5.12 Long Term Maintenance Plan

5.12.1 Engineering/Hydrologic Improvements Maintenance Plan

In this section, the long-term maintenance costs for the Homosassa Tract mitigation site are provided, specifically the cost associated with low water crossings and culvert replacement along with other non-engineered maintenance on the mitigation sites, relative to the following road maintenance service objective.

Road Maintenance Service Objective

The proposed road service objective is maintenance for logging or pickup trucks, with some sections that are native and some gravel surfaces. Annual average daily traffic is 10 vehicles or less, mostly during the summer months. During timber sales, the road use is a mix of logging traffic and Forest Service administrative traffic, with occasional other public use. The information provides the anticipated vehicle loadings for the mitigation project.

General Site Maintenance

All of the overall site road system that leads to and from the mitigation features shall be visually inspected on a once a month basis. This long-term maintenance plan includes this inspection as a part of the FFS management plan for the forest and would be conducted by FFS. The general inspections should include the following items:

- roadbed thickness inspections;
- inspection and maintenance of erosion and sedimentation controls;
- vegetation removal; and
- debris removal.

Inspection schedule: Once every month, and twice monthly during heavy traffic cycles.

Low Water Crossing Maintenance – Sites North1 LWC, South 1, 2 and 3 LWC

All low water crossings shall be visually inspected and shall include the following items:

- inspection of stream flow across low water crossing;
- removal of debris, branches, and soil deposits;
- inspection of the gravel roadbed and bedding for erosion;
- review of structural integrity of the low water crossing; and
- review of thickness of roadway through the low water crossing.

Inspection schedule: Once every other month.
Useful life of the culvert system: 30 years

Culvert Maintenance – Site North 2 Culvert Replacement

Routine maintenance involves the removal of sediments, clogs, and debris. Additional maintenance is required to keep culvert ends as open and "un-crimped" as possible to help reduce the potential for restricted flow. This inspection shall include the following items:

- debris removal in the culvert;
- inspection and maintenance of erosion and sedimentation controls;
- review of the stream bed alignment of the culverts, potential for scour;
- review of structural integrity of the culvert;
- review of thickness of roadway cover over culvert; and
- removal of weeds and other vegetation.

Inspection schedule: Once every other month.
Useful life of the culvert system: 15 years

Costs for Maintenance

Mitigation Activity/Site	Annual Operations and Maintenance Costs	Design Life (yrs)	Total Operations and Maintenance Costs for the Design Life
North 1 Low Water Crossing	$4,320.00	30	$129,600.00
North 2 Culverts	$8,226.67	15	$123,400.00
South 1 Low Water Crossing	$4,873.33	30	$146,200.00
South 2 Low Water Crossing	$3,526.67	30	$105,800.00
South 3 Low Water Crossing	$5,833.33	30	$175,000.00

See the Overall Mitigation Area Maintenance Costs Schedule in Appendix B.

5.12.2 Long Term Invasive/Exotic Species Management Plan

The Florida Exotic Pest Plant Council (FLEPPC) categorizes invasive and exotic species as the following: Exotic-a species introduced to Florida, purposefully or accidentally, from a natural range outside of Florida; Naturalized exotic-an exotic that sustains itself outside cultivation, i.e., it is still exotic and has not become native; Invasive exotic-a exotic that has not only naturalized, but is expanding on

its own in Florida native plant communities. These species have been further categorized as Category I or Category II, based on the documented ecological damage that has occurred.

The mitigation construction activities can lead to conditions for the establishment of invasive and exotic species within these disturbed areas. This long-term maintenance plan will detail the invasive/exotic species that could potentially populate within the proposed mitigation areas. The plan will also discuss the most appropriate and effective treatment methodology(ies) for each species.

Below is a list of the common invasive and exotic species potentially found within the proposed mitigation areas, as well as recommended treatment methodologies, preventative measures and monitoring criteria.

Upland Species List

1. Cogon grass (*Imperata cylindrica*). This is a grass species that typically grows in disturbed upland areas such as roadway edges and recently timbered sites. This plant contains rhizomes and in order to successfully eradicate, the rhizomes must be fully destroyed. The cogon grass seed is typically spread through wind or wildlife movement and is very difficult to contain.

Recommended Treatment: Mechanical removal or regular foliar application of herbicide.

2. Chinaberry (*Melia azedarach*). Chinaberry is a tree that can grow up to 50 ft. tall and is commonly found in disturbed areas mostly in uplands, but can be found within wetlands. It often forms thickets and can reproduce quickly by spreading numerous seeds through bird and other wildlife movement. Due to the woody nature of the stem, chemical treatments are the most effective.

Recommended Treatment: Mechanical cutting and cut stump application of herbicide.

3. Camphor tree (*Cinamomum camphora*). The camphor tree can reach heights of 65 feet and produce an abundance of seeds on a regular basis. Theses seeds are spread quickly by wildlife and are quick to mature. Camphor tree is typically found within drier disturbed sites, but can eventually populate within natural areas.

Recommended Treatment: Mechanical cutting and cut stump application of herbicide for mature species, foliar application of herbicide for juveniles.

Wetland Species List

1. Chinese tallow (*Sapium sebiferum*). Chinese tallow tree can grow as tall as 50 feet and often has multi-stemmed trunks that can quickly shade out competing species. It is typically found in wetter, disturbed areas but can also thrive in well drained upland areas in addition to fresh and saline soil types. The species can quickly overtake a habitat due to its broad leaf coverage, shading and high seed output. The young juvenile species can be easy to treat and prevent from spreading, but once the species matures, it becomes very difficult to fully eradicate. Physical removal of juvenile species is sometimes an option, but can be costly and time consuming.

Recommended Treatment: Foliar application of herbicide for juveniles, frill girdle and cut stump application of herbicide for mature individuals

2. Peruvian primrose willow (*Ludwigia peruviana*). This species of Ludwigia typically grows into a large shrub approximately 6-8 feet high. It typically grows on pond edges or other areas of shallow standing water. It is also very advantageous and will populate quickly in disturbed areas. The plant blooms all year, so it generates very quickly and if left uncontrolled, can quickly overtake an area and shade out desirable wetland groundcover and other emergent plants.

Recommended Treatment: Foliar application of herbicide

3. Brazilian pepper (*Schinus terebinthifolius*). Brazilian pepper is a highly invasive, destructive species that can grow as tall as 40 feet and typically has numerous trunks and branches that form tangled masses as they mature. These masses ultimately shade out desirable wetland groundcover species as well as juvenile shrub and tree species. It also has very high seed output and quickly spreads in disturbed areas and road edges, as well as undisturbed natural areas. The plant also produces allelopathic agents which suppress other competing plants from growing. Once established, mature species are very difficult to eradicate.

Recommended Treatment: Foliar application of herbicide for juveniles, frill girdle and cut stump application of herbicide for mature individuals.

4. Torpedo grass (*Panicum repens*). Torpedo grass is a low growing, aquatic grass that can reach as high as 3 feet. This species will establish in or near shallow waters and quickly form a monoculture that will displace native vegetation. The plant reproduces through rhizome extension and fragmentation, so mowing, cutting or disking is not effective and often makes the problem worse. Regular foliar application that eventually kills the rhizome is the most effective treatment method.

Recommended Treatment: Foliar application of herbicide.

5. Japanese climbing fern (*Lygodium japonicum*). The Japanese climbing fern is a vine that can grow up to 90 feet long. It is typically found in both sunny and shady disturbed areas such as yards and roadsides, but can also be found along less disturbed edges of swamps and marshes. The vine grows quickly and forms tangled masses over groundcover and shrub and juvenile tree species which smothers seedlings and prevents further forest growth. Physical removal may be applicable in some cases, so as not to harm the desirable species that are present, but this option is only viable for small populations.

Recommended Treatment: Foliar application of herbicide.

6. Old World climbing fern (*Lygodium microphyllum*). The Old World climbing fern is very similar to the Japanese climbing fern and has the same growth, production and habitat characteristics. The treatment for both species uses the same approach and regular foliar treatment is usually the best option. Physical removal may be applicable in some cases, so as not to harm the desirable species that are present, but this option is only viable for small populations.

Recommended Treatment: Foliar application of herbicide.

Nuisance Species of Concern

1. Cattails (*Typha* spp.). Cattails are not listed as Category I or II invasive/exotic species, however, in the warmer southern climates where the species is not regulated by annual freezes, it can quickly establish a monoculture in disturbed wetland areas. Due to its aggressive spreading nature through rhizome establishment and wind and water transport of the seed, the species is often treated as an invasive species. While it does provide some beneficial wetland habitat, it often ends up out competing other desirable herbaceous species. The most effective treatment for cattails is foliar application before the plant begins to seed.

Recommended Treatment: Mechanical removal or foliar application of herbicide.

2. Willow (*Salix* spp.). Much like cattails, willow is not listed as a Category I or II invasive/exotic species. However, it too can exhibit similar qualities and can establish a monoculture in disturbed wetland areas. Most will species are trees that can grow very quickly and contain large, thickly vegetated limbs. These limbs spread out from the main trunk and often end up shading other desirable species.

Recommended Treatment: Mechanical cutting, frill girdle and cut stump application of herbicide

Treatment Methodologies

1. Mechanical. Mechanical treatment includes the use of heavy machinery such as a bulldozer or back hoe, small machinery such as a bushhog or tractor and hand tools such as weed eaters and pruning tools. This methodology is best utilized when access to the treatment area is not an issue and will not cause further damage. In addition, species such as cogon grass and torpedo grass often have shallow root systems that a bulldozer or backhoe can completely remove. Other species such as the Chinese tallow are often not suited to mechanical removal due to their deep root system as established trees and high incidence of seeds within the surrounding soil. Mechanical removal can be very effective under the right conditions, but can often be expensive and time consuming due to disposal of removed material.

2. Manual. Manual treatment is often the most labor intensive and least productive treatment method. It involves physically removing the invasive species and is only applicable for certain species.

3. Chemical. Chemical treatment involves applying approved herbicides directly to the target plant through a variety of application techniques. Specific herbicides are produced that disrupt the growth process of the plant and ultimately kill it. Different herbicides are designed to target specific plant types and it's important to use the proper herbicide on the correct plant in order to yield the best results. Herbicide application methodologies include three different techniques: Foliar, frill girdle and cut stump. Foliar application involves diluting the herbicide with water and applying the mixture directly to the plant's leaves and stems. Frill girdle application (also known as hack-and-squirt) is primarily used on

tree species and involves cutting several notches in the base of the tree and injecting an herbicide directly into the interior of the tree. The tree's natural process then distributes the herbicide throughout, which ultimately kills the tree. Cut stump application is also used primarily on tree species and involves cutting down the target tree and "painting" the cut stump with an herbicide mixture to prevent the stump from re-sprouting.

The use of any herbicides will be conducted by a Florida Department of Agriculture licensed pesticide applicator, who is certified for herbicide application in the categories of "Natural Areas Weed Management" and "Aquatic Pest Control". In addition, during the use of any herbicide, all application rates and handling will be conducted in strict accordance with the associated product label to achieve the best results and remain in compliance with Florida law.

Preventative Measures

Once construction commences, DEF will introduce preventative measures where possible to help curb the establishment or spreading of any invasive or exotic species. These measures will be determined on-site as the clearing and impacts occur. In some cases, preventative measures may not be available or practical.

When possible preventative measures that may include planting, seeding or hydro-mulching will be applied to help control the establishment of invasive/exotic species. Each area will be assessed prior to and immediately after any clearing activities to determine the extent of the clearing that occurred and any potential invasive/exotic species that may be present or nearby that could result in contamination.

Monitoring

Monitoring is an important aspect of long-term control of invasive and exotic species as it ensures that the on-going maintenance efforts are effective and achieving the desired results. Many treatment methodologies require numerous follow up events in order to successfully eradicate the target species. A regular monitoring plan allows for documentation of the maintenance efforts and provides for a way to determine how effective the efforts have been. A detailed monitoring plan is important to ensure that the maintenance efforts are successful.

The proposed mitigation activities will impact some of the existing vegetation during the construction process. These disturbed areas will provide for potential

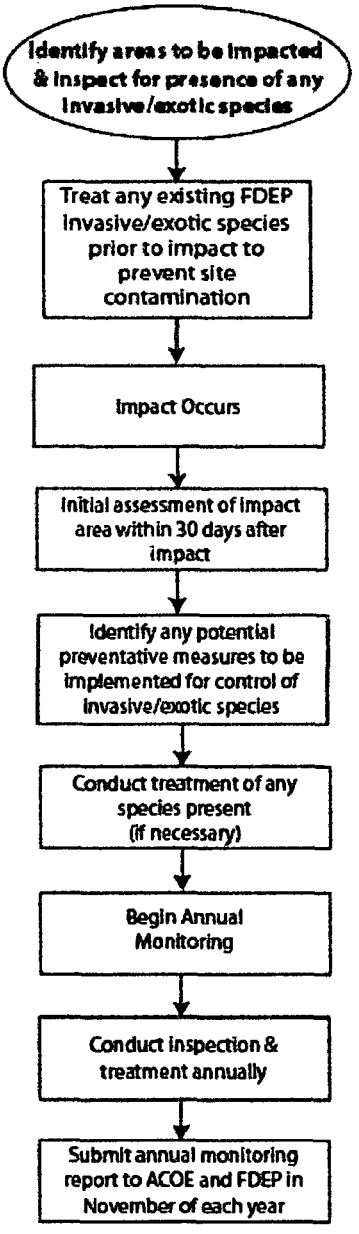
habitat for the establishment of invasive and exotic species. These areas will be inspected both before and during the clearing and installation process to determine the presence and extent of any existing populations of listed species. During this time, if any invasive and exotic species are identified a treatment event prior to disturbance may be conducted in order to help prevent further spread of the species. Each disturbed area will be inspected on an annual basis in order document any changes or need for additional treatment events. This documentation will include the recording of the location and prevalence of any listed species observed, any potential alternative treatment options and photo documentation.

Specific monitoring stations will be established within each mitigation area. The location of these monitoring stations will be determined in the field based on the areas that supported invasive and exotic species and/or require the most treatment. In some cases, it may be appropriate to establish monitoring plots within a particular treatment area depending on the size of the area. Each area will be assessed for what type of species is present, the recommended treatment method, success of any previous treatments and any other conditions worth noting. A baseline habitat map will be established for each treatment area that will detail the existing populations of both desirable and invasive/exotic species prior to the impacts occurring. This habitat map will be updated after each treatment event to determine any changes from the previous event.

Annual reports of the maintenance and monitoring plan will be submitted during November of each year. Each report will include the dates of each maintenance and monitoring event, results, photographic documentation, maps and recommendations.

Please see the following page for a flow chart that details the proposed inspection, treatment and monitoring plan for the LNP project.

Invasive/Exotic Species Managment Plan



6.0 TAMPA BAY WATERSHED – BROOKER CREEK PRESERVE SITE

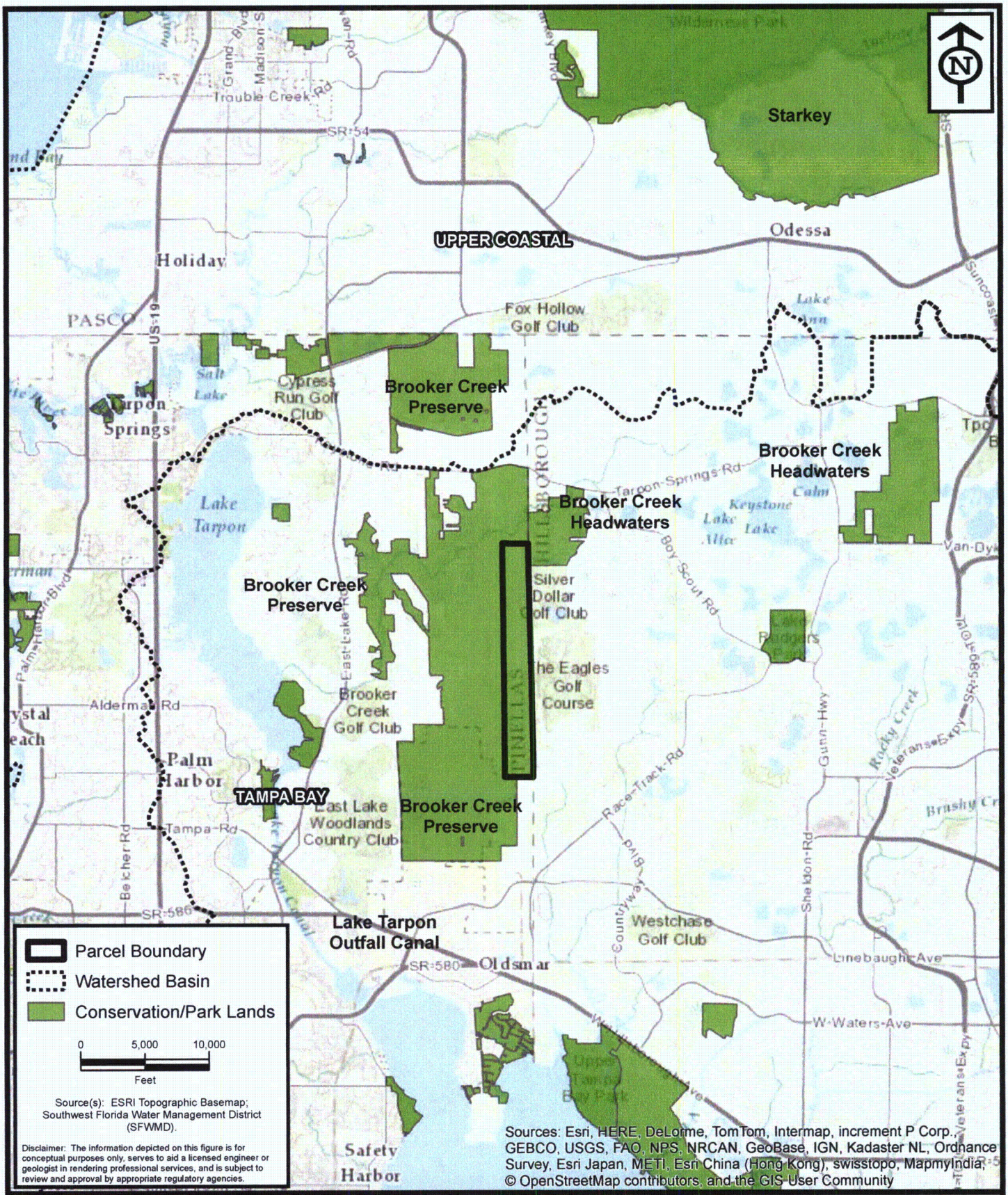
6.1 Introduction

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 DEF for the LNP project (Figure 6-1). 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. DEF owns the existing transmission line right-of-way (ROW), while the rest of BCP is owned and managed by Pinellas County, Florida (Figure 6-2). 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 DEF 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.

6.2 Impact Summary

The wetland impacts within the Tamp Bay Watershed from the proposed LNP project total approximately 23.9 acres for FDEP with a total functional loss of -7.6 UMAM units (-6.8 herbaceous and -0.8 forested) and for ACOE a total of 26.2 acres of impacts with a total functional loss of -4.9 UMAM units (-4.6 herbaceous and -0.3 forested). 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 and indirect impacts. The proposed mitigation plan at BCP will provide for 14.7 functional units of lift within the Tampa Bay Watershed. See Section 6.6 for a complete summary of the UMAM scores. Please note that an "excess" of 7.1 units is being provided for use on future projects. The impact summary is provided on Table 6-1.



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Tampa Bay Watershed

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.03
Date:	Aug 2014
Drwn/Chkd:	JGB/JRN
Figure:	6-1

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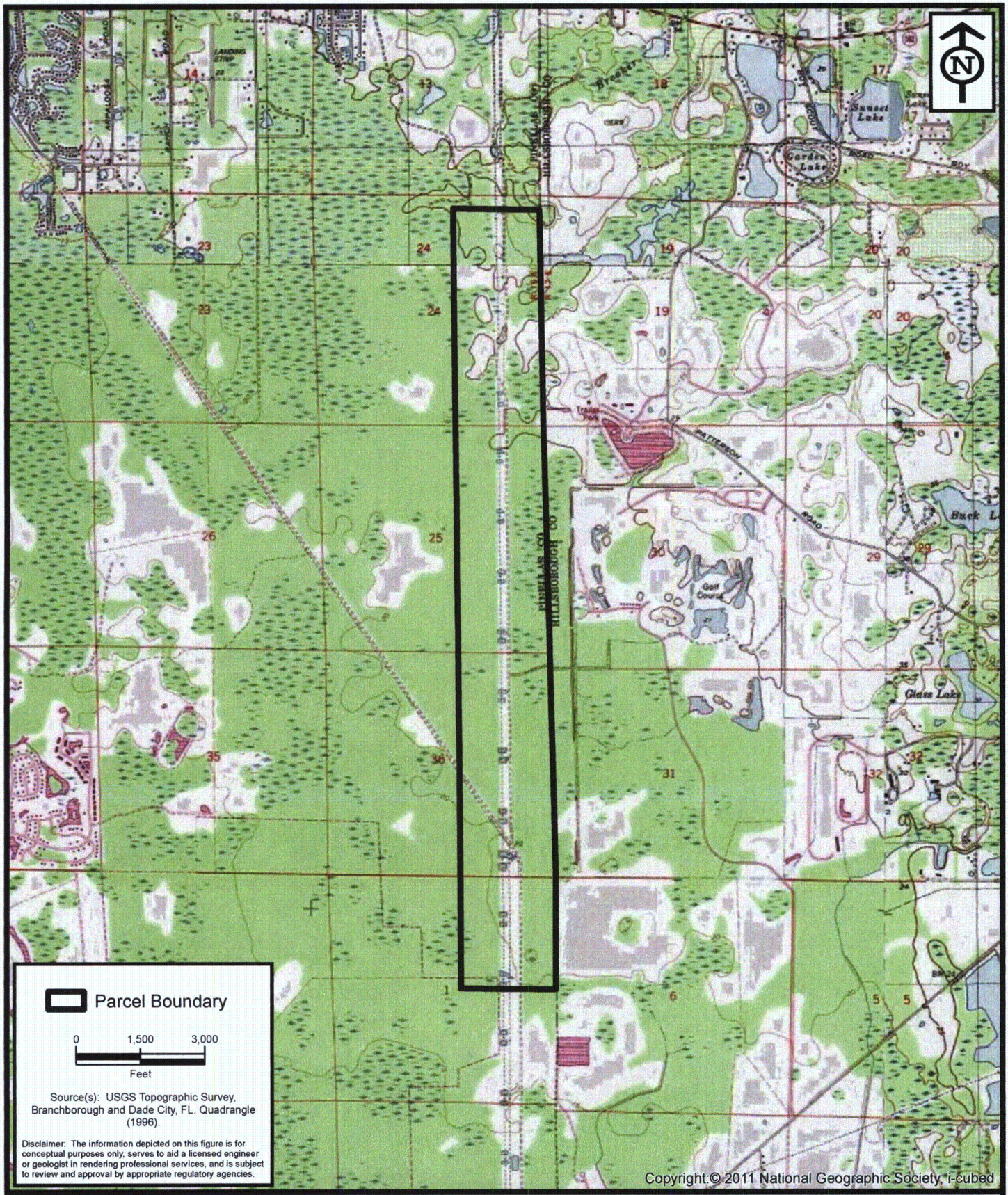

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Project Location

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.03
Date:	July 2014
Drwn/Chkd:	JGB/JRN
Figure:	6-2

Path: Q:_Projects\EJ\2011\021\03\fig\Mitigation Update\Brooker\Project Location.mxd Date: 8/8/2014 5:06:16 PM

Table 6-1. Tampa Bay Watershed Wetland Impacts by UMAM Functional Loss

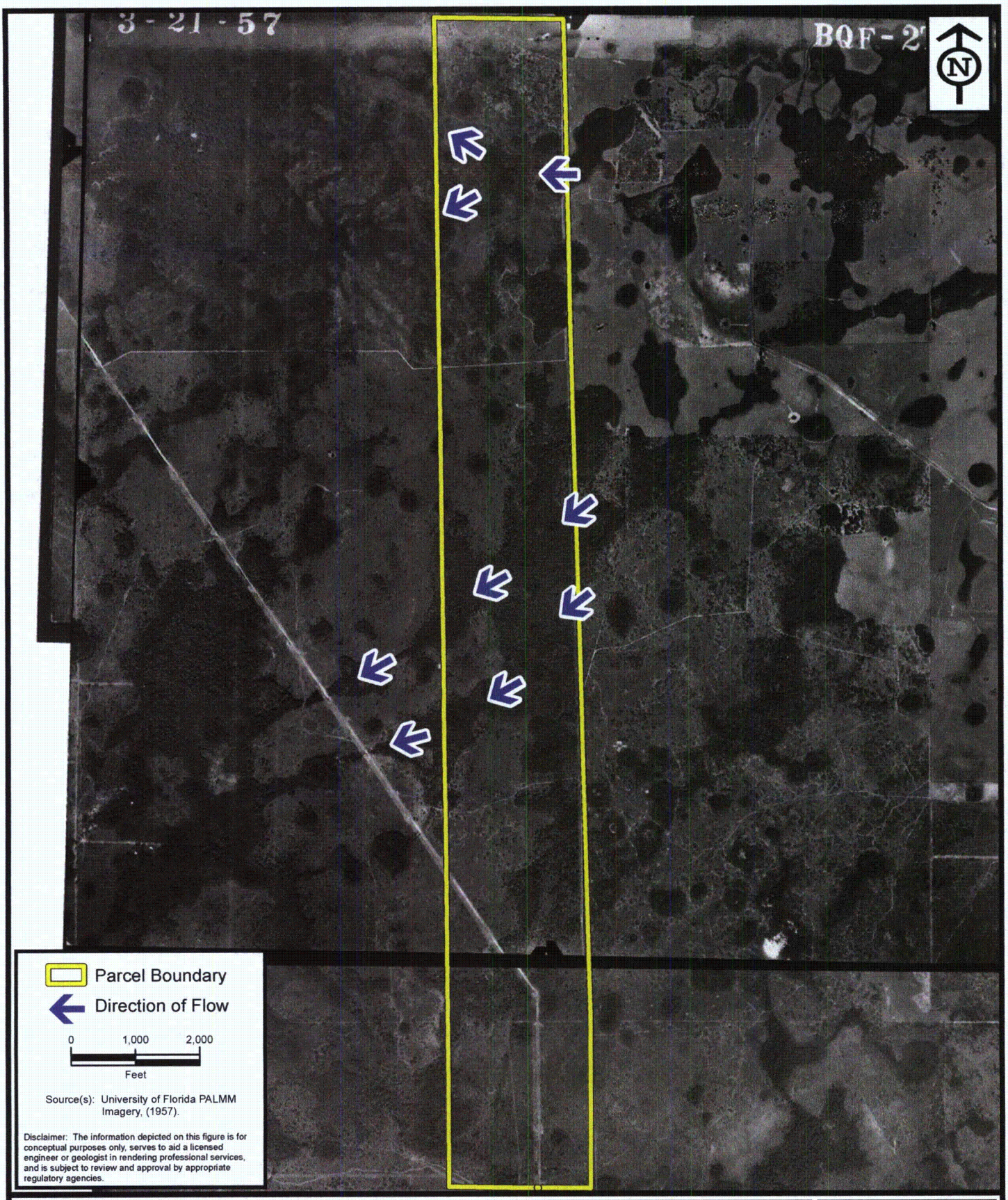
	ACOE Herbaceous Wetland Functional Loss	ACOE Forested Wetland Functional Loss	ACOE Total Functional Loss	FDEP Herbaceous Wetland Functional Loss	FDEP Forested Wetland Functional Loss	FDEP Total Functional Loss
UMAM Units	-4.6	-0.3	-4.9	-6.8	-0.8	-7.6

6.3 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.

6.3.1 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 6-3).



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1957 Historic Aerial Imagery

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.03
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Figure:	6-3

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6.3.2 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.

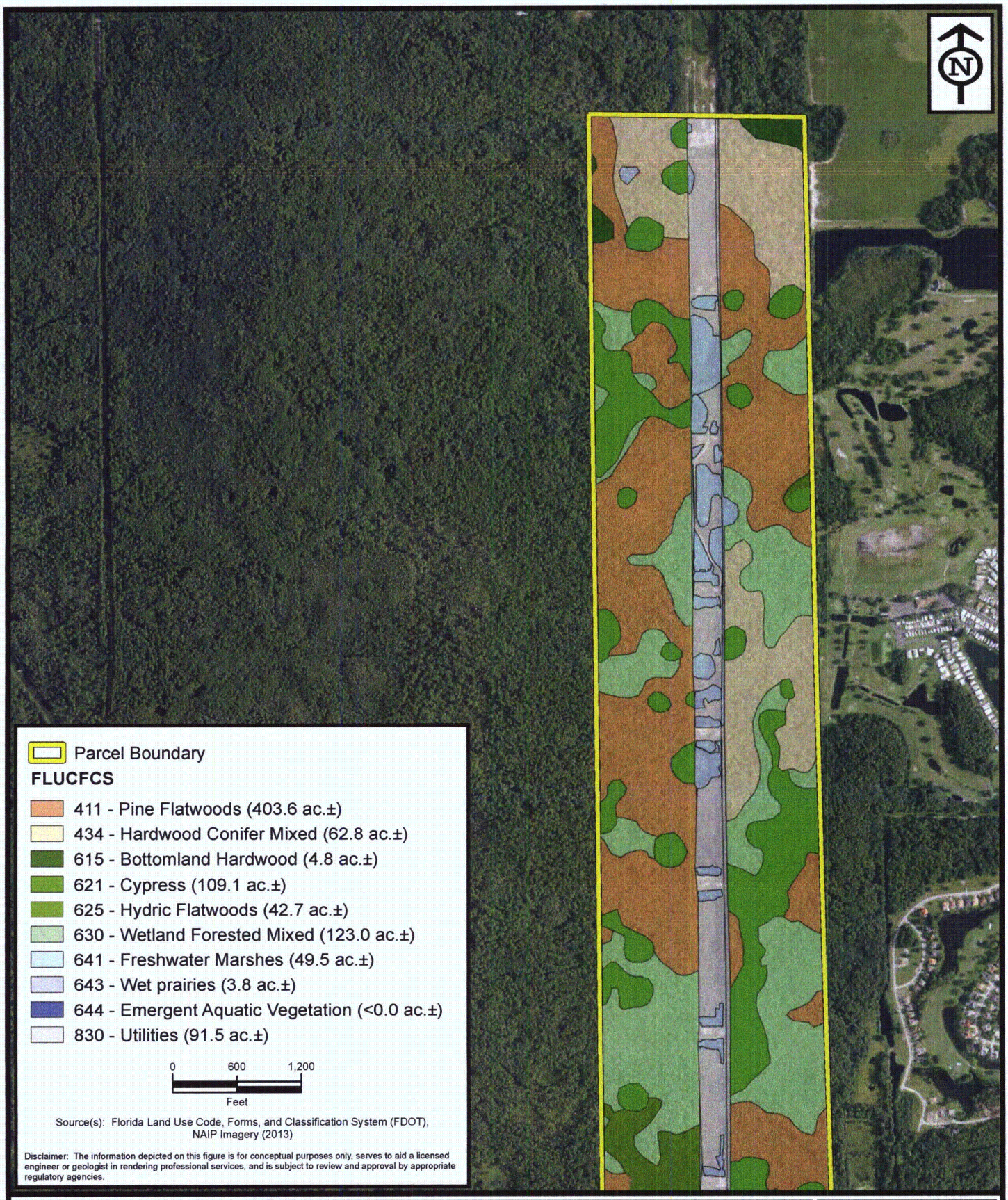
FLUCFCS was used to determine the different community types on site. Please see the Brooker Creek Preserve Community Map, Figure 6-4 and 6-4a, for details of the specific community types associated with this mitigation site.

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.



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Existing Community Map

Brooker Creek Preserve Site

Pinellas County, Florida

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Figure:	6-4

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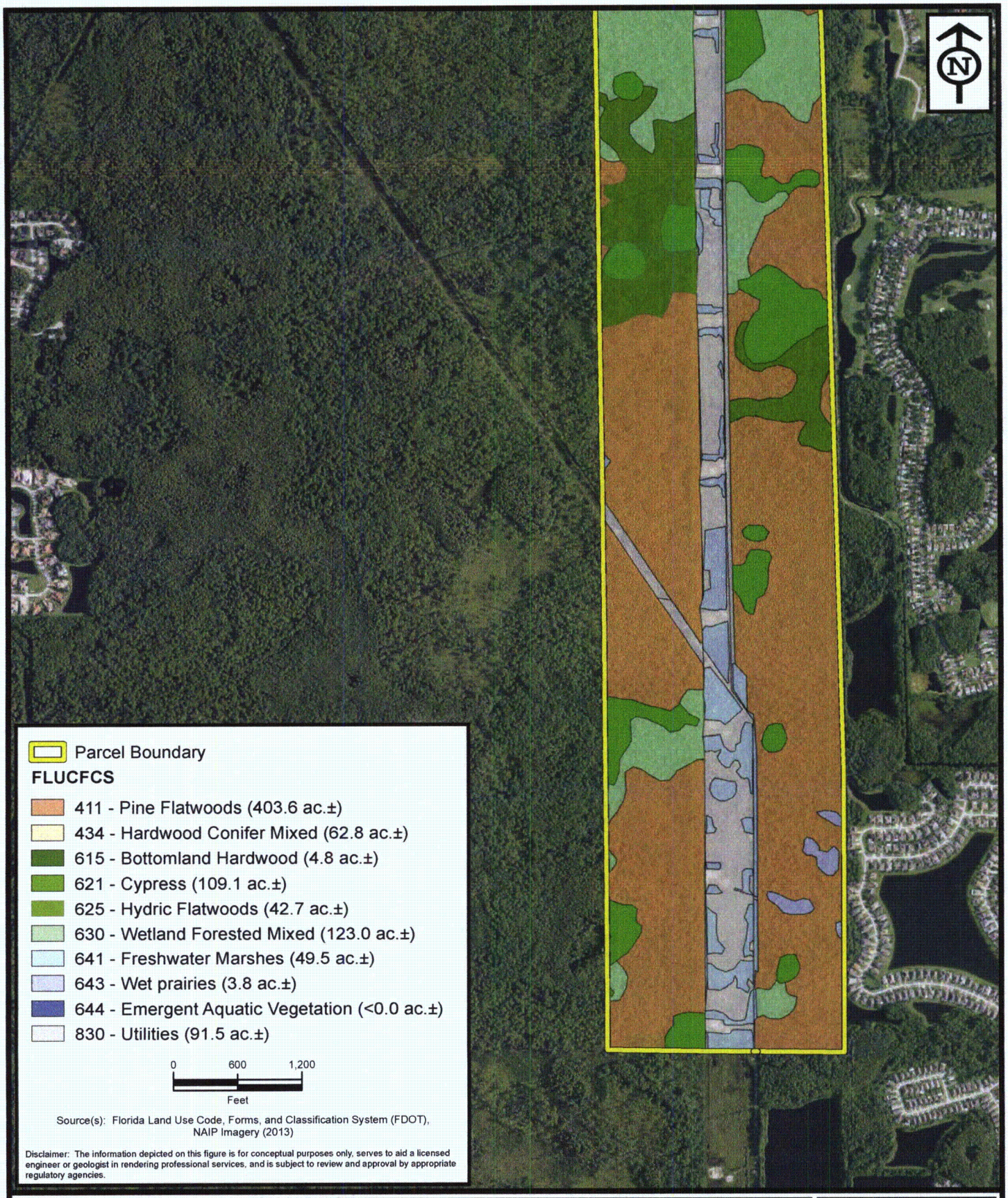

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Existing Community Map

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.03
Date:	July 2014
Drwn/Chkd:	JGB/JRN
Figure:	**6-4a**

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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.

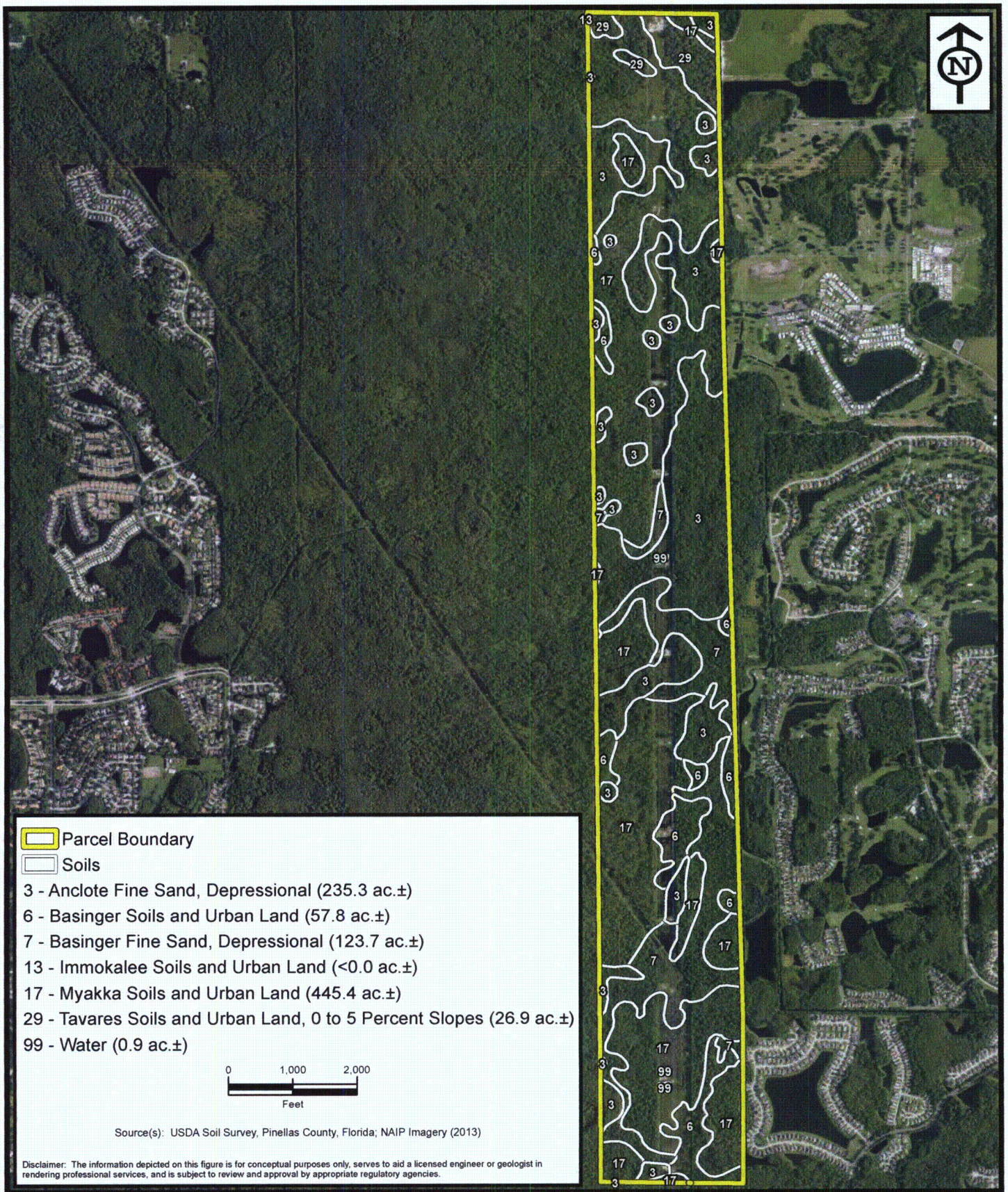
6.3.3 Soils

According to the NRCS soil map for Pinellas County, six soil types and water are present on the BCP site (Figure 6-5). 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 6-2. 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

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Date:	July 2014
Drwn/Chkd:	JRN/GKH
Figure:	6-5

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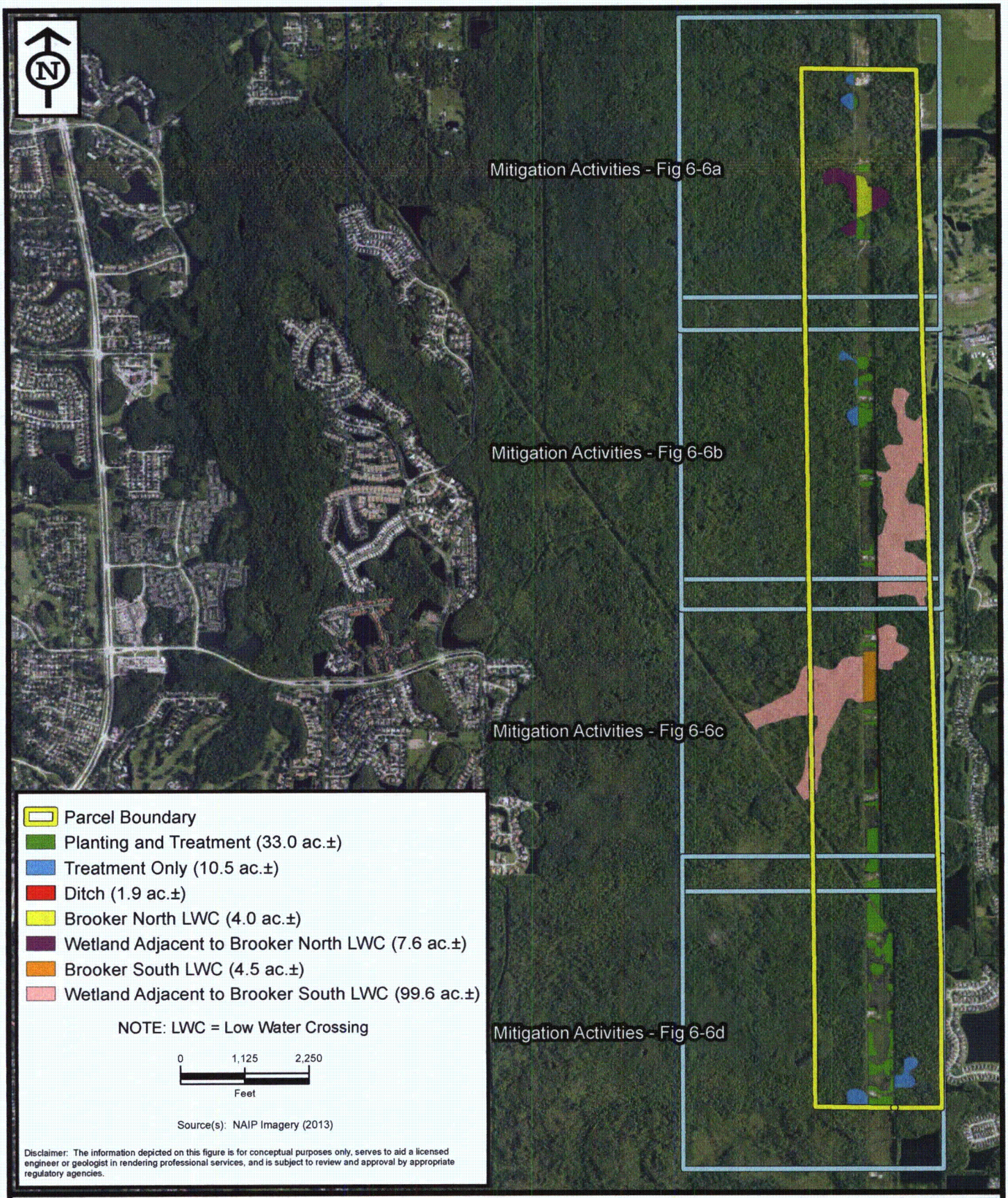
6.4 Mitigation Plan

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 DEF plan has incorporate the goals of these projects into its planning to ensure that the plan developed satisfies both DEF and Pinellas County, while still satisfying the requirements of both the State and Federal agencies involved (Figure 6-6, 6-6a through 6-6d). 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 6-7).



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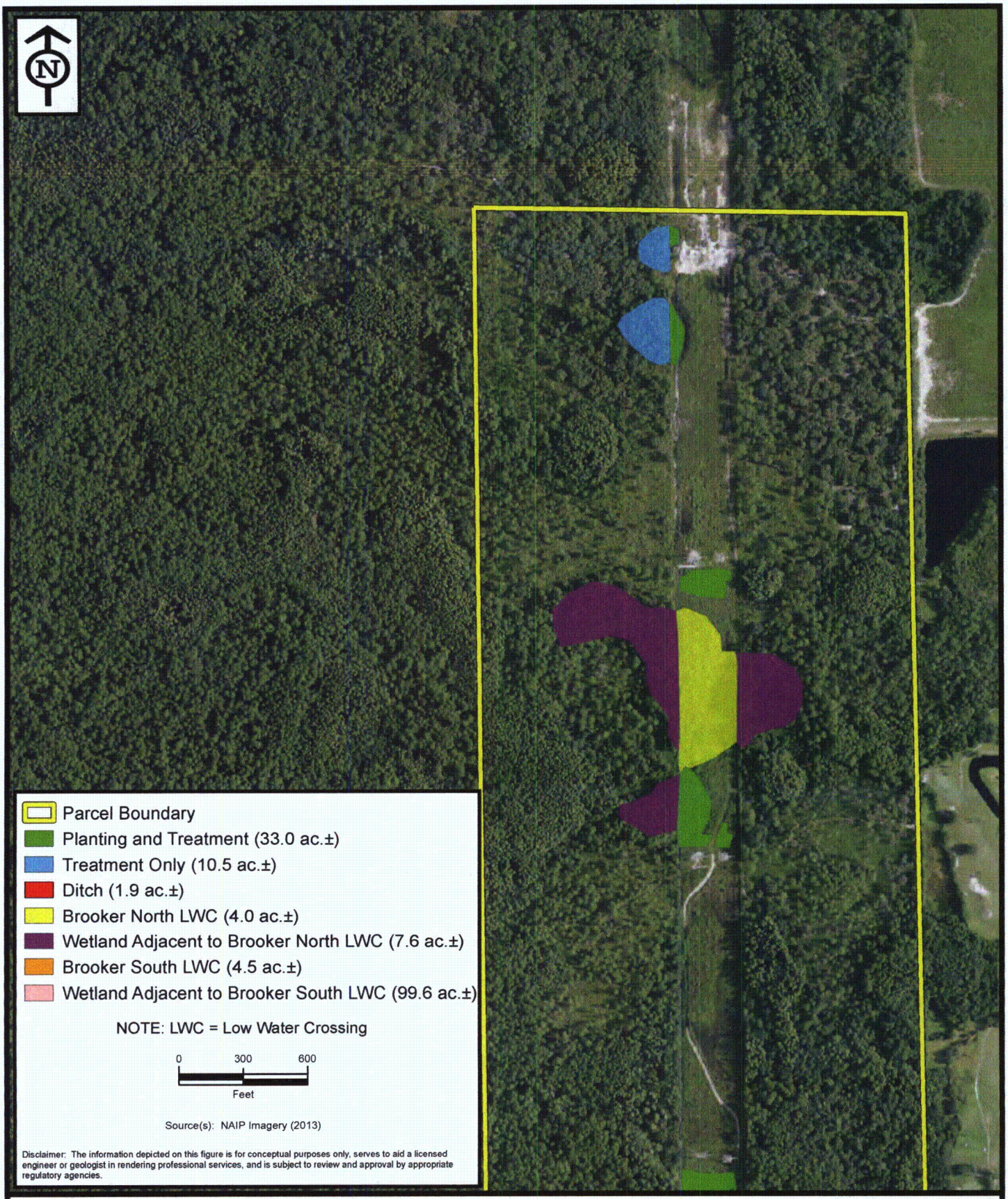
Proposed Mitigation Activities - Index

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.03
Date:	July 2014
Drwn/Chkd:	JRN/GKH
Figure:	6-6

Path: Q:_Projects\EJ2011\021\03\figMitigation Update\Brooker\Mitigation Index.mxd Date: 8/8/2014 4:31:04 PM



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Proposed Mitigation Activities

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.03
Date:	July 2014
Drwn/Chkd:	JRN/GKH
Figure:	**6-6a**

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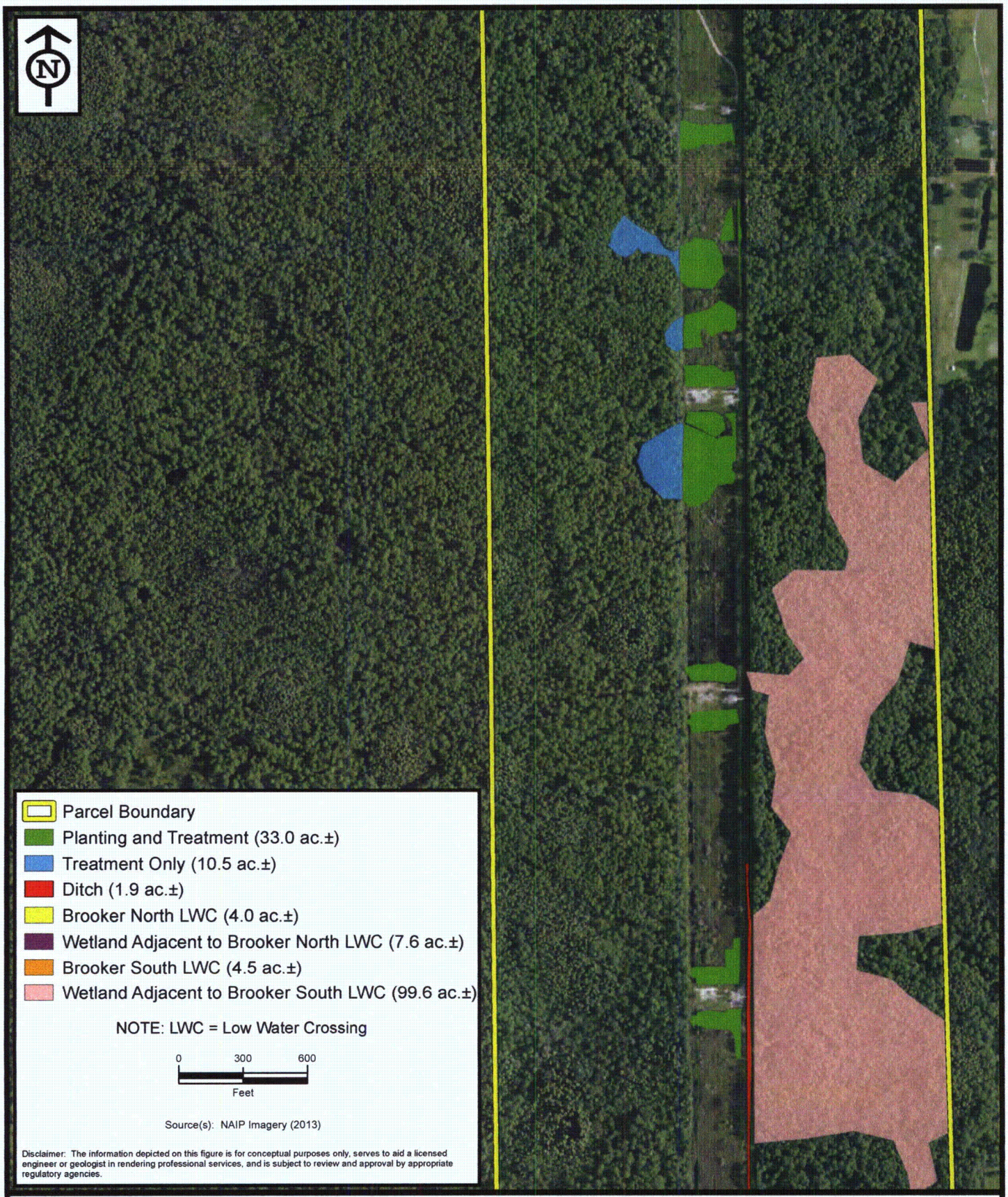

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Proposed Mitigation Activities

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.03
Date:	July 2014
Drwn/Chkd:	JRN/GKH
Figure:	**6-6b**

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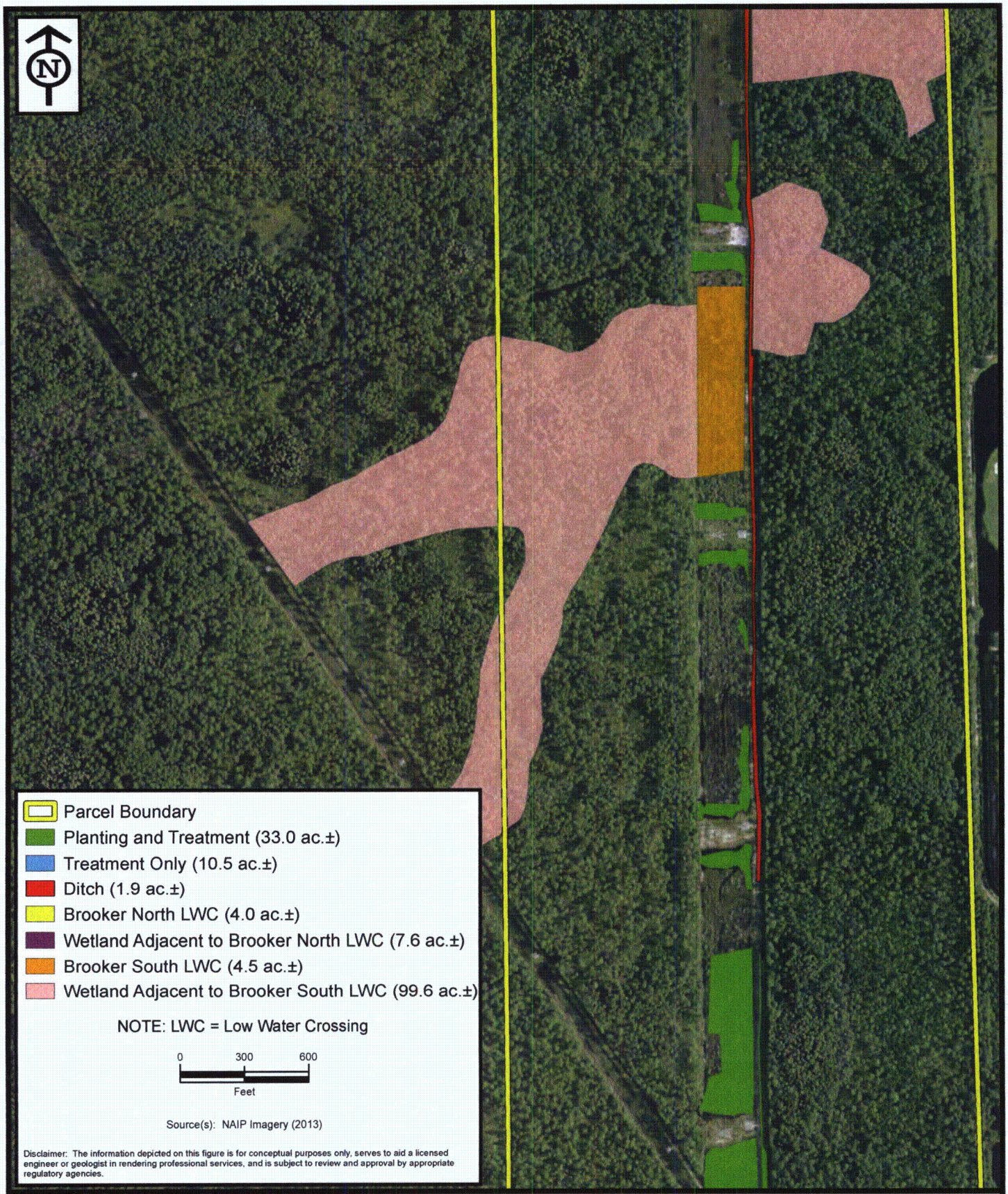

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Proposed Mitigation Activities

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.03
Date:	July 2014
Drwn/Chkd:	JRN/GKH
Figure:	**6-6c**

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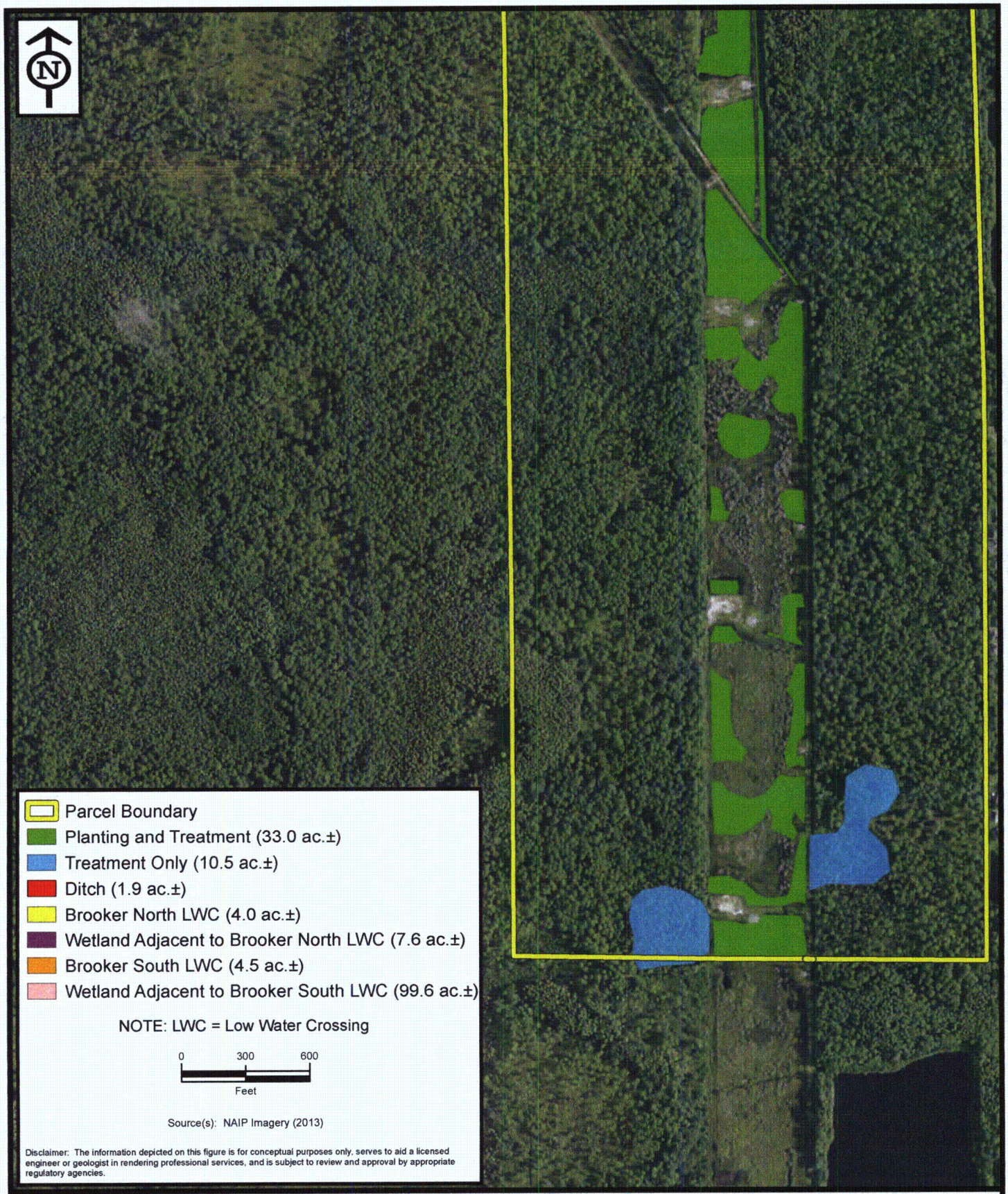

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Proposed Mitigation Activities

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.03
Date:	July 2014
Drwn/Chkd:	JRN/GKH
Figure:	**6-6d**

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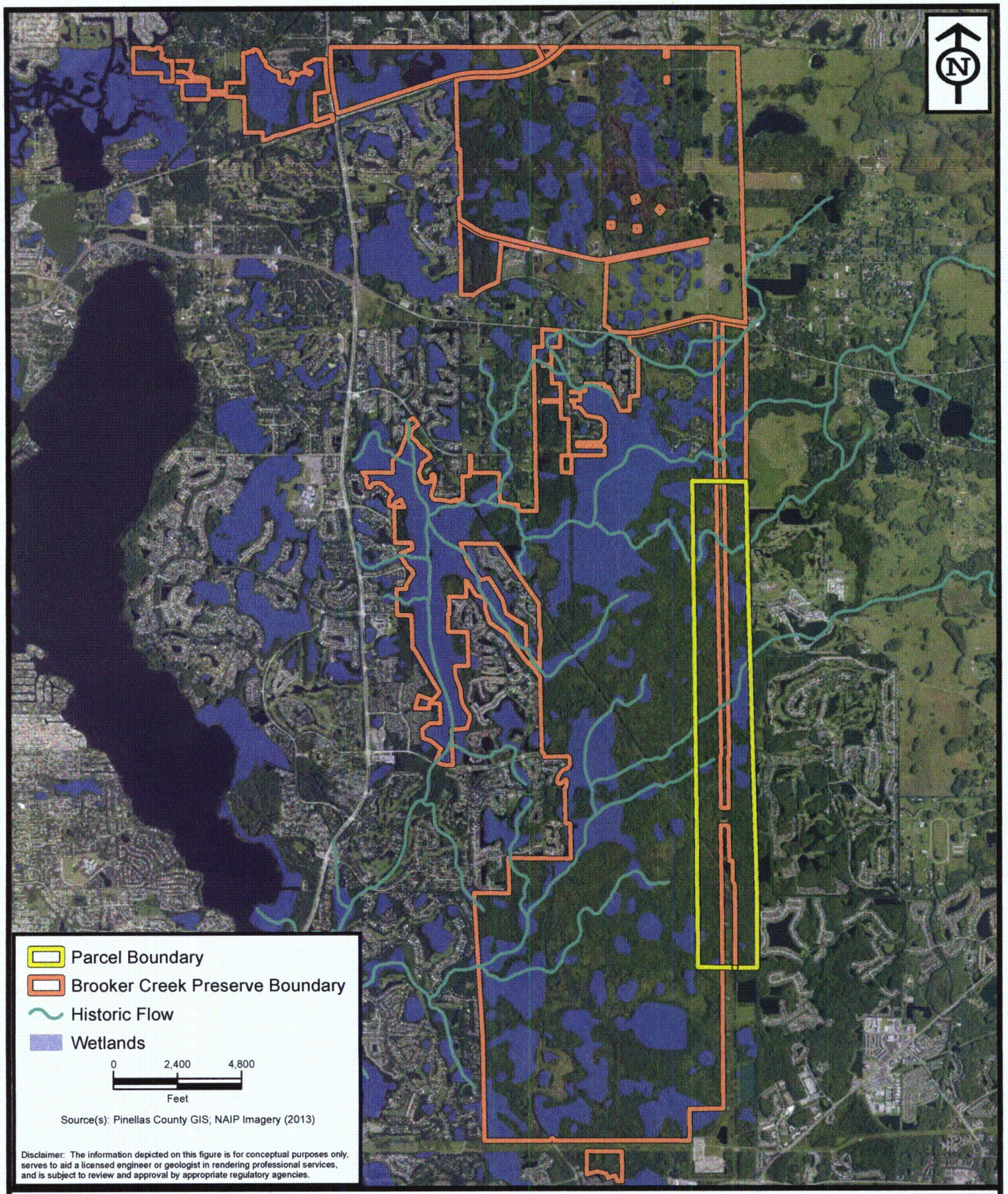

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Historic Flow

Brooker Creek Preserve Site

Pinellas County, Florida

Project:	EJ11021.03
Date:	Aug 2014
Drwn/Chkd:	JGB/JRN
Figure:	6-7

Path: Q:_Projects\EJ\2011\021\03\fig\Mitigation Update\Brooker\Historic Flow.mxd Date: 8/8/2014 4:22:09 PM

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 6-6, 6-6a through 6-6d 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 6-6, 6-6a through 6-6d for details of the specific wetlands that will receive benefit from this treatment.

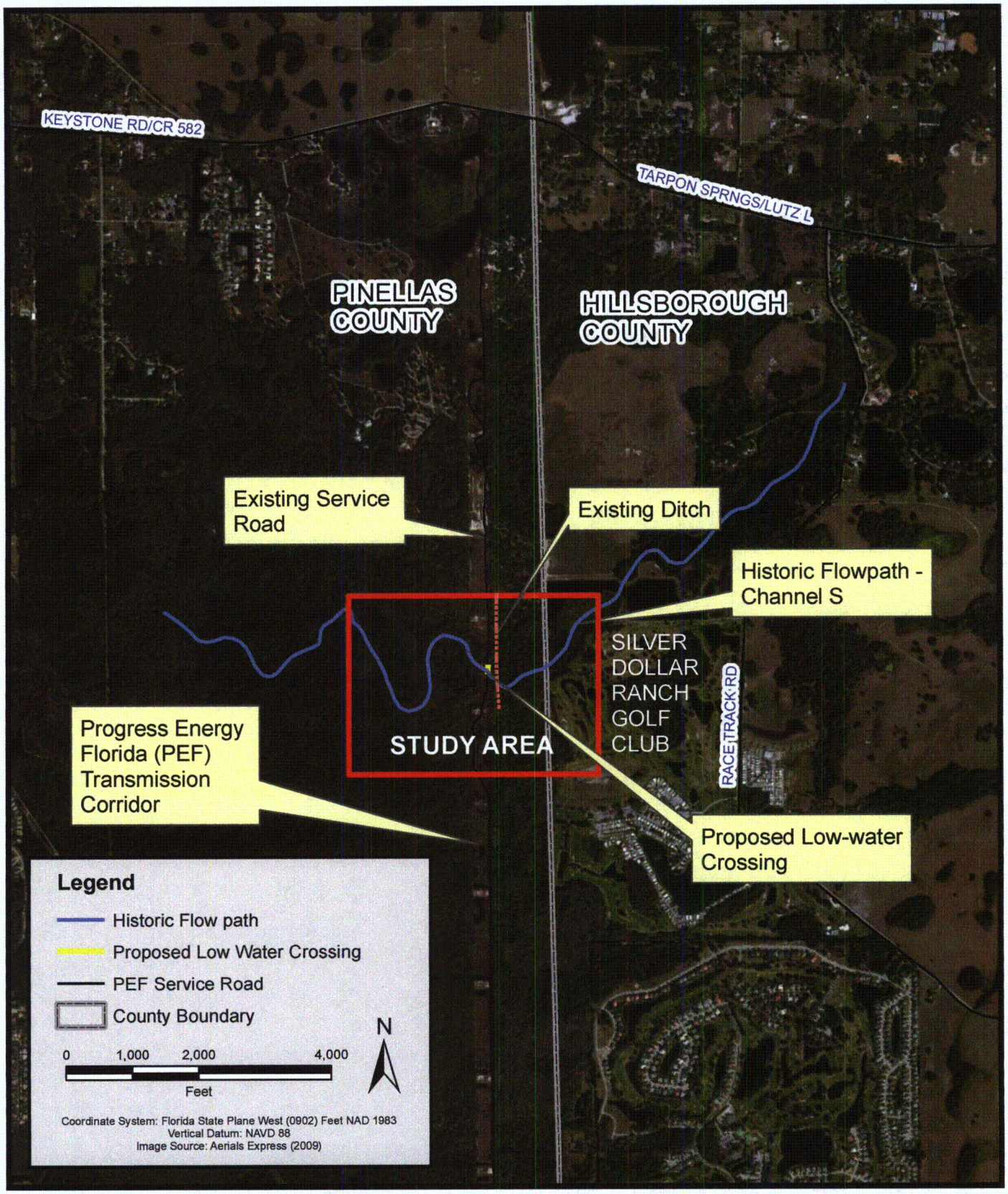
3. Ditch Treatment Area. A large ditch is located along the eastern side of the access road within the TLC which totals 1.9 ac. This ditch is the result of the construction of the access road, during which the fill excavated from the ditch was used to construct the elevated road. This ditch contains 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 6.11 for Engineering and Planting Detail Drawings.

6.5 Hydrology & Hydraulics

6.5.1 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 6-8), involves construction of a 140-feet wide low-water crossing along DEF's transmission corridor service road. The second mitigation site referred to as Brooker South LWC, located west of Eagles Golf Course Club (see Figure 6-9), involves construction of a 300-feet wide low-water crossing along DEF'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.



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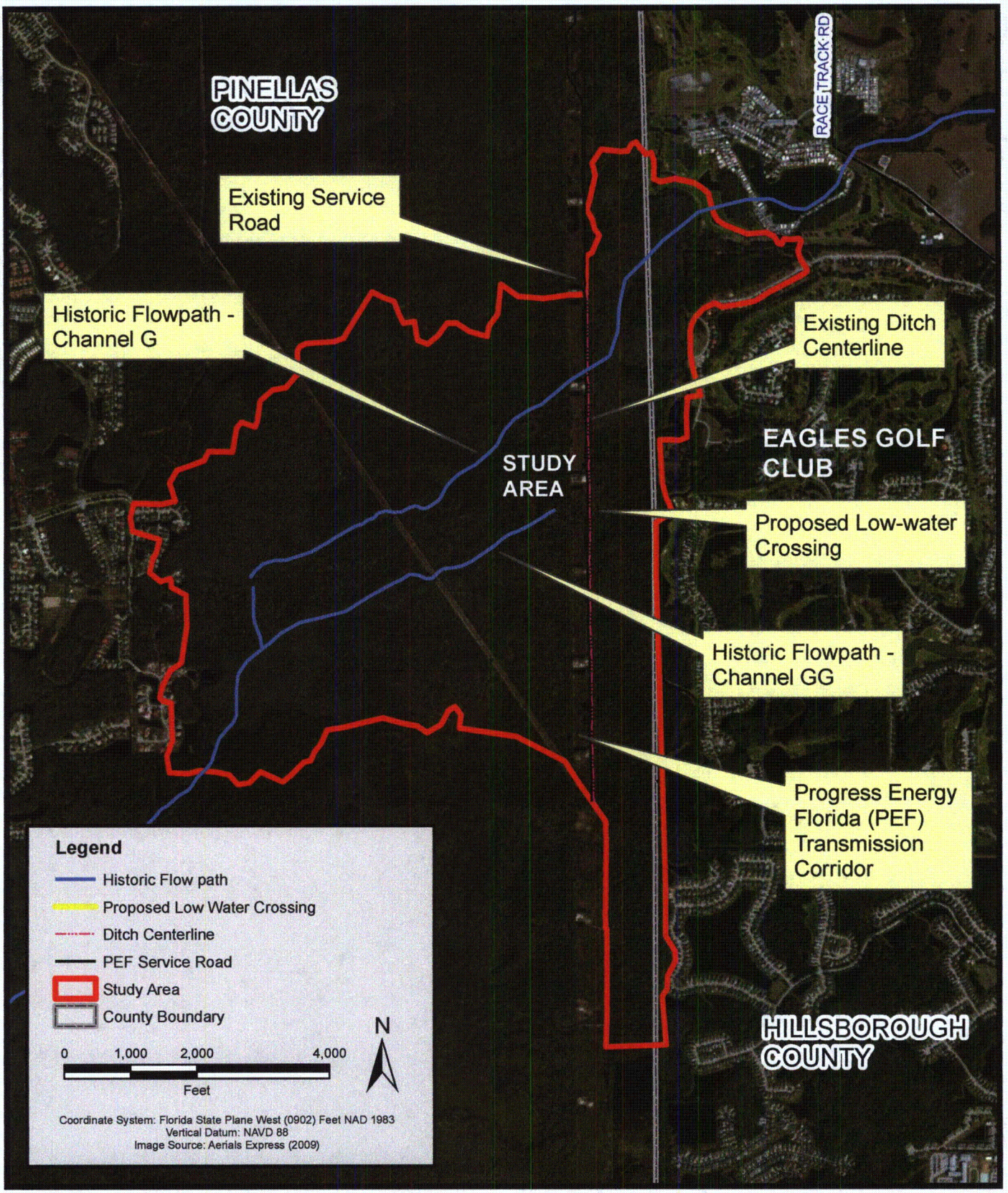
Study Area - Brooker North LWC
Brooker Creek Preserve Site
Pinellas County, Florida

PROJECT	C2011-025
FIGURE	6-8
DRAWN BY	RP
DATE	JULY 2011



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Study Area - Brooker South LWC
Brooker Creek Preserve Site
Pinellas County, Florida

PROJECT	C2011-025
FIGURE	6-9
DRAWN BY	RP
DATE	JULY 2011