

**NORTH BELLE MEADE  
MITIGATION FEASIBILITY STUDY  
PHASE 2**

**May 2017**

Prepared For:

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## **1.0 INTRODUCTION**

Under Collier County Contract No. 15-6397/Purchase Order No. 4500174511, Passarella & Associates, Inc. (PAI) has been requested to perform the second phase of an analysis of the North Belle Meade – Natural Resource Protection Area (NRPA) for the potential to generate wetland credits and/or wildlife habitat compensation units. This study phase included field work to better define the current site conditions within accessible portions of a defined area of the NRPA. Further, this phase of the project analysis 1) refined the anticipated costs to generate the credits and compensation; 2) estimated the costs timeline; and 3) estimated a potential credit and/or compensation generation timeline.

While the initial overall study area was North Belle Meade Sending Lands, at approximately 9,900 acres in size (Exhibit 1), the primary area analyzed in this phase of study is a portion of the 6,650± acre North Belle Meade NRPA area (Exhibit 2). The overall North Belle Meade Sending Lands are comprised of a variety of upland and wetland habitat types. While much of the North Belle Meade area is relatively undeveloped, areas of agriculture, pasture, residential, and other land uses exist and in the Belle Meade West area in particular. In general, the North Belle Meade NRPA contains less development activity and a lesser degree of land alteration.

This second phase reports relies and builds upon concepts and formulas developed in the initial phase study with added detail regarding existing site conditions and implementation costs.

## **2.0 BACKGROUND**

An initial study of the feasibility of utilizing North Belle Meade Sending Lands to generate wetland mitigation credits and/or habitat compensation values and the potential costs to generate those credits and/or compensation values was completed and submitted to Collier County by Passarella & Associates, Inc. in July 2016 (the “Phase 1 Study”). This initial study was based on a range of hypothetical conditions (primarily percentage of wetlands and levels of exotic coverage) for lands within North Belle Meade.

This current study refines the range of potential credit and compensation generation, as well as associated costs, based on more site specific information gathered from field work and the review of available land cover/land use data for specific areas within the NRPA portion of North Belle Meade

## **3.0 FOCUS AREA**

The initial overall study area reviewed in the Phase 1 Study included all of North Belle Meade Sending Lands (9,900± acres). For this Phase 2 Study, the North Belle Meade NRPA area (6,650± acres) was chosen for closer examination based on the lesser degree of land development and land alteration relative to the non-NRPA portion of North Belle Meade Sending Lands. For the purposes of this Phase 2 study, a particular area of the North Belle Meade NRPA was identified as having the highest potential for permissible large-scale wetland

credit and habitat compensation generation. This area, hereafter designated as the study “Focus Area,” is depicted on Exhibit 3 and contains approximately 4,380 acres of relatively undeveloped lands. The Focus Area was selected for more detailed analysis based on the following attributes:

### **3.1 Large Undeveloped Area**

Relative to other areas within the North Belle Meade, the selected Focus Area has few structures, is less developed, and contains few public roads.

### **3.2 Large Percentage of Wetlands**

Based on existing land use/land cover maps from the South Florida Water Management District (SFWMD), a large percentage of the lands are comprised of wetland land cover types.

### **3.3 Potential for Future Hydrologic Enhancement**

The recently adopted Collier County Watershed Improvement Plan (CCWIP) identifies the lands immediately north of the Focus Area as the potential location of a future pumping facility and spreader swale system to redirect a limited amount of flow from the Golden Gate canal system southward in order to contribute to the restoration of historic surface water flows for this portion of the County (see excerpted exhibit from the CCWIP, attached as Exhibit 4) The potential pumping facility and associated spreader swale system is identified in the Watershed Plan for further study and potential future implementation.

### **3.4 Existence of Conservation Lands**

A significant number of land parcels are, or are proposed to be, committed for conservation purposes under past or ongoing state and federal permitting actions. Exhibit 5 depicts lands within the NRPA that are committed, or proposed to be committed, as wetland mitigation and/or habitat compensation. These lands, at a total of approximately 2,166 acres could be utilized as the nucleus for a wider ranging mitigation/compensation as envisioned under this study

### **3.5 Listed Species Prevalence**

Lands within the Focus Area have been identified by the US Fish and Wildlife Service (USFWS) and the Florida Fish and Wildlife Conservation Commission (FWCC) as providing important regional benefits to listed wildlife species including the Florida panther (*Puma concolor coryi*). Several of the existing conservation parcels within the Focus Area are currently in protected status in order to serve as habitat compensation of panther habitat impacts elsewhere in the County.

#### **4.0 FIELD WORK AND DATA COLLECTION**

The primary purpose of the performed field work and data collection was to refine estimations of the percentage of lands that are wetlands within the Focus Area and to access the levels of exotic vegetation present.

Access to portions of the Focus Area was limited due to the lack of roads and other forms of legal access. Fencing and postings of “No Trespassing” signage limited pedestrian surveys for some areas. In order to supplement data collected from field reconnaissance, existing mapping of land use and land cover (primarily from SFWMD’s Florida Land Use, Land Cover, and Forms Classification System (FLUCFCS) (Florida Department of Transportation 1999)) was ground truthed in accessible areas in order to extrapolate reconnaissance finds into inaccessible areas. Similarly, existing and historic aerials were reviewed for accessible areas and used to extrapolate probable land cover and land use specifics for inaccessible areas.

Additional data relative to site-specific land cover types, wetlands, and exotic coverage levels was gathered from available public records for existing conservation lands within the Focus Area and compared to the existing generalized FLUCFCS maps to identify appropriate correction factors. Based on the field work and data collection/analysis, the percentage of wetlands comprising the Focus Area is estimated at 75 percent and the current levels of exotic vegetation coverage within wetlands are estimated at:

- E0 (0% coverage) – 20% of land area
- E1 (0-25% coverage) – 64% of land area
- E2 (26-50% coverage) – 8% of land area
- E3 (51-75% coverage) – 6% of land area
- E4 (76-100% coverage) – 2% of land area

This combination of exotic coverage levels most closely resembles Scenario 2 in Table 1 of the Phase 1 Study Report.

#### **5.0 POTENTIAL MITIGATION VALUE (WITHOUT HYDROLOGIC ENHANCEMENT)**

Per the methodology proposed in the Phase 1 Study, the potential mitigation value of a given area is the value of the potential wetland credits to be generated plus the habitat compensation values of non-wetland areas, or:

$$\text{Wetland Credit Value} + \text{Habitat Compensation Value} = \text{Mitigation value}$$

##### **5.1 Wetland Credit Value**

On a per 100 acre basis, application of the Uniform Mitigation Assessment Methodology (UMAM) yields a potential wetland credit number of 4.95 credits. Based on the current market price of \$75,000 per credit, these 4.95 credits could generate a value of \$371,250



given the exotic coverage levels and percentage of wetlands determined to exist in the Focus Area (provided in Section 4.0, above). The UMAM worksheet used to estimate the potential credit number is attached as Exhibit 6.

## **5.2 Habitat Compensation Value**

On a per 100 acre basis and given that the Focus Area is comprised of approximately 25 percent uplands, the potential habitat compensation value calculation for these uplands yields \$4,500/acre x 25 acres = \$112,500.

## **5.3 Potential Mitigation Value**

Combining the above values yields the sum of \$483,750 as the potential mitigation value per 100 acres of land within the Focus Area.

$$\text{Mitigation Value} = \$371,250 + \$112,500 = \$483,750$$

## **6.0 COSTS**

Project costs can be influenced by the size (acreage) of a given project. Economies of scale can be realized for permitting, project administration, and mitigation plan implementation. For the purposes of this study, costs are given on a per 100 acre basis, assuming a project size of at least 350 acres.

The basic costs elements of implementing a mitigation program within a typical area were presented in the Phase 1 Study Report as initial exotic vegetation eradication, ongoing exotic vegetation management, funding of perpetual management, and project administration.

For a typical mitigation project, the basic timing of costs can be broken down as:

- Field work, design, and permitting – approximately three years
- Mitigation Implementation – begins after permitting is complete and may be in phases
- Funding of perpetual management account – the timing of this expense can be negotiated during the permitting process but must occur before full credit release occurs
- Annual maintenance and monitoring – five years of monitoring post implementation

The costs for annual maintenance and monitoring beyond the five year period are assumed to be funded by monies from the perpetual management fund.

Using the cost formulas previously developed and updated per unit cost estimates, the estimated implement costs for a representative 100 acres within the Focus Area would be approximately \$390,249 with administrative costs at \$33,220 and permitting/monitoring costs at \$42,000 (Exhibit 7). The sum of these numbers provides the anticipated project cost as \$465,469 per 100 acres (exclusive of land acquisition costs).

## **7.0 VALUE VERSUS COST**

This report's analysis of both cost elements and potential mitigation values relies on a significant number of variables which may be influenced by more detailed site analyses, future market conditions, and changes in permitting criteria over time. Therefore, the results of the potential mitigation values and potential project costs contain a margin of error and can only be better defined through the site-specific analysis and permitting process.

Values used in this study are based on past projects, current regulatory agencies' rules, and best available data regarding land cover. The analysis is in 2017 dollars, and the assumption made that costs and revenues will rise or fall commensurately over time. Using these values, the projected value of a representative acre within the focus area and the associated cost to generate that value can be shown as:

\$483,750 per 100 acres= \$4,837 in Value per acre  
\$465,469 per 100 acres = \$4,655 in Cost per acre

## **8.0 TIMING OF CREDIT GENERATION VALUE VERSUS COSTS (ASSUMING A HYPOTHETICAL 100 ACRE IMPLEMENTATION AREA)**

The eradication of exotic vegetation and the implementation of a perpetual wetland management plan is the primary form of mitigation activity proposed under this study. This type of mitigation activity is deemed wetland "enhancement" as opposed to "wetland creation" or "wetland restoration." Wetland enhancement is the term typically used for an activity that enhances the level of wetland function for an existing wetland. Wetland creation is an activity that converts an existing upland to a fully functioning wetland, and wetland restoration is an activity that takes an area that was once a wetlands but is now has either minimal or no wetland functions and returning it to full wetland function level. Both wetland creation and wetland restoration typically generate more wetland credits per acre but also take a longer period for the mitigation activity to result in measureable success levels and, therefore, longer for the associated wetland credits to become available for use. The wetland mitigation activity contemplated for the study area wetland enhancement generates fewer wetland credits per acre but typically up to 80 percent of those credits generated are available for use to offset wetland impacts within one to two years of mitigation implementation. Potential project milestones, associated project costs, and the potential timeline for a hypothetical 100 acre area (exclusive of administrative costs) can be approximated as shown in Table 1.

**Table 1. Cost Schedule**

<b>Milestone Events</b>	<b>Associated Costs*</b>	<b>Approximate Timeline</b>	<b>Credits and Habitat Compensation Units Generated and Available**</b>	<b>Value of Available Credits and Habitat Compensation***</b>
Mitigation/compensation project start	--	0 months	--	--
Field work and design	\$4,000	Month 0 through Month 3	--	--
Permitting	\$8,000	Month 4 through Month 36	--	--
Agency approvals/permits issued	--	Month 37	--	--
Placement of conservation easement, baseline monitoring report, initial exotic vegetation eradication, time-zero monitoring report	\$206,000	Month 39 through Month 43	2.47 initial wetland credits; 112 initial habitat compensation units	\$185,250 initial wetland credit value; \$56,250 initial habitat compensation value
Establishment of financial assurance for perpetual management	\$217,250	Month 54	--	--
Annual treatment of exotics and first annual monitoring report	\$9,047	Month 53 through Month 55	1.47 additional wetland credits; 67 additional habitat compensation units	\$119,250 wetland credit value; \$33,750 additional habitat compensation unit value
Annual treatment of exotics and second annual monitoring report	\$9,047	Month 65 through Month 67	0.25 additional wetland credits; 11.25 additional habitat compensation units	\$18,750 wetland credit value; \$5,625 additional habitat compensation unit value
Annual treatment of exotics and third annual monitoring report	\$9,047	Month 77 through Month 79	0.25 additional wetland credits; 11.25 additional habitat compensation	\$18,750 wetland credit value; \$5,625 additional habitat compensation
Annual treatment of exotics and fourth annual monitoring report	\$9,047	Month 89 through Month 92	0.25 additional wetland credits; 11.25 additional habitat compensation	\$18,750 wetland credit value; \$5,625 additional habitat compensation
Annual treatment of exotics and fifth annual monitoring report	\$9,047	Month 101 through Month 104	0.25 additional wetland credits; 11.25 additional habitat compensation	\$18,750 wetland credit value; \$5,625 additional habitat compensation

**Table 1. (Continued)**

Milestone Events	Associated Costs*	Approximate Timeline	Credits and Habitat Compensation Units Generated and Available**	Value of Available Credits and Habitat Compensation***
Perpetual management paid from perpetual management fund	--	Month 104 through Month 464	--	--

\*Costs are given on a per 100 acre basis assuming a 350+ acre project size

\*\*Assumes a credit release schedule of 50 percent, 30 percent, 5 percent, 5 percent, 5 percent, 5 percent

\*\*\*Conservatively assumes a consistent market price value of \$75,000 per wetland credit

## 9.0 PERMITTING/PROGRAM CONSIDERATIONS

The use of lands within the North Belle Meade NRPA to generate wetlands mitigation credits and habitat compensation values to offset permitted wetland impacts would require approval from the federal government through the U.S. Army Corps of Engineers (COE) and the State of Florida through either the Florida Department of Environmental Protection (FDEP) or the SFWMD as discussed in the Phase 1 Study Report.

The potential “project area” for large-scale mitigation/habitat compensation would be those lands within the Focus Area that are not already committed to mitigation or habitat compensation for other projects, as further discussed under Section 10 Feasibility Discussion, below.

### 9.1 Federal Permitting

As part of this Phase 2 Study, discussions were held with the COE District Headquarters’ office in Jacksonville in March of 2017. Basic exhibits showing the landscape context of the North Belle Meade NRPA, land cover/land use mapping, and the location and extent of existing preserved or conservation lands within the Focus Area were reviewed and discussed. The COE representative indicated the Focus Area had potential to be used as a mitigation area under an In Lieu Fee (ILF) program. For public sector mitigation projects that contemplate large-scale mitigation, ILF programs can allow early credits to be sold and the monies collected used to fund a mitigation program. The lands proposed for mitigation need not all be in ownership by the public entity but the monies from any advance credit sales must be used to purchase designated properties and implement the permitted mitigation works. Potential issues of concern expressed by the COE included subsurface gas and mineral rights needing to be restricted under any acceptable mitigation program and the need to address existing easements which could conflict with the need to ultimately place lands under a restrictive conservation easement. The COE also discussed the fact their regulatory program will only consider credit for proposed wetland mitigation and habitat enhancements that are above and beyond those an applicant is already committed to under another program or regulatory program. If the County acquires land through any deal or program that obligates the County to wetland or habitat improvements and/or long-term management, then the COE will only consider

credits under any proposed ILF Program (or any other wetland mitigation program) for enhancements or benefits above what the COE considers part of existing obligations on the land. The COE representative did recognize and acknowledge the local and regional positive environmental benefits that could be achieved by enhancing and protecting the Focus Area lands under a mitigation program. General public access to mitigation lands is generally not allowed under the federal mitigation regulations.

## **9.2 State Permitting**

Discussions were also held with the FDEP and the SFWMD about the potential of using lands within the Focus Area for mitigation purposes under the State of Florida's regulatory programs and the appropriate permitting program to use. Both agencies responded positively to the concept of enhancing and protecting Focus Area lands. The SFWMD in particular acknowledged the Focus Area lands as being important in the regional landscape and the longstanding desire by wildlife agencies, regulatory agencies, and Non-Governmental Organizations to see this area protected and managed. In addition to the possibility of creating a Regional Off-Site Mitigation Area (ROMA) (reference Phase 1 Study), the FDEP and the SFWMD brought up the alternative possibility of using the Focus Area to establish an "up front mitigation" program whereby a single credit user (Collier County) could permit upfront mitigation (mitigation work done in advance of a project being done that needed mitigation credits). The primary difference between this upfront mitigation program and a ROMA program would be the need for the permittee (Collier County) to be in legal ownership of any proposed mitigation lands at the time of permitting.

Regardless of the state permitting program (ROMA versus upfront permitting) used, the estimates of credit generation values and costs of this Phase 2 Study will still generally apply equally. Resolution of the appropriate state permitting avenue will depend on the circumstances and situation of a specific permit application at the time of application submittal (i.e., are all the subject lands under County ownership and control, will the credit system be based on a single-user basis, etc.). Of the two permit programs, the upfront mitigation program could be considered the more "restrictive" for the this feasibility discussion since it would require the County to have ownership control of relevant lands at the time of permit application rather than a ROMA type program which can accommodate prospective land ownership at the time of permit application.

## **10.0 DISSENTING VIEWS**

Within the environmental community, there has been a stated standing concern with the awarding of mitigation credit for wetland projects which proposed only eradication of exotic vegetation as the basis for increasing wetlands functions. The concern is that exotic eradication alone does not provide enough significant increase in wetland function unless the exotic eradication efforts are for significantly infested areas and only then when supplemental planting of wetland vegetation also occurs. In the case of lands within the Focus Area, an argument can be made that for a larger-scale mitigation program, such as contemplated by this study, many of

the land parcels within the Focus Area may not ever be subject to exotic eradication efforts and, equally significant, to perpetual land management efforts to improve and preserve wetland and habitat functions.

## **11.0 FEASIBILITY DISCUSSION**

The Focus Area as defined in this study is approximately 4,380 acres in size and is comprised of lands that have been deemed ecologically important by regulatory and wildlife agencies due to the significant acreage of relatively undeveloped lands, the existence of listed species habitat utilization, and the area's landscape context. Within the approximately 4,380 acres of the Focus Area, approximately 2,166 acres are currently either existing in, or are proposed to be placed in, conservation status as offsets for wetland and/or listed species impacts elsewhere. The term conservation status, as used herein, indicates lands that are subject to a conservation easement and obligated for preservation under a FDEP or SFWMD permit and/or a COE permit. These existing mitigation and habitat compensation parcels range in size from 600+ acres to scattered smaller parcels as small as 2± acres. Some of these existing parcels are subject to exotic eradication and long-term management requirements while some parcels do not have such requirements clearly stated in their enabling permits. The southern portion of the Focus Area in particular is comprised of numerous smaller and disjointed parcels of mitigation or habitat compensation lands.

The balance of the Focus Area is comprised of numerous parcels totaling 2,214± acres. These parcels or a significant number of these parcels could be aggregated to form the basis for a mitigation/habitat compensation project as conceived by this study. This potential "Project Area" at 2,214± acres would benefit from the existence of the 2,166± acres already existing or proposed as mitigation and/or compensation lands both in terms of permissibility and ecological benefits. Exhibit 8 indicates the potential project area. The benefits of wetland mitigation and habitat compensation programs are most fully realized with large scale projects rather than smaller disjointed projects. Also, cost effectiveness and efficiency for exotic vegetation eradication programs and long-term land management programs is typically more attainable for single large areas of contiguous lands rather than smaller areas or a collection of smaller disconnected areas. For these reasons, the aggregation of lands not currently in conservation status (and augmented by the existence of those lands already in conservation status) in order to establish a larger scale wetland mitigation/habitat compensation project would have benefits in terms of ecological enhancement/functionality and land management efforts. Also, regulatory agencies have consistently expressed a preference for larger scale mitigation and habitat compensation projects. Those lands already in conservation status would not be available to generate wetland credits or habitat compensation, as those benefits are already accounted for under other permits, but the existence of those parcels serves as a nucleus or precursor to a County mitigation/compensation program in which additional parcels could be acquired, enhanced, and managed to generate definable wetland credit and habitat compensation values as presented above. The combined size of lands acquired under a county program and existing conservation lands could achieve significant ecological benefits base on the net size. Potential also exists for more cost effective exotic eradication and land management efforts if the interests

and responsibilities of the County program and existing conservation lands are somehow shared or combined.

The acquisition of land parcels by the County within the Focus Area would ultimately determine the potential size of any County mitigation/compensation program. Incentive programs and acquisition parameters are beyond the scope of this study. However, based on concerns expressed by the COE, lands acquire by the County and utilized as part of a mitigation program, will only be able to generate wetland credits only to the extent that additional wetland enhancements and management obligations are proposed, above what is already required under any existing program or regulations. If the Transfer of Development Rights program in place at the time of County land acquisition places on or implies an obligation on the County to enhance and/or manage the lands then the potential wetland credit generation and habitat compensation generation numbers presented in this study would be reduced.

The Focus Area is also an important area of Collier County in that it has been identified as a potential area of hydrologic restoration to the localized benefit of North Belle Meade and to the generalized benefit to the overall watershed. A significant portion of the area identified as Focus Area under this Phase 2 study is identified in the adopted Collier County Watershed Improvement Plan as the potential flow-way area downstream of a contemplated pump station and spreader swale system. The purpose of the pump station and spreader swale would be to restore a portion of the historic north to south surface water flow that has been altered by past development activities. One of the challenges to ultimately constructing such a system would be the increase of sheet flow of water across the area and the increase in wetland hydrology south of the spreader swales. Such potential changes to wetland hydrology could impact existing landowners and, therefore, would require either landowner permission (flow-way easement) or outright land acquisition by the County or other entity. An assemblage of parcels within the Focus Area as part of any County mitigation program could compliment the goals of the County's watershed management plan by to route water through this portion of North Belle Meade. Also, the addition of hydrological improvements (such as the installation of the contemplated pump station/flow-way) to lands within the Focus Area could significantly increase the potential wetland credit generation, as was demonstrated in the Phase 1 Study.

## **12.0 SUMMARY**

The Phase 1 Study indicated the use of North Belle Meade sending lands was hypothetically feasible based on a range of assumed land types (wetland versus upland percentages) and exotic vegetation coverage levels.

This Phase 2 Study indicates the lands identified as potential "Project Lands" on Exhibit 8 could be permissible as a wetland mitigation and habitat compensation project with the costs to generate wetland credit and habitat compensation values being approximately offset by the values generated. Costs associated with land acquisition are not factored into this analysis and the analysis assumes an initial project size of between 350 to 2,100± acres.

A number of base assumptions were necessary for the analysis including a minimum project size of approximately 350 acres, land management costs will follow current trends, land acquisition will be required, and project administration costs will be consistent with the national average of eight percent of full project costs.

Of particular note, the state and federal permitting programs for large-scale mitigation projects require a conservation easement be placed on the project lands with a stated restriction on public access.

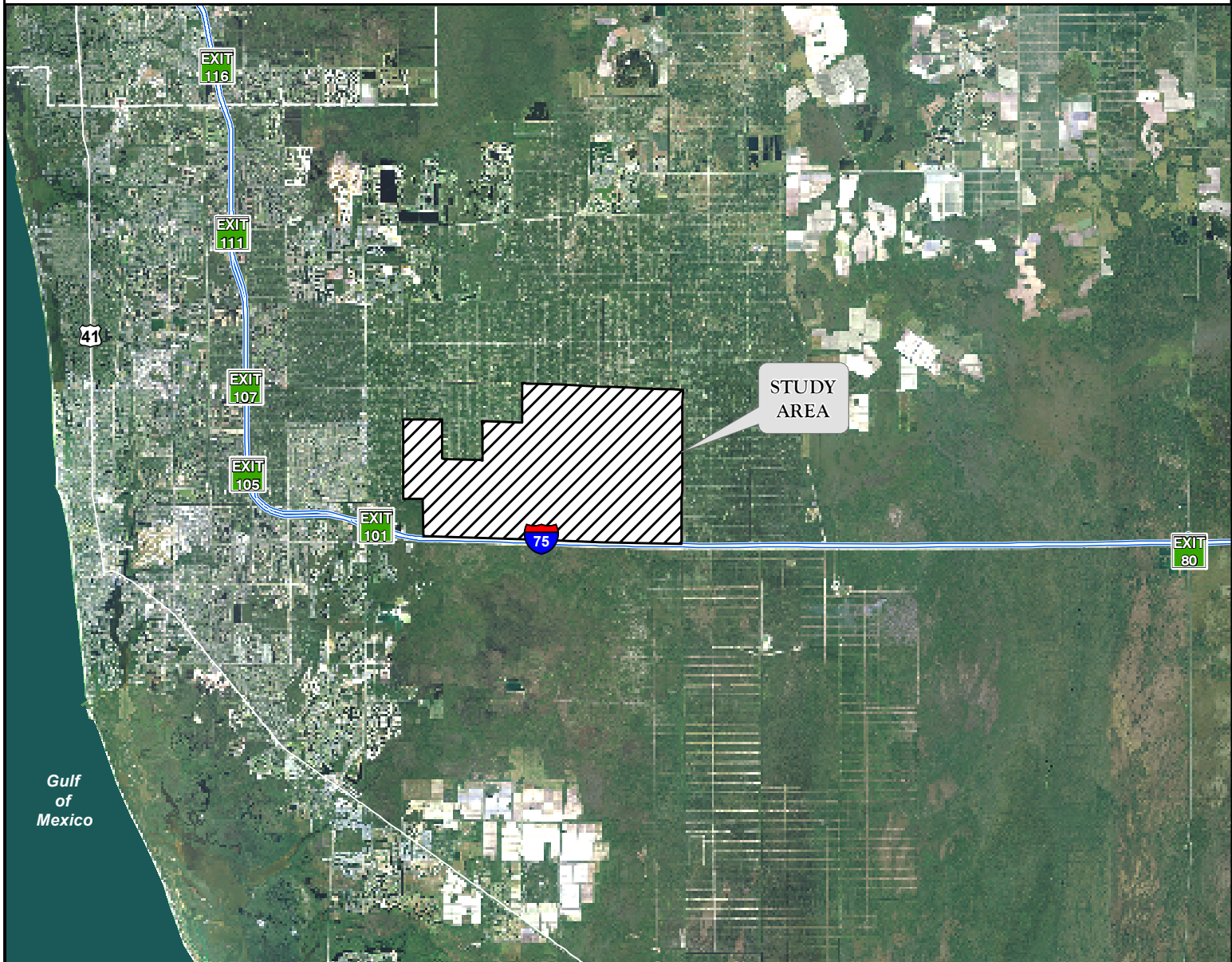
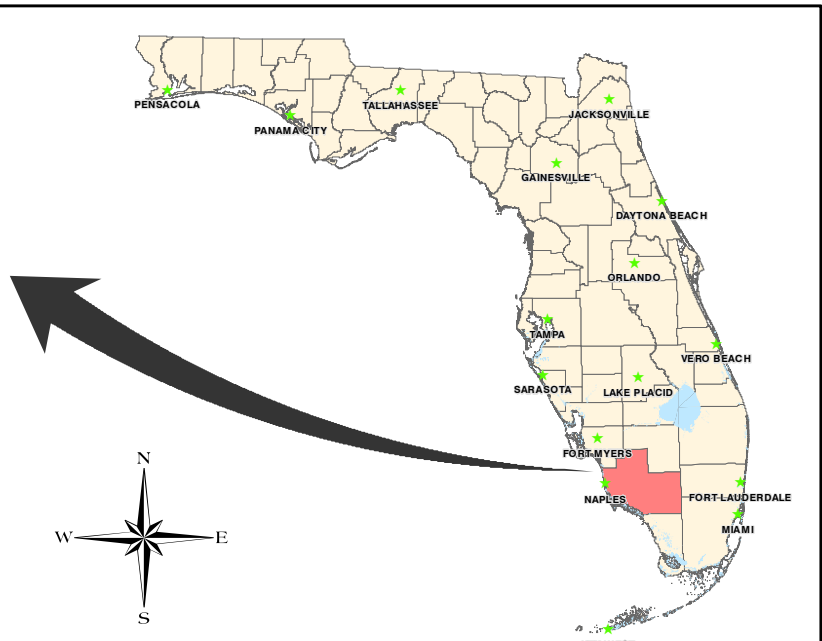
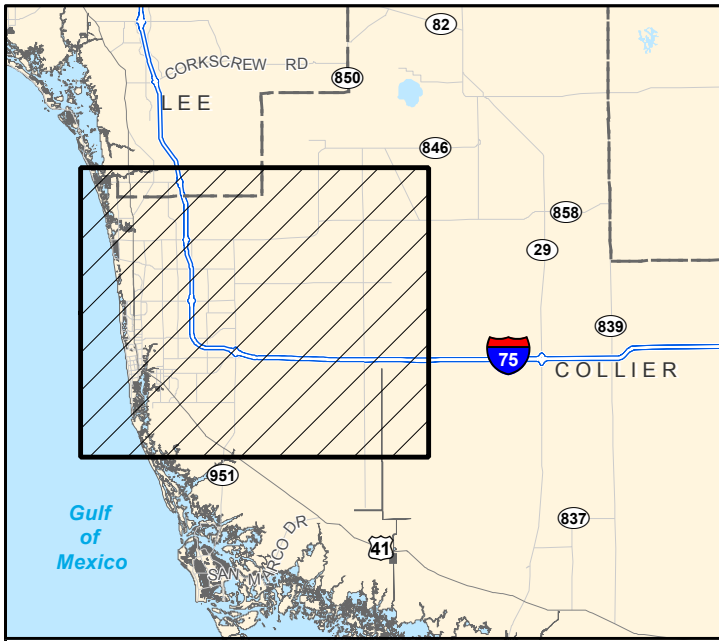
### **13.0 REFERENCES**

Florida Department of Transportation. 1999. Florida Land Use, Cover and Forms Classification System. Procedure No. 550-010-001-a. Third Edition.



**EXHIBIT 1**

**STUDY AREA LOCATION MAP**



**EXHIBIT 1. STUDY AREA LOCATION MAP  
NORTH BELLE MEADE SENDING LANDS**

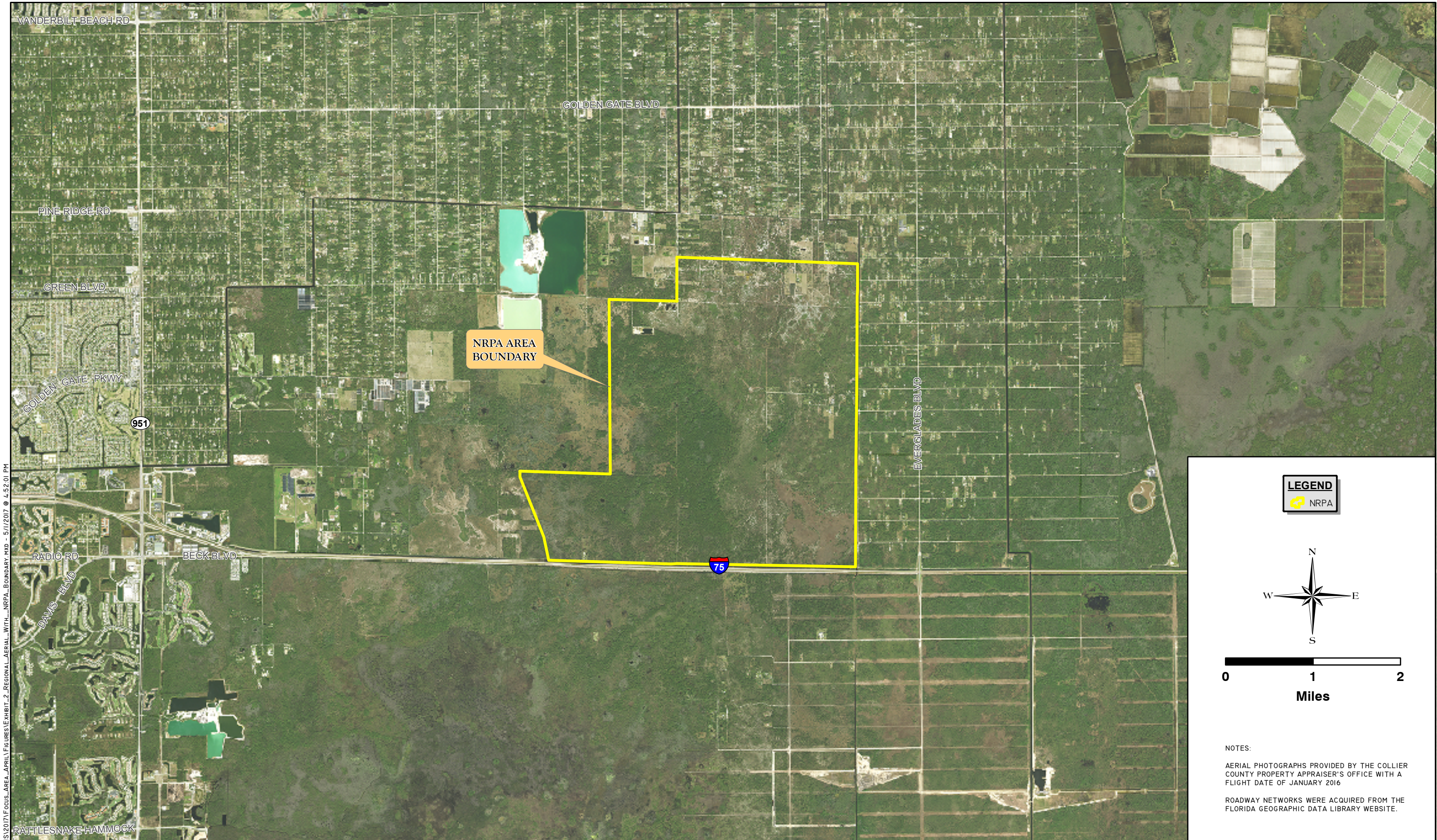
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REVIEWED BY	DATE
T.D.	4/27/17
REVISED	DATE



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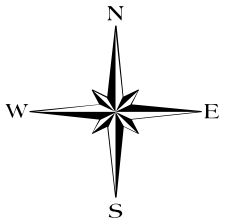
**EXHIBIT 2**

**REGIONAL AERIAL WITH NRPA BOUNDARY**



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**LEGEND**  
 NRPA



NOTES:  
 AERIAL PHOTOGRAPHS PROVIDED BY THE COLLIER COUNTY PROPERTY APPRAISER'S OFFICE WITH A FLIGHT DATE OF JANUARY 2016  
 ROADWAY NETWORKS WERE ACQUIRED FROM THE FLORIDA GEOGRAPHIC DATA LIBRARY WEBSITE.

REVISIONS	DATE	DRAWN BY	DATE
		D.B.	4/27/17
		DESIGNED BY	DATE
		T.D.	4/27/17
		REVIEWED BY	DATE
		T.D.	4/27/17

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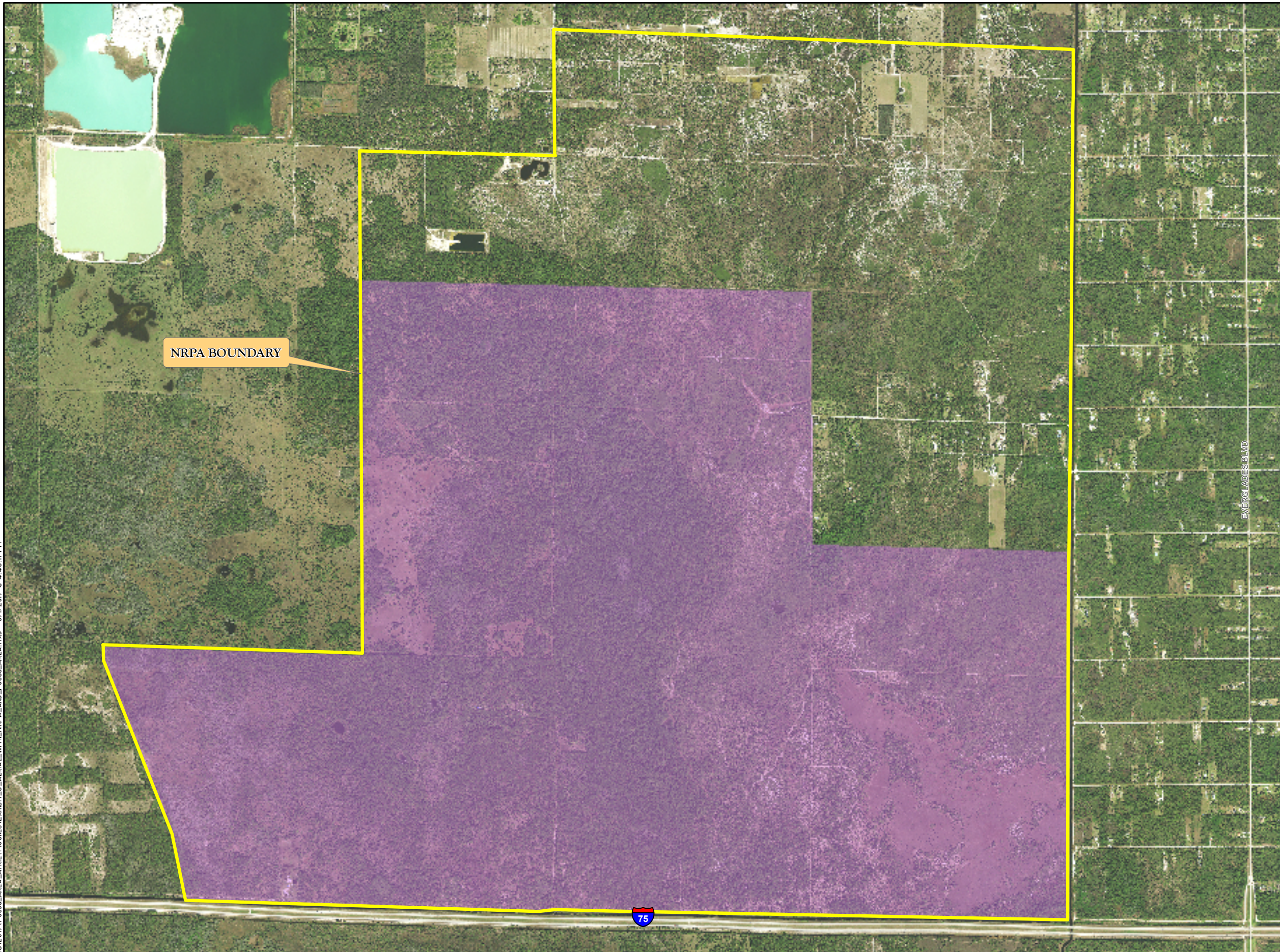
**NORTH BELLE MEADE NRPA  
 REGIONAL AERIAL WITH NRPA BOUNDARY**

DRAWING No. 16CCG2467
SHEET No. EXHIBIT 2



**EXHIBIT 3**

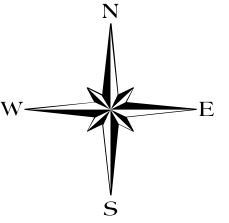
**AERIAL WITH NRPA BOUNDARY AND FOCUS AREA**

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**LEGEND**

-  NRPA
-  FOCUS AREA



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		REVIEWED BY	DATE
		T.D.	4/25/17

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**PASSARELLA & ASSOCIATES**  
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**NORTH BELLE MEADE FOCUS AREA  
 AERIAL WITH NRPA BOUNDARY AND FOCUS AREA**

DRAWING No. 16CCG2467
SHEET No. EXHIBIT 3

**EXHIBIT 4**

**CCWIP EXCERPT**

## North Belle Meade Spreader Swale

ATKINS

# Collier County Watershed Management Plan



## Rookery Bay Watershed

### STATEMENT OF PROBLEM

Construction of the Golden Gate Main Canal significantly increased the size of the watershed draining to Naples Bay and reduced the size of the watershed flowing to Rookery Bay. As a result, Naples Bay receives significantly too much water and Rookery Bay receives too little water, negatively affecting both receiving estuary systems.

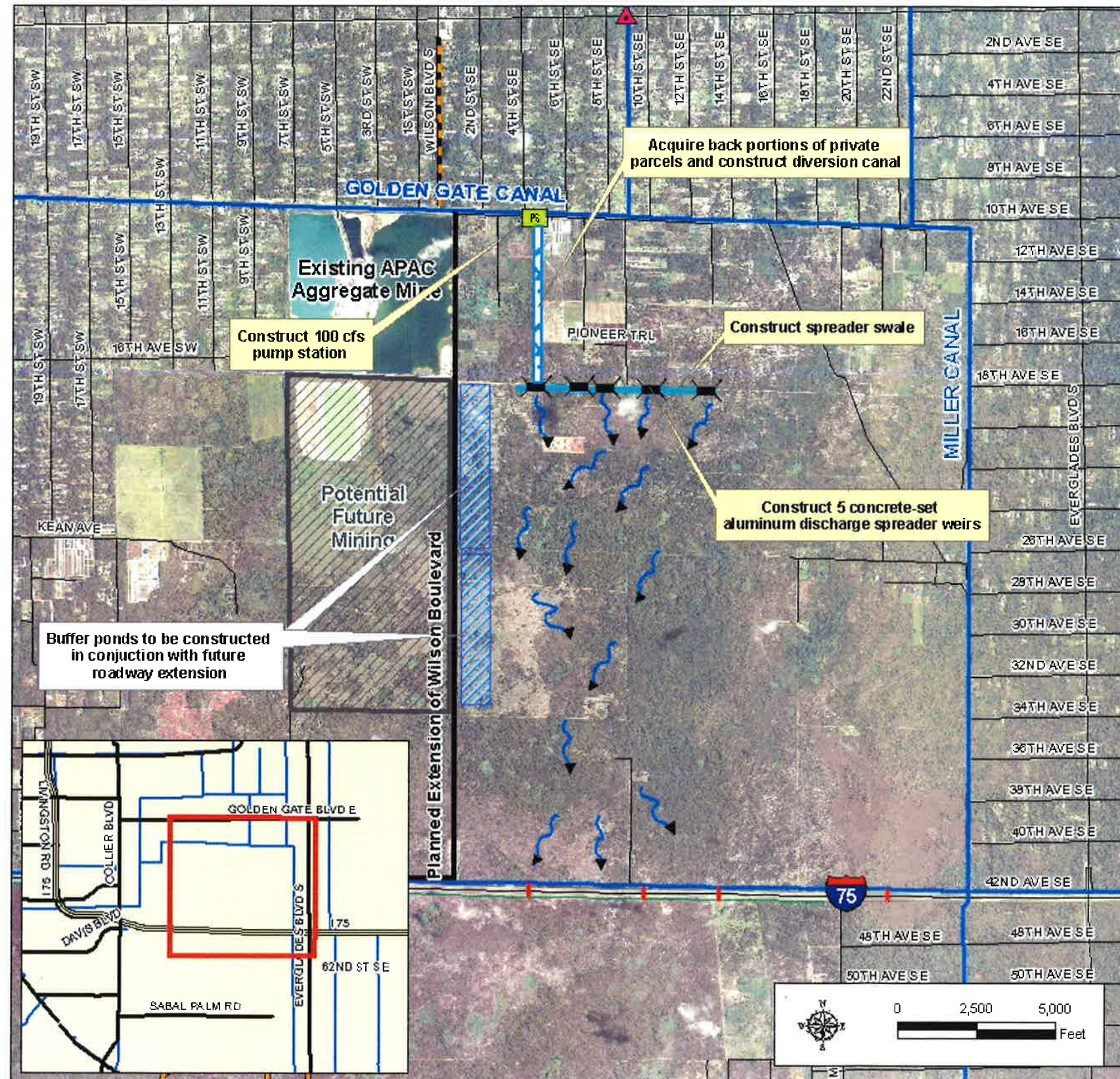
Additionally, the reduction of stormwater runoff to the south has decreased wetland hydroperiods in areas where sheetflow used to occur.

### PROJECT BENEFITS

- (1) Predicted to reduce freshwater discharges to Naples Bay by 10 percent resulting in an annual performance measure lift of 0.89.
- (2) Predicted to increase freshwater discharge to Rookery Bay by 19 percent, resulting in an annual performance measure lift of 1.25.
- (3) Increases wetland hydrology in North Belle Meade with predicted performance measure lift of 0.04.
- (4) Project reduces nutrient load to Naples Bay but does not significantly increase load to Rookery Bay.

### PROJECT DISADVANTAGES

- (1) Primary concept is dependant on acquisition of privately-owned property for the diversion canal construction.
- (2) Project implementation may be tied to construction of Wilson Boulevard Extension or to proposed mining permits in the area.



### SOLUTION

- Construct a 100 cfs pump station to divert water south from the Golden Gate Main Canal
- Construct a spreader swale with weir structure to promote overland flow into wetland areas in North Belle Meade

### DESIGN CONSIDERATIONS

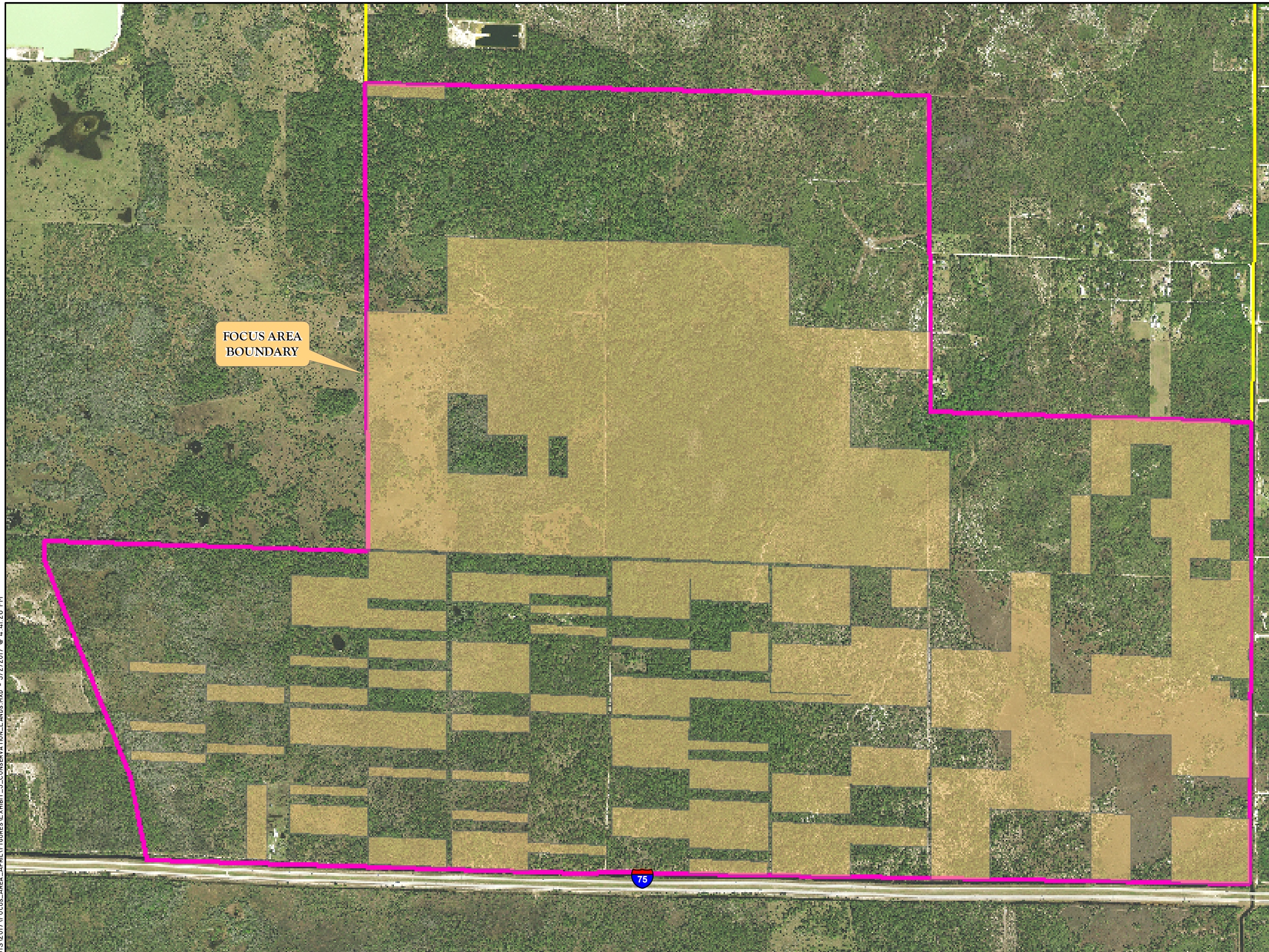
- An alternative design would be to build the diversion canal in conjunction with and adjacent to the Wilson Blvd extension. Water would be pumped from the diversion canal to the spreader swale.
- Flows north of the constructed spreader swale may need to be graded slightly east to the constructed finger canal.
- Project discharge area lies with a Rural Fringe Sending area, the development rights for this area would need to be obtained prior to construction. This could be tied to the proposed mining permits in the area.

### COST ESTIMATE

Construction:	\$4,788,000
Land Acquisition:	\$322,000
Engineering and Contingency:	\$1,916,000
<b>TOTAL</b>	<b>\$7,026,000</b>

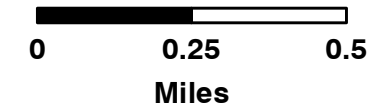
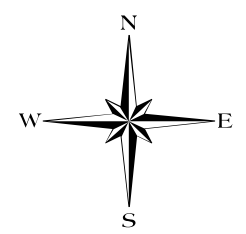


**EXHIBIT 5**  
**CONSERVATION LANDS**



**LEGEND**

-  NRPA
-  CONSERVATION LANDS



NOTES:  
 AERIAL PHOTOGRAPHS PROVIDED BY THE COLLIER COUNTY PROPERTY APPRAISER'S OFFICE WITH A FLIGHT DATE OF JANUARY 2016  
 ROADWAY NETWORKS WERE ACQUIRED FROM THE FLORIDA GEOGRAPHIC DATA LIBRARY WEBSITE.

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REVISIONS	DATE	DRAWN BY	DATE
		D.B.	5/1/17
		DESIGNED BY	DATE
		T.D.	5/1/17
		REVIEWED BY	DATE
		T.D.	5/1/17



NORTH BELLE MEADE  
 CONSERVATION LANDS

DRAWING No.	16CCG2467
SHEET No.	EXHIBIT 5

**EXHIBIT 6**

**UMAM WORKSHEET**

**NORTH BELLE MEADE  
UMAM WORKSHEETS for FOCUS AREA  
WETLAND MITIGATION FUNCTIONAL SCORING  
May 2017**

**UMAM WORKSHEET 1 of 2  
WETLAND CREDIT GENERATION PER 100 ACRES (WITHOUT HYDROLOGIC LIFT and WITHOUT UPLAND CREDIT GENERATION)**

Polygon No.	FLUCFCS TYPE - Exotic Level	UMAM Acres	Phase	Location		Hydrology		Community		Existing w/out UMAM	Proposed w/ UMAM	Delta	T-factor	Risk	Pres. Fact	RFG	Credits
				w/o	with	w/o	with	w/o	with								
a	Wetland - No Exotics	15.00	N/A	8	9	5	5	9	9	0.733	0.767	0.033	1.00	1.00	N/A	0.033	0.50
b	Wetland-E1	48.00	N/A	8	9	5	5	8	9	0.700	0.767	0.067	1.00	1.00	N/A	0.067	3.20
c	Wetland- E2	6.00	N/A	8	9	5	5	7	9	0.667	0.767	0.100	1.00	1.00	N/A	0.100	0.60
d	Wetland- E3	4.50	N/A	8	9	5	5	7	9	0.667	0.767	0.100	1.00	1.00	N/A	0.100	0.45
e	Wetland-E4	1.50	N/A	8	9	5	5	6	9	0.633	0.767	0.133	1.00	1.00	N/A	0.133	0.20
<b>Subtotal</b>		<b>75.00</b>															<b>4.95</b>

**NORTH BELLE MEADE UMAM WORKSHEET 2 of 2  
WETLAND CREDIT GENERATION PER 100 ACRES (WITH HYDROLOGIC LIFT and WITHOUT UPLAND CREDIT GENERATION)**

<b>HYDRO SCENARIO* 1 at 75% Wetlands/ 25% Uplands</b>																	
Polygon No.	FLUCFCS TYPE - Exotic Level	UMAM Acres	Phase	Location		Hydrology		Community		Existing w/out UMAM	Proposed w/ UMAM	Delta	T-factor	Risk	Pres. Fact	RFG	Credits
				w/o	with	w/o	with	w/o	with								
a	Wetland - No Exotics	72.00	N/A	8	9	5	8	9	9	0.733	0.867	0.133	1.00	1.00	N/A	0.133	9.60
b	Wetland-E1	18.00	N/A	8	9	5	8	8	9	0.700	0.867	0.167	1.00	1.00	N/A	0.167	3.00
c	Wetland- E2	0.00	N/A	8	9	5	8	7	9	0.667	0.867	0.200	1.00	1.00	N/A	0.200	0.00
d	Wetland- E3	0.00	N/A	8	9	5	8	7	9	0.667	0.867	0.200	1.00	1.00	N/A	0.200	0.00
e	Wetland-E4	0.00	N/A	8	9	5	8	6	9	0.633	0.867	0.233	1.00	1.00	N/A	0.233	0.00
<b>Subtotal</b>		<b>90.00</b>															<b>12.60</b>

\*The label "Hydro Scenario" indicates the UMAM scoring includes functional lift for hydrological enhancements  
UMAM - Uniform Mitigation Assessment Methodology

**EXHIBIT 7**

**UPDATED IMPLEMENTATION COSTS**

## NORTH BELLE MEADE UPDATED IMPLEMENTATION COSTS

Implementation costs for wetland areas can be considered as the cost of the following for the initial five-year period:

- Initial treatment/eradication of exotic and nuisance vegetation
- Five years of ongoing treatment of exotic and nuisance vegetation
- Replanting of areas with 75 percent or greater levels of exotic vegetation
- Prescribed burns where and when appropriate
- Funding of the long-term management fund

For the purpose of this analysis, the need and/or cost for prescribed burning of wetland areas during the five-year implementation period is assumed to be negligible relative to other costs.

### Implementation Cost for Wetland Areas by Infestation levels

For areas with no exotic or nuisance vegetation present:

Initial treatment		N/A
Five years of ongoing treatment	(5 x \$25)	\$125/acre
Replanting		N/A
<u>Funding of perpetual management</u>		<u>\$2,667/acre</u>
Total		\$3,792/acre

For areas with less than 25 percent (E1) exotic/nuisance infestation:

Initial treatment		\$500/acre
Five years of ongoing treatment	(5 x \$190)	\$950/acre
Replanting		N/A
<u>Funding of perpetual management</u>		<u>\$2667/acre</u>
Total		\$4,117/acre

For areas with 25 to 50 percent (E2) exotic/nuisance infestation:

Initial treatment		\$1,000/acre
Five years of ongoing treatment	(5 x \$220)	\$1,100/acre
Replanting		N/A
<u>Funding of perpetual management</u>		<u>\$2,667/acre</u>
Total		\$4,767/acre

For areas with 51 to 75 percent (E3) exotic/nuisance infestation:

Initial treatment		\$1,500/acre
Five years of ongoing treatment	(5 x \$240)	\$1,200/acre
Replanting		N/A
<u>Funding of perpetual management</u>		<u>\$2,667/acre</u>
Total		\$5,367/acre

For areas with greater than 75 percent (E4) exotic/nuisance infestation:

Initial treatment		\$2,000/acre
Five years of ongoing treatment	(5 x \$240)	\$1,200/acre
Replanting		\$3,500/acre
Funding of perpetual management		\$2,667/acre
	Total	\$9,367/acre

The above information is presented in tabular form below.

**Table 1. General per acre Implementation Costs Summary for Wetland Areas**

Infestation Level	Implementation Cost Per Acre
None	\$3,792
Minor (E1)	\$4,117
Moderate (E2)	\$4,767
High (E3)	\$5,367
Extreme (E4)	\$9,367

**Table 2. Focus Area Wetland Implementation Costs per 100 Acres (75 Percent Wetlands, 25 Percent Upland)**

Infestation Level	Percentage per 100 Acres	Acreage of Land with Infestation Level	Unit Cost per Acre	Implementation Cost
None	20	15.0	\$3,792	\$ 56,880
Minor (E1)	64	48.0	\$4,117	\$ 197,616
Moderate (E2)	8	6.0	\$4,767	\$ 28,602
High (E3)	6	4.5	\$5,367	\$ 24,151
Extreme (E4)	6	1.5	\$9,367	\$ 14,050
			<b>Total</b>	<b>\$321,299</b>

### Implementation Costs for Upland Areas

Exotic and nuisance vegetation commonly occurs in both wetlands and uplands in Southwest Florida. The costs presented for the four scenarios above are primarily representative of treatment costs for wetland systems. Treatment costs for upland areas are typically less because prescribed burning can be used as an effective management component of any exotic vegetation eradication program.

### Prescribed Burn Costs

The cost to burn land is highly variable depending on the amount of fuel load present, the linear feet of burn lines that need to be established, the size of the area to be burned, the types of habitat present, and other factors. For the purposes of this analysis, an assumed cost of \$850 per 100

acres of uplands will be used for the initial burn event and \$600 per 100 acres for the follow-up burn likely to be required during the five year implementation period.

Prescribed burns are also a useful management tool for certain types of wetland habitats. The use of fire in wetland areas often reduces the need to treat exotic and nuisance species; therefore, for the purpose of this analysis, the cost of burning wetlands, where appropriate, is assumed as accounted for in the costs for ongoing treatments of exotic/nuisance vegetation in wetland areas.

The costs for implementation for upland areas can be generally defined as:

*Initial Exotic Vegetation Treatments Costs + Initial Burn Cost + Follow-up Burn Costs + funding perpetual management fund*

Using the assumed estimated cost numbers for 100 acres this equation yields:

$\$25,000 + \$850 + \$600 + (\$425/\text{acre} \times 100 \text{ acres}) \times = \$68,950$  per 100 acres for upland implementation costs

### **Combined Wetland and Upland Implementation Costs**

For a given 100-acre area, the combined implementation costs can generally be calculated as:

*(Percent Upland x \$104,600) + (Percent Wetland x Implementation Costs for given levels of infestation)*

The total implementation costs for 100 acres of the Focus Area can be calculated as:

Wetland Implementation Costs + Upland Implementation Costs

Total Implementation Cost:  $321,299 + 68,950 = 390,249$  \$/100 Acres

### **Administrative Costs**

The project administrative costs are calculated as 8 percent of total implementation cost plus land cost. Assuming a base land cost of \$2,500/acre, the administrative cost per 100 acres would be anticipated as:

$[(\$2,500/\text{acre} \times 100 \text{ acres}) + \$390,249] \times 0.08 = \$33,220/100 \text{ acres}$

### **Permitting and Monitoring Costs**

Permitting (with mitigation design), and monitoring costs are dependent on the scale of the project but can be roughly estimated as \$12,000 per 100 acres and five years of monitoring as \$30,000 for a combined cost of \$42,000



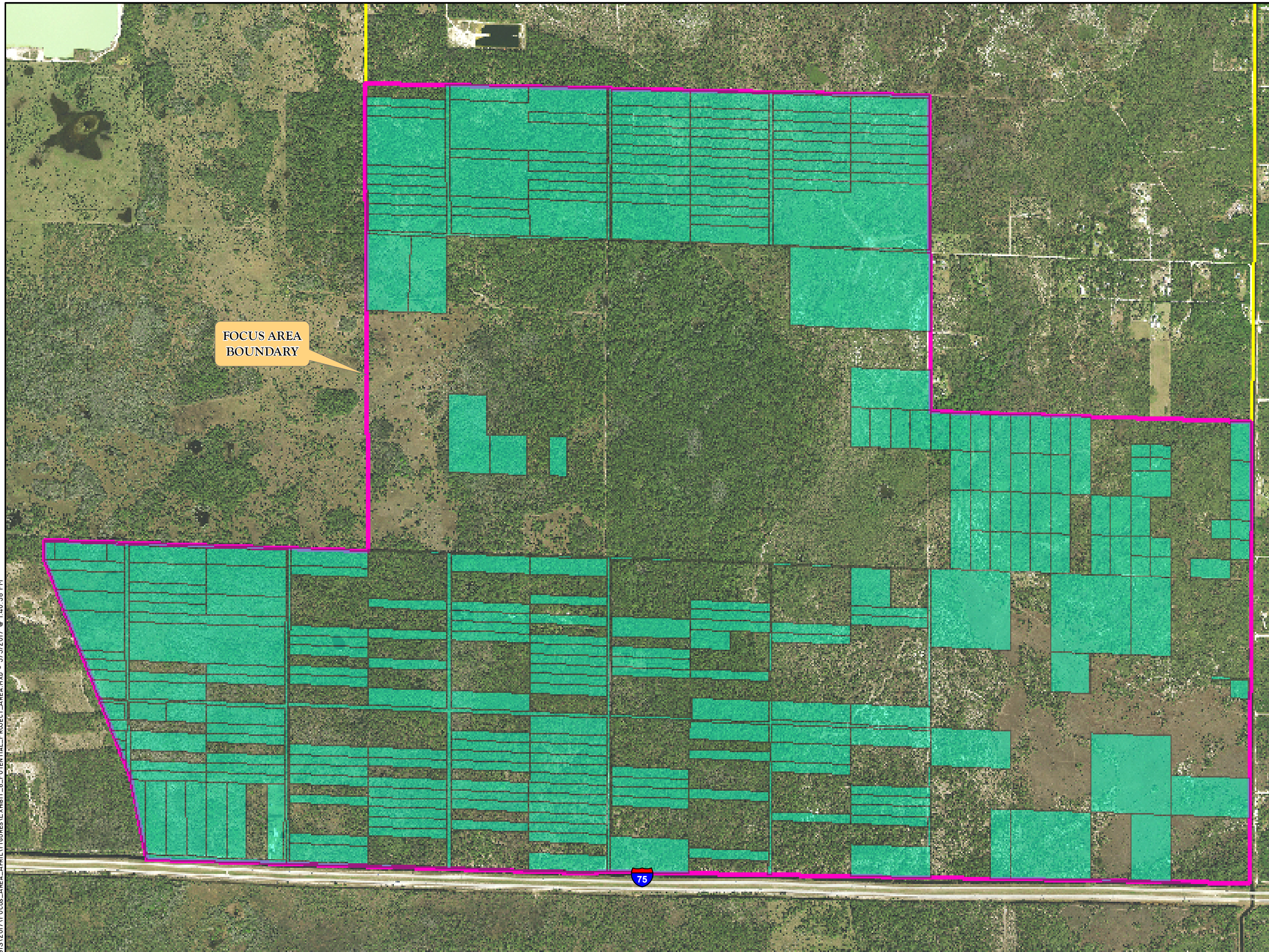
## **Total Project Cost**

Exclusive of land acquisition costs, the anticipated cost to permit, implement, manage, and administer the mitigation project would be the combined costs of wetland and upland implementation plus the administrative costs plus permitting and monitoring costs:

390,249 \$/100 Acres + \$33,220/100 acres + \$42,000/100 acres = \$465,469/100 acres

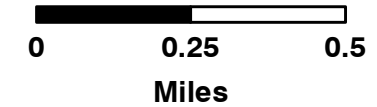
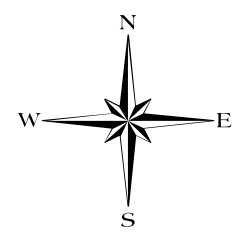
**EXHIBIT 8**

**POTENTIAL PROJECT AREA**



**LEGEND**

-  NRPA
-  POTENTIAL PROJECT LANDS



FOCUS AREA  
BOUNDARY

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		DESIGNED BY	DATE
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NORTH BELLE MEADE  
POTENTIAL PROJECT AREA

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