasive/exotic species;
- success of any previously recommended treatment methods and any future methods proposed;
- any areas of mortality of planted or other natural species;
- current hydrologic conditions, water depths and hydric soils observed;
- any evidence of wildlife presence or utilization;
- any maintenance needs in regard to stabilization, erosion, vandalism etc. and suggested corrective actions.

Hydrologic restoration and hydrologic data will be observed through the use of ten (10) continuously recording piezometers installed strategically throughout the site (Figure 6-41b). A piezometer will be installed within the affected wetlands both upstream and downstream of the LWC and readings will be recorded daily to demonstrate that the water is at least within one foot on either side. In addition, 0.1 acre plots will be established in the same upstream and downstream wetlands to monitor any changes or improvements in vegetation community.

A baseline monitoring event will be conducted at the HT no less than 60 days after the completion of construction and roller chopping. The baseline event will help to establish the initial conditions after construction and will be used as a reference to assess progression during future monitoring events. The annual monitoring will commence after the baseline event and will be submitted to FDEP and ACOE in the fall (September/October) of each year. The report will consist of a narrative describing the site conditions, the management activities that have occurred, photographs taken from fixed location points and maps depicting the mitigation area. The wet prairie restoration area will be monitored for at least three years until it reaches the criteria established below. The monitoring period may be adjusted based upon the performance of the vegetation and hydrologic restoration.



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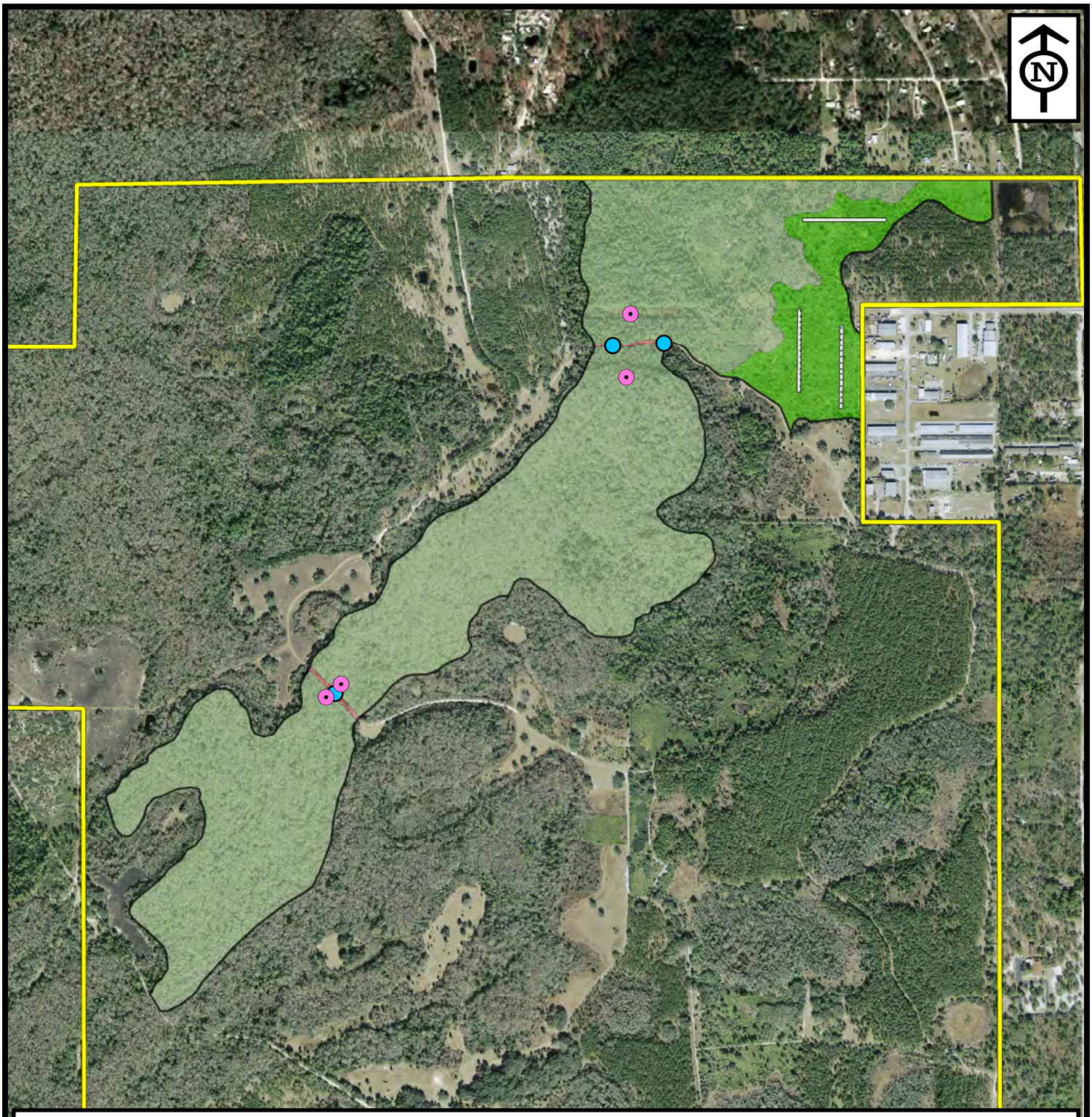
Monitoring Stations - Index

Homosassa Tract

Citrus County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JRN/SRJ
Figure:	**6-41**

Path: Q:_Projects\EJ\2011\021\00\fig\Homosassa\Report\mon_activities_index.mxd Date: 7/21/2011 3:57:46 PM



0 500 1,000
Feet

Source(s): Taylor Engineering; FDOT Imagery (2010); Bing Aerial Imagery

Disclaimer: The information depicted on this figure is for conceptual purposes only, serves to aid a licensed engineer or geologist in rendering professional services, and is subject to review and approval by appropriate regulatory agencies.

- Parcel Boundary
- Transects (1.0 ac.±)
- Piezometer
- Low Water Crossing

Activity Area 1

- Wetland Hydrologic Enhancement (170.4 ac.±)
- Wet Prairie Restoration (25.0 ac.±)
- Trailroad (0.7 ac.±)

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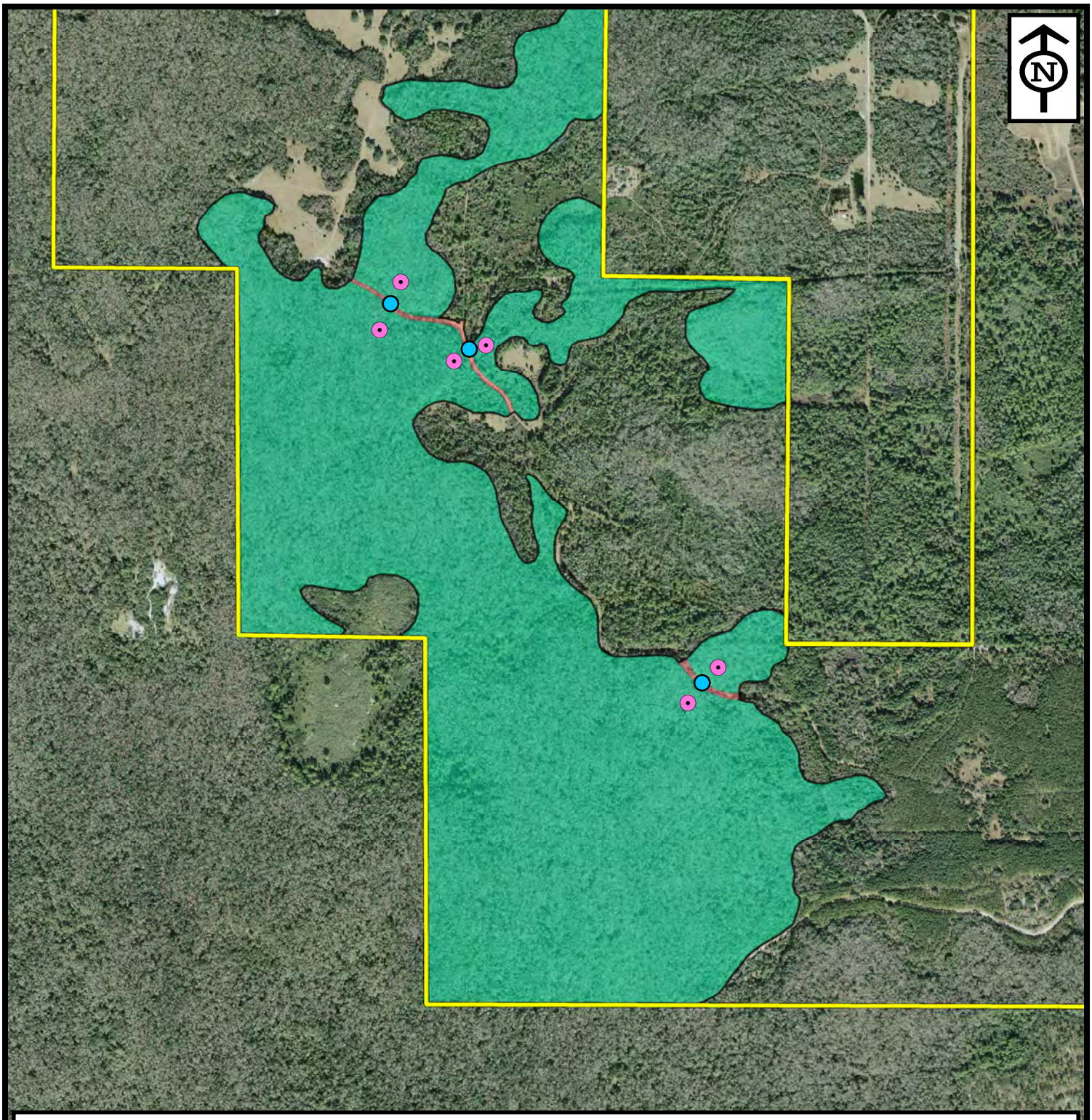
Monitoring Stations - Activity Area 1

Homosassa Tract

Citrus County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JRN/SRJ
Figure:	**6-41a**

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0 500 1,000
Feet

Source(s): Taylor Engineering; FDOT Imagery (2010); Bing Aerial Imagery

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- Parcel Boundary
- Transects (1.0 ac.±)
- Piezometer
- Low Water Crossing

Activity Area 2

- Wetland Hydrologic Enhancement (387.2 ac.±)
- Trailroad (1.8 ac.±)

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Monitoring Stations - Activity Area 2

Homosassa Tract

Citrus County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JRN/SRJ
Figure:	**6-41b**

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6.10 Success Criteria

Specific success criteria outlined below will ensure that the proposed mitigation activities achieve their intended design and function. The main focus of the success criteria for HT will emphasize the re-establishment of historic hydrologic conditions in forested wetlands and the restoration of historic wet prairie from wetland shrub dominated by wax myrtle. Currently there are no invasive/exotic species. Regular monitoring as described above and maintenance implementation is important to ensuring success at the HT site. The mitigation area will be considered successful when the following criteria have been met within the required monitoring time frame:

Wet Prairie Restoration:

- 75% coverage of native/desirable herbaceous vegetation;
- 5% or less total coverage of any invasive/exotic species;
- hydrology is well established and visibly apparent based on the hydrologic indicators as defined by Rule 62-340 F.A.C.;
- the above criteria must be met within the three years of annual monitoring.

Wetland Hydrologic Enhancement:

- LWCs must contain certified as-built surveys reflecting that they were built to specified design and are performing as expected;
- areas must demonstrate no signs of erosion, sedimentation, wash-outs or scouring and have been operating without significant maintenance for at least one year;
- recording piezometers installed within designated wetlands upstream and downstream of the LWC must demonstrate relatively even waters levels (within 1.0 ft.) on both sides.

The progress of the mitigation area towards reaching success will be tracked through the monitoring reports that will be submitted annually to FDEP and ACOE for review and approval. In the event that the above criteria are not met at the end of the monitoring period, or it is becoming obvious during annual monitoring that an area will not meet the established success criteria, then PEF will work closely with FDEP and ACOE staff in order to identify and correct any problems. Once the success criteria outlined above are met, the mitigation effort will be deemed a success and the monitoring of the mitigation area will be terminated.

6.11 Engineering Detail Drawings

Please see the attached engineering detail drawings.

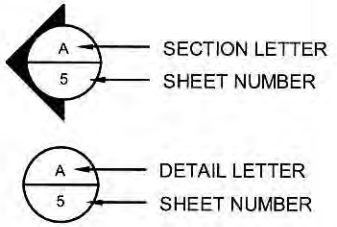
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

DRAWING INDEX

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SHEET 32	EROSION CONTROL DETAILS



LOCATION MAP
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PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	1 of 32
DATE	JULY 2011

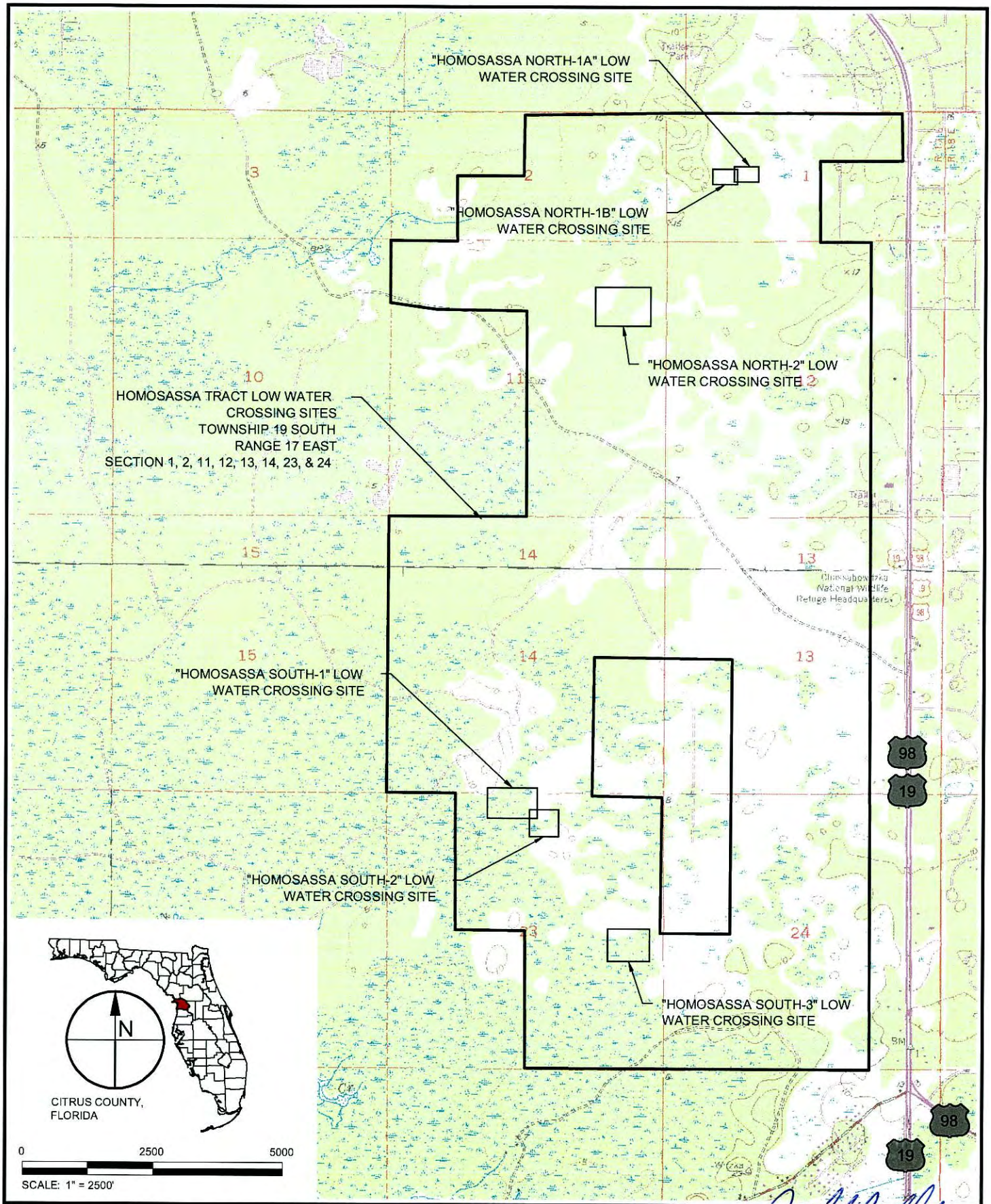
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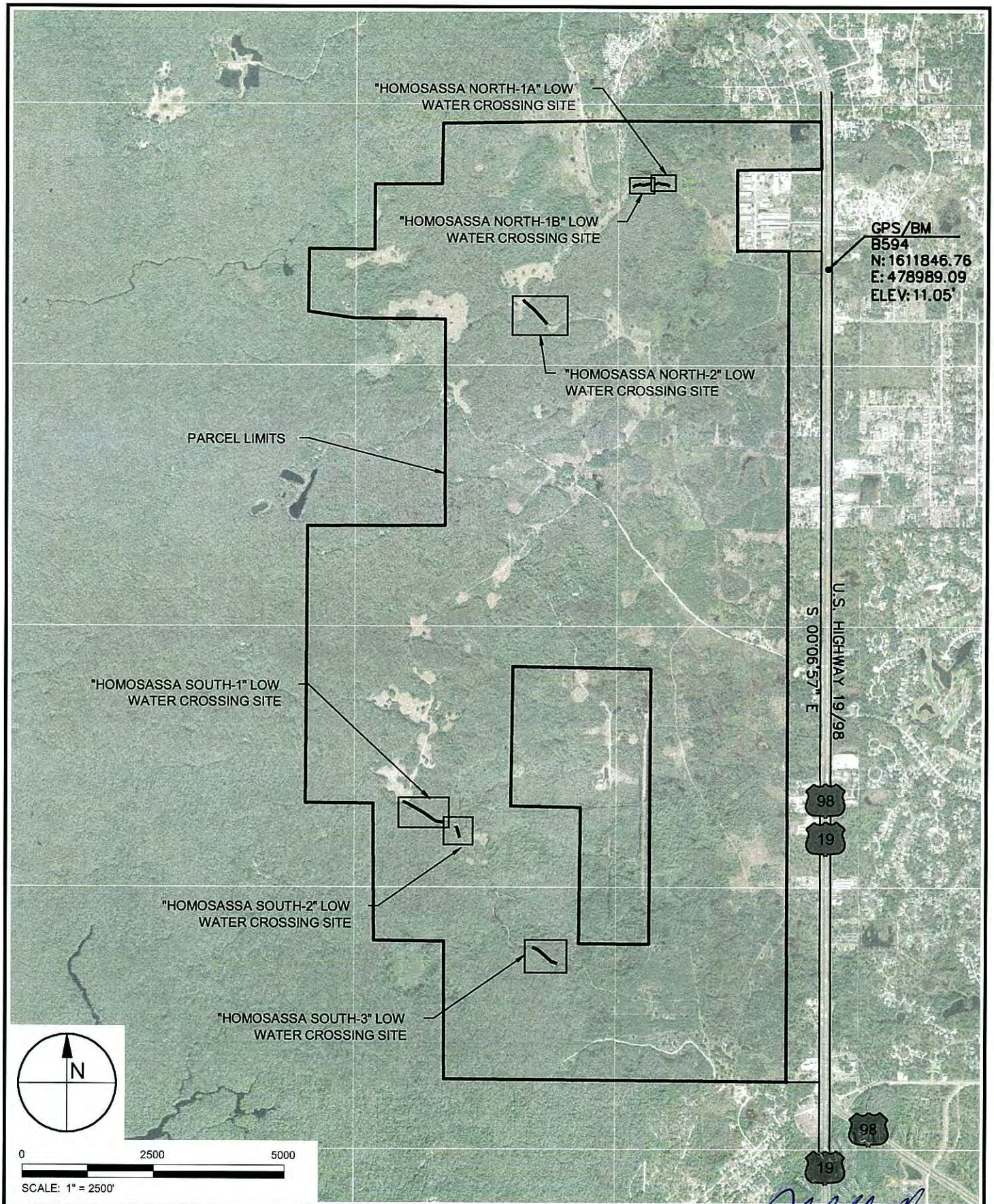
PROJECT LOCATION MAP
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PROJECT	DRAWN BY	SHEET	DATE
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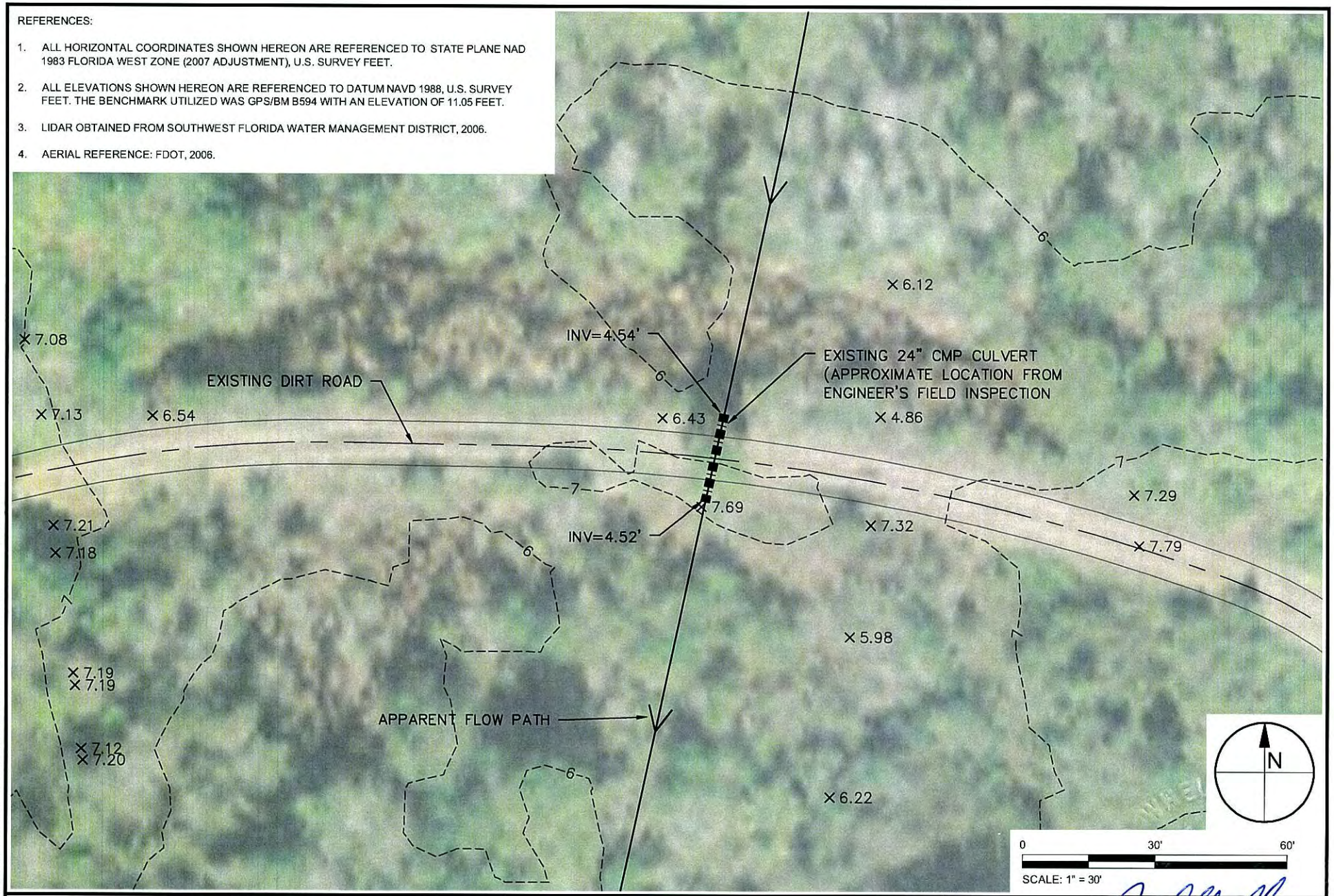
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PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

REFERENCES:

1. ALL HORIZONTAL COORDINATES SHOWN HEREON ARE REFERENCED TO STATE PLANE NAD 1983 FLORIDA WEST ZONE (2007 ADJUSTMENT), U.S. SURVEY FEET.
2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO DATUM NAVD 1988, U.S. SURVEY FEET. THE BENCHMARK UTILIZED WAS GPS/BM B594 WITH AN ELEVATION OF 11.05 FEET.
3. LIDAR OBTAINED FROM SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, 2006.
4. AERIAL REFERENCE: FDOT, 2006.



TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

EXISTING CONDITIONS - NORTH-1A LOW WATER CROSSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	4 of 32
DATE	JULY 2011

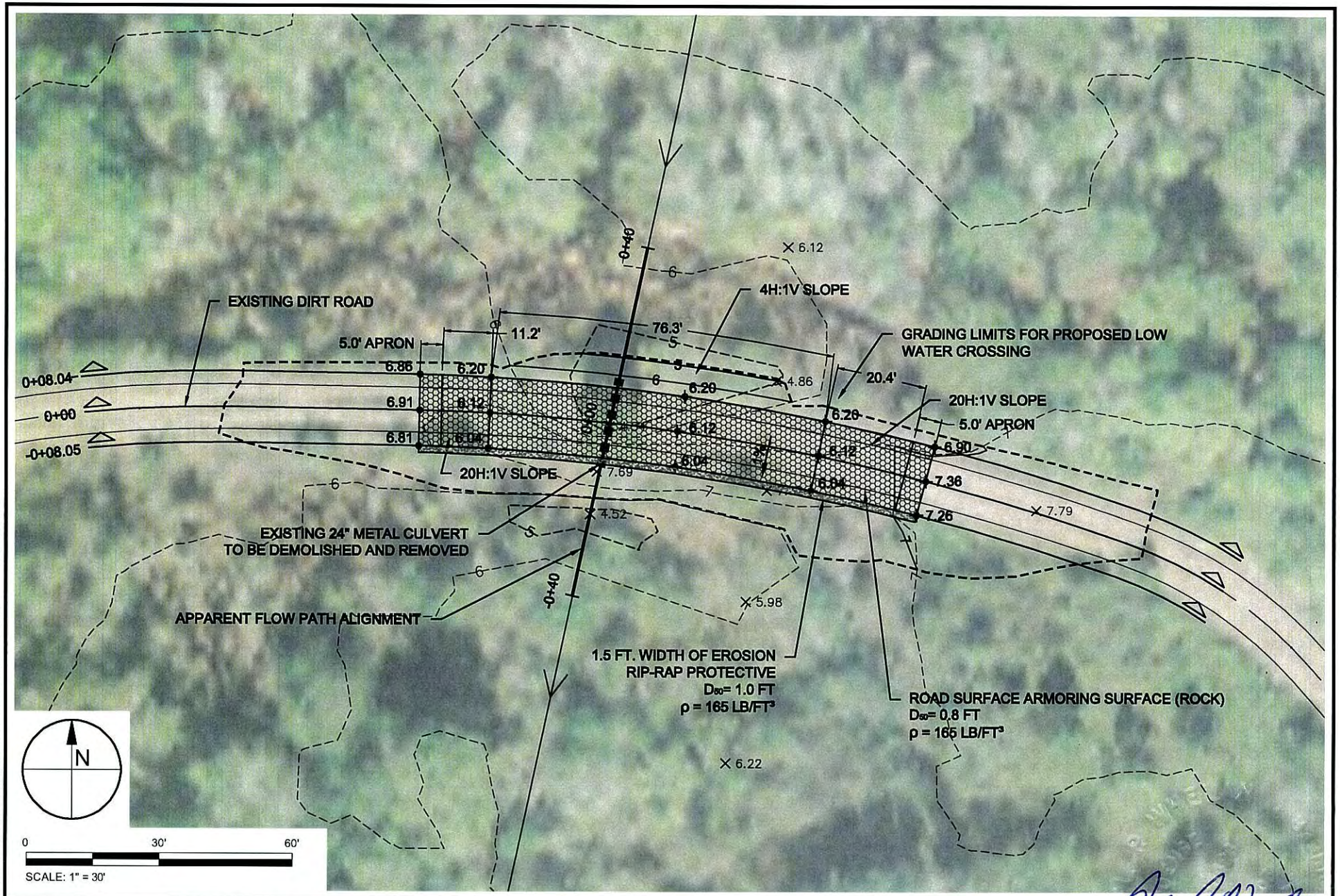
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9/20/2011

MICHAEL P. WHELAN P.E.# 55496 DATE

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

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TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

GRADING PLAN - NORTH-1A LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

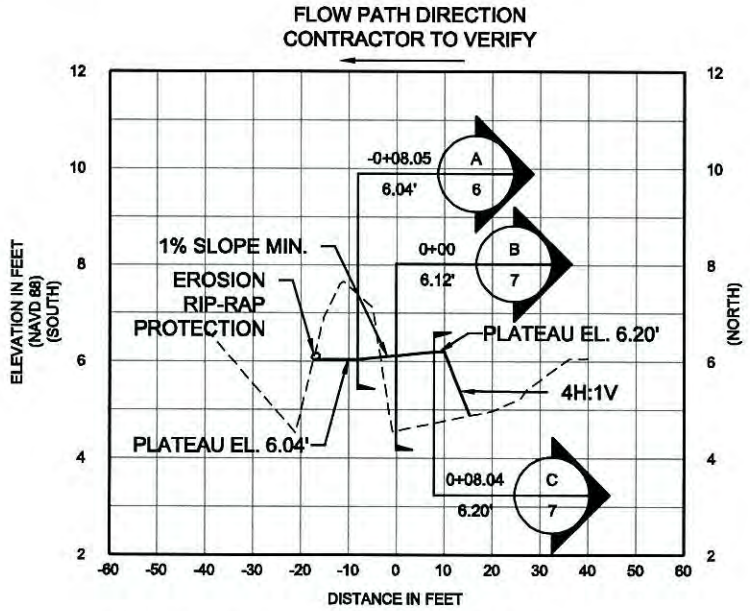
PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	5 of 32
DATE	JULY 2011

SEAL

9/20/2011

MICHAEL P. WHELAN P.E. # 55496 DATE

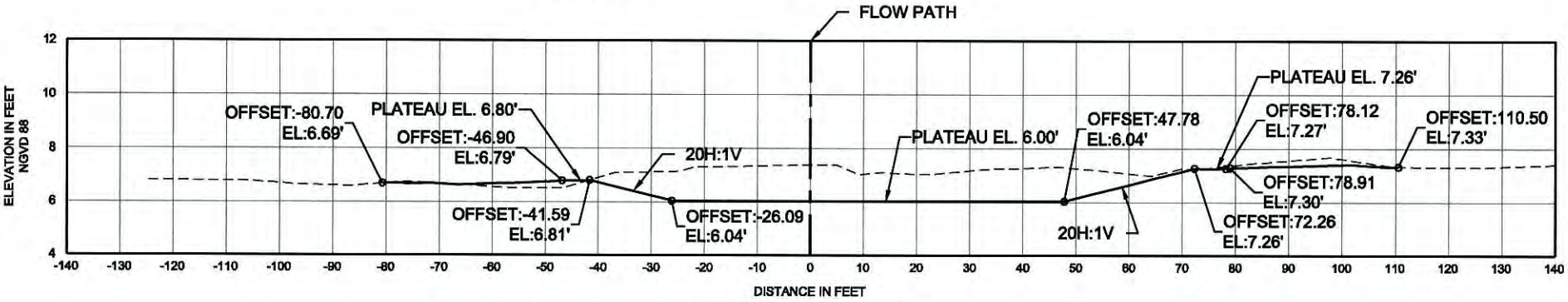
PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



NORTH-1A FLOW PATH ALIGNMENT

SCALE: 1" = 40'
V-SCALE: 1" = 4'

0 40'



CROSS SECTION STATION -0+08.05
HOMOSASSA NORTH-1A LOW WATER CROSSING

A / 6

SCALE: 1" = 30'
V-SCALE: 1" = 6'

0 30'

LEGEND:

EXISTING GRADE

PROPOSED GRADE

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

PROFILE & CROSS SECTION - NORTH-1A LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	6 of 32
DATE	JULY 2011

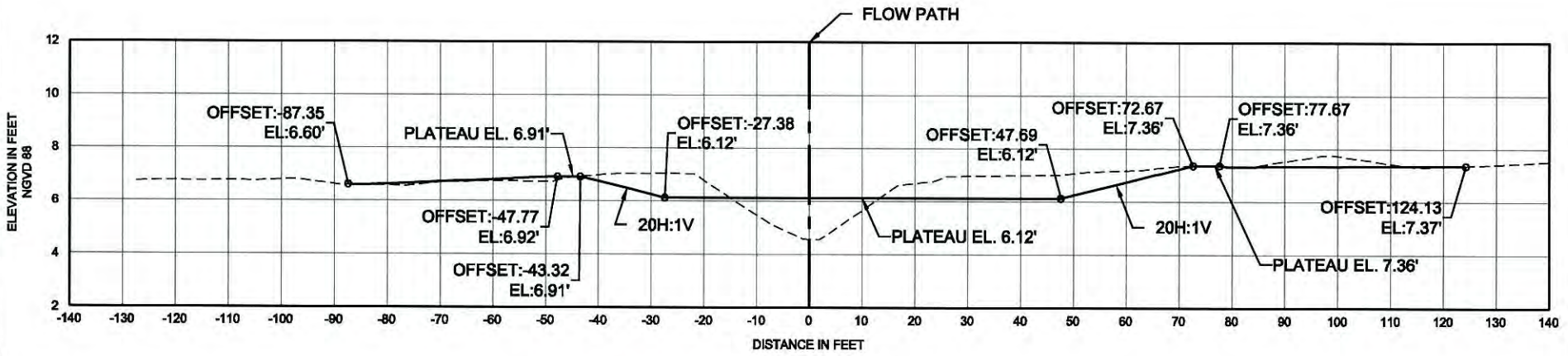
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9/20/2011

MICHAEL P. WHELAN P.E.# 55496 DATE

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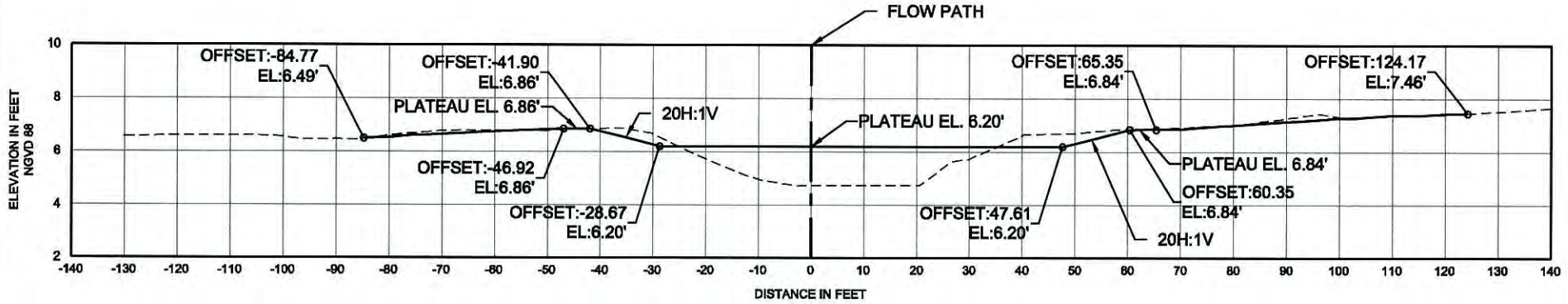


CROSS SECTION STATION 0+00
HOMOSASSA NORTH-1A LOW WATER CROSSING

B / 6

SCALE: 1" = 30'
V-SCALE: 1" = 6'

0 30'



CROSS SECTION STATION 0+08.04
HOMOSASSA NORTH-1A LOW WATER CROSSING

C / 6

SCALE: 1" = 30'
V-SCALE: 1" = 6'

0 30'

LEGEND:

EXISTING GRADE

PROPOSED GRADE

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

CROSS SECTIONS - NORTH-1A LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	7 of 32
DATE	JULY 2011

SEAL

9/20/2011

MICHAEL P. WHELAN P.E. # 55496 DATE

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PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

REFERENCES:

1. ALL HORIZONTAL COORDINATES SHOWN HEREON ARE REFERENCED TO STATE PLANE NAD 1983 FLORIDA WEST ZONE (2007 ADJUSTMENT), U.S. SURVEY FEET.
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3. LIMITED TOPOGRAPHICAL SURVEY (SPOT ELEVATIONS) PROVIDED BY PARDUE LAND SURVEYING, DATED MAY 31, 2011.
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5. AERIAL REFERENCE: FDOT, 2006.



TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

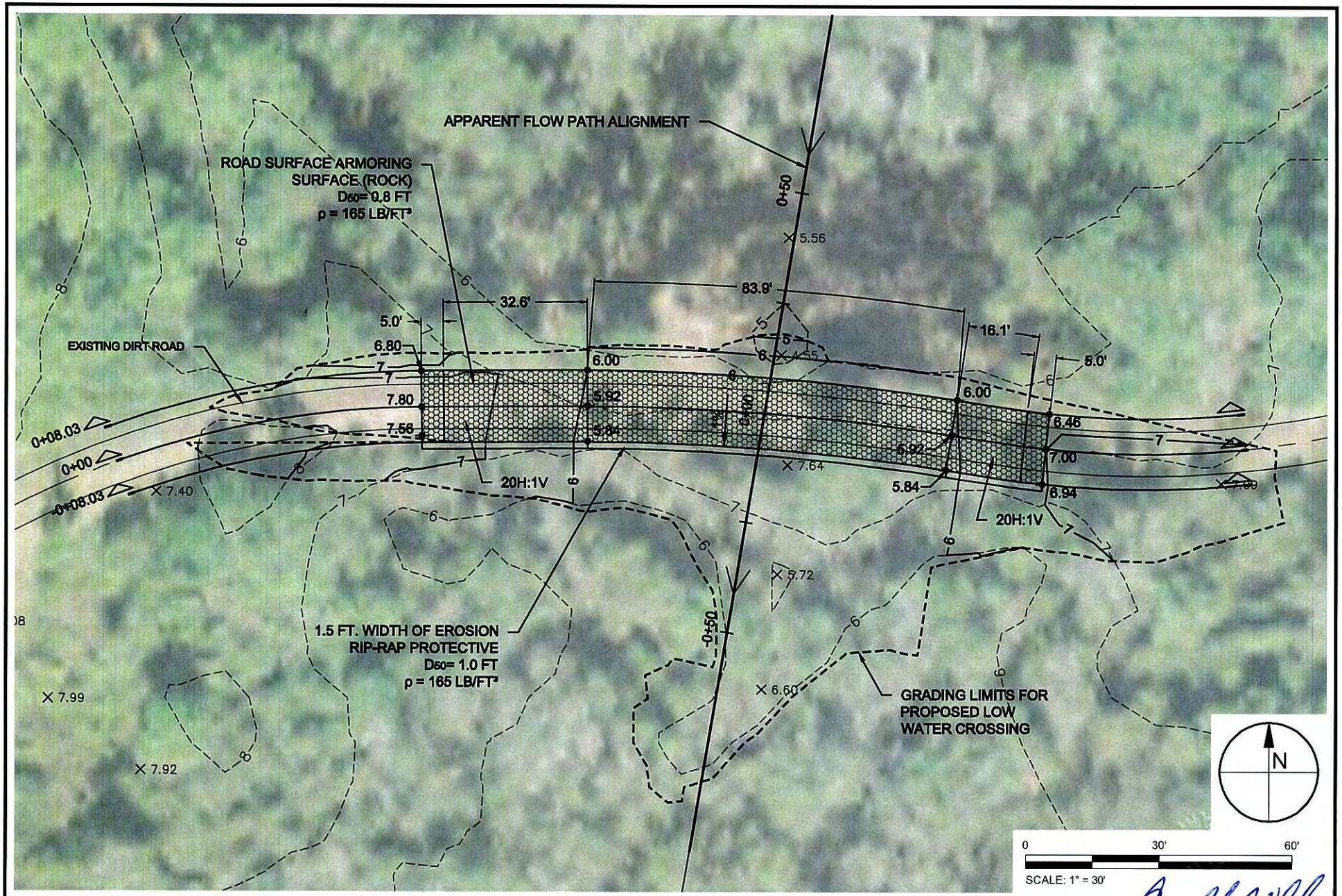
EXISTING CONDITIONS - NORTH-1B LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	8 of 32
DATE	JULY 2011

SEAL
9/20/2011
MICHAEL P. WHELAN P.E. # 55496 DATE

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TAYLOR ENGINEERING INC.

10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

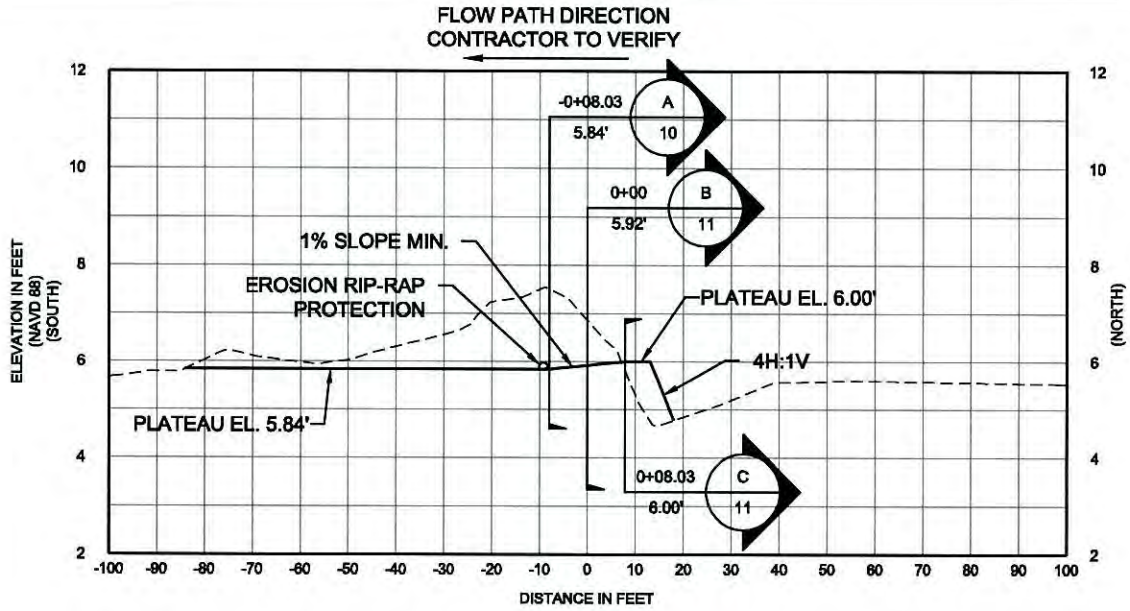
GRADING PLAN - NORTH-1B LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	9 of 32
DATE	JULY 2011

SEAL
9/20/2011
MICHAEL P. WHELAN P.E. # 55496 DATE

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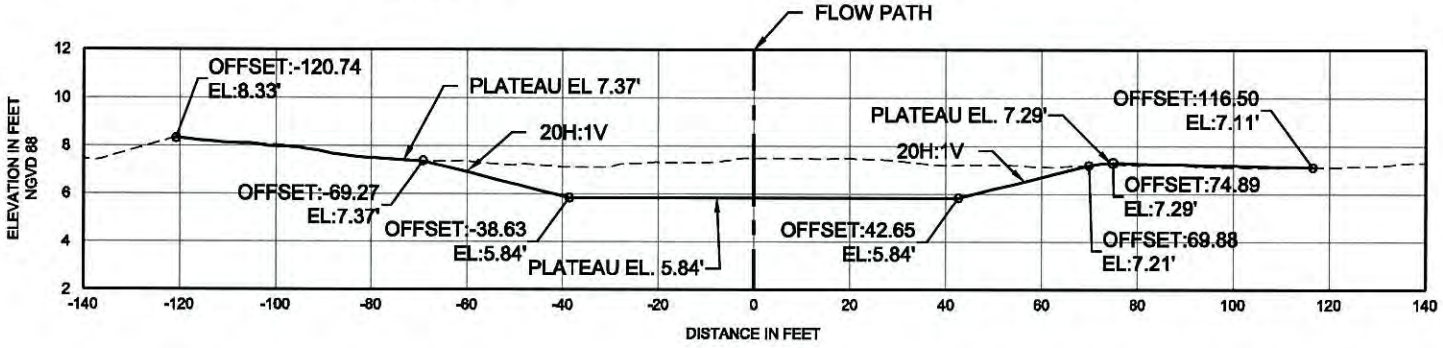
PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



HOMOSASSA NORTH-1B FLOW PATH ALIGNMENT

SCALE: 1" = 40'
V-SCALE: 1" = 4'

0 40'



CROSS SECTION STATION -0+08
HOMOSASSA NORTH-1B LOW WATER CROSSING

A
10

SCALE: 1" = 40'
V-SCALE: 1" = 8'

0 40'

LEGEND:

EXISTING GRADE
PROPOSED GRADE

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

PROFILE & CROSS SECTION - NORTH-1B LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	10 of 32
DATE	JULY 2011

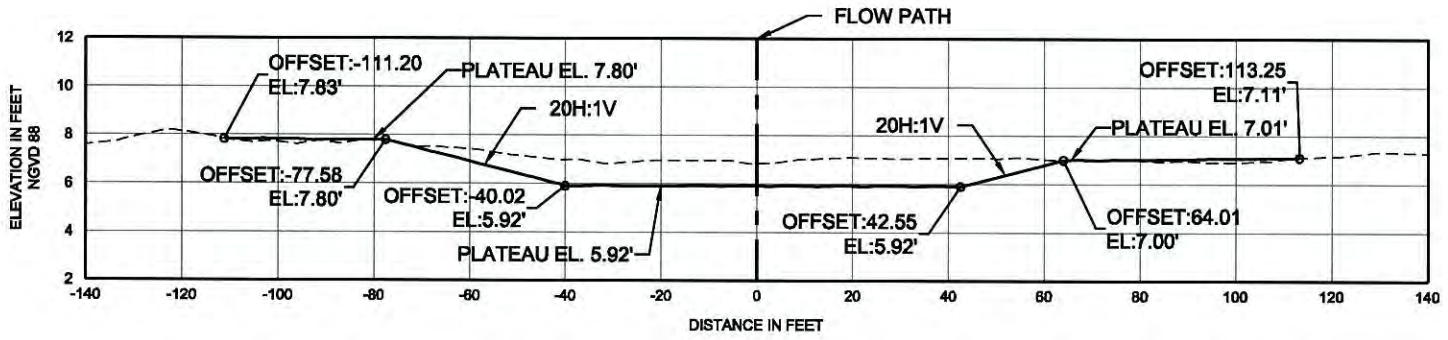
SEAL

6/20/2011

MICHAEL P. WHELAN P.E. # 55496 DATE

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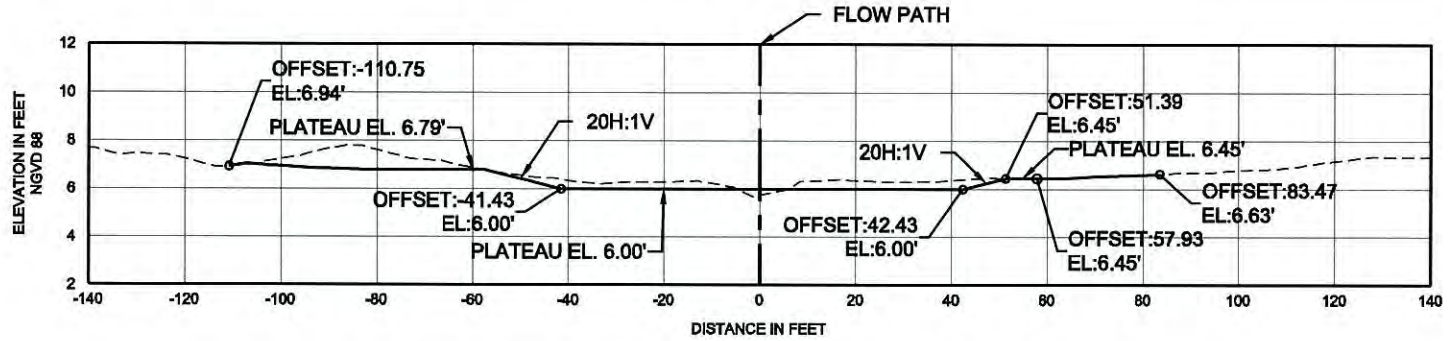


B/10

CROSS SECTION STATION 0+00
HOMOSASSA NORTH-1B LOW WATER CROSSING

SCALE: 1" = 40'
V-SCALE: 1" = 8'

0 40'



C/10

CROSS SECTION STATION 0+08
HOMOSASSA NORTH-1B LOW WATER CROSSING

SCALE: 1" = 40'
V-SCALE: 1" = 8'

0 40'

LEGEND:

EXISTING GRADE

PROPOSED GRADE

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

CROSS SECTIONS - NORTH-1B LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	11 of 32
DATE	JULY 2011

SEAL

9/20/2011

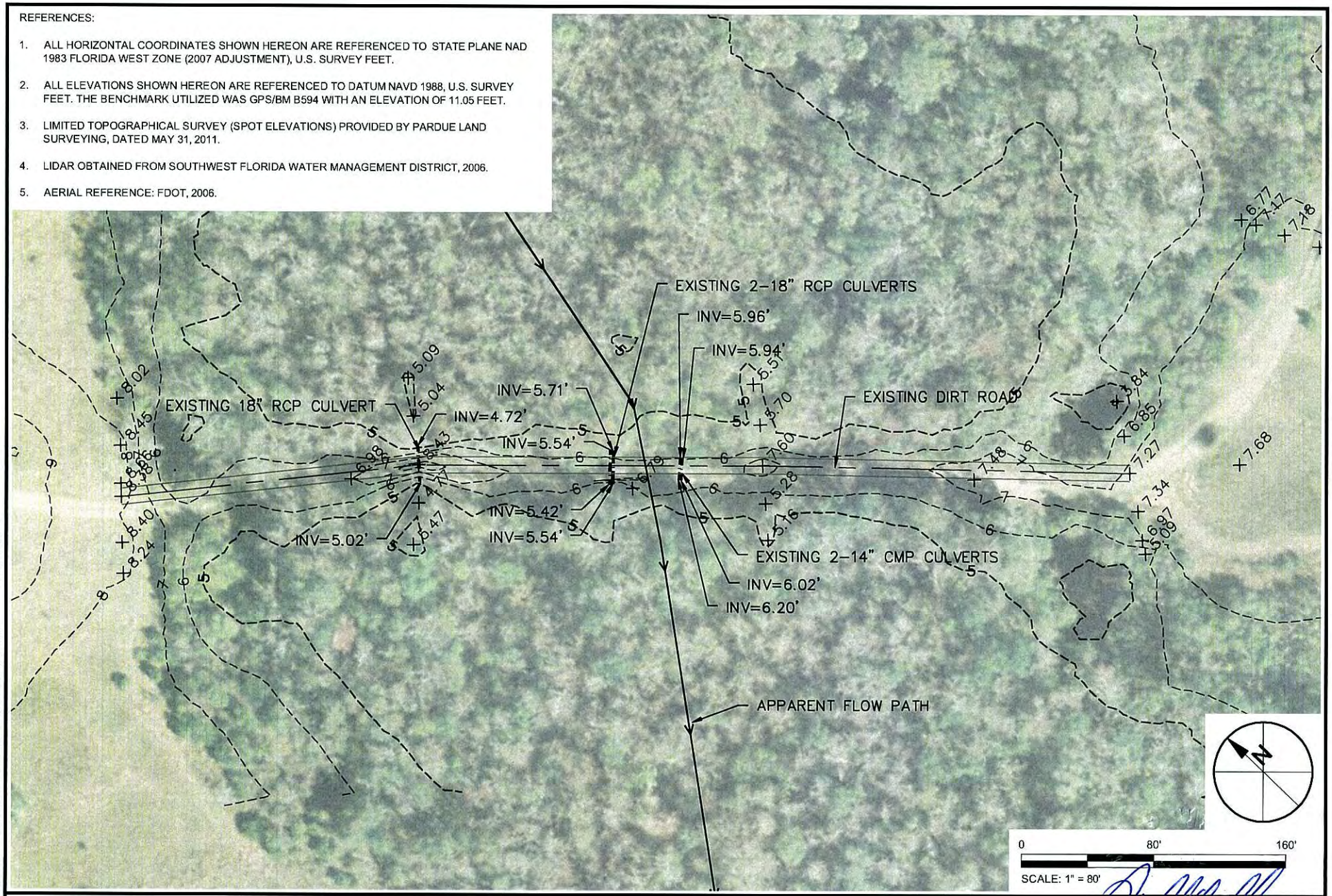
MICHAEL P. WHELAN P.E. # 55496 DATE

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PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

REFERENCES:

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TAYLOR ENGINEERING INC.

10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

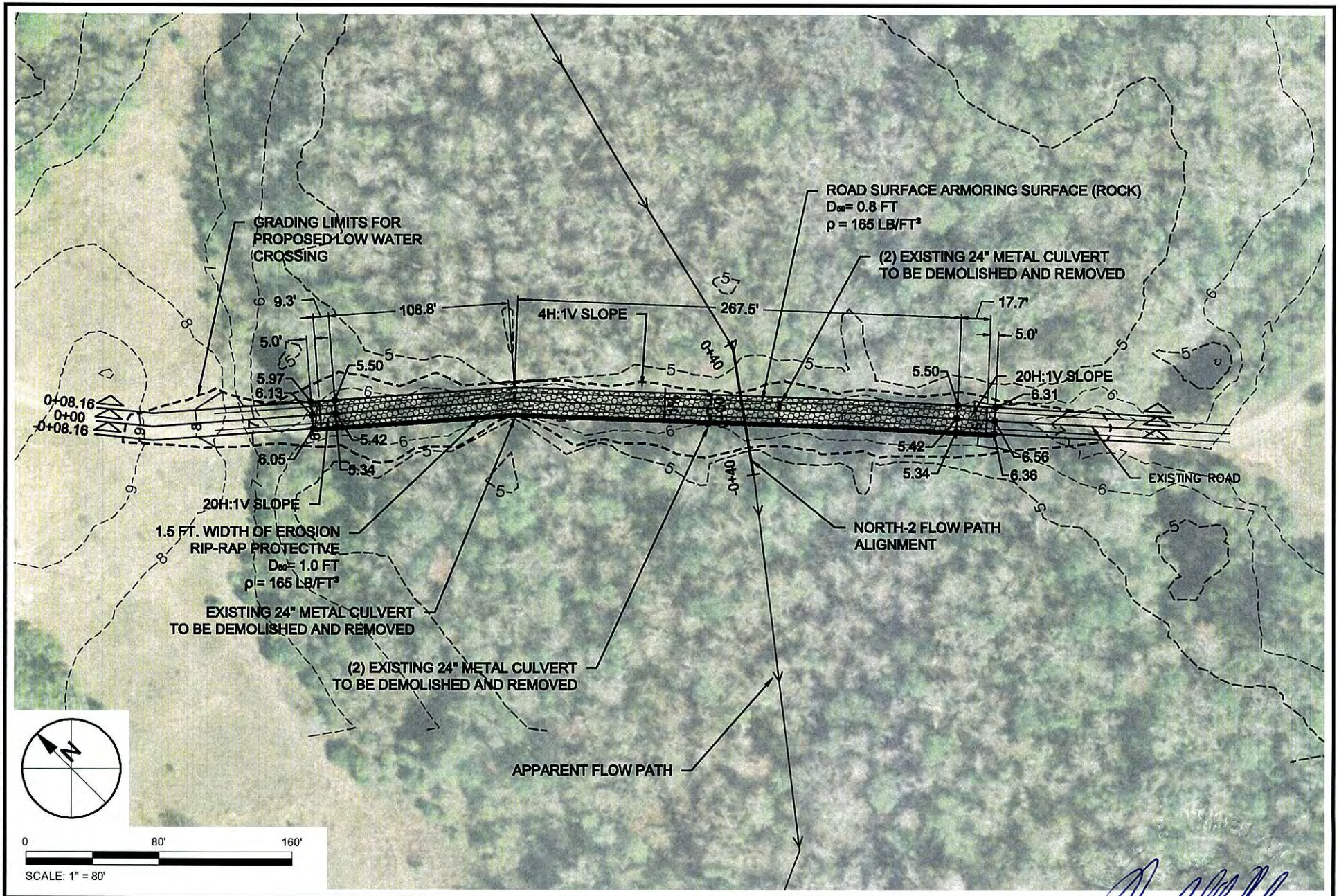
EXISTING CONDITIONS - NORTH-2 LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	12 of 32
DATE	JULY 2011

SEAL
9/20/2011
MICHAEL P. WHELAN P.E. # 55496 DATE

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TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

GRADING PLAN - NORTH-2 LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	13 of 32
DATE	JULY 2011

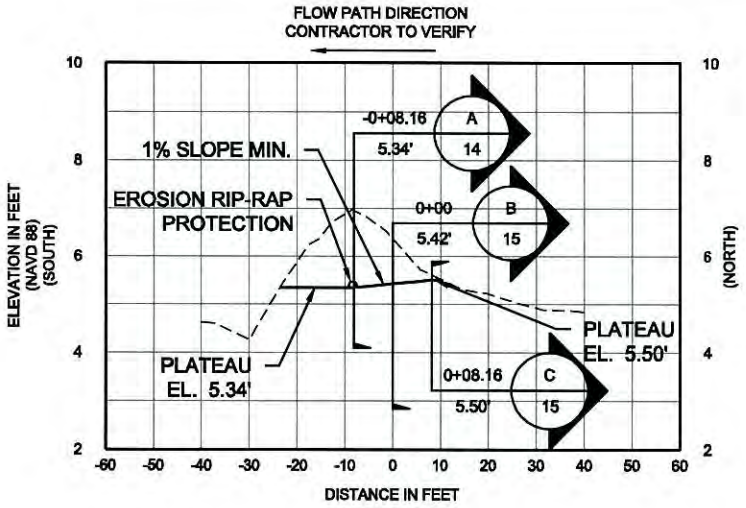
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MICHAEL P. WHELAN P.E.# 55496 DATE

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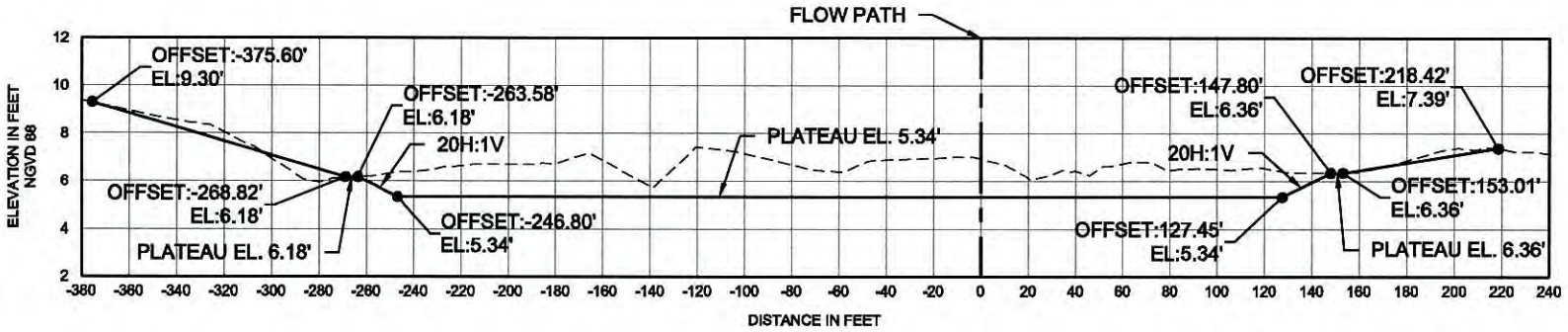
PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



HOMOSASSA NORTH-2 FLOW PATH ALIGNMENT

SCALE: 1" = 40'
V-SCALE: 1" = 4'

0 40'



CROSS SECTION STATION -0+08.16
HOMOSASSA NORTH-2 LOW WATER CROSSING

A
14

SCALE: 1" = 80'
V-SCALE: 1" = 8'

0 80'

LEGEND:

EXISTING GRADE
PROPOSED GRADE

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

PROFILE & CROSS SECTION - NORTH-2 LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	14 of 32
DATE	JULY 2011

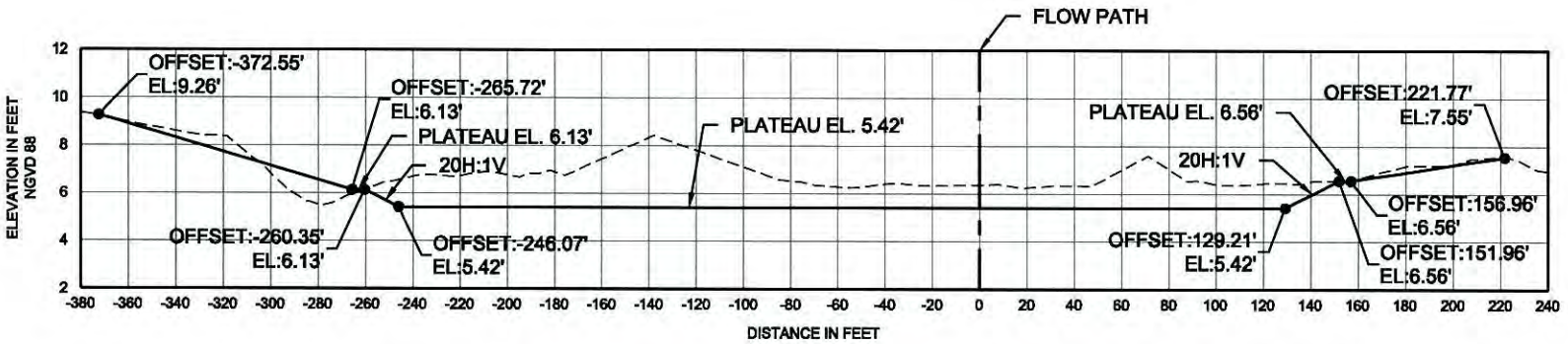
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9/20/2011

MICHAEL P. WHELAN P.E. # 55496 DATE

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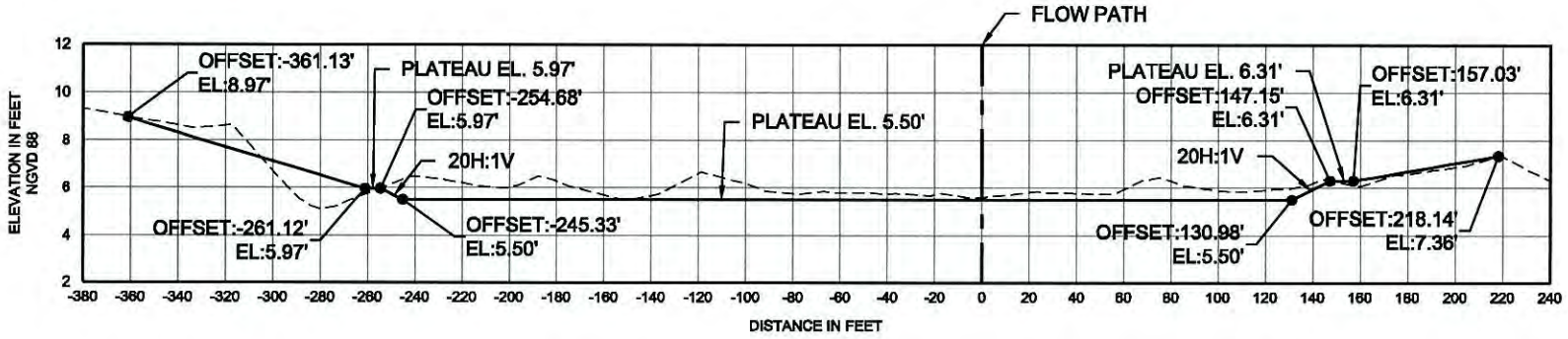


B
14

CROSS SECTION STATION 0+00
HOMOSASSA NORTH-2 LOW WATER CROSSING

SCALE: 1" = 80'
V-SCALE: 1" = 8'

0 80'



C
14

CROSS SECTION STATION 0+08.16
HOMOSASSA NORTH-2 LOW WATER CROSSING

SCALE: 1" = 80'
V-SCALE: 1" = 8'

0 80'

LEGEND:

EXISTING GRADE
PROPOSED GRADE

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

CROSS SECTIONS - NORTH-2 LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	15 of 32
DATE	JULY 2011

SEAL

9/20/2011

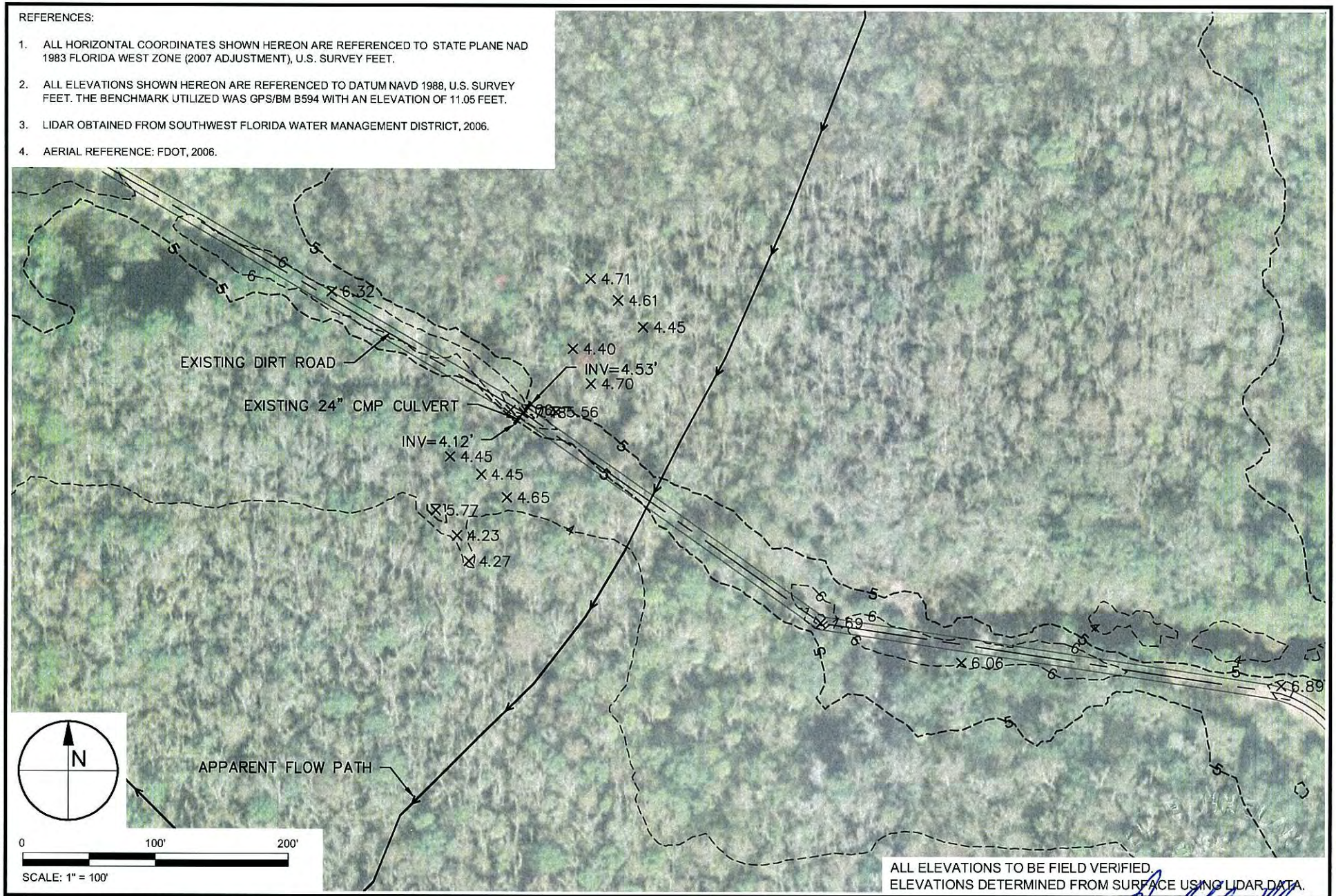
MICHAEL P. WHELAN P.E. # 55496 DATE

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REFERENCES:

1. ALL HORIZONTAL COORDINATES SHOWN HEREON ARE REFERENCED TO STATE PLANE NAD 1983 FLORIDA WEST ZONE (2007 ADJUSTMENT), U.S. SURVEY FEET.
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3. LIDAR OBTAINED FROM SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, 2006.
4. AERIAL REFERENCE: FDOT, 2006.



ALL ELEVATIONS TO BE FIELD VERIFIED.
ELEVATIONS DETERMINED FROM SURFACE USING LIDAR DATA.

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

EXISTING CONDITIONS - SOUTH-1 LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	16 of 32
DATE	JULY 2011

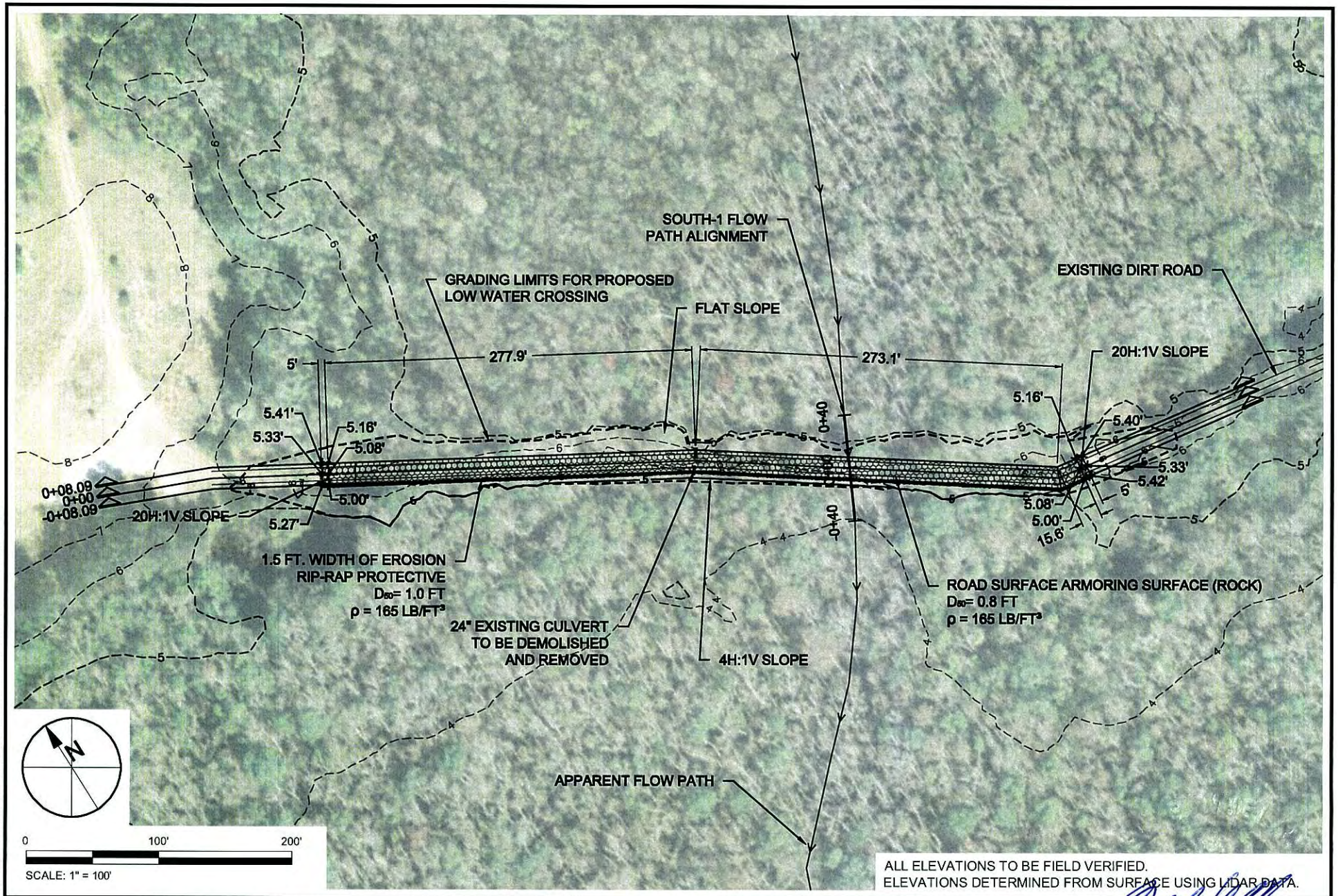
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6/20/2011

MICHAEL P. WHELAN P.E.# 55496 DATE

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

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ALL ELEVATIONS TO BE FIELD VERIFIED.
ELEVATIONS DETERMINED FROM SURFACE USING LIDAR DATA.

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

GRADING PLAN - SOUTH-1 LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	17 of 32
DATE	JULY 2011

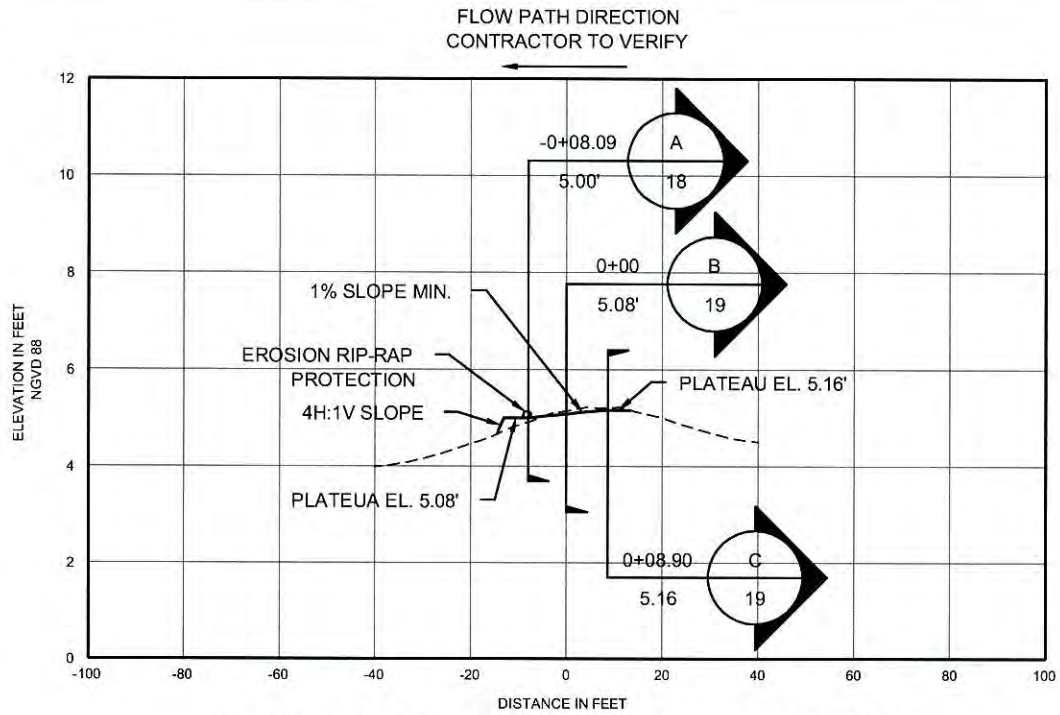
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9/20/2011

MICHAEL P. WHELAN P.E. # 55496 DATE

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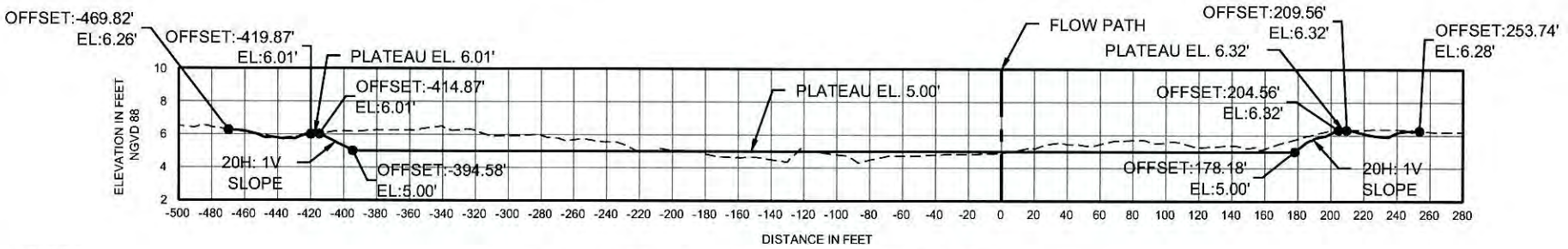
PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



HOMOSASSA SOUTH-1 FLOW PATH ALIGNMENT

SCALE: 1" = 40'
V-SCALE: 1" = 4'

0 40'



LEGEND:

EXISTING GRADE
PROPOSED GRADE

A
18

CROSS SECTION STATION -0+08.09
HOMOSASSA SOUTH-1 LOW WATER CROSSING

SCALE: 1" = 100'
V-SCALE: 1" = 10'

0 100'

ALL ELEVATIONS TO BE FIELD VERIFIED.
ELEVATIONS DETERMINED FROM
SURFACE USING LIDAR DATA.

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

PROFILE & CROSS SECTION - SOUTH-1 LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	18 of 32
DATE	JULY 2011

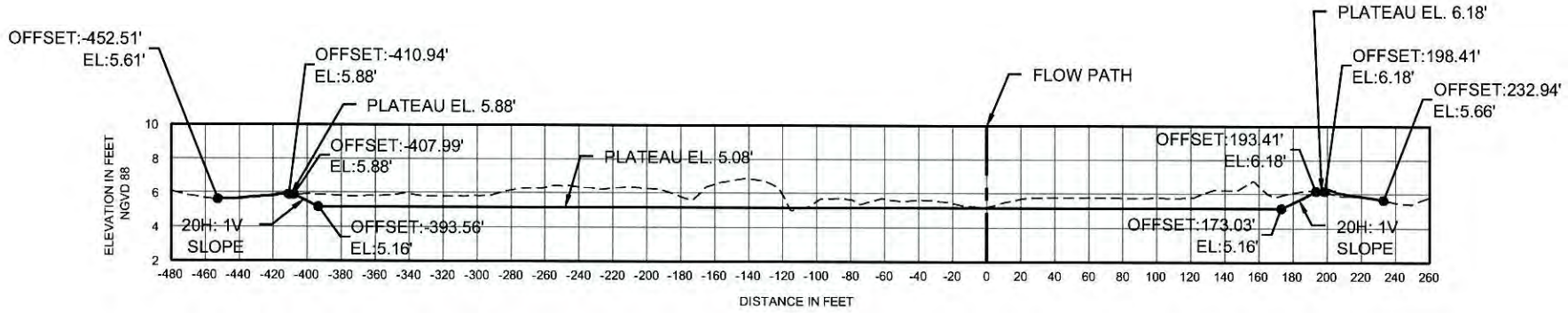
SEAL

9/20/2011

MICHAEL P. WHELAN P.E. # 55496 DATE

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

9/20/2011 4:41:50 PM
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REBECCA JOHNSON

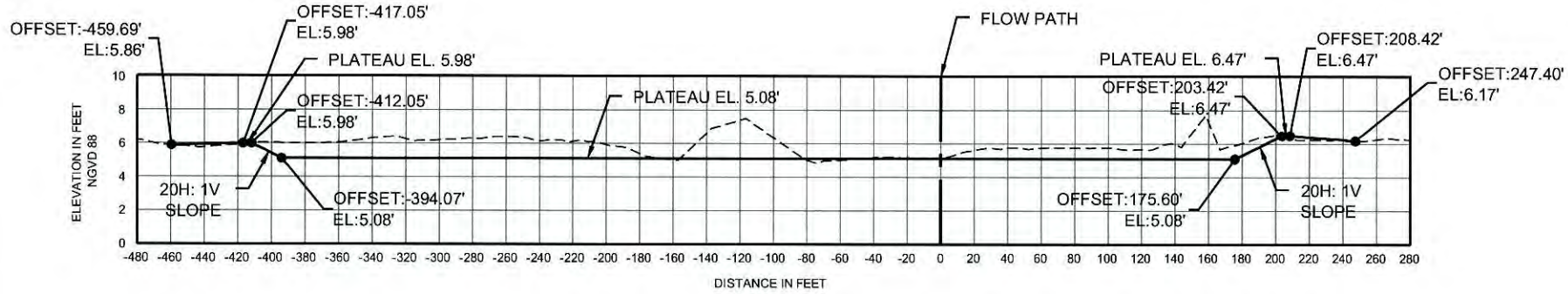


B
18

CROSS SECTION STATION 0+00
HOMOSASSA SOUTH-1 LOW WATER CROSSING

SCALE: 1" = 100'
V-SCALE: 1" = 10'

0 100'



LEGEND:

- EXISTING GRADE
- PROPOSED GRADE

C
18

CROSS SECTION STATION 0+08.09
HOMOSASSA SOUTH-1 LOW WATER CROSSING

SCALE: 1" = 100'
V-SCALE: 1" = 10'

0 100'

ALL ELEVATIONS TO BE FIELD VERIFIED.
ELEVATIONS DETERMINED FROM
SURFACE USING LIDAR DATA.

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

CROSS SECTIONS - SOUTH-1 LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	19 of 32
DATE	JULY 2011

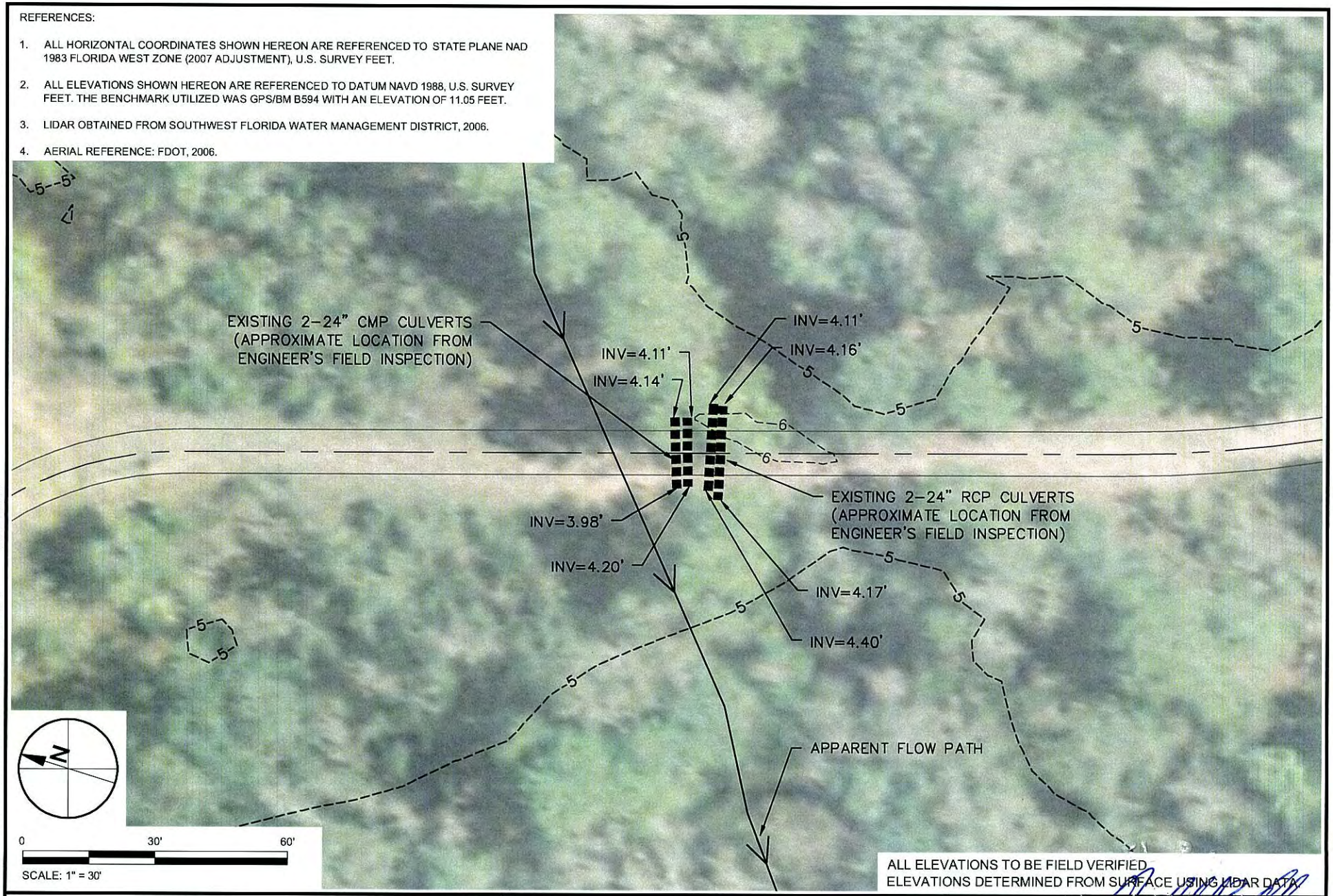
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9/20/2011
MICHAEL P. WHELAN P.E. # 55496 DATE

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REFERENCES:

1. ALL HORIZONTAL COORDINATES SHOWN HEREON ARE REFERENCED TO STATE PLANE NAD 1983 FLORIDA WEST ZONE (2007 ADJUSTMENT), U.S. SURVEY FEET.
2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO DATUM NAVD 1988, U.S. SURVEY FEET. THE BENCHMARK UTILIZED WAS GPS/BM B594 WITH AN ELEVATION OF 11.05 FEET.
3. LIDAR OBTAINED FROM SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, 2006.
4. AERIAL REFERENCE: FDOT, 2006.



ALL ELEVATIONS TO BE FIELD VERIFIED
ELEVATIONS DETERMINED FROM SURFACE USING LIDAR DATA

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

EXISTING CONDITIONS - SOUTH-2 LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	20 of 32
DATE	JULY 2011

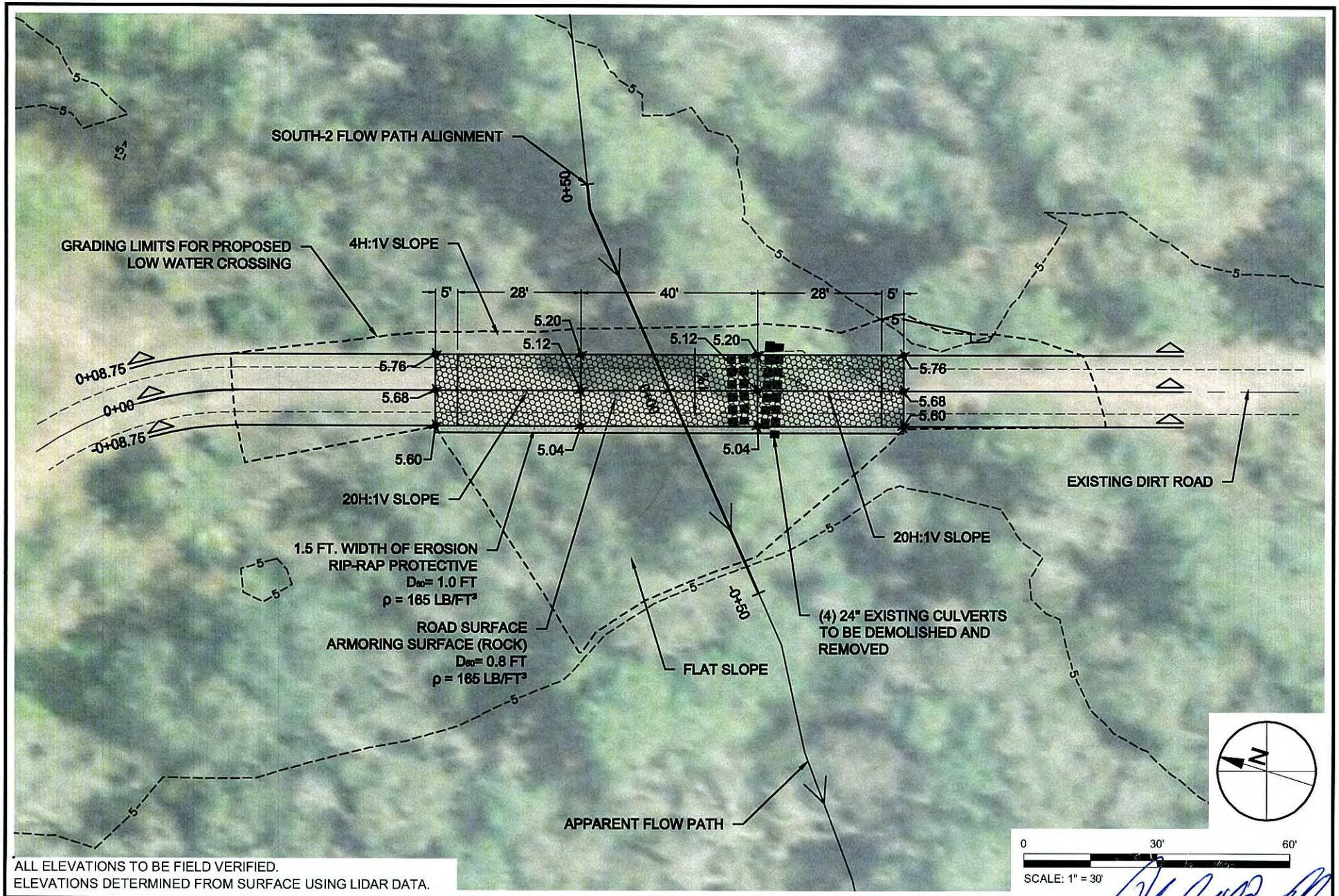
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9/20/2011

MICHAEL P. WHELAN P.E. # 55496 DATE

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PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



ALL ELEVATIONS TO BE FIELD VERIFIED.
ELEVATIONS DETERMINED FROM SURFACE USING LIDAR DATA.

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

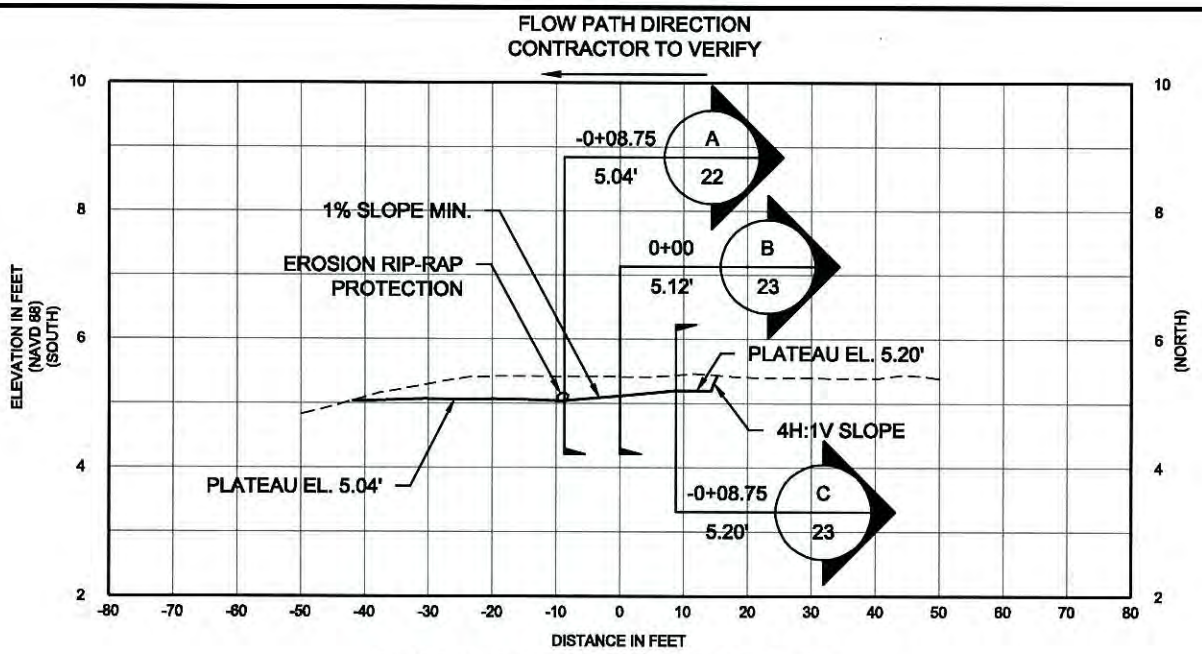
GRADING PLAN - SOUTH-2 LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	21 of 32
DATE	JULY 2011

SEAL
9/20/2011
MICHAEL P. WHELAN P.E. # 55496 DATE

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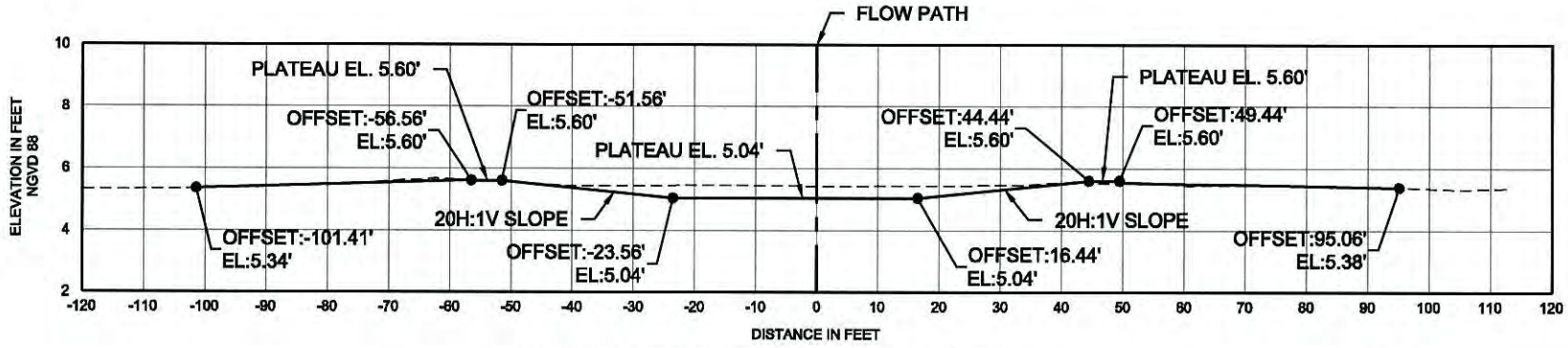
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SOUTH-2 FLOW PATH PROFILE

SCALE: 1" = 30'
V-SCALE: 1" = 3'

0 30'



CROSS SECTION STATION -0+08.75
HOMOSASSA SOUTH-2 LOW WATER CROSSING

A
22

SCALE: 1" = 30'
V-SCALE: 1" = 6'

0 30'

ALL ELEVATIONS TO BE FIELD VERIFIED.
ELEVATIONS DETERMINED FROM
SURFACE USING LIDAR DATA.

LEGEND:

EXISTING GRADE
PROPOSED GRADE

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

PROFILE & CROSS SECTION - SOUTH-2 LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	22 of 32
DATE	JULY 2011

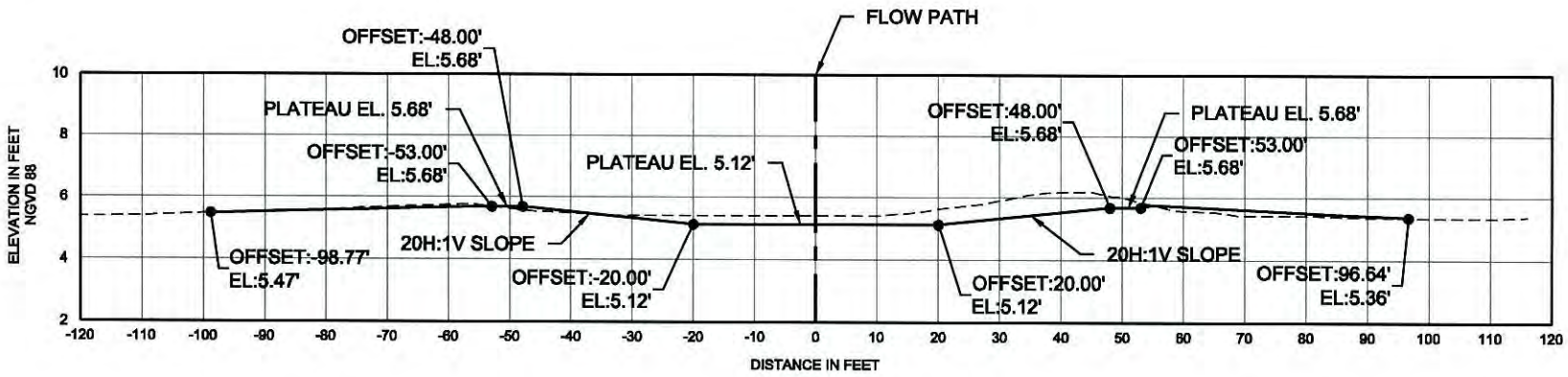
SEAL

9/20/2011

MICHAEL P. WHELAN P.E.# 55496 DATE

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

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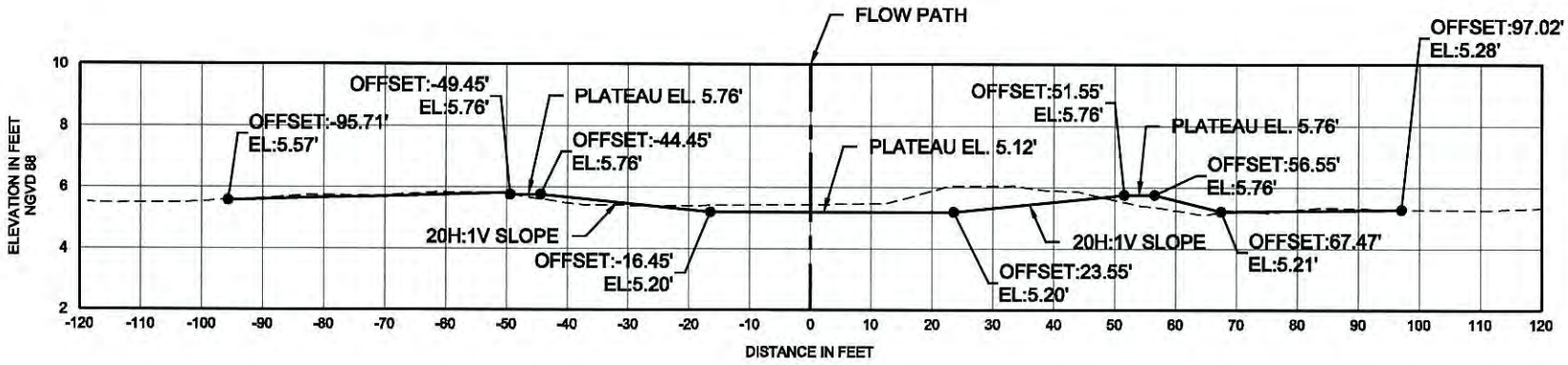


B
22

CROSS SECTION STATION 0+00
HOMOSASSA SOUTH-2 LOW WATER CROSSING

SCALE: 1" = 30'
V-SCALE: 1" = 6'

0 30'



LEGEND:

- - - - - - - EXISTING GRADE
——— PROPOSED GRADE

C
22

CROSS SECTION STATION 0+08.75
HOMOSASSA SOUTH-2 LOW WATER CROSSING

SCALE: 1" = 30'
V-SCALE: 1" = 6'

0 30'

ALL ELEVATIONS TO BE FIELD VERIFIED. ELEVATIONS DETERMINED FROM SURFACE USING LIDAR DATA.

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

CROSS SECTIONS - SOUTH-2 LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	23 of 32
DATE	JULY 2011

SEAL

9/20/2011

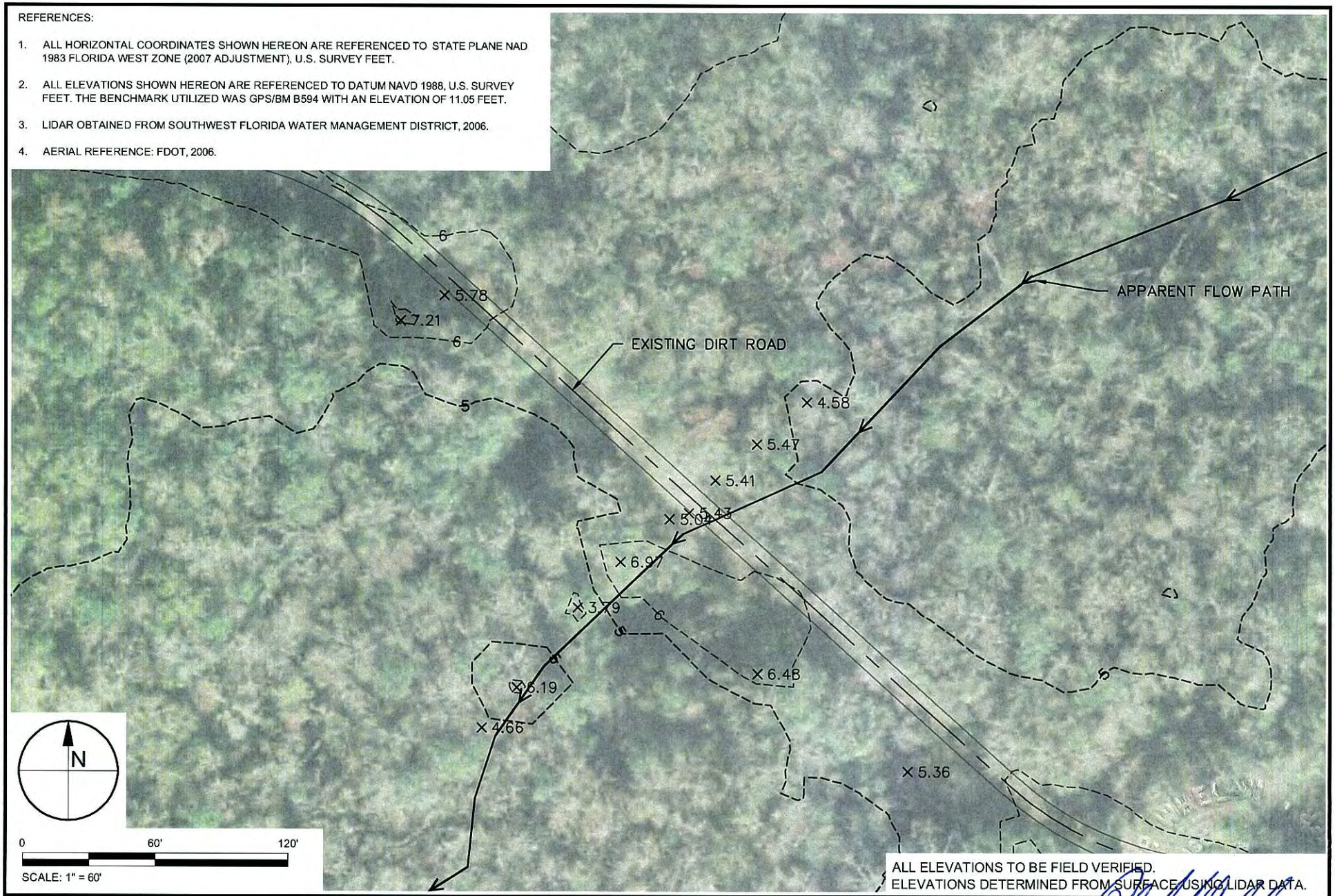
MICHAEL P. WHELAN P.E. # 55496 DATE

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REBECCA JOHNSON X:\SYS\PROJECTS\C2011-025 PROGRESS ENERGY\PERMITH\TC2011-025A-HT-S2 LWC PLAN.DWG 9/20/2011 4:42:48 PM

REFERENCES:

1. ALL HORIZONTAL COORDINATES SHOWN HEREON ARE REFERENCED TO STATE PLANE NAD 1983 FLORIDA WEST ZONE (2007 ADJUSTMENT), U.S. SURVEY FEET.
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ALL ELEVATIONS TO BE FIELD VERIFIED.
ELEVATIONS DETERMINED FROM SURFACE USING LIDAR DATA.

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

EXISTING CONDITIONS - SOUTH-3 LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	24 of 32
DATE	JULY 2011

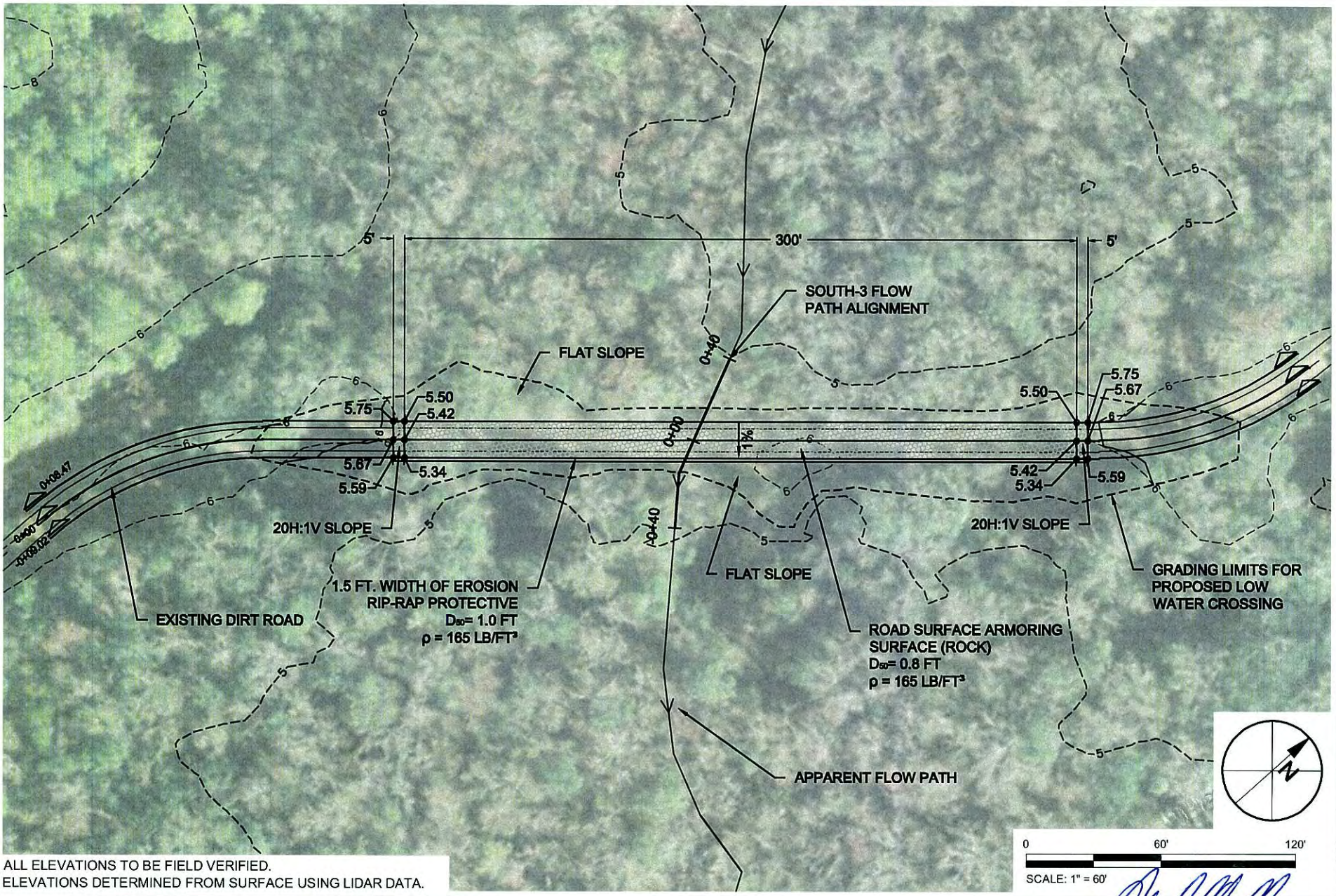
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9/20/2011

MICHAEL P. WHELAN P.E. # 55496 DATE

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

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ALL ELEVATIONS TO BE FIELD VERIFIED.
ELEVATIONS DETERMINED FROM SURFACE USING LIDAR DATA.

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

GRADING PLAN - SOUTH-3 LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	25 of 32
DATE	JULY 2011

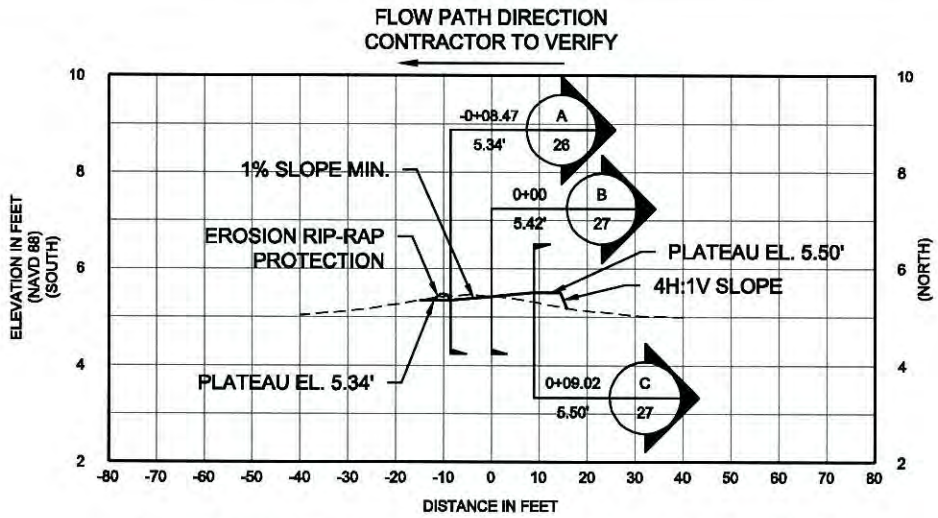
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9/20/2011

MICHAEL P. WHELAN P.E.# 55496 DATE

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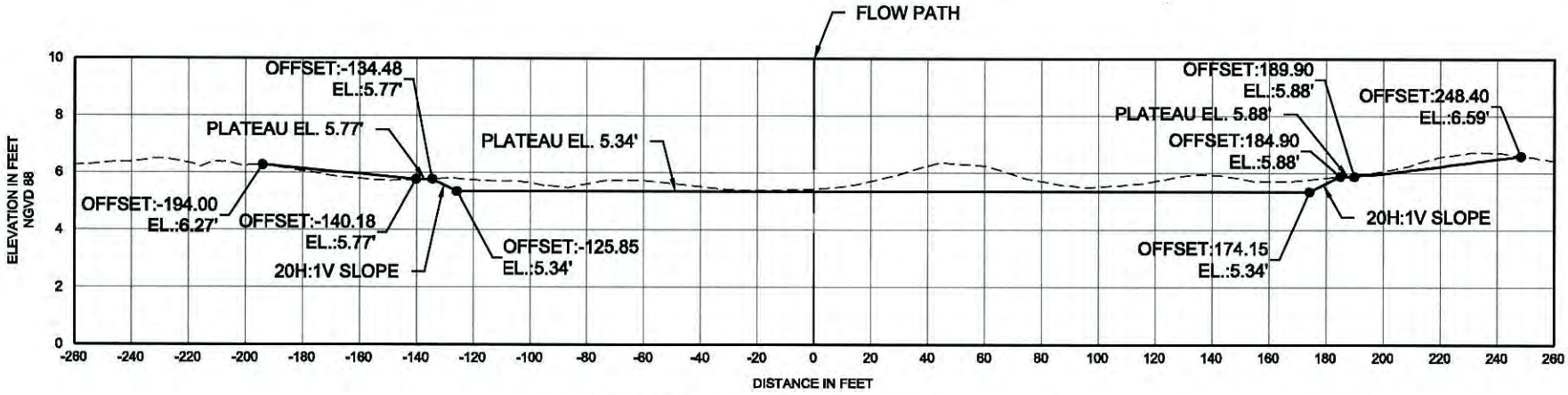
PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



HOMOSASSA SOUTH-3 FLOW PATH ALIGNMENT

SCALE: 1" = 40'
V-SCALE: 1" = 4'

0 40'



CROSS SECTION STA. -0+08.47
HOMOSASSA SOUTH-3 LOW WATER CROSSING

A
26

SCALE: 1" = 60'
V-SCALE: 1" = 6'

0 60'

ALL ELEVATIONS TO BE FIELD VERIFIED.
ELEVATIONS DETERMINED FROM
SURFACE USING LIDAR DATA.

LEGEND:
- EXISTING GRADE
- PROPOSED GRADE

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

PROFILE & CROSS SECTION - SOUTH-3 LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	26 of 32
DATE	JULY 2011

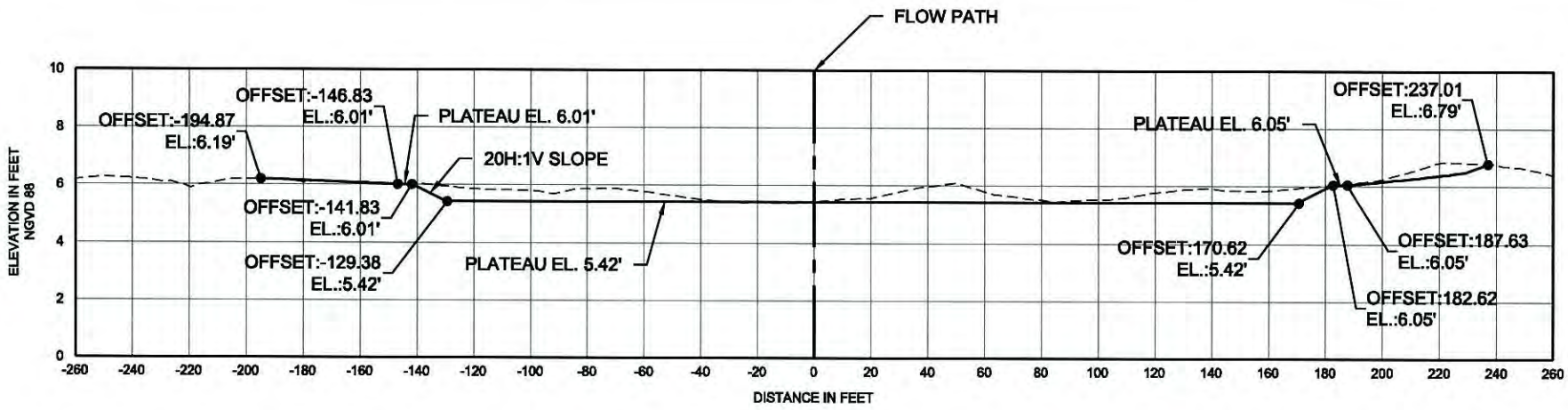
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9/20/2011

MICHAEL P. WHELAN P.E.# 55496 DATE

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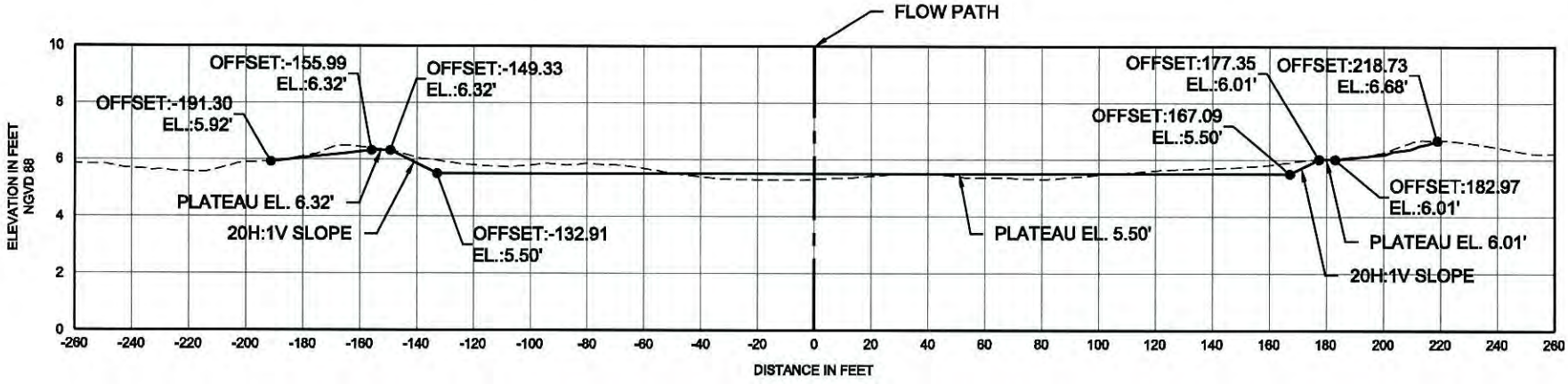


CROSS SECTION STA. -0+08.47
HOMOSASSA SOUTH-3 LOW WATER CROSSING

B / 26

SCALE: 1" = 60'
V-SCALE: 1" = 6'

0 60'



CROSS SECTION STA. -0+08.47
HOMOSASSA SOUTH-3 LOW WATER CROSSING

C / 26

SCALE: 1" = 60'
V-SCALE: 1" = 6'

0 60'

ALL ELEVATIONS TO BE FIELD VERIFIED.
ELEVATIONS DETERMINED FROM
SURFACE USING LIDAR DATA.

LEGEND:
- EXISTING GRADE
- PROPOSED GRADE

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

CROSS SECTIONS - SOUTH-3 LOW WATER CROSSING
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	27 of 32
DATE	JULY 2011

SEAL

9/20/2011

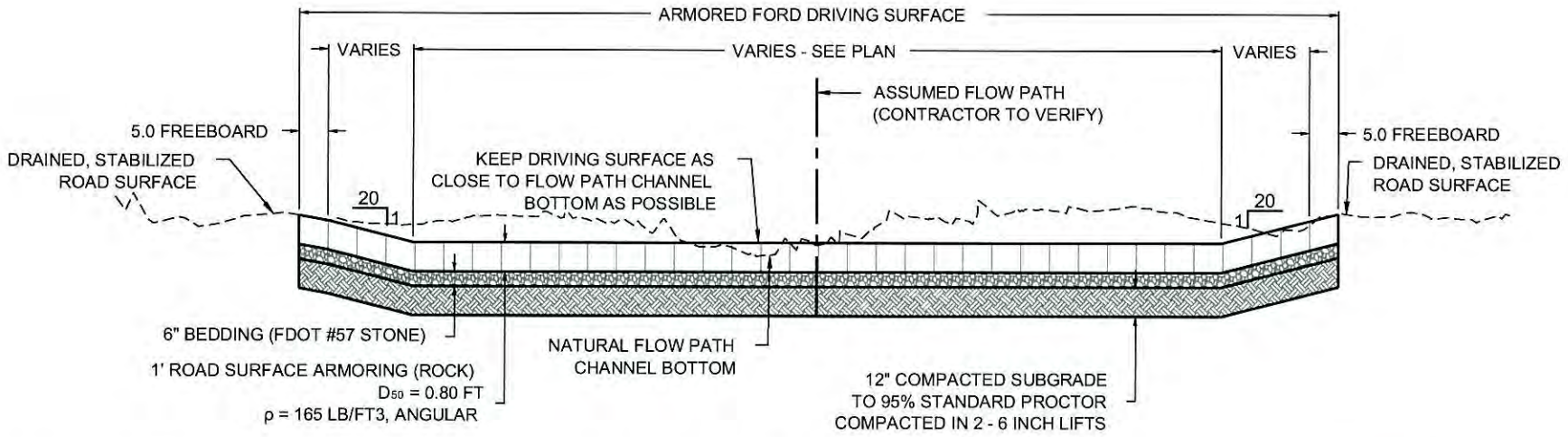
MICHAEL P. WHELAN P.E.# 55456 DATE

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PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

TYPICAL CONSTRUCTION NOTES:

1. CONTRACTOR TO IDENTIFY ROAD BASE SUPPLIER AND PROVIDE DENSITY AND SAMPLES OF MATERIAL PRIOR TO CONSTRUCTION.
2. CONTRACTOR TO USE "LOCAL" RIP-RAP, IF APPLICABLE.
3. CONTRACTOR TO PROVIDE CONSTRUCTION METHODOLOGY TO CONSTRUCT DURING LOW FLOW, LOW PRECIPITATION SEASON.
4. CONTRACTOR TO CONSTRUCT ROAD TO MEET H-20 VEHICLE LOADING.
5. CONTRACTOR TO MINIMIZE CONSTRUCTION IMPACT AND NOT DISTURB NATURAL STREAMBED ADJACENT TO PROJECT.
6. CONTRACTOR TO PROVIDE RIP-RAP PROTECTION ON DOWNSTREAM EDGE OF LOW WATER CROSSING, AND USE EROSION FILTER BLANKET, ETC. TO PREVENT DOWNSTREAM EROSION.
7. CONTRACTOR TO KEEP SERVICE AND REFUELING AREAS WELL AWAY FROM WET AREAS AND STREAMBEDS.



RIP-RAP PROTECTION
D_{50} = 0.80 FT
ρ = 165 LB/FT3, ANGULAR

TYPICAL SECTION DETAIL

SCALE: 1" = 30'
V-SCALE: 1" = 5'
0 30'

LEGEND:
EXISTING GRADE
PROPOSED GRADE

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

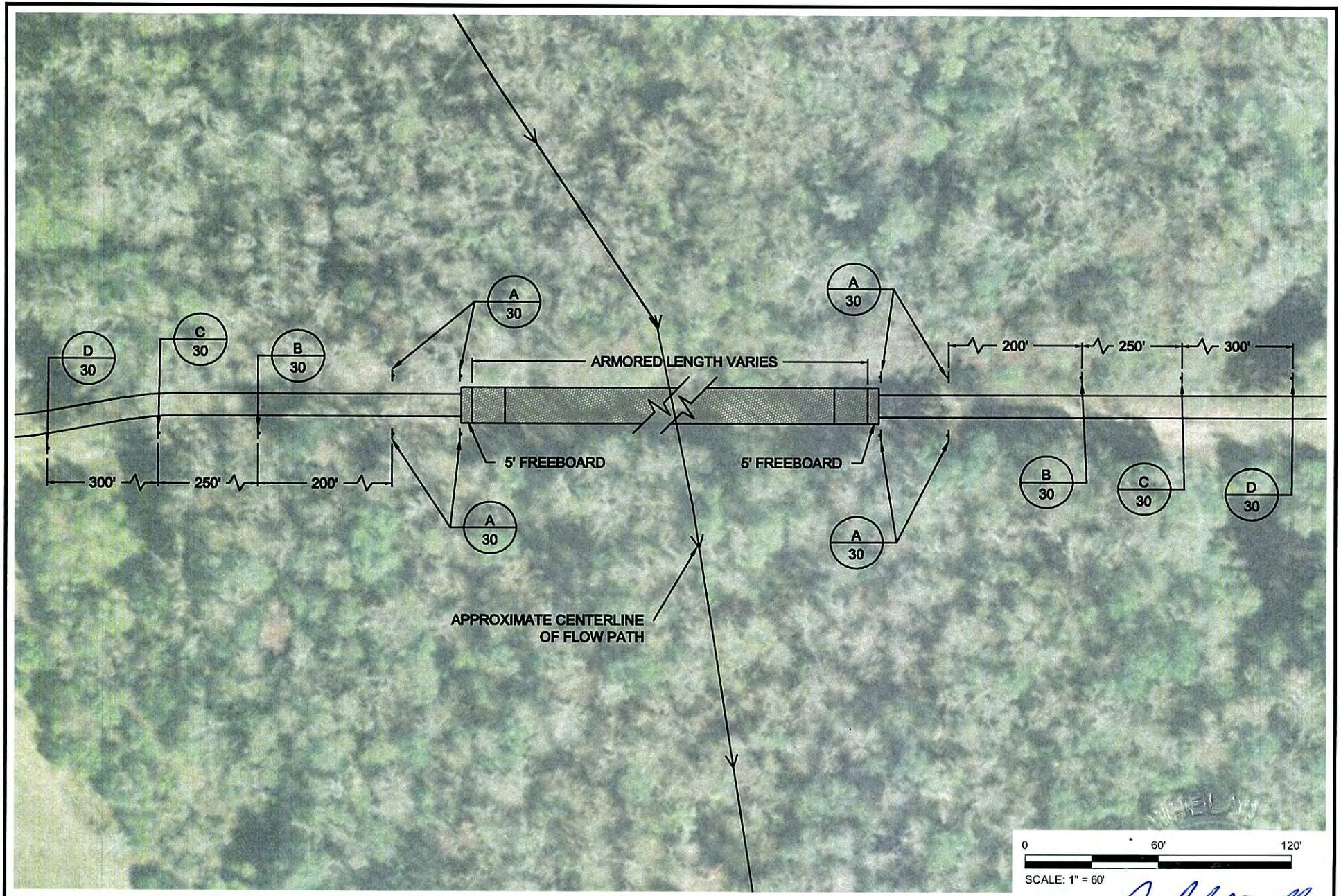
TYPICAL SECTION DETAIL
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	28 of 32
DATE	JULY 2011

SEAL
9/20/2011
MICHAEL P. WHELAN P.E. # 55496 DATE

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TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

TYPICAL SIGNAGE PLAN
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	29 of 32
DATE	JULY 2011

SEAL

9/20/2011

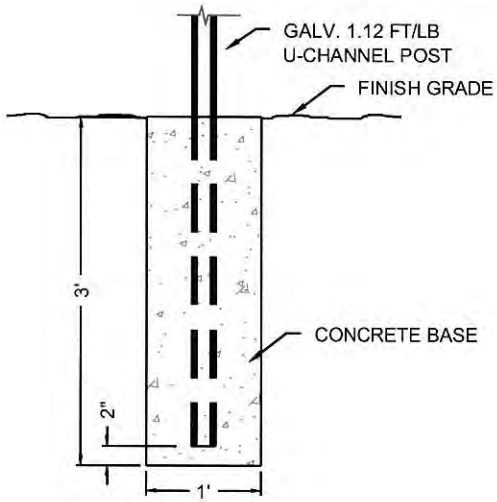
MICHAEL P. WHELAN P.E.# 55496 DATE

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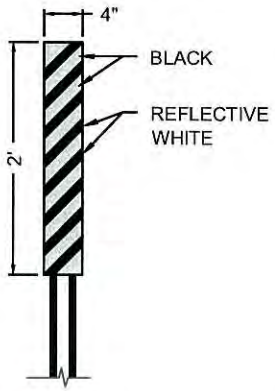
PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

SIGNAGE NOTES:

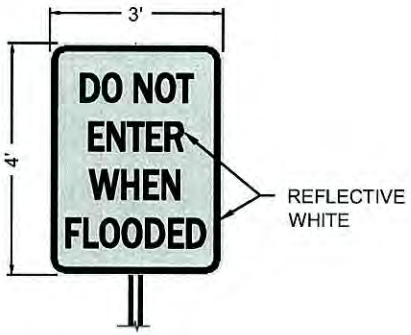
1. CONTRACTOR TO INSTALL ALL SIGNS 7' ABOVE FINISH GRADE (TOP OF SIGN).



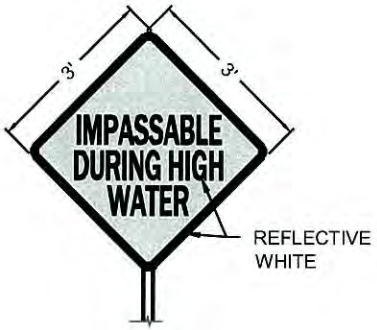
TYPICAL
BREAKAWAY SIGN BASE
NOT TO SCALE



A / 29 TYPICAL
CHANNEL MARKER
NOT TO SCALE



B / 29 "DO NOT ENTER" SIGN
NOT TO SCALE



C / 29 "IMPASSABLE" SIGN
NOT TO SCALE



D / 29 "FLOOD AREA" SIGN
NOT TO SCALE

TAYLOR ENGINEERING INC.
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SIGNAGE DETAILS
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	30 of 32
DATE	JULY 2011

SEAL
MICHAEL P. WHELAN P.E.# 55496
9/20/2011
DATE

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PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

EROSION CONTROL AND GENERAL VEGETATION NOTES:

1. THE CONTRACTOR SHALL IMPLEMENT AND MAINTAIN EROSION CONTROL MEASURES AS NECESSARY TO COMPLY WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS AND COMPLY WITH STATE WATER QUALITY CRITERIA FOR STORMWATER DISCHARGE. EROSION CONTROL MEASURES INCLUDE BUT ARE NOT LIMITED TO TURBIDITY SCREENS, MULCHING, HAY BALES, AND SILT FENCE. IF A WATER QUALITY VIOLATION OCCURS, THE CONTRACTOR SHALL BE WHOLLY RESPONSIBLE FOR ALL DAMAGE AND ALL COSTS WHICH MAY RESULT INCLUDING LEGAL FEES, CONSTRUCTION COSTS, AND FINES.
2. DISTURBED AREAS SHALL BE VEGETATED, FERTILIZED, MULCHED, AND MAINTAINED IN ACCORDANCE WITH PROJECT SPECIFICATIONS AND CITY, COUNTY, STATE, AND FEDERAL REQUIREMENTS.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING PERMANENT VEGETATION AT ALL DISTURBED AREAS PER NPDES FINAL STABILIZATION REQUIREMENTS.
4. EROSION CONTROL MEASURES SHALL BE MAINTAINED FOR THE ENTIRE DURATION OF THE PROJECT OR UNTIL PERMANENT VEGETATION IS ESTABLISHED.
5. EROSION CONTROL MEASURES SHALL BE PLACED TO CONTAIN ALL POINTS OF DISCHARGE TO SURFACE WATERS OR WETLANDS INCLUDING CURB INLETS, DITCH BOTTOM INLETS, DITCHES, AND DOWNSTREAM PORTIONS OF NATURAL DRAINAGE PATHWAYS, STREAMS, CANALS, AND TIDAL WATERS ADJACENT TO CONSTRUCTION.
6. 48 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION, THE CONTRACTOR WILL SUBMIT A "NOTICE OF INTENT" TO THE EPA IN ACCORDANCE WITH NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM RULES AND REGULATIONS.
7. THE SITE CONTRACTOR IS RESPONSIBLE FOR REMOVING THE TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES AFTER COMPLETION OF CONSTRUCTION AND ONLY WHEN AREAS HAVE BEEN STABILIZED.
8. SILT FENCES AND FILTER BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
9. CONTRACTOR TO FIELD VERIFY EXTENT OF CLEARING ADJACENT TO LOW WATER CROSSING PRIOR TO CONSTRUCTION.

GENERAL CONSTRUCTION NOTES:

1. ARMOR THE DRIVING SURFACE THROUGH THE WETTED PERIMETER TO THE HIGH WATER LEVEL, PLUS FREEBOARD, AS SHOWN.
2. CONSTRUCT A DRIVABLE LOW WATER CROSSING. THE DRIVING SURFACE WILL BE AS CLOSE AS POSSIBLE TO THE NATURAL STREAM CHANNEL BOTTOM.
3. CONTRACTOR TO MAKE THE VERTICAL CURVE SMOOTH ENOUGH TO PASS THE DESIGN VEHICLE.
4. CONTRACTOR TO PLACE RIP-RAP TO MINIMIZE THE FALL AT THE DOWNSTREAM EDGE OF THE CROSSING.
5. USE A ROUGHENED SURFACE TO MINIMIZE FLOW ACCELERATION ACROSS THE APRON.
6. PROVIDE FOR TRAFFIC SAFETY WITH SIGNS, DEPTH MARKERS, AND OBJECT MARKERS.

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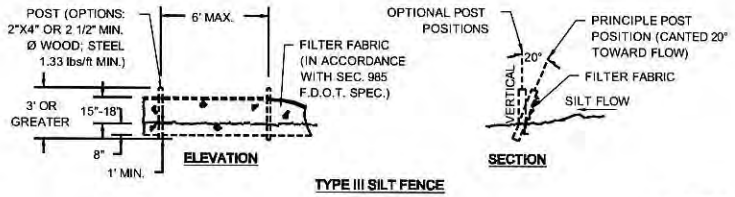
GENERAL CONSTRUCTION & EROSION CONTROL NOTES
PROGRESS ENERGY MITIGATION PROJECT
HOMOSASSA TRACT
CITRUS COUNTY, FLORIDA

PROJECT	C2011-025
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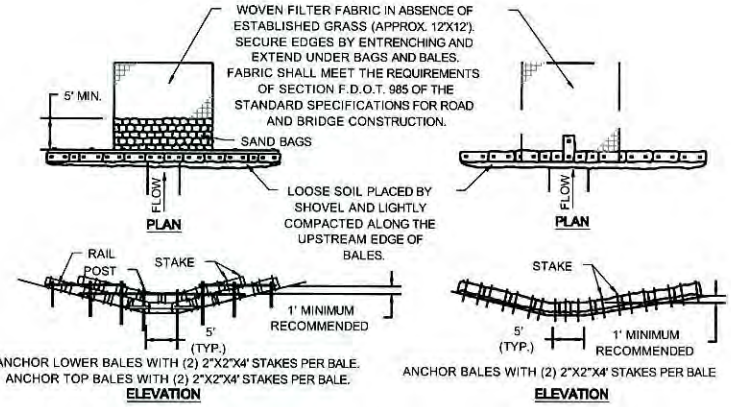
PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



TYPE III SILT FENCE



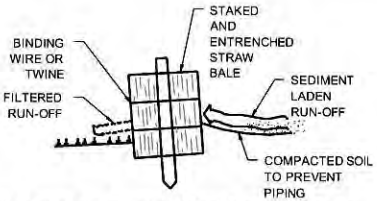
TYPE IV SILT FENCE



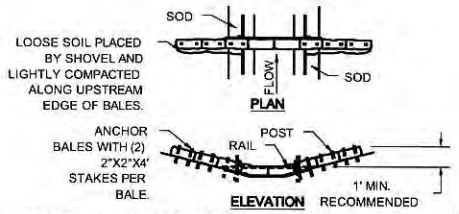
APPLICATION AND SPACING OF TYPES I & TYPES II HAY BALE BARRIERS SALL BE IN ACCORDANCE WITH SHEET 1 OF 3, F.D.O.T. INDEX NO. 102

TYPE II TYPE I

TYPICAL STRAW BALE DETAIL

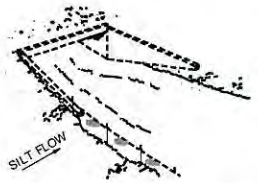


CROSS SECTION OF A PROPERLY INSTALLED STRAW BALE



SPACING: BALE BARRIERS FOR PAVED DITCHES SHOULD BE SPACED IN ACCORDANCE WITH CHART I, SHEET 1 OF 3, INDEX NO. 102 OF THE F.D.O.T. ROADWAY AND TRAFFIC DESIGN STANDARDS.

STRAW BALE BARRIER FOR PAVED DITCH





TYPE III OR TYPE IV SILT FENCE PROTECTION AROUND DITCH BOTTOM INLETS.



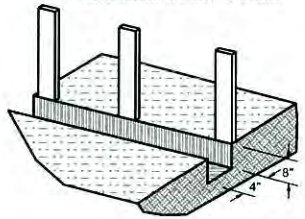
TYPE III AND IV SILT FENCE

DITCH INSTALLATION AND SPACING FOR TYPE III & TYPE IV FENCE TO BE IN ACCORDANCE WITH SHEET 1 OF 3, OF THE F.D.O.T. INDEX NO. 102

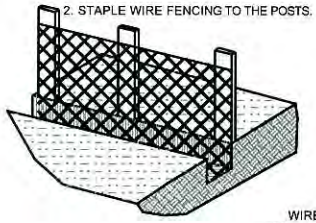
TYPE III OR TYPE IV SILT FENCE

DO NOT DEPLOY IN A MANNER THAT SILT FENCES WILL ACT AS A DAM ACROSS PERMANENT FLOWING WATERCOURSES. SILT FENCES ARE TO BE USED AT UPLAND LOCATIONS AND TURBIDITY BARRIERS USED AT PERMANENT BODIES OF WATER.

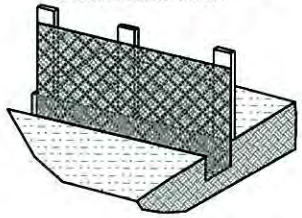
1. SET POSTS AND EXCAVATE A 8"X4" TRENCH UP SLOPE ALONG THE LINE OF POSTS.



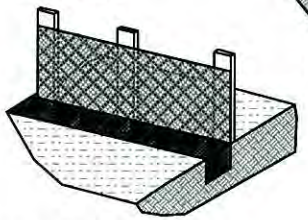
2. STAPLE WIRE FENCING TO THE POSTS.

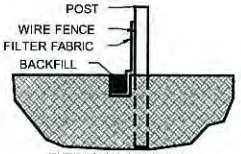


3. ATTACH THE FILTER FABRIC TO THE WIRE FENCE AND EXTEND FILTER FABRIC AND WIRE FENCE INTO THE TRENCH.



4. BACKFILL AND COMPACT THE EXCAVATED SOIL.





EXTENSION OF FILTER FABRIC AND WIRE FENCE INTO THE TRENCH.

SILT FENCE INSTALLATION DETAILS

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EROSION CONTROL DETAILS
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PROJECT	C2011-025
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MICHAEL P. WHELAN P.E. # 55496 DATE

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PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

7.0 TAMPA BAY WATERSHED – BROOKER CREEK PRESERVE SITE

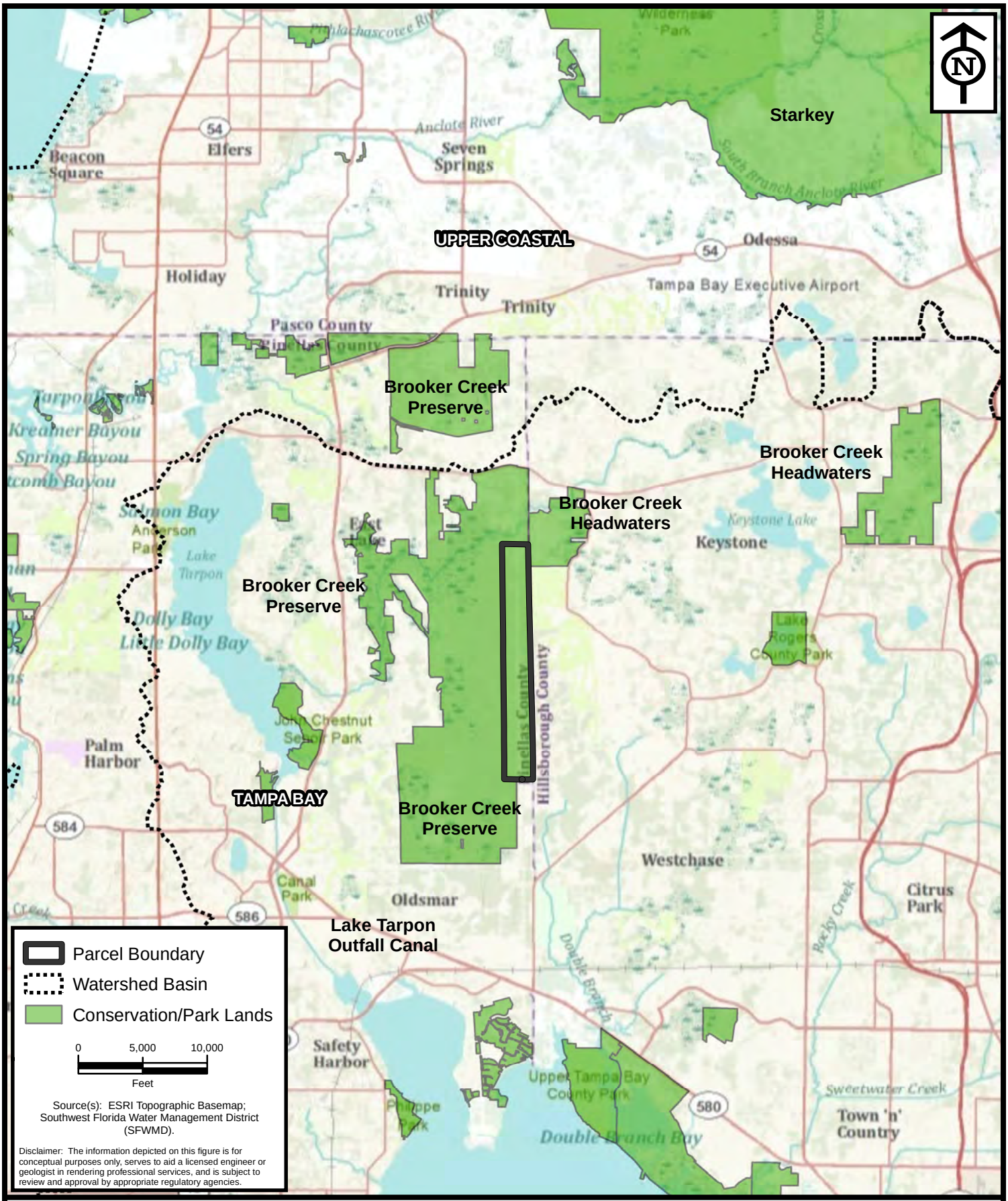
7.1 Introduction

The Brooker Creek Preserve mitigation site (BCP) is located in the Tamp Bay Watershed and will offset herbaceous and forested wetland impacts associated with the installation of new transmission lines by PEF for the LNP project (Figure 7-1). More specifically, the BCP site will offset primarily herbaceous wetland impacts through the restoration of historic flow patterns and the enhancement and restoration of existing low quality wetlands.

The BCP mitigation site refers to the existing Transmission Line Corridor (TLC) and the surrounding habitats, which totals approximately 1,300 acres. PEF owns the existing transmission line right-of-way (ROW), while the rest of BCP is owned and managed by Pinellas County, Florida (Figure 7-2). This parcel is part of the largest remaining natural forest in Pinellas County and the proposed mitigation plan will restore historic flow patterns that were disturbed during the construction of the PEF transmission line ROW, within the TLC. The installation of this ROW altered historic flow patterns and affected the hydrology and species composition of the adjacent natural wetlands. The proposed mitigation plan will help to return BCP to a more natural hydrologic condition and help to restore the adjacent natural wetlands within the Preserve.

7.2 Impact Summary

The wetland impacts within the Tamp Bay Watershed from the proposed LNP project total approximately 10.1 acres. These impacts will generate a total loss of 6.6 functional units. The majority of these impacts will be the result of permanently filling existing herbaceous wetlands, with a smaller portion coming from clearing and filling of forested wetlands. The proposed mitigation plan at BCP will provide for 14.7 functional units of lift within the Tampa Bay Watershed. See Section 7.6 for a complete summary of the UMAM scores. Please note that an “excess” of 8.1 units is being provided for use on future projects. The impact summary is provided on Table 7-1.



Source(s): ESRI Topographic Basemap; Southwest Florida Water Management District (SFWMD).

Disclaimer: The information depicted on this figure is for conceptual purposes only, serves to aid a licensed engineer or geologist in rendering professional services, and is subject to review and approval by appropriate regulatory agencies.

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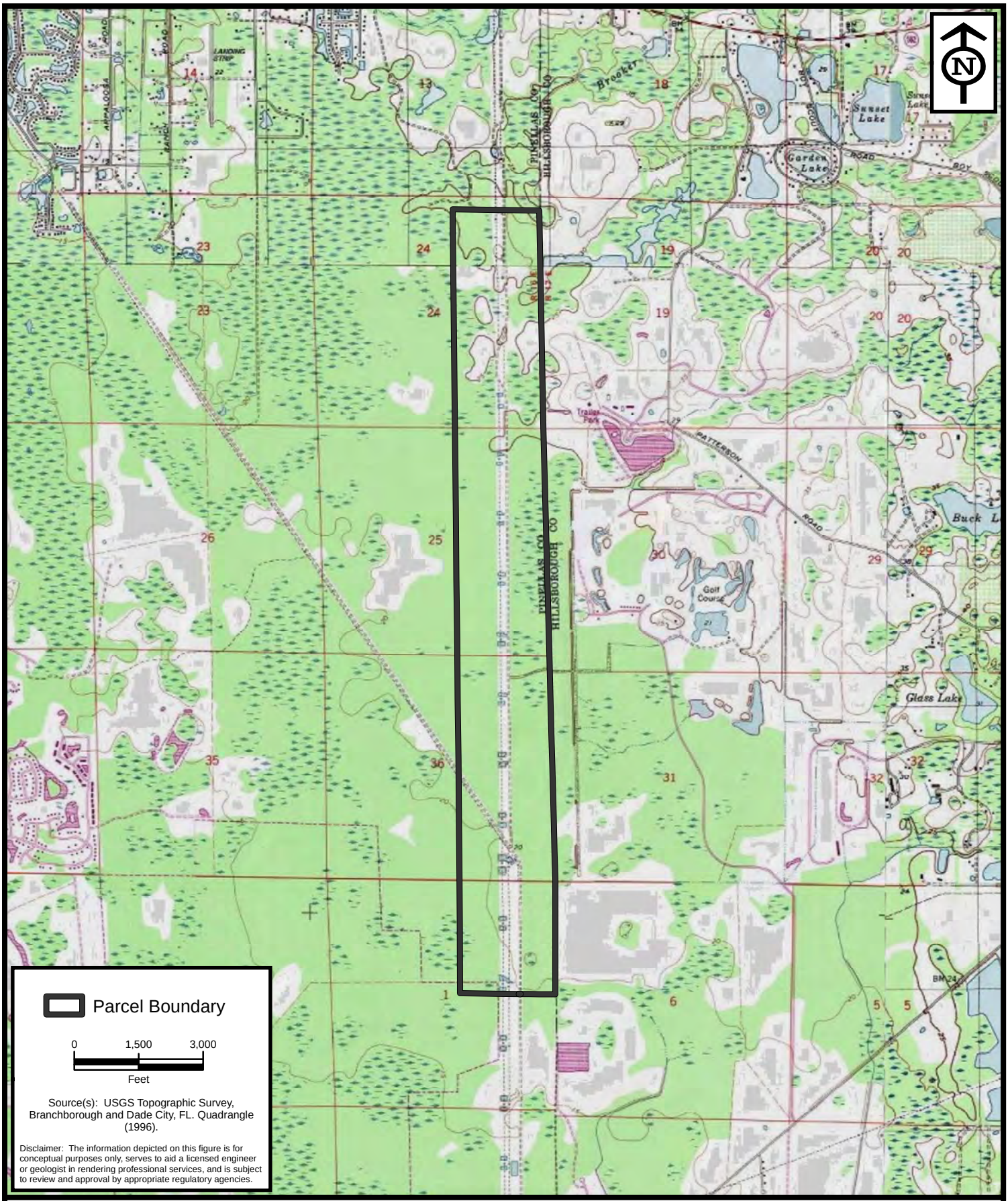
Tampa Bay Watershed

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JGB/JRN
Figure:	**7-1**

Path: Q:_Projects\EJ\2011\021\00\fig\Brooker\Report\Watersheds.mxd Date: 8/2/2011 5:19:49 PM



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Project Location

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JGB/JRN
Figure:	**7-2**

Path: Q:_Projects\EJ\2011\021\00\fig\Brooker\Report\Location.mxd Date: 7/20/2011 1:28:13 PM

Table 7-1. Tampa Bay Watershed wetland impacts by UMAM functional loss and acreage

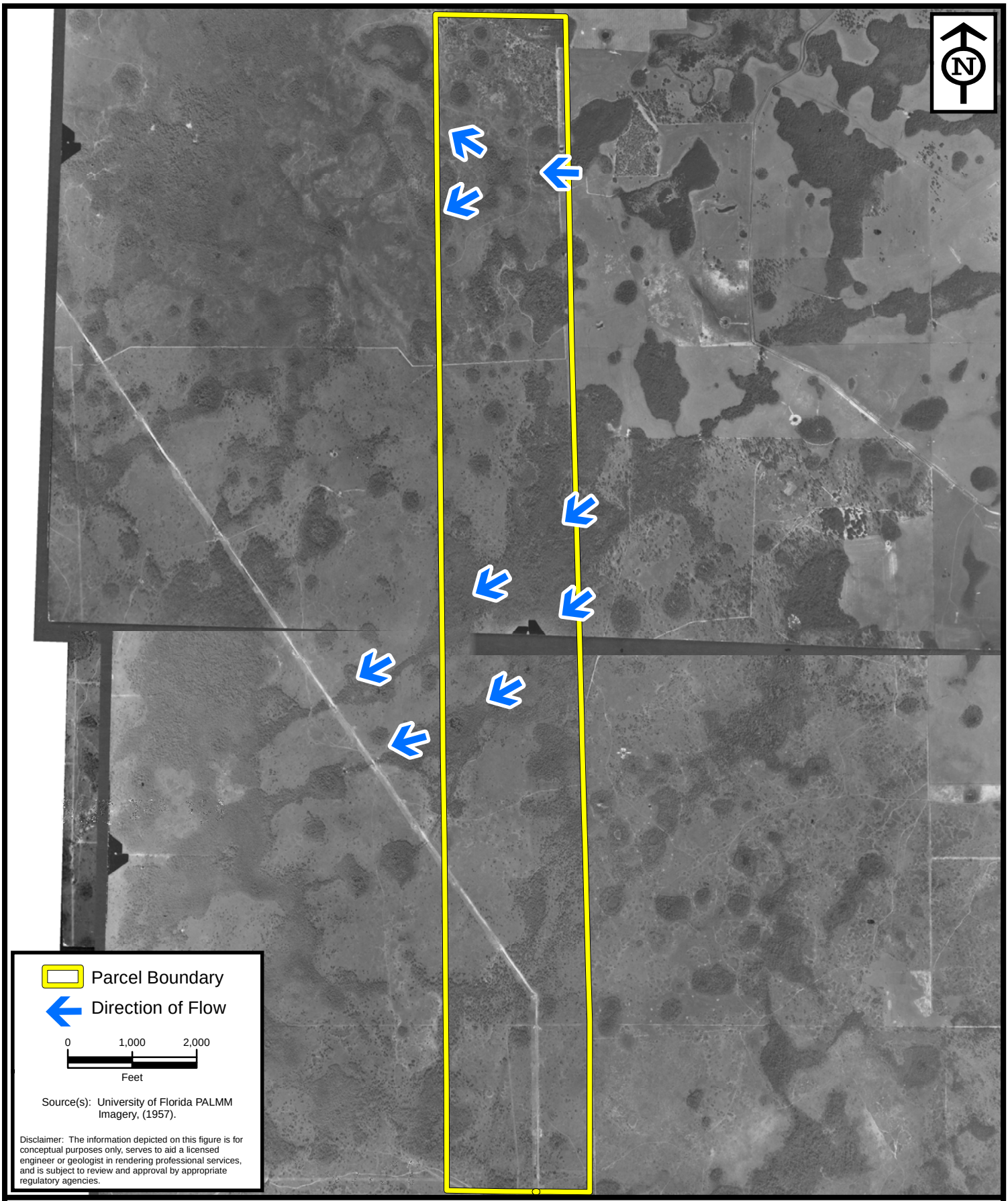
Area	Herbaceous Wetland Acreage (including open water)	Herbaceous Wetland Functional Loss	Forested Wetland Acreage	Forested Wetland Functional Loss	Total Acres	Total Functional Loss
Permanent Fill	9.4 acres	-6.3 units	0.3 acres	-0.2 units	9.7	-6.5
Permanent Clearing	None	None	0.4 acres	-0.1 units	0.4	-0.1
Total					**10.1**	**-6.6**

7.3 Site Description

The BCP site is located in Sections 12, 13, 24, 25 and 36, Township 27S and Range 16E and Sections 1 and 12, Township 28S and Range 16E in Pinellas County, FL. The total area of the BCP parcel is approximately 1,296 acres and is further located east of Lake Tarpon and directly west of the Hillsborough County line. The BCP lies within The Preserve, which totals approximately 7,000 acres. The BCP site is relatively flat, but generally slopes from northeast to southwest with large wetlands immediately adjacent to and within the TLC. These wetlands drain into smaller channels of Brooker Creek, which is a system that generally flows west into Lake Tarpon and ultimately outfalls into Upper Tampa Bay.

7.3.1 Historic Conditions

The Preserve was historically populated by flatwood systems with both isolated and contiguous forested wetlands throughout. Numerous braided creek systems eventually joined to form the Brooker Creek system, which flowed west towards Lake Tarpon and ultimately into Upper Tamp Bay, which eventually feeds into the Gulf of Mexico (Figure 7-3).



Source(s): University of Florida PALMM Imagery, (1957).

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1957 Historic Aerial Imagery

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JGB/JRN
Figure:	**7-3**

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7.3.2 Current Conditions

Various habitat types are present at the BCP site including the above-mentioned maintained TLC which contains existing upland and wetland communities within it, surrounding forested and herbaceous wetlands and forested uplands. A large ditch was installed along the eastern edge of the TLC to help facilitate surface flow after the natural flow was altered from installing the raised access road. This ditch is directly connected to several large historically contiguous wetlands and has altered the hydrology within these particular communities.

The vegetation within the TLC is managed through the use of herbicides to control the vegetation and ensure no trees interfere with the transmission lines above. This has resulted in large, herbaceous areas within the TLC, many of which contain invasive/exotic species. For the purposes of this project, it is assumed that all references to invasive/exotic species refer to those listed as Category I and II invasive exotic species, as defined by the Florida Exotic Pest Council. In addition, numerous small borrow pits are located on either side of the transmission line towers that are the result of constructing the structure pads for the towers. Most of these borrow pits are isolated, open water pits that contain sparse aquatic vegetation and invasive/exotic species. Invasive/exotics species within these open water pits include cattail, primrose willow, torpedo grass and cogon grass, while some native vegetation such as pickerelweed and duck potato is also present.

The natural wetlands adjacent to the TLC remain largely intact and are mainly in good condition, but have been subject to hydrologic alterations by the above mentioned ditch and the presence of invasive/exotic species encroaching from the adjacent TLC. These wetlands are typically characterized by a canopy of pond cypress, bald cypress, black gum and red maple. Other wetland shrubs such as button bush and fetterbush are present along with numerous wetland ferns, grasses and other groundcover.

The uplands on site consist mainly of pine flatwood communities, with small portions of sand hill community located within the northern portions of the TLC. The pine flatwood communities are typically characterized by a canopy of slash pine, with various other hardwood species including laurel oak, live oak within the sub-canopy. The understory consists of mainly bitter gallberry and saw palmetto.

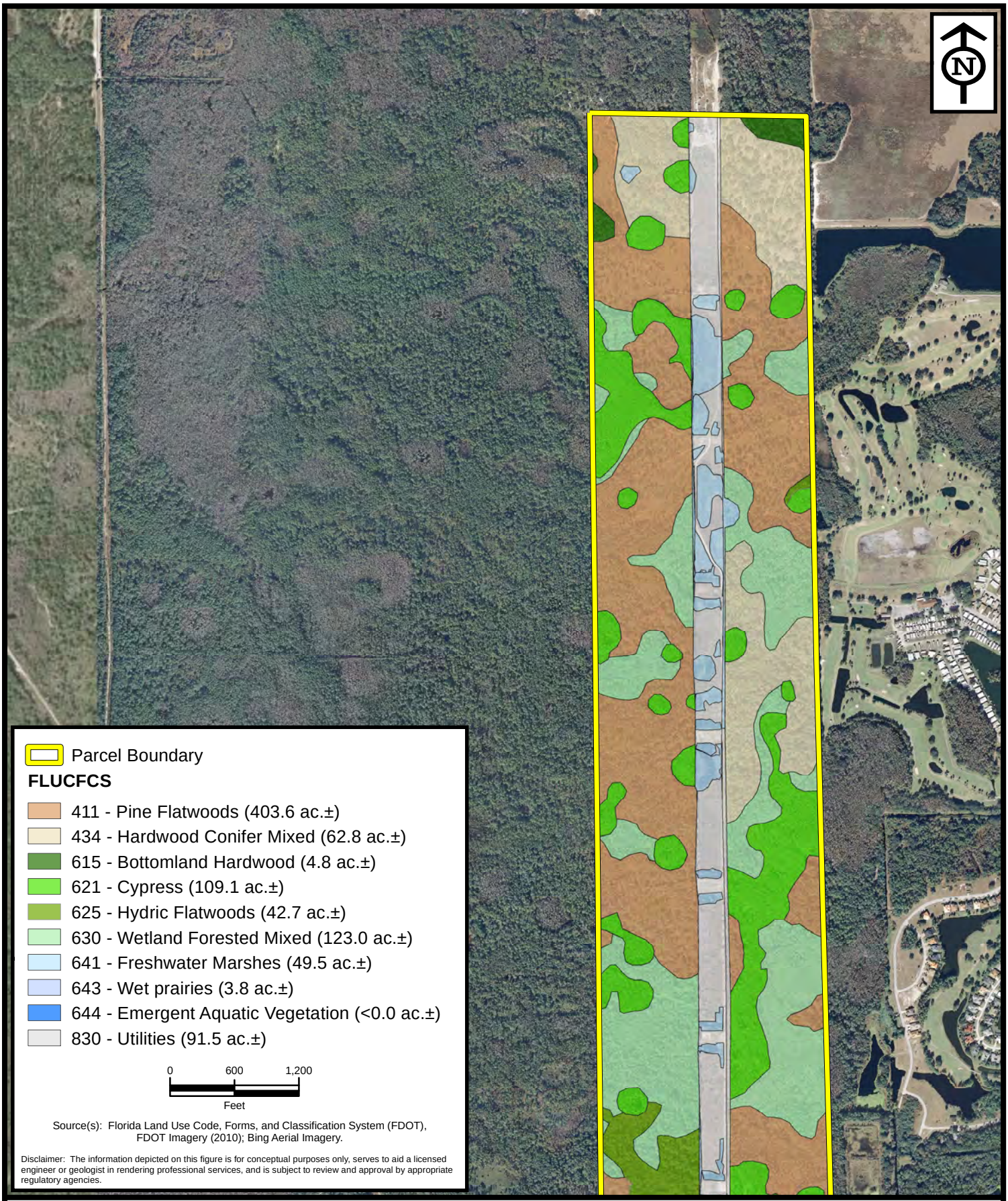
FLUCFCS was used to determine the different community types on site. Please see the Brooker Creek Preserve Community Map, Figure 7-4 and 7-4a, for details of the specific community types associated with this mitigation site.

Uplands

1. Pine Flatwoods (FLUCFCS code 411). The pine flatwood communities are the main upland community present on site. These communities are characterized by a canopy of slash pine with an understory typically containing bitter gallberry and saw palmetto. Some of these areas have been subject to land management activities in the past, including timber thinning and prescribed fire management.

2. Live Oak (FLUCFCS code 427). A live oak sand hill community exists in the northern portion of the site. This area is dominated by a canopy of mature live oaks. Due to the mature size of the trees, shrubs and groundcover species are sparse, primarily saw palmetto and other upland grasses.

3. Hardwood Conifer Mixed (FLUCFCS code 434). The remaining uplands on site consist of a mix of pine species, mainly slash pine and other upland hardwood species such as laurel oak, sweet gum and water oak. Sub canopy and shrub species consist of juvenile laurel oak, wax myrtle and saw palmetto.



Source(s): Florida Land Use Code, Forms, and Classification System (FDOT), FDOT Imagery (2010); Bing Aerial Imagery.

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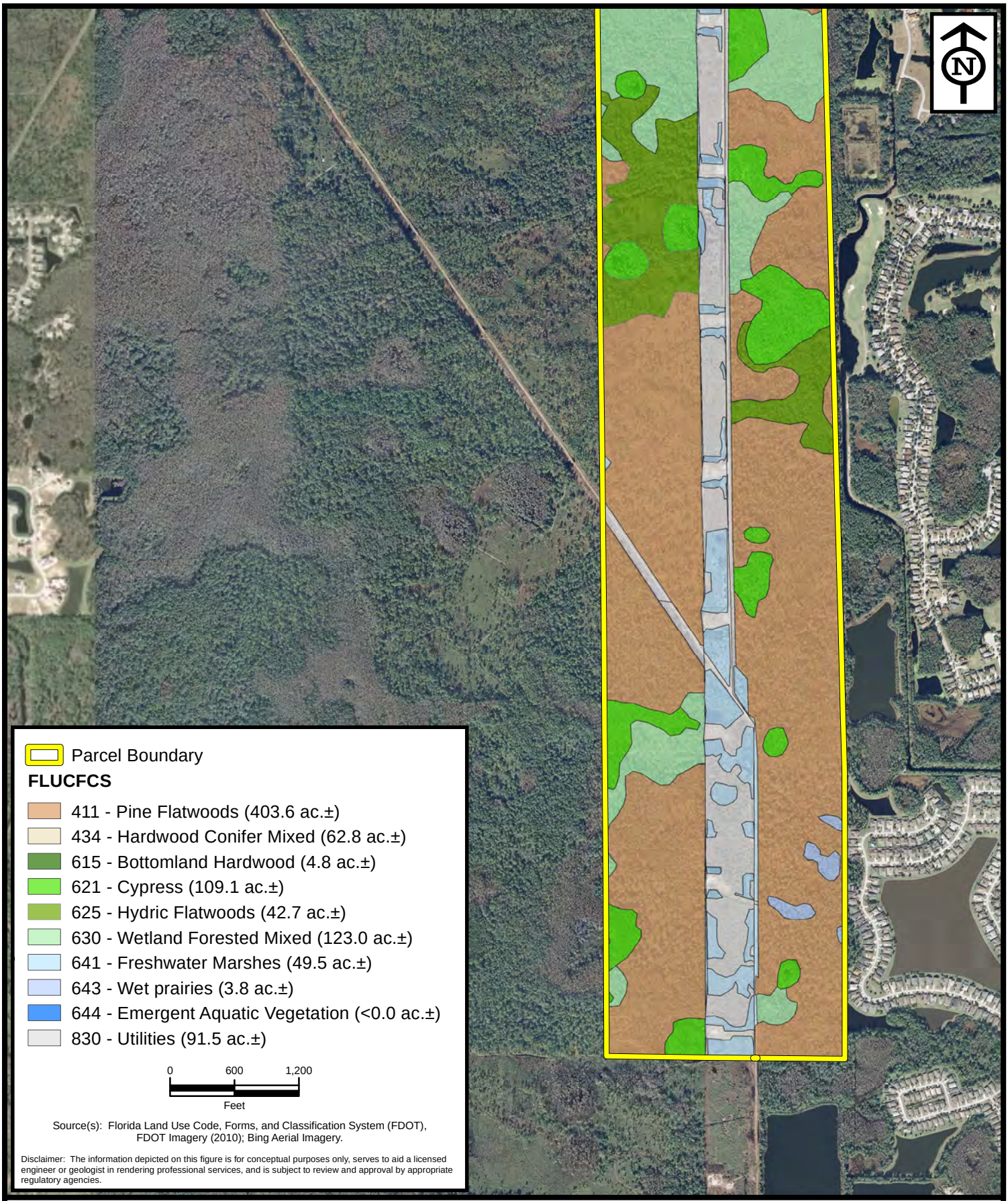
Existing Community Map

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	JGB/JRN
Figure:	**7-4**

Path: Q:_Projects\EJ\2011\021\00\fig\Brooker\Report\FLUCFCS.mxd Date: 7/20/2011 11:06:19 AM



Source(s): Florida Land Use Code, Forms, and Classification System (FDOT), FDOT Imagery (2010); Bing Aerial Imagery.

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Existing Community Map

Brooker Creek Preserve Site

Pinellas County, Florida

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Figure:	**7-4a**

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Wetlands

1. Cypress (FLUCFCS code 621). The isolated wetlands on site consist primarily of cypress domes, along with other contiguous systems that are also dominated by cypress. Most of these wetlands are dominated by a canopy of pond cypress, with black gum and dahoon holly present as well. Many of these communities have fluctuating water levels and act as runoff storage for nearby uplands, resulting in little to no groundcover within most of the domes.

2. Wetland Scrub (FLUCFCS code 631). This community type represents the majority of the wetlands found within the TLC and consists primarily of low quality wetland species such as, willow wax myrtle and salt bush, along with invasive/exotic species such as torpedo grass, cattails, and primrose willow.

3. Wetland Forested Mixed (FLUCFCS 630). The wetland communities outside of the TLC are typically characterized by well-established wetland canopy species such as pond cypress and black gum. These are mature systems that help convey water across the Preserve and typically contain standing water. The groundcover species within most of these wetlands contain emergent aquatic species and other wetland shrubs such as fetter bush and button bush.

4. Freshwater Marsh (FLUCFCS 641). Several freshwater marsh systems are located throughout the TLC, mainly as a result from digging pits and other excavation areas used to construct the transmission line towers and the access road. These "borrow pit" areas typically contain standing water and aquatic vegetation such as pickerelweed, lemon bacopa (*Bacopa caroliniana*), soft rush (*Juncus effusus*), blue flag iris (*Iris virginica*), duck potato and water lilies. These areas typically only contain groundcover and aquatic vegetation due to regular herbicide maintenance to keep the shrub and tree species low under the transmission lines.

5. Utilities (FLUCFCS code 830). The remaining land use is attributed to the transmission line roads and other access/maintenance areas, such as the transmission tower pads. These areas contain little vegetation and are regularly utilized by

maintenance and service trucks associated with the regular maintenance of the transmission lines.

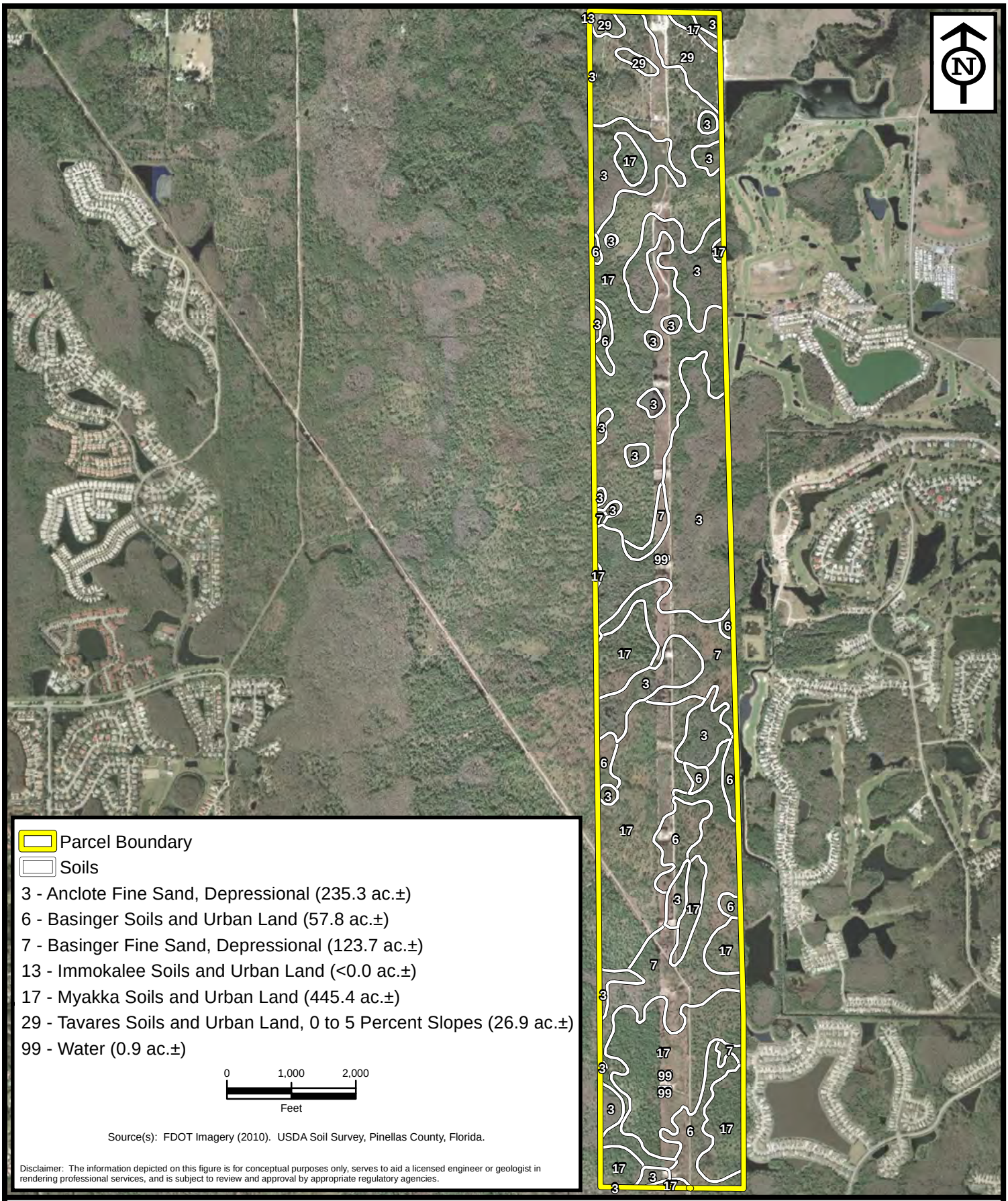
7.3.3 Soils

According to the NRCS soil map for Pinellas County, six soil types and water are present on the BCP site (Figure 7-5). The NRCS soil map was produced prior to the disturbance associated with the transmission line installation, so some areas have been significantly altered and are now displaying wetland characteristics where the survey indicates upland soils are present.

Table 7-2. Brooker Creek Preserve soil types

NRCS Soil Type	Hydric	Acreage
3 Anclote Fine Sand	Yes	235.3
6 Basinger	TBD*	57.8
7 Basinger Fine Sand, depressional	Yes	123.7
13 Immokalee	No	0.0
17 Myakka Sand	No	445.4
29 Tavares Sand, 0-5 % slopes	No	26.9
99 Water	No	0.9

**This soil type is typically not a hydric soil, however, this soil type is present in several wetland areas and may now be exhibiting hydric soil characteristics.*



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NRCS Soils

Brooker Creek Preserve Site

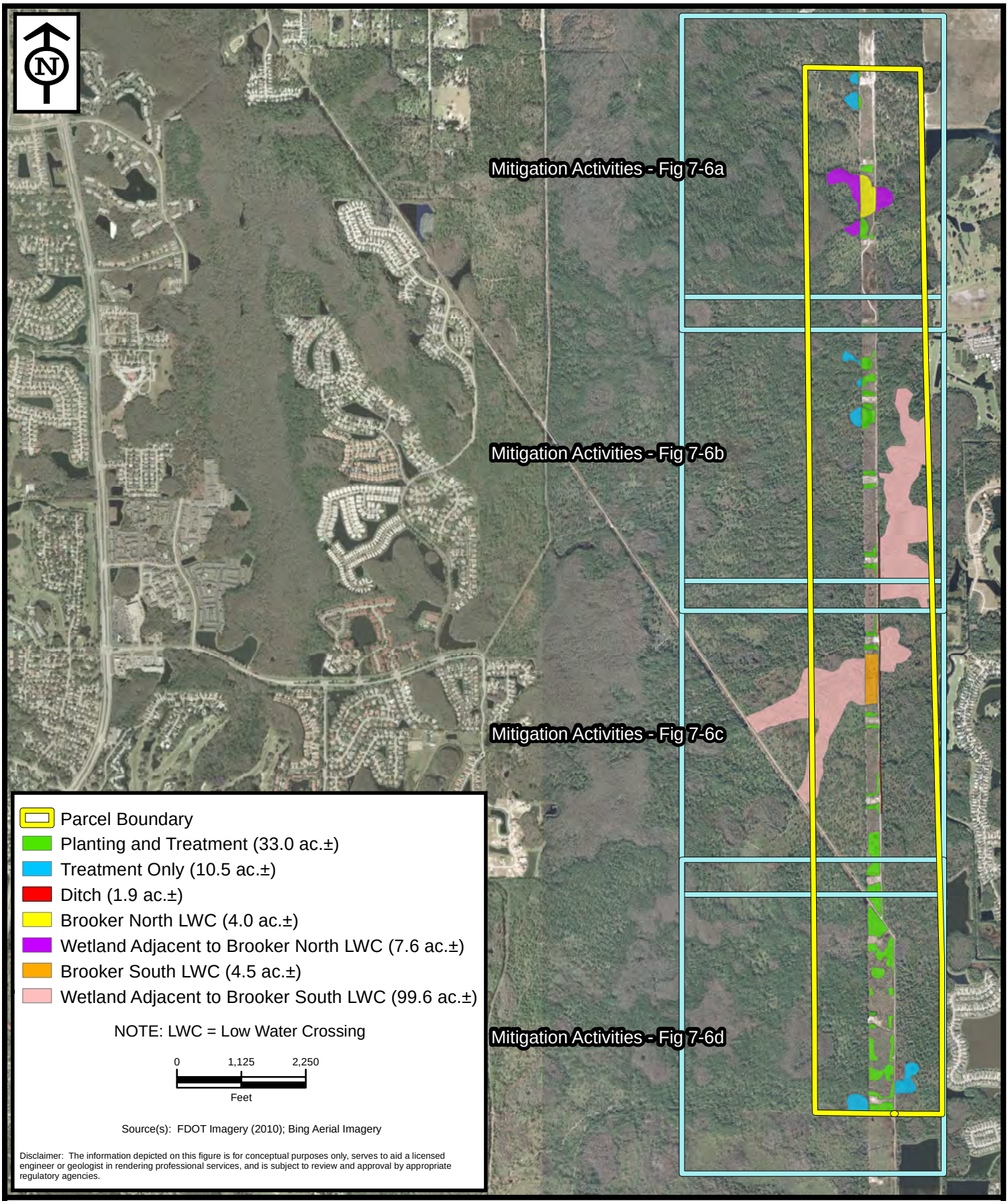
Pinellas County, Florida

Project:	EJ11021.00
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Figure:	**7-5**

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7.4 Mitigation Plan

The proposed mitigation plan for BCP consists of a combination of herbaceous wetland enhancement and hydrologic improvements to restore historic flow paths through the installation of LWC's. Several other land improvement projects are currently proposed throughout the rest of The Preserve that include wetland creation, wetland restoration and hydrologic improvements. The PEF plan has incorporate the goals of these projects into its planning to ensure that the plan developed satisfies both PEF and Pinellas County, while still satisfying the requirements of both the State and Federal agencies involved (Figure 7-6, 7-6a through 7-6d). The low water crossing locations are based on the review of historic aerial photographs, a map that is part of the Pinellas County Brooker Creek Preserve Management Plan, as well as limited groundtruthing, and confirmed through the hydrologic modeling (Figure 7-7).



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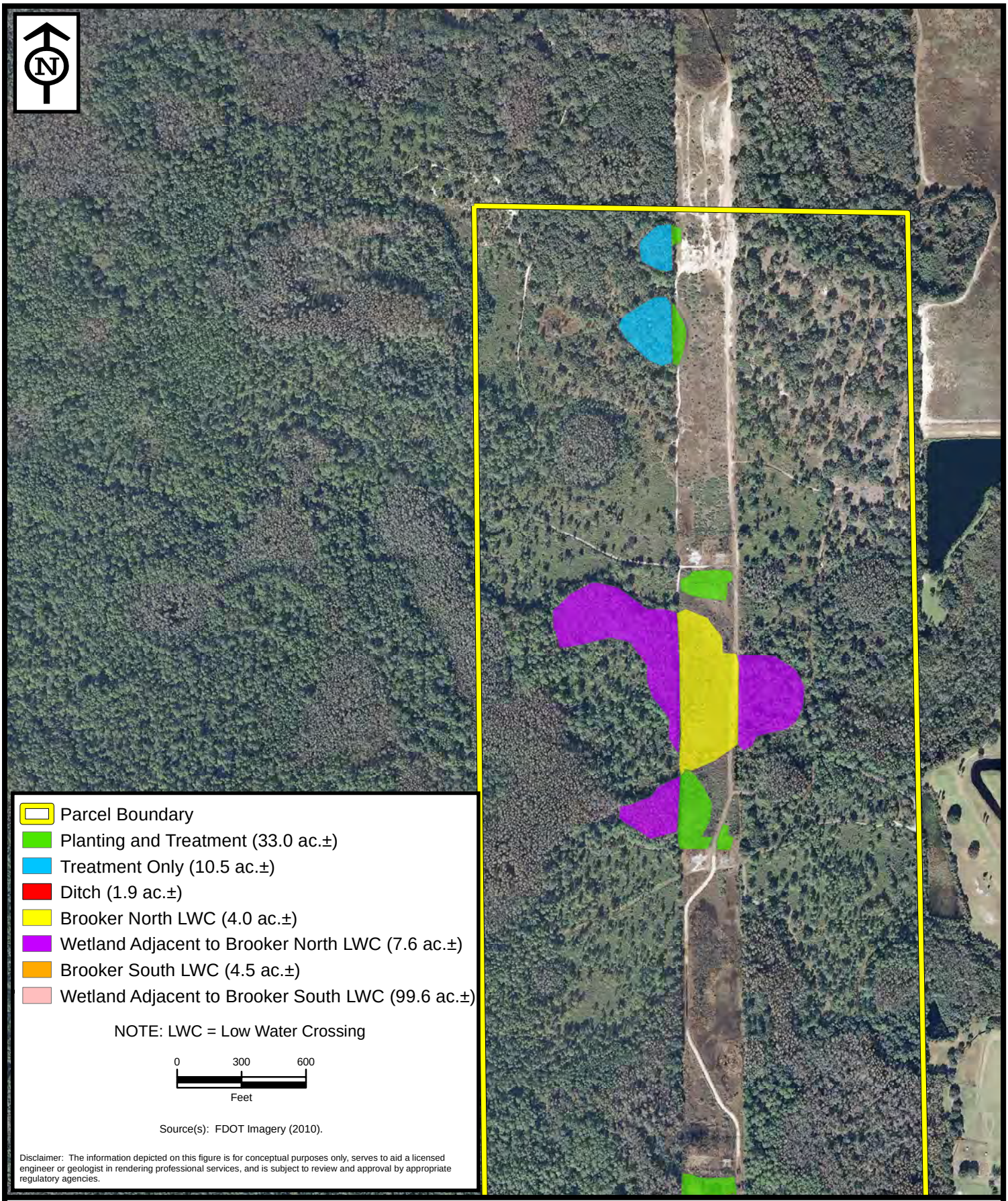
Proposed Mitigation Activities - Index

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	CRD/JRN
Figure:	**7-6**

Path: Q:_Projects\EJ\2011\021\00\fig\Brooker\Report\Mitigation_Index.mxd Date: 7/20/2011 11:50:00 AM



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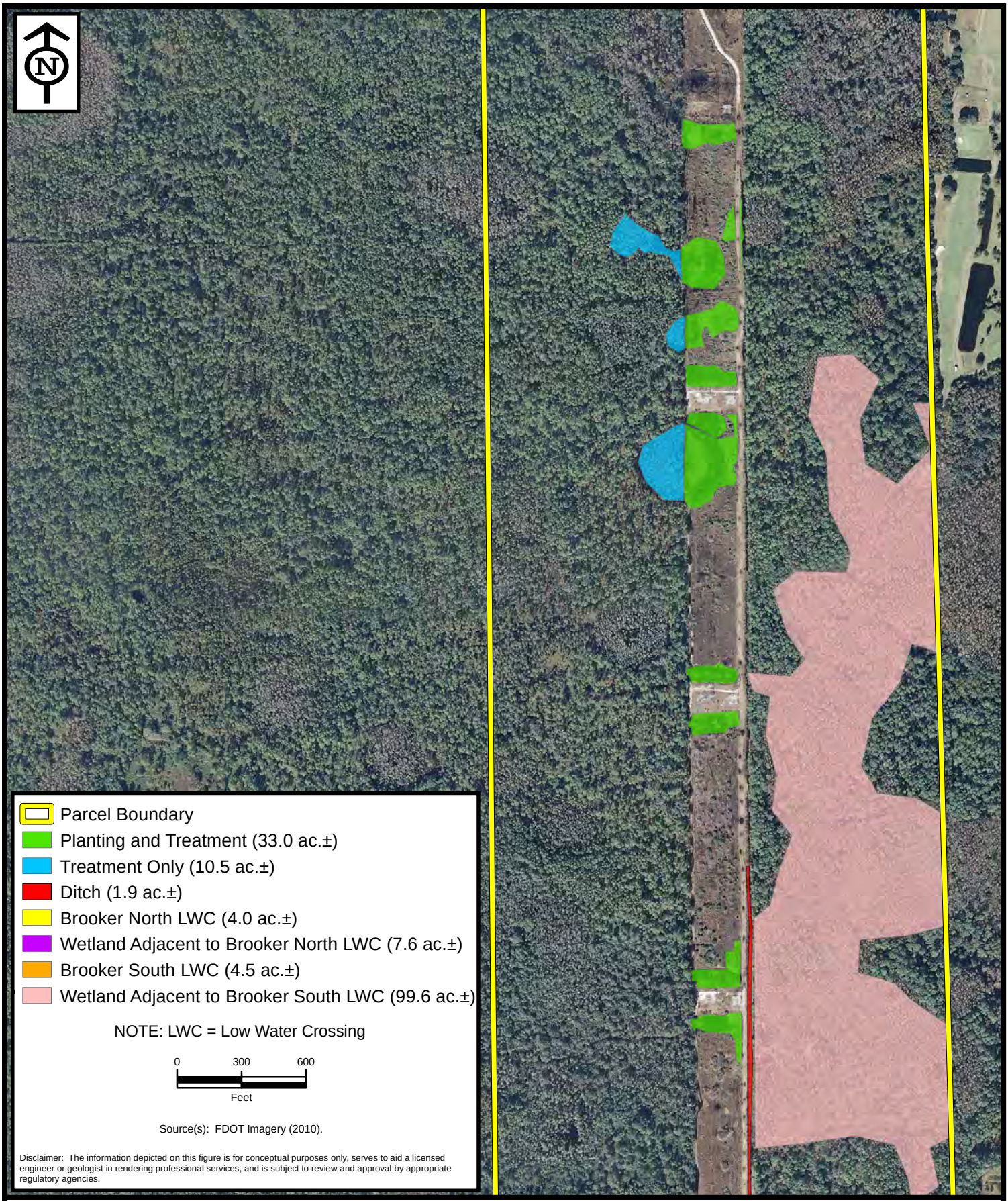
Proposed Mitigation Activities

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	CRD/JRN
Figure:	**7-6a**

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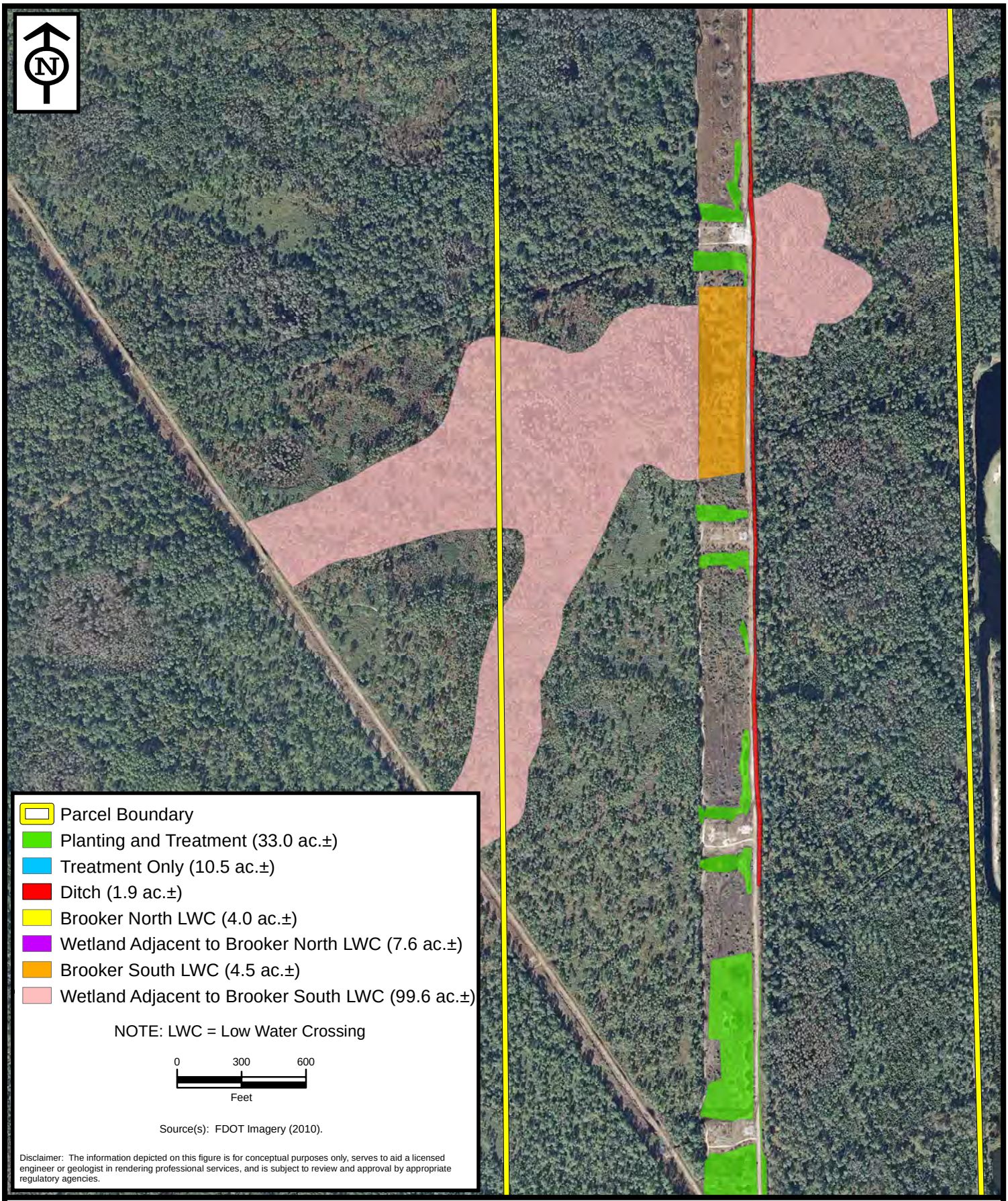
Proposed Mitigation Activities

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	CRD/JRN
Figure:	**7-6b**

Path: Q:_Projects\EJ\2011\021\00\fig\Brooker\Report\Mitigation_Sheets.mxd Date: 7/20/2011 11:53:43 AM



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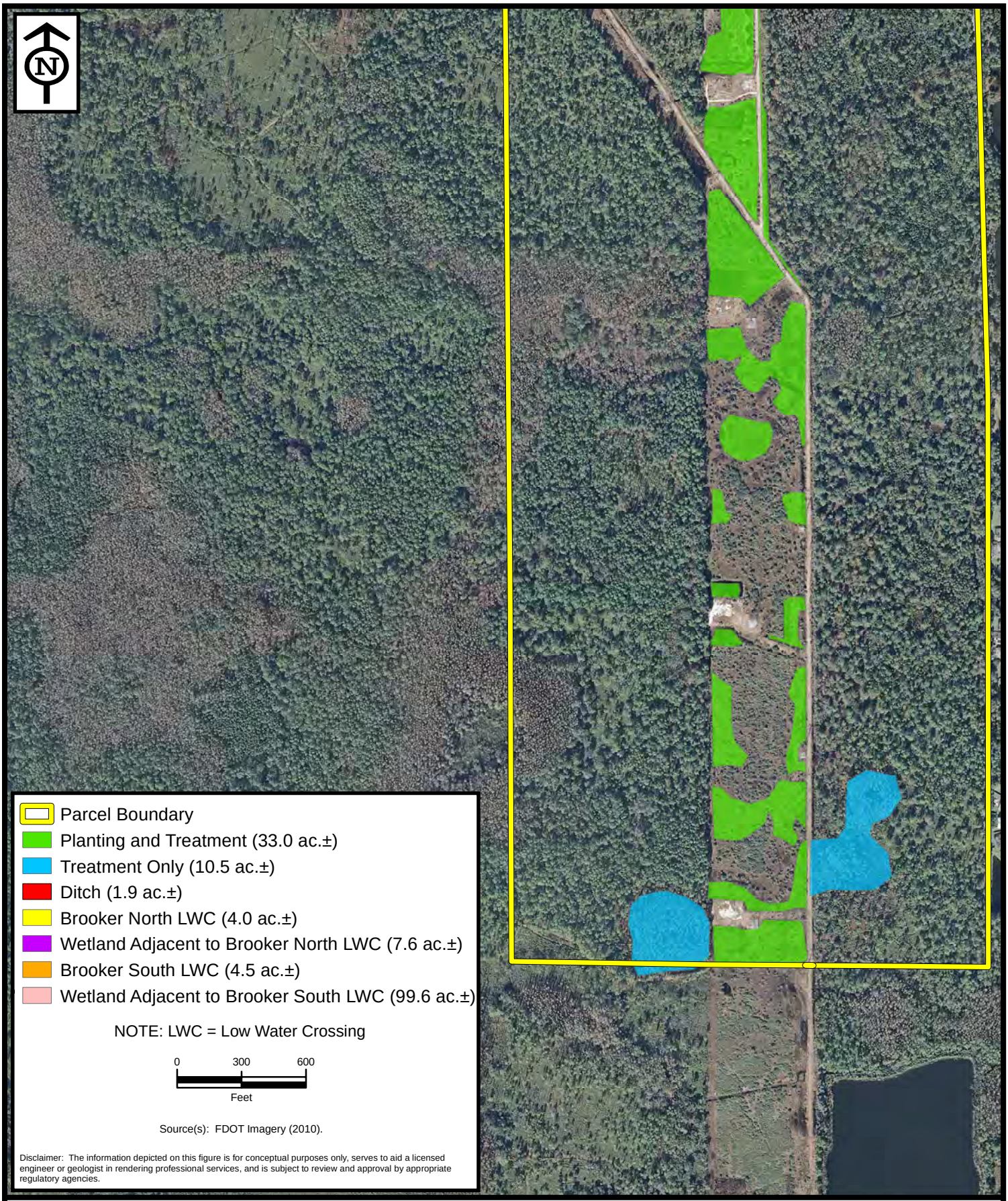
Proposed Mitigation Activities

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	CRD/JRN
Figure:	**7-6c**

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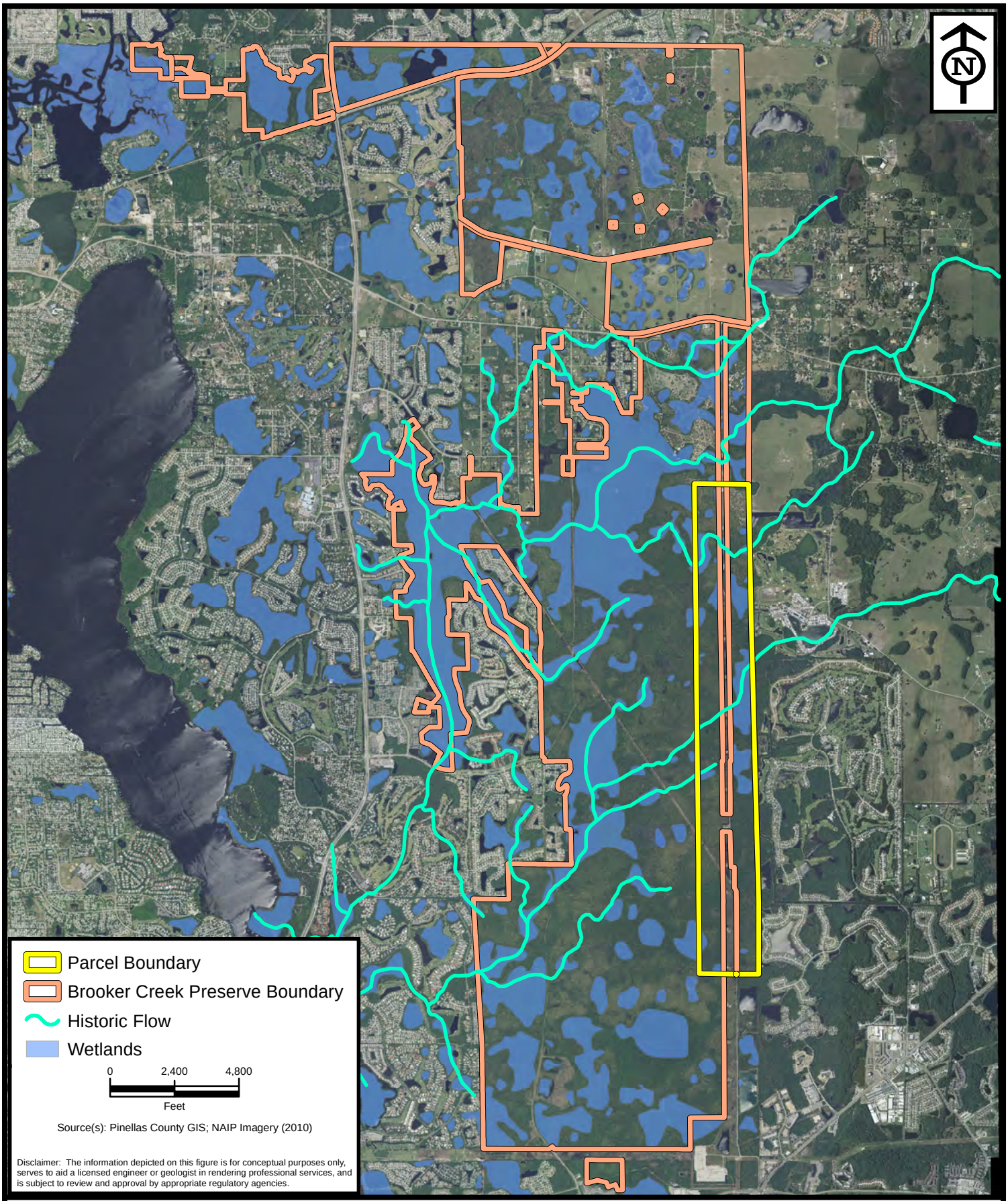
Proposed Mitigation Activities

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	CRD/JRN
Figure:	**7-6d**

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Historic Flow

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.00
Date:	Aug 2011
Drwn/Chkd:	JGB/JRN
Figure:	**7-7**

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1. Wetland Enhancement (treatment and planting). The proposed wetland enhancement is located in several wetland areas throughout the TLC. The enhancement will consist of a combination of treating existing populations of invasive/exotic species, and then planting emergent aquatic vegetation where necessary. Treatment of invasive/exotic species will include mainly the use of herbicides, but some mechanical removal may be necessary. Some areas will be excavated to remove the seed source and encourage additional hydrologic flow. Due to the varying sizes and conditions of the proposed enhancement areas, each wetland will be assessed individually to determine the best combination of treatment, excavation and planting. See Figures 7-6, 7-6a through 7-6d for details of the specific action for each wetland.

The wetland enhancement areas will be planted on three-foot centers at a density of 4,840 stems/acre with bare-root size Florida native aquatic plants including:

Pickerelweed
Duck potato
Soft rush
Maidencane
Fire flag

A total of 159,720 aquatic herbaceous plants will be installed within the wetland enhancement areas.

2. Wetland Enhancement (treatment only). Some of the wetlands that contain invasive/exotic species are strand wetlands that are located both within the TLC and the adjacent areas. These wetlands have an established seed source within the open canopy areas. UMAM credits are being sought for the treatment and removal of these species and removing the seed source as a possible source of contamination for the rest of the adjacent wetland. This is only being proposed for wetlands that are on the west side of the TLC and are hydrologically connected to the areas within the TLC. See Figures 7-6, 7-6a through 7-6d for details of the specific wetlands that will receive benefit from this treatment.

3. Ditch Treatment Area. A large ditch is located along the eastern side of the access road within the TLC which totals 1.9 ac. This ditch is the result of the construction of the access road, during which the fill excavated from the ditch was used to construct the elevated road. This ditch contains the nuisance species cattails throughout it and is spreading the seed source into other adjacent wetlands. The cattails within the ditch will be treated using aquatic herbicides on a regular basis until the cattails and their seed source reach the success criteria within the monitoring period.

4. Low Water Crossings. Two LWC (Brooker North LWC and Brooker South LWC) are proposed within the TLC to help restore historic flow patterns for tributaries that ultimately convey water from the east across The Preserve towards Lake Tarpon. These historic flow patterns were identified and established in the Pinellas County Brooker Creek Preserve management plan. The two proposed LWC will help to reestablish these historic connections and improve water quality within the Brooker Creek system. Wetlands adjacent to the proposed LWC will be enhanced by restoring a more historic hydrologic regime due to the removal of the raised roadway. The presence of the raised roadway has resulted in several pooled areas which now contain a monoculture of cattails. These areas will be treated once the LWC is installed and additional planting will occur, if an acceptable level of natural regeneration does not occur. Wetlands both upstream and downstream of the proposed LWC's will be enhanced through additional hydrologic flow, higher aquatic wildlife usage, an increase in plant diversity and by creating more sheet flow throughout the area. For details please see Section 7.11 for Engineering and Planting Detail Drawings.

7.5 Hydrology & Hydraulics

7.5.1 Objective

The hydrologic and hydraulic engineering analysis for the BCP simulated existing and proposed project condition. The results demonstrated improved flow patterns that better represent historic, unaltered conditions at sites within The Preserve. These improvements (proposed project conditions) addressed mitigation modifications – including re-grading existing road and establishing low-water crossings of wetlands – at two sites. The first mitigation site referred to as Brooker North LWC, located west of Silver Dollar Ranch Golf Club (see Figure 7-8), involves construction of a 140-feet wide low-water crossing along PEF's transmission corridor service road. The second mitigation site referred to as Brooker South LWC, located west of Eagles Golf Course Club (see

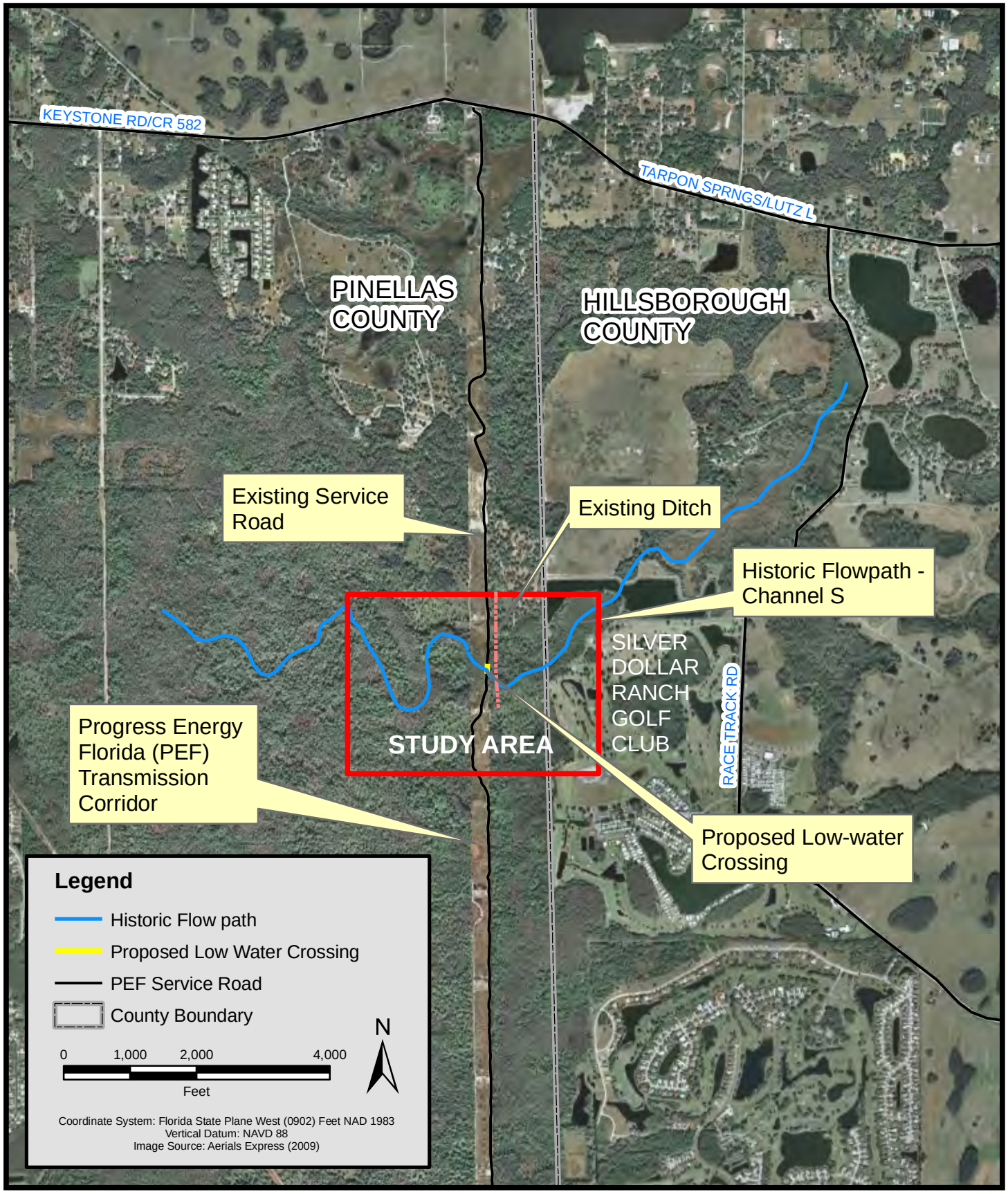
Figure 7-9), involves construction of a 300-feet wide low-water crossing along PEF's transmission corridor service road. To demonstrate improved water movement, a hydrologic and hydraulic modeling analysis was conducted for these two mitigation sites as described below.

7.5.2 Model Setup

This study applied two separate models – one for the Brooker North LWC site and another for the Brooker South LWC site. The Brooker North LWC site was modeled with the U.S Army Corps of Engineers Hydrologic Engineering Center's River Analysis System (HEC-RAS version 4.1) to simulate conveyance, and flooding conditions in the Brooker North LWC mitigation area. This HEC-RAS model was created using data from a SWFWMD model for the Brooker Creek watershed (SWFWMD, 2009) called Hillsborough Stormwater Management Model (HC-SWMM). HC-SWMM is a one-dimensional, dynamic rainfall runoff model that estimates runoff from the selected storm events based on NRCS Runoff CN method and routes the flow hydrographs through a drainage system represented as a series of links and nodes. HC-SWMM model for the Brooker Creek watershed provided the rainfall-runoff flow hydrographs at various locations within the mitigation site.

Currently, for the Brooker South LWC site, the elevated service road located along the eastern edge of the transmission corridor acts as a basin divide and blocks the sheet flow of water that historically crossed the corridor. Based on an initial assessment of the topography (LiDAR surveys), the north-south ditch running along the service road intercepts the westerly sheet flow of water from the forested wetland located east of the corridor, and drains south along the corridor outside the study area. The construction of a low-water crossing would divert a portion of the southerly flow to the west into the historical Channel GG if an appropriate water surface gradient across the service road allowed such diversion. A one-dimensional model would not be able accurately simulate these multi-dimensional flow paths and demonstrate the presence of an appropriate water surface gradient. In fact, the low water crossing might create an undesirable easterly flow from the wetland west of the service road into the ditch if water levels west of the service road are sufficiently high. Due to the complex flow pattern of sheet flow within the study area, combined with the presence of the elevated road and ditch, it is necessary to evaluate these multi-dimensional flow patterns with a two-dimensional model. Hence, the Brooker South LWC site was modeled with the Danish Hydraulic Institute's two-dimensional hydro-dynamic model, MIKE 21. MIKE 21 demonstrated the desired flow

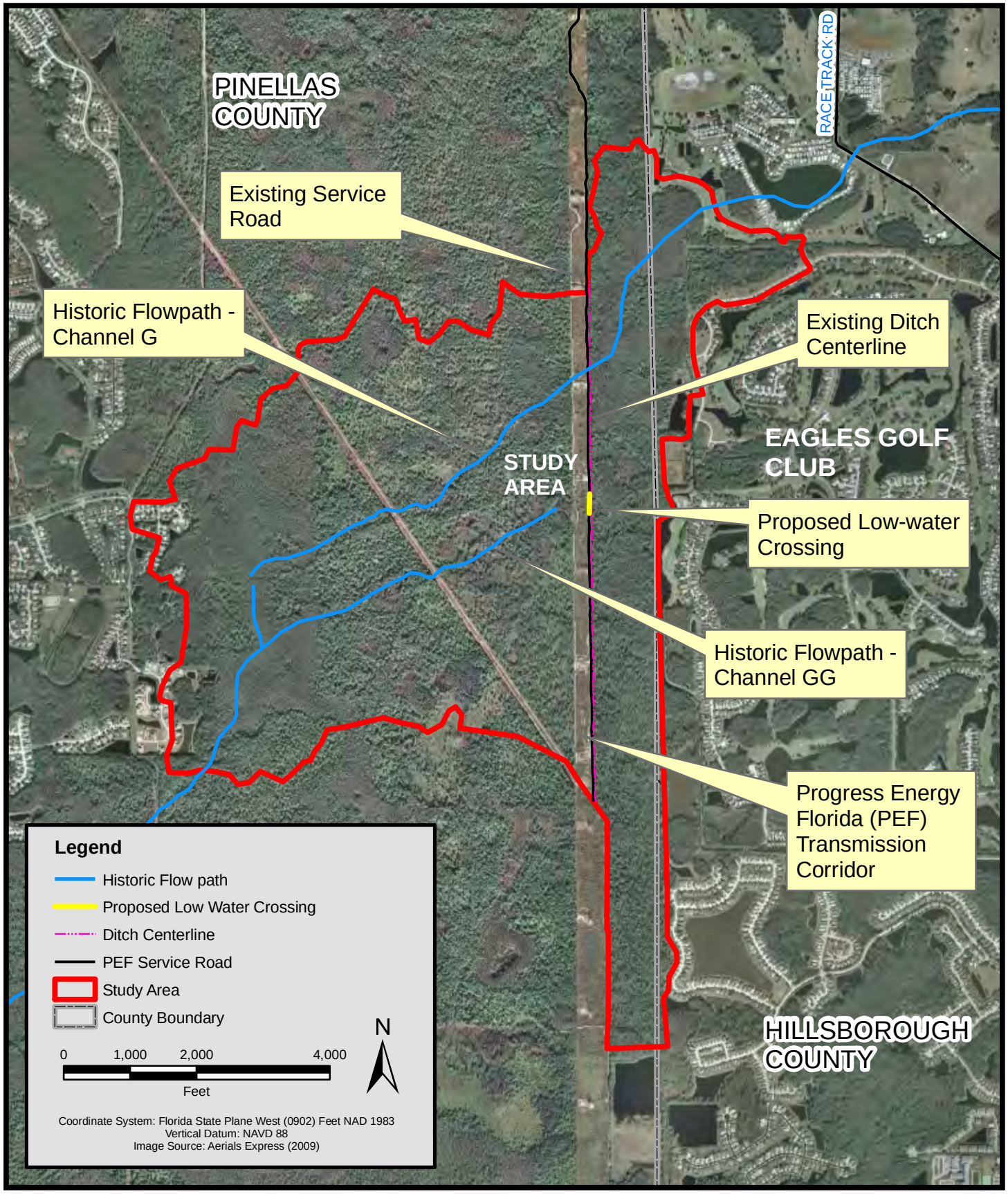
diversion was feasible and better defined the areas by sheet flow flooding. As with the Booker North LWC site, the SWFWMD's HC-SWMM model for Brooker Creek watershed provided the rainfall-runoff flow hydrographs at various locations within the Brooker South LWC mitigation site. This section describes the hydrology and hydraulic input parameters for each mitigation site.



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Study Area - Brooker North LWC
Brooker Creek Preserve Site
Pinellas County, Florida

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FIGURE	7-8
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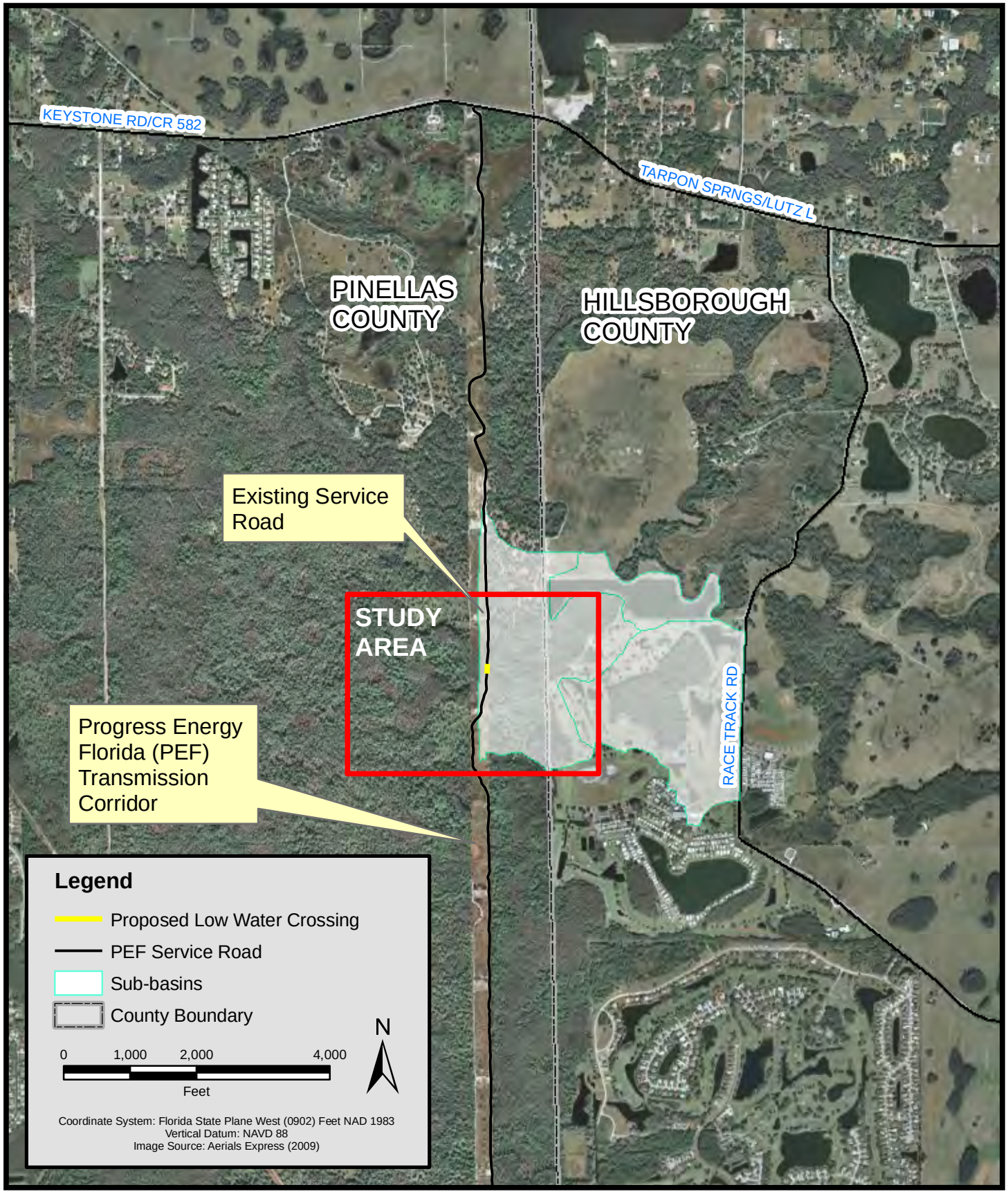
Study Area - Brooker South LWC
Brooker Creek Preserve Site
Pinellas County, Florida

PROJECT	C2011-025
FIGURE	7-9
DRAWN BY	RP
DATE	JULY 2011

Brooker North LWC

The service road located along the eastern side of PEF's transmission corridor blocks the natural sheet flow of water that historically crossed the corridor into Channel S (see Figure 7-8). The road elevations are about 2-4' higher than the surrounding grade. A ditch located east of the service road runs parallel to the road and captures the flow coming from the easterly wetland along the historic Channel S. Water fills up the ditch and overflows the road only when the water level in the ditch exceeds the road elevations. In the current existing condition, the water level in the ditch does not overtop the road regularly. In order to restore the historic Channel S, it is necessary to re-establish a continuous sheet flow of water between the eastern and western wetland forests located on either side of the road. The proposed LWC located along the service road would allow for continuous passage of sheet flow of water, there by connecting the wetlands along the historic flow path. A one-dimensional hydraulic model was developed with HEC-RAS model to demonstrate the effects of LWC in restoring the historic sheet flow.

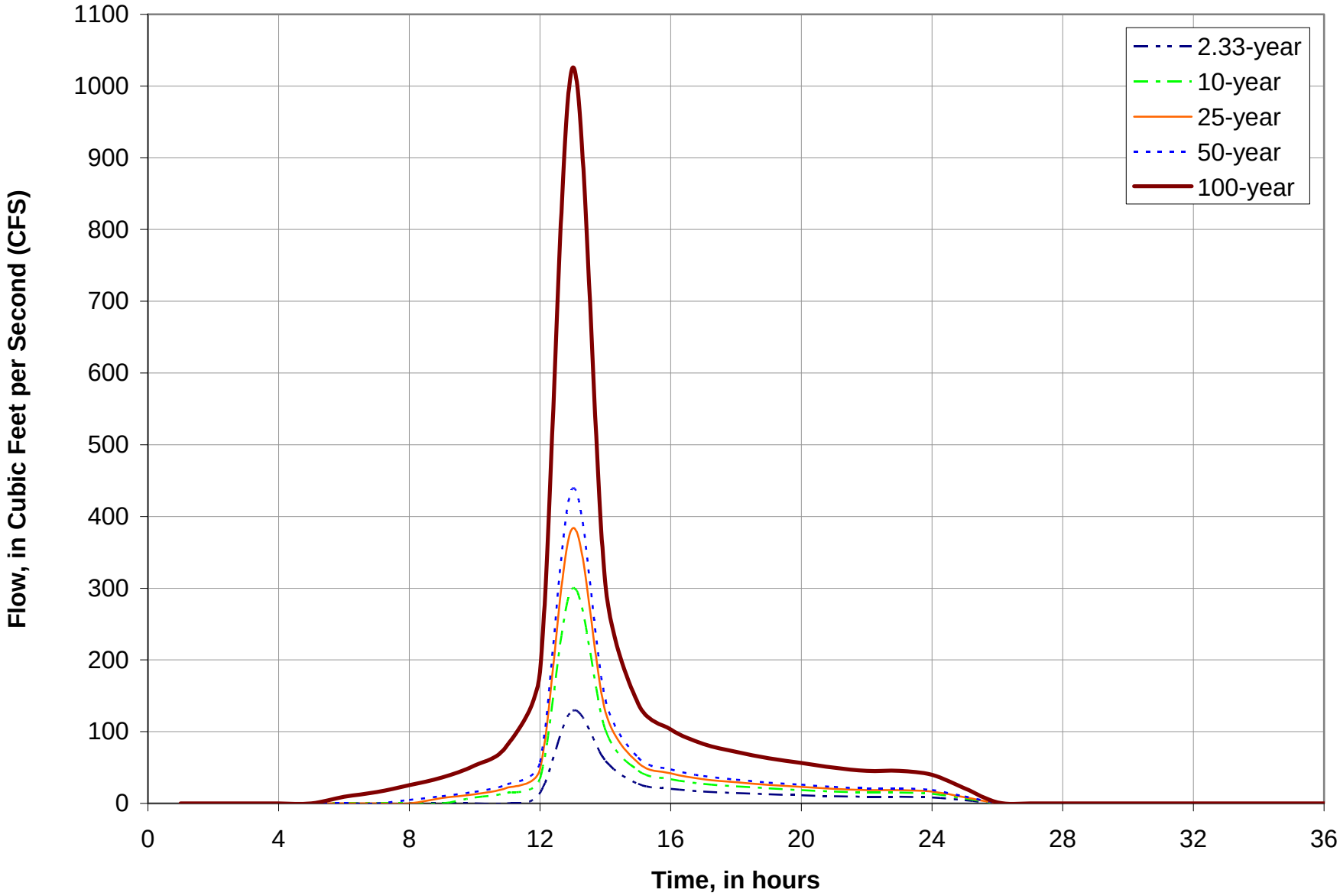
1. Hydrology inflows from HC-SWMM model. Brooker North LWC receives flows from an area covering 278 acres located east of transmission line corridor. As seen from Figure 7-10, three sub-basins drain water from the east of the transmission corridor towards PEF's service road. Flow hydrographs from the district's HC-SWMM model provides the necessary boundary condition for the hydraulic model. Figure 7-11 shows the flow hydrographs for the 2.33-, 10-, 25-, 50- and 100-year storm events. The HEC-RAS model uses these inflow hydrographs as a boundary condition for existing and proposed conditions models.



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Sub-basins Map for Brooker North LWC
Brooker Creek Preserve Site
Pinellas County, Florida

PROJECT	C2011-025
FIGURE	7-10
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DATE	JULY 2011



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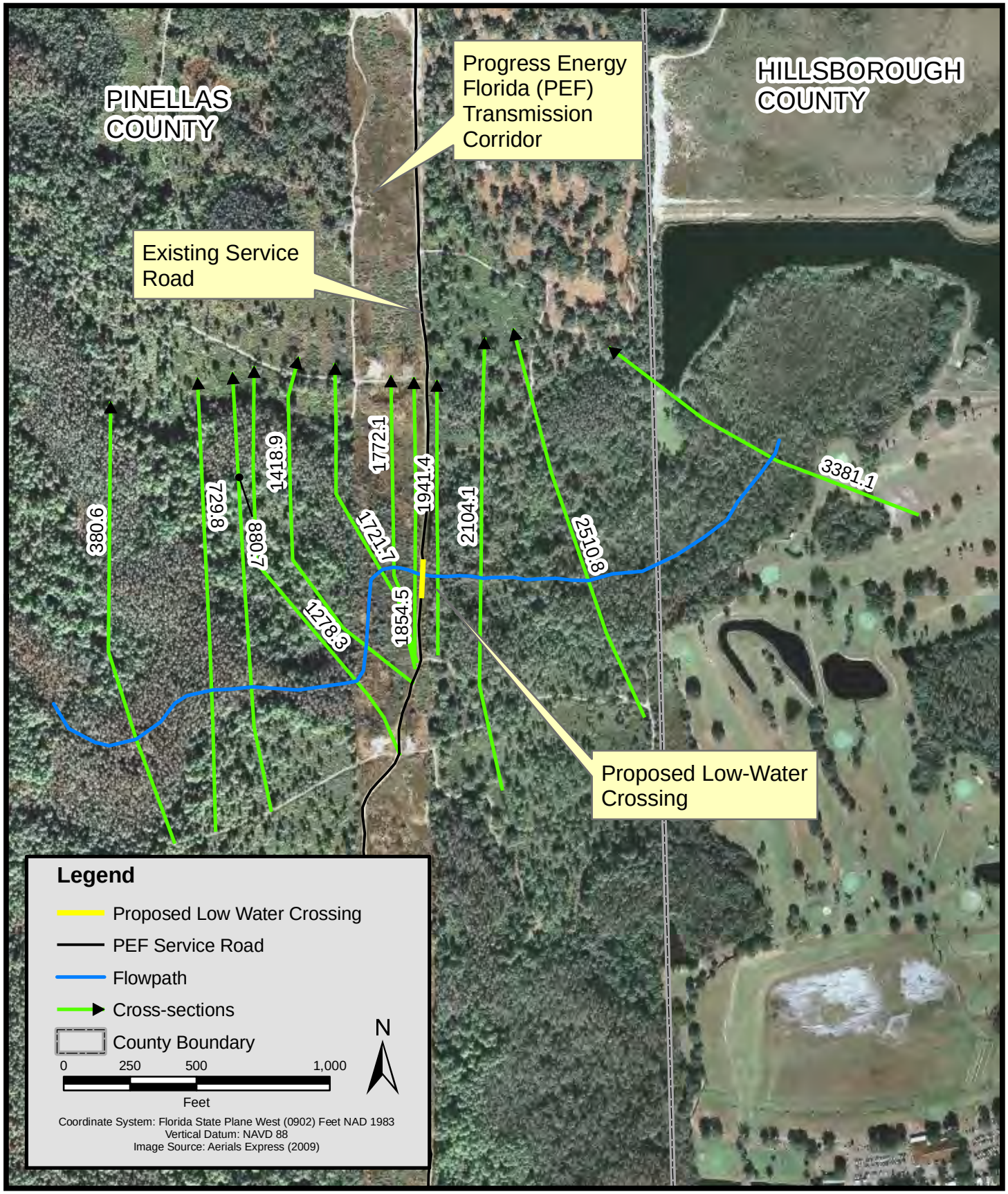
Inflow Hydrographs for Brooker North LWC
Brooker Creek Preserve Site
Pinellas County, Florida

PROJECT	C2011-025
FIGURE	7-11
DRAWN BY	RP
DATE	JULY 2011

2. One dimensional hydraulic model (HEC-RAS) geometry. The HEC-RAS model applies a defined flow path with cross sections at specified distances. The cross section elevations assigned within the model reflect the LIDAR data collected by Florida Division of Emergency Management in 2007 (FDEM, 2007) and survey data collected by SurvTech Solutions Inc. in June 2011. Figure 7-12 shows the cross-section layout for the HEC-RAS model for existing and proposed conditions. Typical values of overland roughness co-efficient (also referred to as Manning's N co-efficient) for the various land use segments within our study area were obtained from widely published USGS report on Manning's N co-efficient (USGS, 1989).

3. One dimensional hydraulic model (HEC-RAS) boundary conditions. Two types of boundary conditions were applied within the HEC-RAS model. One boundary condition was the tailwater condition at the model outlet. It was assumed that the areas draining west of the transmission corridor would not affect the downstream boundary condition. Hence, a normal depth boundary condition corresponding to the slope of downstream area was used as a boundary condition at the model outlet.

The second boundary condition is the rainfall-runoff inflow hydrograph obtained from the district HC-SWMM model (see Figure 7-11). This inflow hydrograph was applied at the upstream end of the model boundary. The HEC-RAS model routes the flows from the inflow hydrograph to estimate the flow and stage at different cross-sections within the model domain.



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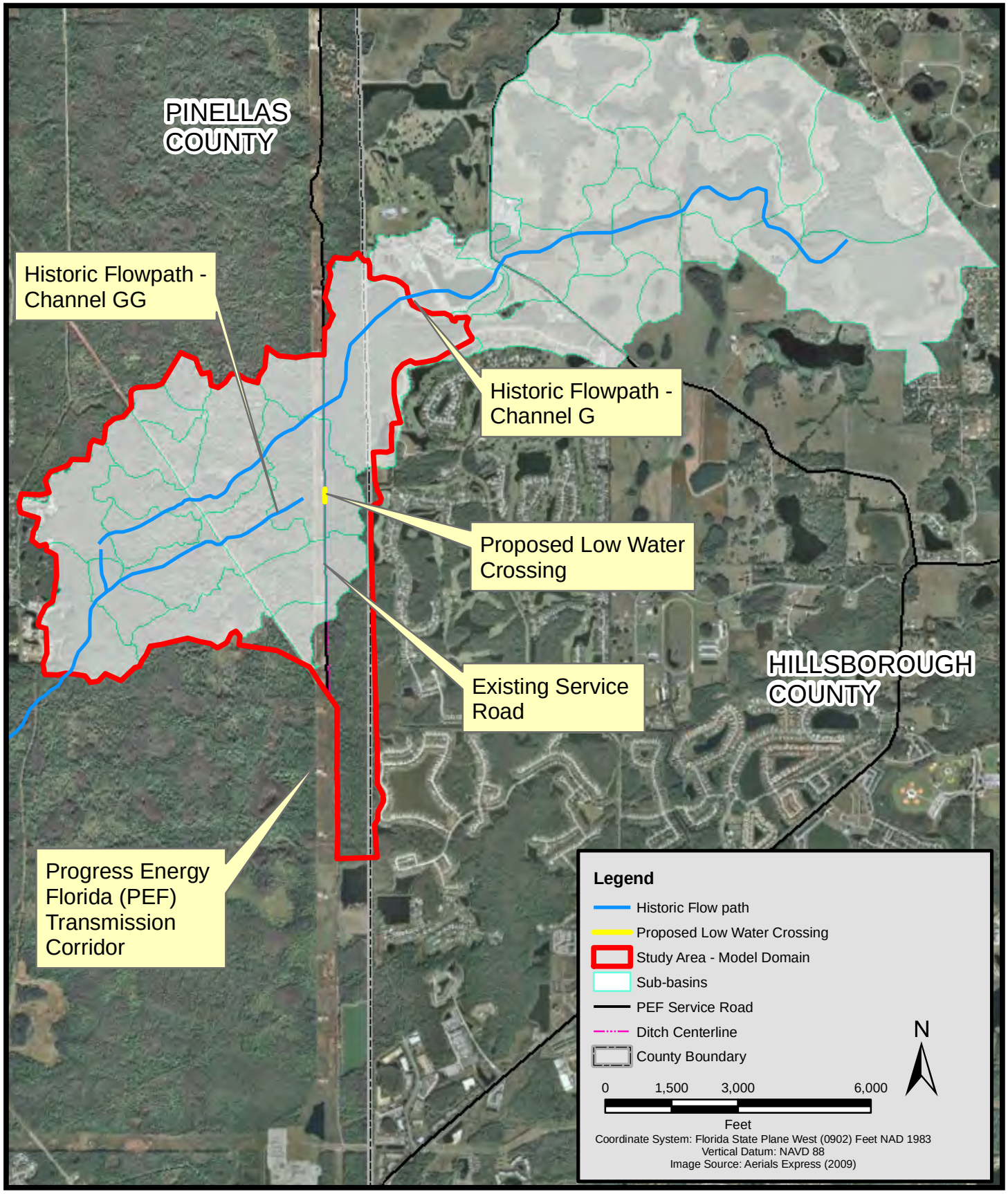
HEC-RAS Model Cross-sections for Brooker North LWC
Brooker Creek Preserve Site
Pinellas County, Florida

PROJECT	C2011-025
FIGURE	7-12
DRAWN BY	RP
DATE	JULY 2011

Brooker South LWC

The objective of the Brooker South LWC is to evaluate the feasibility of re-establishing the historic sheet flow between the wetland areas located east and west of the transmission corridor within The Preserve (see Figure 7-9). Currently, the elevated service road located along the eastern edge of the transmission corridor acts as a basin divide and blocks the sheet flow of water that historically crossed the corridor into Channel GG. Based on an initial assessment of the topography (LiDAR and surveys), the ditch intercepts the westerly sheet flow of water from the wetland located east of the corridor, and drains south along the corridor. Due to the complex flow pattern of sheet flow within the study area, combined with the presence of the elevated road and ditch, it was necessary to evaluate the flow patterns with two-dimensional model. A two-dimensional model was developed using DHI's MIKE 21 model to evaluate existing conditions flow paths and to demonstrate the restoration of historic Channel GG by constructing a low-water crossing along the service road.

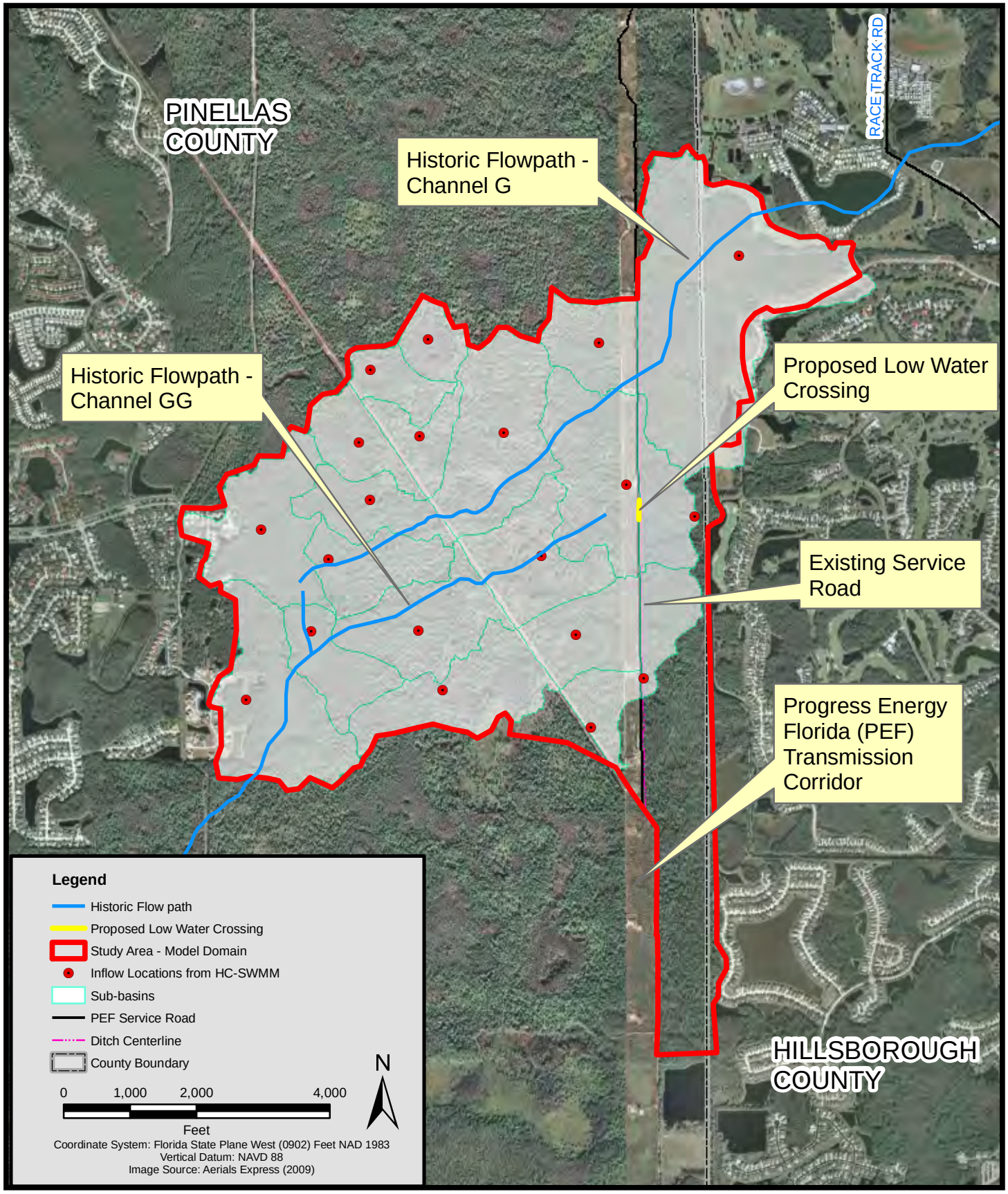
1. Hydrology inflows from HC-SWMM model. Brooker South LWC receives flows from a large area located east of TLC. As seen from Figure 7-13, 21 sub-basins encompassing an area of 1,476 acres drains water from the eastern section of the transmission corridor toward the service road. The SWFWMD's HC-SWMM model provided the inflow hydrograph that captures the flow coming into the model domain and for the 20 sub-basins located within the model domain. Figure 7-14 shows the location of inflow hydrographs used in the two-dimensional model for the 2.33-, 5-, 25-, 50- and 100-year storm events.



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Sub-basins Map for Brooker South LWC
Brooker Creek Preserve Site
Pinellas County, Florida

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FIGURE	7-13
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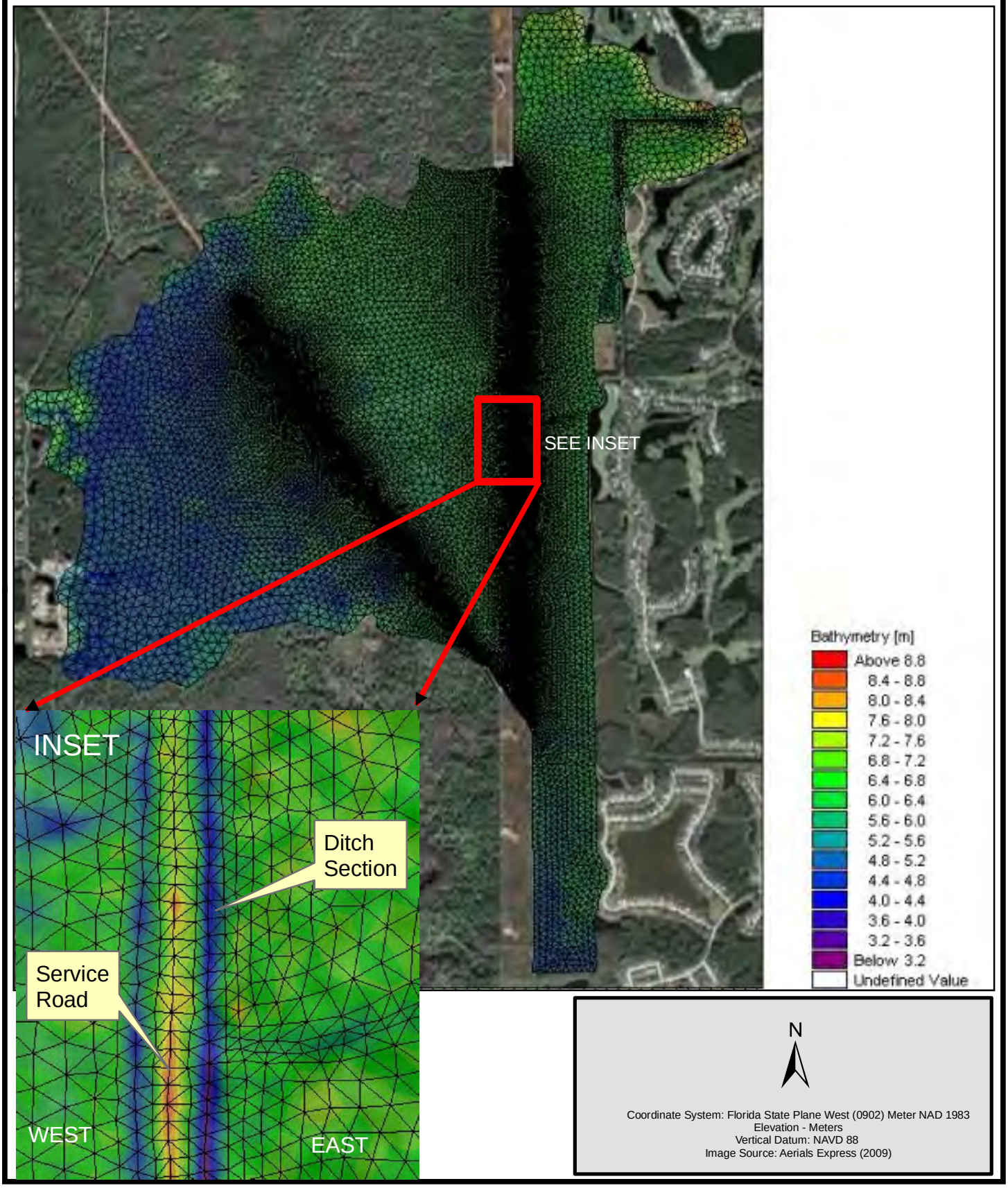
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Location of Inflow Hydrographs for Brooker South LWC
Brooker Creek Preserve Site
Pinellas County, Florida

PROJECT	C2011-025
FIGURE	7-14
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2. Two-Dimensional Model (MIKE-21) Mesh Development. Given the initial water surface elevations and the hydraulic conditions at the boundaries, MIKE21 model employs finite volume methods to compute the water surface elevation, and velocity magnitude and direction. A model mesh was developed in MIKE 21 to represent the ground topography within the Brooker Creek study area, the service road elevations, and the ditch sections as finite elements interpolated from LiDAR (FDEM, 2007) and surveys collected by SurvTech Solutions Inc. The Brooker South LWC model applies a 2-D finite volume mesh that includes more than 19,000 nodes, 38,000 elements (see Figure 7-15), and a spatially varying Manning's bottom friction roughness coverage to execute the hydrodynamic flood routing computations. Smaller elements were applied to capture details of critical flow way and flow obstruction such as roadways, ditches and embankments (see inset in Figure 7-15). Typical values of Manning's roughness co-efficient for the various land use segments within our study area were obtained from widely published USGS report on Manning's N co-efficient (USGS, 1989).

The mesh used for existing conditions was modified to reflect the LWC in the proposed conditions. For proposed conditions, the elevations of the mesh elements located along the proposed LWC were modified to represent a 300 feet wide LWC section at an elevation of 20.5ft-NAVD88. Note that because of limitations in model computation and availability of data, the model meshes do not reflect culverts and fire break trails in the project area. The exclusion of these structures does not significantly affect model results at flood rise and peak flow because the flow is negligible through these structures.



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MIKE 21 Model Mesh for Brooker South LWC
Brooker Creek Preserve Site
Pinellas County, Florida

PROJECT	C2011-025
FIGURE	7-15
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DATE	JULY 2011

3. Two-Dimensional Model (MIKE-21) Boundary Conditions. The model boundary conditions applied inflow hydrographs from HC-SWMM model within the model domain (see Figure 7-14) and a land-boundary condition along the southern and western edges of the model domain. By specifying a land-boundary, the MIKE 21 model does not allow the water to leave the model domain boundary. Since the ground elevations at the northern and eastern boundaries are at significantly higher than the surrounding ground, it was assumed that water would not overtop the boundary. Hence, the northern and eastern boundaries do not require a land boundary condition. In spite of the ground elevations being lower than the surrounding ground along the southern and western edges of the model, a land boundary condition was applied since these model boundaries are far away from the LWC site and backwater effects can be neglected.

7.5.3 Model Results

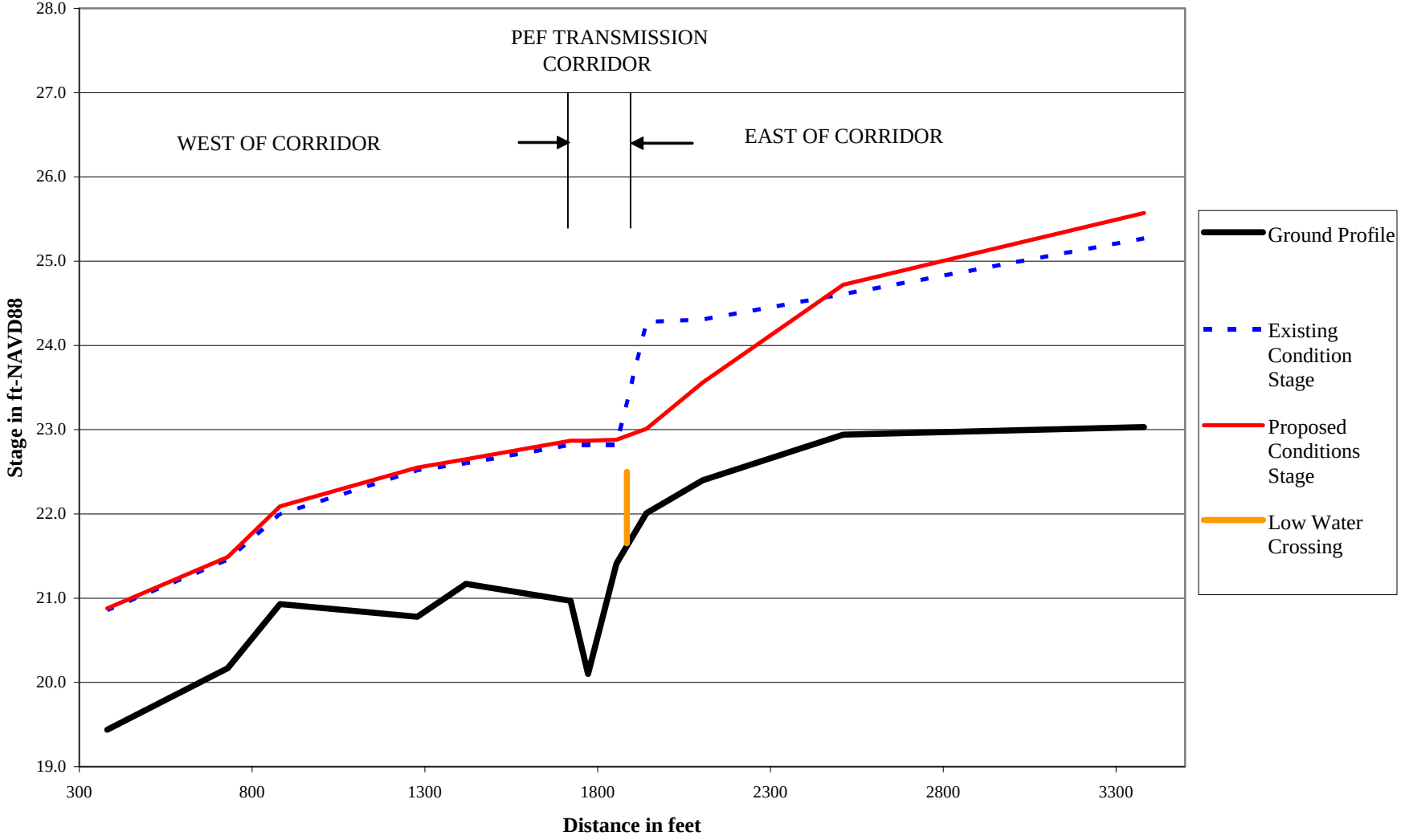
The HEC-RAS model was applied to the Brooker North LWC area for five rainfall events representing the 2.33-, 10-, 25-, 50-, and 100-year return periods. The MIKE-21 model was applied to the Brooker South LWC area for five rainfall events representing the 2.33-, 5-, 25-, 50-, and 100-year return periods. The model was applied to both existing (pre-construction) and proposed (post-construction) conditions. The post-construction conditions represent the proposed LWC at each site within the system (more details about the modifications are provided in the civil design section of this report). Comparison of the pre- and post-construction model results at each mitigation site demonstrate the improved flow conveyance gained from the construction of LWC. A detailed description of the results for each mitigation site is described in the following sections.

Brooker North LWC

Figures 7-16 through 7-20 shows the water surface profile for the 2.33-, 10-, 25-, 50-, and 100-year storm events in existing and proposed conditions. As seen from Figure 7-16, by constructing the LWC, the head loss across the road decreases from 1.5’ to 0.1’ for the 2.33-year storm event. The LWC allows for additional volume of water to pass over the road to restore the natural sheet flow along the historic Channel S and, thereby reducing the back-up of water upstream of the road. This increase in 2.33-yr event flow and decrease in head loss will better

represent historical conditions. As seen from figures 7-17 and 7-18, the model results for the 10- and 25-year storm events show similar decrease in head loss across the road. The model results show a negligible decrease in head loss across the road for the 50- and 100-year events.

2.33-year storm event - Profile of peak stages in Existing and Proposed Conditions

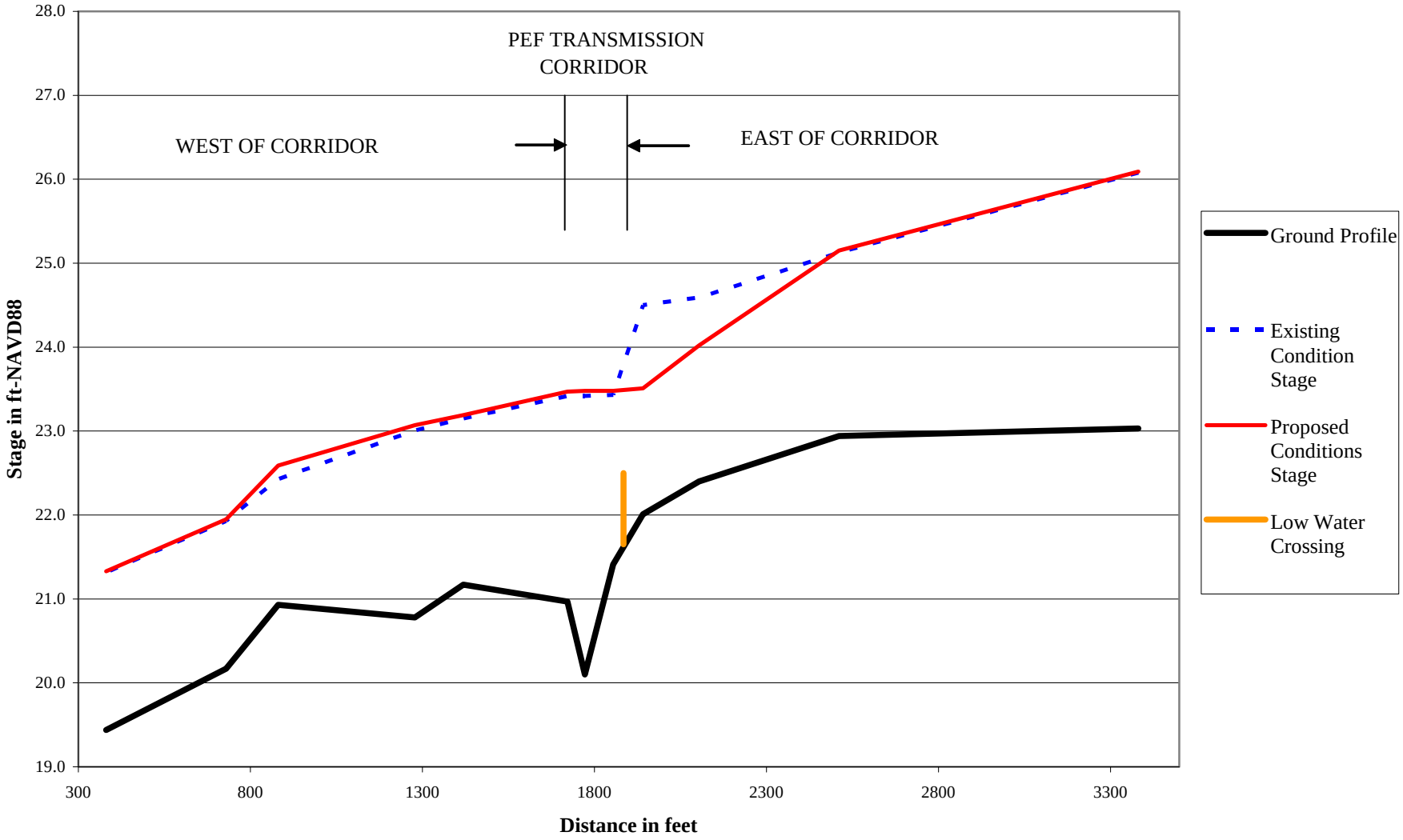


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Water Surface Profile in Existing and Proposed Conditions for 2.33-year Storm Event at Brooker North LWC
Brooker Creek Preserve Site
Pinellas County, Florida

PROJECT	C2011-025
FIGURE	7-16
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DATE	JULY 2011

10-year storm event - Profile of peak stages in Existing and Proposed Conditions

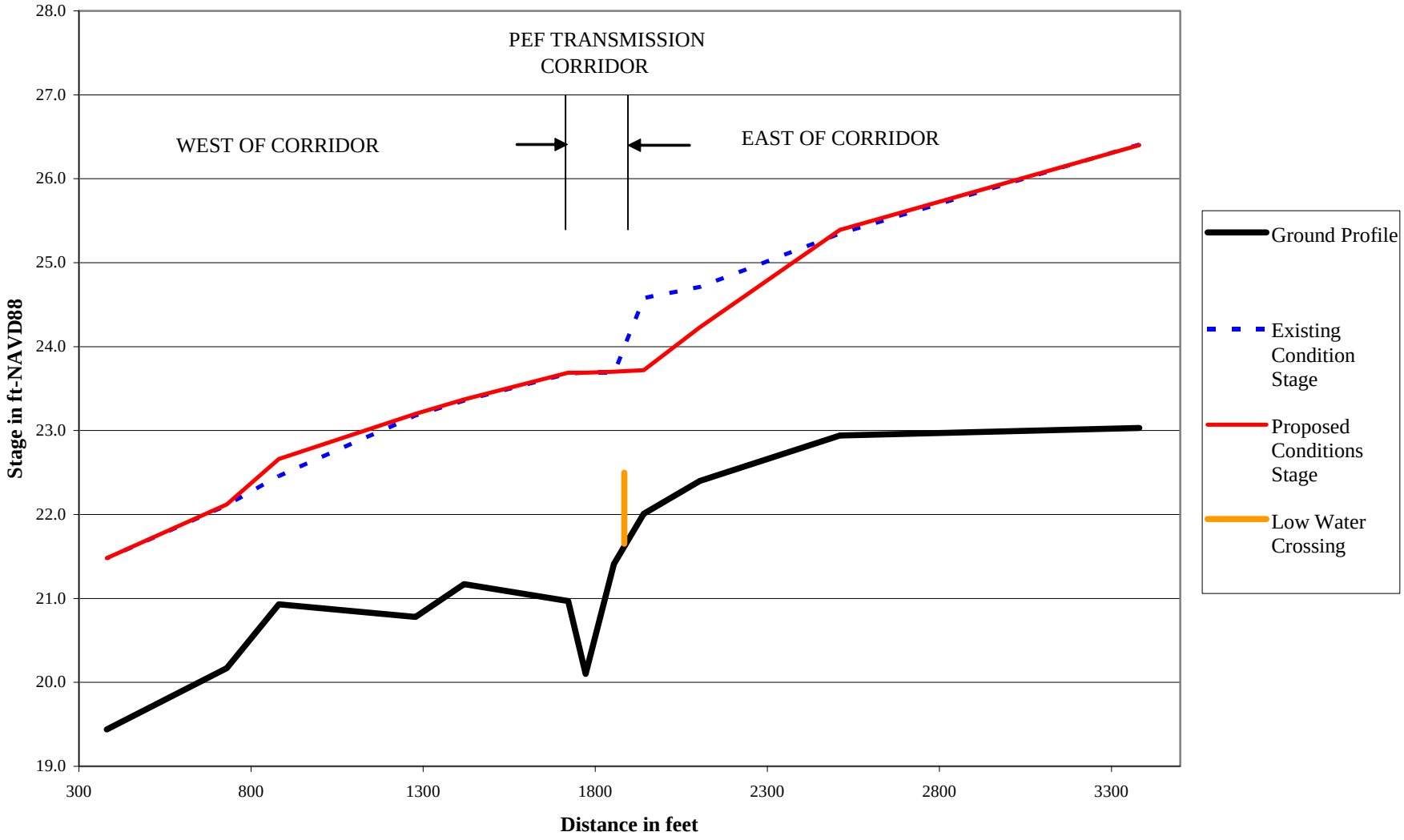


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Water Surface Profile in Existing and Proposed Conditions for 10-year Storm Event at Brooker North LWC
Brooker Creek Preserve Site
Pinellas County, Florida

PROJECT	C2011-025
FIGURE	7-17
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25-year storm event - Profile of peak stages in Existing and Proposed Conditions

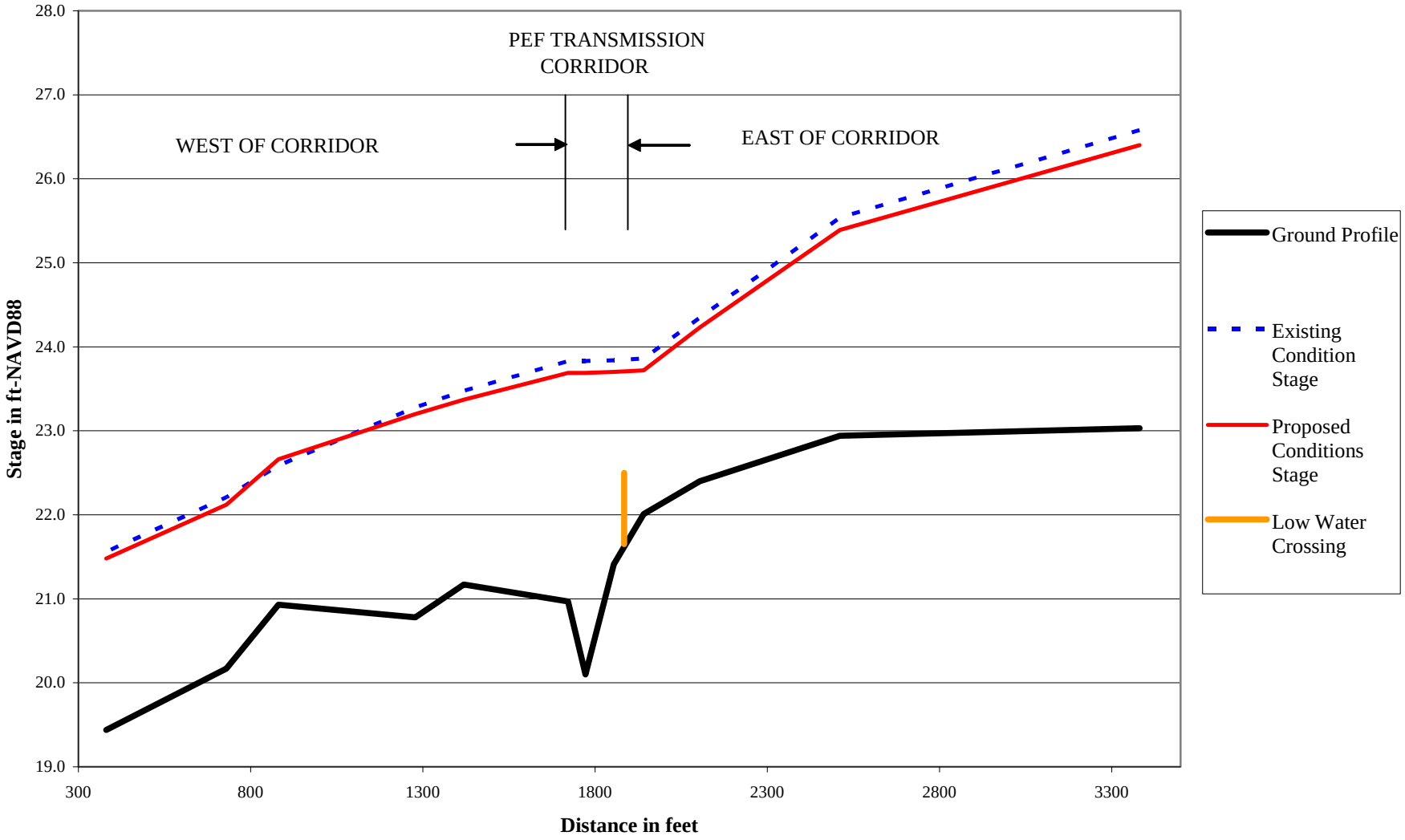


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Water Surface Profile in Existing and Proposed Conditions for 25-year Storm Event at Brooker North LWC
Brooker Creek Preserve Site
Pinellas County, Florida

PROJECT	C2011-025
FIGURE	7-18
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50-year storm event - Profile of peak stages in Existing and Proposed Conditions

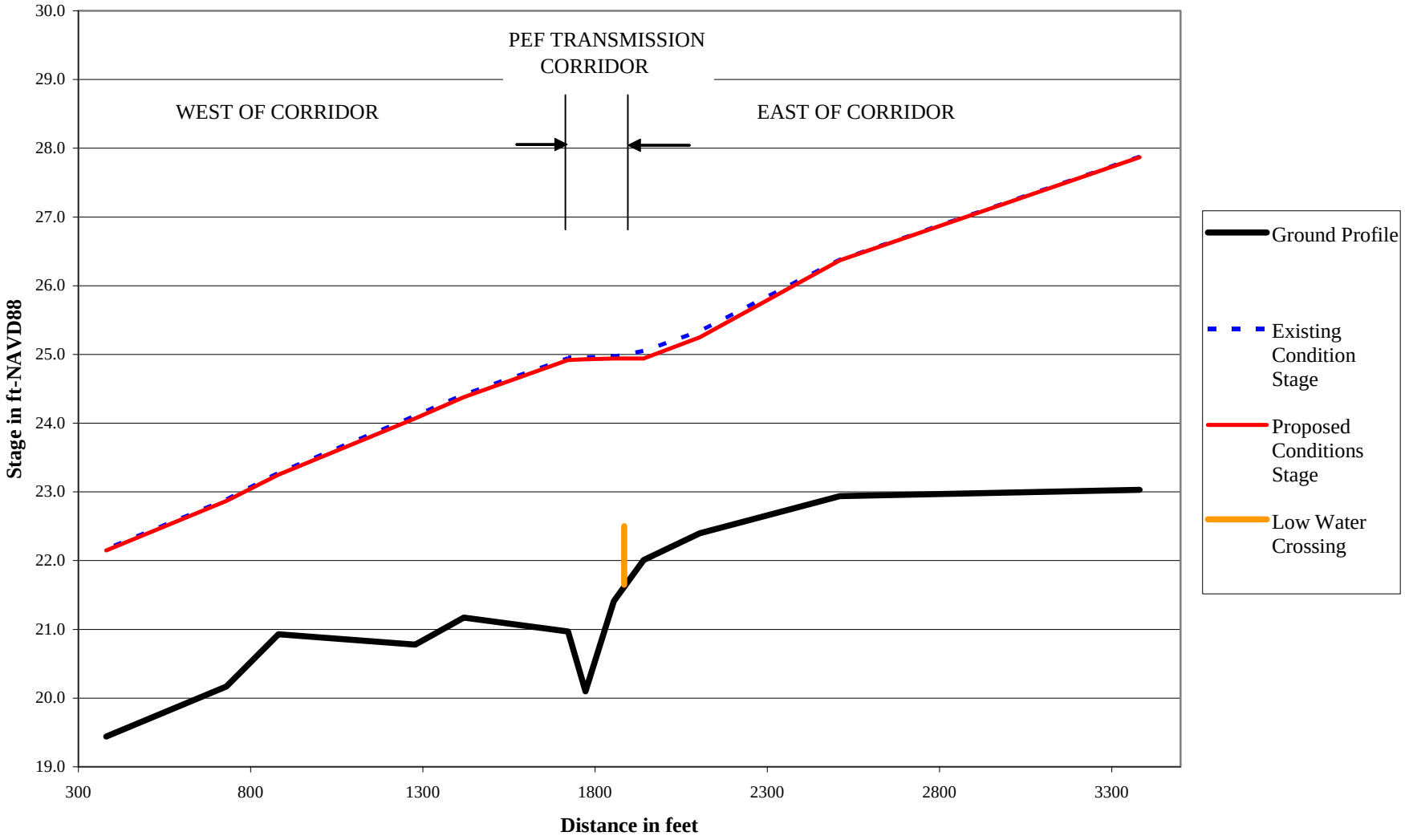


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Water Surface Profile in Existing and Proposed Conditions for 50-year Storm Event at Brooker North LWC
Brooker Creek Preserve Site
Pinellas County, Florida

PROJECT	C2011-025
FIGURE	7-19
DRAWN BY	RP
DATE	JULY 2011

100-year storm event - Profile of peak stages in Existing and Proposed Conditions



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Water Surface Profile in Existing and Proposed Conditions for 100-year Storm Event at Brooker North LWC
Brooker Creek Preserve Site
Pinellas County, Florida

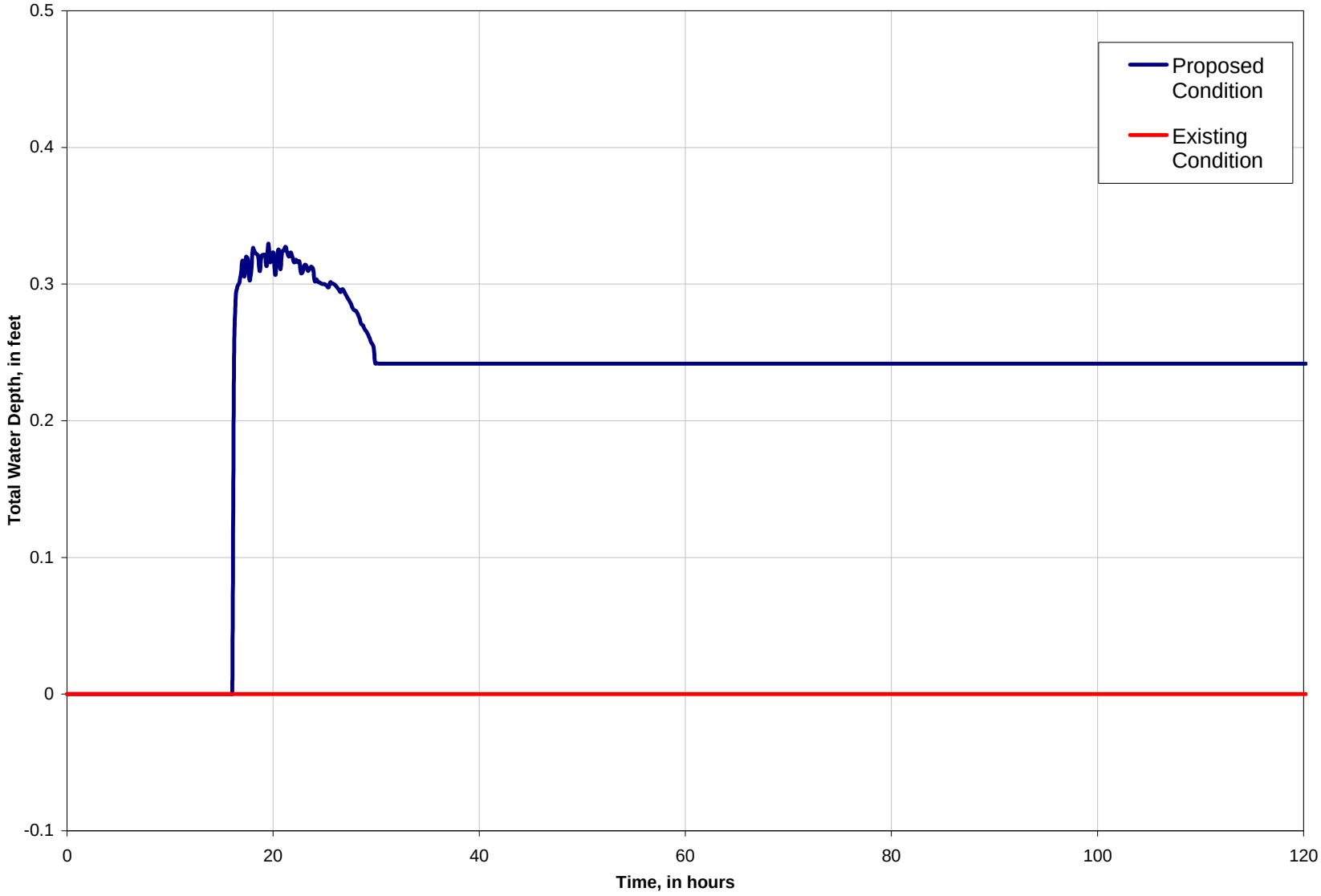
PROJECT	C2011-025
FIGURE	7-20
DRAWN BY	RP
DATE	JULY 2011

Brooker South LWC

For a 2.33-year storm event, the two-dimensional model result show the road is blocking the flow of water in the existing conditions. Model results for the proposed conditions, with the LWC, show a good connection between the east and west wetlands. Figure 7-21 shows a maximum water depth of 0.32 ft. over the road in proposed conditions for the 2.33-year storm event. Table 7-3 presents the peak flows along the proposed LWC in the existing and proposed conditions. As seen from this table, by constructing the low-water, the peak flow increases for by 767% for a 5-year storm event.

Table 7-3 Peak flows over the road in the existing and proposed conditions

	Peak flow for storm events (cfs)				
	2.33-year	**5-year**	**25-year**	**50-year**	**100-year**
Existing Conditions	0	9	102	148	342
Proposed Conditions	33	78	190	237	480
Increase	N/A	767%	86%	60%	40%



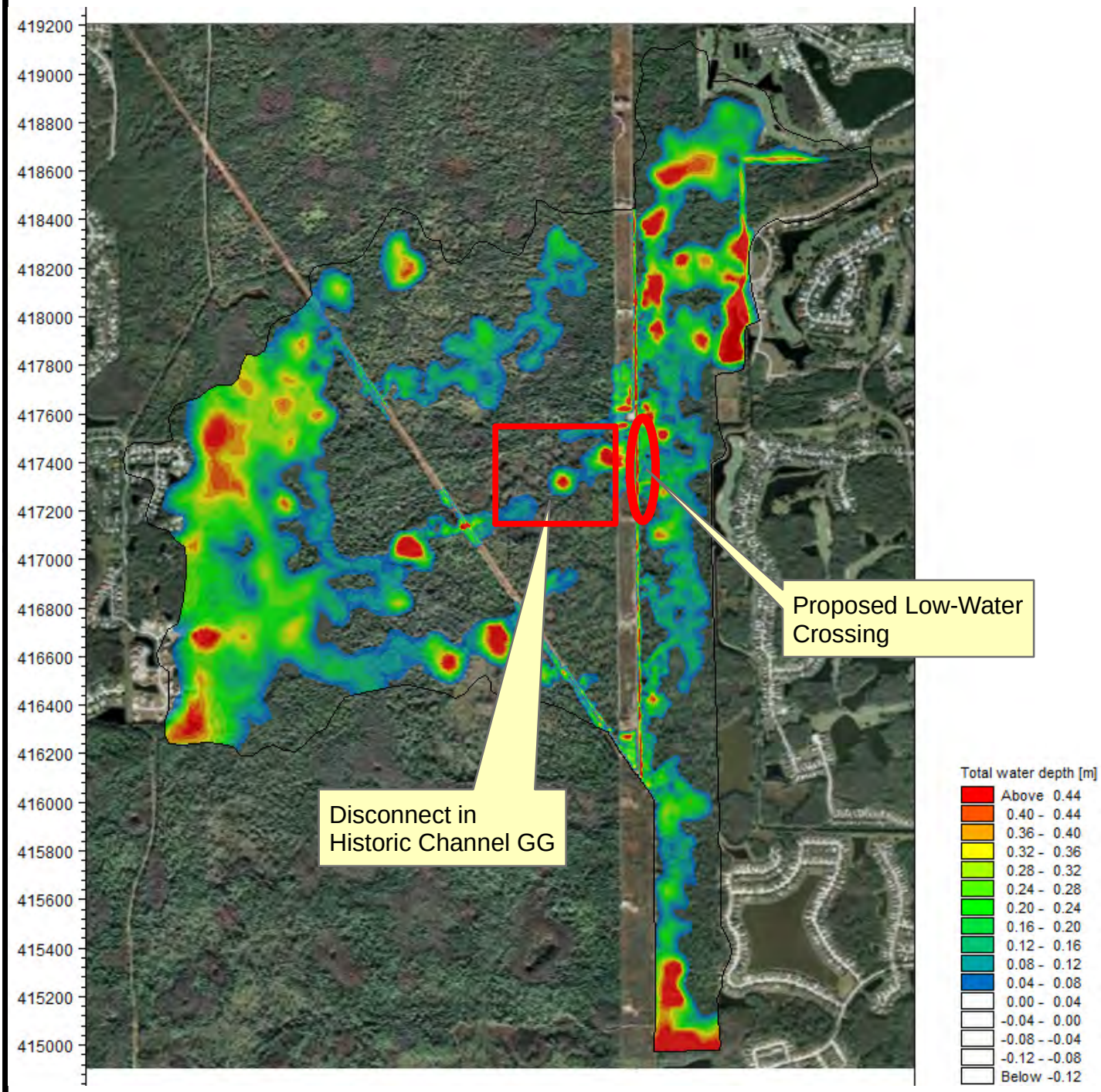
TAYLOR ENGINEERING, INC.

Comparison of water depths for 2.33-year storm event in Existing and Proposed Conditions at Brooker South LWC Brooker Creek Preserve Site Pinellas County, Florida

PROJECT	C2011-025
FIGURE	7-21
DRAWN BY	RP
DATE	JULY 2011

Figures 7-22 through 7-31 show the maximum water depth within the study area from 2.33-, 5-, 25-, 50-, and 100-year storm event model simulations for existing and proposed conditions. During a 2.33-year storm event the proposed conditions model with a LWC helps to re-establish the flow connection between the eastern wetlands with the historic Channel GG (see Figure 7-22). The existing conditions model simulation for the 2.33-year storm event shows the road blocking the flow of water from east to west (represented as velocity vectors in Figure 7-32). The proposed conditions model simulation for the 2.33-year storm event shows the flow passing over the LWC from east to the west (represented as velocity vectors in Figure 7-32).

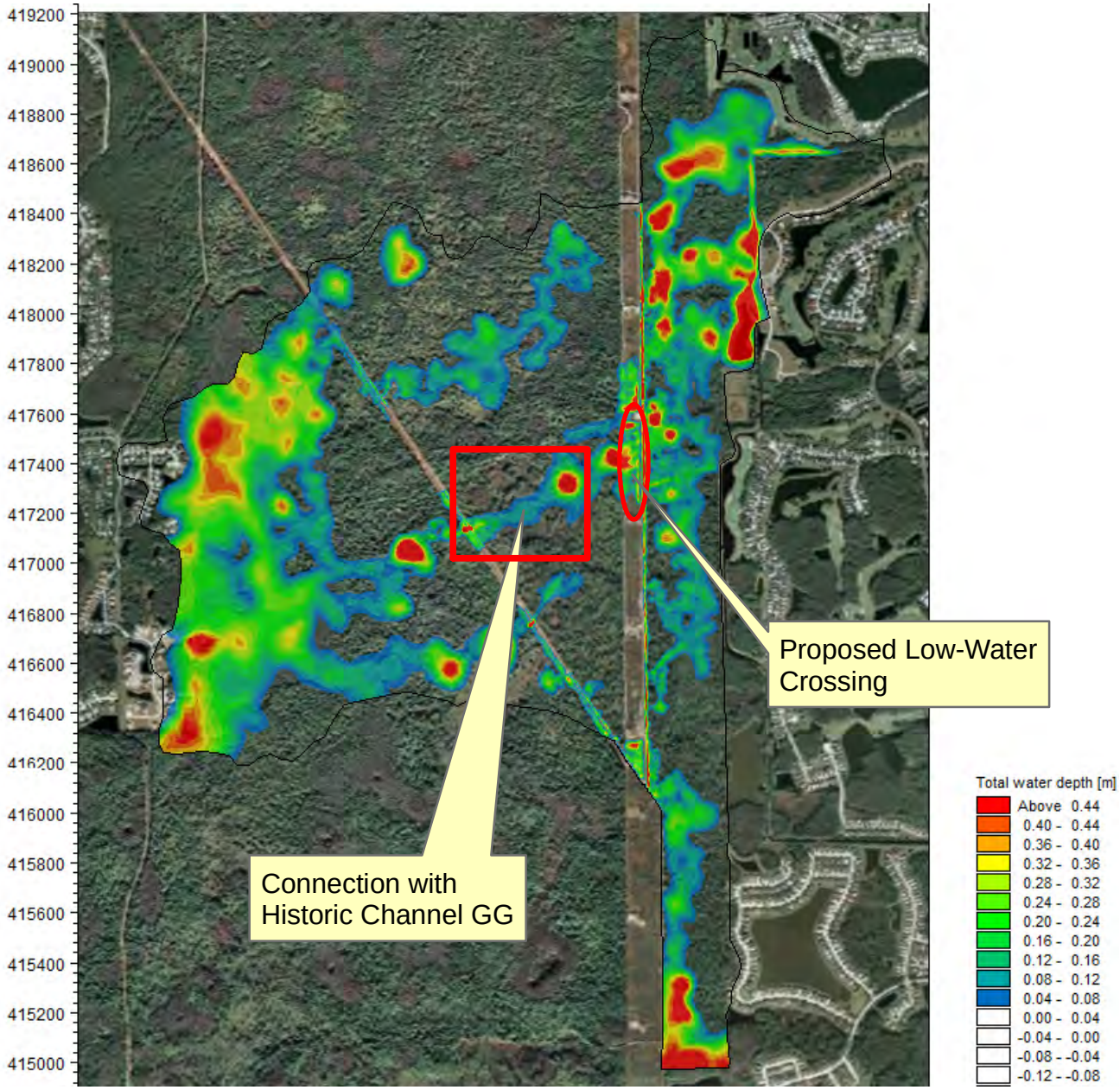
The model simulations were also used to evaluate flooding impacts on the Eagles Golf Course Club. Figure 7-33 compares the water depths from the 100-year storm event model simulation for the existing and proposed conditions at the Eagles Golf Course Club. This figure shows that the water depths in the proposed conditions do not exceed the existing conditions water depths and thus proves that the LWC would not cause any flooding impacts at Eagles Golf Course Club.



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Maximum Water Depth for the 2.33-year storm event in Existing Conditions at Brooker South LWC
Brooker Creek Preseve Site
Pinellas County, Florida

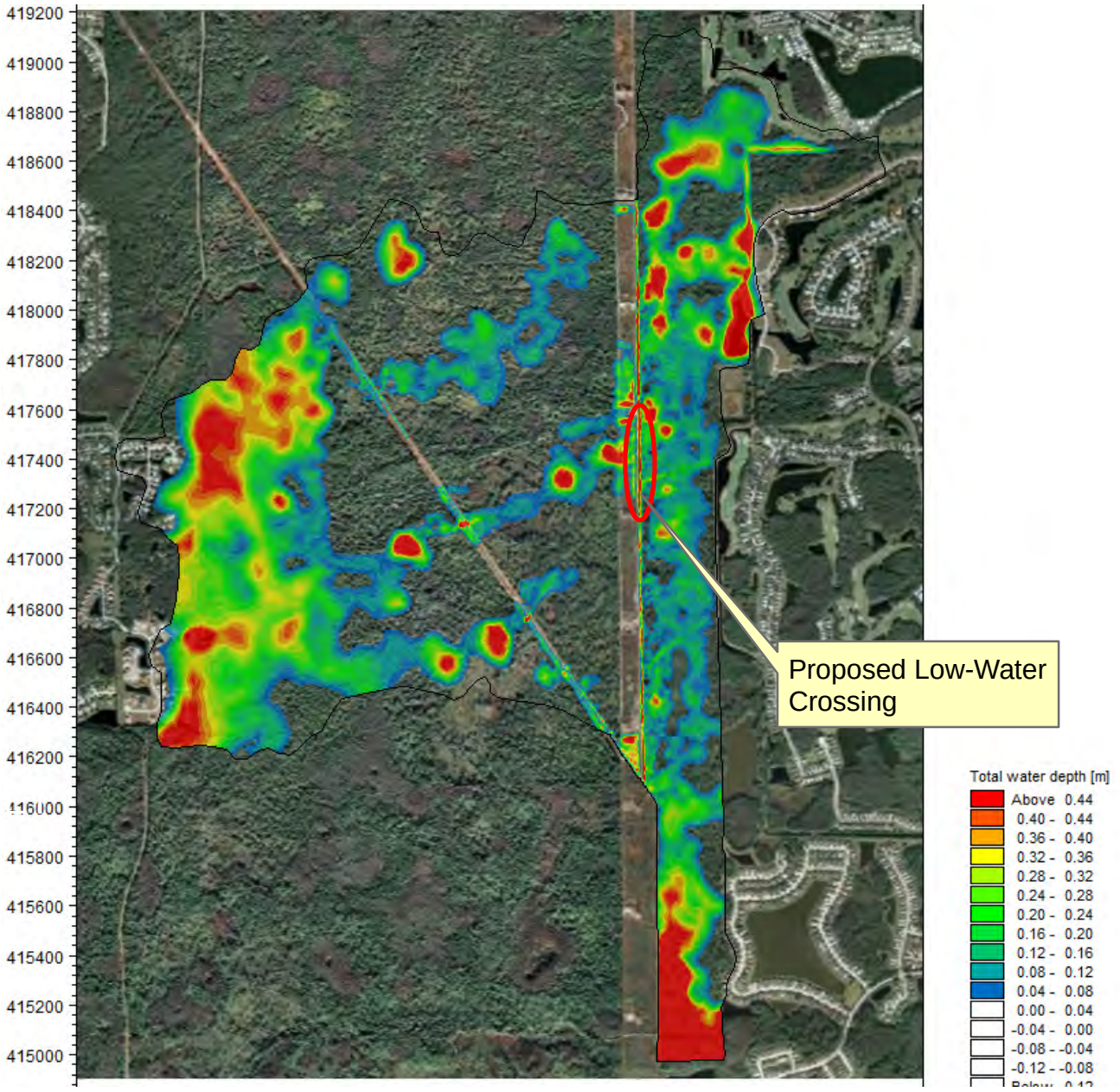
PROJECT	C2011-025
FIGURE	7-22
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DATE	JULY 2011



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Maximum Water Depth for the 2.33-year storm event in Proposed Conditions at Brooker South LWC
Brooker Creek Preserve Site
Pinellas County, Florida

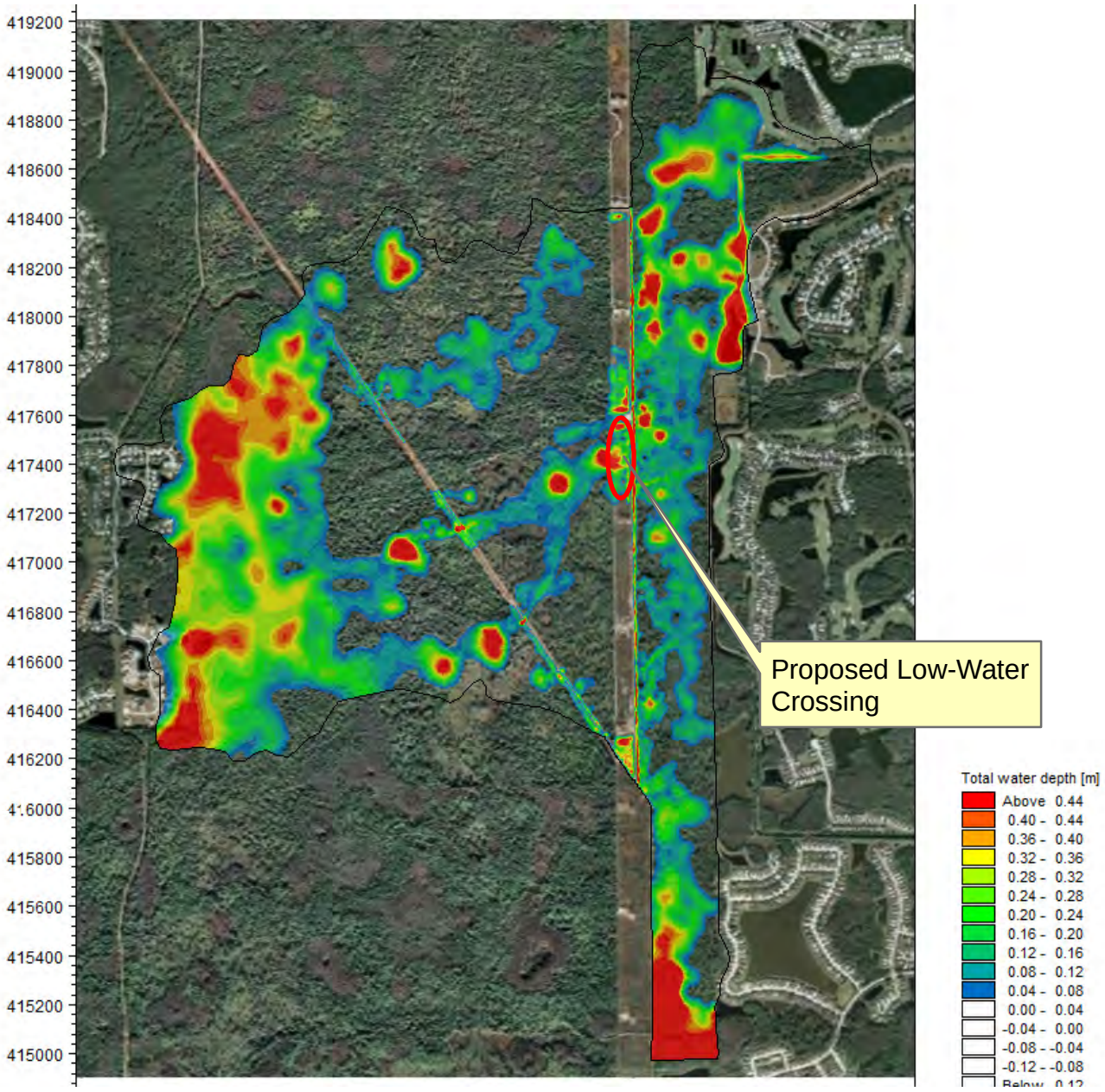
PROJECT	C2011-025
FIGURE	7-23
DRAWN BY	RP
DATE	JULY 2011



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Maximum Water Depth for the 5-year storm event in Existing Conditions at Brooker South LWC
Brooker Creek Preserve Site
Pinellas County, Florida

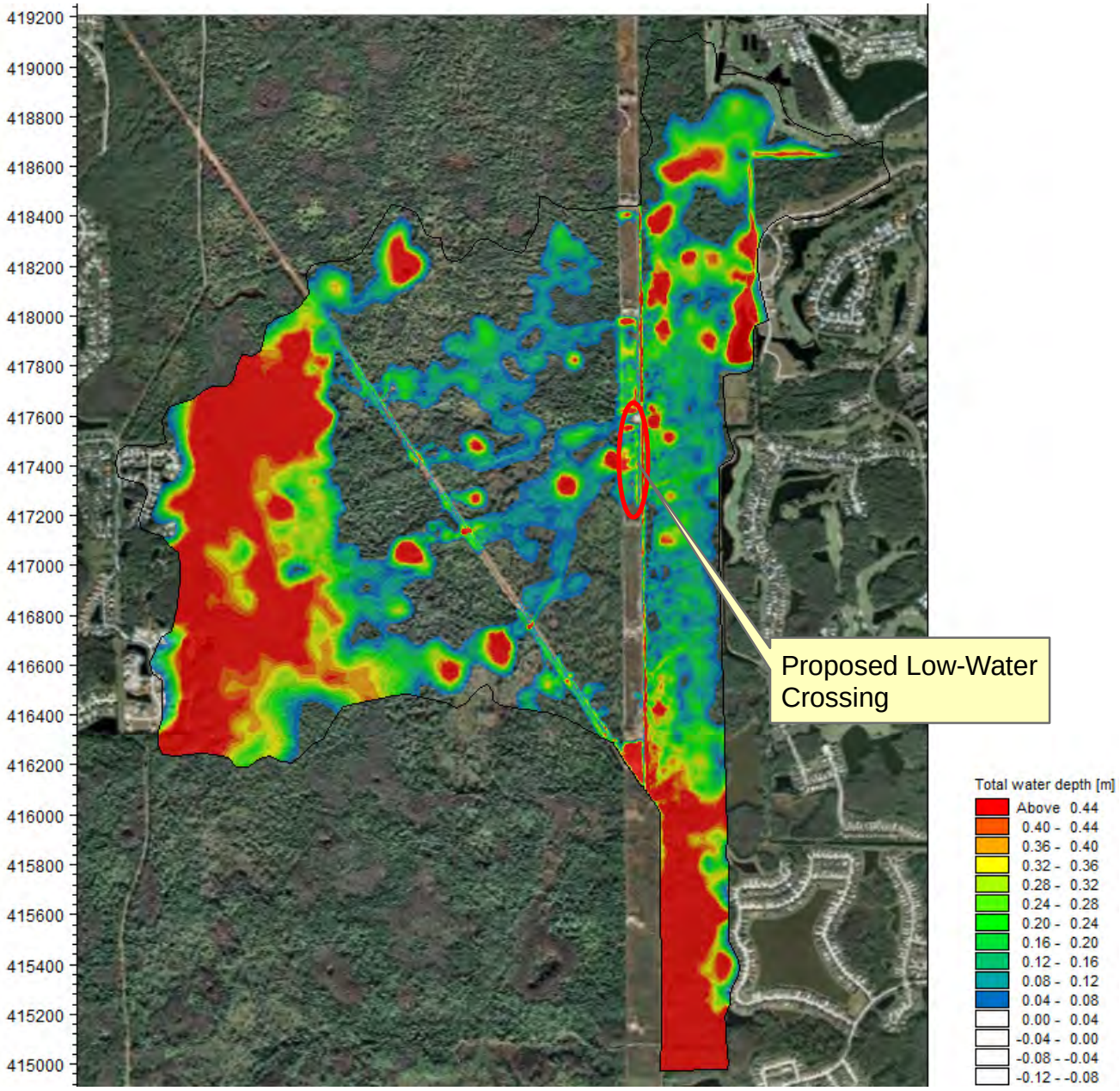
PROJECT	C2011-025
FIGURE	7-24
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DATE	JULY 2011



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Maximum Water Depth for the 5-year storm event in Proposed Conditions at Brooker South LWC
Brooker Creek Preserve Site
Pinellas County, Florida

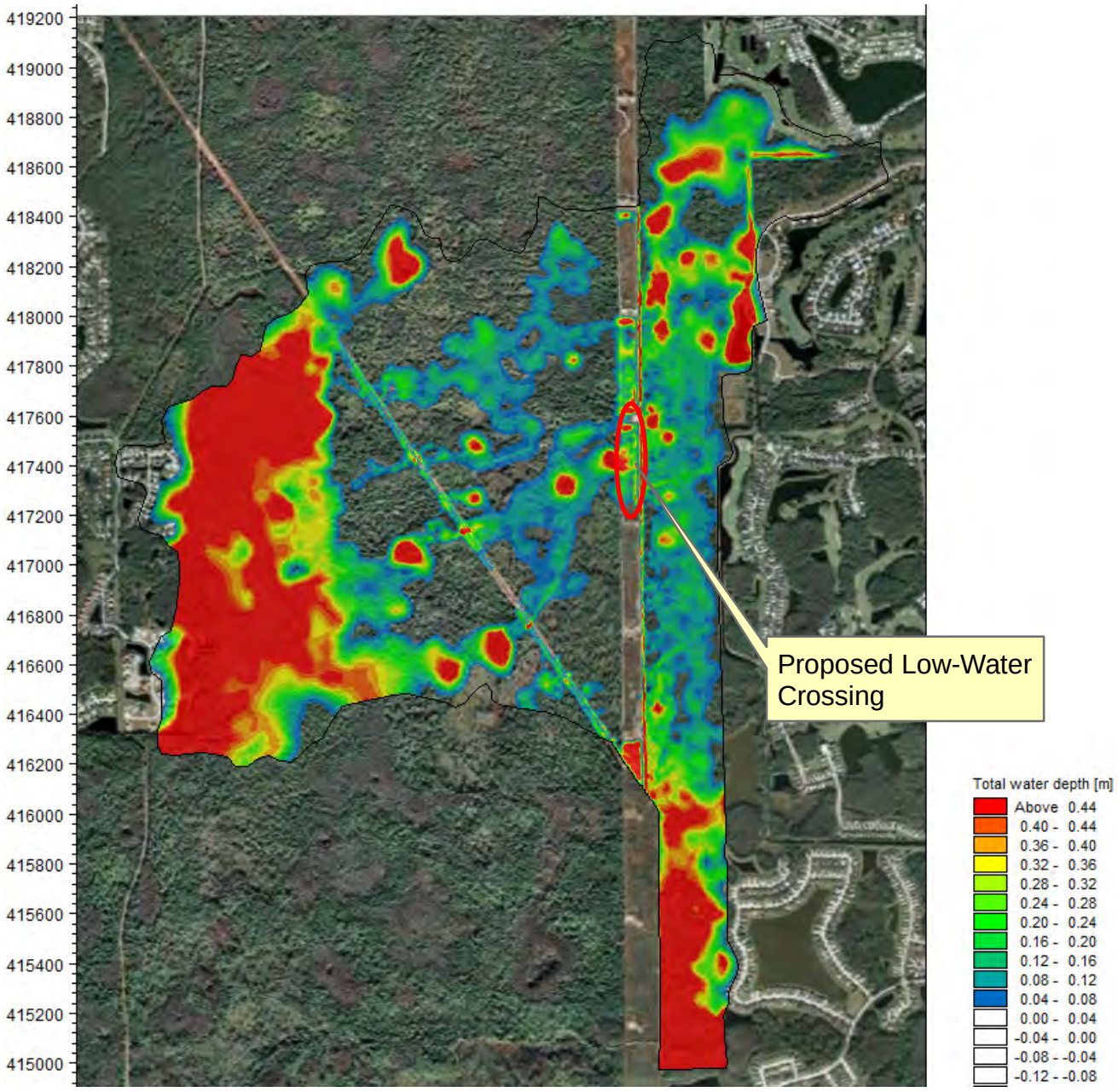
PROJECT	C2011-025
FIGURE	7-25
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Maximum Water Depth for the 25-year storm event in Existing Conditions at Brooker South LWC
Brooker Creek Preserve Site
Pinellas County, Florida

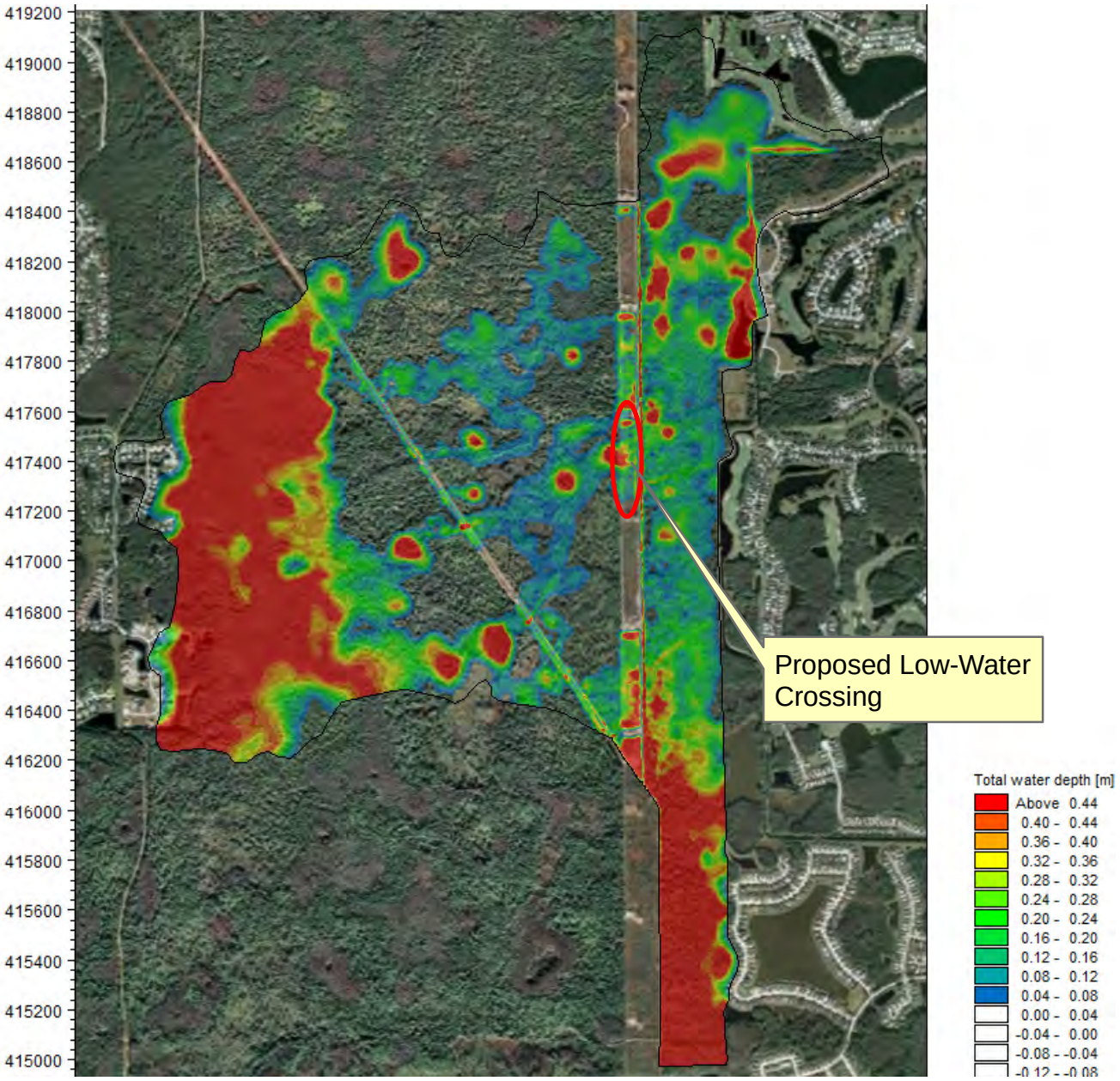
PROJECT	C2011-025
FIGURE	7-26
DRAWN BY	RP
DATE	JULY 2011



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Maximum Water Depth for the 25-year storm event in Proposed Conditions at Brooker South LWC
Brooker Creek Preserve Site
Pinellas County, Florida

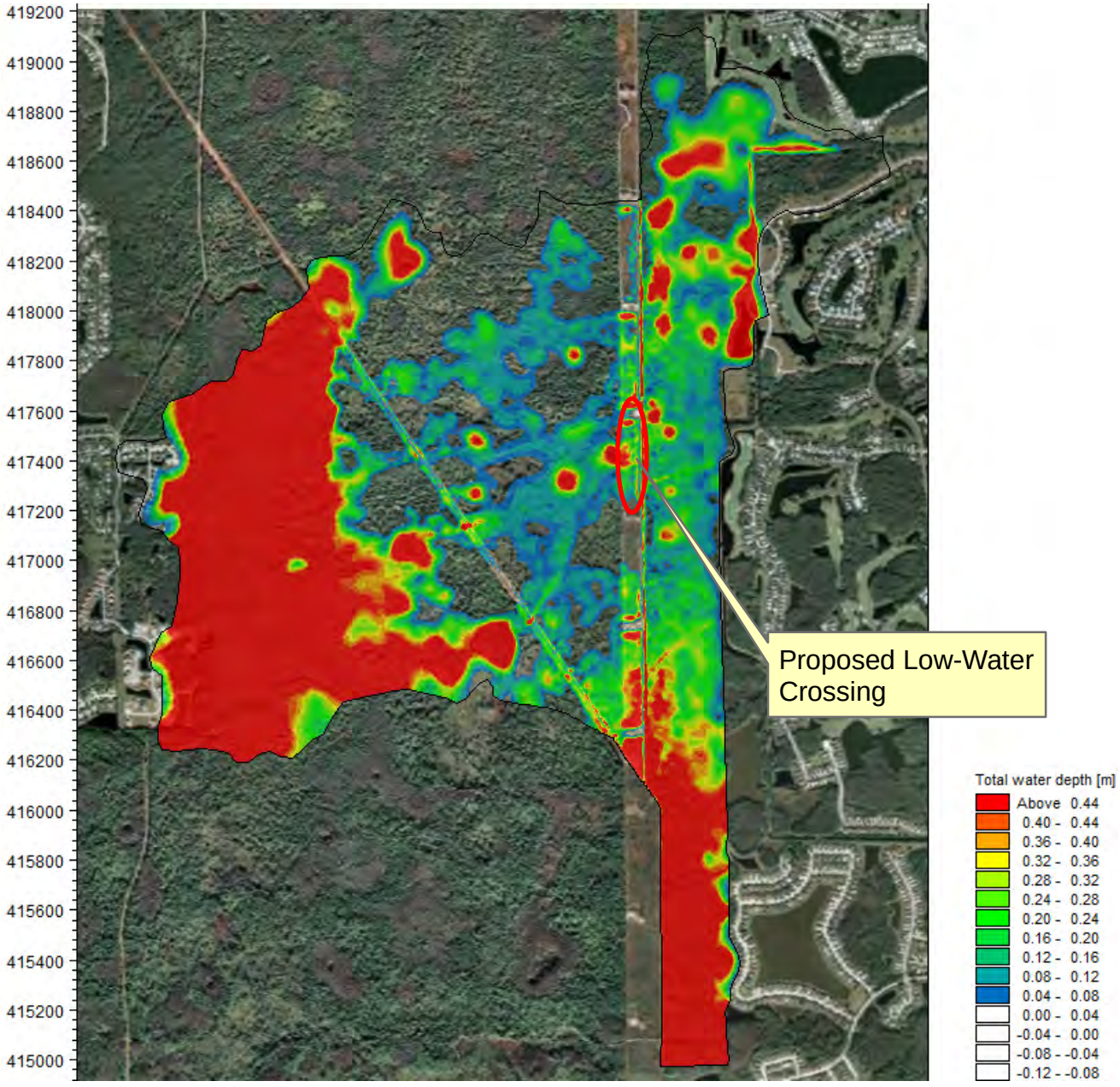
PROJECT	C2011-025
FIGURE	7-27
DRAWN BY	RP
DATE	JULY 2011



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Maximum Water Depth for the 50-year storm event in Existing Conditions at Brooker South LWC
Brooker Creek Preserve Site
Pinellas County, Florida

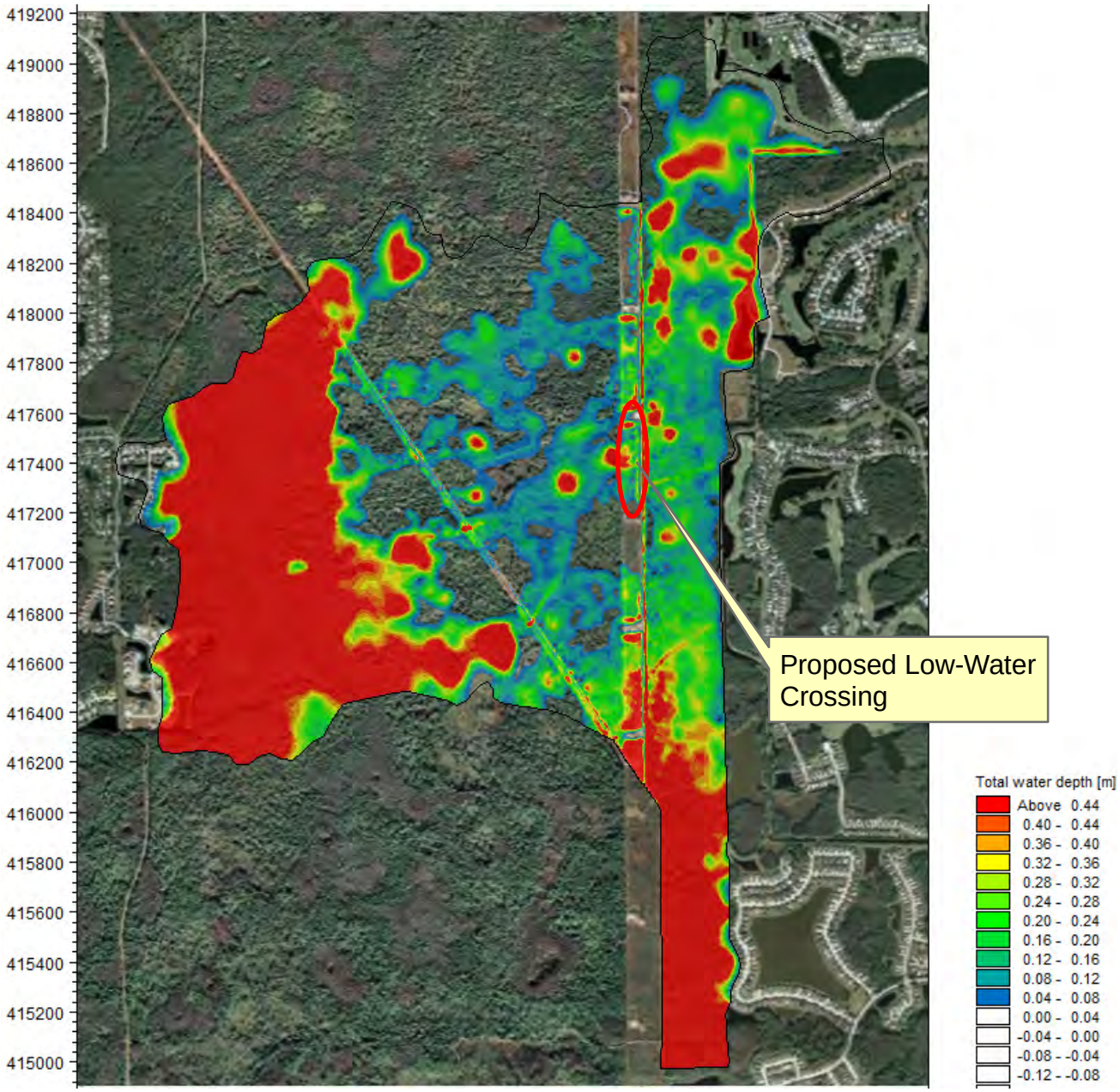
PROJECT	C2011-025
FIGURE	7-28
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DATE	JULY 2011



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Maximum Water Depth for the 50-year storm event in Proposed Conditions at Brooker South LWC Brooker Creek Preserve Site Pinellas County, Florida

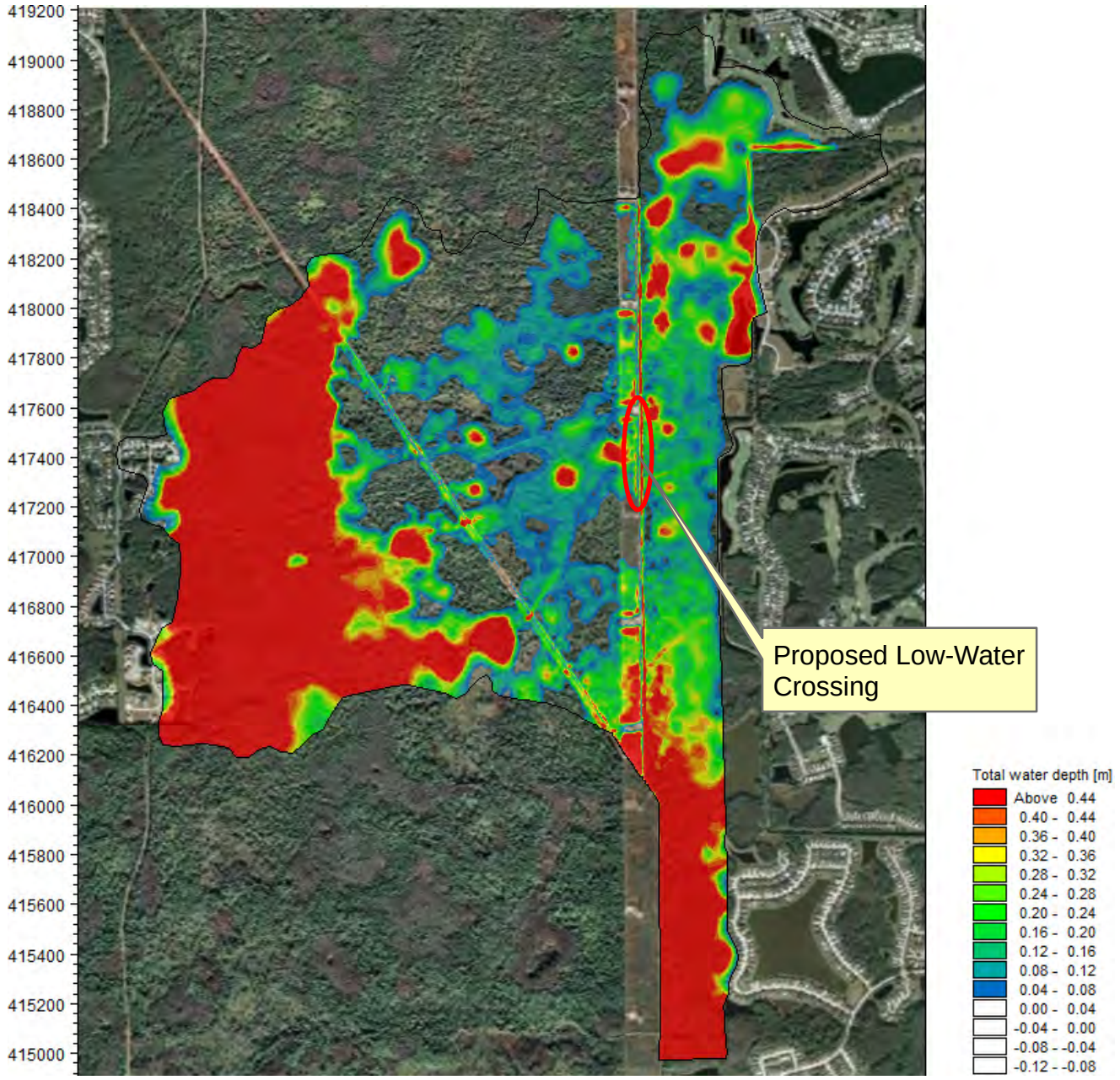
PROJECT	C2011-025
FIGURE	7-29
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DATE	JULY 2011



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Maximum Water Depth for the 100-year storm event in Existing Conditions at Brooker South LWC
Brooker Creek Preserve Site
Pinellas County, Florida

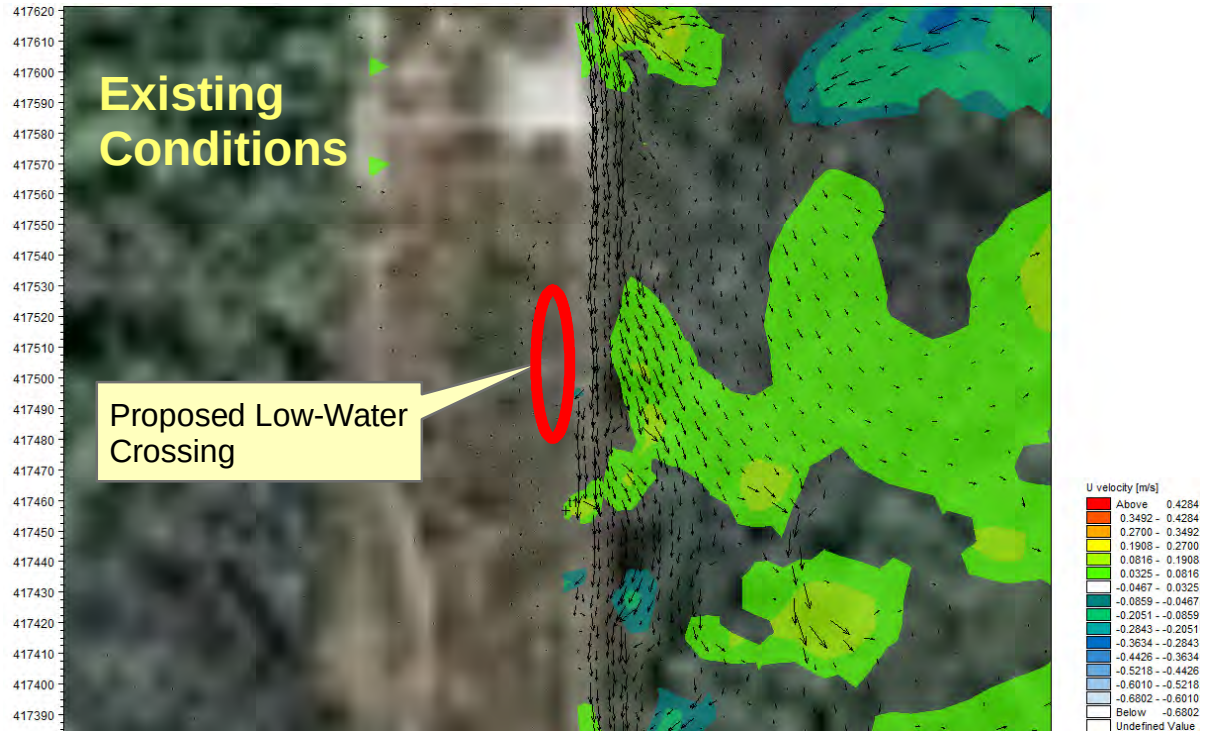
PROJECT	C2011-025
FIGURE	7-30
DRAWN BY	RP
DATE	JULY 2011



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Maximum Water Depth for the 100-year storm event in Proposed Conditions at Brooker South LWC
Brooker Creek Preserve Site
Pinellas County, Florida

PROJECT	C2011-025
FIGURE	7-31
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DATE	JULY 2011

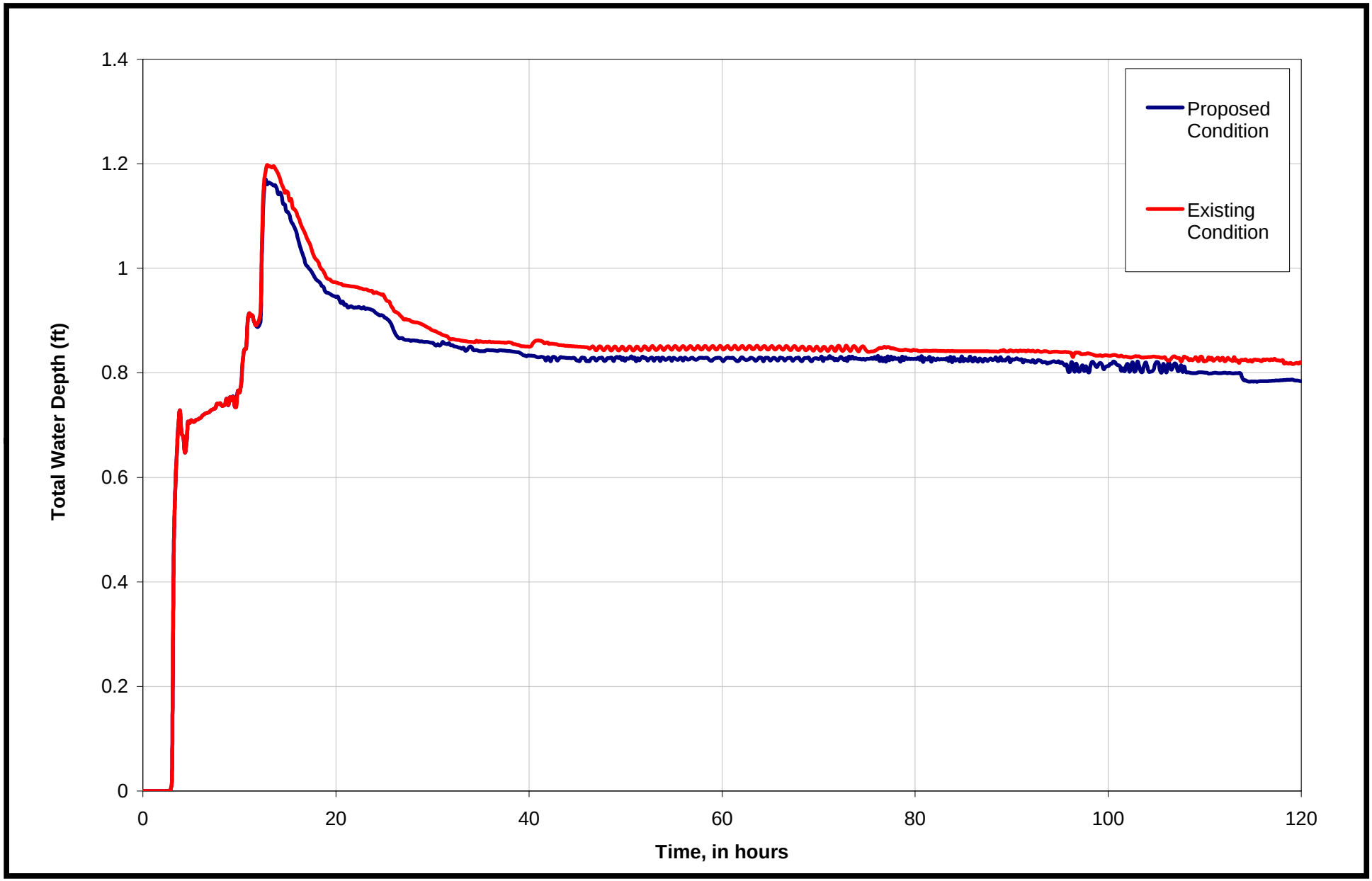




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Velocity Vectors for the 2.33-year storm event in Existing and Proposed Conditions at Brooker South LWC Brooker Creek Preserve Site Pinellas County, Florida

PROJECT	C2011-025
FIGURE	7-32
DRAWN BY	RP
DATE	JULY 2011



TAYLOR ENGINEERING, INC.

Comparison of water depths in Existing and Proposed Conditions at Eagles Golf Course Club for 100-year storm event
Brooker Creek Preserve Site
Pinellas County, Florida

PROJECT	C2011-025
FIGURE	7-33
DRAWN BY	RP
DATE	JULY 2011

7.6 UMAM Score

The proposed mitigation plan for BCP will provide for 14.7 units of functional lift to offset primarily herbaceous wetland impacts within the Tampa Bay watershed. Please see Table 7-4 for a breakdown of the UMAM analysis. As noted previously, approximately 8.1 extra UMAM lift units are being provided under the current proposed mitigation plan that will be available for future use on other projects.

Scores for existing communities that were assessed ranged from 3 to 8, pursuant to the UMAM process. Target UMAM scores presented in Table 7-4 ranged from 5 to 9 in accordance with the UMAM scoring parameters based on the target results of each of the mitigation activities outlined in this plan.

For Location and Landscape Support, the proposed scores range from 5 to 8 based on the UMAM scoring methodology. These scores were derived by assessing the existing communities on site and identifying the main characteristics that these habitats were deficient in, such as habitat availability, wildlife access barriers, land use impacts and several others. This information was then used to incorporate those criteria into the proposed mitigation activities. By introducing increased habitat availability and the other criteria mentioned above, the proposed mitigation plan will "increase" the value of the existing on-site habitats and site functionality. The scores of 5, 7 and 8 were assigned after reviewing the UMAM scoring requirements and the description of each scoring tier where a 5 is defined as having low habitat diversity, a high incidence of invasive/exotic species and contains areas that impede wildlife movement. A score of 7 is defined as having appropriate habitat diversity, but not a high overall diversity and still may contain some invasive/exotic species; provides some support for fish and wildlife, but is not quite optimal and there is a generally effective land management plan in place. An 8 score was defined as providing slightly higher habitat diversity than the areas that were scored as a 7 with most the majority of plants native and desirable, but still not as diverse as habitats scored as a 9 or 10; increased support for fish and wildlife and a land management plan that is more specified to address such issues as invasive/exotic species management is also included.

For the Water category, all proposed scores are between 6 and 8. A score of 6 represents aquatic vegetation and wildlife habitat is present, but is not very diverse and of generally low quality. A score of 7 reflects that the same habitat is present, but still has slightly higher or lower water levels than appropriate and will generally fluctuate seasonally. A score of 8 represents that the assessment area will provide adequate habitat for both aquatic vegetation and wildlife, will aide in the hydroperiod of the area and assist in storage capacity and attenuation, will increase water flow through the area resulting in better water quality and that the area will remain inundated under normal circumstances so that the other improvements will function as designed.

The Community Structure assessment areas were assigned a scores ranging between 8 and 9. The community structure will be improved in all habitat types as plant diversity will be increased, in addition to removing well-established populations of invasive/exotic species. The PEF plan will provide for additional habitat for aquatic vegetation and wildlife and will represent improvement over existing conditions.

Risk and Time Lag were the other parameters assessed during the UMAM scoring of the BCP project. The Risk parameter is examined to assess the potential risk the proposed activity has of not fully maturing and developing into the proposed habitat. Factors such as the project's location in proximity to other existing structures such as housing developments or major roadways, access to the site (both public and private), general environmental conditions compared to the proposed activity, and the amount of effort required to build and maintain a functioning habitat are all considered when assessing the Risk for a particular project. Due to the limited access to the BCP site, the relative location within an existing managed nature preserve and the general nature of the proposed work, a score of 1.25 to 1.75 was assigned to all proposed activities at BCP. The planting areas received the highest risk factor, as they are dependent on rainfall and groundwater presence to aid in establishment. The low water crossings and the adjacent wetlands were scored between 1.25 and 1.50, as there is significant hydrologic modeling being conducted within these areas that will demonstrate the proposed improvements will provide for the intended enhancement.

Time Lag is examined to determine an appropriate time frame that can be expected for a given activity to reach its full potential and provide the functions and values of a mature system. Herbaceous systems typically become well established in a short time frame due to the limited complexity of habitat structure and the general hardiness of the plants found within. Scores for the BCP site ranged from 1.00 to 1.07 for the proposed enhancement activities. The 1.00 score is associated with the herbicide treatment areas and the low water crossing area to the south, as these areas should see immediate improvement once the enhancement activities are performed. The 1.07 scores represent areas proposed for planting that will take slightly longer to become established than the already existing communities.

Table 7-4. Brooker Creek Preserve mitigation plan proposed UMAM score summary

Area	Location		Water		Community		Acreage	Risk	Time Lag	RFG[1]	FG[2]
	Current	With	Current	With	Current	With					
Wetland enhancement (treatment and planting)	5	5	7	7	5	8	33.0	1.75	1.07	0.1	1.8
Wetland enhancement (treatment only)	7	8	8	8	8	9	10.5	1.25	1.0	0.1	0.5
Ditch treatment	7	7	7	7	5	8	1.9	1.50	1.07	0.1	0.1
Brooker North LWC	7	7	6	8	5	8	4.0	1.50	1.07	0.1	0.4
Wetlands adjacent to North LWC	7	7	6	8	7	8	7.6	1.25	1.00	0.1	0.8
Brooker South LWC		7	73	6	7	8	4.5	1.50	1.00	0.1	0.4
Wetlands adjacent to South LWC	7	7	6	8	7	8	99.6	1.25	1.00	0.1	10.7
Subtotal	**Herbaceous**						**53.9**				**3.2**
Subtotal	**Forested**						**107.2**				**11.5**
Total							**161.1**				**14.7**

[1]Relative Functional Gain
[2]Functional Gain

7.7 Engineering

The proposed mitigation plan for the BCP site includes two low water crossings - the Brooker North LWC and the Brooker South LWC. The paragraphs below summarize the proposed improvements for each site.

Brooker North LWC

The contractor will construct a LWC within the designated road sections shown on Sheet 5 of 21 in Section 7.11. This LWC is 210-ft. long, with the level water crossing of 140 ft. at +22.5 ft. NAVD centered on the existing historical flow path, with 30-ft. slopes upward from the leveled section to the existing road grades, and 5-ft. freeboard (Section 7.11, Sheet 5 of 21). The existing road grade is at elevation +24.0 ft. NAVD. The contractor will compact the existing sub-grade, place bedding stone, and install the roadway material. The contractor will adjust the surrounding grade with the LWC. The downstream side of the LWC has rip-rap protection to minimize edge erosion (Section 7.11, Sheets 5 and 6 of 21). The contractor will place the project signage in accordance with the design plans (Section 7.11, Sheets 9 and 16 of 21). The Contractor will place the appropriate erosion and sediment controls (Section 7.11, Sheets 17 and 18 of 21) throughout the project life, in accordance with the National Erosion Pollution Discharge Standards (NPDES).

Brooker South LWC

The contractor will construct a LWC within the designated road sections shown on Sheet 11 of 21 in Section 7.11. This LWC is 370-ft. long, with the level water crossing of level 300 ft. (+20.5 ft. NAVD) centered on the existing historical flow path, with 30-ft. slopes upward from the leveled section to the existing road grades and 5-ft. freeboard (Section 7.11, Sheet 11 of 21). The existing road grade is at elevation +22.0 ft. NAVD. The contractor will compact the existing sub-grade, place bedding stone, and install the roadway material. The contractor will adjust the surrounding grade with the LWC. The downstream side of the LWC has rip-rap protection to minimize edge erosion (Section 7.11, Sheets 11 and 12 of 21). The contractor will place the project signage in accordance with the design plans (Section 7.11, Sheets 15 and 16 of 21). The Contractor will place the appropriate erosion and sediment controls (Section 7.11, Sheets 17 and 18 of 21) throughout the project life, in accordance with the NPDES.

7.8 Implementation Schedule

The construction improvements at the BCP site will commence upon the construction and wetland impacts of the associated transmission lines within the Tampa Bay watershed for the LNP project. As with any construction project, natural conditions and weather patterns will be observed and activities will be planned to best coincide with the most ideal weather conditions. The construction of the LWCs will occur during the dry season (October-March) to ensure better erosion and sedimentation control. The mechanical/chemical treatment of the invasive/exotic species will also occur during the dry season to ensure the least impact on the surrounding natural habitats. Herbaceous wetland plantings will occur once the areas have been properly treated for invasive/exotic species. Additional maintenance for invasive/exotic species will be conducted year-round, with mechanical and/or chemical removal methodologies to be utilized throughout the year to ensure the best results.

Based on the above-referenced priorities, an implementation schedule of the mitigation activities is listed below:

Activity	Timeframe
Acquire local land disturbance permits, etc.	Prior to start of construction
Establish all turbidity/erosion control measures	Week 1
Clear and excavate LWC areas and begin construction and installation of LWC material	Weeks 2-14
Conduct mechanical/chemical removal of invasive/exotic species including Ditch and areas within the TLC	Weeks 3-6
Generate and review as-built surveys	Week 15
Plant all wetland enhancement areas	Weeks 15-18
Begin 5 year monitoring and maintenance period	Week 19

* Optimal planting season for herbaceous species is March through September, and October through March for forested species.

The above is a general timeline of the basic implementation of the proposed mitigation activities. Additional planning and specifics may need to be established once the transmission line construction schedule is finalized.

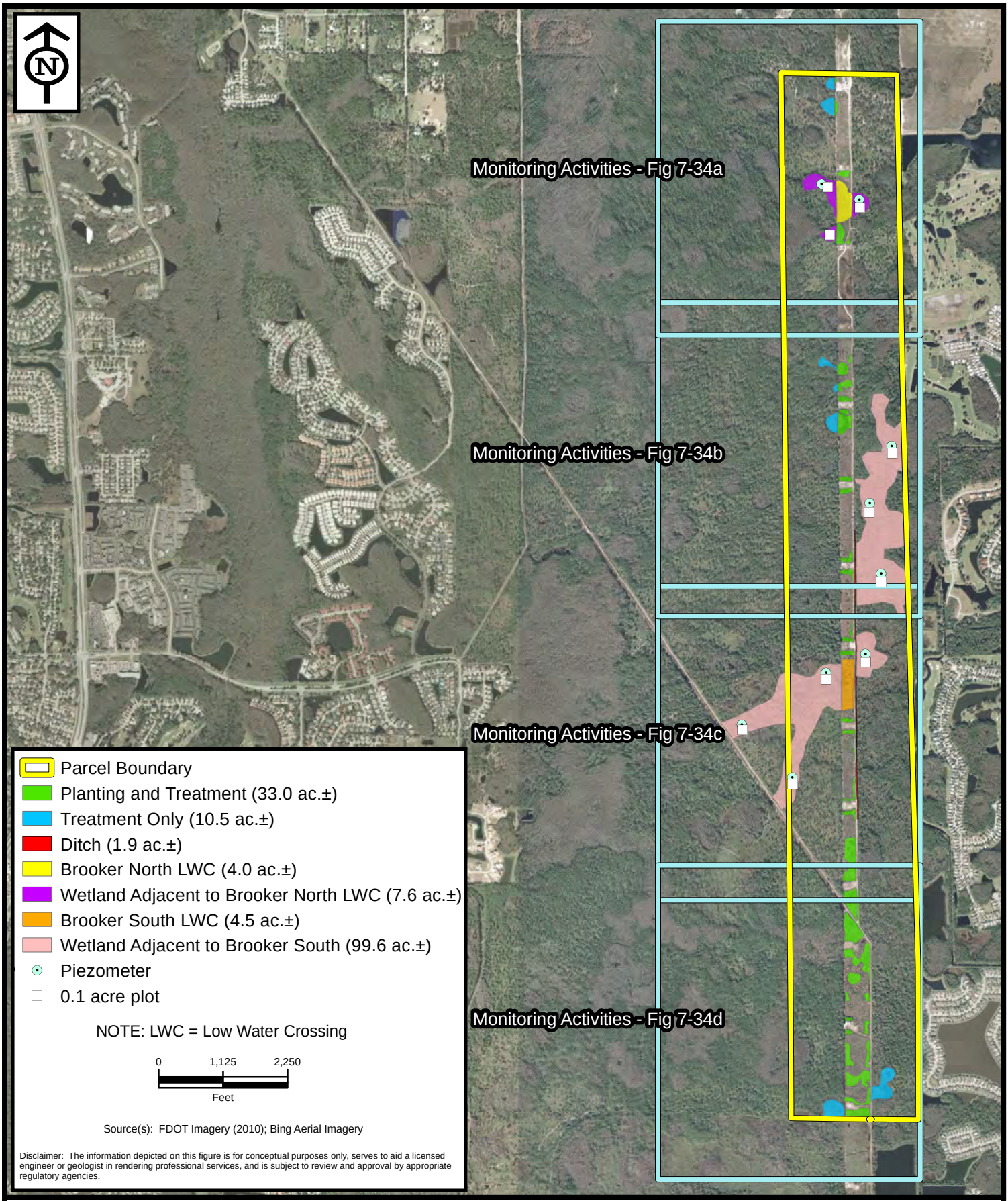
7.9 Monitoring and Maintenance Requirements

The wetland enhancement/restoration areas will be monitored on an annual basis and maintained quarterly to ensure their success. Monitoring will document that each habitat type is naturally progressing to resemble its intended target community in regard to plant species and composition. In addition, wildlife utilization, hydrologic conditions and any other management issues will be noted and addressed.

Due to the isolated nature of the proposed wetland enhancement planting areas, the quantitative monitoring of these areas will consist of visual estimation of overall percent coverage of planted/desirable species (Figure 7-34, 7-34a through 7-34d). The data that will be observed and recorded within each area will include:

- date of installation and number and types of plants installed;
- total coverage and survivorship of desirable planted species and any other dominant species;
- the presence and overall coverage of any listed invasive/exotic species;
- success of any previously recommended treatment methods and any future methods proposed;
- any areas of mortality of planted or other natural species;
- current hydrologic conditions, water depths and hydric soils observed;
- any evidence of wildlife presence or utilization;
- any maintenance needs in regard to stabilization, erosion, vandalism etc. and suggested corrective actions.

The LWC areas will be monitored using continuous recording piezometers that will provide an accurate record of the hydrologic activities within each area. A piezometer will be installed within the affected wetlands both upstream and downstream of the LWC and readings will be recorded daily to demonstrate that the water is at least within one foot on either side. In addition, 0.1 acre plots will be established in the same upstream and downstream wetlands to monitor any changes or improvements in vegetation community.



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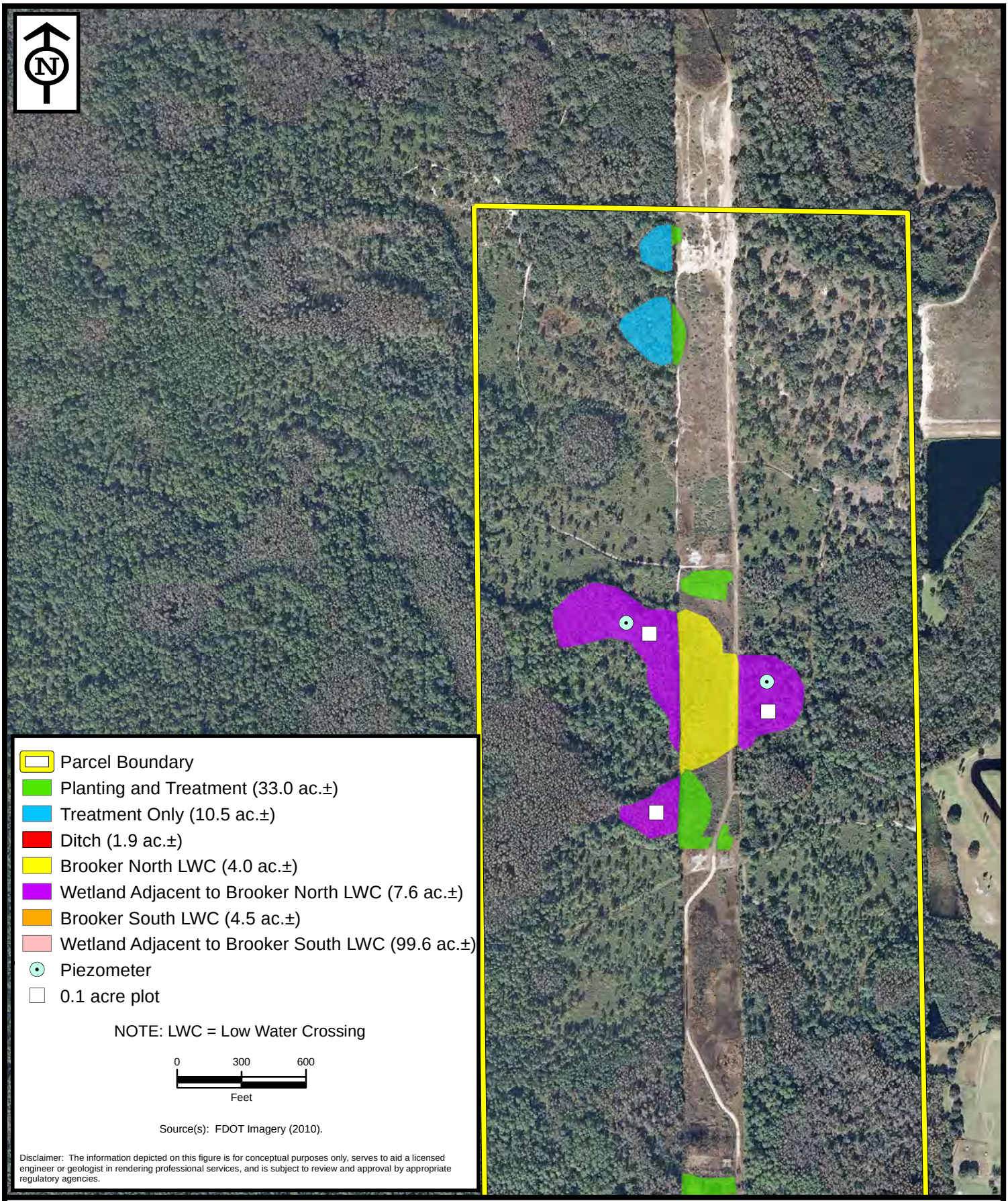
Proposed Monitoring Activities - Index

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	CRD/JRN
Figure:	**7-34**

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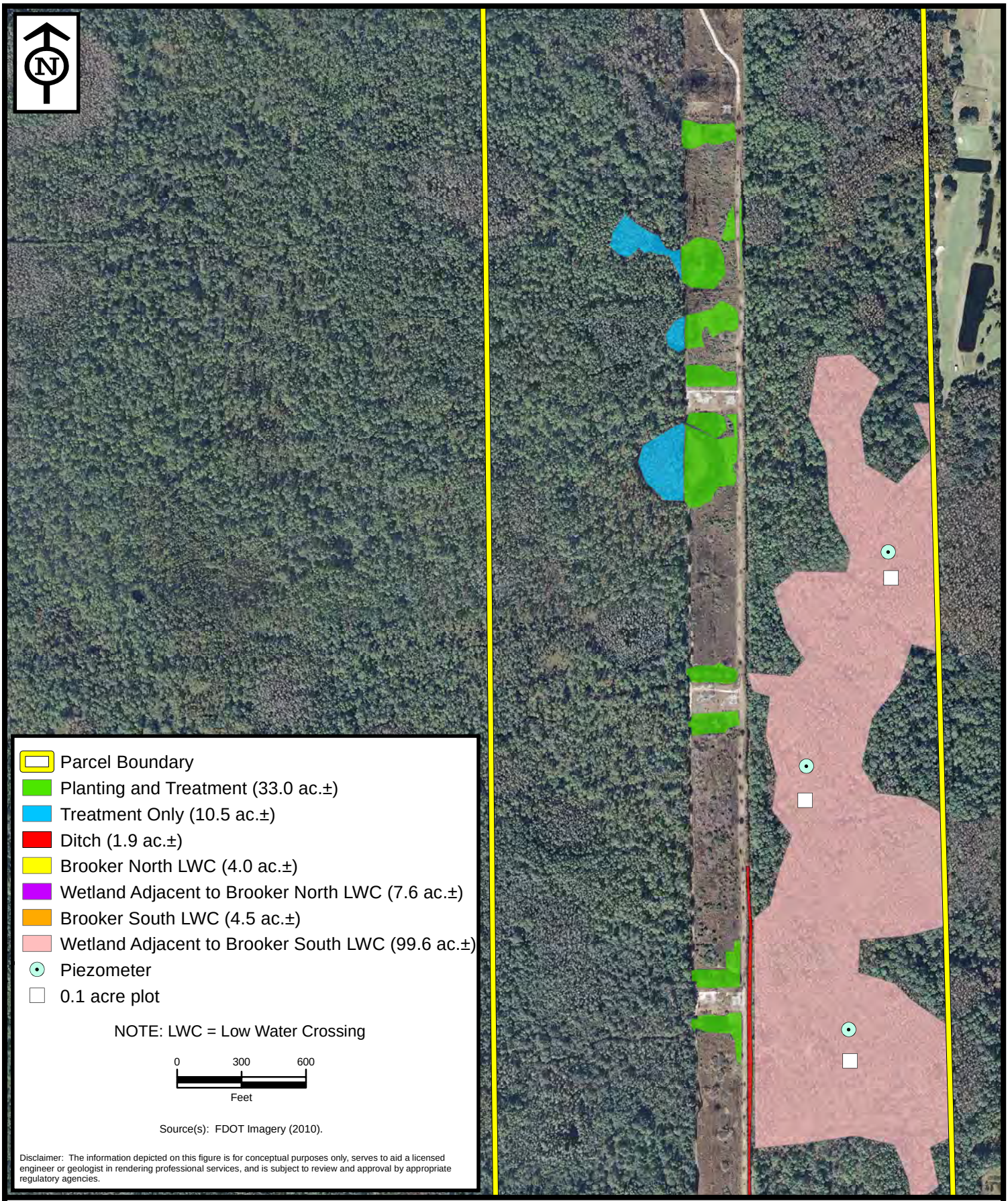
Proposed Monitoring Activities

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	CRD/JRN
Figure:	7-34a

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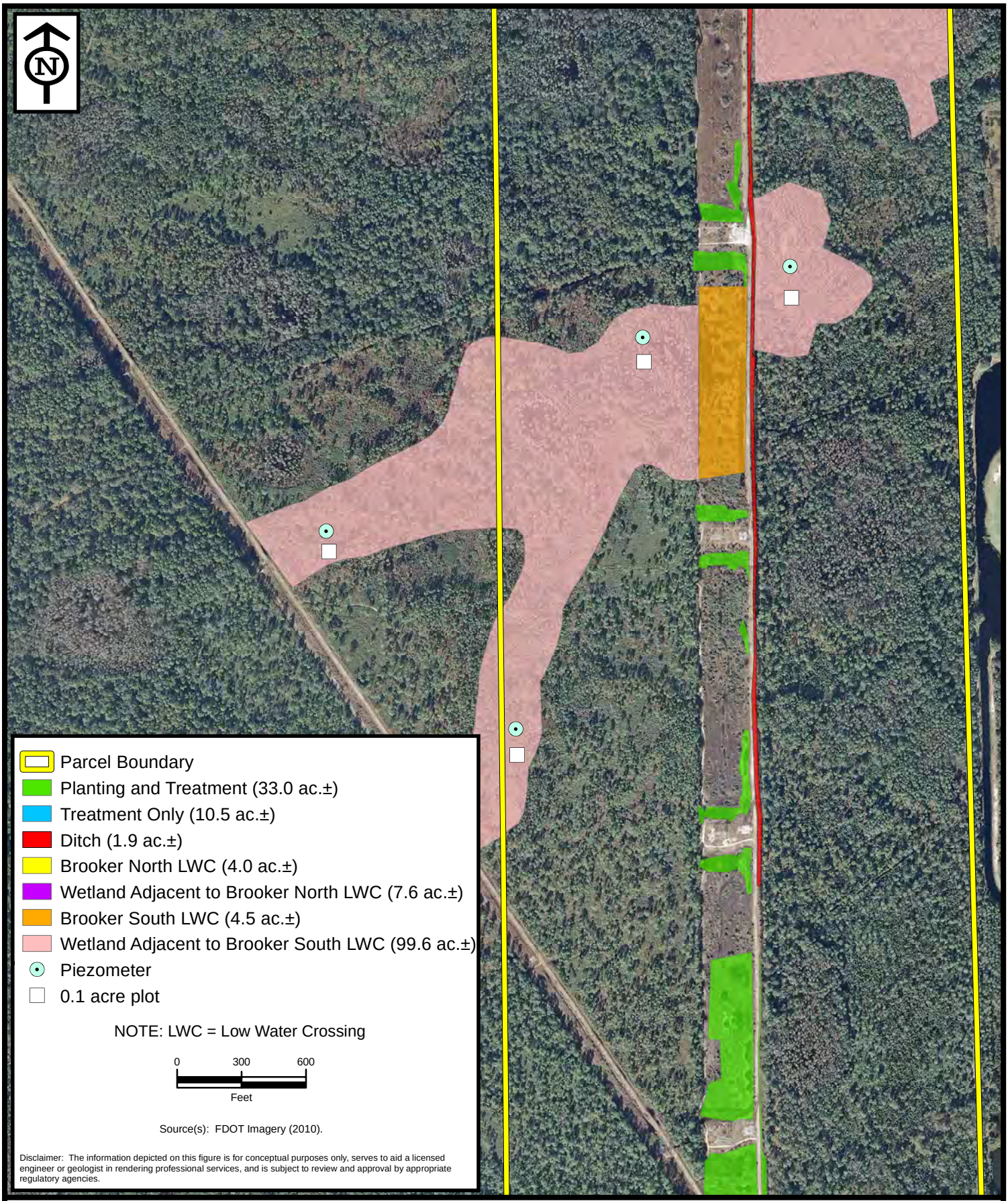
Proposed Monitoring Activities

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	CRD/JRN
Figure:	7-34b

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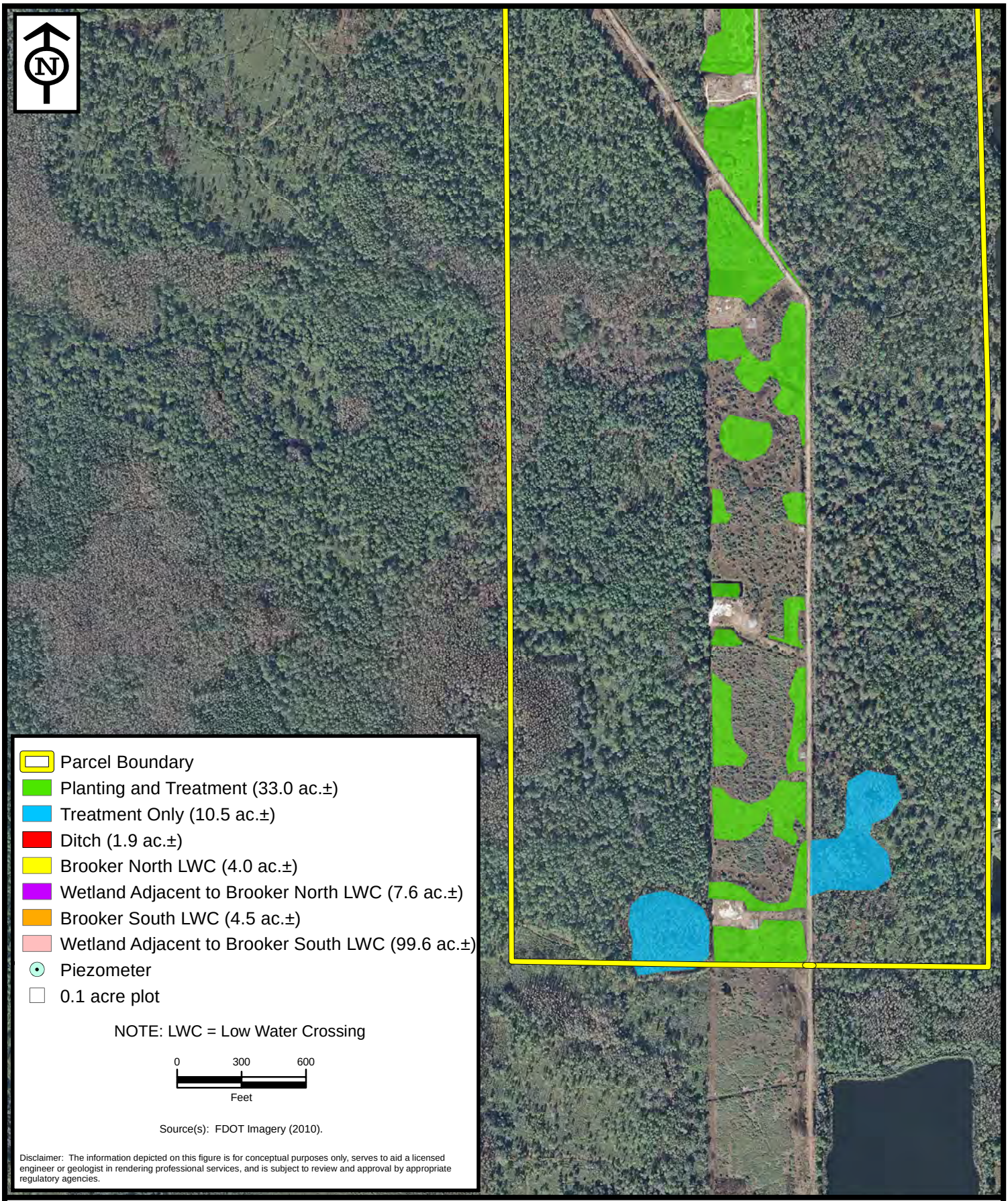
Proposed Monitoring Activities

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	CRD/JRN
Figure:	7-34c

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Proposed Monitoring Activities

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	CRD/JRN
Figure:	7-34d

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7.10 Success Criteria

Specific success criteria outlined below will ensure that the proposed mitigation activities achieve their intended design and function. The main focus of the success criteria for BCP will emphasize the establishment of fresh water marsh and the control of invasive/exotic species. Regular monitoring as described above and maintenance implementation is important to ensuring success at the BCP site. The mitigation area will be considered successful when the following criteria have been met within the required monitoring time frame:

Wetland Enhancement Areas (planting and treatment):

- 75% coverage of native/desirable herbaceous vegetation;
- 5% or less total coverage of any invasive/exotic species;
- hydrology is well established and visibly apparent based on the hydrologic indicators as defined by Rule 62-340 F.A.C.;
- the above criteria must be met within the three years of annual monitoring.

Wetland Enhancement Areas (treatment only – including ditch):

- 5% or less total coverage of any invasive/exotic species;
- hydrology is well established and visibly apparent based on the hydrologic indicators as defined by Rule 62-340 F.A.C.;
- the above criteria must be met within the three years of annual monitoring.

LWC Areas:

- both LWC must contain certified as-built surveys reflecting that they were built to specified design and are performing as expected;
- both areas must demonstrate no signs of erosion, sedimentation, wash-outs or scouring and have been operating without significant maintenance for at least one year;
- recording piezometers installed within designated wetlands upstream and downstream of the LWC must demonstrate relatively even water levels (within 1.0 ft.) on both sides.

The progress of the mitigation area towards reaching success will be tracked through the monitoring reports that will be submitted annually to FDEP and ACOE for review and approval. In the event that the above criteria are not met at the end of the monitoring period, or it is becoming obvious during annual monitoring that an area will not meet the established success criteria, then PEF will work closely with FDEP and ACOE staff in order to identify and correct any problems. Once the success criteria outlined above are met, the mitigation effort will be deemed a success and the monitoring of the mitigation area will be terminated.

7.11 Engineering and Planting Detail Drawings

Please see the attached engineering and planting detail drawings.

PROGRESS ENERGY MITIGATION PROJECT
BROOKER CREEK PRESERVE SITE
NORTH & SOUTH LOW WATER CROSSINGS
PINELLAS COUNTY, FLORIDA

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SHEET 7	CROSS SECTIONS - BROOKER NORTH LWC
SHEET 8	TYPICAL SECTION DETAIL - BROOKER NORTH LWC
SHEET 9	SIGNAGE PLAN - BROOKER NORTH LWC
SHEET 10	EXISTING CONDITIONS - BROOKER SOUTH LWC
SHEET 11	GRADING PLAN - BROOKER SOUTH LWC
SHEET 12	PROFILE & CROSS SECTION - BROOKER SOUTH LWC
SHEET 13	CROSS SECTIONS - BROOKER SOUTH LWC
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SHEET 15	SIGNAGE PLAN - BROOKER SOUTH LWC
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SHEET 17	EROSION CONTROL NOTES
SHEET 18	EROSION CONTROL DETAILS
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SHEET 20	PLANTING PLAN SHEET A
SHEET 21	PLANTING PLAN SHEET B

A / 5 — SECTION LETTER / SHEET NUMBER

A / 5 — DETAIL LETTER / SHEET NUMBER



LOCATION MAP
N.T.S.

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TITLE SHEET
PROGRESS ENERGY MITIGATION PROJECT
BROOKER CREEK PRESERVE SITE
PINELLAS COUNTY, FLORIDA

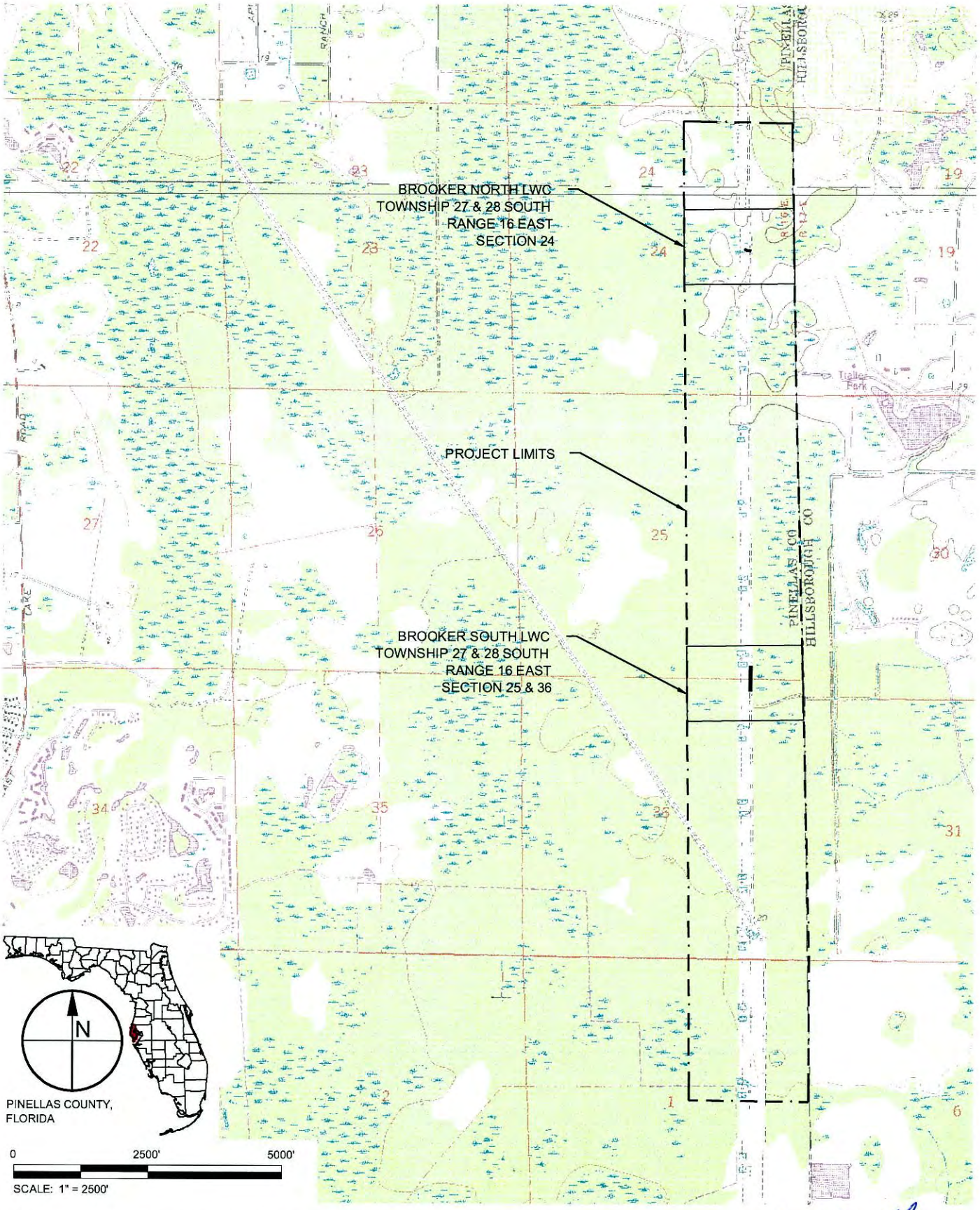
PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	1 of 21
DATE	JULY 2011

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PROJECT LOCATION MAP
PROGRESS ENERGY MITIGATION PROJECT
BROOKER CREEK PRESERVE SITE
PINELLAS COUNTY, FLORIDA

PROJECT	DRAWN BY	SHEET	DATE
C2011-025	RLJ/CAS	2 of 21	JULY 2011

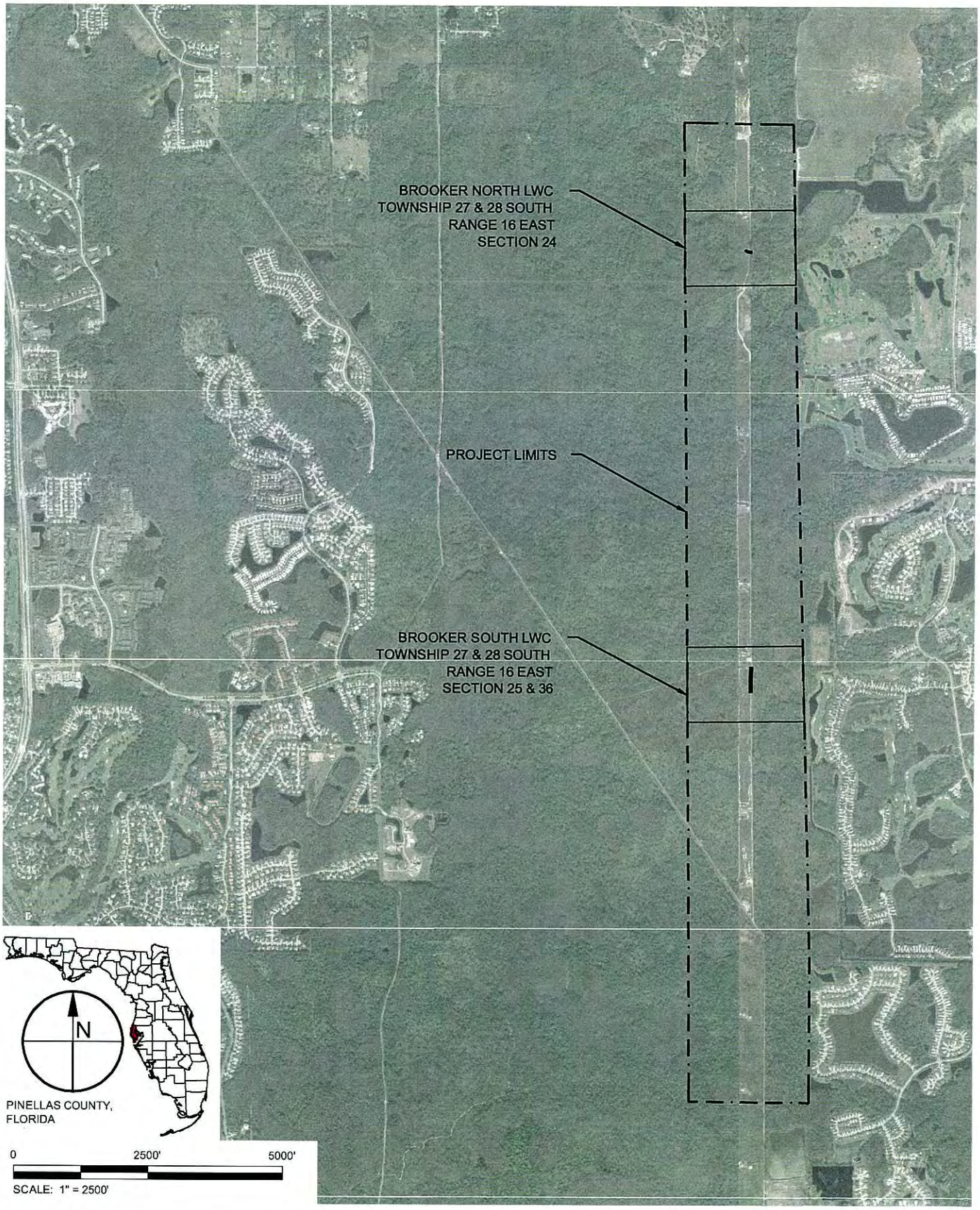
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PROJECT OVERVIEW
PROGRESS ENERGY MITIGATION PROJECT
BROOKER CREEK PRESERVE SITE
PINELLAS COUNTY, FLORIDA

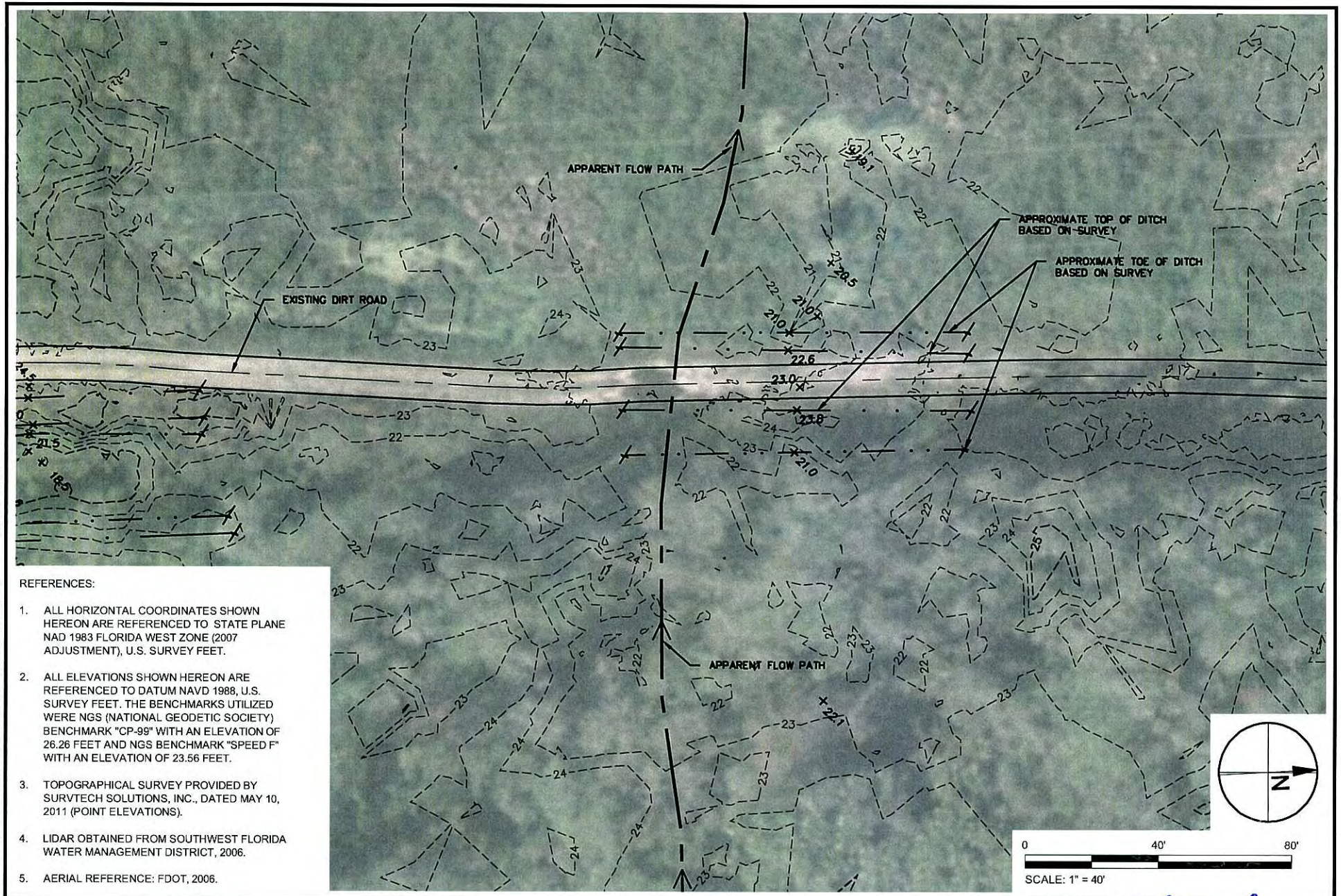
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C2011-025	RLJ/CAS	3 of 21	JULY 2011

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REFERENCES:

1. ALL HORIZONTAL COORDINATES SHOWN HEREON ARE REFERENCED TO STATE PLANE NAD 1983 FLORIDA WEST ZONE (2007 ADJUSTMENT), U.S. SURVEY FEET.
2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO DATUM NAVD 1988, U.S. SURVEY FEET. THE BENCHMARKS UTILIZED WERE NGS (NATIONAL GEODETIC SOCIETY) BENCHMARK "CP-99" WITH AN ELEVATION OF 26.26 FEET AND NGS BENCHMARK "SPEED F" WITH AN ELEVATION OF 23.56 FEET.
3. TOPOGRAPHICAL SURVEY PROVIDED BY SURVTECH SOLUTIONS, INC., DATED MAY 10, 2011 (POINT ELEVATIONS).
4. LIDAR OBTAINED FROM SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, 2006.
5. AERIAL REFERENCE: FDOT, 2006.

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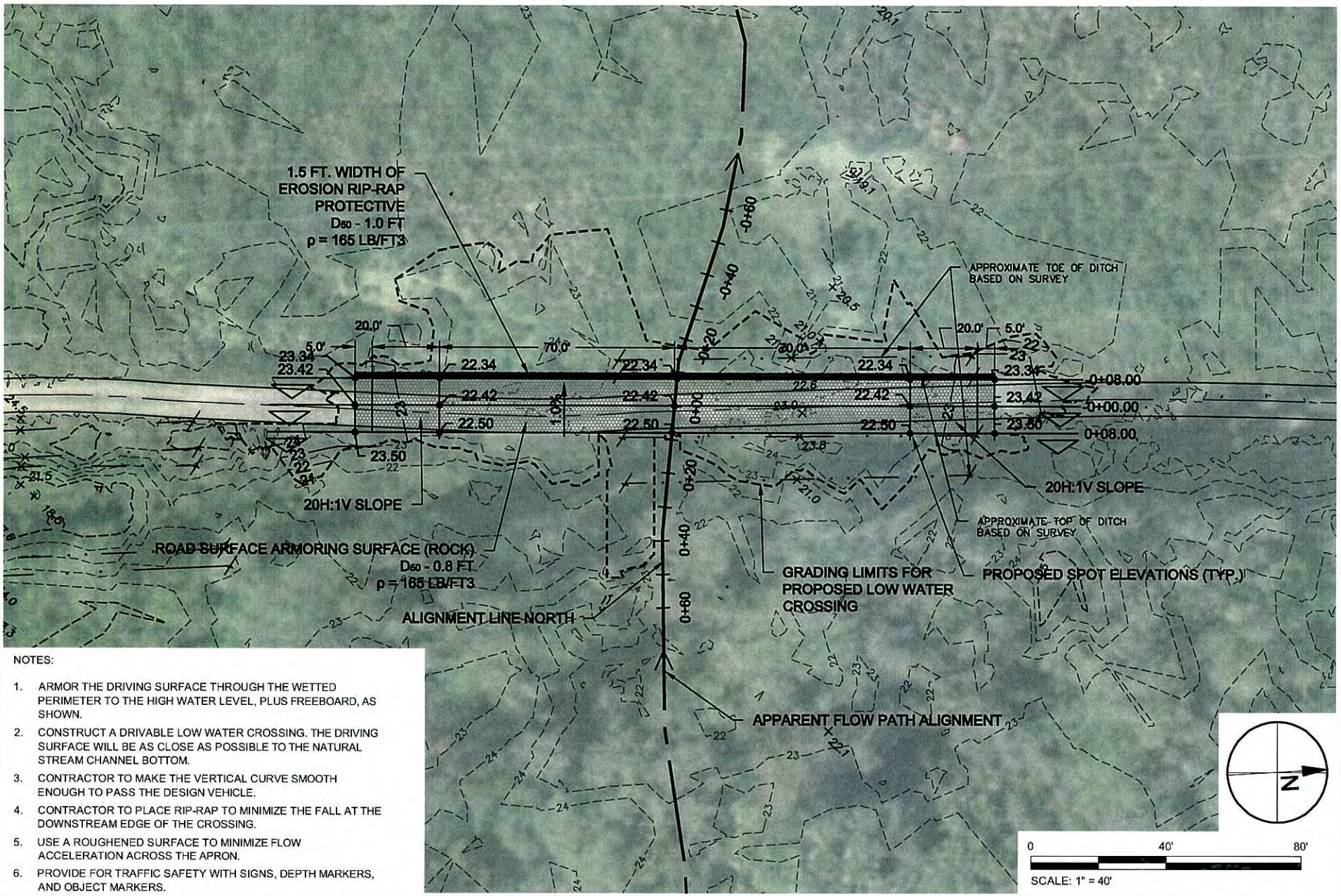
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PROGRESS ENERGY MITIGATION PROJECT
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PINELLAS COUNTY, FLORIDA

PROJECT	C2011-025
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NOTES:

1. ARMOR THE DRIVING SURFACE THROUGH THE WETTED PERIMETER TO THE HIGH WATER LEVEL, PLUS FREEBOARD, AS SHOWN.
2. CONSTRUCT A DRIVABLE LOW WATER CROSSING. THE DRIVING SURFACE WILL BE AS CLOSE AS POSSIBLE TO THE NATURAL STREAM CHANNEL BOTTOM.
3. CONTRACTOR TO MAKE THE VERTICAL CURVE SMOOTH ENOUGH TO PASS THE DESIGN VEHICLE.
4. CONTRACTOR TO PLACE RIP-RAP TO MINIMIZE THE FALL AT THE DOWNSTREAM EDGE OF THE CROSSING.
5. USE A ROUGHENED SURFACE TO MINIMIZE FLOW ACCELERATION ACROSS THE APRON.
6. PROVIDE FOR TRAFFIC SAFETY WITH SIGNS, DEPTH MARKERS, AND OBJECT MARKERS.

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GRADING PLAN - BROOKER NORTH LWC
PROGRESS ENERGY MITIGATION PROJECT
BROOKER CREEK PRESERVE SITE
PINELLAS COUNTY, FLORIDA

PROJECT	C2011-025
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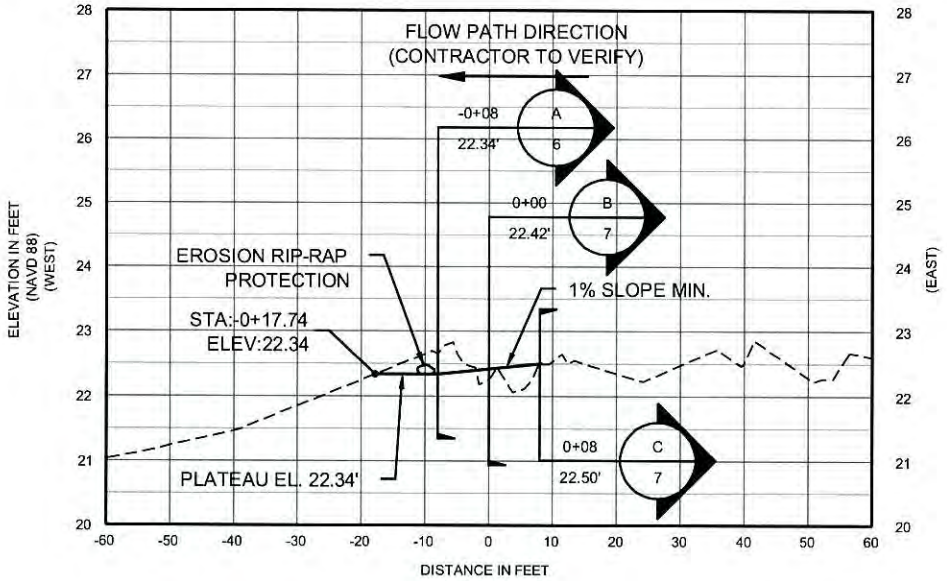
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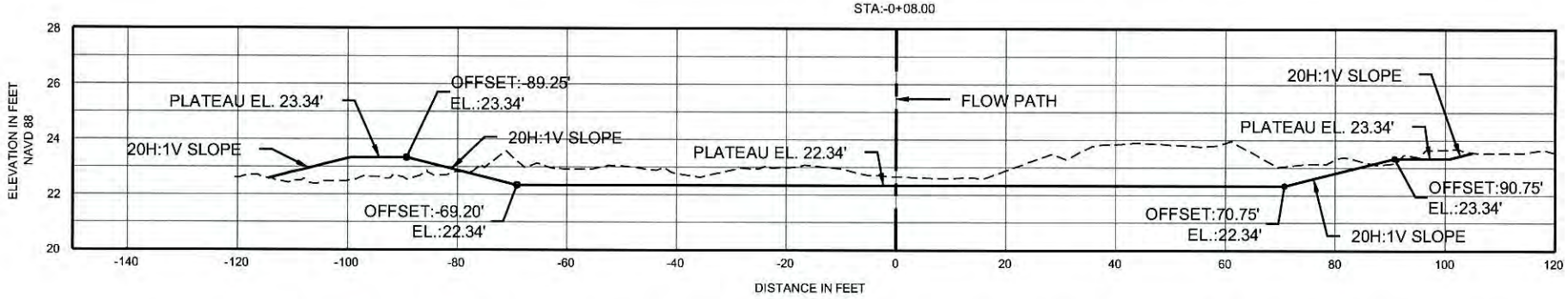
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BROOKER CREEK NORTH FLOW PATH ALIGNMENT

SCALE: 1" = 30'
V-SCALE: 1" = 3'

0 30'



CROSS SECTION STATION -0+08
BROOKER CREEK NORTH LOW WATER CROSSING

A
6

SCALE: 1" = 30'
V-SCALE: 1" = 6'

0 30'

LEGEND:
EXISTING GRADE
PROPOSED GRADE

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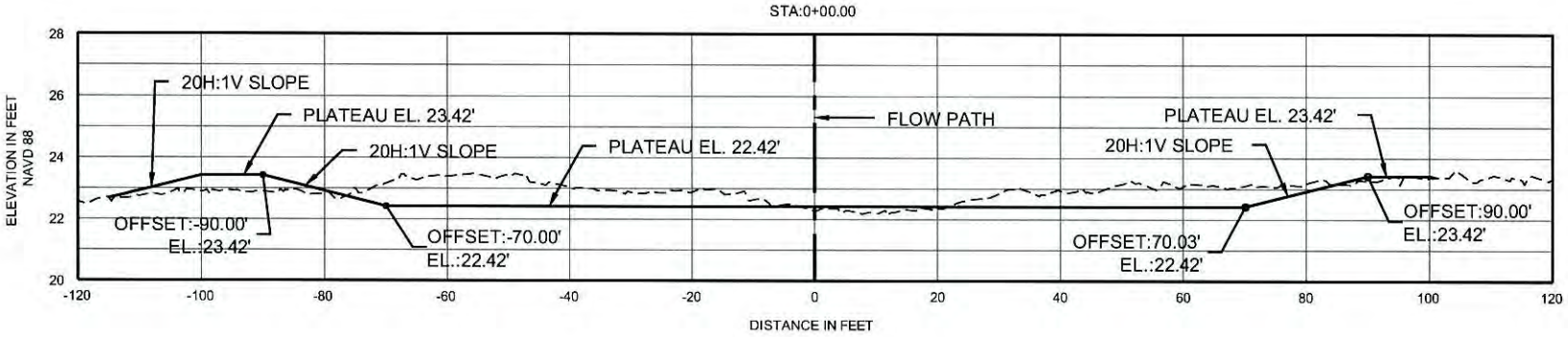
PROFILE AND CROSS SECTION - BROOKER NORTH LWC
PROGRESS ENERGY MITIGATION PROJECT
BROOKER CREEK PRESERVE SITE
PINELLAS COUNTY, FLORIDA

PROJECT	C2011-025
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DATE	JULY 2011

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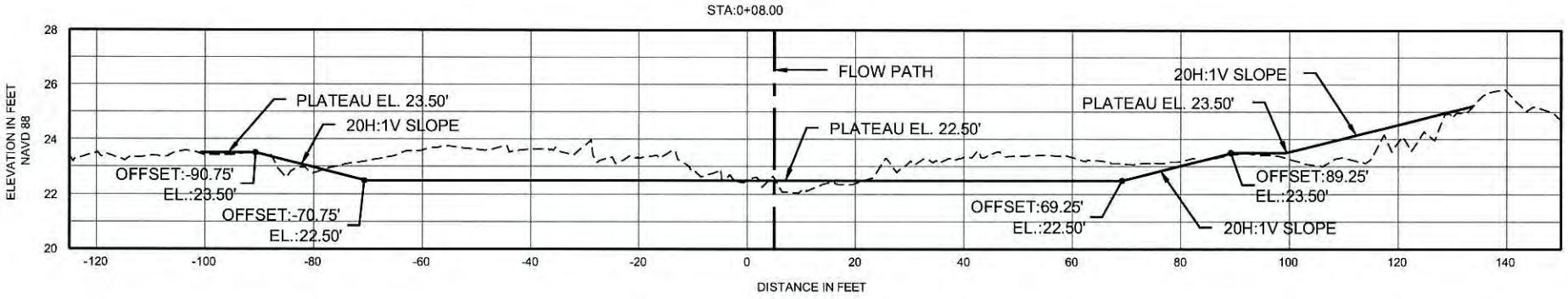


CROSS SECTION STA. 0+00
BROOKER CREEK NORTH LOW WATER CROSSING

B / 6

SCALE: 1" = 30'
V-SCALE: 1" = 6'

0 30'



CROSS SECTION STA. 0+08
BROOKER CREEK NORTH LOW WATER CROSSING

C / 6

SCALE: 1" = 30'
V-SCALE: 1" = 6'

0 30'

LEGEND:

EXISTING GRADE

PROPOSED GRADE

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CROSS SECTIONS - BROOKER NORTH LWC
PROGRESS ENERGY MITIGATION PROJECT
BROOKER CREEK PRESERVE SITE
PINELLAS COUNTY, FLORIDA

PROJECT	C2011-025
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SHEET	7 of 21
DATE	JULY 2011

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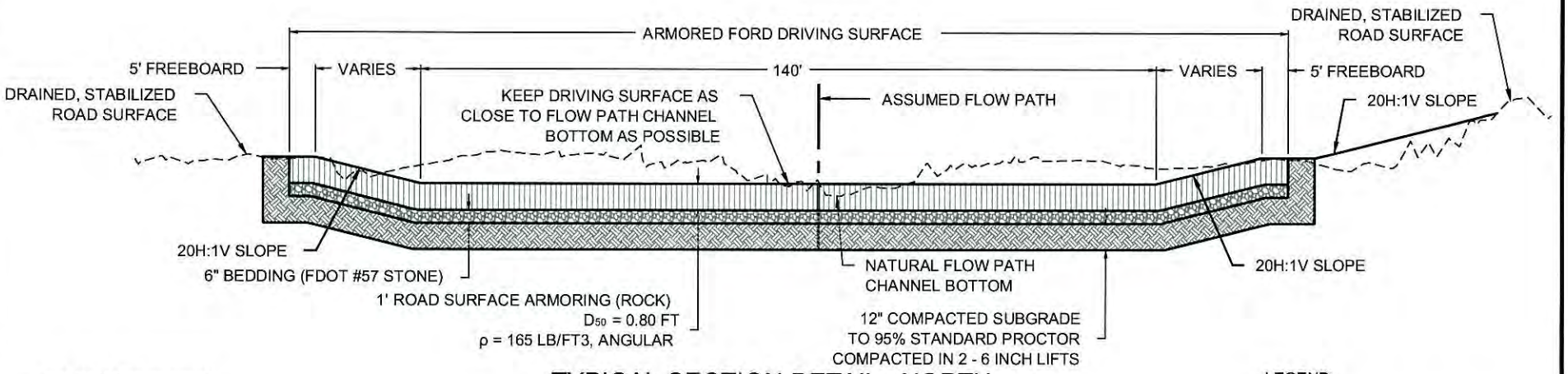
PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT FOR CONSTRUCTION, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

TYPICAL CONSTRUCTION NOTES:

1. CONTRACTOR TO IDENTIFY ROAD BASE SUPPLIER AND PROVIDE DENSITY AND SAMPLES OF MATERIAL PRIOR TO CONSTRUCTION.
2. CONTRACTOR TO USE "LOCAL" RIP-RAP, IF APPLICABLE.
3. CONTRACTOR TO PROVIDE CONSTRUCTION METHODOLOGY TO CONSTRUCT DURING LOW FLOW, LOW PRECIPITATION SEASON.
4. CONTRACTOR TO CONSTRUCT ROAD TO MEET H-20 VEHICLE LOADING.
5. CONTRACTOR TO MINIMIZE CONSTRUCTION IMPACT AND NOT DISTURB NATURAL STREAMBED ADJACENT TO PROJECT.
6. CONTRACTOR TO PROVIDE RIP-RAP PROTECTION ON DOWNSTREAM EDGE OF LOW WATER CROSSING, AND USE EROSION FILTER BLANKET, ETC. TO PREVENT DOWNSTREAM EROSION.
7. CONTRACTOR TO KEEP SERVICE AND REFUELING AREAS WELL AWAY FROM WET AREAS AND STREAMBEDS.

EARTHWORK VOLUMES *	
EXCAVATED MATERIAL	476 CU. YDS.
FILL MATERIAL	0.24 CU. YDS.

* DATA APPROXIMATE FROM FDOT 2006 LIDAR AND DOES NOT INCLUDE VOLUME OF COMPACTED FILL.



RIP-RAP PROTECTION
D_{50} = 0.80 FT
ρ = 165 LB/FT3, ANGULAR

TYPICAL SECTION DETAIL - NORTH

SCALE: 1" = 30'
V-SCALE: 1" = 6'

0 30'

LEGEND:
EXISTING GRADE
PROPOSED GRADE

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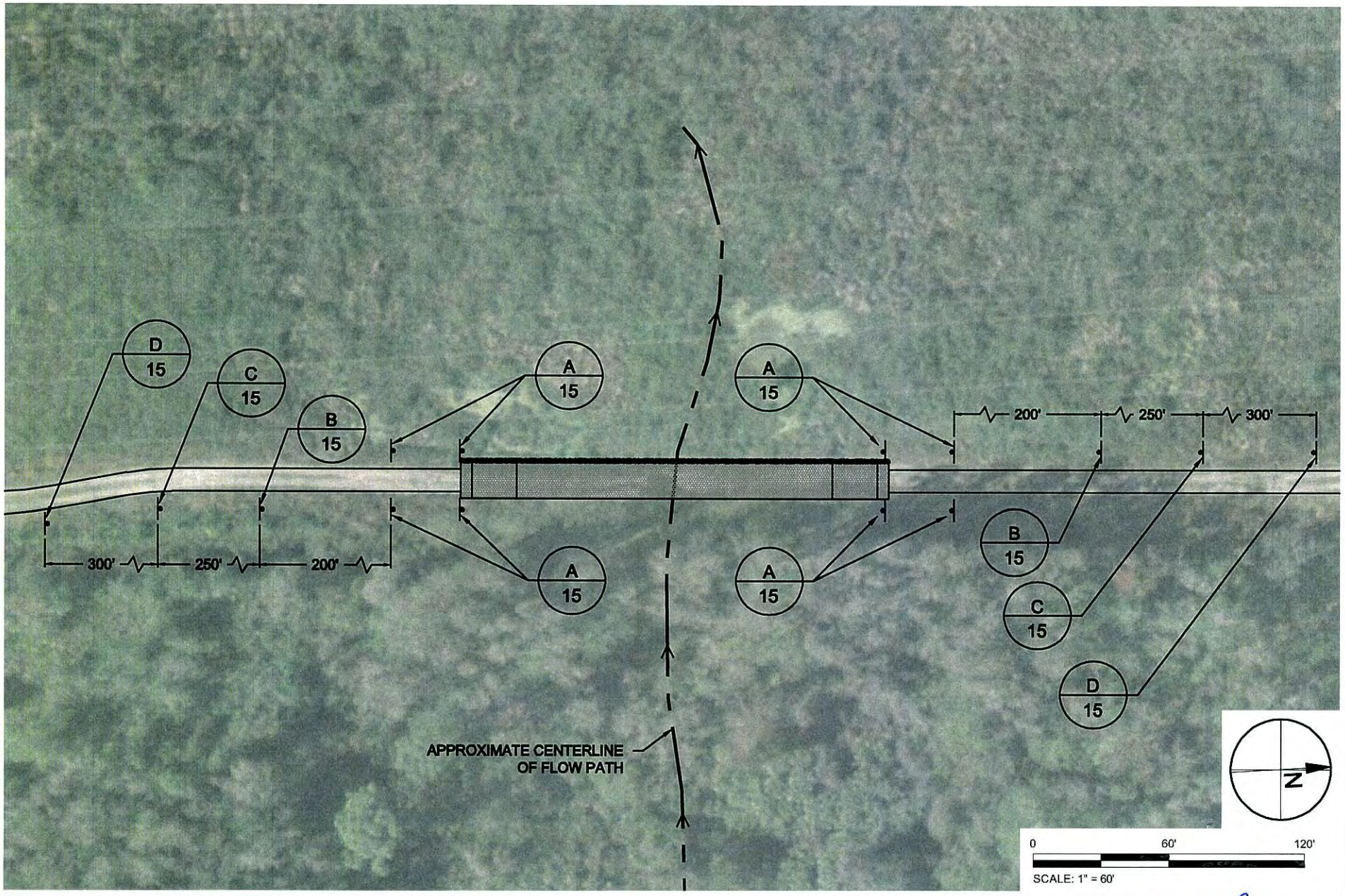
TYPICAL SECTION DETAIL - BROOKER NORTH LWC
PROGRESS ENERGY MITIGATION PROJECT
BROOKER CREEK PRESERVE SITE
PINELLAS COUNTY, FLORIDA

PROJECT	C2011-025
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DATE	JULY 2011

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SIGNAGE PLAN - BROOKER NORTH LWC
PROGRESS ENERGY MITIGATION PROJECT
BROOKER CREEK PRESERVE SITE
PINELLAS COUNTY, FLORIDA

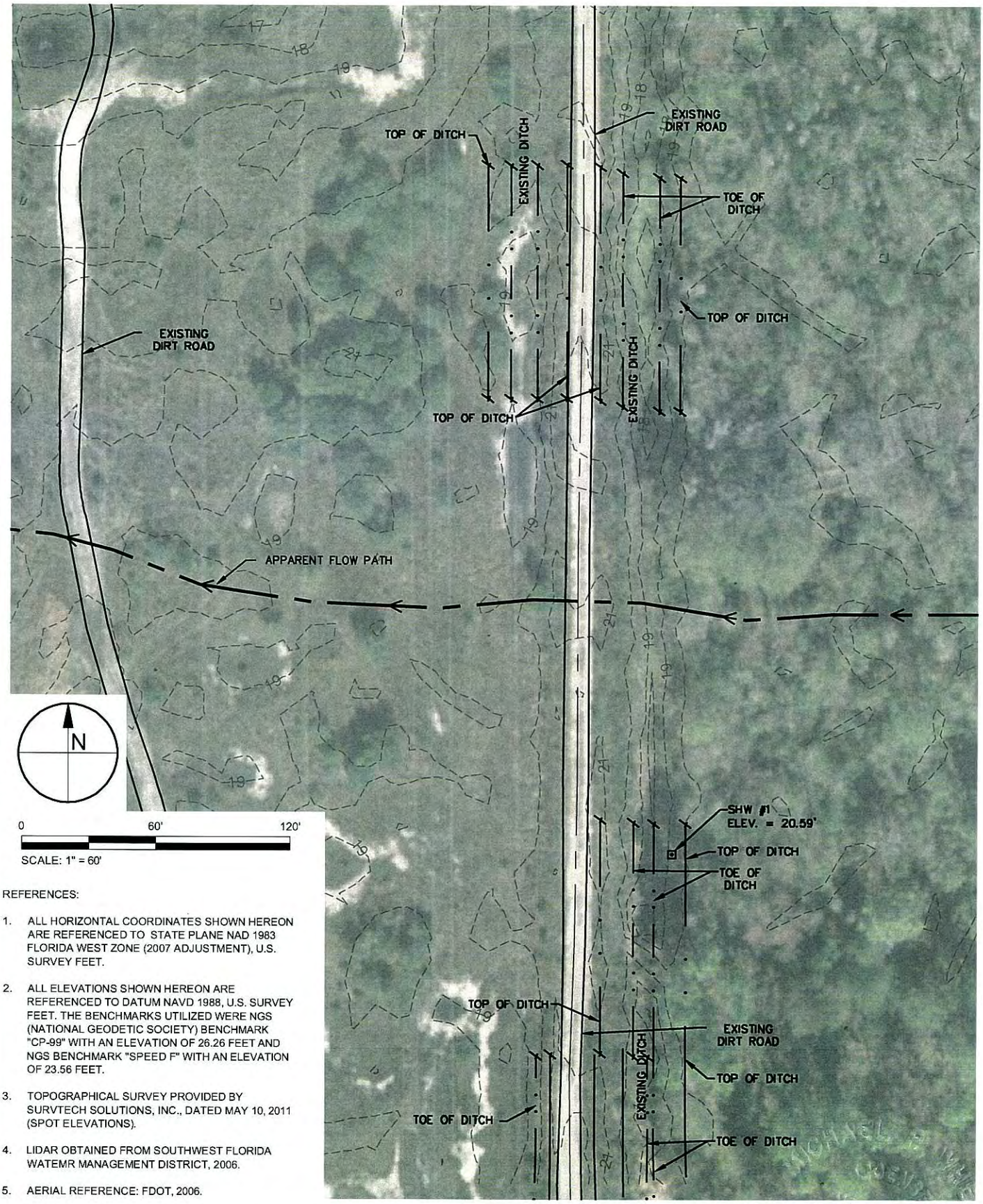
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SHEET	9 of 21
DATE	JULY 2011

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3. TOPOGRAPHICAL SURVEY PROVIDED BY SURVTECH SOLUTIONS, INC., DATED MAY 10, 2011 (SPOT ELEVATIONS).
4. LIDAR OBTAINED FROM SOUTHWEST FLORIDA WATEMR MANAGEMENT DISTRICT, 2006.
5. AERIAL REFERENCE: FDOT, 2006.

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EXISTING CONDITIONS - BROOKER SOUTH LWC
PROGRESS ENERGY MITIGATION PROJECT
BROOKER CREEK PRESERVE SITE
PINELLAS COUNTY, FLORIDA

PROJECT	DRAWN BY	SHEET	DATE
C2011-025	RLJ/CAS	10 of 21	JULY 2011

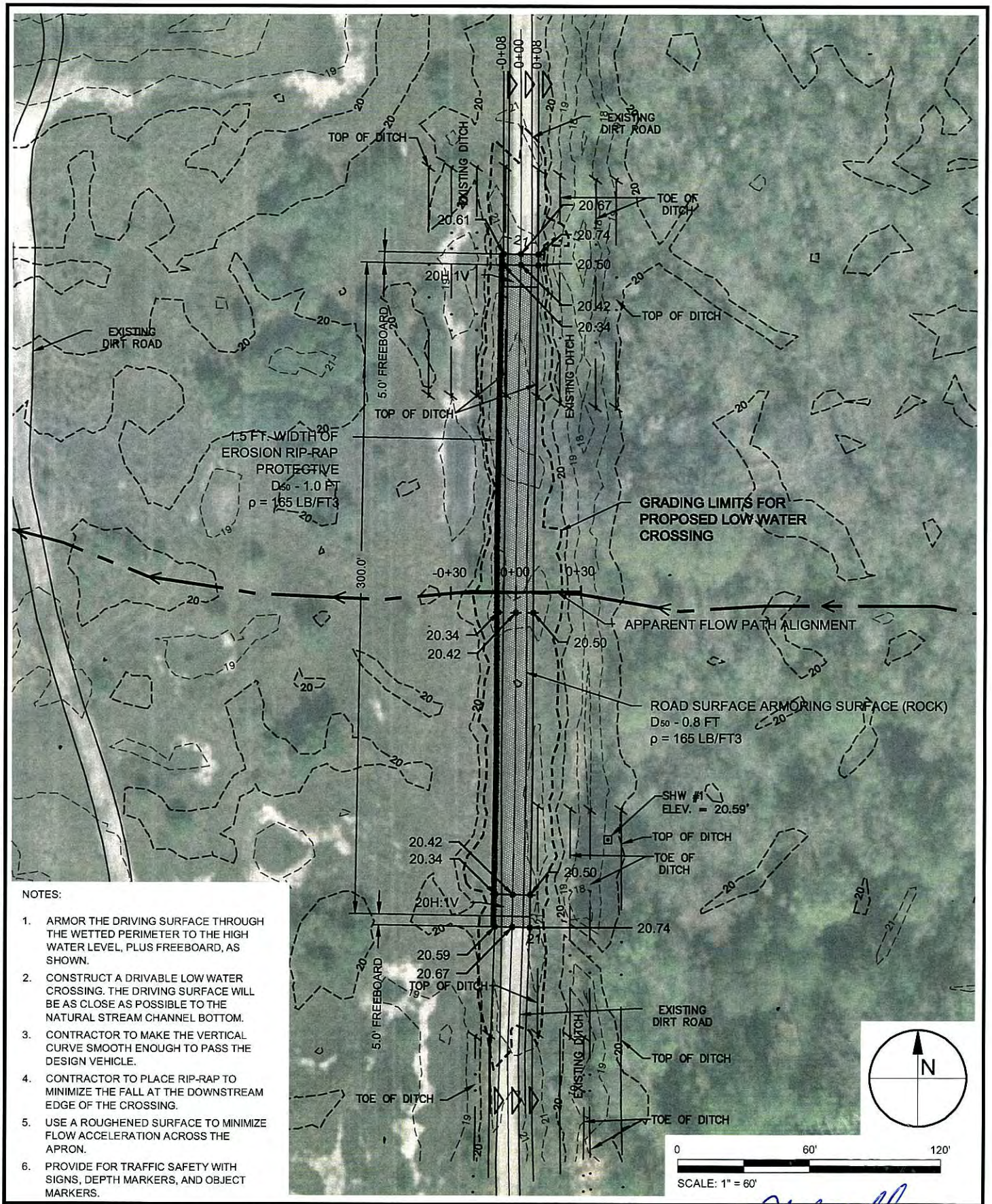
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NOTES:

1. ARMOR THE DRIVING SURFACE THROUGH THE WETTED PERIMETER TO THE HIGH WATER LEVEL, PLUS FREEBOARD, AS SHOWN.
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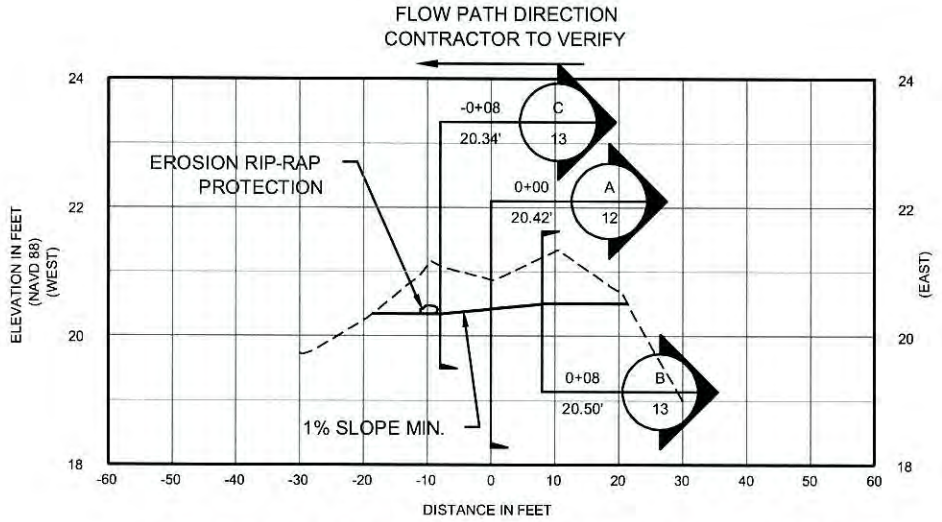
GRADING PLAN - BROOKER SOUTH LWC
PROGRESS ENERGY MITIGATION PROJECT
BROOKER CREEK PRESERVE SITE
PINELLAS COUNTY, FLORIDA

PROJECT	DRAWN BY	SHEET	DATE
C2011-025	RLJ/CAS	11 of 21	JULY 2011

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9/20/2011
DATE

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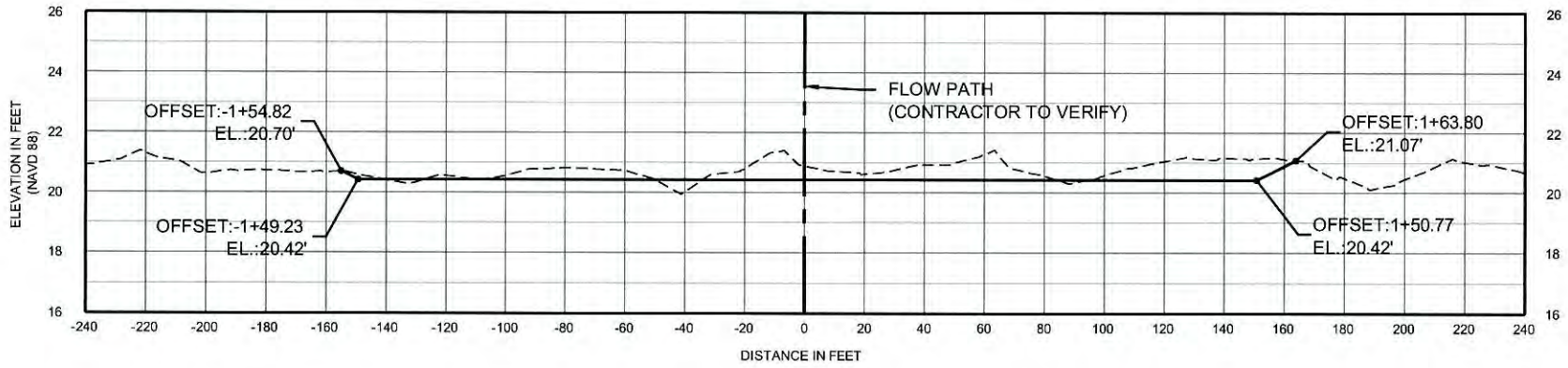
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BROOKER CREEK SOUTH FLOW PATH ALIGNMENT

SCALE: 1" = 30'
V-SCALE: 1" = 3'

0 30'



CROSS SECTION STA 0+00
BROOKER CREEK SOUTH LOW WATER CROSSING

A
12

SCALE: 1" = 60'
V-SCALE: 1" = 6'

0 60'

LEGEND:
EXISTING GRADE
PROPOSED GRADE

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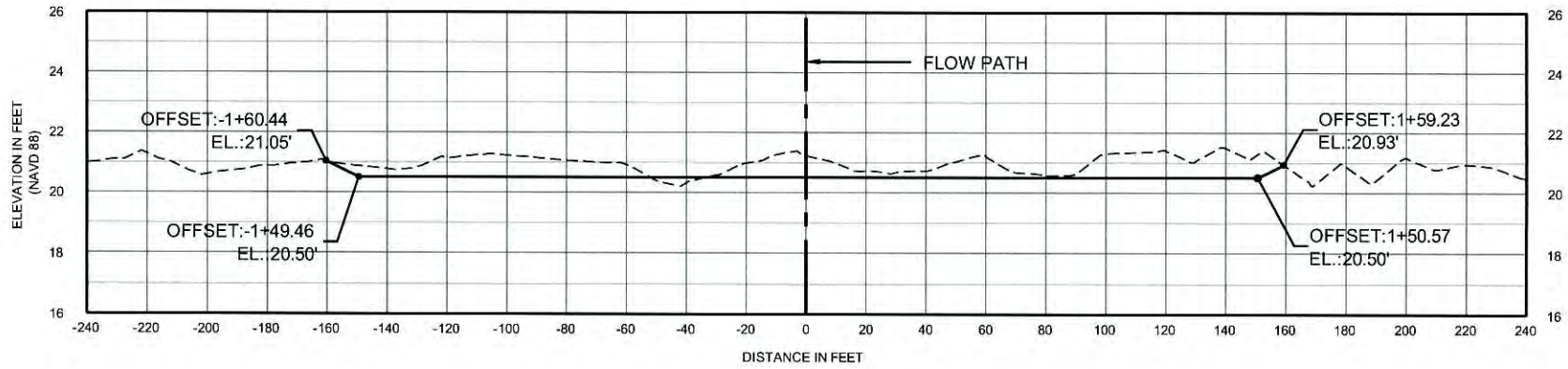
PROFILE & CROSS SECTION - BROOKER SOUTH LWC
PROGRESS ENERGY MITIGATION PROJECT
BROOKER CREEK PRESERVE SITE
PINELLAS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	12 of 21
DATE	JULY 2011

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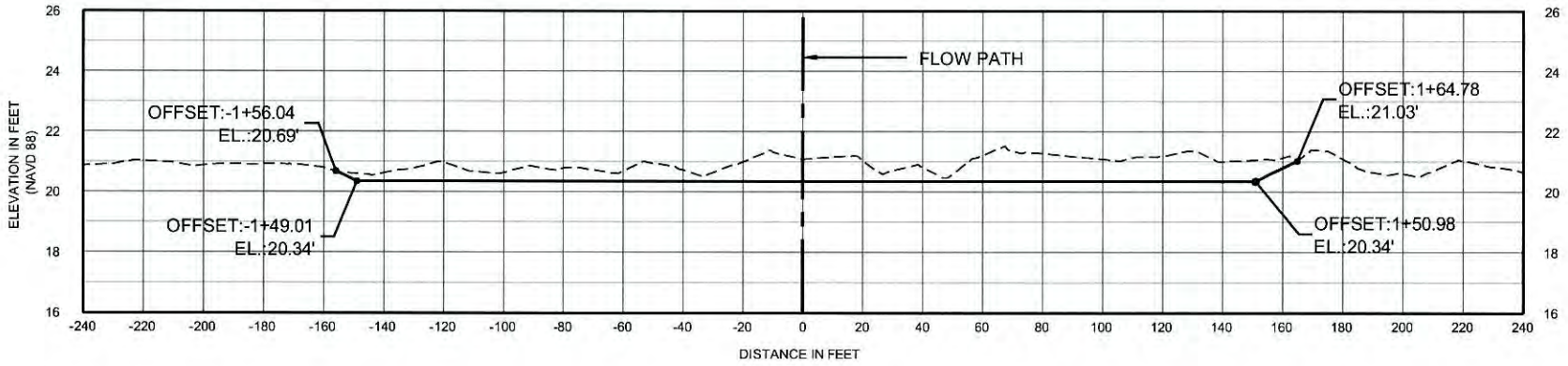


B/12

CROSS SECTION STA. 0+08.00
BROOKER CREEK SOUTH LOW WATER CROSSING

SCALE: 1" = 60'
V-SCALE: 1" = 6'

0 60'



C/12

CROSS SECTION STA. -0+08.00
BROOKER CREEK SOUTH LOW WATER CROSSING

SCALE: 1" = 60'
V-SCALE: 1" = 6'

0 60'

LEGEND:

EXISTING GRADE

PROPOSED GRADE

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD.
BLDG. 300, SUITE 300
JACKSONVILLE, FL 32256
CERTIFICATE OF AUTHORIZATION # 4815

CROSS SECTIONS - BROOKER SOUTH LWC
PROGRESS ENERGY MITIGATION PROJECT
BROOKER CREEK PRESERVE SITE
PINELLAS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	13 of 21
DATE	JULY 2011

SEAL

9/20/2011

MICHAEL P. WHELAN P.E.# 55996 DATE

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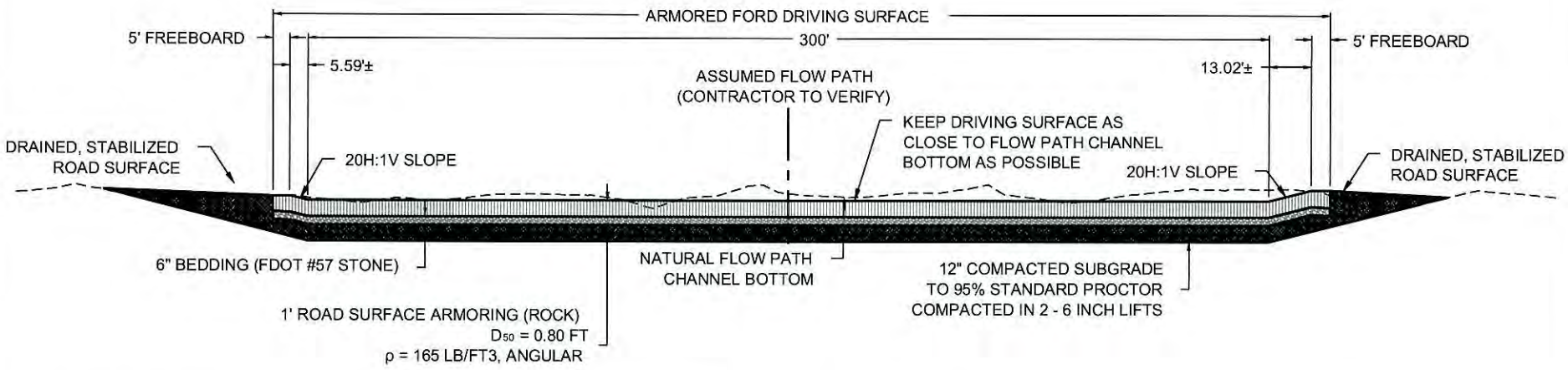
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TYPICAL CONSTRUCTION NOTES:

1. CONTRACTOR TO IDENTIFY ROAD BASE SUPPLIER AND PROVIDE DENSITY AND SAMPLES OF MATERIAL PRIOR TO CONSTRUCTION.
2. CONTRACTOR TO USE "LOCAL" RIP-RAP, IF APPLICABLE.
3. CONTRACTOR TO PROVIDE CONSTRUCTION METHODOLOGY TO CONSTRUCT DURING LOW FLOW, LOW PRECIPITATION SEASON.
4. CONTRACTOR TO CONSTRUCT ROAD TO MEET H-20 VEHICLE LOADING.
5. CONTRACTOR TO MINIMIZE CONSTRUCTION IMPACT AND NOT DISTURB NATURAL STREAMBED ADJACENT TO PROJECT.
6. CONTRACTOR TO PROVIDE RIP-RAP PROTECTION ON DOWNSTREAM EDGE OF LOW WATER CROSSING, AND USE EROSION FILTER BLANKET, ETC. TO PREVENT DOWNSTREAM EROSION.
7. CONTRACTOR TO KEEP SERVICE AND REFUELING AREAS WELL AWAY FROM WET AREAS AND STREAMBEDS.

EARTHWORK VOLUMES *	
EXCAVATED MATERIAL	942 CU. YDS.
FILL MATERIAL	0.76 CU. YDS.

* DATA APPROXIMATE FROM FDOT 2006 LIDAR AND DOES NOT INCLUDE VOLUME OF COMPACTED FILL.



RIP-RAP PROTECTION
D_{50} = 0.80 FT
ρ = 165 LB/FT3, ANGULAR

TYPICAL SECTION DETAIL - SOUTH

SCALE: 1" = 50'
V-SCALE: 1" = 10'

0 50'

LEGEND:
EXISTING GRADE
PROPOSED GRADE

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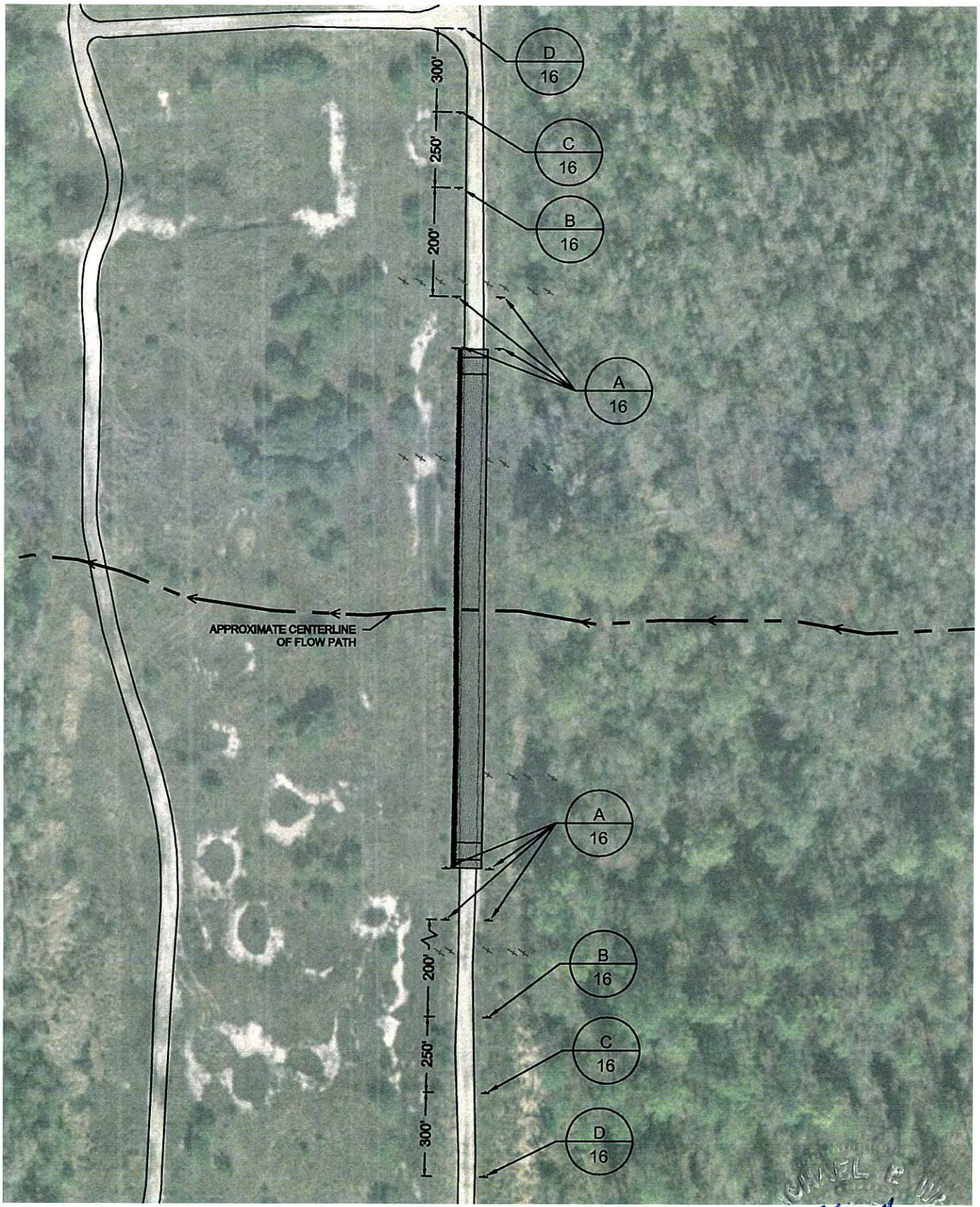
TYPICAL SECTION DETAIL - BROOKER SOUTH LWC
PROGRESS ENERGY MITIGATION PROJECT
BROOKER CREEK PRESERVE SITE
PINELLAS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	14 of 21
DATE	JULY 2011

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9/20/2011
MICHAEL P. WHELAN P.E.# 55495 DATE

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SIGNAGE PLAN - BROOKER SOUTH LWC
PROGRESS ENERGY MITIGATION PROJECT
BROOKER CREEK PRESERVE SITE
PINELLAS COUNTY, FLORIDA

PROJECT	DRAWN BY	SHEET	DATE
C2011-025	RLJ/CAS	15 of 21	JULY 2011

SEAL

9/20/2011

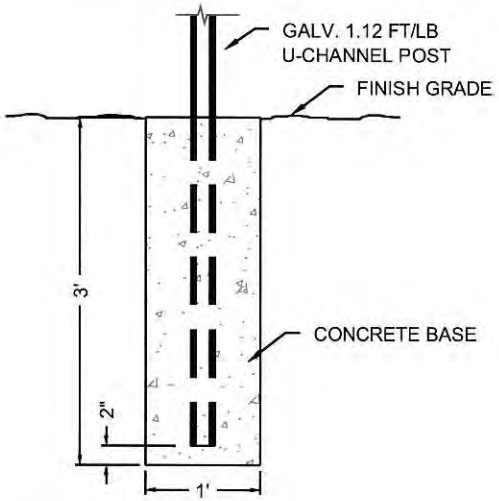
MICHAEL P. WHELAN P.E. # 55496 DATE

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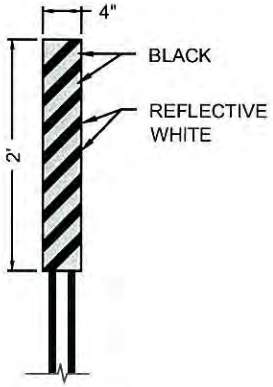
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SIGNAGE NOTES:

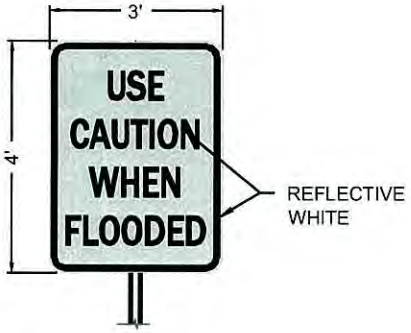
1. CONTRACTOR TO INSTALL ALL SIGNS 7' (TOP OF SIGN) ABOVE FINISH GRADE .



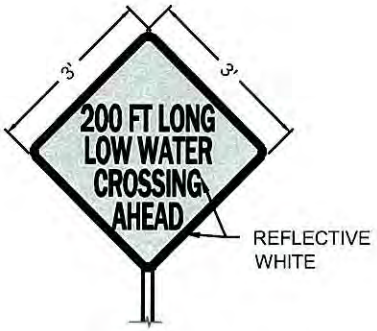
TYPICAL
BREAKAWAY SIGN BASE
NOT TO SCALE



A 9,15 TYPICAL
CHANNEL MARKER
NOT TO SCALE



B 9,15 "CAUTION" SIGN
NOT TO SCALE



C 9,15 "LOW WATER" SIGN
NOT TO SCALE



D 9,15 "FLOOD AREA" SIGN
NOT TO SCALE

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SIGNAGE PLAN DETAILS
PROGRESS ENERGY MITIGATION PROJECT
BROOKER CREEK PRESERVE SITE
PINELLAS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	16 of 21
DATE	JULY 2011

SEAL
MICHAEL P. WHELAN P.E. # 55496
9/20/2011
DATE

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EROSION CONTROL AND GENERAL VEGETATION NOTES:

1. THE CONTRACTOR SHALL IMPLEMENT AND MAINTAIN EROSION CONTROL MEASURES AS NECESSARY TO COMPLY WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS AND COMPLY WITH STATE WATER QUALITY CRITERIA FOR STORMWATER DISCHARGE. EROSION CONTROL MEASURES INCLUDE BUT ARE NOT LIMITED TO TURBIDITY SCREENS, MULCHING, HAY BALES, AND SILT FENCE. IF A WATER QUALITY VIOLATION OCCURS, THE CONTRACTOR SHALL BE WHOLLY RESPONSIBLE FOR ALL DAMAGE AND ALL COSTS WHICH MAY RESULT INCLUDING LEGAL FEES, CONSTRUCTION COSTS, AND FINES.

2. DISTURBED AREAS SHALL BE VEGETATED, FERTILIZED, MULCHED, AND MAINTAINED IN ACCORDANCE WITH PROJECT SPECIFICATIONS AND CITY, COUNTY, STATE, AND FEDERAL REQUIREMENTS.

3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING PERMANENT VEGETATION AT ALL DISTURBED AREAS PER NPDES FINAL STABILIZATION REQUIREMENTS.

4. EROSION CONTROL MEASURES SHALL BE MAINTAINED FOR THE ENTIRE DURATION OF THE PROJECT OR UNTIL PERMANENT VEGETATION IS ESTABLISHED.

5. EROSION CONTROL MEASURES SHALL BE PLACED TO CONTAIN ALL POINTS OF DISCHARGE TO SURFACE WATERS OR WETLANDS INCLUDING CURB INLETS, DITCH BOTTOM INLETS, DITCHES, AND DOWNSTREAM PORTIONS OF NATURAL DRAINAGE PATHWAYS, STREAMS, CANALS, AND TIDAL WATERS ADJACENT TO CONSTRUCTION.

6. 48 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION, THE CONTRACTOR WILL SUBMIT A "NOTICE OF INTENT" TO THE EPA IN ACCORDANCE WITH NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM RULES AND REGULATIONS.

7. THE SITE CONTRACTOR IS RESPONSIBLE FOR REMOVING THE TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES AFTER COMPLETION OF CONSTRUCTION AND ONLY WHEN AREAS HAVE BEEN STABILIZED.

8. SILT FENCES AND FILTER BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.

9. CONTRACTOR TO FIELD VERIFY EXTENT OF CLEARING ADJACENT TO LOW WATER CROSSING PRIOR TO CONSTRUCTION.

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EROSION CONTROL NOTES
PROGRESS ENERGY MITIGATION PROJECT
BROOKER CREEK PRESERVE SITE
PINELLAS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
SHEET	17 of 21
DATE	JULY 2011

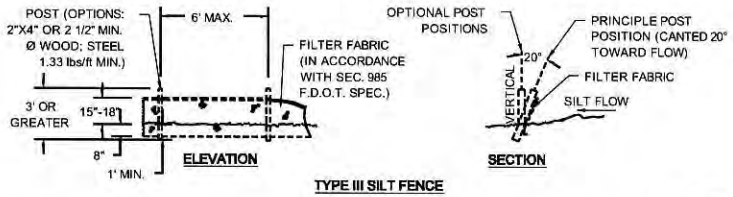
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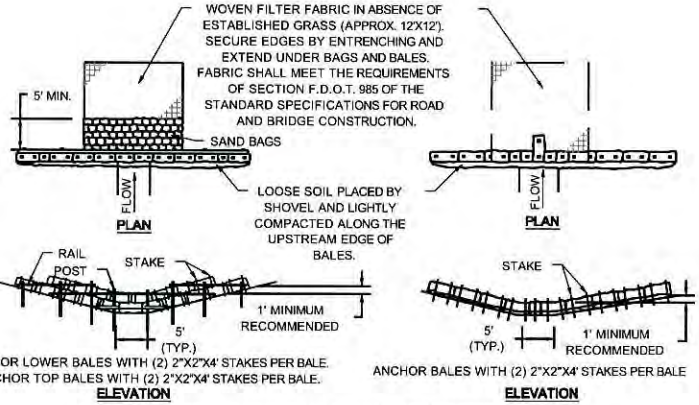
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TYPE III SILT FENCE



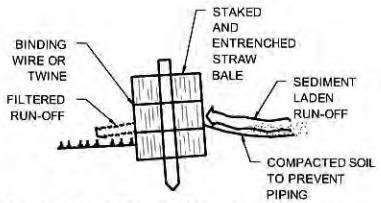
TYPE IV SILT FENCE



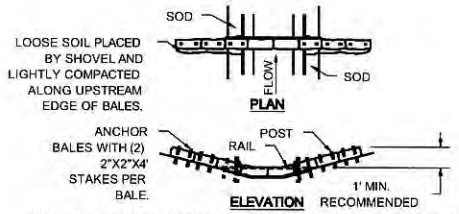
APPLICATION AND SPACING OF TYPES I & TYPES II HAY BALE BARRIERS SALL BE IN ACCORDANCE WITH SHEET 1 OF 3, F.D.O.T. INDEX NO. 102

TYPE II TYPE I

TYPICAL STRAW BALE DETAIL

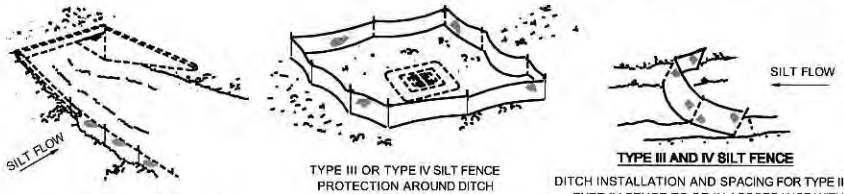


CROSS SECTION OF A PROPERLY INSTALLED STRAW BALE



SPACING: BALE BARRIERS FOR PAVED DITCHES SHOULD BE SPACED IN ACCORDANCE WITH CHART I, SHEET 1 OF 3, INDEX NO. 102 OF THE F.D.O.T. ROADWAY AND TRAFFIC DESIGN STANDARDS.

STRAW BALE BARRIER FOR PAVED DITCH



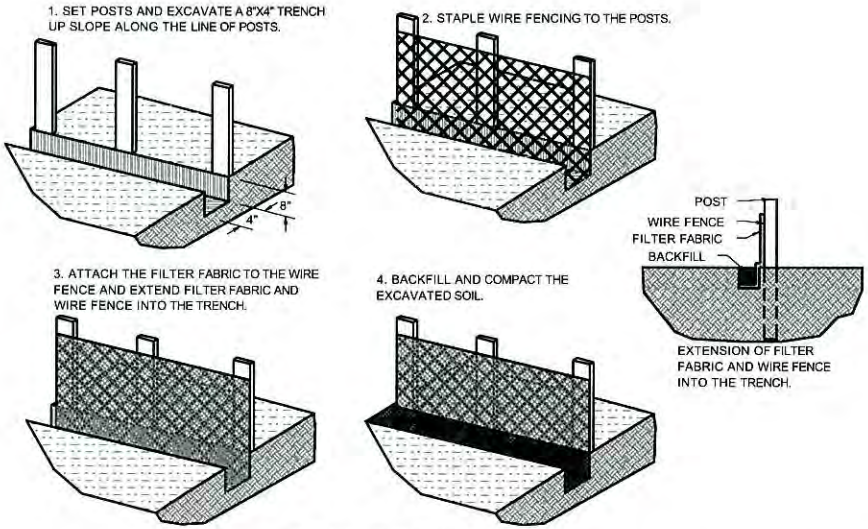
TYPE III OR TYPE IV SILT FENCE

TYPE III OR TYPE IV SILT FENCE PROTECTION AROUND DITCH BOTTOM INLETS.

TYPE III AND IV SILT FENCE

DITCH INSTALLATION AND SPACING FOR TYPE III & TYPE IV FENCE TO BE IN ACCORDANCE WITH SHEET 1 OF 3, OF THE F.D.O.T. INDEX NO. 102

DO NOT DEPLOY IN A MANNER THAT SILT FENCES WILL ACT AS A DAM ACROSS PERMANENT FLOWING WATERCOURSES. SILT FENCES ARE TO BE USED AT UPLAND LOCATIONS AND TURBIDITY BARRIERS USED AT PERMANENT BODIES OF WATER.



SILT FENCE INSTALLATION DETAILS

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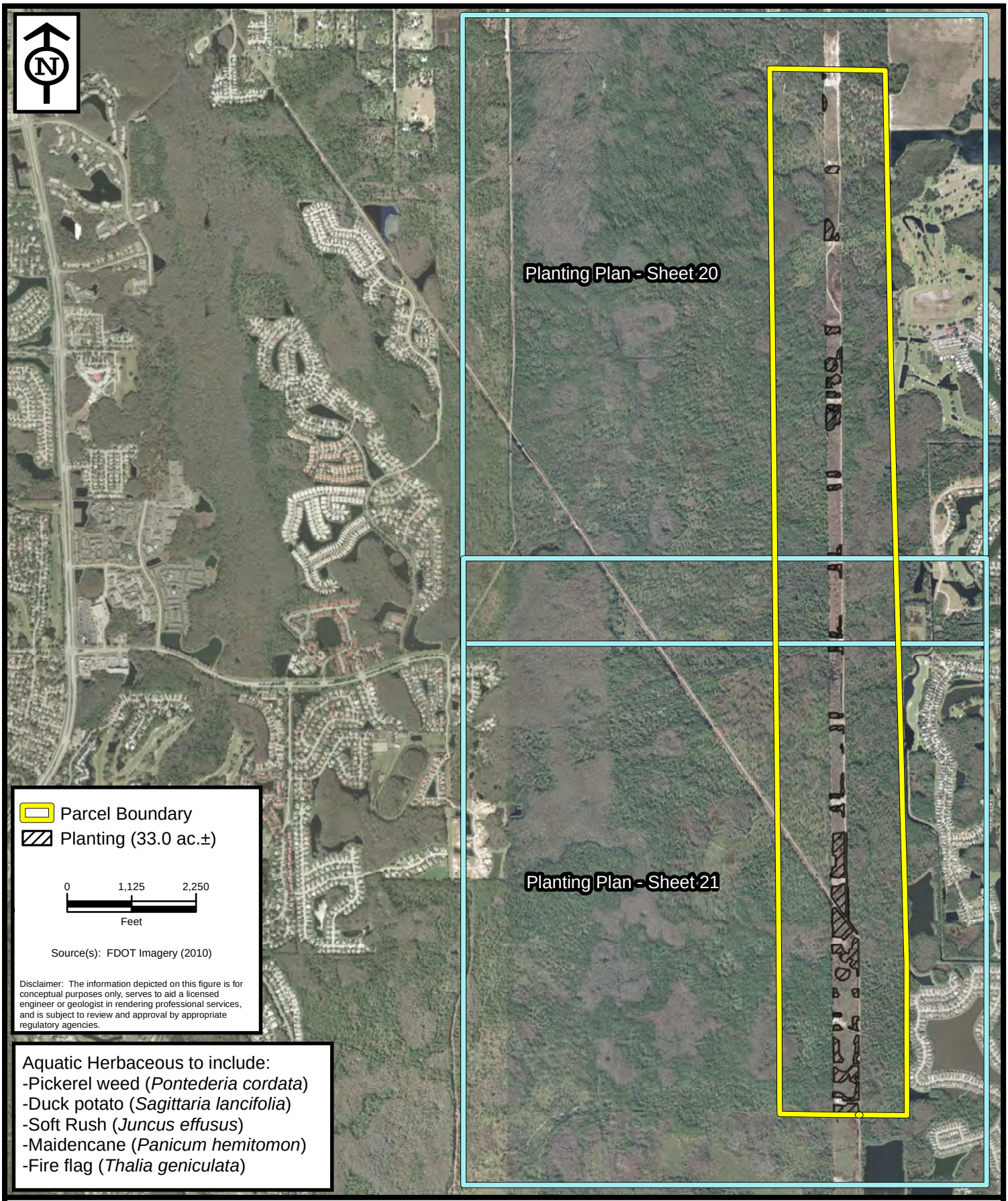
EROSION CONTROL DETAILS
PROGRESS ENERGY MITIGATION PROJECT
BROOKER CREEK PRESERVE SITE
PINELLAS COUNTY, FLORIDA

PROJECT	C2011-025
DRAWN BY	RLJ/CAS
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Aquatic Herbaceous to include:
-Pickerel weed (*Pontederia cordata*)
-Duck potato (*Sagittaria lancifolia*)
-Soft Rush (*Juncus effusus*)
-Maidencane (*Panicum hemitomon*)
-Fire flag (*Thalia geniculata*)

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(904) 470-2112 Fax
www.environmentalservicesinc.com

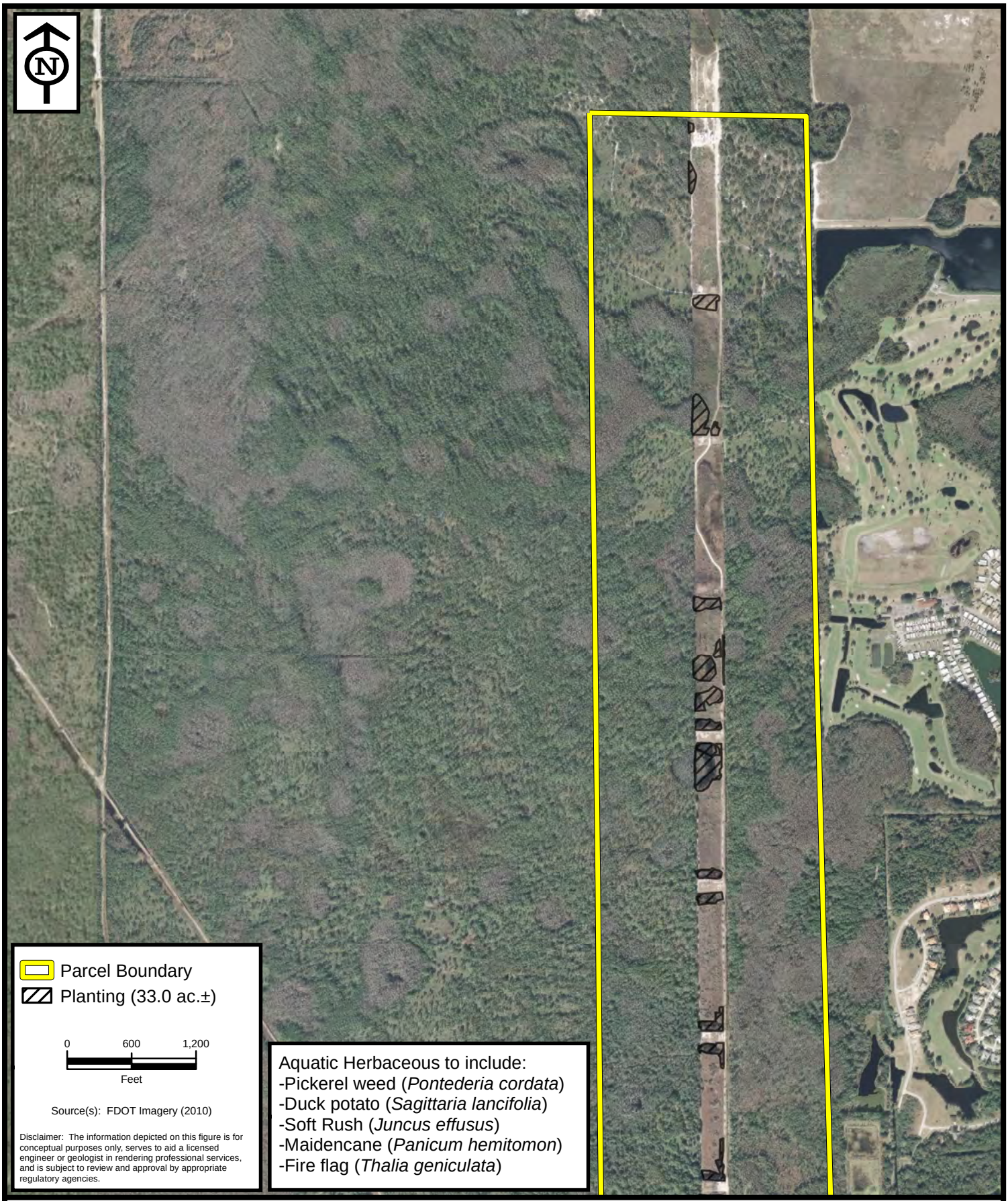
Proposed Planting Plan - Index

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	CRD/JRN
Sheet:	**19**

Path: Q:_Projects\EJ\2011\021\00\fig\Brooker\Report\Planting_Index.mxd Date: 7/20/2011 11:19:45 AM



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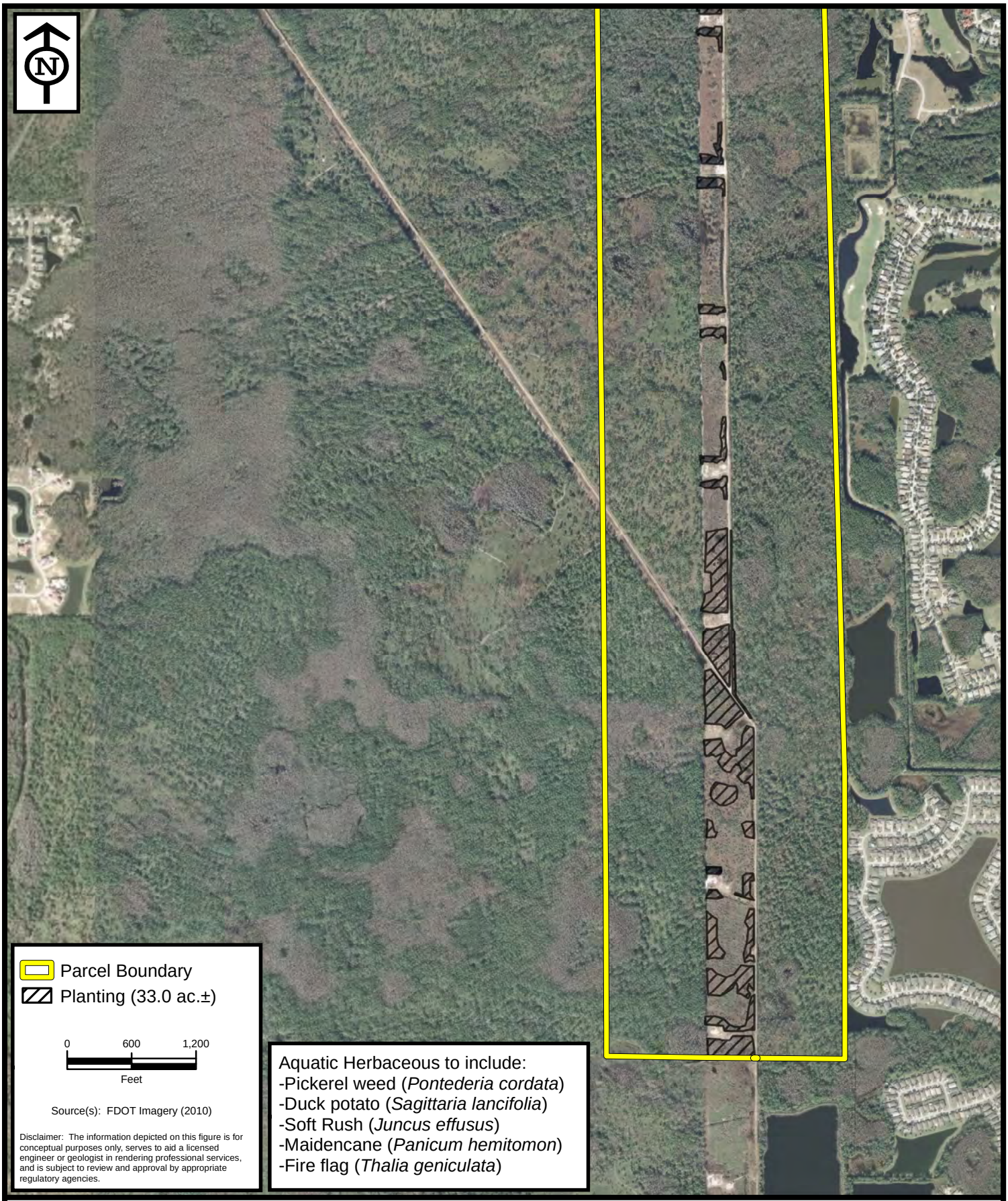
Proposed Planting Plan

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	CRD/JRN
Sheet:	**20**

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Proposed Planting Plan

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.00
Date:	July 2011
Drwn/Chkd:	CRD/JRN
Sheet:	**21**

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Florida Natural Areas Inventory and Department of Natural Resources. 2009. *Guide to the Natural Communities of Florida*. http://www.fnai.org/PDF/NaturalCommunitiesGuide.pdf and http://www.fnai.org/natcomdrafts.cfm

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