

PALM BEACH COUNTY
BOARD OF COUNTY COMMISSIONERS
AGENDA ITEM SUMMARY

Meeting Date: March 14, 2017 (X) Consent () Regular
() Ordinance () Public Hearing

Department
Submitted By: Environmental Resources Management
Submitted For: Environmental Resources Management

I. EXECUTIVE BRIEF

Motion and Title: Staff recommends motion to approve: a Management Plan (Plan) for the Winding Waters Natural Area.

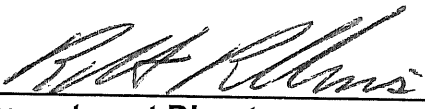
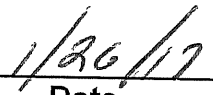
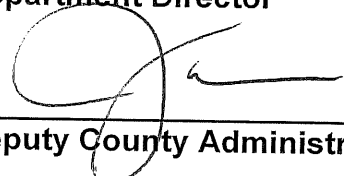

Summary: The Plan identifies natural resources present on the site and provides for the preservation, restoration, management and passive recreational uses of those resources. The first update to the Plan will be due in 2027. District 7 (AH)

Background and Justification: After review of the Plan by the Natural Areas Management Advisory Committee (NAMAC) and a public hearing held on December 7, 2016, NAMAC unanimously recommended the Plan for approval at its January 20, 2017 meeting.

Initial invasive/nonnative vegetation removal, fence and regulatory sign installation, and trash pickup activities have been completed. Annual management and maintenance costs, including biological monitoring, prescribed burns/mechanical vegetation reduction, ongoing nonnative/invasive animal and plant control, and repair and replacement of facilities, as needed, are estimated to be \$554,874. Funds for the management and maintenance of the site are expected to come from the Natural Areas Fund, Natural Areas Stewardship Endowment Fund, Pollution Recovery Trust Fund, and/or Ag Reserve Land Management Fund. Staff also will pursue grants to offset a portion of land management costs.

Attachments:
1. Winding Waters Natural Area Management Plan

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Recommended by:		
	Department Director	Date
Approved by:		
	Deputy County Administrator	Date

II. FISCAL IMPACT ANALYSIS

A. Five Year Summary of Fiscal Impact:

Fiscal Years	2017	2018	2019	2020	2021
Capital Expenditures	\$554,874	\$571,520	\$588,666	\$606,326	\$624,516
Operating Costs	_____	_____	_____	_____	_____
External Revenues	_____	_____	_____	_____	_____
Program Income (County)	_____	_____	_____	_____	_____
In-Kind Match (County)	_____	_____	_____	_____	_____
NET FISCAL IMPACT	\$554,874	\$571,520	\$588,666	\$606,326	\$624,516
# ADDITIONAL FTE POSITIONS (Cumulative)	_____	_____	_____	_____	_____

Is Item Included in Current Budget? Yes X No _____
Budget Account No.: Fund 1226 Department 380 Unit 3162 Object Various
Program _____

B. Recommended Sources of Funds/Summary of Fiscal Impact:

Fiscal year 2017 costs include \$554,874 in annual management and maintenance costs. Over the past five years, management and maintenance costs for County owned/managed natural areas have increased an average of 3% per year. Actual costs for FY 2018 and beyond may be higher or lower than projected. Funds for the management and maintenance of the site are expected to come from the Natural Areas Fund (1226), Natural Areas Stewardship Endowment Fund (1220), and/or Ag Reserve Land Management Fund (1222).

C. Department Fiscal Review: *L. Neary*

III. REVIEW COMMENTS

A. OFMB Fiscal and /or Contract Administrator Comments:

[Signature]
OFMB *2/2/17*

[Signature] *2/2/17*
Contract Administrator *2/2/17*

B. Legal Sufficiency:

Anne Delmont *2-22-17*
Assistant County Attorney

C. Other Department Review:

Department Director



**MANAGEMENT PLAN FOR
WINDING WATERS NATURAL AREA**

2016

Prepared by:

**Palm Beach County
Department of Environmental Resources Management
2300 N. Jog Road, 4th Floor
West Palm Beach, Florida 33411-2743**

THE PALM BEACH COUNTY NATURAL AREAS SYSTEM MANAGEMENT STATEMENT

The Palm Beach County Natural Areas System is comprised of those environmentally sensitive lands that are owned or leased by the County and managed as natural areas by the County's Department of Environmental Resources Management. These natural areas were selected and acquired to preserve the rare and diverse native ecosystems present on these sites and the endangered, threatened, and rare species of plants and animals that live there.

Purpose and Goals of the Natural Areas System

- The purpose of the Natural Areas System is to protect, restore and manage remnant native ecosystems, and the plants and animals characteristic of those ecosystems, in perpetuity, throughout Palm Beach County. The management of each natural area shall be coordinated with that of the other natural areas in the system.*
- Attempts shall be made to maintain physical and/or biological connections with other publicly- or privately-owned natural area through additional land acquisitions, conservation easements, interlocal agreements, greenway/trail connections and other appropriate actions.*

Management Considerations

- County natural areas shall be open to the public for non-consumptive/non-destructive, resource-based recreation, environmental education and scientific research. Public use shall not take precedence over ecosystem protection. Public uses shall be limited to those that are compatible with the perpetual preservation and management of the native ecosystems, plants and animals found on the natural area.*
- All public use facilities shall be chosen, designed and located to have minimal impact on the rare and imperiled plants, animals and natural communities found on the natural area. Facilities, structures or roads (other than management accessways/firebreaks or access roads) that would cause fragmentation of a natural area shall not be permitted.*
- To the extent practicable, fire-maintained native ecosystems shall be burned at the fire interval necessary to maintain those ecosystems. Burns shall be conducted by trained personnel, using a prescribed burn plan that addresses safety and smoke concerns.*
- Native ecosystems that have been impacted by invasive/nonnative plant infestations, land-clearing activities, drainage and/or other man-made disturbances shall be restored to their previous condition, if practicable, or to a native ecosystem that is better suited to current environmental conditions.*
- The special requirements of listed species shall be considered in developing management strategies for each natural area, but an individual species' needs shall not take precedence over management of an entire ecosystem or be allowed to have a detrimental impact on that ecosystem's complement of species.*

Management Plan Development and Revision

- A management plan shall be written for each natural area that: 1) describes the natural and cultural resources; 2) identifies any constraints associated with managing the natural area in an urbanized environment; and 3) identifies the strategies and techniques that will be used to preserve, restore and manage the native ecosystems, preserve the cultural resources; protect listed species, control invasive/non-native plants and animals, provide for appropriate public access, and prevent unauthorized access and activities.*

- *Each plan shall be reviewed by the Palm Beach County Natural Areas Management Advisory Committee (NAMAC), a citizens' advisory board, and the public shall be invited to comment on the plan at a public hearing held by NAMAC in the community in which the site is located. Following NAMAC's review of any comments received, the plan shall be sent to the Board of County Commissioners for approval.*
- *Each approved plan shall be subsequently reviewed at least every ten years by the County.*

EXECUTIVE SUMMARY

The 562.4-acre Winding Waters Natural Area (natural area) is located in the northeastern portion of Palm Beach County (County). The County owns approximately 548.1 acres of land within the natural area and manages 14.3 acres pursuant to a September 1, 2009 Interlocal Agreement with the Florida's Turnpike Enterprise. The County purchased 550.0 acres of the site in December 2001 with funds from the Palm Beach County Lands for Conservation Purposes Bond Issue Referendum of March 9, 1999. In 2010 the County swapped the 1.90-acre southern portion of the "pigtail" for a 2.18-acre portion of the County's Bert Winters Park just west of the Town of Juno Beach.

Basin marsh, depression marsh, mesic flatwoods, mesic hammock and wet prairie are the predominant natural communities present on the site. Smaller areas of canal and berm, dome swamp, open water, sand and shell, strand swamp and wet flatwoods are also present. Thus far, 267 species of plants and 146 species of animals have been recorded on the site, including 7 plant and 21 animal species that have been listed as having some degree of endangerment by at least one governmental agency or have been ranked by the Florida Natural Areas Inventory.

The primary purpose for the acquisition of this natural area was to preserve, restore/enhance and manage the site's ecological resources, including the existing natural communities, their component plant and animal species, and local groundwater resources. Acquisition and development of the site as a natural area have provided the general public with opportunities for recreational activities, environmental education and scientific research which are consistent with the primary purpose of the site's acquisition. It also has helped the County comply with portions of its comprehensive plan.

Public use facilities have been constructed; the site opened to the public in March 2015. An accessible nature trail, hiking trails, an elevated boardwalk, wildlife observation platform, shade shelters with benches, canoe/kayak launch and trail, and kiosks with interpretive displays provide valuable opportunities for the public to observe and learn about the site's distinctive plant communities and associated animals, and to appreciate their biological uniqueness. Parking facilities and a bicycle rack are located in the north-central portion of the natural area. Access to the parking lot and bicycle rack is via Dyer Boulevard, west of Haverhill Road. A multi-use trail (pedestrian/bicycle), bicycle rack and pedestrian entrance will be provided along the eastern edge of the property as part of a roadway expansion project that is expected to be constructed in 2017.

The Winding Waters Natural Area is one of 25 natural areas, preserves and parks that are part of the Northeast Everglades Natural Area, a special place in northern Palm Beach County and southern Martin County that contains more than 165,000 acres of publicly-owned conservation lands and activity/education centers that will be connected through a system of greenways and trails. These sites provide a wide range of nature-based outdoor recreation activities.

This initial management plan: 1) identifies the existing natural resources, including rare and imperiled species and vegetation communities; 2) identifies factors that affect the preservation, restoration and long-term management of the existing resources; 3) addresses the site-specific goals, strategies and techniques that will be used to preserve, restore/enhance, manage and monitor the existing resources; 4) ensures that the natural area is managed in accordance with all applicable grant restrictions and management agreement conditions; and 5) identifies public recreational uses that may be accommodated without adversely affecting the site's natural resources. This management plan also includes: information related to the site's connectivity with other conservation areas, estimated capital costs, estimated annual management and maintenance costs, and any other issues identified by staff.

The management plan will be reviewed at least once every ten years by the County and updated as necessary on the basis of new information, improvements in management techniques or other relevant factors.

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1. INTRODUCTION

1.1 LOCATION AND DESCRIPTION

The Winding Waters Natural Area (natural area) is located in the northeastern portion of Palm Beach County (County) (Figure 1). The 562.4-acre natural area is located in the north-central portion of the City of West Palm Beach (City). The main portion of the natural area is bordered to the north by a short, unnamed east-west canal (hereinafter referred to as the “Northwest Canal”), Dyer Boulevard and the County’s Dyer Park; to the west by an unnamed north-south canal (hereinafter referred to as the “Turnpike Canal”), Florida’s Turnpike and the County’s main Solid Waste Authority (SWA) facility; to the south by the EPB-10 Canal, a Costco Wholesale distribution center, the Premier Park of Commerce, the Caribbean Villas and Cypress Run multifamily residential subdivisions, a small vacant property owned by the City of Riviera Beach, a small public water supply well property owned by the Riviera Beach Utility Special District, two small commercial properties and a daycare facility; and to the east by Haverhill Road, a vacant industrial property that is used for tractor trailer and metal scaffolding storage, the Turtle Cay multifamily residential subdivision, a portion of the EPB-9 Canal and the Lone Pine Estates single family residential subdivision. The linear, 4.1-acre “pigtail” portion of the natural area that lies just south of the EPB-10 Canal is bordered to the west by the Premier Park of Commerce; to the south by the County’s Gramercy Park; and to the east by Parke Avenue, the Cypress Run multifamily and Gramercy Park single family residential subdivisions, and three small City of Riviera Beach public water supply well properties. Conservation lands, parks and significant water bodies in vicinity of the Winding Waters Natural Area are shown in Figure 1.

The County owns approximately 548.1 acres of land within the natural area and manages an additional 14.3 acres (Figure 2). The County purchased 550.0 acres of the site in December 2001 with funds from the Palm Beach County Lands for Conservation Purposes Bond Issue Referendum of March 9, 1999. In 2010 the County swapped the 1.90-acre southern portion of the “pigtail” for a 2.18-acre portion of the County’s Bert Winters Park just west of the Town of Juno Beach. The land swap allowed the County’s Parks and Recreation Department to construct Gramercy Park, a small neighborhood park south of the Winding Waters Natural Area. In exchange an undeveloped portion of the Bert Winters Park was added to the County’s Juno Dunes Natural Area. The County also manages approximately 14.3 acres of land west of the natural area in accordance with a September 1, 2009 Interlocal Agreement between the County and Florida’s Turnpike Enterprise.

The natural area is composed of a variety of wetlands and landforms. In general, uplands within the site - mesic flatwoods, mesic hammock, sand/shell and wet flatwoods - exhibit very little relief. Wetlands within the natural area include: man-made basin marsh, depression marsh and open water communities, as well as naturally-occurring dome swamp, strand swamp and wet prairie communities. Ground elevations within the natural area, exclusive of the man-made wetland area, canals and berms, range from about 13.5 to 19.5 feet National Geodetic Vertical

Datum (NGVD) (Blak and McKenzie 2006). However, most ground elevations within the site are between 15 and 18 feet NGVD (Higgins Engineering, Inc. 2002).

Basin marsh, depression marsh, mesic flatwoods, mesic hammock and wet prairie are the predominant natural communities present on the site. Smaller areas of canal and berm, dome swamp, open water, sand and shell, strand swamp and wet flatwoods are also present.

The natural area contains important habitat for many rare plant and animal species. Thus far, 267 species of plants and 146 species of animals have been recorded on the site, including 7 plant and 21 animal species that have been listed as having some degree of endangerment by at least one governmental agency or have been ranked by Florida Natural Areas Inventory (FNAI). A list of plant species recorded at the site is provided in Appendix A and a list of animal species recorded at the site is provided in Appendix B. The listed plant and animal species recorded at the site are indicated in Tables 1 and 2, respectively. Definitions for the listing categories used by the agencies are provided in Appendix C.

1.2 PAST USES

All of the natural area has been modified by one or more past uses. Portions of the natural area have been modified by the creation of dirt trails, digging of borrow ditches, installation and maintenance of power lines, and unauthorized uses including off-highway vehicle (OHV) usage, dumping and camping. Most of the site was modified by past agricultural uses (primarily cattle grazing), and the entire site has been modified by drainage canals and nearby public water supply wells.

The first known localized alteration of the natural area was the creation of a few narrow dirt trails prior to 1940 (United States Department of Agriculture [USDA] 1940). These trails provided access to lands within and west of the natural area. Use of these trails appears to have ended prior to 1953; most of the pre-1940 trails were overgrown and indistinguishable in the 1953 aerial photograph (USDA 1953). Additional dirt trails – mostly related to use of the property for agricultural purposes - were created and abandoned between 1953 and 2001 when the property was acquired by the County. Although the creation and use of dirt trails within the natural area resulted in the loss of vegetation within their footprint, the trails appear to have had little impact on the site as a whole.

Another localized, but longer term impact to the natural area came from the creation of three borrow ditches. Between 1968 and 1969 two narrow, east-west borrow ditches were dug within the natural area, just south of Dyer Boulevard (Florida Department of Transportation [FDOT] 1968 and 1969). Fill from these borrow ditches (and from two similar borrow ditches within the present-day Dyer Park property) was used to create Dyer Boulevard. The western borrow ditch was approximately 2,500 feet in length; the eastern borrow ditch was approximately 250 feet in length. Between 1976 and 1981 the western borrow ditch was extended to the western edge of the natural area (Palm Beach County Property Appraiser 1976 and 1981). The western portion

of the extended borrow ditch currently connects the Turnpike Canal to the 155-acre created wetland. The eastern portion of the extended borrow ditch was filled in to allow for construction of the parking lot and entrance driveway. The short, eastern borrow ditch still exists today.

Between 1964 and 1968 a third borrow ditch was created immediately adjacent to an east-west ditch that would later become the EPB-9 Canal (FDOT 1964 and 1968). The removal of fill from this area significantly widened and deepened a 0.5-mile segment of the precursor of the EPB-9 Canal. It appears that most, or all, of the fill taken from this borrow ditch was used off site (FDOT 1968). This borrow ditch became part of the EPB-9 Canal in the early 1970s, but was filled in 2010 as part of the County's hydrological restoration project.

The installation and maintenance of electric power lines also caused localized impacts to the natural area. Between 1973 and 1978 Florida Power and Light (FPL) obtained two 12-foot-wide utility easements within and east of the eastern boundary of the Winding Waters Natural Area. Because the eastern boundary of the natural area is irregularly shaped, only a portion of these easements actually lie within the natural area. The rest of the easements are within the Haverhill Road right of way. Power poles and overhead power lines currently exist along the southern 683± feet of the eastern property boundary, and from about 590 feet south of the Dyer Boulevard southern right of way line to approximately to 790 feet south of the Dyer Boulevard right of way.

In 2010 the County granted a third easement to FPL to provide power to the newly-constructed EPB-10 Canal water control structure just north of the Costco property. This easement provided for the construction and maintenance of an underground power line from the northern portion of the "pigtail," north under the EPB-10 Canal to its northern bank, then west along the northern canal bank to the water control structure which located approximately 1,430 feet east of the western boundary of the natural area. This power line was constructed underground to avoid damage to the power line during prescribed burns and to help preserve the aesthetics of the area.

Unauthorized uses of the natural area, including OHV usage, illegal dumping and camping (by the homeless) also caused limited and localized impacts to the natural area. OHV usage occurred from the 1980s until the site's acquisition in 2001. Most of the impacts related to illegal dumping occurred around the perimeter edges of the natural area. Most of the impacts related to camping occurred in the southeastern portion of the natural area prior to and within the first few years of the site's acquisition by the County. Fencing of the natural area by the County, removal of abnormally-dense understory vegetation, increased efforts by the local police department and surveillance of the site by the County's Wildlands Task Force have virtually eliminated these unauthorized uses.

In addition to the localized impacts described above, most of the main portion of the natural area was modified by agricultural uses prior its acquisition by the County. Some of the uplands within the southeastern portion of the site and most of the uplands in the northeastern portion of the site were cleared of native vegetation between 1940 and 1953 (USDA 1940 and 1953). Vegetation cleared from the southeastern portion of the site was pushed into long north-south

windrows and left to decay on site; vegetation cleared from the northeastern portion of the site appears to have been removed from the site. After the vegetation was removed, soils within the northeastern portion of the site were then contoured to create hills and furrows. Historic aerials suggest that these cleared areas were used for pasture. By 1965 all of the uplands in the central portion of the site had been cleared for pasture (Palm Beach County Property Appraisers 1965). Over the next 30 years, various barns, sheds, livestock feeding stations, trailers, watering holes and fences were added, moved and removed by various tenants as part of their cattle grazing endeavors. Portions of the natural area that were not cleared and maintained as pasture were still affected by cattle which fed on the native vegetation, and whose droppings raised nutrient levels and helped spread nonnative seeds within the natural area.

All of the natural area has been and continues to be affected by regional drainage systems and adjacent public water supply wells. The first drainage structures constructed within or adjacent to the natural area were two ditches that were constructed between 1940 and 1953 (USDA 1940 and 1953). During this time narrow, east-west ditches were dug through the center of the main portion of the natural area (the precursor of the EPB-9 Canal) and just south of the main portion of the natural area (the precursor of the EPB-10 Canal). Fill was placed south of each of the ditches to form an earthen berm/road. At the time of their initial construction both of these ditches dead-ended at Military Trail approximately 0.5 mile east of the natural area. Because the ditches were not initially connected to a regional drainage system, only the wetlands that were immediately adjacent to the ditches were affected by their construction (USDA 1953).

Negative impacts to wetlands within the natural area increased significantly when the two east-west ditches were widened, deepened and connected to a positive outfall, and when the EPB-9A Canal was constructed in the north-central portion of the site. Between 1953 and 1964 the east-west ditch south of the main portion of the natural area (the present-day EPB-10 Canal) was widened and connected to the C-17 Canal approximately 1.5 miles east of the site (FDOT 1964, USDA 1953). This connection allowed excess water in the EPB-10 Canal to be discharged into Lake Worth, thereby providing positive outfall for the canal. This connection lowered ground water levels in the vicinity of the canal and resulted in the loss of many of the wetlands in the southern portion of the natural area.

Between 1969 and 1973 the EPB-9 Canal was extended eastward to connect with the EPB-10 Canal/C-17 Canal system (FDOT 1969 and 1973). This connection provided a positive outfall for the EPB-9 Canal and helped drain wetlands within the central portion of the site. Although a portion of the EPB-9 Canal had been previously widened and deepened to provide fill for offsite use, the rest of the canal wasn't widened or deepened until the mid 1970s (FDOT 1973 and 1975). During this same time frame the EPB-9 Canal was connected to the Turnpike Canal. This allowed excess surface waters from the Turnpike Canal and the Ironhorse Golf and Country Club to flow through the natural area before being discharged into Lake Worth.

Initially the borrow ditches south of Dyer Boulevard were not connected to a regional drainage system. This changed when the north-south EPB-9A Canal was constructed through the north-

central portion of the site between 1970 and 1973 (Palm Beach County Property Appraiser 1970 and 1973). The EPB-9A Canal connected the Dyer Boulevard borrow ditches and portions of the present-day Dyer Park property to the EPB-9 Canal. This connection resulted in the loss of nearly all of the wetlands within the northern portion of the site.

In addition to the impacts caused by the drainage canals, groundwater levels within the natural have been adversely affected by the operation of five public water supply wells east and southeast of the “pigtail” and just south of the main portion of the natural area. These wells have affected, and continue to affect, groundwater levels throughout the natural area. The ongoing use of these wells reduces groundwater levels within the entire natural area by 1 foot or more (County Ordinance 2014-039, as approved on November 18, 2014).

Agricultural uses and hydrological changes that occurred prior to the County’s acquisition allowed invasive/nonnative plant species to invade large portions of the site. Brazilian pepper (*Schinus terebinthifolius*) monocultures developed in the south-central portion of the site, whereas, melaleuca (*Melaleuca quinquenervia*) took over many of the former herbaceous wetland areas. These and other invasive/nonnative species were removed from the site as part of the County’s ongoing invasive/nonnative plant control program.

Although the “pigtail” portion of the natural area was acquired in 1985 by trustees for the MacArthur Liquidating Trust to provide direct vehicular access from the main portion of the natural area to 45th Street, it was never used for that purpose.

1.3 ADJACENT LAND USES

The natural area and all of the lands south and west of the natural area are located within the City’s municipal boundaries. The lands north and southeast of the site are in an unincorporated portion of the County, and lands east of the site are located within the City of Riviera Beach’s municipal boundaries. The entire natural area is designated “Conservation” on the City’s Future Land Use and Zoning Maps (City 2013a and 2013b, respectively). The “Conservation” designation is intended to protect important natural environmental features, including endangered and threatened species.

Both large-scale and localized impacts from adjacent roads, and adjacent and nearby commercial, industrial, residential, recreational and vacant properties are to be expected at the natural area. Impacts that have affected and continue to affect all or most of the natural area include invasion of the site by nonnative plant species via seeds produced by nonnative plants growing within adjacent road rights of ways and within adjacent and nearby commercial, industrial, residential, recreational and vacant properties; access to the site by OHVs; dumping; and animal mortality from vehicular traffic.

In addition to these impacts, localized to large-scale impacts may be caused by domestic cats (*Felis catus*) and/or dogs (*Canis lupus familiaris*) which originate from adjacent and nearby

residential, commercial and industrial properties. Feral/free-roaming cats and stray dogs can cause wildlife mortality. Efforts to mitigate for these impacts include an aggressive nonnative/nuisance animal control program, public outreach, volunteer and interpretive programs, and enforcement of the provision of the Palm Beach County Natural Areas Ordinance, as amended, (Chapter 11, Article XI of the Palm Beach County Code; <http://www.co.palm-beach.fl.us/erm/natural/naturalareaordinances.htm/>) regarding the prohibition of domestic animals and pets on the natural area. Domestic animals may be a problem at the natural area due to the large number of residential developments that surround the site.

Large-scale impacts to the natural area also have occurred and continue to occur as a result of the operation of four public water supply wells just east and southeast of the “pigtail” and one well just south of the main portion of the natural area. All of these wells are controlled by the City of Riviera Beach. The operation of these wells has, and continues to, lower groundwater levels within the natural area. The presence of the wells also places all portions of the natural area within one of four wellfield protection areas as established under the County’s Unified Land Development Code, Article 14 Chapter B, Wellfield Protection Ordinance. This ordinance regulates the use, handling, production and storage of substances such as solvents, gasoline, motor oil and pesticides within the designated wellfield zones.

1.4 USES THAT ARE NOT APPROPRIATE

Public uses on county natural areas such as the Winding Waters Natural Area are regulated by the Palm Beach County Natural Areas Ordinance (Natural Areas Ordinance) which has been adopted by the County’s Board of County Commissioners (BCC). The Natural Areas Ordinance restricts public uses within a county-managed natural area to those that are compatible with the perpetual preservation and protection of the natural area. This ordinance permits passive recreational activities such as hiking, nature study and photography. Other uses (for example, fishing, canoeing/kayaking, horseback riding and/or bicycling in areas that have been designated for such uses, environmental education and scientific research) are permitted as long as they do not jeopardize the protection of the existing natural resources. The Natural Areas Ordinance prohibits destructive uses such as OHV use and dumping, and requires special permits for camping, horseback riding, scientific research involving collection of plant and animal specimens or the use of watercraft in wetlands, and nighttime use of the natural area. Except for service animals, no dogs, cats, or other domestic animals are permitted on the natural area. The ordinance also prohibits damaging, taking, molesting, trapping, hunting and/or poaching of plants and animals.

There are no plans for any concessions to be located on the site, nor are there plans to allow horseback riding on the natural area. There are sufficient retail businesses in the vicinity of the natural area to supply services normally provided by concessionaires. Horses are not permitted on the site due to the rare status of the basin marsh natural community and the sensitivity of the rare and endangered plant and animal species - both of which would be negatively impacted if

equestrian use were permitted on the site - and due to the high potential for soil erosion and the naturally wet condition of the site.

Catch and release fishing is allowed in designated areas on the site. Any fish that are caught must be released on the site to provide foraging resources for wildlife and help maintain a viable game fish population.

Canoeing and kayaking is allowed on the site, but no motorized boating is allowed because of the desire to provide nesting and/or roosting areas for rare and endangered species of birds and the shallow depth of the existing wetlands and waterbodies.

Primitive camping will be allowed on a seasonal basis (October 1 through January 30) at a designated campsite that will be constructed on one of the islands at the natural area; use of this campsite will be prohibited the remainder of the year to avoid potential impacts to nesting birds. Persons wishing to camp on the natural area will be required to apply for and obtain a specific use permit before using the designated camp site. Permitted campers must provide their own canoes or kayaks to access the designated campsite.

Camping is prohibited year-round in all other portions of the natural area due to the rare status of the basin marsh natural community and the sensitivity of the rare and endangered plant and animal species - both of which could be negatively impacted if camping was permitted on the remainder of the site - and due to the naturally wet conditions within the site.

No vehicles (for example, OHVs, skateboards, etc.) are permitted beyond the designated parking lot/trailhead, except to perform the monitoring, maintenance and land management activities described in this management plan, and except as authorized by the County's Access Policy for Use of Natural Area Trails and Other Public Use Facilities by Persons with Mobility Disabilities. Bicycle usage is prohibited within the site except on a multi-use trail that will be constructed along the eastern edge of the natural area as part of the Haverhill Road widening project. No drones are permitted within the natural area, except to assist with the management and monitoring activities described in this management plan or as may be permitted for scientific research.

1.5 OUTPARCELS

There are no outparcels adjacent to the natural area that would be suitable for acquisition. All of the lands immediately adjacent to the natural area have already been developed for public, industrial, commercial, residential, recreational or transportation purposes.

Although the 4.1-acre "pigtail" is currently considered part of the natural area, it has no practicable conservation or greenway purpose. Vegetation within the "pigtail" is dominated by invasive/nonnative and ruderal species; only a few scattered native species still exist. The long, narrow configuration of the "pigtail," and the fact that it is isolated from the rest of the natural

area would make securing, managing and maintaining the 4.1-acre site a relatively expensive undertaking. Since the “pigtail” acts as a seed source for invasive/nonnative plant species and as an attractive nuisance for dumping and other illegal activities, ERM will consult with other governmental entities to see if there is a more appropriate use for these 4.1 acres of land.

1.6 MANAGEMENT CONSTRAINTS

The most significant management constraint on the natural area is the requirement to protect rare and endangered plants, animals and ecosystems. To ensure that this happens, the entire site is managed under constraints imposed by the County’s Natural Areas Ordinance (see Section 1.4). In addition, once this management plan has been formally approved ERM will work with the South Florida Water Management District (SFWMD) to develop a conservation easement over the County-owned portion of the natural area to provide additional long-term protection to the site.

Other significant management constraints are related to the site’s ownership, and to grants and agreements which helped the County develop and restore the site. Management of the 14.3-acre “Turnpike-owned” property (Figure 2) is constrained by the conditions included in a 50-year-term Interlocal Agreement with Florida’s Turnpike Enterprise (see Section 1.7). Management activities on certain portions of the County-owned property are restricted by a Florida Department of Environmental Protection (FDEP) Recreational Trails Program (RTP) trail facilities development grant, a U.S. Natural Resources Conservation Service (NRCS) environmental/hydrological restoration grant and a restoration Interlocal Agreement with Northern Palm Beach County Improvement District (NPBCID). The RTP trail facilities funding agreement and associated “Notice of Limitation of Use/Site Dedication” require that a 533.8-acre portion of the County-owned property be managed and maintained, in perpetuity, as a public outdoor recreational area (see Section 1.7 and Appendix D). The NRCS grant agreement requires that the project area be managed and maintained in its restored condition for a minimum of 10 years (see Sections 1.7 and 4.3.4). The restoration Interlocal Agreement with NPBCID requires the County to provide free and uninterrupted flow, and positive outfall for excess surface waters from the Turnpike Canal, through a portion of the created wetland in exchange for permission to fill in portions of the EPB-9 and EPB-9A Canals (see Section 1.7).

Management of the entire natural area also is regulated by the County’s Unified Land Development Code, Article 14 Chapter B (Wellfield Protection Ordinance) due to the proximity of the City of Riviera Beach’s water supply wells. This ordinance is highly compatible with, and supportive of, natural areas best management practices which prohibit/limit the production and storage, and restrict the use and handling of the same substances regulated by the Wellfield Protection Ordinance (substances such as solvents, gasoline, motor oil and pesticides).

The size, shape and location of the natural area do not restrict certain management activities such as invasive/nonnative vegetation removal or upland restoration activities. These factors do, however, limit what can be done on the site relative to the reintroduction of fire and the

hydrologic restoration of wetland areas. The site's proximity to the CSX railroad tracks, Florida's Turnpike, the Veterans Affairs Medical Center, Haverhill Road, Dyer Park, and residential, commercial and industrial areas severely limit the options for prescribed burning. The site's proximity to the City of Riviera Beach's water supply wells and the EPB-10 Canal, and the need to maintain adequate flood control for adjacent developed lands limit what can be done to restore the hydrology of the site.

1.7 EASEMENTS, CONCESSIONS, LEASES AND OTHER ENCUMBRANCES

There are eight permanent easements, three interlocal agreements, one grant award restriction, one "Notice of Limitation of Use/Site Dedication," one taxing authority that has the right to levy assessments over the natural area and one designation agreement that currently restrict the use of, or benefit, the natural area. All other easements and restrictions, including the EPB-9 and EPB-9A Canal right of ways, a 1991 "Retention Pond and Drainage Easement Agreement" and a 2001 "Temporary Construction Easement and Agreement for Fill Mining and Wetlands Restoration" are no longer in effect. There are no concessions or leases that affect the natural area.

Easements that affect the natural area include one flowage easement, one water management easement, one access easement, one canal right of way easement, one canal maintenance easement and three recorded utility easements.

In 2009 the County granted a 120-foot-wide flowage easement to NPBCID, in exchange for the relinquishment of NPBCID's easement rights over those portions of the EPB-9 and EPB-9A canals that were within the natural area. The flowage easement runs east from the northwest corner of the natural area, along the Northwest Canal, to the northern end of the former EPB-9A Canal (Figure 5). The flowage easement then follows the canoe/kayak trail within the eastern portion of the created wetland. The flowage easement terminates at the EPB-10 Canal outflow structure in the southeastern portion of the natural area (Figure 5).

The County also granted a water management easement to NPBCID in 2009. The water management easement includes a 25-foot by 73-foot easement area in the northwest corner of the natural area. This area allows NPBCID to maintain a water control structure that lies within that easement area. The water management easement also allows NPBCID to access a 25-foot-wide area along the north bank of the EPB-10 Canal for the purposes of constructing, managing, maintaining and inspecting berms, water control structures and other facilities associated with its water management system.

SWA holds a 60-foot-wide, non-public, access easement along the western boundary of the County-owned portion of the natural area. The easement runs from the northwest corner, south to the northern right of way for the former EPB-9 Canal. The purpose of this easement is to provide access from the former Dyer Landfill (now Dyer Park) to the SWA facility west of the Florida Turnpike via a box culvert that lies under the Florida Turnpike ("Dyer-SWA access road").

NPBCID holds two easements that affect the northern portion of the “pigtail” tract. The first easement is a 50-foot-wide, east-west canal right of way easement that lies just south of the northern boundary of the “pigtail” tract; the second is an 18-foot-wide, east-west canal maintenance easement that lies just south of the first easement area. These easements were established to allow for the construction and maintenance of the EPB-10 Canal.

Florida Power & Light Company (FPL) holds three recorded easements which affect the natural area. The first is a 12-foot-wide utility easement that extends from the southern right of way for Dyer Boulevard, south to the EPB-10 Canal. Since the western edge of the easement is 102 feet west of the eastern section line and the distance between the eastern boundary of the site and the section line ranges from 90 to 108 feet, only a portion (approximately 900 linear feet) of this easement lies within the natural area. The second FPL easement covers a north-south, 12-foot-wide by 305-foot-long area that is just inside the northeastern border of the site. The purpose of both of these easements is for the construction, operation and maintenance of electrical utility facilities which benefit nearby properties.

The third easement was granted to FPL by the County in 2010. The purpose of this non-exclusive easement was to allow FPL to construct, operate and maintain underground electrical facilities designed to power the remote-controlled water control structure located within the EPB-10 Canal and north of the Costco facility. This easement is contained within a previously designated, non-exclusive water management easement area that was granted to NPBCID by the County in 2009.

In 2005 the BCC approved a resolution establishing a standard form conservation easement to be placed over all county-owned natural areas (R2005-1770). This conservation easement provides a level of protection that is not affected by the retirement of county or state conservation bonds. It limits improvements to those that support land management activities and recreational opportunities that have little or no impact on natural resources. It also allows for the removal/eradication of nonnative and nuisance plants and animals, and the implementation of environmental restoration/enhancement projects. The County will grant a standard form conservation easement over the main portion of the natural area to the SFWMD after the management plan has been approved by the BCC.

In 2008 the County entered into an Interlocal Agreement with SWA for the supply of fill material excavated from the Winding Waters wetland creation project. Under the initial agreement, the County agreed to sell and SWA agreed to purchase approximately 1,400,000 cubic yards of fill at a predetermined price. In 2010 the agreement was amended to allow SWA to purchase additional fill generated by the Winding Waters wetland creation project. Ultimately just over 1.567 million cubic yards of fill were sold to SWA. The sale of this fill helped pay for the wetland creation, hydrological restoration and native restoration planting/seeding projects. It also helped pay for the initial removal of invasive/nonnative vegetation and the onsite relocation of native trees and palms.

Then in 2009 the County entered into an Interlocal Agreement with NPBCID which provided the process under which the County granted a flowage easement and water management easement to NPBCID in exchange for the right to fill in the EPB-9 and EPB-9A Canals. Implementation of the Interlocal Agreement allowed the County to hydrologically restore the main portion of the natural area and create the large central wetland area. The Interlocal Agreement also provided for the construction of three water control structures designed to raise water levels within the main portion of the natural area, and to transfer ownership and maintenance responsibilities for two of the structures to NPBCID following their construction. Descriptions of the flowage and water management easements are provided above.

The 14.3-acre Turnpike-owned property (Figure 2) is managed by the County pursuant to a September 1, 2009 Interlocal Agreement between the County and Florida's Turnpike Enterprise (Appendix E). This Interlocal Agreement allowed the County to clean out and recontour the Turnpike Canal, and eliminate the EPB-9 Canal through the center of the natural area. In exchange, the County agreed to create two new drainage connections for the Turnpike Canal – one which connected the Turnpike Canal to the created wetland via the Northwest Canal and one which connected the Turnpike Canal to the EPB-10 Canal southwest of the main portion of the natural area (Figure 5). As part of the agreement the County agreed to accept untreated stormwater from the Florida Turnpike right of way and to route this stormwater through the created wetlands within the natural area before allowing these waters to ultimately discharge to the EPB-10 Canal. The Interlocal Agreement also allows the County to remove invasive/nonnative vegetation and nonnative/nuisance animals, and manage the strip between the County-owned property and the Turnpike Canal as part of the natural area. This agreement is scheduled to expire on September 1, 2059 unless otherwise terminated or extended.

One maintenance requirement and one “Notice of Limitation of Use/Site Dedication” have been placed over portions of the natural area in accordance with grant funding requirements. Restoration improvements within an approximate 544-acre portion of the natural area must be maintained at least until June 10, 2021 pursuant to a Restoration Cost-share Project Agreement between NRCS and the County (see Section 4.3.4). In addition, a 533.8-acre portion of the site has been dedicated as an outdoor recreational site for the use and benefit of the general public (Appendix D). This dedication ensures that trail facilities constructed using Recreational Trails Program funds and the lands that those facilities benefit will be available to the general public for recreational uses, in perpetuity.

The natural area is located within the boundaries of the NPBCID and as such is subject to assessments related to improvements that positively affect the natural area. NPBCID currently levies an annual assessment of approximately \$25,000 against the natural area for benefits provided by the improvement district.

The last encumbrance on the Winding Waters Natural Area is a 20-year-term Florida Greenways and Trails Designation Agreement (Designation Agreement) that was voluntarily placed by the

County over a 534-acre area in the main portion of the natural area in April 2013 (see Section 4.7). The Designation Agreement requires the County to preserve, enhance, restore, create, manage, maintain and/or operate the site's natural and public passive recreational resources. The County may remove the natural area from the designation program at any time by submitting a written request to FDEP.

1.8 PLAN DEVELOPMENT AND REVIEW

The main goal of this management plan is to help ensure that the site's natural resources are protected in perpetuity. Scientific research, environmental education, and resource-based recreational uses are permitted as long as they do not jeopardize the protection of these resources. In keeping with these goals, this management plan: 1) identifies the existing natural resources, including rare and imperiled species and vegetation communities; 2) identifies factors that affect the preservation, restoration and long-term management of the existing resources; 3) addresses the site-specific goals, strategies and techniques that will be used to preserve, restore/enhance, manage and monitor the existing resources; 4) ensures that the natural area is developed and managed in accordance with applicable grant restrictions; and 5) identifies public recreational uses that may be accommodated without adversely affecting the site's natural resources. This management plan also includes: information related to the site's connectivity with other conservation areas, an estimation of capital costs (costs related to the construction the proposed public use facilities, fencing, signage, and any restoration projects), an estimation of annual management and maintenance costs, and any other issues identified by staff.

All draft natural areas management plans prepared by ERM are reviewed by a seven-member, BCC-appointed, advisory committee known as the Natural Areas Management Advisory Committee (NAMAC). The purpose of NAMAC is to review and comment on draft management plans developed for natural areas acquired and/or managed by the County, and to hold public hearings on initial management plans prior to their review and adoption by the BCC. As development of each draft management plan nears completion, NAMAC members are invited to tour the natural area with staff. All comments received from NAMAC members during the site visit are taken into consideration during completion of the draft management plan. The draft management plan is then sent to NAMAC for review and comment. The draft management plan also is posted on the ERM website for public review and comment.

Members of the public were invited to comment on this draft management plan at the (month day year) regularly-scheduled meeting of NAMAC when the plan was initially discussed by the committee. The members of NAMAC held a publicly-noticed open house/public hearing on the draft management plan on (month day year) at (identify location – city hall, library, etc.) in (identify appropriate city/town/unincorporated Palm Beach County) (Appendix F). A copy of the draft management plan was available through ERM's website for a minimum of 30 days prior to the open house/public hearing.

Members of the public were allowed to submit comments to the County during the public hearing, in writing during the one-week period following the public hearing and at the (month day year) meeting of NAMAC. A summary of the received comments is included as Appendix F. NAMAC members took those comments into consideration prior to forwarding the draft management plan to the BCC with a recommendation that it be approved. OR No comments were received during the public review process. Members of the public also had the opportunity to comment on the plan on (month day year) when it was considered and approved by the BCC.

Work will begin in 2026 on the next update of the management plan.

1.9 SITE ACQUISITION HISTORY

In 1998 ERM and the County's Environmentally Sensitive Lands Acquisition Selection Committee (ESLASC) identified 39 environmentally-sensitive sites that were to be targeted for acquisition with funds from the proposed \$150 million Land Acquisition for Conservation Purposes Bond Referendum. The 753-acre "SWA Buffer" site, which included the present-day Winding Waters Natural Area, was one of these sites. At the time of the referendum's passage on March 9, 1999, a 550-acre portion of the SWA Buffer site was owned by the MacArthur Foundation and its associated Florida companies - MacArthur Holding B, Inc. and Hartsel Ranch Corporation. Unfortunately, the MacArthur companies sold the 550-acre tract (including most of the present-day natural area) to the Communities Finance Company (CFC) before the County could negotiate a deal to purchase the property for preservation. The remainder of the SWA Buffer was either lost to development and/or use as stormwater ponds between 2000 and 2010, or is in public ownership.

Because of its proximity to an active and former County landfill, CFC realized that the natural area property had a relatively low potential for development. In order to maximize its benefits from the property, CFC offered to sell the site to the County at a discount with the stipulation that CFC be allowed to mine up to 3.2 million cubic yards of fill from a 152-acre highly-disturbed portion of the site. The fill would be used to increase the value of other CFC-owned properties. Although the natural area had been adversely impacted by past agricultural usage, invasive/nonnative plant invasions and drainage impacts from canals, the County was willing to consider its acquisition because of the potential for wetland restoration/creation. Ultimately a deal was worked out in which CFC would remove fill from the site in a manner that would create a deep-water lake and wetland creation area within the agriculturally-altered portions of the site.

An Agreement for Sale and Purchase, and a two-phase "Temporary Construction Easement and Agreement for Fill Mining and Wetland Restoration" were executed by the County and CFC in November 2001. In December 2001 the County purchased the 550.01-acre natural area from CFC for \$6,950,553 (approximately 80 percent of the average of two appraisals). NAMAC subsequently renamed the site the "Winding Waters Natural Area" because of the shape of the proposed wetland restoration/creation project.

Although CFC consultants submitted permit applications for the proposed wetland restoration/creation project in 2000, CFC missed both the May 1, 2002 commencement deadline and the May 1, 2004 completion deadline for the first phase of excavation. In 2005, CFC asked to be released from all of the obligations included in the Temporary Construction Easement and Agreement for Fill Mining and Wetland Restoration. The County agreed to release CFC from its obligations in exchange for the donation of several parcels within or adjacent to other natural areas. The construction easement/fill mining/wetland restoration agreement between the County and CFC was terminated in September 2005; in March 2006 CFC donated approximately 60.9 acres in or near six natural areas to the County as part of the termination agreement.

In 2009 the County acquired management rights over the 14.3-acre Turnpike-owned property (Figure 2). This property is managed by the County pursuant to an Interlocal Agreement with Florida's Turnpike Enterprise (see Section 1.7 and Appendix E).

In September 2010, ERM turned over management responsibility for the southernmost 1.9 acres of the "pigtail" to the County's Parks and Recreation Department and accepted management responsibility over a 2.18-acre undeveloped portion of Bert Winters Park adjoining the Juno Dunes Natural Area. This exchange was completed in accordance with the County's Conservation Lands Protection Ordinance (No. 2003-052).

2. PURPOSE AND OBJECTIVES

2.1 PURPOSE OF ACQUISITION

The primary purpose of the County's Natural Areas System is to protect native ecosystems and biological diversity throughout Palm Beach County. The primary purpose for the acquisition of this natural area was to preserve, restore/enhance and manage the site's ecological resources, including the existing natural communities, their component plant and animal species, and local groundwater resources. Acquisition and development of the site as a natural area have provided the general public with opportunities for recreational activities, environmental education and scientific research which are consistent with the primary purpose of the site's acquisition. It also has helped the County comply with portions of its comprehensive plan by preserving and restoring/enhancing the natural resources of the natural area, while providing compatible public uses. All portions of the natural area lying north of the EPB-10 Canal are important to preserving ecological resource values of the site. Because the area north of the EPB-10 Canal provides habitat for at least one rare or endangered plant species, animal species or natural community, there are no portions of the main tract that can be declared as surplus. The 4.1-acre "pigtail" portion of the site contains no viable native habitat and is separated from the main portion of the natural area by the EPB-10 Canal; the "pigtail" could be declared surplus if another public use was identified for the 4.1-acre area.

2.2 MANAGEMENT GOALS AND OBJECTIVES

The natural area contains basin marsh, depression marsh, dome swamp, mesic flatwoods, mesic hammock, strand swamp, wet flatwoods and wet prairie native vegetation communities (Figure 3). The communities, most of which can be considered as moderate-quality within the context of urbanized southeastern Florida, were in a degraded condition at the time of site acquisition. Maintaining and improving the ecological quality of these native vegetation communities is one of the primary management goals for this site. Another primary goal is to restore, enhance and/or management disturbed areas in a manner that will enhance the overall biological diversity of the site and/or meet specific needs of listed species. Habitat for listed species will be managed for the needs of individual species when such management is compatible with the overall management of the ecosystems within the natural area.

The following goals and objectives reflect desired management outcomes that are specific to the Winding Waters Natural Area. The objectives are actions or measureable outcomes of management targeted to achieve either short-term goals (achievable within 2 years) or long-term goals (achievable within 10 years). All of the following goals and objectives are subject to and contingent upon annual budgetary funding and appropriations by the BCC.

Habitat Restoration and Improvement

- Goal 1. Maintain and enhance healthy mesic flatwoods and wet flatwoods natural communities (short-term and long-term).
- Objective A. Conduct prescribed burns within Management Units 2, 3, 5, 6 and 7 (Figure 4) at 5- to 8-year intervals to maintain the mesic flatwoods and wet flatwoods communities on the site.
 - Objective B. Follow the burn schedule provided in Section 4.3.1 and accelerate the schedule if weather conditions, funding opportunities and resources allow.
 - Objective C. Implement mechanical vegetative reduction of mesic flatwoods and wet flatwoods habitat at least once every 5 to 8 years if fuel levels, and smoke management and safety concerns result in extremely limited or unattainable prescribed burn conditions.
- Goal 2. Maintain and enhance healthy herbaceous wetland communities (short-term and long-term).
- Objective A. Conduct prescribed burns within Management Unit 1 at 2- to 3-year intervals to maintain the wet prairie community on the site.
 - Objective B. Conduct prescribed burns within Management Unit 8 at 5- to 8-year intervals to maintain the basin marsh and depression marsh communities on the site.
- Goal 3. Monitor and replant restored freshwater wetland and upland habitats to ensure that they contain at least 80 percent coverage by appropriate native vegetation within 5 years of completion of the restoration project (short-term). The only exception to this would be areas designed as deep water refugia/open water areas.
- Objective A. Monitor restored areas to ensure that they are recolonized by appropriate native vegetation.
 - Objective B. Conduct nonnative vegetation removal/treatment and/or replanting activities as needed to ensure that all restored areas meet the stated goal.

Imperiled Species Habitat Maintenance, Enhancement, Restoration, or Population Restoration

- Goal 1. Protect, restore/enhance and maintain imperiled species habitat (short-term and long-term).
- Objective A. Conduct prescribed burns in accordance with the schedule provided in Section 4.3.1 to maintain the diversity and health of the plant communities on the site.
 - Objective B. Monitor the status of imperiled plant species populations in accordance with species-specific monitoring schedules established by ERM.
 - Objective C. Conduct annual migratory and nonmigratory wildlife species surveys, and ongoing opportunistic surveys for all wildlife species observed on the natural area. Special care shall be taken to record all sightings of imperiled species.
 - Objective D. Enforce relevant provisions of the Natural Areas Ordinance, such as those dealing with damage to or removal of plants, molestation or harassment of animals, introduction or release of nonnative plants and animals, and prohibition of domestic animals and pets.

Nonnative, Invasive and Nuisance Species Maintenance and Control

- Goal 1. Control nonnative and invasive plant species, and nonnative and nuisance animal species so that they do not significantly impact native communities (short-term and long-term).
- Objective A. Maintain coverage of invasive/nonnative plant species at less than 1 percent of the natural area by conducting annual invasive/nonnative plant treatments.
 - Objective D. Monitor the site for feral hogs (*Sus scrofa*), domestic and feral cats, coyotes (*Canis latrans*), raccoons (*Procyon lotor*) and other nonnative/nuisance animals during opportunistic observations and scheduled wildlife monitoring surveys, and remove/control populations of nonnative/nuisance animals as necessary and feasible.

Hydrological Preservation and Restoration

Goal 1. Evaluate the success (short-term and long-term) of the hydrological restoration project.

Objective A. Monitor water levels within the restored portion of the site and compare the results with pre-project levels.

Objective B. Monitor vegetation within the restored freshwater wetlands to see if the vegetation within these wetlands begins to resemble what is found in similar, nearby intact wetlands.

Capital Facilities and Infrastructure

Goal 1. Maintain the existing facilities and infrastructure in safe condition (short-term and long-term).

Objective A. Monitor the integrity and condition of facilities on a regular basis, including the parking lot, concrete nature trail, hiking trails, kiosks, signs, elevated boardwalk, wildlife observation platform, bike rack, fencing and gates.

Objective B. Close unsafe areas to the public immediately upon the detection of a problem.

Objective C. Replace/repair damaged fencing and signage as soon as possible.

Objective D. Replace/repair minor cracked/damaged infrastructure issues within six months of detection, contingent upon receipt of any necessary permits, construction contract requirements, site conditions and/or budgetary funding and appropriations by the BCC.

Objective E. Replace/repair major cracked/damaged infrastructure issues within one year of detection, contingent upon receipt of any necessary permits, construction contract requirements, site conditions and/or budgetary funding and appropriations by the BCC.

Goal 2. Maintain the overall appearance and aesthetics of the natural area (short-term and long-term).

Objective A. Maintain public use facilities (cleaning of concrete nature trail, boardwalk, parking lot, etc.) on a biweekly or as-needed basis.

Objective C. Mow management accessways and firebreaks on an as-needed basis.

Objective D. Paint over or remove graffiti from public use facilities on an as-needed basis.

Public Access and Recreational Opportunities

Goal 1. Continue to provide non-consumptive/non-destructive, resource-based public access and recreational opportunities within the natural area (short-term and long-term).

Goal 2. Provide additional public access and resource-based recreational opportunities at the natural area (short-term).

Objective A. Construct a multi-use trail (pedestrian/bicycle), and install a pedestrian gate and bike rack along the eastern edge of the site in 2017.

Security

Goal 1. Implement appropriate security and access control measures to prevent unauthorized activities, such as use by OHVs, dumping and off-trail use (short-term and long-term).

Objective A. Install and maintain a fence and gate system which is designed to limit public vehicular access to the designated parking lot, eliminate dumping on the site and limit bicycle use to the proposed multi-use trail.

Objective B. Install and maintain signage to identify the site as a natural area and to inform the public as to the uses and activities that are permitted and not permitted on the site.

Objective C. Subject to funding appropriations from the Board of County Commissioners, continue to fund the Wildlands Task Force to enforce the Natural Areas Ordinance, as amended.

Objective D. Subject to funding appropriations from the Board of County Commissioners, provide annual training sessions designed to educate local law enforcement officers about County ordinances related to the protection of natural areas and site-specific security issues.

3. NATURAL AND CULTURAL RESOURCES

The Winding Waters Natural Area contains a remnant of the native upland and wetland communities formerly present in southeastern Florida. Agriculture, urbanization, road and railroad construction, hydrologic modifications, fire suppression and other human-related disturbances have eliminated or severely modified most of the native upland and wetland communities near the natural area. The site's natural communities currently represent a mosaic of historical, successional and altered vegetation communities.

A thorough inventory and assessment of the existing natural resources had to be conducted before meaningful management goals and objectives could be developed for the natural area. The following sections summarize the site's existing natural resources. Disturbances which have affected, and/or continue to affect, these natural resources also are identified. Restoration, enhancement and management activities designed to mitigate for adverse impacts to the site's natural resources are described in Chapters 4 and 5. A discussion of the archaeological and historical resources is provided in Section 3.6.

Both the scientific and common names of plant and animal species are provided the first time the species is mentioned in this management plan. After the initial reference, only the common name is used. A list of the plants and animals recorded at the natural area are provided in Appendixes A and B, respectively.

3.1 HYDROLOGY

The Winding Waters Natural Area was once part of a pine flatwoods/shallow freshwater wetland mosaic (Davis 1943). The mosaic was bounded to the east by a broad cypress forest/sawgrass marsh area that drained to the north and northeast into the Lake Worth Lagoon, and to the west by the Loxahatchee Slough which ultimately drained into the Loxahatchee River. Surface water flows within the mosaic depended on elevation, with some areas draining eastward into the cypress forest/sawgrass marsh area and some areas draining westward into the Loxahatchee Slough. Based on aerial photographs and Light Detection and Ranging (LiDAR) survey data it appears that water levels within natural area wetlands were historically around 16.5 feet NGVD (Blak and McKenzie 2006, USDA 1940 and 1953).

The first drainage structures to affect the natural area were constructed between 1940 and 1953 (USDA 1940 and 1953). During this time, east-west drainage ditches were dug through the center of the main portion of the natural area and just south of the main portion of the natural area. These ditches later became part of the EPB-9 and EPB-10 canals, respectively. Fill was placed south of each of the ditches to form an earthen berm/road. This berm/road blocked surface water flows to and from areas south of the ditches. When they were initially constructed, both ditches dead-ended at Military Trail approximately 0.5 mile east of the natural area. Because the ditches were not connected to a regional drainage system, only those wetlands lying immediately adjacent to one of the ditches were affected by their construction (USDA 1953).

Negative impacts to wetlands within the natural area increased significantly when the two east-west ditches were widened, deepened and connected to a positive outfall, and when the EPB-9A Canal was constructed in the north-central portion of the site. Between 1953 and 1964 the precursor to the EPB-10 Canal was widened and connected to the Lake Worth Lagoon via the C-17 Canal (FDOT 1964, USDA 1953). This lowered the control elevation of the EPB-10 Canal to 9 feet NGVD (Tomasello Consulting Engineers, Inc. 2000). The difference between water levels within natural area wetlands and the EPB-10 Canal, combined with the operation of wellfields south of the canal, resulted in the loss of many of the wetlands along the southern perimeter of the natural area.

Between 1969 and 1973 the EPB-9 Canal was extended eastward to connect with the EPB-10/C-17 canal system (FDOT 1969 and 1973). This connection lowered the control elevation of EPB-9 Canal to 9 feet NGVD (Tomasello Consulting Engineers, Inc. 2000). It also provided a positive outfall for the EPB-9 Canal and helped drain wetlands within the central portion of the site. The portion of the EPB-9 Canal lying within the natural area was widened and deepened by the mid 1970s, and the western portion of the canal was extended to connect with the Turnpike Canal (FDOT 1973 and 1975). This connection provided a positive outfall for both the Turnpike Canal and the Ironhorse Golf and Country Club; excess surface waters from the Turnpike Canal flowed through the natural area via the EPB-9 Canal and eventually discharged into the Lake Worth Lagoon.

The north-south EPB-9A Canal was constructed through the north-central portion of the natural area between 1970 and 1973 (Palm Beach County Property Appraiser 1970 and 1973). The EPB-9A Canal connected the present-day Dyer Park property and wetlands within the north-central portion of the natural area to the EPB-9 Canal. This connection resulted in the loss of nearly all of the wetlands within the northern portion of the natural area. The control elevation of the EPB-9A Canal was 9.0 feet NGVD (Tomasello Consulting Engineers, Inc. 2000).

Between 1968 and 1969 two narrow, east-west borrow ditches were dug within the natural area, just south of Dyer Boulevard (FDOT 1968 and 1969). Initially these borrow ditches were not connected to a regional drainage system. This changed when the north-south EPB-9A Canal was constructed through the north-central portion of the site. Between 1976 and 1981 the western borrow ditch was extended to the western edge of the natural area in an effort to drain wetlands in the northwestern portion of the site (Palm Beach County Property Appraiser 1976 and 1981).

These man-made structures lowered groundwater levels within the site by approximately 3 to 6 feet and resulted in the loss of nearly all of the natural wetlands on the site by the early 1980s (Tomasello Consulting Engineers, Inc. 2000, Palm Beach County Property Appraiser 1981). Only one natural wetland – a disturbed dome swamp in the northeastern portion of the site – existed at the time of the site's acquisition by the County (Figure 3). The Turnpike Canal, the northwest ditch, and the EPB-9, EPB-9A and EPB-10 canals were the only water bodies within or adjacent to the natural area in 2001.

Between 2009 and 2010, a wetland creation project was conducted on the natural area to create a depression marsh/basin marsh community that was designed to hold water year-round. As part of that project, the portion of the EPB-9 Canal that was located within the boundaries of the natural area and all but the northernmost portion of the EPB-9A Canal were backfilled (Figure 5). Excess waters from the Ironhorse development and Turnpike Canal were rerouted to flow through the Northwest Canal and into a portion of the created wetland project; the discharge point for the natural area was changed from the EPB-9 Canal to the EPB-10 Canal. A hydrological restoration project that was constructed concurrent with the wetland creation project raised the control elevation of the main portion of the natural area from 9.0 to 13.5 feet NGVD. This project helped increase hydroperiods within some of the former wetland areas. Additional information regarding the wetland creation and hydrological restoration projects, and the water control and other structures is provided in Sections 4.3.4 and 5.5, respectively.

3.2 NATURAL COMMUNITIES

The following discussion provides a general description of each of the “intact” and altered (“disturbed”) plant communities present on the natural area - basin marsh, canal and berm, depression marsh, dome swamp, mesic flatwoods, mesic hammock, open water, sand and shell, strand swamp, wet flatwoods and wet prairie (Figure 3). Unless otherwise indicated, the descriptions provided for intact communities are based upon the FNAI classification system (FNAI 2010). If a community is so altered that it no longer resembles or functions as an intact plant community, an alternative description has been developed. The phrase “natural community” is used in this plan, even when a plant community has been altered. A list of the typical plant species found in Palm Beach County is provided for each of the intact plant communities found on the site; these lists are based on information contained in FNAI 2010 and on species ranges provided in Wunderlin and Hansen 2011.

The goal of natural communities management is to restore and maintain as many of the natural communities that historically occupied the site as possible. Nearly all of the natural communities on the natural area have been enhanced or restored (see Section 4.3). They will be maintained through the implementation of invasive/nonnative plant and nonnative/nuisance animal control programs (see Sections 4.3.2 and 4.3.3), through the closure of all old OHV trails that are not part of the management accessway/firebreak system, through security measures designed to eliminate OHV use and dumping (see Section 4.5), and through the maintenance of more natural hydroperiods. Fire-maintained communities - basin marsh, depression marsh, dome swamp, mesic flatwoods, wet flatwoods and wet prairie - also will be maintained through the implementation of a prescribed burn program and/or through mechanical vegetation reduction (see Section 4.3.1).

The only area that lacks a natural community is the “developed area” (Figure 3). This 0.8-acre area includes the parking lot and entrance driveway.

3.2.1 Basin Marsh

Basin marshes are regularly inundated, isolated or mostly isolated freshwater herbaceous wetlands situated in a relatively large basin, usually with shallow to deep zones of aquatic vegetation and patches of shrubs. They occur as large, deep inclusions in fire-maintained upland communities and as inclusions in non-pyrogenic communities. They also may be found along fluctuating lake shorelines, at the bottom of disappearing lakes or at the head of broad, low basins which were former embayments when sea levels were higher. The hydroperiod is generally around 200 days per year (FNAI and FDNR 1990). Typical basin marsh plant species found in the County include American white waterlily (*Nymphaea odorata*), American lotus (*Nelumbo lutea*), spatterdock (*Nuphar advena*), pickerelweed (*Pontederia cordata*), bulltongue arrowhead (*Sagittaria lancifolia*), southern cattail (*Typha domingensis*), Jamaica swamp sawgrass (*Cladium jamaicense*), softstem bulrush (*Schoenoplectus tabernaemontani*), maidencane (*Panicum hemitomon*), smooth beggarticks (*Bidens laevis*), dotted smartweed (*Polygonum punctatum*), sand cordgrass (*Spartina bakeri*), sweetscent (*Pluchea odorata*), spadeleaf (*Centella asiatica*), blue waterhyssop (*Bacopa caroliniana*), coastalplain willow (*Salix caroliniana*), elderberry (*Sambucus nigra* subsp. *canadensis*), common buttonbush (*Cephalanthus occidentalis*) and wax myrtle (*Myrica cerifera*).

Fire maintains open herbaceous basin marshes by restricting shrub invasion. The frequency of natural fire in basin marshes is dependent upon the hydrology of the marsh and its exposure to fire from the surrounding communities. The use of prescribed fire to help maintain the basin marsh community at the natural area will be challenging due to the natural community's large size, the fact that this community is almost entirely surrounded by open water, and the proximity of many smoke sensitive areas.

Historically basin marsh covered a portion of the natural area. However, as the groundwater table within the site was lowered through drainage, the community was invaded by invasive/nonnative and transitional/upland plant species. A wetland creation project was completed post-acquisition which created a large basin marsh community within the natural area (see Section 4.3.4). The natural area currently contains approximately 53.1 acres of basin marsh.

FNAI (2016) ranked basin marsh as G4/S3 - apparently secure globally but very rare and local in Florida, found locally in a restricted range, or vulnerable to extinction due to other factors.

3.2.2 Canal and Berm

The canal and berm community south of the main portion of the natural area was created between 1953 and 1964 when the ditch that was the precursor to the EPB-10 Canal was widened, deepened and extended to the east to connect to the C-17 Canal (FDOT 1964, USDA 1953). The canal and berm community along the western boundary was created between 1953 and 1968 when the Florida Turnpike was built. The canal and berm community in the northwestern portion of the site was created between 1968 and 1981 (FDOT 1968, Palm Beach County

Property Appraiser 1981). Prior to the site's acquisition by the County, the berms and shallower portions of the Northwest and EPB-10 Canals had become colonized by a mixture of ruderal, native and invasive nonnative plant species, including Australian-pine (*Casuarina equisetifolia*), cattails (*Typha* spp.), spikerushes (*Eleocharis* spp.), spatterdock, and torpedograss (*Panicum repens*). The deeper portions of the canal are typically unvegetated, open water areas. With the exception of hard-to-control invasive nonnative grasses such as torpedograss, all of the invasive nonnative plant species have been removed from the canal community. The canal and berm community covers 9.2 acres.

3.2.3 Depression Marsh

Depression marsh is characterized as a small, shallow, usually rounded depression that is surrounded by fire-maintained matrix communities. Hydroperiods are highly variable, and range from as few as 50 days or less to more than 200 days per year (FNAI and FDNR 1990). Typical depression marsh plant species that occur in Palm Beach County include longleaf threeawn (*Aristida palustris*), beaksedges (*Rhynchospora* spp.), myrtleleaf St. John's-wort (*Hypericum myrtifolium*), peelbark St. John's-wort (*Hypericum fasciculatum*), blue maidencane (*Amphicarpum muhlenbergianum*), sand cordgrass, Baldwin's spikerush (*Eleocharis baldwinii*), Elliott's yelloweyed grass (*Xyris elliotii*), fringed yelloweyed grass (*Xyris fimbriata*), corkwood (*Stillingia aquatica*), pipeworts (*Eriocaulon compressum* and *E. decangulare*), maidencane, Jamaica swamp sawgrass, pickerelweed, bulltongue arrowhead and American white waterlily. The outer edges of depression marshes in xeric communities have bluestem grasses (*Andropogon* spp.), falsefennel (*Eupatorium leptophyllum*), witchgrasses (*Dichanthelium* spp.), Small's bogbutton (*Lachnocaulon minus*) and yellow hatpins (*Syngonanthus flavidulus*).

Fire is important in maintaining this community by limiting peat buildup, and preventing the invasion of trees and shrubs (Craighead 1971, FNAI 2010). Fire is most frequent at the edge of the marsh. Wade et al. (1980) stated that fire periodicity is about 3 to 5 years in most deep-water marshes, while shallow-water marshes burn on a 1- to 3-year cycle, provided that plant growth is sufficient to carry a fire. The use of prescribed fire to help maintain the depression marsh community at the natural area will be challenging due to the natural community's large size and the proximity of many smoke sensitive areas. This community covers approximately 78.5 acres.

FNAI (2016) ranked depression marsh as G4/S4 - apparently secure globally and in Florida, but possibly rare in part of its range.

3.2.4 Disturbed Dome Swamp

Intact dome swamp is characterized as a relatively shallow, circular or elliptically-shaped, forested depressional wetland that is found in isolated patches within a fire-maintained community. Standing water is present 180 to 270 days per year (Casey and Ewel 1998), with the longest durations at the center. In South Florida, dome swamps are typically dominated by pond-cypress (*Taxodium ascendens*). Other typical dome swamp plant species that are found in

the County include slash pine (*Pinus elliottii*), dahoon (*Ilex cassine*), swamp bay (*Persea palustris*), sweetbay (*Magnolia virginiana*), red maple (*Acer rubrum*), loblolly bay (*Gordonia lasianthus*), pond apple (*Annona glabra*), coco plum (*Chrysobalanus icaco*), Virginia willow (*Itea virginica*), fetterbush (*Lyonia lucida*), coastalplain willow, wax myrtle, St. John's-worts (*Hypericum* spp.) and common buttonbush, Virginia chain fern (*Woodwardia virginica*), royal fern (*Osmunda regalis* var. *spectabilis*), cinnamon fern (*Osmunda cinnamomea*), swamp fern (*Blechnum serrulatum*), maidencane, Jamaica swamp sawgrass, beaksedges, lizard's tail (*Saururus cernuus*), Carolina redroot (*Lachnanthes caroliana*), taperleaf waterhorehound (*Lycopus rubellus*), false nettle (*Boehmeria cylindrica*), smartweeds (*Polygonum* spp.), Spanish moss (*Tillandsia usneoides*), wild pines (*Tillandsia* spp.), sphagnum (*Sphagnum* spp.), big floatingheart (*Nymphoides aquatica*), water spangles (*Salvinia minima*), duckweeds (*Lemna* spp.), dotted duckweed (*Landoltia punctata*), fireflag (*Thalia geniculata*), bulltongue arrowhead, eastern poison ivy (*Toxicodendron radicans*), white twinevine (*Sarcostemma clausum*) and laurel greenbrier (*Smilax laurifolia*). Fire is essential for maintaining the structure and species composition of dome swamps. Normal fire intervals may be as short as 3 to 5 years along the outer edge to as long as 100 to 150 years near the center. Pond-cypress is tolerant of light surface fires, but fires which burn into the peat can kill most of the trees.

Disturbed dome swamps are those dome swamps that were impacted by road construction, drainage, and/or were left as islands within borrow pit complexes. Disturbed dome swamps typically have significant amounts of ruderal and transitional plants, such as myrsine (*Myrsine cubana*), wax myrtle and coco plum. They also had significant amounts of invasive/nonnative plants prior to implementation of the invasive/nonnative plant control program.

The disturbed dome swamp community at the natural area will be prescribed burned at the same time and frequency as the surrounding fire-dependent communities. Prescribed fire will be allowed to burn into the disturbed dome swamp as far as available fuels and moisture levels allow it to go. No attempts will be made to relight a fire in the disturbed dome swamp community after it has gone out.

Disturbed dome swamp currently covers 16.8 acres. This community should transition to dome swamp over time.

FNAI (2016) ranked dome swamp as G4/S4 - apparently secure globally and in Florida, but possibly rare in part of its range.

3.2.5 Mesic Flatwoods

Mesic flatwoods is the most widespread natural community in Florida. It is characterized as having an open overstory of pines, which in South Florida consists of slash pine. The understory generally includes a low, dense groundcover layer of grasses, forbs and shrubs. Other typical mesic flatwoods plant species that occur in Palm Beach County include saw palmetto (*Serenoa repens*), gallberry (*Ilex glabra*), coastalplain staggerbush (*Lyonia fruticosa*), fetterbush, dwarf

huckleberry (*Gaylussacia dumosa*), shiny blueberry (*Vaccinium myrsinites*), dwarf live oak (*Quercus minima*), running oak (*Quercus pumila*), wiregrass (*Aristida stricta* var. *beyrichiana*), witchgrasses and bluestem grasses, plus a large number of showy forbs.

Mesic flatwoods communities require frequent fire; all of the common plant species recover quickly after a fire and several plant species require fire to reproduce. Nearly all natural fires in mesic flatwoods occur at 1- to 6-year intervals, with 2- to 3-year intervals being the most common. Reintroduction of fire into long unburned flatwoods can result in high pine mortality due to excessive smoldering at the base of the trees, a side effect of fuel and litter build-up. Growing season fires (April to mid-August) are favored over winter burns because many of the grasses and forbs require fire to flower and set seed.

The mesic flatwoods community at the natural area occupies 147.4 acres. It will be prescribed burned or mechanically reduced on a 5- to 8-year interval. Although the proposed burn interval is longer than what is typically desired for mesic flatwoods communities, the proximity of numerous smoke-sensitive areas precludes the more frequent burning of this community.

FNAI (2016) ranked mesic flatwoods as G4/S4 - apparently secure globally and in Florida, but possibly rare in part of its range.

3.2.6 Disturbed Mesic Flatwoods

Disturbed mesic flatwoods typically are those mesic flatwoods communities that have been impacted by drainage, fire exclusion, prior agricultural activities, OHV use and/or invasion by nonnative plant species. Disturbed mesic flatwoods also may be formed as the result of prolonged drainage of wet flatwoods, wet prairie, depression marsh and/or basin marsh communities. The canopy typically consists of slash pine, but a few cabbage palms (*Sabal palmetto*) and mixed hardwood species, such as live oak (*Quercus virginiana*) and laurel oak (*Quercus laurifolia*), may be present. The understory is patchy; it may include a variety of typical mesic flatwoods plant species, as well as transitional, ruderal and/or nonnative species. Groundcover vegetation is composed of a mixture of ruderal herbaceous species and grasses. This community had significant amounts of invasive/nonnative plants prior to implementation of the invasive/nonnative plant control program.

Fire frequency in this community is typically controlled by the fire frequency in the surrounding plant communities. At the natural area it will be prescribed burned or mechanically reduced on a 5- to 8-year interval. Although the proposed burn interval is longer than what is typically desired for mesic flatwoods communities, the proximity of numerous smoke-sensitive areas precludes the more frequent burning of this community.

This community currently occupies approximately 69.0 acres. The disturbed mesic flatwoods communities in Management Units 2, 3, 5, 6 and 8 should transition to mesic flatwoods over time; the disturbed flatwoods communities in Management Unit 4 should transition to mesic

hammock over time. Restoration plantings have been installed in a portion of the disturbed mesic flatwoods community to facilitate its transition to a more intact community (see Section 4.3.4).

3.2.7 Disturbed Mesic Hammock

Intact mesic hammock is a rarely-inundated, evergreen hardwood and/or palm forest. It is characterized by a closed canopy that is dominated by live oak; cabbage palm is common in the canopy and subcanopy. Other canopy and subcanopy plant species found in the County that also may be found in mesic hammock communities include gumbo limbo (*Bursera simaruba*), satinleaf (*Chrysophyllum oliviforme*), water oak (*Quercus nigra*), laurel oak, sweetgum (*Liquidambar styraciflua*), sugarberry (*Celtis laevigata*) and slash pine. Shrubs found in the County that are typical of mesic hammock communities include saw palmetto, American beautyberry (*Callicarpa americana*), American holly (*Ilex opaca*), gallberry, sparkleberry (*Vaccinium arboreum*), hog plum (*Ximenia americana*), common persimmon (*Diospyros virginiana*), Carolina laurelcherry (*Prunus caroliniana*), wax myrtle, Simpson's stopper (*Myrcianthes fragrans*), myrsine and wild coffee (*Psychotria* spp.), low panic grasses (*Panicum* spp.), witchgrasses, basketgrass (*Oplismenus hirtellus*), flatsedges (*Cyperus* spp.), tall nutgrass (*Scleria triglomerata*), bracken (*Pteridium aquilinum*), partridgeberry (*Mitchella repens*), toothpetal false reinorchid (*Habenaria floribunda*) and other ground orchids, Spanish moss, wild pines, resurrection fern (*Pleopeltis polypodioides* var. *michauxiana*), golden polypody (*Phlebodium aureum*), shoestring fern (*Vittaria lineate*) and Florida butterfly orchid (*Encyclia tampensis*), muscadine (*Vitis rotundifolia*), greenbriers (*Smilax* spp.), yellow jessamine (*Gelsemium sempervirens*), eastern poison ivy and Virginia creeper (*Parthenocissus quinquefolia*).

Mesic hammock is a not a fire-maintained community. Intense fires can destroy mesic hammock. The mesic hammock at the natural area has either been placed in a no-burn zone or will be protected from prescribed fire by the creation of temporary firebreaks.

Disturbed mesic hammock has many of the same plant species as intact mesic hammock, but the plants are smaller and sparser, and there are larger expanses of bare sand. The disturbed mesic hammock communities at the natural area were formed as a result of prior agricultural use, long-term fire-exclusion, and through the planting of hammock vegetation within former agriculturally-altered areas (see Section 4.3.4). The disturbed mesic hammock community currently covers 49.5 acres; it should transition to mesic hammock over time.

FNAI (2016) ranked mesic hammock as G3/S3? – both globally and in Florida this natural community is either very rare and local throughout its range, or found locally in a restricted range or vulnerable to extinction from other factors. The question mark indicates that the state status is questionable at present.

3.2.8 Open Water

The open water community at the natural area was created during sand removal/wetland creation activities conducted by the County in 2009 and 2010. No plant species are found within the open water community because of its depth. This is a man-made community; it does not have a natural hydroperiod or fire frequency. This community occupies about 22.3 acres.

3.2.9 Sand/shell

A small sand/shell rock island was constructed during site restoration activities to provide a nesting area for least tern (*Sterna antillarum*) and other shorebirds. The island covers approximately 1.1 acres. The island is buffered from the canoe trail by an area of basin marsh and a deep, open water lake. The sand/shell island will be maintained free of vegetation to provide optimal shorebird nesting habitat.

3.2.10 Disturbed Strand Swamp

Intact strand swamp is characterized by shallow, forested, usually elongate depressions or channels dominated by bald-cypress (*Taxodium distichum*) or pond-cypress. Standing water may be present in strand swamp for 100 to 300 days per year. Water levels are deepest and remain the longest in the center of the strand. Typical strand swamp plant species that are found in the County include pond-cypress, bald-cypress, pond apple, red maple, laurel oak, cabbage palm, strangler fig (*Ficus aurea*), swamp bay, sweetbay, coastalplain willow, wax myrtle, myrsine, common buttonbush, eastern poison ivy, white twinevine, string-lily (*Crinum americanum*), giant leather fern (*Acrostichum danaeifolium*), swamp fern, royal fern, Jamaica swamp sawgrass, waterhyssops (*Bacopa* spp.), epiphytic orchids and wild pines. Fire is rare in intact strand swamp. The frequency of fire is greatest where the edge of the strand swamp abuts a pine-dominated community and lowest in the center of the swamp. Cypress is tolerant of light surface fires, but fires which burn into the peat can kill most of the trees.

Disturbed strand swamps are former strand swamps that have been severely impacted by invasive/nonnative plants, drainage and/or canal or road construction. Pond-cypress is still present in the canopy, but invasive nonnative plant species such as Australian-pine, melaleuca, Old World climbing fern (*Lygodium microphyllum*) and/or strawberry guava (*Psidium cattleianum*) also may be present. This community typically has a hydroperiod that is somewhat less than that of intact strand swamp due to the presence of drainage ditches and/or canals.

The disturbed swamp community at the natural area will be prescribed burned at the same time and frequency as the adjacent mesic flatwoods and disturbed mesic flatwoods communities. Prescribed fire will be allowed to burn into the disturbed strand swamp community as far as available fuels and moisture levels allow it to go. No attempts will be made to relight a fire in the disturbed strand swamp after it has gone out.

The disturbed strand swamp currently occupies approximately 27.8 acres. Most of this community is expected to transition to strand swamp over time.

FNAI (2016) ranked strand swamp as G2/S2 - imperiled both globally and in Florida because of rarity or vulnerability to extinction.

3.2.11 Disturbed Wet Flatwoods

In South Florida wet flatwoods are characterized as relatively open-canopy forests of scattered slash pine, with a sparse or absent midstory and a dense groundcover of hydrophytic grasses, herbs and low shrubs. Typical understory plant species that may be found in the County include sweetbay, swamp bay, loblolly bay, pond-cypress, cabbage palm, dahoon, wax myrtle, gallberry, saw palmetto, fetterbush, wiregrass, blue maidencane, toothachegrass (*Ctenium aromaticum*), coastalplain yelloweyed grass (*Xyris ambigua*), Carolina redroot and beaksedges. During the rainy season, water frequently stands on the surface, inundating the wet flatwoods for one month or more per year. Natural fire frequency in wet flatwoods has been estimated at 1 to 10 years. Shorter fire intervals favor grassy wet flatwoods, while longer intervals favor a shrubbier subtype. The recommended burn interval for South Florida wet flatwoods is 4 years.

Disturbed wet flatwoods typically have an overstory that is dominated by slash pine, often interspersed with an occasional pond-cypress. The understory is atypically dense and may include coco plum, myrsine and wax myrtle. Fire frequency is largely controlled by the fire frequency in the surrounding plant communities.

The disturbed wet flatwoods community was created when the ground water levels dropped 5 to 6 feet as a result of the construction and operation of the EPB-9 and EPB-10 canals, and the five public water wells south of the EPB-10 Canal. A variety of invasive/nonnative plant species became established in the disturbed wet flatwoods community prior to the site's acquisition by the County. With the exception of hard-to-control invasive nonnative grasses such as torpedograss, all of the invasive nonnative species have been removed from the disturbed wet flatwoods community. This community will be burned at the same time and frequency as the adjacent mesic flatwoods community. The disturbed wet flatwoods community currently occupies 3.6 acres. This community should transition to wet flatwoods over time.

FNAI (2016) ranked wet flatwoods as G4/S4 - apparently secure globally, but rare in parts of its range, and apparently secure in Florida.

3.2.12 Disturbed Wet Prairie

Wet prairie is characterized as an herbaceous community found on continuously wet, but not inundated, soils on flat or gentle slopes between lower lying communities such as depression marshes, shrub bogs or dome swamps and slightly higher wet or mesic flatwoods or dry prairies. Wiregrass typically dominates the drier portions of the wet prairie community. In the County,

the wetter portions of the community may be dominated by wiregrass, plumed beaksedge (*Rhynchospora plumosa*), Baldwin's nutrush (*Scleria baldwinii*), slenderfruit nutrush (*Scleria georgiana*) and/or longleaved threeawn. Other typical wet prairie plant species that may be found in the County include sundews (*Drosera* spp.), butterworts (*Pinguicula* spp.), bladderworts (*Utricularia* spp.), yellow-flower butterwort (*Pinguicula lutea*), toothachegrass, pineland rayless goldenrod (*Bigelovia nudata* subsp. *australis*), flattened pipewort (*Eriocaulon compressum*), water cowbane (*Tiedemannia filiformis*) and coastalplain yelloweyed grass. Fires naturally occur in wet prairies at intervals of 2 to 3 years.

Disturbed wet prairies are those wet prairies that have been adversely impacted by drainage, fire exclusion, former agricultural activities or OHV usage, or that were left as a pocket of vegetation within a former borrow pit. These disturbed wetlands have many of the same plant species as intact wet prairie, but also have large amounts of transitional vegetation such as bluestem grasses, wax myrtle and myrsine. Many portions of the disturbed wet prairie community became colonized by invasive/nonnative plant species such as Australian-pine, melaleuca and Brazilian pepper prior to the site's acquisition. All of this community has been treated as part of an ongoing nonnative plant control program and the nonnative plant species are now under control. At the natural area this community will be treated with prescribed fire on a 5- to 8- year interval. Although the proposed burn interval is longer than what is typically desired for wet prairie communities, the proximity of numerous smoke-sensitive areas precludes the more frequent burning of this community.

Disturbed wet prairie occupies approximately 83.5 acres. The disturbed wet prairie community is expected to transition to wet prairie now that water levels have been restored as close as possible to historic levels.

FNAI (2016) ranked wet prairie as G2/S2 – imperiled both globally and in Florida because of rarity or vulnerability to extinction.

3.3 PLANTS AND ANIMALS - OVERVIEW

A total of 267 species of plants have been recorded at the natural area (Appendix A). Of these, seven have been listed for protection or special management by a government agency or have been ranked by FNAI (Table 1). To date, 69 species of plants recorded at the site are not native to the South Florida mainland. These species are discussed in more detail in Section 4.3.2.

A total of 146 species of animals have been recorded at the natural area - 1 gastropod, 3 arachnids, 21 insects, 1 amphibian, 8 reptiles, 101 birds, 9 mammals and 2 fishes (Appendix B). Of these, 21 are listed for protection or special management by a government agency or have been ranked by FNAI (Table 2). To date, four species of invertebrates and five species of vertebrates recorded at the site are not native to the South Florida mainland. These species are discussed in more detail in Section 4.3.3.

Some native plant and animal species recorded at the natural area are habitat-specific, using only one natural community, while others use a variety of natural communities. Therefore, the preservation, restoration, enhancement and management of the variety of natural communities at the natural area are critical to the long-term preservation of animal species indigenous to the site.

3.5 LISTED SPECIES

3.4.1 Plants

Seven plant species recorded at the natural area have been listed for protection or special management by at least one governmental agency or have been ranked by FNAI (Table 1). These species will be protected as components of the natural communities of which they are a part. All listed/ranked plant species recorded at the natural area will be protected through the implementation of management activities designed to restore, enhance and maintain the natural communities in which they occur; by control/removal of invasive nonnative vegetation at the natural area; by implementing a prescribed burning program; by restoring and maintaining the hydrology of the site; by routing management accessways, trails and other public use facilities away from known populations whenever possible; by relocating plants that cannot be avoided during construction and restoration activities; and by protecting the site from plant collectors. Species known to be susceptible to fire may be protected during prescribed burn activities by one or more of the following actions: having multiple management units, burning only one unit at a time to maintain a seed source on the unburned parts of the site, maintaining a mosaic of seral stages on the site, creating temporary firebreaks, or possibly relocating individual plants to other locations on the site prior to a prescribed burn. Information regarding the monitoring of listed/ranked plant species is provided in Section 7.2. Overall, listed/ranked plant populations at the site appear to be stable.

This section includes a brief description of each listed/ranked species and any species-specific management/protection strategy that will be used to protect that species. The ranks and designations assigned to the species are provided in Table 1. Listed/ranked plant species recorded at the natural area are discussed in alphabetical order by common name. The typical habitats provided for each species are as described by Wunderlin and Hansen (2011) unless otherwise noted.

Common wild pine (*Tillandsia fasciculata*)

This epiphytic bromeliad was first recorded at the natural area by ERM staff in 2003; it is occasionally observed at the natural area. It is typically found in cypress swamps, hammocks and flatwoods. All species of *Tillandsia* may be killed directly by fire, or indirectly as a result of the loss of the protective tree canopy or death of the host tree (Robertson and Platt 1992 and 2001).

Florida butterfly orchid (*Encyclia tampensis*)

This epiphytic orchid was first recorded at the natural area by ERM staff in 2003; it is occasionally observed at the natural area. Florida butterfly orchids are typically found in hammocks, hardwood swamps, cypress swamps, mangroves and palm groves. Florida butterfly orchids may be killed directly by fire, or indirectly as a result of the loss of the protective tree canopy or death of the host tree (Robertson and Platt 1992 and 2001).

Giant wild pine (*Tillandsia utriculata*)

This epiphytic bromeliad was first recorded at the natural area by ERM staff in 2003; it is rarely observed at the natural area. Giant wild pine is typically found in hammocks and cypress swamps. All species of *Tillandsia* may be killed directly by fire, or indirectly as a result of the loss of the protective tree canopy or death of the host tree (Robertson and Platt 1992 and 2001).

Hand fern (*Ophioglossum palmatum*)

The epiphytic fern was recorded at the natural area by ERM staff in 2003. It has not been observed since that time and may no longer be present. Populations of this fern species may fluctuate with rainfall patterns, wildfires, hurricanes and the loss of cabbage palm “boots” (Chafin 2000); it requires very humid/moist conditions and is adversely affected by fire (Nelson 2000). Hand ferns are typically found in hammocks and cypress swamps.

Inflated & reflexed wild pine (*Tillandsia balbisiana*)

This epiphytic bromeliad was first recorded at the natural area by ERM staff in 2003; it is very rarely observed at the natural area. Inflated & reflexed wild pine is typically found in hammocks and scrub. All species of *Tillandsia* may be killed directly by fire, or indirectly as a result of the loss of the protective tree canopy or death of the host tree (Robertson and Platt 1992 and 2001).

Meadow jointvetch (*Aeschynomene pratensis*)

This endemic, terrestrial, perennial herb was recorded at the natural area by ERM staff in 2003. It has not been observed since that time and may no longer be present. It is typically found in pinelands.

Royal fern (*Osmunda regalis* var. *spectabilis*)

This terrestrial fern was recorded at the natural area by ERM staff in 2003. It has not been observed since that time and may no longer be present. It is typically found in swamps, marshes and bogs. This species has a low tolerance to fire (LaRue 2008).

3.4.2 Animals

Twenty-one animal species recorded at the natural area have been listed for protection or special management by at least one governmental agency or have been ranked by FNAI (Table 2). They include 2 reptiles and 19 birds. The natural area is not located within a Strategic Habitat Conservation Area as identified by the Florida Fish and Wildlife Conservation Commission (FWC). The listed/ranked animal species at the natural area will be managed and protected as components of the natural communities of which they are a part. All listed/ranked animal species will be managed and protected through the implementation of management activities designed to restore, enhance and maintain the natural communities used by these species; by establishing a protective buffer zone around any existing nest or rookery, or any nest or rookery that may be discovered in the future; and by the enforcement of anti-poaching regulations.

This section includes a brief description of each listed/ranked species, including the habitats in which it is typically found and the species' primary diet. The ranks and designations assigned to the species are provided in Table 2. Listed/ranked animal species recorded at the natural area are discussed in alphabetical order by common name.

American alligator (*Alligator mississippiensis*)

This large aquatic reptile was first recorded at the natural area by ERM staff in 2006; it is regularly observed at the natural area. It is a carnivore; its diet is primarily snails, aquatic insects and crustaceans when young and fish, turtles, snakes, small mammals and birds when older (Ashton and Ashton 1991). The American alligator is primarily a freshwater species. It may be present in any water-retaining habitat, including ponds, canals, lakes, rivers, large streams, borrow pits, swamps and marshes (Bartlett and Bartlett 2011).

American redstart (*Setophaga ruticilla*)

This migratory warbler was first recorded at the natural area by ERM staff in 2009; it is rarely observed at the natural area. American redstarts actively glean foliage for insects and spiders, and hover or take long flights to capture flying insects (Pranty et al. 2006). Fall migrants arrive in Florida between late July and early November, and spring birds pass through between late March and early June (Maehr and Kale 2005). This species does not nest in South Florida (Sherry and Holmes 1997).

Bald eagle (*Haliaeetus leucocephalus*)

This very large bird of prey was first recorded at the natural area by ERM staff in 2006; it is regularly observed at the natural area. Bald eagles feed primarily on fish and waterbirds (Pranty et al. 2006). This species inhabits coastal beaches, salt marshes, dry prairies, mixed pine and hardwood forests, wet prairies and marshes, pine flatwoods, sandhills and agricultural areas (Maehr and Kale 2005). In Florida, most bald eagles are year-round residents, but winter

migrants do occur. Bald eagles typically nest in pine trees, but also may nest in mangrove trees or cypress; most nests are built more than 50 feet off the ground (Stevenson and Anderson 1994). The bald eagle is not known to have nested on the natural area.

Black skimmer (*Rynchops niger*)

This long-billed seabird was recorded at the natural area by ERM staff in 2012; it has not been observed since that time. Black skimmers eat small fish and crustaceans (Pranty et al. 2006). This species is a permanent resident of coastal beaches and salt marshes on the coasts of Florida (Maehr and Kale 2005); some additional birds migrate to the state during the winter (FWC 2013a, Pranty et al. 2006). Black skimmers nest in colonies of a few to several hundred pairs on beaches or offshore spoil islands, often with terns; increasingly on gravel rooftops; and rarely on inland lakes and flooded farmland (FWC 2013a, Maehr and Kale 2005, Pranty et al. 2006). Breeding begins in May and can extend through September (FWC 2013a, Maehr and Kale 2005). The black skimmer is not known to nest at the natural area.

Everglade snail kite (*Rostrhamus sociabilis plumbeus*)

This medium-sized bird of prey was recorded at the natural area by ERM staff in 2013; it has not been observed since that time. The Everglade snail kite's distribution in North America is restricted to the freshwater marshlands of central and southern Florida (Maehr and Kale 2005). It preys almost exclusively on the Florida applesnail (*Pomacea paludosa*) and moves around as the availability of snails changes with fluctuations in water levels (Pranty et al. 2006). Snail kites typically forage in shallow, relatively open water with a low density of emergent vegetation. They are vulnerable to changes to foraging habitat caused by the invasion of nonnative aquatic plants, especially common water-hyacinth (*Eichhornia crassipes*) (Maehr and Kale 2005). The most suitable wetlands are those that remain wet nearly year-round and only become dry on an occasional and sporadic basis. Nests are constructed in low trees or shrubs or emergent marsh vegetation over standing water (Pranty et al. 2006, Maehr and Kale 2005). This species will abandon its nest if the site loses standing water. It is not known to nest at the natural area.

Florida sandhill crane (*Grus canadensis pratensis*)

This large wading bird was first recorded at the natural area by ERM staff in 2006; it is frequently observed at the natural area. The non-migratory Florida sandhill crane typically nests and feeds in wetland habitats such as wet prairies and depression marshes, but also forages for invertebrates and small vertebrates in wet flatwoods and open pastures, as well as on golf courses and suburban lawns (Maehr and Kale 2005, Pranty et al. 2006). They build platform nests in basin marshes and depression marshes. Florida sandhill crane is not known to nest on the site.

Glossy ibis (*Plegadis falcinellus*)

This medium-large wading bird was first recorded at the natural area by ERM staff in 2006; it is frequently observed at the natural area. Glossy ibis typically feed on crayfish, fish, reptiles, amphibians and insects (Maehr and Kale 2005, Pranty et al. 2006). They inhabit freshwater marshes, swamps, lakes, flooded agricultural areas and occasionally estuaries (Pranty et al. 2006). Nesting occurs in mixed colonies with other wading birds in shrubs and trees that are either over standing water or on islands. Glossy ibises build platform nests made of sticks. This species is not known to nest at the natural area.

Gopher tortoise (*Gopherus polyphemus*)

This medium-sized terrestrial turtle was first recorded at the natural area by ERM staff in 2006; it is occasionally observed at the natural area. Gopher tortoises are plant eaters; the bulk of their diet consists of grasses and herbaceous plants and they are known to feed on up to 400 species of plants (Ashton and Ashton 2008). They can travel up to two miles from their burrows to feed on seasonal vegetation such as flowers, fruits and leaves from trees, shrubs and vines, deer feeding plots, or ripe orchard fruits on neighboring properties. They also may eat a variety of other items, such as carrion, small animals, insects and other invertebrates. The gopher tortoise typically inhabits sandhill, scrub, scrubby flatwoods, xeric hammock, pine flatwoods, dry prairie, coastal strand, mixed pine-hardwood communities and a variety of disturbed well-drained habitats (FWC 2012). The gopher tortoise is considered to be a keystone species in upland communities because of the important role that this species plays in relation to other plants and animals. At least 411 species of vertebrate and invertebrate animals are known to use gopher tortoise burrows (Mushinsky et al. 2006).

Great egret (*Ardea alba*)

This large wading bird was first recorded at the natural area by ERM staff in 2006; it is frequently observed at the natural area. Great egrets typically feed on small fish and aquatic invertebrates (Pranty et al. 2006). Their habitat includes salt marshes, wet prairies, the edges of freshwater marshes, lakes and ponds, mangroves, hardwood and cypress swamps, flooded agricultural fields and urban areas (Maehr and Kale 2005, Pranty et al. 2006). Nesting occurs between January and June with large numbers of other wading birds in thick swamps dominated by low bushes and large trees, and on mangrove-covered coastal islands (Maehr and Kale 2005). No rookeries for this species are known to be present on the natural area.

Least bittern (*Ixobrychus exilis*)

This small, reclusive heron was recorded at the natural area by ERM staff in 2013; it is very rarely observed at the natural area. Its diet consists of frogs, fish, insects and other invertebrates (Maehr and Kale 2005). Least bitterns are fairly common residents in wet prairies, marshes and mangrove throughout Florida but are seldom seen (Pranty et al. 2006, Maehr and Kale 2005). Least bitterns breed in freshwater marshes in the southern part of Florida between March and July, using platform nests of twigs or marsh grass constructed over water in dense vegetation. The species is not known to nest on the natural area.

Least tern (*Sterna antillarum*)

This small tern species was first recorded at the natural area by ERM staff in 2010; it is occasionally observed at the natural area. This migratory species is present in Florida from March through September (Maehr and Kale 2005). It feeds on small fish and shrimp (Pranty et al. 2006). Least terns typically inhabit beaches, dunes, soil islands and inland areas near large lakes. Nesting occurs throughout Florida from April through September (Maehr and Kale 2005, Pranty et al. 2006). Least terns are colonial ground nesters. Historically they nested on beaches, dunes, islands and river shores; they now nest on light-colored human-made habitats such as spoil islands, construction sites, phosphate mines and gravel rooftops. It is estimated that rooftops support over 80 percent of the breeding population (FWC 2013a). Least terns are not known to nest on the site.

Limpkin (*Aramus guarauna*)

This unusual wading bird was first recorded at the natural area by ERM staff in 2016; it is very rarely observed at the natural area. Limpkin feed primarily on applesnails (*Pomacea* sp.) and freshwater clams, although a variety of other prey is taken, including lizards, frogs, worms, insects, crustaceans and other snails (Maehr and Kale 2005, Pranty et al. 2006). This species typically inhabits freshwater marshes, cypress swamps and the edges of rivers and creeks (Pranty et al. 2006). The species is not known to nest on the natural area.

Little blue heron (*Egretta caerulea*)

This medium-sized heron was first recorded at the natural area by ERM staff in 2003; it is frequently observed at the natural area. Little blue herons feed on small fish and amphibians, aquatic crustaceans, insects, worms and snakes (FWC 2013b). This species inhabits coastal beaches, salt marshes, mangroves, hardwood swamps, cypress swamps, wet prairies, freshwater marshes, lakes and ponds, and flooded agricultural areas (Maehr and Kale 2005, Pranty et al. 2006). Nesting occurs between late February and August in single species or multiple species wading bird colonies, mainly at saltwater sites (Maehr and Kale 2005). The little blue heron is not known to nest at this site.

Osprey (*Pandion haliaetus*)

This large bird of prey was first recorded at the natural area by ERM in 2006; it is regularly observed at the natural area. It feeds almost exclusively on fish (FWC 2013c, Pranty et al. 2006). Ospreys are widely distributed in Florida and may be found near coastal beaches, salt marshes, open saltwater, open freshwater, mangroves, and wet prairies and marshes (Maehr and Kale 2005). In South Florida, nesting occurs from late November to early summer (FWC 2013c). Ospreys use live or dead trees, telephone poles, and human-made structures for nesting; they create large stick nests high above the ground that they use for many years (Pranty et al. 2006). They are not known to nest at the natural area.

Roseate spoonbill (*Platalea ajaja*)

This large wading bird was first recorded at the natural area in 2008 by ERM staff; it is frequently observed at the natural area. Roseate spoonbills feed on fish, crustaceans, mollusks and other aquatic animals (Pranty et al. 2006). They inhabit shallow estuaries and bays, mangrove swamps, coastal islands and flooded agricultural fields. Roseate spoonbills are fairly common permanent residents in the southern half of the Florida peninsula. In Florida, mainland populations normally breed from late February or early March to June (Sustainable Ecosystems Institute 2007). Nesting usually occurs with other wading birds in large colonies on thick thickets of mangroves; spoonbills construct bulky stick nests (Pranty et al. 2006). This species is not known to nest on the natural area.

Snowy egret (*Egretta thula*)

This wading bird was first recorded at the natural area by ERM staff in 2008; it is frequently observed at the natural area. The snowy egret feeds on a variety of fish, aquatic crustaceans, insects, and small amphibians, worms or snakes (FWC 2013b). It is a common and widespread Florida resident that is found in almost any wetland habitat, including coastal beaches, freshwater and salt marshes, mangroves, hardwood swamps, cypress swamps, wet prairies, flooded agricultural areas and urban environments (Maehr and Kale 2005, Pranty et al. 2006). Platform nests are created in shrub-covered wetlands or islands in coastal lakes and lagoons (Maehr and Kale 2005). Snowy egrets nest in colonies with other wading birds; eggs are laid from March through August. This species is not known to nest at the natural area.

Swallow-tailed kite (*Elanoides forficatus*)

This long-tailed bird of prey was first recorded at the natural area by ERM staff in 2008; it is occasionally observed at the natural area. This species feeds on large insects, tree frogs, small snakes and nestling birds (Pranty et al. 2006). Swallow-tailed kites require a mosaic of communities, with tall, accessible trees for nesting and open areas for foraging. Habitats include xeric scrub, hardwood and cypress swamps, mesic hammocks, mixed pine and hardwood forests, pine flatwoods, sandhills, riparian forests and agricultural environments (Maehr and Kale 2005,

Pranty et al. 2006). This species typically builds platform nests in tall pine or cypress trees (Pranty et al. 2006). This species is not known to nest at the natural area.

Tricolored heron (*Egretta tricolor*)

This long-necked wading bird was first recorded at the natural area by ERM staff from 2006; it is regularly observed at the natural area. It feeds primarily on small fish (Pranty et al. 2006). Tricolored herons are fairly-common permanent residents in Florida, except in the western Panhandle. They primarily live in coastal habitats such as estuaries and mangroves, but also are present in many types of wetlands, including the edges of inland marshes, lakes and ponds, and flooded agricultural fields. Tricolored herons are colonial nesters; they create platform nests in mangroves or other dense aquatic shrubs. Eggs are laid from late February through July (Maehr and Kale 2005). The tricolored heron is not known to nest at the natural area.

White ibis (*Eudocimus albus*)

This wading bird was first recorded at the natural area by ERM staff in 2003; it is regularly observed at the natural area. White ibises typically feed on small fish, crustaceans, worms, snakes, grasshoppers and aquatic insects (Maehr and Kale 2005, Pranty et al. 2006). They inhabit virtually every wetland habitat in Florida; they even forage in agricultural fields and lawns (Pranty et al. 2006). White ibises nest in large colonies in mangroves, thickets or swamps (Maehr and Kale 2005, Pranty et al. 2006). Eggs are laid in platform nests from March through May. This species is not known to nest at the natural area.

Wood stork (*Mycteria americana*)

This large wading bird was first recorded at the natural area by ERM staff in 2007; it is regularly observed at the natural area. Wood storks feed primarily on fish, but crustaceans, gastropods, amphibians, reptiles, mammals, other birds and arthropods also may be consumed (USFWS 1997 and 2007). They typically inhabit freshwater ponds, wet prairies and marshes, cypress swamps, salt marshes mangroves and flooded agricultural fields (Maehr and Kale 2005, Pranty et al. 2006). In Florida, nesting occurs in large colonies in forested wetlands from November to May, either high in cypress trees or lower in mangroves. Freshwater colony sites must remain flooded throughout the nesting period to protect the young against predation and abandonment (USFWS 1997). The wood stork is not known to nest at this natural area. However, USFWS has designated the entire eastern half of Palm Beach County as a core foraging area for this species; four rookeries have been recorded in the County (USFWS 2016).

Worm-eating warbler (*Helminthos vermivorum*)

This uncommon migratory warbler was recorded at the natural area by ERM staff in 2006, but has not been observed since that time. Its diet consists mostly of caterpillars, other insects and spiders (Pranty et al. 2006, Vitz et al. 2013). Migrating worm-eating warblers are typically

found in deciduous hardwood habitats (Maehr and Kale 2005). In Florida, this species is present as a migrant from late March to early May and from late August to early October; a few individuals may overwinter in South Florida. This species does not nest in South Florida (Pranty et al. 2006).

3.5 ARCHAEOLOGICAL AND HISTORICAL RESOURCES

No archaeological or historical resources are known to be present on the natural area (MACTEC Engineering and Consulting, Inc. 2009). Any ground disturbance of previously undisturbed areas will be coordinated with the Florida Department of State, Division of Historical Resources (FDHR) and the Palm Beach County archaeologist. If any archaeological or historical sites are discovered in the future, FDHR management procedures will be followed to protect those sites. If human remains are found, the provisions of Section 872.05, Florida Statutes, will be followed to protect those remains. The County will comply with Chapter 267, Florida Statutes, in its management of any archaeological or historical sites discovered on the natural area. If historical resources are found on the natural area, a historical resources protection plan will be developed in consultation with the Palm Beach County Historic Preservation Officer.

4. MANAGEMENT AND RESTORATION ACTIVITIES

Baseline environmental assessments of the existing plant communities, and plants and animals were conducted by ERM staff between 2001 and 2016. This information was used to identify the initial management activities necessary to protect, restore/enhance and maintain the natural resources of the site, and to determine the locations and types of public use facilities that were installed on the site.

4.1 MANAGEMENT UNITS

The natural area is divided into eight management units using management accessways, and natural and man-made features as boundaries and firebreaks (Figure 4). The management units have been designed to maximize the long-term diversity of natural communities, and native plant and animal species on the site. These units range in size from 22.0 to 179.4 acres, and are small enough to allow for safe and practical fire management. A management unit may be subdivided into smaller units in order to facilitate management and/or monitoring activities, or to minimize the effect of smoke on adjacent properties during a prescribed burn.

4.2 MAINTENANCE

4.2.1 Removal of Debris and Litter

All of the debris and litter found on the natural area at the time of its acquisition has been removed. If additional debris is found, it will be removed in a timely manner unless such removal would cause undesirable damage to a rare or imperiled natural community, or listed species. The installation of perimeter fencing and management access gates has and will continue to help prevent the dumping on the site. Periodic site cleanups to remove litter are conducted by county staff with the assistance of volunteers.

4.2.2 Trail Maintenance

Periodic trail maintenance will be performed by county staff and community volunteers. All existing trails not used for site management or as part of a designated hiking trail will be allowed to revegetate with native vegetation.

4.2.3 Facilities Maintenance

County staff is responsible for the maintenance of all public use facilities, fencing/gates, signage and management accessways/firebreaks. The County also is responsible for maintaining the portion of the Northwest Canal that lies within the natural area boundaries, the twin culverts under the Dyer-SWA access road in the western portion of the Northwest Canal, and the operable water control structure and associated intake culverts within and adjacent to the southeastern edge of the created wetland (the structure that connects the marsh to the EPB-10

Canal). NPBCID is responsible for maintaining the backflow prevention weir in the Northwest Canal and the weir that was constructed within the EPB-10 Canal, just north of the Costco facility.

4.3 RESTORATION AND ENHANCEMENT ACTIVITIES

The site has been and will continue to be managed in a manner that preserves, restores and enhances the natural resource values. Restoration/enhancement activities conducted to date include the development of a fire management plan (see Section 4.3.1), implementation of invasive/nonnative plant and nonnative/nuisance animal control programs (see Section 4.3.2 and 4.3.3, respectively), exclusion of unauthorized uses (see Section 4.5), and completion of several environmental restoration/enhancement projects (see Section 4.3.4). The only remaining restoration/enhancement project proposed for the site is described in Section 4.3.4.

4.3.1 Fire Management

Because of development, natural, lightning-induced fire can no longer fulfill the needs of natural communities in the County which are dependent upon fire for their long-term survival (for example, basin marsh, depression marsh, dome swamp, mesic flatwoods, scrub, scrubby flatwoods, slough marsh, wet flatwoods and wet prairie). Natural fire can no longer spread from adjacent lands onto the natural area because all of the surrounding fire-dependent communities have been lost to development. When natural fire does occur within or adjacent to the natural area it is quickly extinguished due to the threat it poses to adjacent developed areas. Controlled, prescribed fire and mechanical fuel reduction activities will be used at this site to help maintain the existing fire-dependent communities and reduce the risk of damage from wildfire on the adjacent developed areas.

ERM has assumed the primary responsibility for prescribed burning at the natural area. Assistance in the form of firefighting staff and equipment will be requested from Palm Beach County Fire Rescue and the City of West Palm Beach's Fire-Rescue Department. Additional assistance may be provided by Florida Department of Agriculture and Consumer Services' (FDACS) Florida Forest Service (FFS), Palm Beach County Parks and Recreation Department, FWC, The Nature Conservancy and trained volunteers. Fire-related safety training is required of anyone participating in a prescribed burn. All prescribed burns will comply with Section 590.125(3), Florida Statutes (Certified Prescribed Burning; Legislative Findings and Purpose).

ERM has written a flexible fire management plan for the natural area (Appendix G). The fire management plan takes into consideration surrounding land uses, smoke management concerns, safety issues, and the ecological benefits and consequences of the specific fire management strategies. It contains specific tools and management practices designed to minimize adverse impacts to native vegetation and wildlife, while maximizing the beneficial effects of prescribed burns. A specific burn plan will be prepared for the proposed burn area prior to conducting a prescribed burn.

Development-related smoke management concerns dictate extremely narrow weather conditions in which prescribed burning may take place at the natural area. Mechanical reduction of vegetation may be used as a surrogate for fire if a given area/habitat cannot be burned.

Surveys for fire-intolerant listed plant species will be conducted before each prescribed burn. If deemed appropriate, fire-intolerant plants may be relocated outside the burn area. If relocation is not practical due to the presence of hard-to-relocate species or larger populations of listed plants a temporary firebreak may be created to protect the area that contains the listed species from the planned burn. These relatively small unburned areas will increase the diversity of the site. A permit will be obtained for the relocation of a listed plant species when required.

At this site, Management Units 1 through 3, and 5 through 8 have been designated as “burn management units” (burn units) (Figure 4). Depending on the specific conditions and objectives of a burn, a burn unit may be subdivided into smaller subunits to reduce smoke concerns or provide specific habitat benefits. Staff also may investigate the use of micro-burns to help restore habitat and increase species diversity.

Each burn unit was designed so that fire would burn through ecotones and move in a natural, spotty fashion across the landscape. The resulting patchwork of burned and unburned areas will produce a mosaic of vegetation at various stages of maturity, thereby maximizing diversity within and among the various plant communities. This will provide habitat for species that typically use, or may even be restricted to, communities in a particular state of maturity.

The burn interval for each of burn unit was chosen based on the predominant natural community present in that unit. An interval of 5 to 8 years was selected for Management Units 2, 3, 5, 6 and 7 which are dominated by mesic flatwoods and disturbed mesic flatwoods. An interval of 2 to 3 years was selected for Management Unit 1 which is dominated by disturbed mesic hammock and wet prairie. A burn interval of 5 to 8 years was selected for Management Unit 8 which is dominated by basin marsh and depression marsh. Although burn intervals of 2 to 3 years, 2 to 4 years and 1 to 5 years are recommended for wet prairie, mesic flatwoods and depression marsh communities (FNAI 2010), respectively, these shorter intervals are not currently attainable due to resource limitations, and site-specific smoke management and safety concerns that severely limit weather conditions under which prescribed burning may take place. The burn return interval will be shortened if weather conditions, funding opportunities and resources allow.

As of June 2016 no prescribed burns had been completed at the natural area due to the presence of numerous smoke-sensitive areas in the vicinity of the site.

All of the burn units within the natural area are scheduled to be burned within the next ten years. The proposed burn schedule for this site is as follows: Unit 1 in 2017, Unit 3 in 2018, Unit 2 in 2019, Unit 1 in 2020, Unit 8 in 2021, Unit 7 in 2022, Units 1 and 6 in 2023, Unit 5 in 2024, and Units 1 and 3 in 2026. This schedule is conditional upon weather conditions and how many, if any, smoke related issues are experienced during the each of the scheduled burns. Management

Units 5, 6 and 7 are directly adjacent to the Florida Turnpike and will be very difficult to burn. These burn units may be treated solely with mechanical vegetation reduction methods. Management Unit 8 will not be burned for at least five years to allow the shallower portions of the 155-acre created wetland to become fully-vegetated before they are treated with prescribed fire.

When the use of prescribed fire is not feasible/permitted ERM will strive to create a mosaic of natural communities and successional stages, and reduce the risk of catastrophic wildfire through the use of mechanical vegetation reduction methods, subject to and contingent upon annual budgetary funding and appropriations by the BCC. This methodology uses a machine to reduce (grind or shred) vegetation into mulch-sized chips. The mulch chips are then left in place to allow for the recycling of nutrients. Management Units 2, 3, 5, 6 and 7 were treated using mechanical vegetation reduction methods in either 2013 or 2014.

The risk of wildfire also may be reduced through the thinning of unnaturally-dense slash pine stands. Under this method, a timber harvester pays the County for the right to cut down and physically remove excess pine trees from the portions of the natural area that have been targeted for thinning by the site manager. Slash pines are reduced to densities that mimic those found in natural communities where fire has not been suppressed for an extended period of time. Excess slash pines were removed from Management Units 2, 3, 5, 6 and 7 in 2014.

There have been two wildfires within the natural area since it was acquired. The wildfires occurred in April 2015 and August 2015. The first fire occurred in Management Unit 7. The second occurred in Management Unit 2. Both fires were the result of lightning strikes. The first fire burned less than an acre before being put out by FFS; the second fire affected approximately 100 square feet and was put out by falling rain.

If a wildfire occurs on the site in the future, the appropriate actions will be taken by the authorized fire emergency response agency. Active fire suppression measures will only be used if deemed necessary by that agency since they are extremely destructive to vegetation and other natural features. If such measures are undertaken to control a fire, all plow lines will be backfilled after the fire has been extinguished, and disturbed areas will be rehabilitated to the greatest extent possible.

A public education campaign has been developed for this natural area. This campaign includes informing the adjacent residents and business owners of the necessity and benefits of fire, the safety features of prescribed burning versus wildfires, and the strategies that will be developed to minimize the impacts of smoke on the nearby developed areas. The County will coordinate with the appropriate fire emergency response agencies and FDOT prior to conducting a prescribed burn. If requested, county staff will meet with local community groups such as homeowners' associations to coordinate with residents, provide information on the necessity of conducting prescribed burns, and describe the safety precautions that will be taken to protect adjacent lands.

4.3.2 Invasive/Nonnative Plant Control

Like many fragmented conservation lands in southeastern Florida, the natural area has been invaded by a number of nonnative plant species. To date, 69 species of nonnative plants have been recorded at the natural area – 25.8 percent of the plant species recorded (Appendix A). Many of these species were brought to the site by animals (especially birds), or spread from adjacent properties or from vegetation piles that were dumped on the site prior to its acquisition. Many species were recorded prior to the implementation of the invasive/nonnative plant control program and may no longer be present. Nonnative plant species are expected to continue to colonize the site from surrounding properties; periodic invasive/nonnative plant control treatments will be required to prevent these species from adversely affecting the natural area.

A number of the nonnative, and some native, plant species recorded at the natural area exhibit invasive tendencies. In this management plan, the phrase “invasive plant species” includes the plants designated as Category I (invasive) and Category II (potentially invasive) by Florida Exotic Pest Plant Council (FLEPPC 2015), those designated as noxious weeds, or Class I or Class II prohibited aquatic plants by FDACS (2014 and 2008, respectively), as well as native plant species that are harmful to other native vegetation (such as love vine [*Cassytha filiformis*]) or that are too dense or inappropriate for the targeted vegetation community. Invasive nonnative plant species pose a serious threat to the natural communities and listed species found at the site, and are a major management concern.

Thirty-six (52.2 percent) of the nonnative plant species recorded at the natural area are designated as either Category I or Category II species by FLEPPC (2015). A current copy of FLEPPC’s list of invasive exotic plant species can be found at <http://www.fleppc.org/list/list.htm>. Eleven (15.9 percent) of the nonnative plant species have been designated as noxious weeds by FDACS (2014) and five (7.2 percent) have been designated as either Class I or Class II prohibited aquatic plant species (FDACS 2008). All of these species are identified in Appendix A.

The control of nonnative and invasive native plant species is a high priority at this site. A multi-phase invasive/nonnative plant control program began in September 2006 and was completed in December 2011. Follow-up invasive/nonnative plant treatments have been conducted on an as-needed basis since 2012. The site is now in maintenance condition. A site is considered to be in “maintenance condition” when the coverage of invasive plant species does not exceed 1 percent of the canopy or understory layers within any given management year. In addition to invasive nonnative plant species, invasive native species also can have an adverse impact on fragmented natural communities. Native plant species that have an adverse effect on other native species at the natural area, or are too dense or inappropriate for the targeted vegetation community, may be targeted for eradication/control until such time that the invasive native species is no longer having an adverse impact on the site.

Methodologies used to control/eradicate invasive nonnative and invasive native plant species at the natural area may include mechanical removal, herbicidal treatment, hand removal and the use

of periodic prescribed fire. Biological control methods may be used on a case by case basis. Ruderal species, which are typical of open disturbed sites and do not invade functioning natural communities, are controlled through prescribed burning and avoiding unnecessary disturbances.

Mechanical removal methods typically are used to remove accessible, dense stands of highly-invasive nonnative trees such as Australian-pine, Brazilian pepper and melaleuca. The tree and its root system are mechanically removed, then chipped for on-site use or off-site disposal. Any outlying sprouts or resprouts from root remnants are treated with herbicides. Mechanical removal methods were used at the natural area in 2003 to create trails through thick Brazilian pepper stands within the central portion of the natural area, and again between 2006 and 2008 to remove approximately 181 acres of dense Brazilian pepper, melaleuca and Australian-pine from the natural area.

Herbicidal treatments typically are used to control/eradicate individual and scattered invasive/nonnative trees, shrubs and palms; inaccessible (by heavy equipment) dense stands of invasive/nonnative trees; and invasive/nonnative vines and groundcover species. Aquatic plant species that become problematic at the site may be controlled using an appropriate aquatic herbicide. Herbicidal application methodologies include hack-and-squirt, cut-stump, basal bark, foliar treatments and broadcast spraying. Hack-and-squirt, cut-stump and basal bark methods are typically used to control/eradicate individual and scattered nonnative trees, shrubs and palms. Foliar treatments are used for invasive/nonnative vines, and for small patches of invasive/nonnative grasses, sedges and forbs. Broadcast spraying is primarily used for larger areas of invasive/nonnative grasses, sedges and forbs. Invasive/nonnative plant species which are resistant to herbicides or which easily resprout from basal mats, roots or vegetative fragments may require repeated herbicide application before the species is eradicated from an area. All herbicide treatments comply with the instructions on the herbicide label, are applied under the supervision of a licensed applicator and employ Best Management Practices for their application.

Hand removal is used to remove seedlings of invasive/nonnative tree and shrub species. Since tree and shrub seedlings are not reproductive, they typically are pulled out of the ground and left to decompose on site after the soil has been shaken from the roots of the plant.

Hand removal also may be used in combination with herbicide treatments to treat invasive/nonnative vines, as well as invasive/nonnative plants that are resistant to herbicides. In the case of invasive/nonnative vines, the targeted vine is cut at an appropriate height. The base is then hand-pulled or treated with a systemic herbicide; vine stems are either removed from the supporting plant or left to decompose in the trees. In the case of plants that are resistant to herbicides, hand removal may be used as the sole plant control method or it may be used as a follow up method to remove plants that are still alive following an herbicidal treatment.

Finally, hand removal may be used to help control plant species that readily reestablish from seed (for example, rose natalgrass (*Melinis repens*) and thalia lovegrass [*Eragrostis atrovirens*]) or that resprout from vegetative fragments (for example, air potato [*Dioscorea bulbifera*],

American evergreen [*Syngonium podophyllum*], arrowleaf elephant's ear [*Xanthosoma sagittifolium*], golden pothos [*Epipremnum pinnatum*] and nightblooming cactus [*Hylocereus nudatus*]). In these cases, the seedheads and vegetative parts of the invasive/nonnative plants are bagged and removed from the site.

4.3.3 Nonnative/Nuisance Animal Control

Nonnative and nuisance (feral and certain native species) animals can be a problem on sites like the natural area. The presence and impacts of nonnative/nuisance animals will be monitored as part of the systematic and opportunistic wildlife surveys. Targeted surveys for nonnative/nuisance animals also may be undertaken if additional information is required. Nonnative/nuisance animal control programs will be developed and implemented, as necessary, to control species that adversely affect the natural area.

Thus far, four species of invertebrates and five species of vertebrates recorded at the natural area are not indigenous to the South Florida mainland (see Appendix B). Native vertebrate species recorded at the natural area that may become a nuisance include the coyote and raccoon. A short description of the potentially harmful nonnative invertebrate species and all nonnative/nuisance vertebrate species found on the natural area is provided below. No control methods will be undertaken for species identified below as having no significant impact on the natural area.

None of the nonnative invertebrate species recorded at the natural area appear to be having a negative effect on the natural communities. Therefore, no control methods are proposed for these species at this time. The use of a biological control may be considered if one becomes available for the lobate lac scale (*Paratachardina pseudolobata*) as this species may have a significant adverse impact on native vegetation within the natural area. The other nonnative invertebrate species either are not having a negative effect or are having a positive effect on the natural area (for example, the melaleuca psyllid [*Boreioglycaspis melaleucae*] and melaleuca snout beetle [*Oxyops vitiosa*] are beneficial insects that were purposely released to provide biological control of melaleuca [Cuda et. al 2009, Wineriter et al. 2003, Wood and Flores 2002]).

The blue tilapia (*Oreochromis aureus*) is widespread and abundant in lakes, ponds, rivers, streams and canals throughout the state; it also is tolerant of saltwater and is present in some nearshore marine habitats (FWC undated[a]). This species feeds primarily on plankton and small organisms living in or on bottom detritus. This fish is frequently observed in the created wetland. There currently are no feasible methods to eradicate this species from ditches and/or canals within or adjacent to the natural area or to prevent it from being reintroduced via connections with adjacent water bodies.

The brown anole (*Anolis sagrei*) has become the most abundant anole in South Florida (FWC undated[b]). This prolific species is well-adapted to habitats modified by humans and can live in most inland and coastal habitats, including disturbed areas (FWC undated[b]), Meshaka et al. 2004). Although its primary diet is insects, the brown anole also eats hatchling green anoles; this

predation appears to have caused a rapid decline in the population of the native green anole in Florida. This species is occasionally observed at the natural area. Potential control efforts for this species will be explored in the future if it is determined that it is having a negative effect on the natural area.

The brown basilisk (*Basiliscus vittatus*) is a long-limbed, fast-moving lizard that can run on its hind legs (Bartlett and Bartlett 2011, FWC undated[c]). This species is commonly present along canals and pond edges, in agricultural habitats, and in low-density suburban areas (Bartlett and Bartlett 2011b, FWC undated[c], Meshaka et al. 2004). This lizard primarily feeds on invertebrates, but may eat some fruits; it is prey for various species of snakes (Meshaka et al. 2004). It is occasionally observed at the natural area. Potential control efforts will be explored in the future if it is determined that the brown basilisk is having a negative effect on the natural area.

The coyote was introduced in north Florida, beginning in the 1920s (Coates et al. 1998, FWC undated[d]). It began spreading eastward from Texas at about the same time (FWC undated [d]). This species now occurs statewide and is considered to be a native species by FWC (McCown and Scheick 2007). Coyotes prefer open brushy land that is not heavily wooded; they use hollow logs, brush piles or burrows, or dig dens for shelter and to raise young (FWC undated[d]). The impact of the coyote on native animals is not well quantified, other than sea turtle nests and gopher tortoises, and the harm or benefit to them is under debate. The coyote appears to fill an ecological niche left open by the extirpation of the native red wolf (McCown and Scheick 2007). Coyotes are opportunistic omnivores; they eat whatever animal or plant material is most abundant, including sea turtle eggs in late spring and early summer, and saw palmetto berries in late summer and early fall. This species is occasionally observed at the natural area. Although coyotes may provide a benefit to the natural area by preying on feral cats and raccoons, there is a concern that they could have a significant negative impact on native wildlife, including ground-nesting birds and gopher tortoises. Wildlife cameras and opportunistic surveys will be used to monitor the coyote population at the natural area and determine if any actions need to be taken to control this species.

The European starling (*Sturnus vulgaris*) is associated with disturbed sites and urban environments, as well as open grassy or agricultural areas (FWC undated[e], Johnson and Givens 2012). This medium-sized songbird is omnivorous; it feeds on a wide variety of invertebrates (such as beetles, insects, earthworms and spiders), as well as seeds, plants and fruits. It is a cavity nester, and can aggressively displace native bird species from nest holes in trees, human-made structures and artificial nesting boxes. This species is rarely observed at the natural area. Due to the limited amount of habitat available for cavity-nesters on the site, this species is not expected to have a significant negative impact on native bird species at the natural area.

The nine-banded armadillo (*Dasypus novemcinctus*) inhabits dense shady areas such as brush, woodland or pine forests, and prefers areas with sandy or loamy soils that are easy to excavate (Schaefer and Hostetler 2012). It feeds primarily on insects and their larvae, but also eats

earthworms, scorpions, spiders, snails, small invertebrates and their eggs. Armadillos are carriers of diseases such as St. Louis encephalitis, leptospirosis, arboviruses and leprosy (FWC undated [f]). This species is occasionally observed at the natural area. Armadillos do not appear to be having a significant adverse impact on the natural area.

The raccoon is common throughout Florida (FWC undated[g]). It feeds on fruits, plant material, eggs, crustaceans, small animals and garbage. Raccoons are found wherever suitable combinations of woods and wetlands provide acceptable food and den sites, from swamps and marshes to mesic woods, cultivated areas and urban situations (Whitaker and Hamilton 1998). This species is considered to be one of the primary carriers of the rabies virus in the United States; it also may carry roundworm (*Baylisascaris procyonis*) and leptospirosis both of which can infect humans (FWC undated[h], Humane Society of the United States 1997). This species is occasionally observed at the natural area. Wildlife cameras and opportunistic surveys will be used to monitor the raccoon population at the natural area and determine if any actions need to be taken to control this species.

4.3.4 Restoration and Enhancement Projects

The restoration and enhancement of natural communities within the natural area has begun and is expected to be completed in 2017. Activities conducted to date include the development of a prescribed burn program and the implementation of mechanical vegetation reduction and pine thinning activities designed to reduce fuel levels, and create a mosaic of natural communities and successional stages within the site (see Section 4.3.1); implementation of invasive/nonnative plant and nonnative/nuisance animal control programs (see Sections 4.3.2 and 4.3.3, respectively); installation of native plantings (see Subsection 4.3.4.1); completion of one wetland creation project (see Subsection 4.3.4.2); construction of one hydrological restoration project (see Section 4.3.4.3); and removal of trash dumped on the site prior to its acquisition by the County.

One additional restoration/enhancement project is proposed for the east-central portion of the site (see Section 4.3.4.4). This project will be designed to further improve the hydrology and the ecological value of a portion of the natural area. The project is expected to be completed by the end of 2017. Habitat and hydrological restoration projects, and large-scale restoration/enhancement plantings completed at and proposed for this site are described in the following sections and depicted in Figure 5.

Restoration/enhancement activities conducted to date have already begun to improve the natural communities on the site in terms of biological composition and ecological function. However, it will take several years for planted native vegetation to mature and for additional native plants to recruit into the restored/enhanced areas. Once this has happened, restoration of the site will be considered complete.

4.3.4.1 Native Plantings

Native plantings conducted on the site between 2003 and 2016 included vegetation salvage, offsite mitigation and general restoration planting projects. Native planting projects completed to date are described below.

Over 2,390 cabbage palms, live oak, laurel oak and pond-cypress salvaged from offsite road widening projects and/or the onsite wetland creation project were planted on or relocated at the natural area, respectively, between 2002 and 2009. Just over 790 cabbage palms were planted along the northeastern perimeter of the site to visually screen the natural area from Haverhill Road, Dyer Road and the nearby veteran's hospital. Another 1,403 cabbage palms were relocated from the wetland creation area to open areas in the three southern tree islands, and along the southeastern perimeter of the site and perimeter of the 155-acre created wetland. A total of 173 tree spade units (mostly pond-cypress), and 24 large live oaks and laurel oaks were salvaged from the wetland creation area and replanted in open, disturbed areas along the southern and eastern edges of the site.

Mitigation plantings for six offsite development projects were completed at the natural area between 2003 and 2011. In 2003, a 3-acre area in the northeastern portion of the site was mowed and planted with 4,350 native plants as mitigation for the removal of native vegetation at an offsite development project. Unfortunately, the plants were not watered by the contractor following their installation and very few survived. Between May 2010 and May 2011 over 4,220 native trees were planted within the natural area as mitigation for the removal of native trees at five offsite development projects. These trees were installed in portions of the created depression marsh, disturbed mesic flatwoods, disturbed mesic hammock and disturbed wet prairie communities in an effort to "jump-start" the restoration of those areas (Figure 5). A total of 20 acres of trees were planted at no cost to the County. The species planted included: bald-cypress, dahoon, laurel oak, live oak, pond apple, pond-cypress, red bay (*Persea borbonia*), red maple, slash pine, swamp bay and sweetbay.

Several general (non-salvage, non-mitigation) restoration plantings were completed by the County between 2003 and 2014 (Figure 5). All of these plantings were funded by the County. Between 2003 and 2004 county staff and community volunteers planted approximately 100 strangler fig trees and 50 shrubs (coco plum, firebush [*Hamelia patens*] and myrsine), and 350 slash pine, dahoon, live oak and red maple saplings in between the cabbage palms in the northeastern portion of the site. Then in 2012 a native seed mix was spread over 20± acres of disturbed herbaceous uplands and wetlands to help restore portions of the former EPB-9 and EPB-9A canal right of ways, and areas with very little natural recruitment. This project was successful in restoring a native groundcover layer in about 80 percent of the area that was treated. In 2013 sand cordgrass was planted in several areas (approximately 4 acres total) that were unsuccessfully treated with the native seed mix. Approximately 40,000 native wetland plantings were installed within the basin marsh portion of the created wetland in 2012 to provide a vegetative buffer around potential bird rookery islands and help delineate the canoe/kayak trail.

The main species used in these plantings included fireflag, giant bulrush (*Schoenoplectus californicus*), softstem bulrush, spatterdock, Gulf coast spikerush (*Eleocharis cellulosa*), tapegrass (*Vallisneria americana*), American white waterlily and yellow waterlily (*Nymphaea mexicana*). An additional 50,000 wetland plantings were installed within the created wetland in 2013 and 2014 to further delineate the canoe/kayak trail and help increase the vegetation coverage. The plants - primarily fireflag, giant bulrush, pickerelweed, Jamaica swamp sawgrass and spatterdock - were installed in deep and shallow marsh areas.

4.3.4.2 Wetland Creation

When the County-owned portion of the natural area was purchased in 2001, the County agreed to allow the prior owner, CFC, to harvest to 3.2 million cubic yards of fill from the site in exchange for the creation of a large deep-water lake and wetland creation area (see Section 1.9). However, CFC never began construction on the lake/wetland creation project. In 2005 CFC asked to be released from all of its contractual obligations under the lake/wetland creation agreement. The County agreed and the agreement was terminated in September 2005.

Once the agreement with CFC was terminated, the County modified the wetland creation project to create a smaller, shallower open water area in place of the large, deep-water lake. The final project design included a broad range of wetland elevation levels to maximize wading bird foraging opportunities throughout the year. The design also preserved several tree islands to provide roosting areas for birds and created an unvegetated sand/shell island to encourage shorebird nesting at the natural area.

Excavation of the 155-acre wetland creation project started in April 2009 and was completed in June 2010. The project created approximately 53.1 acres of basin marsh, 78.5 acres of depression marsh, 22.3 acres of open water and a 1.1-acre sand/shell island (Figure 3). Natural recruitment of native wetland vegetation has occurred, and supplemental native plantings were installed to increase the vegetation coverage and provide greater species diversity (see Section 4.3.4.1).

As required by the wetland creation permit, a portion of the fill excavated from the wetland creation project was used to create berms (minimum elevation of 17 feet NGVD) around the perimeter of the created wetland and the County-owned portion of the natural area (see Section 5.5). The rest of the excavated fill was used to build an emergency dune restoration project on Singer Island or sold to SWA to help pay for the wetland creation project. Additional funding for the wetland creation project came from a \$1.5 million NRCS grant to restore agricultural lands.

4.3.4.3 Hydrological Restoration

A single hydrological restoration project was constructed within the natural area between 2009 and 2010. The purposes of the project were to: 1) reduce or eliminate surface water losses due to

the EPB-9, EPB-9A, EPB-10 and Turnpike canals; 2) increase surface water inflows into the natural area; 3) raise the control elevation in the main portion of the natural area; and 4) continue to provide flood protection for the surrounding properties.

Three large canals were constructed through (EPB-9 and EPB-9A canals) or adjacent to the natural area (EPB-10 Canal) prior to its acquisition by the County. All three of these canals had control elevations of 9 feet NGVD (Tomasello Consulting Engineers, Inc. 2000). Together they lowered ground water levels within the natural area by an average of 6 feet (from approximately 15 to 9 feet NGVD). This lowering of ground water elevations within the natural area resulted in the loss of nearly all of the former wetland areas on the site prior to its acquisition by the County.

In order to mitigate for the adverse effects of the EPB-9 and EPB-9A canals the County filled in the portions of the canals lying within the natural area boundaries (Figure 5). Approximately 10.4 acres of former canal right of way were filled and recontoured to match the surrounding natural grade. Surface waters that once flowed from Dyer Park and the Turnpike Canal into the EPB-9 and EPB-9A canals before being discharged from the site now discharge into, and are retained within, the created wetland. Now, the only times surface waters are discharged from site are when water levels within the created wetland exceed 13.5 feet NGVD and when water levels are intentionally reduced to facilitate planned management or restoration activities.

Although water levels within the southern portion of the natural area are adversely affected by the presence of the EPB-10 Canal, geotechnical investigations and seepage studies conducted on behalf of the County determined that the installation of a seepage barrier north of the canal would not be cost-effective. Due to the lack of a confining layer in the underlying soils, the seepage barrier would have to extend nearly 17 feet below the existing ground level in order to be effective at preventing seepage losses (Cook 2006). Because the financial costs and environmental impacts associated with installing a seepage barrier that would extend 17 feet underground were very high, the County decided against its installation.

Instead, the County decided to limit the amount of seepage losses occurring in the southwestern portion of the site and increase surface water inflows into the natural area through the construction of an operable water control structure within the EPB-10 Canal, and the extension of the Turnpike Canal to connect to the EPB-10 and Northwest canals (see Section 5.5; Figure 5). The EPB-10 water control structure was designed to raise the control elevation within the western portion of the canal from approximately 9.0 to 14.8 feet NGVD (when the gate is in the closed position). The increased water levels within the western portion of the EPB-10 Canal have greatly reduced the amount of groundwater seeping out of the southwestern portion of the natural area. The construction of the EPB-10 water control structure and the new canal connections also helped mitigate for seepage losses by allowing the County to direct excess surface waters from the SWA property into the created wetland area, via the Turnpike and Northwest canals.

The control elevation for the main portion of the natural area was raised through the construction of an operable water control structure in the southeastern portion of the wetland creation area and a fixed weir within the Northwest Canal (see Section 5.5, Figure 5). Prior to the hydrological restoration project, the control elevation for the natural area was approximately 9 feet NGVD. The addition of these two structures, along with the filling in of the former EPB-9 and EPB-9A canals, raised the control elevation of the main portion of the natural area to 13.5 feet NGVD.

The final components of the hydrological restoration project were two berms. One of the berms was constructed around the wetland creation area; the other berm was constructed around the perimeter of the County-owned main tract. These berms were designed to help retain water within the wetland creation area and the main tract of the natural area, respectively. They also were designed to provide flood protection for the surrounding properties.

The hydrological restoration project was very successful. It raised the control elevation of the main tract of the natural area from approximately 9 feet to 13.5 feet NGVD. The project also raised water levels and/or extended hydroperiods within the site's created basin marsh and depression marsh natural communities, as well as within its naturally-occurring dome swamp, strand swamp, wet flatwoods and wet prairie natural communities. And lastly the project has continued to provide flood protection for the surrounding properties.

4.3.4.4 Wetland Re-creation/Water Retention Area

The only restoration project not yet completed at the natural area is an approximate 3.6-acre herbaceous wetland re-creation/water retention project (the "wetland/retention area") (Figure 5). The wetland/retention area will take the place of three water retention ponds that were to be constructed within the present-day natural area as part of a road widening project that was proposed in the late 1980s. Although an easement for the previously proposed retention ponds was acquired by the County's Engineering Department in 1991, the road widening project was not constructed at that time. The retention pond easement merged with the property's title when ERM acquired the property for environmental purposes in 2001. In 2010 ERM and the County's Engineering Department agreed to create a single wetland/retention area to collect, treat and store stormwater runoff from the road widening project in lieu of constructing one or more stormwater retention ponds within the natural area.

Pursuant to the 2010 agreement, pretreated stormwater from Haverhill Road will be funneled from the roadway, through a series of structures and improvements (see Section 5.5) and into the wetland/retention area within the east-central portion of the natural area. Ground elevations within the proposed wetland/retention area will be lowered 1 to 3 vertical feet to help retain the stormwater and create conditions that are favorable for the re-creation of a viable herbaceous wetland habitat within, and adjacent to, the wetland/retention area. Appropriate native wetland plant species will be planted, as needed, to help ensure the establishment of native herbaceous wetland vegetation within the re-created wetland.

4.4 SECURITY

The City has the primary responsibility for public safety and law enforcement at the Winding Waters Natural Area, including routine patrols of the boundaries. The County also has contracted with the Sheriff's Office to have Wildlands Task Force deputies conduct extra patrols of the natural area when needed. The Wildlands Task Force is a specially-trained and specially-equipped unit that was formed to prevent illegal activities, such as dumping, on natural areas managed by the County and to enforce the provisions of the Natural Areas Ordinance. There is no on-site manager or security guard and no on-site staff residence. ERM staff, trained volunteer site stewards and/or neighborhood watch groups (where available) visit the site on a regular basis and report any signs of illegal and prohibited activities to the Wildlands Task Force.

The County's Natural Areas Ordinance regulates public use of the natural area. The ordinance provides for passive recreational activities (for example, hiking, nature study and photography), environmental education and scientific research. It prohibits destructive uses such as OHV use, dumping, and poaching of plants and animals. The ordinance gives law enforcement personnel the authority to fine and/or arrest persons damaging a natural area. Dumping on public lands also is prohibited by state law (state statute 403.413) and by Chapter 74 of the Code of Ordinances of West Palm Beach.

The natural area is open to the public daily from sunrise to sunset. Access hours are posted at each public entrance. In addition, regulatory signs have been posted at each corner of the natural area and every 500 feet along the perimeter of the natural area. The signs state that the site is a protected natural area and cite the appropriate county ordinance.

The northeastern, eastern and western boundaries of the site are fenced to help prevent unauthorized access to the natural area (see Section 5.2). Although the northwestern and southern boundaries are not fenced, the adjacent canals are deep enough to prevent vehicular access and deter unauthorized pedestrian access to this site. County Parks and Recreation Department staff is responsible for opening and closing the gate on Dyer Boulevard which provides access to the parking lot for the natural area.

4.5 STAFFING

Because of the following factors, on-site staffing is not proposed for this natural area:

- the low-impact, non-consumptive activities allowed on the site require limited oversight by staff;
- the site is closed from sunset to sunrise;
- sufficient security measures (fencing, regulatory signage, Wildlands Task Force) are in place to protect the site when it is closed to the public;
- ERM staffing levels are insufficient to provide on-site staffing at any of the County's natural areas; and

- construction and use of a permanent office or residence for on-site staff would adversely affect the site's natural resources.

Instead, ERM has created a roving management team that is trained to conduct all levels of management activities, including invasive/nonnative vegetation control, prescribed burning, mechanical vegetation reduction activities and environmental monitoring. ERM also has created a volunteer site steward program. These trained volunteers periodically visit their assigned site and provide feedback to staff regarding the site's condition and any problems noted. Volunteers from local citizens' organizations, businesses and schools provide additional support where feasible and necessary.

4.6 COORDINATION WITH ADJACENT LAND MANAGERS

The only large conservation area adjacent to the natural area is Dyer Park (Figure 1). Other large conservation areas in the vicinity of the natural area include the City's Grassy Water Preserve and Apoxee Park, and SWA's Preserve. Review of this management plan by the County's Parks and Recreation Department was facilitated by the staff member who serves on NAMAC. ERM staff has and will continue to coordinate with adjacent and nearby conservation land manager(s) whenever proposed hydrological changes or other management activities, such as prescribed burns and nonnative/nuisance animal control, could affect an adjacent conservation land.

4.7 GREENWAY CONNECTIONS/MANAGEMENT

The Winding Waters Natural Area is 1 of 35 conservation lands and parks that lie within the Northeast Everglades Natural Area (NENA). NENA includes approximately 165,000 acres of conservation lands in northern Palm Beach County and southern Martin County; it is a cooperative effort among partnering land managers and educational centers to link conservation lands, parks and activity/education centers through a system of designated and thematic elements. Development and management of the natural area has helped implement the NENA master plan by creating public use facilities that provide for and encourage recreational uses that do not harm the exiting natural resources. The County will coordinate with agencies managing other conservation lands within NENA to ensure that the natural area is managed as part of a linked conservation lands system. A map and other information about NENA may be found on ERM's website at <http://www.co.palm-beach.fl.us/erm/nena/>.

The natural area also has been designated as part of the Florida Greenways and Trails System. The Florida Greenways and Trails designation program was established to further the purposes, goals and objectives of the Florida Greenways and Trails System; ensure an inclusive and interconnected system of greenways and trails; encourage voluntary partnerships in conservation, development and management of system components; provide recognition for individual components of the system and those partners involved; and raise public awareness of the conservation and recreation benefits of the system components.

The proposed multi-use trail along the eastern boundary of the natural area will facilitate pedestrian and bicycle access to and from neighborhoods south of the EPB-10 Canal to Winding Waters Natural Area and Dyer Park. It also will help link sites south of the EPB-10 Canal with a proposed multi-use (pedestrian/bicycle) trail designed to connect existing trails within Dyer Park to existing trails within the SWA Preserve and Grassy Waters Preserve.

4.8 PUBLIC OUTREACH, ENVIRONMENTAL EDUCATION AND SCIENTIFIC RESEARCH

ERM has a very active public outreach and environmental education program. To help members of the public become invested in the natural area, numerous volunteer opportunities, environmental education events and resource-based recreational activities are provided each year. These events may be led by ERM staff or by volunteer community groups, clubs, businesses and/or knowledgeable individuals. Volunteer opportunities may include trash pickups, removal of nonnative/invasive plant species, trail maintenance, environmental restoration projects, etc. Environmental education events may include informational discussions on natural communities, native or nonnative plant or animal species, land management techniques or the effects of man on natural ecosystems; species surveys/inventories; educational programs for school use; etc. Activities that encourage members of the public to get out and enjoy the resource-based recreational opportunities afforded by the natural area may include guided walks/hikes or canoe/kayak tours, running or biking events, group equestrian rides, kids catch and release fishing tournaments, star gazing, etc.

Interpretative exhibits have been prepared and installed in a large kiosk located adjacent to the parking lot, and in five mini kiosks located adjacent to the four trail shelters and near the eastern end of the elevated boardwalk. These exhibits help educate the public about the natural resources present on the site, the negative impacts of nonnative/invasive plants and nonnative/nuisance animals, any restoration/enhancement projects that have been undertaken at the site, ongoing management activities such as prescribed fire and/or mechanical vegetation reduction activities, and/or any other relevant topics.

Information related to the site's natural resources, location, size and any existing public use facilities/recreational amenities, as well as links to the site's trail guide, current management plan, any restoration project summaries, photo album and Channel 20 Naturescope program may be found on ERM's Winding Waters Natural Area webpage at: <http://www.pbcgov.com/erm/natural/natural-areas/winding-waters/>. Information on how to obtain a free natural areas map application for mobile devices may be found at: www.pbcgov.com/erm/mobile-maps. Printed copies of the site's trail guide are available in a brochure box attached to the kiosk that is adjacent to the parking lot.

A half-hour Naturescope program about the natural area was filmed by the County's public access television station in 2010 and 2011; the program is shown periodically on Channel 20.

The program also may be viewed at any time via a link at the bottom of the Winding Waters Natural Area webpage.

ERM staff will request that FWC include the Winding Waters Natural Area in the South Florida section of the Great Florida Birding and Wildlife Trail when that section of the trail is updated.

No specific research needs have been identified for this site. ERM does not anticipate performing any scientific research other than compiling and interpreting the data from monitoring activities, but will allow researchers affiliated with local institutes of higher learning, botanical gardens and government agencies to conduct scientific research on a permit basis.

4.9 RESPONSE TO SIGNIFICANT EVENTS

If a natural or human-caused event severely damages structures or native vegetation, or alters the natural values of the site, ERM staff will assess the nature of the damage/alteration and take actions necessary to protect the public and minimize/mitigate impacts to the site. The first priority following a significant event will be to secure the site to ensure public safety and prevent dumping, vandalism and unauthorized vehicular use. If hazardous conditions exist, the natural area will be closed to the public until such conditions have been eliminated. The site also may be closed until public use facilities have been repaired. Damaged/altered native plant communities will be managed to encourage natural regeneration following such an event. Management practices will be adjusted, if necessary, to accommodate the new conditions at the site. The County will inform RTP and/or NRCS about any impacts caused by the event, and any actions designed to help restore damaged/altered natural resources and/or public use facilities. If the natural values of the site are severely limited or eliminated, the County and NRCS will discuss future plans for the site. All significant events affecting the natural area will be discussed in the next ASE. The event also will be summarized in the next update to the management plan.

4.10 CLIMATE CHANGE

The natural area will help address climate change in the following ways:

- The preservation and restoration/enhancement of existing plant communities will help reduce greenhouse gases by converting carbon dioxide to oxygen.
- The restored/enhanced plant communities will serve as a refuge for wildlife affected by climate change-induced habitat losses.
- The restoration/enhancement of historic wetlands will reduce carbon dioxide releases caused by over drainage of the associated wetland soils; rehydration of these wetland areas will help rebuild carbon stores within the soils.

- The created wetland area will act as a new carbon “sink” where one did not previously exist, thereby increasing the carbon stores and reducing local carbon dioxide levels.
- The proposed and completed hydrologic restoration activities will allow the site’s wetlands to hold more water for longer periods of time, thereby reducing the effect of changes in rainfall patterns on wetland dependent plant and animal species.
- The extra water stored in the wetlands will help recharge the underlying aquifer, thereby helping to mitigate and reduce impacts that may occur to the aquifer due to changes in rainfall patterns.

5. SITE DEVELOPMENT AND IMPROVEMENT

All structural improvements and major land alterations were done in compliance with applicable local, state, regional and federal laws and regulations. All required licenses and permits were obtained prior to the commencement of any construction, native vegetation removal, or major land alterations on the natural area. All of the existing and proposed improvements were and will be constructed in disturbed portions of the site to the greatest extent feasible. The location of each improvement was and will be surveyed for listed species prior to the construction of that facility. If any listed species were found within the construction area, the location of the improvement was adjusted to avoid impacts to the listed species, or the listed species was relocated to a safe location on the natural area.

The County is responsible for maintaining all public use facilities, fencing, gates, signage, management accessways/firebreaks and other structures on the natural area. Structures will be replaced when needed due to age or damage.

5.1 PUBLIC USE FACILITIES AND ACCESS

The natural area is a publicly-owned preserve and resource-based, outdoor recreational site. It is open to the public during daylight hours, unless a special, after-hours use permit has been issued. The hours of operation are posted at each designated public access point. The natural area officially opened to the public in March 2015.

All public use facilities (Figure 6) have been carefully chosen, designed and located so as to not jeopardize the site's natural resources, including the rare and endangered plants, animals and natural communities found on the natural area. Public uses currently permitted on this site include nature appreciation and study, hiking, nature photography, bird/wildlife watching, canoeing/kayaking, catch-and-release fishing and primitive camping on a seasonal basis (requires individual permit). In addition, a paved, multi-use trail will be developed as part of the Haverhill Road widening project so that bicyclists can enjoy the natural area in a manner that does not jeopardize the site's natural resources. The relatively small size of the parking lot limits the number of people that are on the site at any given time. With the exception of the existing canoe/kayak trail, the proposed designated bicycle trail, and the use of vehicles for management purposes, all human traffic within the natural area is by foot.

Several of the existing public use facilities are compliant with Americans with Disabilities Act (ADA) requirements. The parking lot includes one designated ADA-compliant parking space. This parking space connects to an ADA-compliant pathway that leads to an interpretive kiosk, and ADA-compliant concrete and boardwalk nature trail. Other ADA-compliant public use facilities constructed on, and proposed for, the site include a 253-foot-long elevated boardwalk that spans a narrow portion of the created wetland, a wildlife observation platform with benches, floating canoe/kayak launch and dock, and paved multi-use (pedestrian and bicycle) trail.

The primary public access is via a 10-car, 2-bus parking lot located just south of Dyer Boulevard and approximately 0.4 mile west of Haverhill Road (Figure 6). A bicycle rack has been installed adjacent to the parking lot to encourage visitors to ride bicycles to the natural area. Unpaved areas within the parking lot have been landscaped with native plant species to provide additional wildlife habitat and to enhance the parking lot's appearance. Entry to the parking lot is controlled by gates that limit access to Dyer Boulevard from Haverhill Road. County Parks and Recreation Department staff open and close these gates on a daily basis.

In addition to the parking lot, members of the public will be able to access the natural area through a proposed pedestrian access gate along the east side of the site. This gate is proposed to be constructed as part of the Haverhill Road widening project in 2017. This entrance will include a bike rack and small kiosk, and will connect to the natural area's hiking trail system via a short, natural-surfaced spur trail.

Approximately 9.6 miles of trail have been and will be created within the natural area (Figure 6). This includes a 0.5-mile-long nature trail, a 253-foot-long elevated wooden boardwalk, 4.9 miles of natural-surfaced hiking trails and a 3.3-mile canoe/kayak trail. All of these trails can be accessed from the parking lot and/or from the existing pedestrian entrance gate. In addition to the existing trail facilities, a 0.9-mile-long, paved multi-use (pedestrian and bicycle) trail will be constructed along the eastern edge of the natural area as part of the proposed 2017 Haverhill Road widening project. Access to the proposed multi-use trail will be from the Haverhill Road right of way.

The concrete and boardwalk nature trail begins at the parking lot. The nature trail is a minimum of 5-feet-wide to accommodate wheelchairs and other non-motorized mobility devices. Trail markers have been placed along the nature trail with station numbers that correspond to information in the printed trail guide.

The southern terminus of the nature trail connects to a 253-foot-long, elevated boardwalk that spans the narrowest portion of the created wetland. The elevated boardwalk also is a minimum of 5-feet-wide to accommodate wheelchairs and other non-motorized mobility devices. The west end of the boardwalk connects to the nature trail and the portion of the hiking trail system that lies west of the created wetland via a ramp; the east end of the boardwalk connects to the portion of the hiking trail system that lies east of the created wetland via a short set of stairs. The elevated boardwalk provides access to a wildlife observation platform which sits over a portion of the created wetland.

Approximately 4.8 miles of hiking trail currently exist at the natural area; an additional 0.1-mile-long trail will be constructed when the new pedestrian entrance along Haverhill Road is constructed. All of the hiking trails within the natural area have a natural soil base. Access to the hiking trail system is from the parking lot. Users of the proposed multi-use trail will be able to access the hiking trail system via a proposed pedestrian gate that will be installed as part of the Haverhill Road widening project in 2017. Portions of the hiking trail are co-located with

management accessways/firebreaks; other portions of the management accessways/firebreaks also may be used for foot traffic. The portions of the hiking trail that are not co-located with management accessways/firebreaks will be maintained at a width of three to six feet. The hiking trail system will not be improved other than the addition of color-coded blazes on trees and/or posts to help keep hikers on the trail. Public use of secondary trails will be discouraged by signage and vegetative barriers, by not maintaining the trails and by encouraging the regeneration of native vegetation in these trails.

The 3.3-mile canoe/kayak trail was dug as part of the wetland creation project. Access to the canoe/kayak trail is via a short concrete, accessible walkway that connects the parking lot to a floating, accessible canoe/kayak launch, as well as to a natural shoreline canoe/kayak launch area. Primitive canoe/kayak tie up/pullout areas are located near the southeastern shade shelter and adjacent to the footpath that leads to the seasonal, primitive campsite.

Non-trail amenities provided at the natural area include: a covered, wildlife observation platform with benches, four shade shelters with benches, an accessible canoe/kayak launch and dock, and a seasonal, primitive campsite. The wildlife observation platform is south of the 253-foot long elevated boardwalk and connects to the boardwalk via a 32-foot-long connector boardwalk. The wildlife observation platform provides visitors with an unobstructed view of the central portion of the created wetland area. The shade shelters are located adjacent to the large, looped hiking trail that follows the edge of the created wetland. The seasonal, primitive camping area will be accessible only by canoe or kayak; it will be located on one of the islands in a disturbed area that was previously used as pasture for cattle. The primitive camping area will be available on a permit basis from October 1 through January 30. Drinking water and restrooms are available at Dyer Park, but are not available at the natural area.

The County Parks and Recreation Department has been working on identifying a way to connect the multi-use trails (pedestrian and bicycle) within Dyer Park to the multi-use trails within the Grassy Waters Preserve (pedestrian and bicycle) and the multi-use trails (pedestrian and bicycle) within the SWA Greenway. One possible means to provide this connection would be to use the existing access road that connects the SWA property with Dyer Park via a culvert that lies under the Turnpike and an existing access road in the northwestern portion of the natural area. If permission for the proposed trail is obtained from the SWA and a safe public connector trail can be built and funded by others, the County will allow inclusion of the existing access road as part of the proposed trail.

5.2 FENCING AND GATES

The northern, eastern and western boundaries of the site have been fenced to restrict access to and prevent unauthorized use of the site. All unnecessary interior fencing has been removed to reduce impacts to wildlife movements.

The types of fencing that currently exist on the natural area include barbed-wire, split-rail and galvanized chain-link. Barbed-wire fencing that existed along the northern perimeter of the natural area at the time of the site's acquisition has not yet been replaced. Pre-existing six-foot-tall, chain-link fencing east of the Turnpike Canal and north of where the Dyer-SWA access road crosses the Turnpike Canal, and east of the Dyer-SWA access road was left in place and incorporated into the fencing plan for the natural area. After the County acquired the site, the existing fencing along the eastern perimeter of the site was removed and replaced with a three-rail, split-rail fence with wire backing. Two-rail, split-rail fencing was installed around the perimeter of the parking lot. And finally, six-foot-tall, chain-link fence was installed along the western edge of the site where the natural area borders the Turnpike Canal, south of the Dyer-SWA access road.

Fencing has not been installed along the portion of the site that lies just north of the EPB-10 Canal; the adjacent canal is deep enough to prevent vehicular access and deter unauthorized pedestrian access to the natural area. The pigtail portion of the site is not fenced. The County will consider installing a fence just north of the EPB-10 Canal if security becomes a problem.

Two pre-existing gates in the southern portion of the eastern fence line and one pre-existing gate in the northwestern portion of the site (where the Dyer-SWA access road enters Dyer Park) have been kept in place and incorporated into the management access plan for the natural area. A fourth pre-existing gate that was installed by NPBCID in the eastern fence line just north of the former EPB-9 water control structure has been left in place, but is not used for land management purposes. All other pre-existing gates were removed. A total of six new management access gates have been installed – three in the northwestern corner of the site, two near where the Dyer-SWA access road crosses the Turnpike Canal, and one in the southwestern corner of the site. Except as indicated, all of these gates provide vehicular access for management and monitoring activities, public safety and law enforcement.

Public vehicular access to the parking lot is provided through two pre-existing gates that control access to Dyer Boulevard: these gates are controlled by the County's Parks and Recreation Department. There is no gate at the parking lot entrance to the natural area. A pedestrian maze gate will be installed in the eastern perimeter fence when the multi-use trail is constructed by the County's Engineering Department (Figure 6).

5.3 SIGNS

Signs identifying the site as a natural area were installed along Haverhill Road and on the east side of the Florida Turnpike to inform drivers of the existence of the natural area. The signs along Haverhill Road also help direct the public to the natural area. An entrance sign was installed on the south side of Dyer Boulevard adjacent to the entrance to the parking lot. A "Winding Waters Trail System" sign was installed along the driveway that leads to the parking lot; the sign indicates that funding for the public trail system was provided by the County with assistance from RTP.

Regulatory signs have been posted at each corner of the natural area and every 500 feet along the perimeter of the natural area. These signs identify the Winding Waters Natural Area as a protected site and cite the County's Natural Areas Ordinance. Access hours and natural area rules signs have been and will be installed adjacent to the parking lot and other public access points. Signs that notify visitors of trail use restrictions, security patrols, the presence of hidden cameras and other site-specific information also may be installed on the site. Trail markers with station numbers corresponding to descriptive information in the trail guide have been installed along the nature trail. Trail markers also have been installed at various points along the hiking trail to keep hikers on the designated trail.

A "No Trash Area" sign has been installed adjacent to the natural area parking lot. Trash receptacles are not provided at the natural area for the following reasons: 1) the lack of trash receptacles promotes the concepts of "carry in – carry out" and "leave only footprints"; 2) the use of trash receptacles within natural areas draws wildlife to areas where they may come into conflict with, or be fed by, members of the public; 3) people empty all of their vehicle trash into the receptacles which leaves little room for other trash; 4) people attempt to place trash in receptacles even after they are full resulting in unsanitary/unsafe conditions for other visitors and wildlife; 5) trash which is left in receptacles may blow into the adjacent natural communities or be scattered by wildlife; and 6) the removal of trash receptacles from county natural areas has not increased the amount of trash found on the site.

5.4 MANAGEMENT ACCESSWAYS/FIREBREAKS

A network of management accessways and firebreaks has been established around the perimeter of the natural area and between each of the management units (Figure 4). Management accessways are cleared, drivable trails. They typically have an unimproved sand/dirt surface; however, portions of the trail may be stabilized where very fine soils or other conditions make it difficult for management and/or emergency vehicles to access the site. Management accessways are primarily used for vehicular access related to land management activities and for the containment of wildfires and prescribed burns when they occur. Management accessways also may be used as part of a designated hiking and/or multiuse trail.

Firebreaks which are not part of the management accessway system may be established within management units to separate fire-intolerant natural communities from adjacent burn areas and/or to create smaller burn units. These firebreaks, which are cleared on an as-needed-basis, may include areas that have been cleared of vegetation (bare soil), as well as areas where the vegetation has been mowed or cut/chopped. Temporary firebreaks are allowed to revegetate following a prescribed burn.

All management accessways/firebreaks are located whenever possible on existing trails and within disturbed areas; natural firebreaks are used when feasible. Prior to construction, all management accessway/firebreak locations are surveyed for listed species. If a listed species is

likely to be impacted by the proposed construction, the management accessway/firebreak will be rerouted or the listed species will be relocated elsewhere on the site. Management accessway/firebreak locations are field adjusted to minimize impacts to wetlands and/or avoid steep slopes whenever possible. If a wetland crossing is unavoidable, at-grade crossings are utilized to maintain natural water flow patterns.

5.5 OTHER STRUCTURES AND IMPROVEMENTS

As of August 2016 the only other structures and improvements constructed/completed within and immediately adjacent to the natural area included three water control structures, two canal extensions, two canal widenings, and two flood control/water retention structures (Figure 5). All of these structures and improvements were constructed within and immediately adjacent to the natural area between 2009 and 2010 as part of the hydrological restoration project (see Section 4.3.4.3). These structures and improvements raised the control elevation of the main portion of the natural area from approximately 9.0 to 13.5 feet NGVD. One additional water control structure, a set of culverts and a 3.6-acre wetland re-creation/water retention area will be constructed as part of the Haverhill Road widening project in 2017.

The first water control structure is located in the Northwest Canal, near the western boundary of the site. This water control structure controls water flowing into the natural area from the Turnpike Canal and Ironhorse development when water levels within the canal are high; it also prevents the backflow of water from the natural area into the Turnpike Canal whenever water levels within the Turnpike Canal fall below the 13 feet NGVD control elevation of the weir. The structure consists of a 29-foot-wide sheet-pile weir structure with a 13 foot control elevation, two 72 inch culverts which allow water to flow under the SWA access road, and riprap to control erosion along the base of the access road.

The second water control structure is located within the EPB-10 Canal right of way and just north of the Costco facility. The water control structure was designed to redirect excess flow from the western end of the EPB-10 Canal, northward through the Turnpike Canal into the Northwest Canal and eventually into the created wetland. The center portion of the 80.7-foot-wide, reinforced concrete/sheet-pile weir structure has a set elevation of 17 feet NGVD; the outside portions of the weir have a set elevation of 18 feet NGVD. The structure includes an operable gate structure which has a control elevation of 14.8 feet NGVD in the closed position. The operable gate opens from the bottom and is designed to quickly drain excess waters west of the structure in advance of storms, after periods of heavy rainfall and/or for canal maintenance. This gate is operated remotely through telemetry and is controlled by NPBCID.

The third water control structure allows excess waters from the created wetland, Dyer Park and the Turnpike Canal to discharge into the EPB-10 Canal. This water control structure consists of a precast concrete box that has a top elevation of 17 feet NGVD. A manually-operated, downward sliding gate allows the County to control water levels within the created wetland. The control elevation for the structure is 13.5 feet NGVD when the gate is closed; the gate has an

operable range of 3.5 feet to facilitate restoration and/or maintenance activities. Two 48-inch-diameter culverts provide conveyance from the water control structure, under the canal berm and into the EPB-10 Canal. A floating debris barrier, located just north of the water control structure, helps to keep the water control structure and EPB-10 Canal free of debris.

Two canal extensions were constructed by the County to allow for the rerouting of excess surface waters from the SWA into the natural area. The Turnpike Canal was extended southward to connect with the existing EPB-10 Canal and eastward to connect with the Northwest Canal in order to allow redirected surface waters from the SWA to flow into the created wetland. Both the Turnpike and Northwest canals were widened/cleaned out to facilitate this flow of water.

The County also constructed two 22-foot-wide earthen berms – one around the perimeter of the created wetland and one around the perimeter of the natural area’s main tract. The purpose of these berms was to: 1) provide adequate flood protection to the adjacent properties; and 2) retain as much water on the site as practicable. The berm that was constructed around the perimeter of the created wetland was designed to retain as much water as possible within the wetland; the berm that was constructed around the perimeter of the main tract was designed to help rehydrate historic wetland areas within the remainder of the tract. The minimum elevation for each of the two berms was 17 feet NGVD.

The last structures/improvements that will be constructed on, or adjacent to, the natural area include a 3.6-acre wetland re-creation/water retention area (the “wetland/retention area”), a low vegetated berm, a set of culverts through the eastern perimeter berm and a water control structure that will hydrologically connect the wetland/retention area to the created wetland (see Section 4.3.4.4; Figure 5). These structures/improvements will be constructed in 2017 as part of the proposed Haverhill Road widening project.

The purpose of the proposed structures/improvements will be to: 1) collect, treat and store stormwater runoff from Haverhill Road once it is widened; 2) re-create/rehydrate an herbaceous wetland in the east-central portion of the natural area; and 3) provide positive outfall for stormwater runoff from the widened roadway. Once the Haverhill Road widening project has been completed, stormwater runoff from the roadway will be collected and pretreated in a shallow, vegetated swale in the western portion of the road right of way. As water levels rise within the swale, excess water will flow westward over a low vegetated berm, through a set of culverts placed thorough the eastern perimeter berm and into a 3.6-acre wetland/retention area. Once water levels within the wetland/retention area rise above 14.5 feet NGVD (the control elevation of the new water control structure), the excess water will flow from the wetland/retention area, through a water control structure that will be constructed in the northwestern portion of the wetland/retention area and into the existing created wetland. The new water control structure will consist of a fixed weir and a set of culverts that will be constructed through the existing berm that surrounds the existing created wetland.

The water control structures in the Northwest Canal and EPB-10 Canal will be maintained by NPBCID; all other water control and flood structures will be maintained by the County.

6. COST ESTIMATES AND FUNDING SOURCES

The County has primary responsibility for development, restoration/enhancement, management and maintenance of the natural area. These activities are accomplished by existing county personnel, with assistance from county contractors and community volunteers. The City has primary responsibility for public safety and law enforcement within the natural area.

6.1 ESTIMATED INITIAL CAPITAL COSTS

Initial capital related to the wildfire mitigation, environmental restoration/enhancement, site development and security projects/activities described in Sections 4.3 and 5.1 through 5.5 are expected to total \$11,437,053 (Table 3). Most of the described capital projects and activities have been completed; the remaining capital projects and activities are subject to, and contingent upon, annual budgetary funding and appropriations by the BCC.

6.2 ESTIMATED ANNUAL MANAGEMENT AND MAINTENANCE COSTS

Annual management and maintenance costs are expected to average \$554,874 per year over the next ten years (Table 4). These costs have been and will continue to be minimized by coordinating the management and maintenance of natural areas on a countywide basis. Costs also will be minimized whenever possible through the use of volunteers for non-hazardous/non-technical activities. However, most of the ongoing management and maintenance work, including all hazardous and technical work, will be done by existing county personnel with assistance from county contractors. All future management and maintenance activities (repair/replacement of site improvements, invasive/nonnative vegetation and nonnative/nuisance animal control activities, wildfire mitigation, etc.) are subject to, and contingent upon, annual budgetary funding and appropriations by the BCC.

6.3 FUNDING SOURCES

All of the acquisition costs and some of capital costs associated with invasive/nonnative vegetation removal, restoration plantings and engineering design were paid using funds from the Palm Beach County Lands for Conservation Purposes Bond Issue Referendum of March 9, 1999.

A significant portion of the funds used to develop and restore the natural area have come from non-County funding sources. Approximately \$175,566 of the public use facility costs were paid using grant funds received from Recreational Trail Program (RTP). All of the costs associated with the wetland creation, hydrological restoration and native planting/relocation projects, and a portion of the costs to remove invasive/nonnative vegetation from the site were provided by the following non-County funding sources: 1) funds paid by SWA and FDEP to purchase clean, high-quality fill excavated from the wetland creation project (for landfill purposes and an emergency dune restoration project on Singer Island, respectively); 2) a \$1,500,000 hydrological restoration and invasive/nonnative vegetation removal grant from NRCS; 3) a \$200,000

invasive/nonnative vegetation removal grant from FDEP's Bureau of Invasive Plant Management; and 4) mitigation plantings installed on the natural area by other entities as a way to offset the loss of native trees and vegetation elsewhere in the County. An additional \$370,000 in future capital costs (multi-use trail construction, fence removal and replacement, and 3.6-acre wetland re-creation/water retention area) will be paid by the County's Roadway Division.

The balance of the site security, site development, restoration/enhancement and wildfire mitigation costs, as well as all long-term land management/maintenance costs have and will continue to come from County funding sources. Funding for these activities has and will come from the Palm Beach County Natural Areas Fund, Palm Beach County Natural Areas Stewardship Endowment Fund, Ag Reserve Land Management Fund and/or Palm Beach County General Fund, as may be amended.

The County has established a Natural Areas Stewardship Endowment Fund which includes funds from restricted gifts and other sources. These funds are invested and the interest earned provides operating funds for county natural areas. The County also has established a Natural Areas Fund to help pay for the development, restoration/enhancement and management of county natural areas. Funding sources for the Natural Areas Fund include cash payments made in lieu of preservation requirements pursuant to Article 14, Chapter C (Vegetation Preservation and Protection Ordinance) of the Palm Beach County Unified Land Development Code (ULDC), as well as monies received from the sale of development rights removed from natural area lands, leases of county-owned land in the Agricultural Reserve, and the use of county natural areas as offsite mitigation areas. And lastly, the Pollution Control Recovery Trust Fund, which receives fees related to violations under Article 14 of the ULDC, may be used to help pay for restoration/enhancement projects on county natural areas. Even with these possible funding sources, the County recognizes the need for additional management funds. ERM will investigate all possible local, state, or federal sources of land management funds.

7. MONITORING AND REPORTING

The natural area is managed specifically to preserve, restore/enhance and maintain natural resource values, and to allow public uses that do not adversely affect the existing resources. Restoration/enhancement and other land management activities are continually monitored and assessed to determine whether the stated objectives for natural vegetation communities and listed species are being achieved, and/or to identify any new species not previously identified on the site. Management practices are adjusted (a process known as “adaptive management”) if an analysis of the monitoring data indicates that management objectives are not being met. Likewise anthropogenic impacts are monitored to ensure that public uses do not negatively impact the natural area. If an analysis of monitoring data indicates that public uses are having a negative impact on vegetation and/or wildlife populations, a carrying capacity or additional use restrictions may need to be established for the site. Monitoring data also will be used to prepare Annual Site Evaluation reports (ASEs) (see Section 7.6).

The effects of management activities and public uses will be determined through implementation of the monitoring program described in the following sections. Monitoring protocols have been developed to ensure consistency on all natural areas managed by ERM. Copies of these protocols are available upon request. The types of monitoring activities conducted on the natural area are summarized in the following sections. The monitoring requirements and procedures contained in this chapter are based on the monitoring protocols in existence as of July 2016. If any of the monitoring protocols are amended or revised prior to the initial update of this management plan, the monitoring requirements contained in this chapter will automatically be revised so that they are in compliance with the newly approved monitoring protocols.

7.1 PHOTOMONITORING

The primary objective of photomonitoring is to obtain a qualitative, long-term visual record of changes in vegetative composition and/or condition over time, including the effects of planned management and restoration activities. Photomonitoring also may be used on a short-term basis to document relatively rapid changes in vegetation coverage which are related to specific restoration or management activities, such as the mechanical removal of invasive/nonnative vegetation, ditch filling/plugging, recontouring of areas which have been mined or filled, and prescribed fire; or to document changes related to natural events, such as wildfires and tropical storms/hurricanes.

Photomonitoring began at the natural area in 2009. Five project-specific photomonitoring stations were established within the site between 2009 and 2010 to monitor the wetland creation project.

Permanent photomonitoring stations will be established in 2016/2017 in areas where planned management or restoration activities have occurred, or are anticipated to occur, and in areas in which natural vegetation succession of management interest is expected to occur. At least one photomonitoring station will be established in each management unit. Stations that are within a "burn" unit will be located in a vegetation community that is expected to carry fire during a wildfire or prescribed burn. When the photomonitoring stations are established, staff will attempt to locate the stations so that at least one long-term photomonitoring station is installed in each native vegetation community to provide photographic documentation of the effects of management and/or restoration activities on that community.

7.2 VEGETATION MONITORING

As of 2016 no vegetation transects had been established at the natural area.

In the future if vegetation monitoring is required by the conditions of a permit, grant or any other agreement, or if vegetation transects are needed to monitor the effects of a destructive natural event (such as a hurricane, wildfire, pest, disease or invasive species), a point intercept transect monitoring method will be used (subject to approval by the overseeing agency or organization). Transects will be surveyed twice a year, once in the dry season and once in the wet season. Data will be recorded at predetermined intervals along each transect. If an analysis of the transect data indicates that negative natural community changes are occurring, additional transects may be established in the affected management unit to determine if the changes are localized or widespread.

Any plant species that has been listed for protection or special management by at least one governmental agency and/or is ranked as a S1-S3 species by FNAI, and that has been observed on the site during a given calendar year, will be recorded in ERM's Environmental Enterprise Database (EEDB). In addition, population information will be collected for certain listed plant species in accordance with established monitoring protocols. Additional surveys may be conducted if it is determined that they are necessary to document the effect(s) of changing site conditions, or a significant natural event or land management activity on one or more listed plant species. If the population of a species is too large to practically count all individuals, a representative portion of the population will be surveyed. A species-specific monitoring plan may be developed for endangered listed plant species when more intense monitoring is needed due to regulatory requirements, management information needs, or because the species is highly endangered or suspected to be declining.

County staff also records any plant species encountered opportunistically (during a normal site visit) on a natural area that has not previously been recorded for the site. The sighting and any specific information obtained during the opportunistic sighting (for example, the number of

individual plants observed, location, whether or not the plant is blooming or fruiting, etc.) are recorded in the EEDB.

7.3 WILDLIFE MONITORING

Migratory bird surveys have been performed within the natural area since 2008 using temporary point count stations. Annual non-migratory surveys will commence at the natural area in 2017. At least one permanent migratory/nonmigratory point count station will be established within each representative habitat type or management unit within the natural area. Migratory bird surveys are conducted when migratory bird species are expected to be present - September through October and February through May. Nonmigratory wildlife surveys will be conducted from June through August. All surveys have been and will be conducted in a manner that is largely repeatable in order to obtain information that can be compared from year to year. Data collected during these surveys will be used to determine what effect, if any, public recreational uses, and management and restoration activities have on resident and migratory wildlife populations at the natural area.

Any animal species observed at the site that has been listed for protection or special management by at least one governmental agency or that has been ranked as a S1-S3 species by FNAI, and that has been observed on the site during a given calendar year, will be recorded in ERM's EEDB. A species-specific monitoring plan may be developed for any listed animal species that is recorded as breeding on the site, if deemed necessary/feasible by the site manager and his/her supervisor.

County staff also records any animal species that is encountered opportunistically (during a regular site visit) and that has not previously been recorded for the site. The sighting and any specific information obtained during the opportunistic sighting (for example, the number of individuals observed, whether they were adult/juvenile, male/female, breeding, feeding, etc.) are recorded in the EEDB.

7.4 HYDROLOGICAL MONITORING

Thirteen hydrological monitoring stations, consisting of a staff gauge, a monitoring well or a staff gauge/monitoring well combination, were installed in the Winding Waters Natural Area between 2005 and 2010. Six of the original hydrological monitoring stations were deactivated between 2006 and 2009 because they were in the footprint of the wetland creation project; the hydrological monitoring station within the EPB-10 Canal was deactivated in 2008 because it was damaged by improvements to the adjacent Haverhill Road bridge and prior data showed very little fluctuation in water levels within the canal. There are currently six active hydrological monitoring stations at this site. Readings from the hydrological monitoring stations are recorded on a regular basis. Readings are plotted against rainfall data obtained from SFWMD near the

intersection of the C-17 Canal and Alternate A1A, which is 3.4 miles northeast of the natural area. Success of the hydrological restoration projects will be determined based on vegetative changes within the site and a comparison of water levels versus rainfall over time.

7.5 CLIMATE CHANGE MONITORING

All of the monitoring information gathered on the site will be evaluated for changes that may be the result of climate change. If significant changes in rainfall patterns and/or vegetation communities are noted over time, staff will attempt to mitigate for these changes if possible. If the changes cannot be mitigated for, county staff will modify its management practices to provide the highest quality vegetation communities practicable under the new climate conditions.

7.6 ANNUAL REPORT

ERM staff will prepare an ASE report each year. Each ASE will include information related to any structural improvements, natural events, management activities and restoration activities that occurred during the prior year, as well as the degree of success of any management and restoration activities relative to the stated management goals for the site. The ASE will include a description of any changes to the monitoring plan that occurred during the prior year, as well as recommendations for future management actions for the natural area. A general review of management efforts related to natural vegetation communities and the status of listed species also will be completed at the end of each management year and included in the ASE.

The ASE will be the vehicle through which detailed information on the management of the natural area will be shared with other ERM staff, including any new or current employee who may be assigned as the site manager in the future. ASEs will provide information that will be used in conjunction with data stored in the NRS portion of ERM's EEDB to allow staff biologists, ecologists and engineers to analyze and evaluate the success of staff management activities on the natural area over a period of years. ASEs will provide the basis for trend analysis of site data that will be performed at least every five years by staff.

8. REFERENCES CITED

- Ashton, R.E., Jr. and P.S. Ashton. 1991. Handbook of Reptiles and Amphibians of Florida: Part Two - Lizards, Turtles & Crocodilians, 2nd ed. Windward Publishing, Inc., Miami.
- Ashton, R.E., Jr. and P.S. Ashton. 2008. The Natural History and Management of the Gopher Tortoise (*Gopherus polyphemus* Daudin). Krieger Publishing Company, Malabar, Fla.
- Bartlett, R.D. and P.P. Bartlett. 2011. Florida's Turtles, Lizards, and Crocodilians: A Guide to Their Identification and Habits. University Press of Florida, Gainesville.
- Blak, T. and E. McKenzie. 2006. Palm Beach County FEMA Composite LiDAR 10-ft DEM, 1999-2002. Dewberry and Davis LLC, unpublished digital raster data.
- Chafin, L.G. 2000. Field guide to the rare plants of Florida. Florida Natural Areas Inventory, Tallahassee.
- [City] City of West Palm Beach. 2013a. City of West Palm Beach future land use map. Development Services Department. June 6, 2013. West Palm Beach, Fla.
- [City] City of West Palm Beach. 2013b. City of West Palm Beach zoning map - 2013. Development Services Department. April 23, 2013. West Palm Beach, Fla.
- Coates, S.F., M.B. Main, J.J. Mulahey, J.M. Schaefer, G.W. Tanner, M.E. Sunkist, and M.D. Fanning. 1998. The coyote (*Canis latrans*): Florida's newest predator. Publication WEC124. Reviewed 2011. Wildlife Ecology and Conservation Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Gainesville.
- Cook, J. 2006. Winding Waters seepage test. Memo to Clint Thomas, P.E. dated December 14, 2006.
- Craighead, F.C. 1971. The Trees of South Florida. Volume 1 – The Natural Environments and Their Succession. University of Miami Press, Coral Gables, Fla.
- Cuda, J.P., S.A. Wineriter, G.R. Buckingham, T.D. Center and K.T. Gioeli. 2009. Featured Creatures: melaleuca snout beetle, melaleuca weevil: *Oxyops vitiosa* (Pascoe) (Insecta: Coleoptera: Curculionidae). Publication No. EENY-211. University of Florida Institute of Food and Agricultural Services and Florida Department of Agriculture and Consumer Services, Gainesville. Available online: <http://entomology.ifas.ufl.edu/creatures/beneficial/melaleuca_weevil.htm>. Accessed August 24, 2016.

Davis, J.H. 1943. The natural features of southern Florida, especially the vegetation and the Everglades. Florida Geological Survey Bulletin No. 25.

[FDACS] Florida Department of Agriculture and Consumer Services. 2008. Prohibited aquatic plants. Rule 5B-40.0055, Florida Administrative Code. Available online: <<https://www.flrules.org/gateway/ruleNo.asp?id=5B-64.011>>. Accessed February 26, 2016.

[FDACS] Florida Department of Agriculture and Consumer Services. 2014. Noxious weed list. Rule 5B-57.007, Florida Administrative Code. Available online: <<https://www.flrules.org/gateway/ChapterHome.asp?Chapter=5B-57>>. Accessed February 26, 2016.

[FDACS] Florida Department of Agriculture and Consumer Services. 2016. Regulated plant index. Rule 5B-40.0055, Florida Administrative Code. Available online: <<https://www.flrules.org/gateway/ChapterHome.asp?Chapter=5B-40>>. Accessed September 21, 2016.

[FDOT] Florida Department of Transportation. 1964. Florida Aerial Photography Archive Collection. Available online: <<https://fdotewp1.dot.state.fl.us/AerialPhotoLookUpSystem/>>.

[FDOT] Florida Department of Transportation. 1968. Florida Aerial Photography Archive Collection. Available online: <<https://fdotewp1.dot.state.fl.us/AerialPhotoLookUpSystem/>>.

[FDOT] Florida Department of Transportation. 1969. Florida Aerial Photography Archive Collection. Available online: <<https://fdotewp1.dot.state.fl.us/AerialPhotoLookUpSystem/>>.

[FDOT] Florida Department of Transportation. 1973. Florida Aerial Photography Archive Collection. Available online: <<https://fdotewp1.dot.state.fl.us/AerialPhotoLookUpSystem/>>.

[FDOT] Florida Department of Transportation. 1975. Florida Aerial Photography Archive Collection. Available online: <<https://fdotewp1.dot.state.fl.us/AerialPhotoLookUpSystem/>>.

[FLEPPC] Florida Exotic Pest Plant Council Plant List Committee. 2015. List of Florida's invasive plant species. Available online: <<http://www.fleppc.org/list/2015FLEPPCLIST-LARGEFORMAT-FINAL.pdf>> Accessed December 1, 2015.

- [FNAI] Florida Natural Areas Inventory. 2010. Guide to the natural communities of Florida: 2010 edition. Tallahassee.
- [FNAI] Florida Natural Areas Inventory. 2016. Tracking list of rare, threatened, and endangered plants and animals and natural communities of Florida. Tallahassee. Updated as of January 2016. Available online: <<http://www.fnai.org/trackinglist.cfm>>. Accessed February 26, 2016.
- [FNAI and FDNR] Florida Natural Areas Inventory and Florida Department of Natural Resources. 1990. Guide to the natural communities of Florida. Tallahassee.
- [FWC] Florida Fish and Wildlife Conservation Commission. Undated(a). Blue tilapia: *Oreochromis aureus*. Tallahassee. Available online: <<http://myfwc.com/wildlifehabitats/profiles/fish/freshwater/nonnatives/blue-tilapia/>>. Accessed December 1, 2015.
- [FWC] Florida Fish and Wildlife Conservation Commission. Undated(b). Brown anole – *Anolis sagrei*. Tallahassee. Available online: <<http://myfwc.com/wildlifehabitats/nonnatives/reptiles/brown-anole/>>. Accessed December 1, 2015.
- [FWC] Florida Fish and Wildlife Conservation Commission. Undated(c). Brown basilisk – *Basiliscus vittatus*. Available online: <<http://myfwc.com/wildlifehabitats/nonnatives/reptiles/brown-basilisk/>>. Accessed June 27, 2016.
- [FWC] Florida Fish and Wildlife Conservation Commission. Undated(d). Coyote – *Canis latrans*. Available online: <<http://myfwc.com/wildlifehabitats/profiles/mammals/land/coyote/>>. Accessed December 1, 2015.
- [FWC] Florida Fish and Wildlife Conservation Commission. Undated(e). European starling – *Sturnus vulgaris*. Tallahassee. Available online: <<http://myfwc.com/wildlifehabitats/nonnatives/birds/european-starling/>>. Accessed December 1, 2015.
- [FWC] Florida Fish and Wildlife Conservation Commission. Undated(f). Nine-banded armadillo – *Dasypus novemcinctus*. Tallahassee. Available online: <<http://myfwc.com/wildlifehabitats/nonnatives/mammals/nine-banded-armadillo/>>. Accessed December 1, 2015.
- [FWC] Florida Fish and Wildlife Conservation Commission. Undated(g). Raccoon – *Procyon lotor*. Tallahassee. Available online: <<http://myfwc.com/wildlifehabitats/profiles/mammals/land/raccoon/>>.

Accessed December 1, 2015.

[FWC] Florida Fish and Wildlife Conservation Commission. Undated(h). Raccoon roundworm. Tallahassee. Available online: <<http://myfwc.com/wildlifehabitats/health-disease/other-animals/raccoon-roundworm/>>. Accessed December 1, 2015.

[FWC] Florida Fish and Wildlife Conservation Commission. 2012. Gopher tortoise management plan. Tallahassee. Available online: <<http://www.myfwc.com/media/2286685/GT-Management-Plan.pdf>>. Accessed December 2, 2015.

[FWC] Florida Fish and Wildlife Conservation Commission. 2013a. A species action plan for four imperiled beach-nesting birds: American oystercatcher (*Haematopus palliatus*), snowy plover (*Charadrius nivosus*), least tern (*Sternula antillarum*), black skimmer (*Rynchops niger*). Final draft plan dated November 1, 2013. Tallahassee. Available online: <<http://myfwc.com/media/2720106/Imperiled-Beach-Nesting-Birds-Species-Action-Plan-Final-Draft.pdf>>. Accessed August 12, 2016.

- [FWC] Florida Fish and Wildlife Conservation Commission. 2013b. A species action plan for six imperiled wading birds: little blue heron (*Egretta caerulea*), reddish egret (*Egretta rufescens*), roseate spoonbill (*Ajaia ajaja*), snowy egret (*Egretta thula*), tri-colored heron (*Egretta tricolor*), white ibis (*Eudocimus albus*). Final draft plan dated November 1, 2013. Tallahassee. Available online: <http://myfwc.com/media/2738289/Wading-Birds-Species-Action-Plan-Final-Draft.pdf>. Accessed August 12, 2016.
- [FWC] Florida Fish and Wildlife Conservation Commission. 2013c. A species action plan for the osprey of Monroe County – *Pandion haliaetus*. Final draft dated November 1, 2013. Tallahassee. Available online: <http://myfwc.com/media/2720115/Osprey-Species-Action-Plan-Final-Draft.pdf>. Accessed August 12, 2016.
- [FWC] Florida Fish and Wildlife Conservation Commission. 2016. Florida's endangered and threatened species. Updated January 2016. Available online: <http://myfwc.com/media/1515251/threatened-endangered-species.pdf>. Accessed February 26, 2016.
- Higgins Engineering, Inc. 2002. SWA Natural Buffer Area (Parcel 17) Haverhill Road, conceptual water management calculations. Prepared for CFC Communities, Inc.
- [ITIS] Integrated Taxonomic Information System. 2016. On-line database. Updated as of February 2016. Available online: <http://www.itis.gov>. Accessed June 29, 2016.
- Johnson, S.A. and W. Givens. 2012. Florida's introduced birds: European starling (*Sturnus vulgaris*). Publication WEC 255. Department of Wildlife Ecology and Conservation, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville. Available online: <http://edis.ifas.ufl.edu/uw300>. Accessed December 1, 2015.
- LaRue, E. 2008. *Osmunda regalis* var. *spectabilis*. Kasey Hartz Natural Area Reference Sheet. Available online: http://www.muskegoncc.edu/Include/Life%20Science/Kasey%20Hartz%20Nature%20Trail/Reference%20Sheets%20KHNA/Osmunda_regalis.pdf. Accessed June 20, 2016.
- MACTEC Engineering and Consulting, Inc. 2009. Final report of archaeological reconnaissance survey. Winding Waters Wetland Reserve Program project area, Palm Beach County, Florida. GSA Contract No. GS-10F-0157K. Prepared for USDA-NRCS Florida State Office.
- Maehr, D.S. and H.W. Kale II. 2005. Florida's Birds. 2nd edition. Pineapple Press, Sarasota.

- McCown, W. and B. Scheick. 2007. The coyote in Florida. Publication No. IHR2007-007. Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, Tallahassee.
- Meshaka, W.E., Jr., B.P. Butterfield, and J.B. Hauge. 2004. The Exotic Amphibians and Reptiles of Florida. Krieger Publishing Company, Malabar, Florida.
- Mushinsky, H.P, E.D. McCoy, J.E. Berish, R.E. Ashton, Jr., and D.S. Wilson. 2006. Pp. 350-375 in P.A. Meyer (ed.), Biology and Conservation of Florida Turtles. Chelonian Research Monographs, Vol. 3. Chelonian Research Foundation, Lunenburg, Mass.
- NatureServe. 2015. NatureServe Explorer. An online encyclopedia of life [web application]. Updated as of February 2015. NatureServe, Arlington, Va. Available online: <<http://www.natureserve.org/explorer>>. Accessed December 2, 2015.
- Nelson, G. 2000. The ferns of Florida: a reference and field guide. Pineapple Press, Inc., Sarasota, Fla.
- Palm Beach County Property Appraiser. 1965. Aerial photograph of Section 35 in Range 42, Township 42. Flight date February 26, 1965.
- Palm Beach County Property Appraiser. 1970. Aerial photograph of Section 35 in Range 42, Township 42. Flight date October 25, 1970.
- Palm Beach County Property Appraiser. 1973. Aerial photograph of Section 35 in Range 42, Township 42. Flight date December 1973.
- Palm Beach County Property Appraiser. 1976. Aerial photograph of Section 35 in Range 42, Township 42. Flight date November 14, 1976.
- Palm Beach County Property Appraiser. 1981. Aerial photograph of Section 35 in Range 42, Township 42. Flight date January 10, 1981.
- Pranty, B., K.A. Rademaker and G. Kennedy. 2006. Birds of Florida. Lone Pine Publishing International Inc. Auburn, Wash.
- Robertson, K. and Platt, W. 1992. Effects of fire on bromeliads in subtropical hammocks of Everglades National Park, Florida. Selbyana 13:39-49. Available online: <https://www.jstor.org/stable/41759791?seq=1#page_scan_tab_contents>. Accessed August 12, 2016.

- Robertson, K.M. and Platt, W.J. 2001. Effects of multiple disturbances (fire and hurricane) on epiphyte community dynamics in a subtropical forest, Florida, U.S.A. *Biotropica* 33:573–582. Available online: <<http://onlinelibrary.wiley.com/doi/10.1111/j.1744-7429.2001.tb00216.x/abstract>>. Accessed August 12, 2016.
- Schaefer, J.M. and M.E. Hostetler. 2012. The nine-banded armadillo (*Dasypus novemcinctus*). Publication No. WEC 76. Department of Wildlife Ecology and Conservation, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville. Available online: <<http://edis.ifas.ufl.edu/uw082>>.
- Sherry, T.W. and R.T. Holmes. 1997. American Redstart (*Setophaga ruticilla*) in A. Poole, ed., The Birds of North America Online. Cornell Lab of Ornithology. Ithaca, NY. Available online: <http://www.allaboutbirds.org/guide/American_Redstart/lifehistory#>. Accessed January 6, 2014.
- Stevenson, H.M. and B.H. Anderson. 1994. The birdlife of Florida. University Press of Florida, Gainesville.
- Tomasello Consulting Engineers, Inc. 2000. Parcel 17 groundwater model study. Prepared for Watermark Communities Inc. Jupiter, Fla.
- [USDA] United States Department of Agriculture. 1940. Everglades Area Florida – 1940 index. Available online: <<http://ufdc.ufl.edu/UF00071775/00041>>. Accessed January 8, 2016.
- [USDA] United States Department of Agriculture. 1953. Aerial photographs of Palm Beach County - Flight 2L. Flight date November 27, 1953. Available online: <<http://ufdc.ufl.edu/UF00071775/00008>>. Accessed January 8, 2016.
- [USFWS] United States Fish and Wildlife Service. Undated. Endangered species database – U.S. species. Washington, D.C. Updated daily. Available online: <<http://www.fws.gov/endangered/species/us-species.html>>. Accessed December 1, 2015.
- [USFWS] United States Fish and Wildlife Service. 1997. Revised recovery plan for the U.S. breeding population of the wood stork. Southern Region, Atlanta.
- [USFWS] United States Fish and Wildlife Service. 2007. Wood stork (*Mycteria americana*), 5-Year Review: Summary and Evaluation. Southeast Region, Jacksonville Ecological Services Field Office, Jacksonville. Available online: <<http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?sppcode=B06O#actionPlans>>. Accessed May 20, 2014.

- USFWS] United States Fish and Wildlife Service. 2016. Wood stork nesting colonies and core foraging areas active within 2006-2015 in Florida. Available online: <https://www.fws.gov/northflorida/WoodStorks/WOST_Data/2016_FL_Nesting_Colonies_Core_Foraging_Areas_Active_2006-2015%20Map.pdf>. Accessed June 22, 2016.
- Wade, D., J. Ewel and R. Hofstetter. 1980. Fire in South Florida ecosystems. General Technical Report No. E-17. U.S. Forest Service, Southeast Forest Experiment Station, Asheville, N.C.
- Whitaker, J.L. and W.J. Hamilton. 1998. Mammals of the Eastern United States, 3rd Edition. Comstock Publishing Associates, New York.
- Wineriter, S.A., S.E. Halbert and J.P. Cuda. 2003. *Boreioglycaspis melaleucae* (Hemiptera: Psyllidae), an introduced biocontrol agent of *Melaleuca quinquenervia* (Myrtaceae) in Florida. Publication No. EENY-300, Institute of Food and Agricultural Services, University of Florida, Gainesville. Revised 2008. Available online <<http://www.freshfromflorida.com/content/download/10793/141049/ent410.pdf>>. Accessed December 1, 2015.
- Wood, M and A. Flores. 2002. Sap-sucking psyllid pests pushy plant. Agricultural Research Magazine 50(11):18-19. Available online: <<http://www.ars.usda.gov/is/AR/archive/nov02/sap1102.htm>>. Accessed December 2, 2015.
- Wunderlin, R.P. and B.F. Hansen. 2008. Atlas of Florida Vascular Plants. [S. M. Landry and K. N. Campbell (application development), Florida Center for Community Design and Research]. Institute for Systematic Botany, University of South Florida, Tampa. Available online: <<http://www.florida.plantatlas.usf.edu>>. Data modified as of December 1, 2015.
- Wunderlin, R.P. and B.F. Hansen. 2011. Guide to the Vascular Plants of Florida. 3rd ed. University Press of Florida, Gainesville.

9. Figures

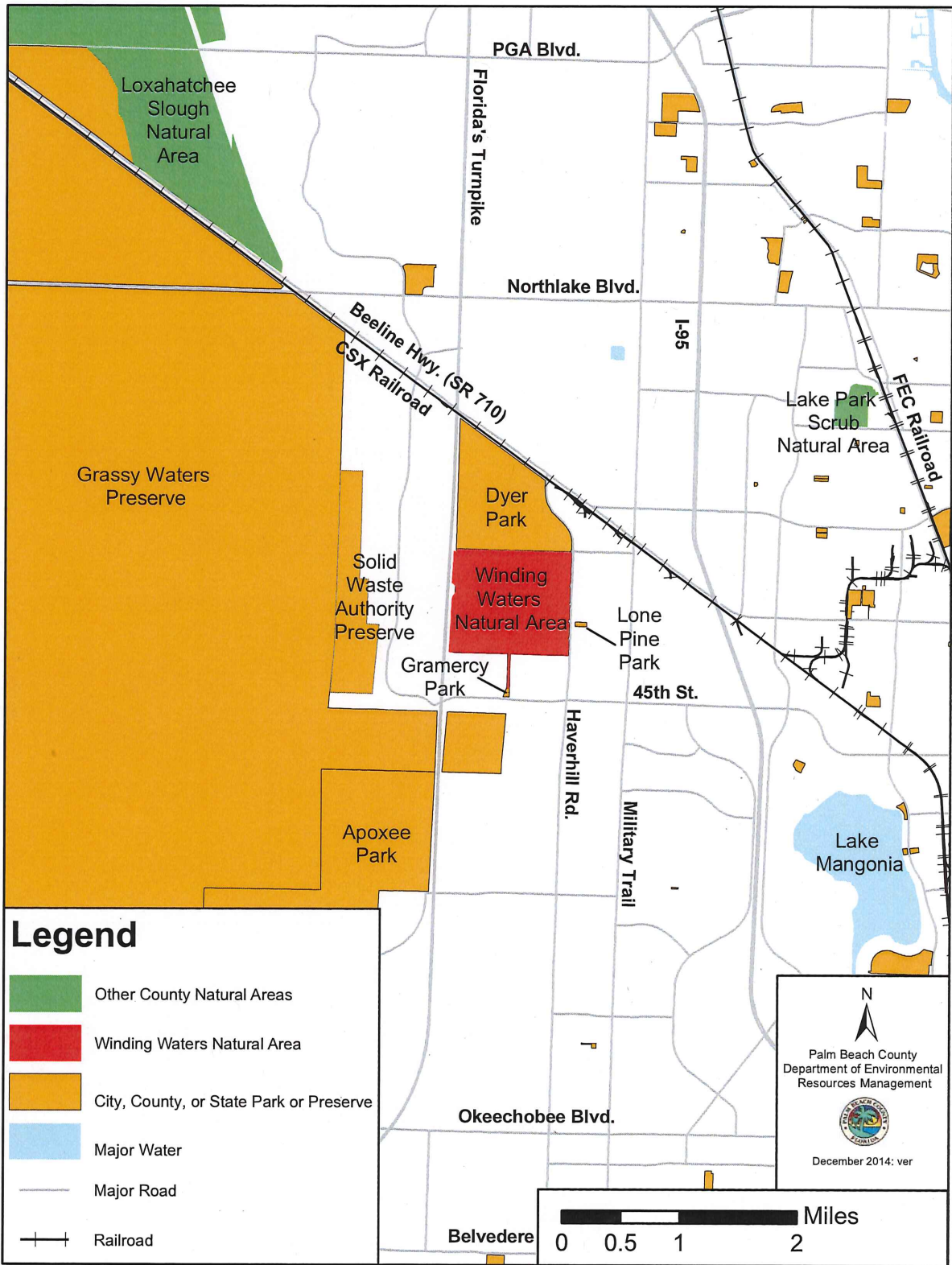


Figure 1. Winding Waters Natural Area Location Map

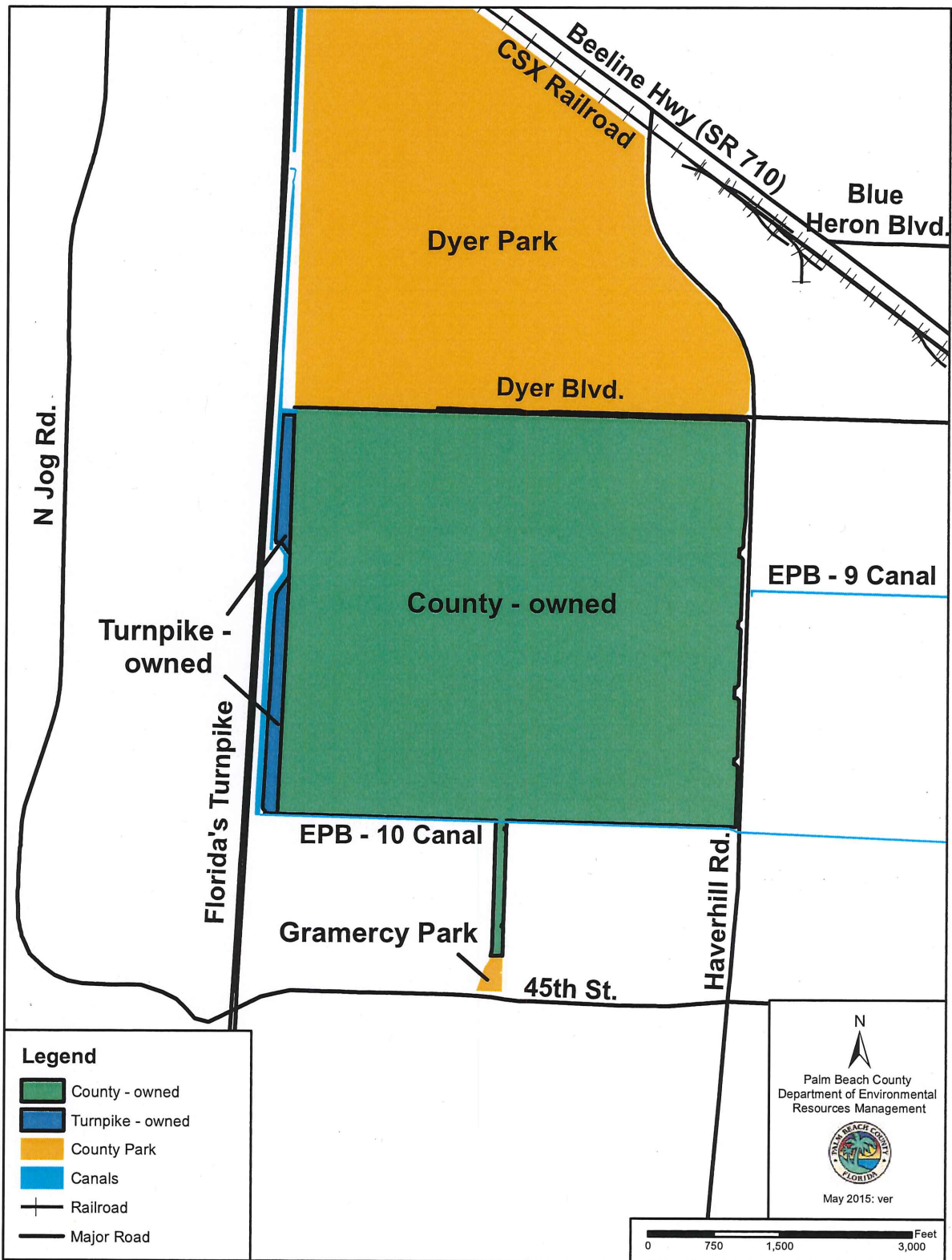


Figure 2. Winding Waters Natural Area Ownership Map

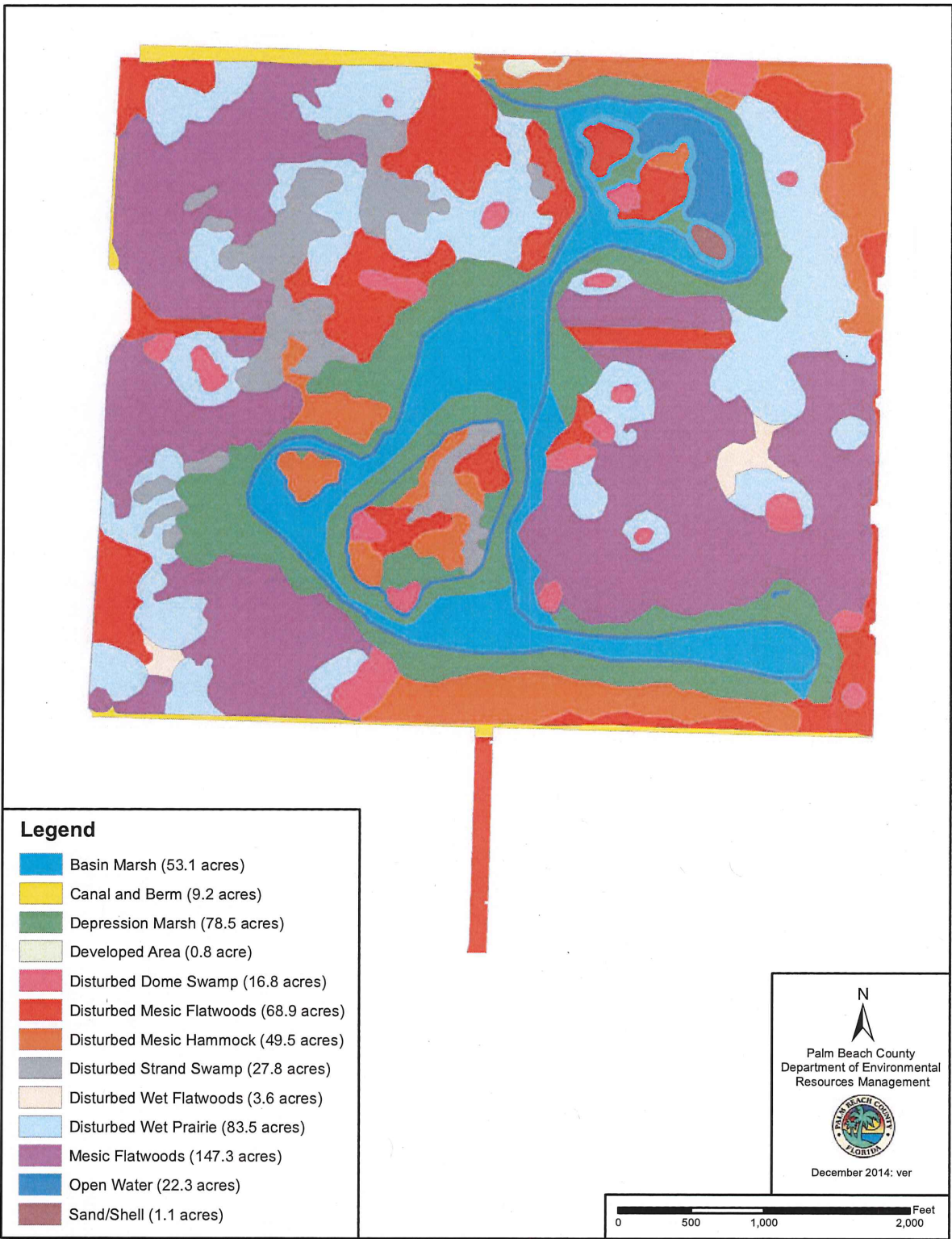


Figure 3. Winding Waters Natural Area Vegetation Communities Map

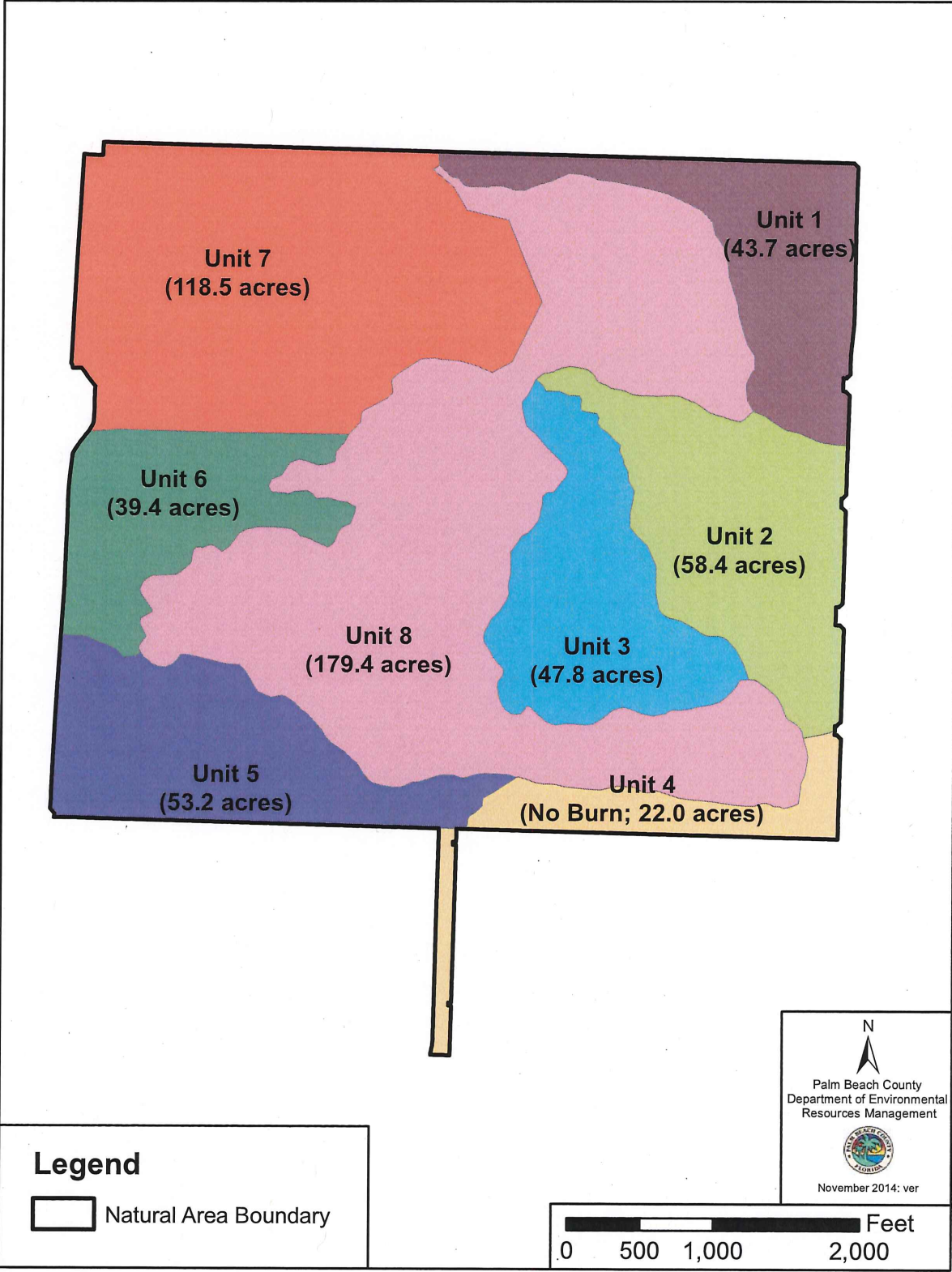


Figure 4. Winding Waters Natural Area Management Units Map

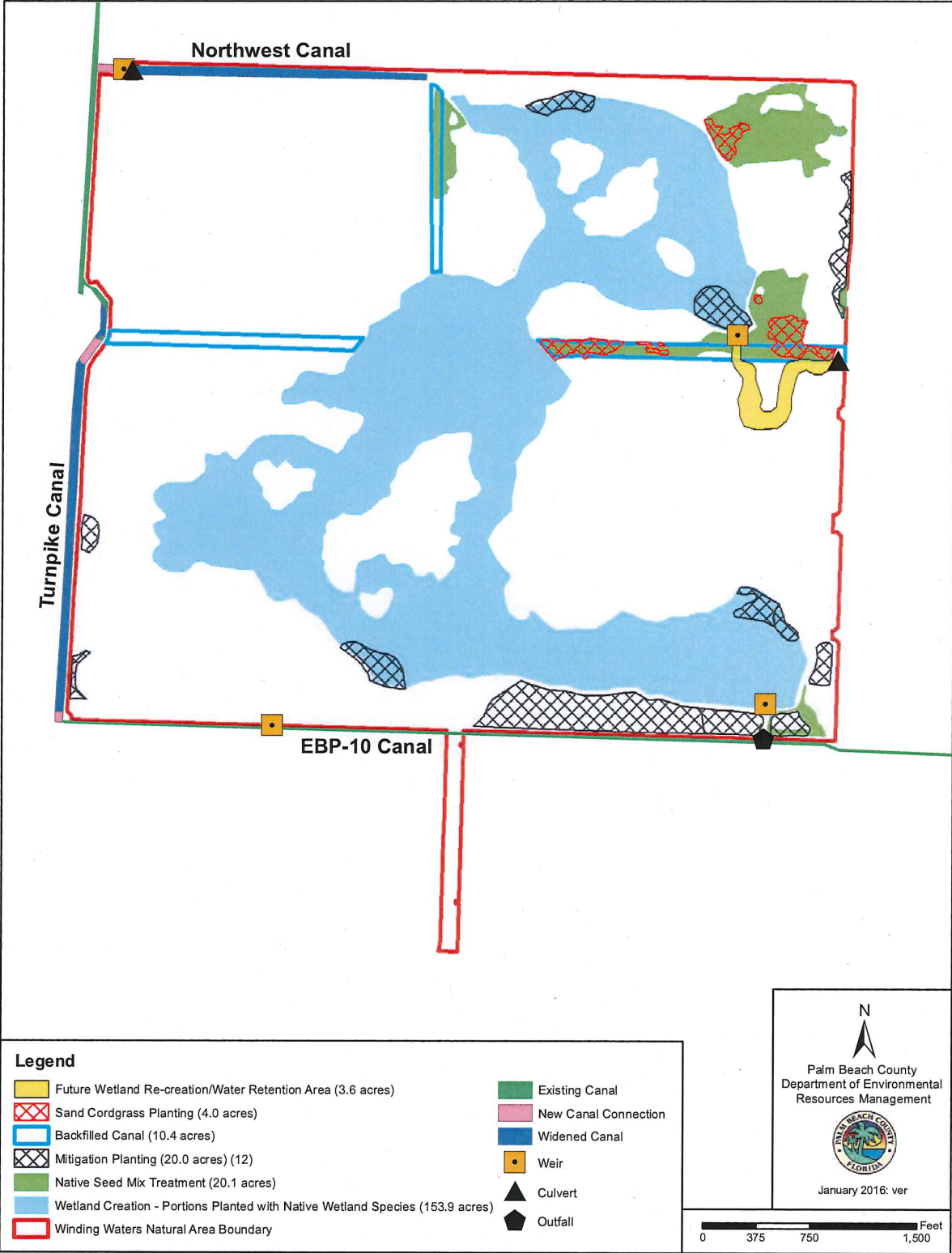


Figure 5. Winding Waters Natural Area Restoration Map



Figure 6. Winding Waters Natural Area Public Use Facilities Map

10. Tables

Table 1. Listed Plant Species Recorded at the Winding Waters Natural Area

SCIENTIFIC NAME	COMMON NAME	STATUS/RANK DESIGNATIONS		
		USFWS	FDACS	FNAI
<i>Aeschynomene pratensis</i>	Meadow jointvetch	N	E	G4/S1
<i>Encyclia tampensis</i>	Florida butterfly orchid	N	CE	N
<i>Ophioglossum palmatum</i>	Hand fern	N	E	G4/S2
<i>Osmunda regalis</i> var. <i>spectabilis</i>	Royal fern	N	CE	N
<i>Tillandsia balbisiana</i>	Inflated & reflexed wild pine	N	T	N
<i>Tillandsia fasciculata</i>	Common wild pine	N	E	N
<i>Tillandsia utriculata</i>	Giant wild pine	N	E	N

- CE = Commercially exploited
E = Endangered
FDACS = Florida Department of Agriculture and Consumer Services
FNAI = Florida Natural Areas Inventory
N = Not listed
T = Threatened
USFWS = United States Fish and Wildlife Service

Occurrences determined from field surveys and data collected by ERM (2002-2016). Ranks assigned by FNAI are from a January 2016 tracking list (FNAI 2016), designations assigned by the Florida Department of Agriculture and Consumer Services are from FDACS (2015), and designations assigned by the United States Fish and Wildlife Service are from USFWS (undated). Definitions for the ranks and designations used by these entities are provided in Appendix C.

Table 2. Listed Animal Species Recorded at the Winding Waters Natural Area

SCIENTIFIC NAME	COMMON NAME	STATUS/RANK DESIGNATIONS		
		USFWS	FWC	FNAI
<i>Alligator mississippiensis</i>	American alligator	T(S/A)	FT(S/A)	G5/S4
<i>Aramus guarauna</i>	Limpkin	N	SSC	G5/S3
<i>Ardea alba</i>	Great egret	N	N	G5/S4
<i>Egretta caerulea</i>	Little blue heron	N	SSC**	G5/S4
<i>Egretta thula</i>	Snowy egret	N	SSC*	G5/S3
<i>Egretta tricolor</i>	Tricolored heron	N	SSC**	G5/S4
<i>Elanoides forficatus</i>	Swallow-tailed kite	N	N	G5/S2
<i>Eudocimus albus</i>	White ibis	N	SSC*	G5/S4
<i>Gopherus polyphemus</i>	Gopher tortoise	C	ST	G3/S3
<i>Grus canadensis pratensis</i>	Florida sandhill crane	N	ST	G5T2T3/S2S3
<i>Haliaeetus leucocephalus</i>	Bald eagle	N	N	G5/S3
<i>Helmitheros vermivorum</i>	Worm-eating warbler	N	N	G5/S1
<i>Ixobrychus exilis</i>	Least bittern	N	N	G5/S4
<i>Mycteria americana</i>	Wood stork	T	FT	G4/S2
<i>Pandion haliaetus</i>	Osprey	N	SSC***	G5/S3S4
<i>Platalea ajaja</i>	Roseate spoonbill	N	SSC**	G5/S2
<i>Plegadis falcinellus</i>	Glossy ibis	N	N	G5/S3
<i>Rostrhamus sociabilis plumbeus</i>	Everglade snail kite	E	FE	G4G5T2/S2
<i>Rynchops niger</i>	Black skimmer	N	SSC**	G5/S3
<i>Setophaga ruticilla</i>	American redstart	N	N	G5/S2
<i>Sternula antillarum</i>	Least tern	N	ST	G4/S3

- C = Candidate species
- E = Endangered
- FE = Federally-designated Endangered
- FT = Federally-designated Threatened
- FT(S/A) = Federally-designated Threatened Due to Similarity of Appearance
- FWC = Florida Fish and Wildlife Conservation Commission
- FNAI = Florida Natural Areas Inventory
- N = Not listed

SSC	= State Species of Special Concern
ST	= State-designated Threatened
T	= Threatened
T(S/A)	= Threatened Due to Similarity of Appearance
USFWS	= United States Fish and Wildlife Service

*FWC has approved a staff recommendation that these species be removed from the list of endangered and threatened species in Florida. A species will not be formally removed from the list until after an imperiled species management plan that includes information on the species has been reviewed by the public and approved by FWC. Species designated by USFWS as endangered or threatened are considered by FWC to be endangered or threatened species in Florida; there is no separate state category for endangered species. There is a separate state category for species considered to be threatened within Florida. There will be no category for species of special concern within Florida after all of the current species of special concern have either been listed as state-designated threatened or removed from the list.

**FWC has approved a staff recommendation to change the status of these species from state species of special concern to state-designated threatened. The change will not become effective until after an imperiled species management plan that includes these species has been reviewed by the public and approved by FWC.

*** Currently only the Monroe County population of this species is listed as a species of special concern in Florida. FWC has recommended that populations of nonmigratory ospreys in nearby counties also should be given this designation until additional information such as genetic analysis becomes available to determine the relationships between these populations. If they are considered to be one population, it would be termed the southern coastal osprey population. The expansion of the designation to the other populations will not become effective until after an imperiled species management plan that includes the species has been reviewed by the public and approved by FWC.

Occurrences determined from field surveys and data collected by ERM (2003-2016). Ranks assigned by FNAI are from a January 2016 tracking list (FNAI 2016); designations assigned by FWC are from FWC (2016); and designations assigned by USFWS are from USFWS (undated). Definitions for the ranks and designations used by these entities are provided in Appendix C.

**Table 3. Cost Estimates for Public Use Facilities and Capital Restoration Activities
(In 2016 Dollars)**

ITEM	ACTUAL/ESTIMATED COST
1 metal-roofed, elevated, 16-foot x 16-foot wildlife observation platform with benches	\$41,094 ¹
10 car/1 bus parking area with 1 ADA parking space	\$148,656 ¹
Concrete nature trail (0.5-mile-long x 5-feet-wide), with 8 interpretive trail markers	\$72,015 ¹
One large double-sided, interpretive kiosk in parking area and 7 mini kiosks	\$7,241 ^{1,2}
4 shade shelters with benches	\$51,621 ¹
Signage	\$4,615 ^{1,2}
Fencing and gates – approximately 4,675 linear feet of 3-rail, split-rail fence with wire backing along Haverhill Road, 1,140 linear feet of 2-rail, split-rail fence around parking area, barbwire fence added to existing chain link fence; chain link fence around 2 water control structures; 4,370 linear feet of chain-link fencing along Turnpike Canal; 3 new management access gates and future pedestrian maze gate	\$156,797 ^{1,2}
Construction of natural-surfaced hiking trail, including installation of 76 hiking trail markers	\$12,769 ¹
Accessible canoe/kayak launch	\$47,125 ¹
Boardwalk over canal and created wetland	\$256,874 ¹
Primitive campsite	\$369 ²
Paved multiuse trail adjacent to Haverhill Road, including removal and replacement of existing fence	\$280,000 ²
Bike racks (2)	\$914 ^{1,2}
Mechanical fuel reduction	\$177,531 ¹
Water control structures (3)	\$557,575 ¹
Wetland creation; hydrological restoration; plantings; and tree/palm relocation	\$6,278,319 ¹
Invasive/nonnative vegetation control through mid July 2016	\$2,841,259 ¹
Engineering and permit fees	\$ 412,279 ¹

ITEM	ACTUAL/ESTIMATED COST
Wetland restoration/stormwater treatment area associated with Haverhill Road expansion project	\$90,000 ²
TOTAL ACTUAL AND ESTIMATED COSTS	\$11,437,053

¹ = Actual cost

² = Estimated cost

Table 4. Estimated Annual Management and Maintenance Costs (in 2016 dollars)

Site Management and Maintenance

Annual assessment by Northern Palm Beach County Improvement District for drainage facilities benefitting the natural area	\$25,000**
Prescribed habitat burns or mechanical fuel reduction (personnel and equipment - \$27,500 per burn or reduction, 11 burns/reductions in a 10-year period/10 years to next management plan update)	\$30,250*
Mowing of management accessways/hiking trails (4 times/year)	\$1,478*
Fence line maintenance (3 times/year)	\$1,108*
Maintenance of public use facilities, including parking lot, nature trail and trail markers/signs (bi-weekly or as needed) and trimming of hiking trail vegetation (2 times/year)	\$9,236*
Site management – monitoring program, annual reports, management plan updates, listed species protection, volunteer coordination and supervision, public outreach, educational materials and intergovernmental coordination	\$77,459*
Nonnative/invasive plant control (562 acres @ \$629/acre/year)	\$353,498**
Repair/replacement due to damage/vandalism (0.005% of structural facilities cost of \$1,076,131)	\$5,381**
<i>Subtotal – present annual cost</i>	\$503,410

Capital Facilities Maintenance and Replacement

Removal and replacement of facilities with 10- year expected life (trail markers, all signs, resurfacing and restriping of parking lot, post-and-rail fencing and floating debris barrier); replace existing barbwire fencing with field fence	\$136,738
<i>Estimated annual cost over 10 years @ 4% interest rate</i>	\$16,860**
Removal and replacement of all facilities with 10-year expected life listed above, plus those with 20-year expected life (benches, observation platform, bike racks, shade shelter roofs, pressure-treated pine structures, kiosks, gates, chain link fencing and operable water control structure gate, wheelstops and mill/resurface parking lot surface)	\$470,167
<i>Estimated annual cost over 20 years @ 4% interest rate</i>	\$34,604**
<i>Subtotal – estimated annual capital replacement costs</i>	\$51,464

TOTAL ANNUAL COST (in 2016 dollars) **\$554,874**

* To be performed by existing Palm Beach County personnel.

** Funding for these activities will come from the Palm Beach County Natural Areas Fund, Palm Beach County Natural Areas Stewardship Endowment Fund, Ag Reserve Land Management Fund and/or Palm Beach County General Fund, as may be amended.

NOTE: All facilities and activities listed are subject to annual budgetary funding and appropriations by the Palm Beach County Board of County Commissioners

APPENDIX A

**PLANT SPECIES RECORDED AT
THE WINDING WATERS NATURAL AREA**

APPENDIX A

PLANT SPECIES RECORDED AT THE WINDING WATERS NATURAL AREA

Updated 8/26/16

<u>Scientific Name</u>	<u>Common Name</u>
<i>Abrus precatorius</i> * (NX) (CAT I)	Rosary pea
<i>Acacia auriculiformis</i> * (CAT I)	Earleaf acacia
<i>Acer rubrum</i>	Red maple
<i>Acrostichum danaeifolium</i>	Giant leather fern
<i>Aeschynomene pratensis</i>	Meadow jointvetch
<i>Amaranthus spinosus</i> *	Spiny amaranth
<i>Ambrosia artemisiifolia</i>	Common ragweed
<i>Ammannia latifolia</i>	Toothcups
<i>Amphicarpum muhlenbergianum</i>	Blue maidencane
<i>Andropogon brachystachyus</i>	Shortspike bluestem
<i>Andropogon glomeratus</i>	Bushy bluestem
<i>Andropogon ternarius</i>	Splitbeard bluestem
<i>Andropogon virginicus</i>	Broomsedge bluestem
<i>Annona glabra</i>	Pond apple
<i>Ardisia elliptica</i> * (NX) (CAT I)	Shoebuttton
<i>Aristida</i> sp.	Threeawn
<i>Aristida speciformis</i>	Bottlebrush threeawn
<i>Aristida stricta</i> var. <i>beyrichiana</i>	Wiregrass
<i>Asimina reticulata</i>	Netted pawpaw
<i>Azolla filiculoides</i>	American waterfern
<i>Baccharis halimifolia</i>	Groundsel tree
<i>Bacopa monnieri</i>	Herb-of-grace
<i>Bejaria racemosa</i>	Tarflower
<i>Bidens alba</i>	Beggarticks
<i>Bischofia javanica</i> * (CAT I)	Javanese bishopwood
<i>Blechnum serrulatum</i>	Swamp fern
<i>Boehmeria cylindrica</i>	False nettle
<i>Boltonia diffusa</i>	Smallhead doll's daisy
<i>Buchnera americana</i>	American bluehearts
<i>Bulbostylis barbata</i> *	Watergrass
<i>Callicarpa americana</i>	American beautyberry
<i>Carphephorus carnosus</i>	Pineland chaffhead
<i>Carphephorus paniculatus</i>	Hairy chaffhead
<i>Casuarina equisetifolia</i> * (NX) (PAP I) (CAT I)	Australian-pine
<i>Catharanthus roseus</i> *	Madagascar periwinkle
<i>Cenchrus spinifex</i>	Coastal sandbur
<i>Centella asiatica</i>	Spadeleaf
<i>Cephalanthus occidentalis</i>	Common buttonbush

Chamaecrista fasciculata
*Chamaecrista pilosa**
Chamaesyce hirta
Chamaesyce hypericifolia
*Chamaesyce lasiocarpa**
*Chenopodium ambrosioides**
Chromolaena odorata
Chrysobalanus icaco
Cirsium horridulum
Cirsium sp.
*Citrus x aurantiifolia**
*Citrus x aurantium**
Cladium jamaicense
*Commelina diffusa**
Coreopsis floridana
Coreopsis leavenworthii
Crinum americanum
*Crotalaria lanceolata**
Crotalaria pallida var. *obovata**
Crotalaria rotundifolia
Croton glandulosus
Ctenium aromaticum
*Cupaniopsis anacardioides** (NX) (CAT I)
*Cuphea carthagenensis**
*Cyanthillium cinereum**
*Cynodon dactylon**
Cyperus haspan
Cyperus ligularis
Cyperus odoratus
Cyperus sp.
*Dactyloctenium aegyptium** (CAT II)
*Desmodium incanum**
Dichanthelium aciculare
Dichanthelium sp.
Digitaria sp.
Diodia virginiana
Echinochloa sp.
Echinochloa walteri
Eclipta prostrata
Eleocharis baldwinii
Eleocharis cellulosa
Eleocharis geniculata
Eleocharis interstincta
Eleocharis vivipara
*Emilia fosbergii**

Partridge pea
Hairy sensitive pea
Pillpod sandmat
Graceful sandmat
Roadside sandmat
Mexican tea
Jack-in-the-bush
Coco plum
Purple thistle
Thistle
Key lime
Grapefruit, sour orange, sweet orange
Jamaica swamp sawgrass
Common dayflower
Florida tickseed
Leavenworth's tickseed
String-lily
Lanceleaf rattlebox
Smooth rattlebox
Rabbitbells
Vente conmigo
Toochachegrass
Carrotwood
Colombian waxweed
Little ironweed
Bermudagrass
Haspan flatsedge
Swamp flatsedge
Fragrant flatsedge
Flatsedge
Durban crowfootgrass
Zarabacoa comun
Needleleaf witchgrass
Witchgrass
Crabgrass
Virginia buttonweed
Cockspur grass
Coast cockspur
False daisy
Baldwin's spikerush
Gulf Coast spikerush
Canada spikerush
Knotted spikerush
Viviparous spikerush
Florida tassleflower

*Emilia sonchifolia**
Encyclia tampensis
*Eragrostis atrovirens**
*Eragrostis ciliaris**
Eragrostis elliottii
Eragrostis virginica
Erechtites hieraciifolius
Erigeron quercifolius
Eryngium yuccifolium
*Eucalyptus torrelliana**
*Eugenia uniflora** (CAT I)
Eupatorium capillifolium
Eustachys petraea
Eustachys sp.
Euthamia caroliniana
Ficus aurea
*Ficus microcarpa** (CAT I)
Ficus sp.
Fuirena pumila
*Gamochaeta pensylvanica**
Gaura angustifolia
Habenaria floribunda
Hamelia patens
Heliotropium polyphyllum
Heterotheca subaxillaris
Hydrocotyle umbellata
Hydrocotyle verticillata
Hypericum cistifolium
Hypericum fasciculatum
Hypericum mutilum
Hypericum tetrapetalum
Ilex cassine
Ilex glabra
*Indigofera hirsuta**
Ipomoea hederifolia
Iresine diffusa
Lemna sp.
Lepidium virginicum
Leptochloa fusca
Liatris garberi
Liatris spicata
Liatris tenuifolia
Lindernia grandiflora
Lobelia feayana
Ludwigia arcuata

Lilac tassleflower
Florida butterfly orchid
Thalia lovegrass
Gophertail lovegrass
Elliott's lovegrass
Coastal lovegrass
Fireweed
Oakleaf fleabane
Button rattlesnakemaster
Torrell's eucalyptus
Surinam cherry
Dogfennel
Pinewoods fingergrass
Fingergrass
Slender flattop goldenrod
Strangler fig
Indian laurel
Fig
Dwarf umbrellasedge
Pennsylvania everlasting
Southern beeblossom
Toothpetal false reinorchid
Firebush
Pineland heliotrope
Camphorweed
Manyflower marshpennywort
Whorled marshpennywort
Roundpod St. John's-wort
Peelbark St. John's-wort
Dwarf St. John's-wort
Fourpetal St. Johns-wort
Dahoon
Gallberry
Hairy indigo
Scarletcreeper
Juba's bush
Duckweed
Virginia pepperweed
Bearded sprangletop
Garber's gayfeather
Dense gayfeather
Shortleaf gayfeather
Savannah false pimpernel
Bay lobelia
Piedmont primrosewillow

<i>Ludwigia maritima</i>	Seaside primrosewillow
<i>Ludwigia octovalvis</i>	Mexican primrosewillow
<i>Ludwigia peruviana</i> * (CAT I)	Peruvian primrosewillow
<i>Ludwigia repens</i>	Creeping primrosewillow
<i>Lygodium microphyllum</i> * (NX) (CAT I)	Old World climbing fern
<i>Lyonia fruticosa</i>	Coastalplain staggerbush
<i>Lyonia lucida</i>	Fetterbush
<i>Lythrum alatum</i>	Winged loosestrife
<i>Macroptilium lathyroides</i> *(CAT II)	Wild bushbean
<i>Magnolia virginiana</i>	Sweetbay
<i>Mecardonia acuminata</i>	Axilflower
<i>Melaleuca quinquenervia</i> * (NX) (PAP I) (CAT I)	Melaleuca
<i>Melia azedarach</i> * (CAT II)	Chinaberrytree
<i>Melinis repens</i> * (NX)(PAP I)(CAT I)	Rose natalgrass
<i>Mikania scandens</i>	Climbing hempvine
<i>Momordica charantia</i> *(CAT II)	Balsampear
<i>Myrica cerifera</i>	Wax myrtle
<i>Myrsine cubana</i>	Myrsine
<i>Nephrolepis brownii</i> * (CAT I)	Asian sword fern
<i>Nephrolepis cordifolia</i> * (CAT I)	Tuberous sword fern
<i>Nephrolepis exaltata</i>	Wild Boston fern
<i>Nuphar advena</i>	Spatterdock
<i>Nymphaea mexicana</i>	Yellow waterlily
<i>Nymphaea odorata</i>	American white waterlily
<i>Oeceoclades maculata</i> *	Monk orchid
<i>Oenothera laciniata</i>	Cutleaf eveningprimrose
<i>Ophioglossum palmatum</i>	Hand fern
<i>Oplismenus hirtellus</i>	Basketgrass
<i>Osmunda regalis</i> var. <i>spectabilis</i>	Royal fern
<i>Panicum hians</i>	Gaping panicum
<i>Panicum maximum</i> * (CAT II)	Guineagrass
<i>Panicum repens</i> * (CAT I)	Torpedograss
<i>Panicum rigidulum</i>	Redtop panicum
<i>Panicum virgatum</i>	Switchgrass
<i>Parthenocissus quinquefolia</i>	Virginia creeper
<i>Paspalum notatum</i> *	Bahia grass
<i>Paspalum setaceum</i>	Thin paspalum
<i>Passiflora foetida</i> *	Fetid passionflower
<i>Passiflora quadrangularis</i> *	Giant granadilla
<i>Passiflora suberosa</i>	Corkstem passionflower
<i>Persea borbonia</i>	Red bay
<i>Persea palustris</i>	Swamp bay
<i>Phlebodium aureum</i>	Golden polypody
<i>Phyla nodiflora</i>	Turkey tangle fogfruit
<i>Physalis pubescens</i>	Husk tomato

<i>Phytolacca americana</i>	American pokeweed
<i>Piloblephis rigida</i>	Wild pennyroyal
<i>Pinus elliottii</i>	Slash pine
<i>Pistia stratiotes*</i> (PAP II) (CAT I)	Water-lettuce
<i>Pityopsis graminifolia</i>	Narrowleaf silkgrass
<i>Plantago virginica</i>	Southern plantain
<i>Pluchea baccharis</i>	Rosy camphorweed
<i>Pluchea carolinensis</i>	Cure-for-all
<i>Poinsettia cyathophora</i>	Paintedleaf
<i>Polygonum hydropiperoides</i>	Mild waterpepper
<i>Polypremum procumbens</i>	Rustweed
<i>Pontederia cordata</i>	Pickernelweed
<i>Portulaca pilosa</i>	Pink purslane
<i>Pseudognaphalium obtusifolium</i>	Rabbit tobacco
<i>Psilotum nudum</i>	Whisk-fern
<i>Psychotria nervosa</i>	Wild coffee
<i>Pteridium aquilinum</i>	Bracken
<i>Pterocaulon pycnostachyum</i>	Blackroot
<i>Quercus laurifolia</i>	Laurel oak
<i>Quercus pumila</i>	Running oak
<i>Quercus virginiana</i>	Live oak
<i>Rhodomyrtus tomentosa*</i> (NX) (CAT I)	Rose myrtle
<i>Rhynchosia sp.</i>	Snoutbean
<i>Rhynchospora microcarpa</i>	Southern beaksedge
<i>Rhynchospora nitens</i>	Shortbeak beaksedge
<i>Richardia brasiliensis*</i>	Tropical Mexican clover
<i>Richardia grandiflora*</i> (CAT II)	Largeflower Mexican clover
<i>Rivina humilis</i>	Rougeplant
<i>Sabal palmetto</i>	Cabbage palm
<i>Sagittaria lancifolia</i>	Bulltongue arrowhead
<i>Salix caroliniana</i>	Coastalplain willow
<i>Salvinia minima*</i> (CAT I)	Water spangles
<i>Sansevieria hyacinthoides*</i> (CAT II)	Bowstring hemp
<i>Sarcostemma clausum</i>	White twinevine
<i>Schefflera actinophylla*</i> (CAT I)	Australian umbrella tree
<i>Schefflera arboricola*</i>	Dwarf schefflera
<i>Schinus terebinthifolius*</i> (NX) (PAP I) (CAT I)	Brazilian pepper
<i>Schizachyrium scoparium</i>	Little bluestem
<i>Schoenoplectus californicus</i>	Giant bulrush
<i>Schoenoplectus tabernaemontani</i>	Softstem bulrush
<i>Scoparia dulcis</i>	Sweetbroom
<i>Senna occidentalis*</i>	Septicweed
<i>Senna pendula</i> var. <i>glabrata*</i> (CAT I)	Valamuerto
<i>Serenoa repens</i>	Saw palmetto
<i>Setaria magna</i>	Giant bristlegrass

Setaria parviflora
*Sida cordifolia**
Sida rhombifolia
Sisyrinchium angustifolium
Smilax auriculata
Smilax bona-nox
Solanum americanum
*Solanum diphyllum** (CAT II)
*Solanum viarum** (NX) (CAT I)
Solidago fistulosa
Solidago odora var. *chapmanii*
Solidago stricta
*Sonchus asper**
Spartina bakeri
Spermacoce remota
*Spermacoce verticillata** (CAT II)
*Sphagneticola trilobata** (CAT II)
*Sporobolus indicus**
Stenotaphrum secundatum
Symphyotrichum dumosum
Taxodium ascendens
Taxodium distichum
Thalia geniculata
Thelypteris kunthii
Tillandsia balbisiana
Tillandsia fasciculata
Tillandsia paucifolia
Tillandsia recurvata
Tillandsia usneoides
Tillandsia utriculata
Toxicodendron radicans
*Tradescantia spathacea** (CAT II)
*Tribulus cistoides** (CAT II)
*Tridax procumbens** (NX)
Typha latifolia
Typha sp.
*Urena lobata** (CAT I)
*Urochloa mutica** (CAT I)
Urochloa sp.
Vaccinium myrsinites
Vaccinium stamineum
Vallisneria americana
Vernonia blodgettii
Vigna luteola
Vitis rotundifolia

Knotroot foxtail
 Lima
 Indian hemp
 Narrowleaf blue-eyed grass
 Earleaf greenbrier
 Saw greenbrier
 American black nightshade
 Twoleaf nightshade
 Tropical soda apple
 Pinebarren goldenrod
 Chapman's goldenrod
 Wand goldenrod
 Spiny sowthistle
 Sand cordgrass
 Woodland false buttonweed
 Shrubby false buttonweed
 Creeping oxeye
 Smutgrass
 St. Augustinegrass
 Rice button aster
 Pond-cypress
 Bald-cypress
 Fireflag
 Southern shield fern
 Inflated & reflexed wild pine
 Common wild pine
 Potbelly airplant
 Ballmoss
 Spanish moss
 Giant wild pine
 Eastern poison ivy
 Oyster-plant
 Burrnut
 Coatbuttons
 Broadleaf cattail
 Cattail
 Caesarweed
 Paragrass
 Signalgrass
 Shiny blueberry
 Deerberry
 Tapegrass
 Florida ironweed
 Hairypod cowpea
 Muscadine

<i>Vitis shuttleworthii</i>	Calloose grape
<i>Vittaria lineata</i>	Shoestring fern
<i>Woodwardia virginica</i>	Virginia chain fern
<i>Xyris sp.</i>	Yelloweyed grass

NOTES:

- * = Nonnative species
- NX = Species is on the state noxious weed list (Rule 5B-57.007, Florida Administrative Code)
- PAP I = Species designated as Class I Prohibited Aquatic Plant by FDACS (2008)
- PAP II = Species designated as Class II Prohibited Aquatic Plant by FDACS (2008)
- (CAT I) = Exotic species designated as Category I by FLEPPC (FLEPPC 2015)
- (CAT II) = Exotic species designated as Category II by FLEPPC (FLEPPC 2015)

Scientific and common names of vascular plant species generally follow ITIS (2014); Nature Serve (2012); USDA, NRCS (2014), and Wunderlin and Hansen (2008). Lichens are from Brodo et al. (2001).

APPENDIX B

**ANIMAL SPECIES RECORDED AT
THE WINDING WATERS NATURAL AREA**

APPENDIX B

ANIMAL SPECIES RECORDED AT THE WINDING WATERS NATURAL AREA
Updated 8/26/16

<u>Scientific Name</u>	<u>Common Name</u>
MOLLUSCA	
Gastropoda	
Pomacea paludosa	Florida applesnail
ARTHROPODA	
Arachnida (Arachnids)	
Gasteracantha cancriformis	Spinybacked orbweaver
Latrodectus mactans	Southern black widow
Leucauge venusta	Orchard orbweaver
Insecta (Insects)	
<u>Coleoptera</u>	
Coccinellidae (family)	Ladybird beetle
Oxyops vitiosa*	Melaleuca snout beetle
<u>Hemiptera</u>	
Boreioglycaspis melaleucae*	Melaleuca psyllid
Paratachardina pseudolobata*	Lobate lac scale
Tibicen sp.	Cicada
<u>Hymenoptera</u>	
Solenopsis invicta*	Red imported fire ant
Solenopsis sp.	Fire ant
<u>Lepidoptera</u>	
Agraulis vanillae	Gulf fritillary
Anartia jatrophae	White peacock
Danaus gilippus	Queen
Dryas iulia	Julia
Heliconius charithonia	Zebra
Limenitis archippus	Viceroy
Phoebis sennae	Cloudless sulfur
Vanessa atalanta	Red admiral
<u>Odonata</u>	
Celithemis eponina	Halloween pennant
Erythemis simplicicollis	Eastern pondhawk

Erythemis vesiculosa
Erythrodiplax umbrata
Tramea carolina

Great pondhawk
Band-winged dragonlet
Carolina saddlebags

Orthoptera
Schistocerca americana

American grasshopper

CHORDATA

Actinopterygii (Ray-finned fishes)
Lepisosteus platyrhincus
*Oreochromis aureus**

Florida gar
Blue tilapia

Amphibia (Amphibians)
Acris gryllus

Southern cricket frog

Reptilia (Reptiles)

Crocodylia
Alligator mississippiensis

American alligator

Squamata
Anolis carolinensis
*Anolis sagrei**
Basiliscus vittatus
Coluber constrictor
Opheodrys aestivus

Green anole
Brown anole
Brown basilisk
North American racer
Rough greensnake

Testudines
Gopherus polyphemus
Pseudemys floridana peninsularis

Gopher tortoise
Peninsula cooter

Aves (Birds)

Accipitriformes
Accipiter cooperii
Aix sponsa
Buteo jamaicensis
Buteo lineatus
Cathartes aura
Circus cyaneus
Coragyps atratus
Elanoides forficatus
Haliaeetus leucocephalus
Pandion haliaetus
Rostrhamus sociabilis plumbeus

Cooper’s hawk
Wood duck
Red-tailed hawk
Red-shouldered hawk
Turkey vulture
Northern harrier
Black vulture
Swallow-tailed kite
Bald eagle
Osprey
Snail kite

Anseriformes

<i>Anas clypeata</i>	Northern shoveler
<i>Anas fulvigula</i>	Mottled duck
<i>Anas platyrhynchos</i>	Mallard
<i>Dendrocygna autumnalis</i>	Black-bellied whistling duck
<i>Lophodytes cucullatus</i>	Hooded merganser

Apodiformes

<i>Chaetura pelagica</i>	Chimney swift
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Caprimulgiformes

<i>Antrostomus carolinensis</i>	Chuck-will's-widow
<i>Antrostomus vociferus</i>	Eastern whip-poor-will
<i>Chordeiles minor</i>	Common nighthawk

Charadriiformes

<i>Actitis macularis</i>	Spotted sandpiper
<i>Calidris alba</i>	Sanderling
<i>Charadrius vociferous</i>	Killdeer
<i>Gallinago delicata</i>	Wilson's snipe
<i>Himantopus mexicanus</i>	Black-necked stilt
<i>Larus delawarensis</i>	Ring-billed gull
<i>Leucophaeus atricilla</i>	Laughing gull
<i>Rynchops niger</i>	Black skimmer
<i>Sterna antillarum sternula</i>	Least tern
<i>Tringa flavipes</i>	Lesser yellowlegs

Ciconiiformes

<i>Mycteria americana</i>	Wood stork
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Columbiformes

<i>Columbina passerina</i>	Common ground-dove
<i>Zenaida macroura</i>	Mourning dove

Coraciiformes

<i>Megaceryle alcyon</i>	Belted kingfisher
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Cuculiformes

<i>Coccyzus americanus</i>	Yellow-billed cuckoo
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Falconiformes

<i>Falco sparverius</i>	American kestrel
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Galliformes

<i>Meleagris gallopavo</i>	Wild turkey
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Gruiformes

Aramus guarana
Fulica americana
Gallinula galeata
Grus canadensis pratensis
Porphyrio martinicus

Limpkin
American coot
Common gallinule
Florida sandhill crane
Purple gallinule

Passeriformes

Agelaius phoeniceus
Bombycilla cedrorum
Cardinalis cardinalis
Corvus brachyrhynchos
Corvus ossifragus
Cyanocitta cristata
Dumetella carolinensis
Geothlypis trichas
Helmitheros vermivorum
Hirundo rustica
Lanius ludovicianus
Mimus polyglottos
Mniotilta varia
Myiarchus crinitus
Passerina cyanea
Piranga rubra
Polioptila caerulea
Quiscalus major
Quiscalus quiscula
Sayornis phoebe
Setophaga americana
Setophaga caerulescens
Setophaga coronata
Setophaga discolor
Setophaga dominica
Setophaga magnolia
Setophaga palmarum
Setophaga pinus
Setophaga ruticilla
Setophaga striata
Setophaga tigrina
Sturnella magna
*Sturnus vulgaris**
Tachycineta bicolor
Thryothorus ludovicianus
Toxostoma rufum
Troglodytes aedon

Red-winged blackbird
Cedar waxwing
Northern cardinal
American crow
Fish crow
Blue jay
Gray catbird
Common yellowthroat
Worm-eating warbler
Barn swallow
Loggerhead shrike
Northern mockingbird
Black-and-white warbler
Great crested flycatcher
Indigo bunting
Summer tanager
Blue-gray gnatcatcher
Boat-tailed grackle
Common grackle
Eastern phoebe
Northern parula
Black-throated blue warbler
Yellow-rumped warbler
Prairie warbler
Yellow-throated warbler
Magnolia warbler
Palm warbler
Pine warbler
American redstart
Blackpoll warbler
Cape May warbler
Eastern meadowlark
European starling
Tree swallow
Carolina wren
Brown thrasher
House wren

Turdus migratorius
Vireo griseus

American robin
White-eyed vireo

Pelecaniformes

Ardea alba
Ardea herodias
Bubulcus ibis
Butorides virescens
Egretta caerulea
Egretta thula
Egretta tricolor
Eudocimus albus
Ixobrychus exilis
Pelecanus erythrorhynchos
Platalea ajaja
Plegadis falcinellus

Great egret
Great blue heron
Cattle egret
Green heron
Little blue heron
Snowy egret
Tricolored heron
White ibis
Least bittern
American white pelican
Roseate spoonbill
Glossy ibis

Piciformes

Dryocopus pileatus
Melanerpes carolinus
Melanerpes erythrocephalus
Picoides pubescens
Sphyrapicus varius

Pileated woodpecker
Red-bellied woodpecker
Red-headed woodpecker
Downy woodpecker
Yellow-bellied sapsucker

Podicipediformes

Podilymbus podiceps

Pied-billed grebe

Suliformes

Anhinga anhinga
Phalacrocorax auritus

Anhinga
Double-crested cormorant

Mammalia (Mammals)

Canis latrans
*Dasypus novemcinctus**
Didelphis virginiana
Lontra canadensis
Lynx rufus
Procyon lotor
Scalopus aquaticus
Sciurus carolinensis
Sylvilagus floridanus

Coyote
Nine-banded armadillo
Virginia opossum
North American river otter
Bobcat
Raccoon
Eastern mole
Eastern gray squirrel
Eastern cottontail

* = Nonnative species

NOTE: Scientific and common names of species generally follow FWC (2015), FNAI (2016), NatureServe (2015), ITIS (2016) or Arnett (2000).

APPENDIX C

DEFINITIONS OF DESIGNATIONS AND RANKS FOR LISTED SPECIES AND NATURAL COMMUNITIES

APPENDIX C

DEFINITIONS OF DESIGNATIONS AND RANKS FOR LISTED SPECIES AND NATURAL COMMUNITIES

United States Fish and Wildlife Service (USFWS) - Wildlife and Plants

Species listed in the Code of Federal Regulations (CFR) and protected under the provisions of the Endangered Species Act of 1973 (16 USC 1531-1543, as amended); animals are listed in 50 CFR 17-11 and plants are listed in 50 CFR 17-12.

- | | |
|--------------------------------|---|
| Endangered (E) | Any species which is in danger of extinction through all or a portion of its range other than a species of the Class Insecta determined by the Secretary [of the Interior] to constitute a pest whose protection under the provisions of this chapter would present an overwhelming and overriding risk to man. |
| Threatened (T) | Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. |
| Candidate (C) | Species identified by the United States Fish and Wildlife Service (USFW) or the National Marine Fisheries Service (NMFS), which are considered to be candidates for listing under the Endangered Species Act as published in the <i>Federal Register</i> . |
| Similarity of Appearance (S/A) | If a species closely resembles an endangered or threatened species, such species may be treated as endangered or threatened if the Director of USFWS makes a determination that the species shall appear in the list in 50 CFR 17.11 (wildlife) or the list in 50 CFR 17.12 (plants). |

Florida Fish and Wildlife Conservation Commission (FWC) - Animals

Species listed in Chapter 68A-27 of the Florida Administrative Code (F.A.C.) as Florida Endangered and Threatened Species, and protected under that chapter and the Endangered and Threatened Species Act, Section 372.072, Florida Statutes (F.S.).

- | | |
|--|---|
| Federally-designated Endangered and Threatened Species (FE) and (FT) | Species of fish or wild animal life, subspecies or isolated populations of species or subspecies, whether vertebrate or invertebrate, that are native to Florida and are classified as Endangered or Threatened under Commission rule by virtue of designation by the United States Departments of Interior or Commerce as endangered or threatened under the Federal Endangered Species Act, 16 U.S.C. § 1531 et seq. and rules. |
|--|---|

State-designated Threatened Species (ST)	As designated by the Commission, species of fish or wild animal life, subspecies, or isolated population of a species or subspecies, whether vertebrate or invertebrate, that are native to Florida and are classified as Threatened as determined by paragraph (a), (b), (c), (d), or (e) [in subsequent part of definition] in accordance with Rule 68A-27.0012., F.A.C.
Species of Special Concern (SSC)	Per Rule 68A-27.005, management plans will be developed for the species listed in this rule and the species will be evaluated under the listing criteria in subsection 68A-27.001(3), F.A.C. for listing as a State-designated Threatened species.
Candidate Species	A species of fish or wild animal life, subspecies, or isolated populations of species or subspecies, whether invertebrate or vertebrate, that the Commission has determined warrants listing as a State-designated Threatened Species in accordance with Rule 68A-27.0012, F.A.C., and is awaiting final Commission action to be added to the list of Florida Endangered and Threatened Species in Rule 68A-27.003, F.A.C.

Florida Department of Agriculture and Consumer Affairs (FDACS) - Plants

Species listed in Chapter 5B-40 of the Rules of FDACS, Division of Plant Industry and protected under the Preservation of Native Flora of Florida Act (Section 581.185, F.S.).

Endangered (E)	Species of plants native to the state that are in imminent danger of extinction within the state, the survival of which is unlikely if the causes of a decline in the number of plants continue, and includes all species determined to be endangered species or threatened species pursuant to the federal Endangered Species Act of 1973, as amended.
Threatened (T)	Species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in such number as to cause them to be endangered.
Commercially Exploited (CE)	Species native to the state which are being removed in significant numbers from native habitats in the state and sold or transported for sale.

Florida Natural Areas Inventory (FNAI) - Plants, Animals and Natural Communities

FNAI ranks indicate the global (G) or state (S) status of a species or a natural community. Rank definitions are from FNAI (2016).

FNAI Global Rank Definitions

- G1 Critically imperiled globally because of extreme rarity (5 or fewer occurrences or less than 1,000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
- G2 Imperiled globally because of rarity (6 to 20 occurrences or less than 3,000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
- G3 Either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
- G4 Apparently secure globally (may be rare in parts of range).
- G5 Demonstrably secure globally.
- G#? Tentative rank (e.g., G2?).

FNAI State Rank Definitions

- S1 Critically imperiled in Florida because of extreme rarity (5 or fewer occurrences or less than 1,000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
- S2 Imperiled in Florida because of rarity (6 to 20 occurrences or less than 3,000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
- S3 Either very rare and local in Florida (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
- S4 Apparently secure in Florida (may be rare in parts of range).
- S5 Demonstrably secure in Florida.

APPENDIX D

LIMITATION OF USE/SITE DEDICATION



CFN 20150055378
OR BK 27340 PG 0708
RECORDED 02/17/2015 11:55:01
Palm Beach County, Florida
Sharon R. Bock, CLERK & COMPTROLLER
Pgs 0708 - 715; (8pgs)

R201440618

NOTICE OF LIMITATION OF USE/
SITE DEDICATION

Winding Waters Trail System Project – RTP Project Number T13009

This Notice of Limitation of Use/Site Dedication gives notice that the Real Property identified in the project boundary map and legal description, attached hereto as Exhibit "A" (the "Property"), has been developed with financial assistance provided by the Florida Department of Environmental Protection (DEP) under the provisions of Chapter 62S-2, F.A.C. In accordance with the Federal Highway Administration Interim Guidance, Chapter 62S-2, F.A.C., and Section 6(f)(3) of the Land and Water Conservation Fund Act of 1965 [16 U.S.C. 4601-8(f)(3)], the Property is hereby dedicated to the public in perpetuity as an outdoor recreation area for the use and benefit of the general public. The Property is subject to all applicable terms of the law, rule and guidance cited herein.

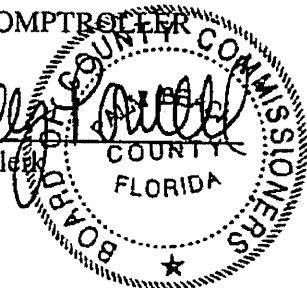
DEDICATOR:

PALM BEACH COUNTY, a Political
subdivision of the State of Florida

ATTEST:
SHARON R. BOCK
CLERK AND COMPTROLLER

By:

Deputy Clerk



By:

Priscilla A. Taylor, Mayor

Date:

MAY 06 2014

APPROVED AS TO FORM
AND LEGAL SUFFICIENCY:

By:

Assistant County Attorney

APPROVED AS TO
TERMS AND CONDITIONS:

By:

Director, Palm Beach County
Department of Environmental
Resources Management

EXHIBIT "A"
WINDING WATERS RECREATIONAL TRAILS
PROGRAM GRANT

A PARCEL OF LAND BEING ALL OF PARCEL 17.01 AND A PORTION OF PARCEL 17.02 OF THE PROPERTY DESCRIBED IN OFFICIAL RECORD BOOK 13232, PAGE 1739 OF THE PUBLIC RECORDS OF PALM BEACH COUNTY, FLORIDA, LYING IN SECTION 35, TOWNSHIP 42 SOUTH, RANGE 42 EAST, PALM BEACH COUNTY, FLORIDA, SAID PARCEL BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:


COMMENCING AT THE SOUTHEAST CORNER OF SAID SECTION 35; THENCE NORTH 88°30'57" WEST ALONG THE SOUTH LINE OF SAID SECTION 35, A DISTANCE OF 200.00 FEET TO A LINE LYING 200.00 FEET WEST OF (AS MEASURED AT RIGHT ANGLE TO) AND PARALLEL WITH THE EAST LINE OF SAID SECTION 35 AND THE POINT OF BEGINNING; THENCE NORTH 88°30'57" WEST CONTINUING ALONG THE SOUTH LINE OF SAID SECTION 35, A DISTANCE OF 2452.01 FEET TO THE SOUTH QUARTER CORNER OF SAID SECTION 35; THENCE NORTH 88°31'13" WEST CONTINUING ALONG THE SOUTH LINE OF SAID SECTION 35, A DISTANCE OF 2651.56 FEET TO THE SOUTHWEST CORNER OF SAID SECTION 35; THENCE NORTH 02°37'35" EAST ALONG THE WEST LINE OF SAID SECTION 35, A DISTANCE OF 2631.73 FEET TO THE WEST QUARTER CORNER OF SAID SECTION 35; THENCE NORTH 01°41'35" EAST CONTINUING ALONG THE WEST LINE OF SAID SECTION 35, A DISTANCE OF 1954.71 FEET TO THE SOUTH LINE OF THE PARCEL OF LAND DESCRIBED IN OFFICIAL RECORD BOOK 1982, PAGE 467 OF SAID PUBLIC RECORDS; THENCE SOUTH 88°30'54" EAST LONG SAID SOUTH LINE, A DISTANCE OF 5060.52 FEET TO SAID LINE LYING 200.00 FEET WEST OF (AS MEASURED AT RIGHT ANGLES TO) AND PARALLEL WITH THE EAST LINE OF SAID SECTION 35; THENCE SOUTH 01°49'15" WEST ALONG SAID PARALLEL LINE, A DISTANCE OF 1948.74 FEET TO A PERPENDICULAR BISECTOR OF SAID PARALLEL LINES; THENCE SOUTH 01°35'39" WEST CONTINUING ALONG SAID PARALLEL LINE, A DISTANCE OF 2636.92 FEET TO THE SOUTH LINE OF SAID SECTION 35 AND THE POINT OF BEGINNING.

SAID PARCEL CONTAINS 23,252,699 SQUARE FEET OR 533.8085 ACRES MORE OR LESS.

SURVEYOR'S NOTES

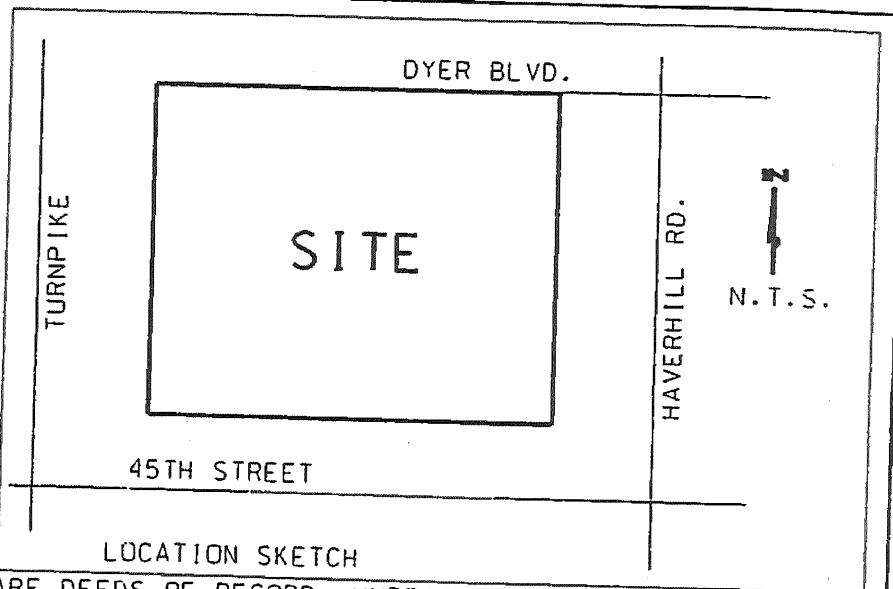
BEARINGS ARE BASED ON A GRID (NAD 83/90) BEARING OF NORTH 88°30'57" WEST ALONG THE SOUTH LINE OF THE SOUTHEAST QUARTER OF SECTION 35, TOWNSHIP 42 SOUTH, RANGE 42 EAST, PALM BEACH COUNTY, FLORIDA, AS SHOWN ON THIS DRAWING AND ALL OTHER BEARINGS ARE RELATIVE THERETO.

NO SEARCH OF THE PUBLIC RECORDS HAS BEEN MADE BY THE SIGNING SURVEYOR. THE CLIENT DID NOT PROVIDE AND THE LEGAL DESCRIPTION AND SKETCH IS NOT BASED ON A TITLE POLICY OR SEARCH OF THE PUBLIC RECORDS.

PROJECT: WINDING WATERS RECREATIONAL TRAILS PROGRAM GRANT	DESIGN FILE NAME S-1-13-3360.DGN	DRAWING NO. S-1-13-3360
	FIELD BOOK NO. N/A	
NO. 1 REVISION REVISED PER PREM ADDED INDEX SHEET	DATE CUL 22 13 CUL 19 13	DATE CUL 22 13 CUL 19 13
 PALM BEACH COUNTY ENGINEERING AND PUBLIC WORKS ROADWAY PRODUCTION 2300 NORTH JOG ROAD WEST PALM BEACH, FL 33411		

LEGEND
O.R.B. = OFFICIAL RECORD
BOOK

W.M.E. = WATER MANAGEMENT
EASEMENT
FPL = FLORIDA POWER & LIGHT
D.E. = DRAINAGE EASEMENT
U.E. = UTILITY EASEMENT
R/W = RIGHT-OF-WAY
POB = POINT OF BEGINNING
POC = POINT OF COMMENCEMENT
CL = CENTERLINE
PG. = PAGE



IT IS POSSIBLE THAT THERE ARE DEEDS OF RECORD, UNRECORDED DEEDS, EASEMENTS, OR OTHER INSTRUMENTS WHICH COULD AFFECT THE SUBJECT PROPERTY, WHICH ARE UNKNOWN TO THE SIGNING SURVEYOR.

THIS IS NOT A SURVEY.

THIS INSTRUMENT PREPARED BY GLENN W. MARK, P.L.S. IN THE OFFICE OF THE COUNTY ENGINEER @ VISTA CENTER 2300 NORTH JOG ROAD, WEST PALM BEACH, FLORIDA 33411-2745.

COORDINATES SHOWN ARE GRID
DATUM = NAD 83, 1990 ADJUSTMENT
ZONE = FLORIDA EAST
LINEAR UNITS = US SURVEY FOOT
COORDINATE SYSTEM 1983 STATE PLANE TRANSVERSE MERCATOR PROJECTION
ALL DISTANCES ARE GROUND.
PROJECT SCALE FACTOR = 1.000034786
GROUND DISTANCE X SCALE FACTOR = GRID DISTANCE
ALL FEATURE SYMBOLS SHOWN ARE NOT TO SCALE.

NOT VALID WITHOUT THE SIGNATURE AND THE ORIGINAL RAISED SEAL OF A FLORIDA LICENSED SURVEYOR AND MAPPER.

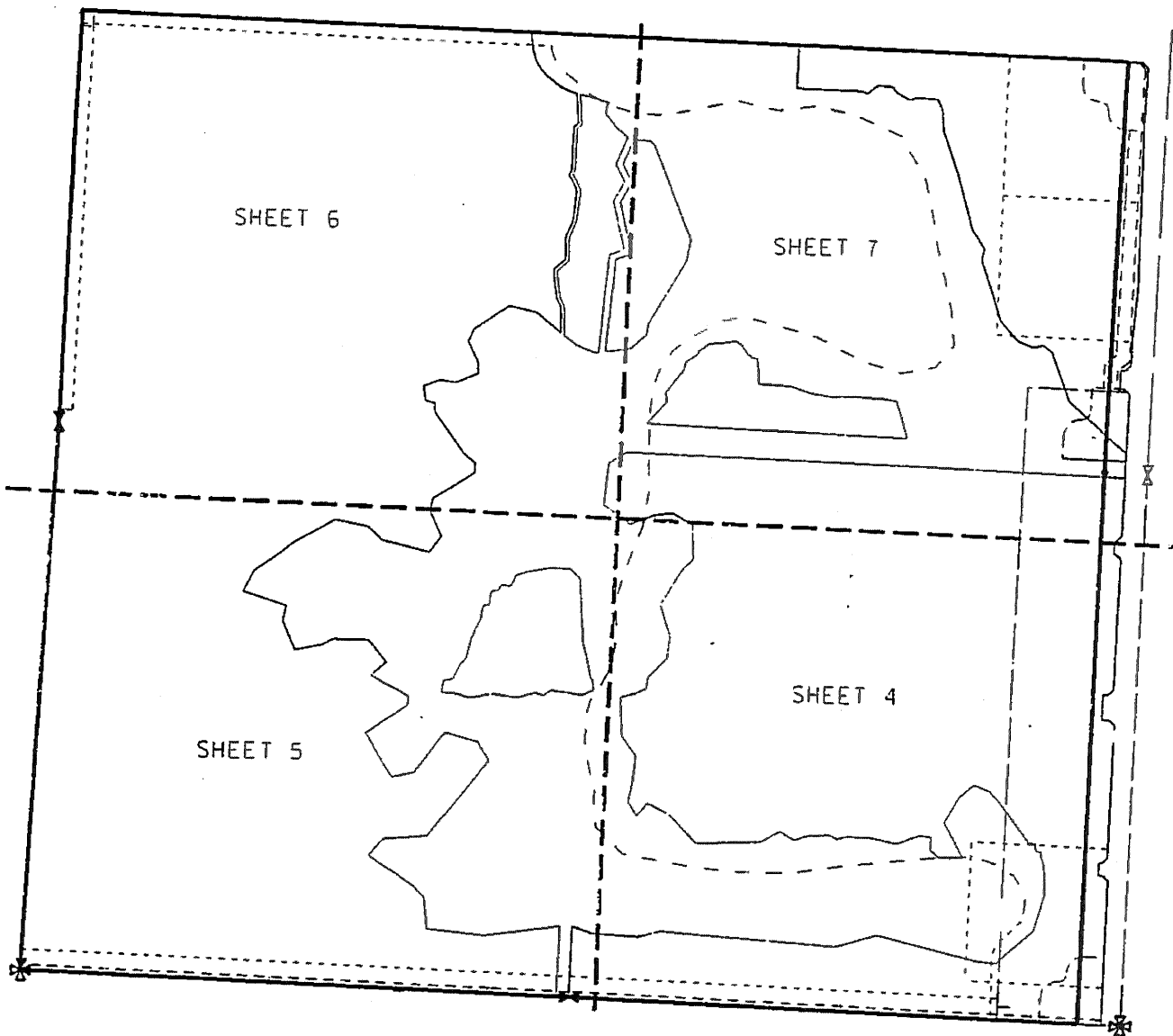
EPB-9 & EPB-9A REFERENCED ON UNDERLYING BOUNDARY SURVEY HAVE BEEN QUIT CLAIM TO PBC PER OFFICIAL RECORD BOOK 23525, PG. 1363

I HEREBY CERTIFY THAT THE LEGAL DESCRIPTION AND SKETCH SHOWN HEREON MEETS THE MINIMUM TECHNICAL STANDARDS SET FORTH BY THE FLORIDA BOARD OF PROFESSIONAL SURVEYORS AND MAPPERS IN CHAPTER 5J-17.050 - .052, FLORIDA ADMINISTRATIVE CODE, PURSUANT TO SECTION 472.027, FLORIDA STATUTES.

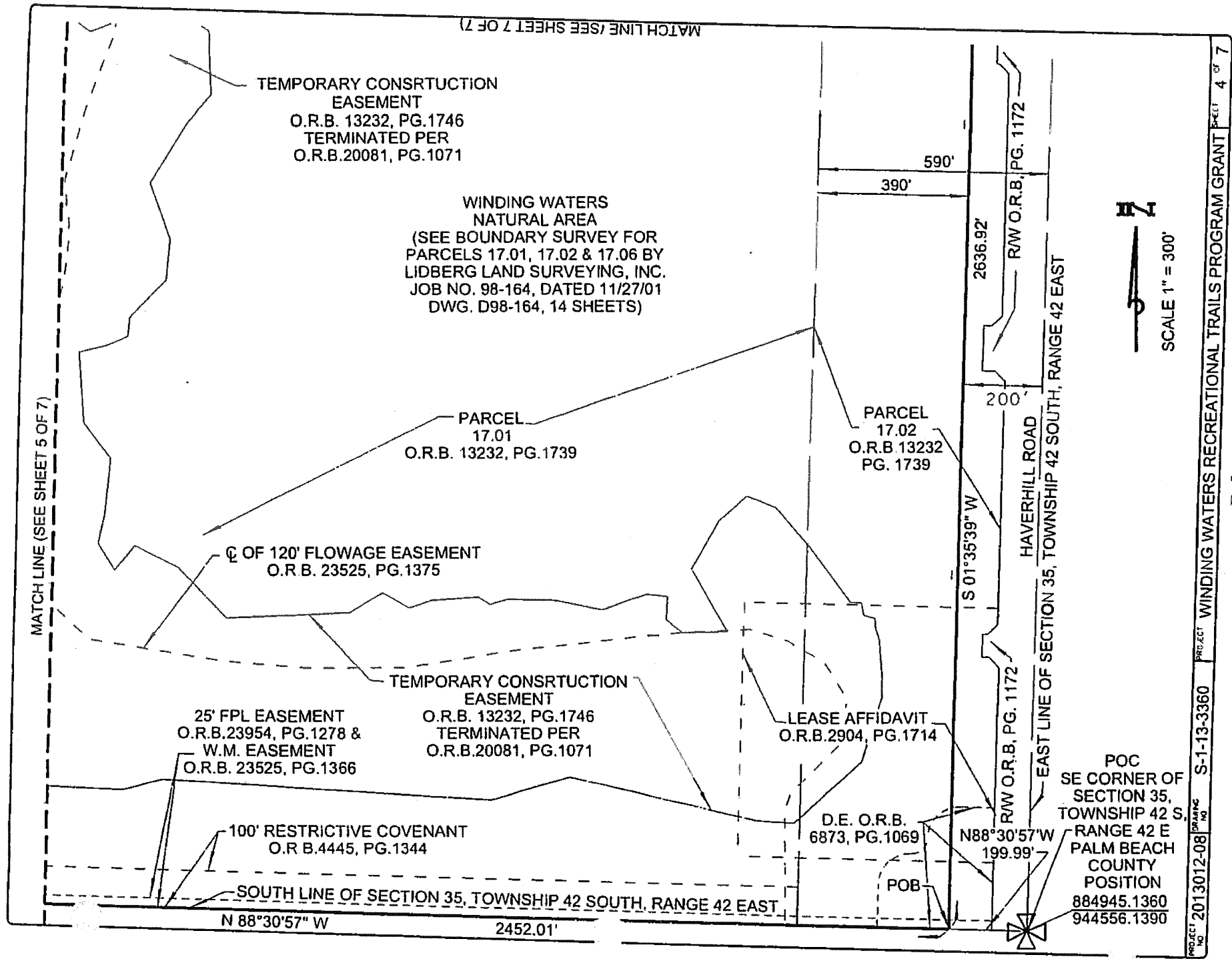
GLENN W. MARK, P.L.S.
FLORIDA CERTIFICATE #5304

DATE

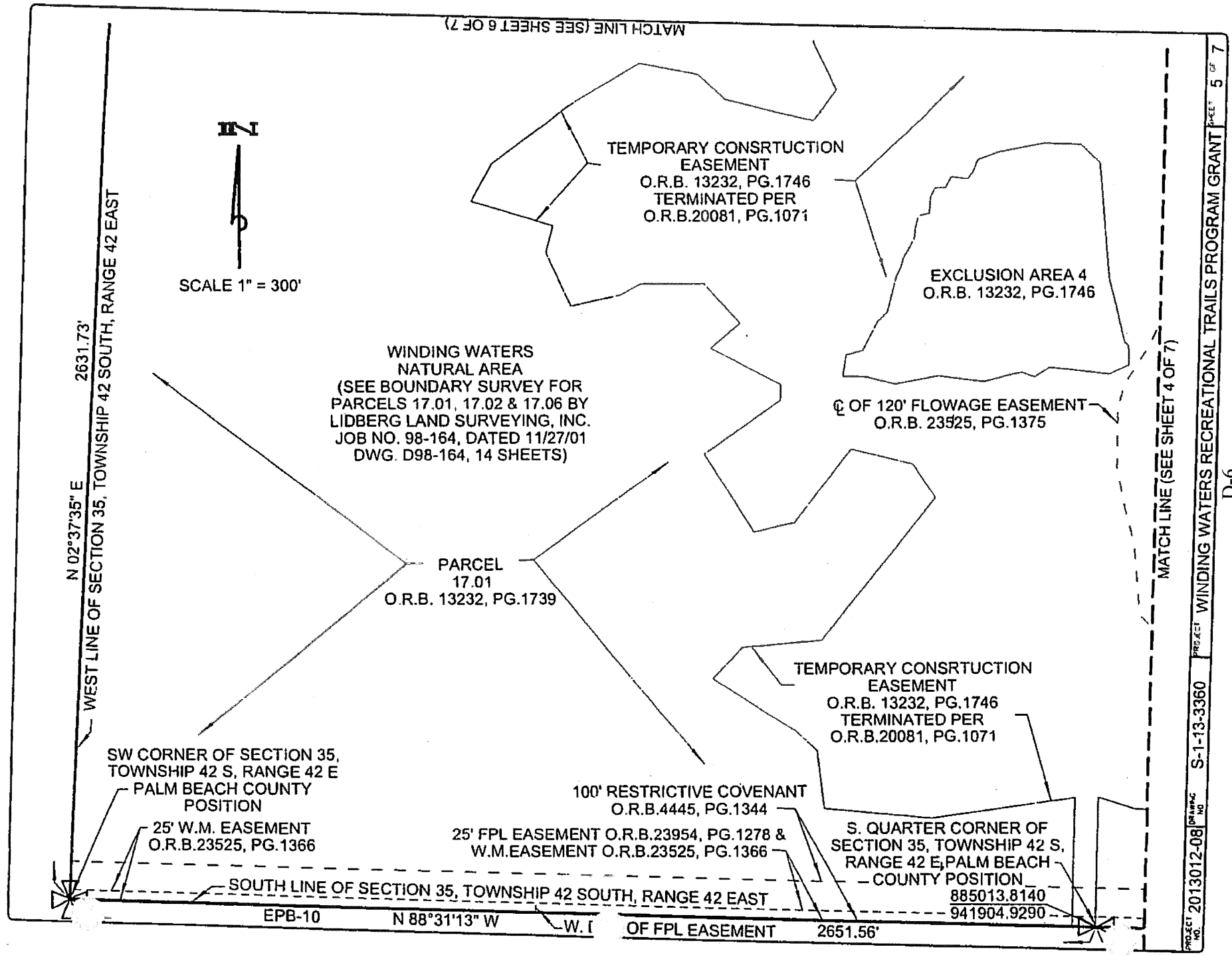
PROJECT NO. 2013012-08 DRAWING NO. S-1-13-3360 PROJECT WINDING WATERS RECREATIONAL TRAILS PROGRAM GRANT SHEET 2 OF 7

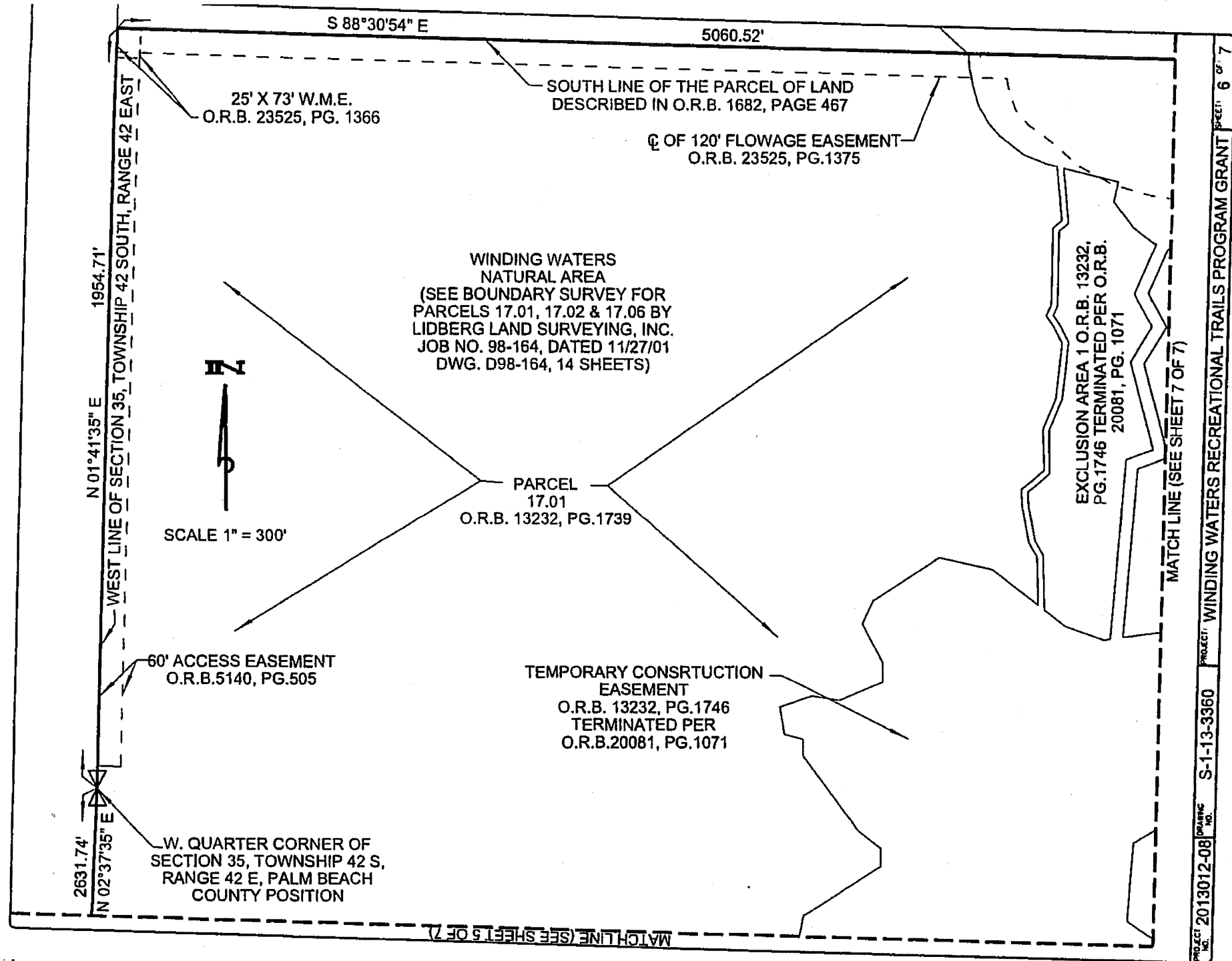


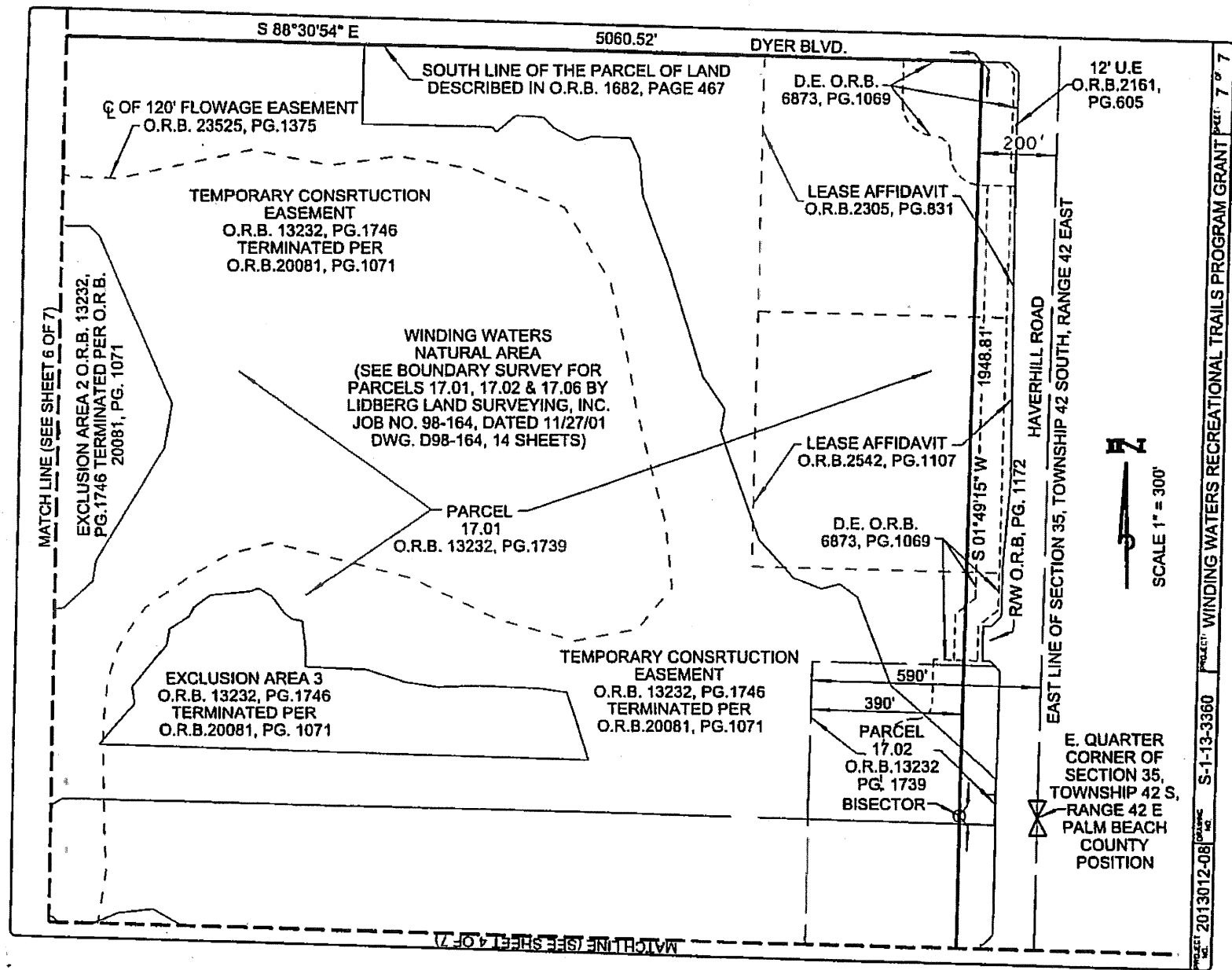
SHEET INDEX
NOT TO SCALE



D-5







STATE OF FLORIDA • PALM BEACH COUNTY

I hereby certify that the foregoing is a true copy of the record in my office with redactions, if any as required by law

THIS 17th DAY OF February 2015

SHARON R. BOCK

CLERK & COMPTROLLER

DEPUTY CLERK

D-8

APPENDIX E

INTERLOCAL AGREEMENT

R2009F1424

INTERLOCAL AGREEMENT
BETWEEN
PALM BEACH COUNTY
AND
FLORIDA'S TURNPIKE ENTERPRISE
(WINDING WATERS NATURAL AREA)

This Interlocal Agreement (the "Agreement") shall be effective as of the SEP 01 2009 day of _____, 2009 (the "Effective Date") and is being entered into by and between **PALM BEACH COUNTY**, a political subdivision of the State of Florida, by and through its Board of County Commissioners, with offices at 301 North Olive Avenue, 6th Floor, West Palm Beach, Florida 33401-4791, (hereinafter referred to as the "County") and the **FLORIDA'S TURNPIKE ENTERPRISE**, a division of the Florida Department of Transportation, with offices at Florida's Turnpike Headquarters, Turkey Lake Service Plaza, Turnpike Milepost 263, Building 5315, P.O. Box 613069, Ocoee, Florida 34761 (hereinafter referred to as "Turnpike Enterprise"). The County and Turnpike Enterprise hereinafter shall be referred to as the "Parties."

WITNESSETH:

WHEREAS, the County is currently in the process of developing its Winding Waters Natural Area on those parcels of real property described in attached Exhibit "A-1" (hereinafter referred to as the "Winding Waters Natural Area") and generally depicted on the site plan in attached Exhibit "A-2"; (the "Site Plan"); and

WHEREAS, Turnpike Enterprise has a real property interest in that parcel of real property described in attached Exhibit "B" (the "Turnpike Enterprise Property") which parcels of real property contains pine flatwoods uplands, a small wetland area, and a canal for surface water drainage purposes; and

WHEREAS, the County has applied to Turnpike Enterprise for a permit relating to construction activities within the Turnpike Enterprise Property; and

WHEREAS, in order to reroute water flows as part of the County's development of its Winding Waters Natural Area, the County has asked the Turnpike Enterprise to authorize the County to clean out the surface water drainage canal on the Turnpike Enterprise Property, re-contour the canal to its original design specifications as needed, and make connections to two canals bordering the Winding Waters Natural Area, one on the northern border (hereinafter referred to as the Northwest Winding Waters Canal ["NWWW Canal"]) and one on the southern border (the "EPB-10 Canal" of the Northern Palm Beach County Improvement District drainage system); and

WHEREAS, the Turnpike Enterprise has asked that in return for its issuance of a

permit to the County for use of the existing Turnpike Property canal and the hydrologic connections to the NWWW Canal and the EPB-10 Canal, 1) that access to the Turnpike Enterprise Property canal for the proposed work shall not require access from the Turnpike mainline, but access shall be accomplished from the County's Winding Waters Natural Area property; 2) that the work on the canal shall all be done east of the eastern Turnpike mainline roadway embankment toe of slope; 3) that the maintenance of the renovated canal on the Turnpike Property remain with the Northern Palm Beach County Improvement District (Northern) pursuant to the executed agreement of April 6, 1989 between the Florida Department of Transportation (FDOT) and Northern (which was known at the time as the Northern Palm Beach County Water Control District) titled Joint Use Agreement for Unit of Development Number 24; 4) that the County provide vegetation management of the remaining portions of the Turnpike Enterprise Property; and 5) accept untreated stormwater runoff from the existing and any future expansion of the Turnpike mainline right of way, between SR 710 (Bee Line Highway) on the north and 45th Street on the south, routed through the created wetlands on the Winding Waters Natural Area, and provide treatment for such stormwater on real property owned by the County; and

WHEREAS, it is the goal of the Parties to cooperate and assist each other, where possible, in order to provide the most efficient delivery of services to their respective users and residents; and

WHEREAS, the Parties are authorized to enter into this Agreement pursuant to Section 163.01, Florida Statutes, which permits local government units to make the most efficient use of their powers by enabling them to cooperate with other government entities on a basis of mutual advantage; and

WHEREAS, the Parties agree that it is in their respective best interests to work together in a cooperative manner by pooling and advancing their resources in order to carry out the implementation and construction of their respective programs and projects.

NOW, THEREFORE, in accordance with Chapter 163, Part I, Florida Statutes, as amended, but specifically subject to the provisions of Section 163.01(9) and (11), Florida Statutes, the Parties for and in consideration of the mutual benefits, understandings and promises as set forth herein, do enter into this Agreement and represent, covenant, and agree with each other as follows:

SECTION 1. RECITALS. The Parties do hereby acknowledge and agree that the above recitals are true and correct to the best of their knowledge and belief and do incorporate them herein by this reference.

SECTION 2. COUNTY OBLIGATIONS. The County does hereby agree to the following duties and obligations, namely:

(A) Subject to the County obtaining all necessary permits or permit modifications from the South Florida Water Management District and the U.S. Army Corp of Engineers, upon receipt of an appropriate permit from the Turnpike Enterprise, the County will diligently pursue the clean-out and re-contouring of the Turnpike Enterprise property canal to the cross-sectional area as shown in the County's permit application with the Turnpike Enterprise. Access to the canal shall be provided from the Winding Waters Natural Area and all work will be done east of the eastern Turnpike mainline roadway embankment toe of slope.

(B) Concurrent with the canal clean-out work on the Turnpike Enterprise property and the construction of the hydrologic connections to the NWWW Canal and the EPB-10 Canal, the County will begin vegetation management of the remaining portions of the Turnpike Enterprise property. This will include the removal of non-native or invasive vegetation to a level where those species will comprise less than 5% of the total vegetation cover on the property. Other land management activities, performed at the sole cost and expense of the County, which may occur on the Turnpike Enterprise Property, include control or removal of exotic animal species, including Pythons, clearing garbage and debris, and maintaining boundary fences to maintain security for both the Winding Waters Natural Area and the Turnpike mainline right-of-way. The County will perform these land management activities on the Turnpike Enterprise property for as long as this interlocal agreement remains in effect.

(C) When performing work on the Turnpike Enterprise Property, the County agrees to comply with all laws, ordinances, orders, rules, regulations and requirements of all governmental authorities which may be applicable to the Turnpike Enterprise Property.

(D) The County agrees to accept untreated stormwater runoff from the existing and any future expansion of the Turnpike Enterprise right of way, between SR 710 (Bee Line Highway) on the north and 45th Street on the south, and to treat such stormwater on real property owned by the County. This water is to be routed through the created wetlands on the Winding Waters Natural Area with ultimate discharge to the EPB-10 Canal approximately 550 feet west of Haverhill Road. The Turnpike Enterprise may avail itself of any storm-water quality treatment and attenuation properties which the regulatory agencies recognize within the Winding Waters Natural Area at the time of any such application.

(E) It is the intention of the Parties that the County be permitted to complete the proposed construction improvements in accordance with the plans submitted in the permit application and that the Turnpike Enterprise be released from any liabilities by reason of the County's negligence or failure in performing this Agreement.

(F) The Parties shall exercise reasonable good faith efforts to conclude, within thirty (30) calendar days following the Turnpike approval of all responses and documents submitted to Turnpike by the County, the provision and processing of satisfactory information that will allow the Turnpike Enterprise to process the County's pending application for a Turnpike Enterprise Permit (plus payment of Turnpike Enterprise Permit application fees) and issue said Turnpike Enterprise Permit for the connections, excavations, re-contouring, non-native invasive vegetation removal or other changes the County intends to implement as to any portion of the Turnpike Enterprise Property.

SECTION 3. TURNPIKE ENTERPRISE OBLIGATIONS. Turnpike Enterprise hereby agrees to the following, namely:

(A) Allow the County to re-route water through the Turnpike Enterprise canal on the Turnpike Enterprise property for purposes of improving the hydrology of the Winding Waters Natural Area.

(B) Grant permission for the County to enter upon the Turnpike Enterprise Property to conduct the canal clean-out and re-contouring work and the land management activities described in Section 2 (A) and (B) above.

(C) Upon the County's submission of satisfactory responses and documentation to address outstanding Turnpike Enterprise comments on the pending application for the Turnpike Enterprise Permit and the County's payment of all Turnpike Enterprise permit application fees relating to the issuance of said Turnpike Enterprise Permit, Turnpike Enterprise shall issue the Turnpike Enterprise Permit to the County.

SECTION 4. MISCELLANEOUS PROVISIONS.

(A) **NOTICES.** Any and all written notices required or permitted to be given hereunder shall be deemed received upon hand delivery, facsimile transmission or three (3) days if same are deposited in U.S. Mail and sent via certified mail, return receipt requested.

All notices to the County shall be sent to:

Palm Beach County Board of County Commissioners
Environmental Resources Management Department
2300 North Jog Road, 4th Floor
West Palm Beach, Florida 33411-2743
Designated Representative: Environmental Resources Management Director
Phone: (561) 233-2400
Fax: (561) 233-2414

With a copy to:

County Attorney's Office
Attention: Real Estate
301 North Olive Avenue, Suite 601
West Palm Beach, Florida 33401-4791
Phone: (561) 355-2225
Fax: (561) 355-4398

All notices to the Turnpike Enterprise shall be sent to:

Florida's Turnpike Headquarters
Turkey Lake Service Plaza, Turnpike Milepost 263
Building 5315
P.O. Box 613069
Ocoee, Florida 34761
Designated Representative: Executive Director
Phone: (407) 532-3999 ext.3101
Fax: (407) 822-6679

With a copy to:

Turnpike Enterprise Office of the Chief Counsel
Phone: (407) 264-3170
Fax: (407) 822-6443

(B) AMENDMENTS. Except as expressly permitted herein to the contrary, no modification, amendment or alteration in the terms or conditions contained herein shall be effective unless contained in a written document executed with the same formality as this Agreement by both Parties.

(C) VENUE AND ELECTION OF REMEDIES. This Agreement shall be construed and governed by the laws of the State of Florida. Any and all legal action arising out of or necessary to enforce this Agreement shall be held in the Ninth Judicial Circuit in and for Orange County, Florida. No remedy herein conferred upon any party is intended to be exclusive of any other remedy and each and every such remedy shall be cumulative and shall be in addition to every other remedy given hereunder or now or hereinafter existing at law or in equity or by statute or otherwise. No single or partial exercise by any Party of any right, power or remedy hereunder shall preclude any other or further exercise thereof.

(D) **DISCRIMINATION.** The Parties agree that no person shall on the grounds of race, color, sex, national origin, disability, religion, ancestry, marital status, gender or identity expression, or sexual orientation be excluded from the benefits of or be subjected to any form of discrimination under any activity carried out by the performance of this Agreement.

(E) **CONSTRUCTION.** The Parties acknowledge that each has shared equally in the drafting and preparation of this Agreement and, accordingly, no Court or Administrative Hearing Officer construing this Agreement shall construe it more strictly against one party than the other and every covenant, term and provision of this Agreement shall be construed simply according to its fair meaning.

(F) **SEVERABILITY.** In the event any section, paragraph, sentence, clause or provision hereof is held invalid by a court of competent jurisdiction, such holding shall not affect the remaining portions of this Agreement and the same shall remain in full force and effect unless the invalid finding is as to payment or construction obligations of a Party in which event the Agreement shall be thereupon terminated.

(G) **ENTIRE UNDERSTANDING.** This Agreement represents the entire understanding between the Parties and supersedes all other negotiations, representations or agreements, either written or oral, relating to the matters which are the subject of this Agreement.

(H) **HEADINGS.** The headings contained in this Agreement are for convenience of reference only and shall not limit or otherwise effect in any way the meaning or interpretation of this Agreement.

(I) **ENFORCEMENT.** Each of the parties to this Agreement is a governmental agency created under the laws of the State of Florida. Each of the parties acknowledge and agree that it is not a reasonable use of their respective limited budgetary resources to resort to litigation to resolve disputes or differences pertaining to the interpretation or enforcement of this Agreement. The parties will attempt to resolve all disputes and differences concerning the interpretation or enforcement of this Agreement by partnering. This is intended to mean that any dispute or difference will attempt to be resolved at the lowest level in each organization; but if that is not successful, then the dispute or difference will be escalated to the next higher level in each organization. This process of escalation will continue up to the Executive Director of District or the Deputy Executive Director and Chief Operating Officer of Florida's Turnpike Enterprise, if necessary. In the event that partnering is unsuccessful in resolving any dispute between the parties concerning the interpretation or enforcement of this Agreement then the parties agree to follow the conflict resolution procedures in Chapter 164, Florida Statutes. If those procedures are unsuccessful then the parties may avail themselves of all available legal or equitable remedies.

(J) **LEGAL FEES AND COSTS.** The Parties agree to bear the expense of their respective legal fees and costs associated with the negotiation and preparation of this Agreement, as well as any actions enforcing the terms of this Agreement.

(K) **DISCLAIMER OF BENEFICIARIES.** This Agreement is solely for the benefit of the herein specifically and formally named Parties and no right or cause of action shall accrue upon or by reason hereof to or for the benefit of any third party not a formally named party hereto. Nothing in this Agreement expressed or implied is intended or shall be construed to confer upon any person or corporation other than the formally named Parties hereto any right, remedy or claim under or by reason of this Agreement or any provisions or conditions hereof; and all of the provisions, representations, covenants and conditions herein contained shall inure to the sole benefit of and shall be binding upon the formally named Parties hereto and their respective representatives, successors and assigns.

(L) **CLERK AND COMPTROLLER.** A copy of this Agreement shall be filed with the Clerk & Comptroller in and for Palm Beach County, Florida.

(M) **COUNTERPARTS.** This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

(N) **TERM.** This Agreement shall continue in full force and effect for fifty (50) years from its Effective Date, unless earlier terminated or extended, as authorized herein.

(O) **ASSIGNMENT.** This Agreement may not be assigned or transferred.

(P) **EFFECTIVE DATE.** This Agreement shall be effective as of the last date that it is signed by both Parties hereto.

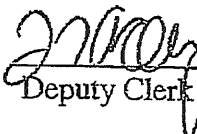
(THE REMAINDER OF THIS PAGE LEFT BLANK)

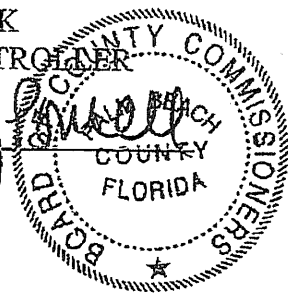
EXECUTED by County this _____ day of SEP 01 2009, 2009.

ATTEST:

SHARON R. BOCK
CLERK & COMPTROLLER

By:


Deputy Clerk

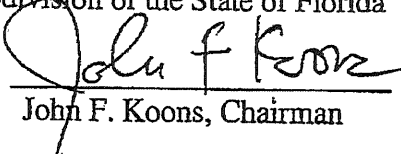


(SEAL)

R20091424

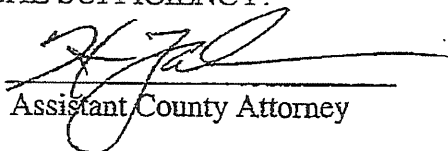
PALM BEACH COUNTY, a political
subdivision of the State of Florida

By:


John F. Koons, Chairman

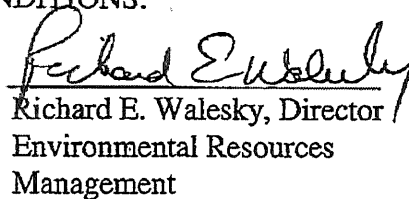
APPROVED AS TO FORM AND
LEGAL SUFFICIENCY:

By:


Assistant County Attorney

APPROVED AS TO TERMS AND
CONDITIONS:

By:


Richard E. Walesky, Director
Environmental Resources
Management

EXECUTED by Turnpike Enterprise this 24th day of September, 2009.

ATTEST:

Florida Department of Transportation
Florida's Turnpike Enterprise

BY: Elizabeth M. Decker
Elizabeth M. Decker
Executive Secretary

By: James L. Ely, D.P.A.
James L. Ely, D.P.A.
Executive Director and
Chief Executive Officer

(Turnpike Enterprise SEAL)

Approved as to legal form and sufficiency:

By: Jack R. Leonard
Jack R. Leonard, Attorney
Florida's Turnpike Enterprise

EXHIBIT "A-1"
TO
INTERLOCAL AGREEMENT

"WINDING WATERS NATURAL AREA"

Parcel 17.01

A parcel of land lying in Section 35, Township 42 South, Range 42 East, within the municipal limits of the City of West Palm Beach, Palm Beach County, Florida and being more particularly described as follows:

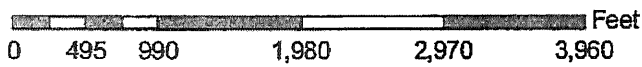
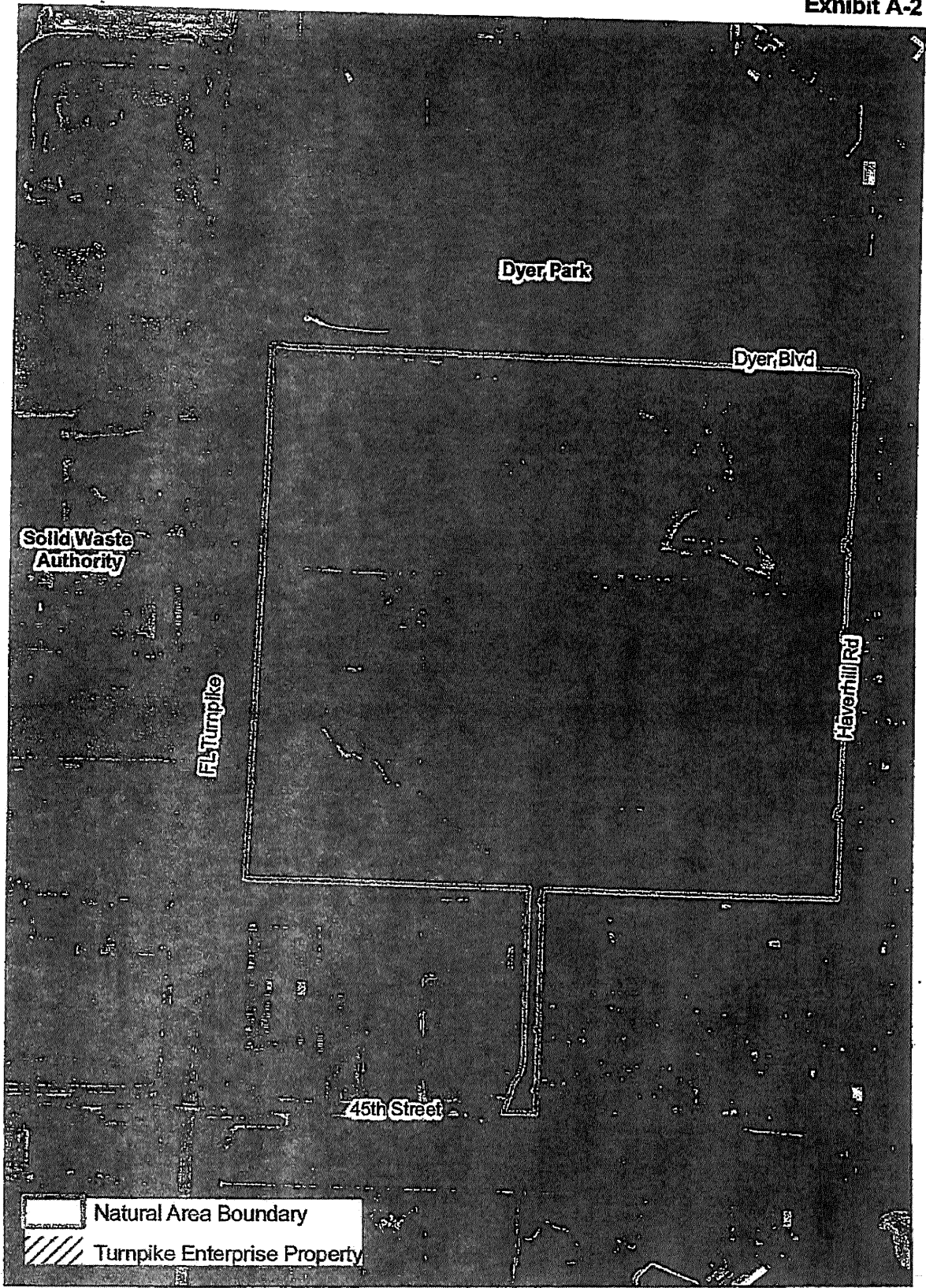
That part of said Section 35 lying South of the South line of the parcel of land described in Official Record Book 1682, page 467, public records of Palm Beach County, Florida, less and excepting therefrom the West 500 feet of the East 590 feet of the South 3,026 feet of the East Half (E ½) of said Section 35, also less the right-of-way of Haverhill Road and the lands conveyed to the Board of County Commissioners of Palm Beach County, Florida in Official Records Book 6873, Page 1172, public records of Palm Beach County, Florida.

Along with:

Parcel 17.02

A parcel of land situate in Section 35, Township 42 South, Range 42 East; within Palm Beach County, Florida, and being more particularly described as follows:

The West 500 feet of the East 590 feet of the South 3,026 feet of the East Half (E ½) of said Section 35, less and excepting therefrom the right-of-way of Haverhill Road and the lands conveyed to the Board of County Commissioners of Palm Beach County, Florida in Official Records Book 6873, Page 1172, public records of Palm Beach County, Florida.



E-11




EXHIBIT "B"
TO
INTERLOCAL AGREEMENT

"TURNPIKE ENTERPRISE PROPERTY"

A parcel of land lying in Section 34, Township 42 South, Range 42 East, Palm Beach County, Florida, more completely described as being the easterly portion of the Turnpike mainline right-of-way lying between a line 15 feet west of the western top of bank of the eastern Turnpike Drainage Canal, eastward to the eastern boundary of the Turnpike mainline right-of-way; and located north of the southern right-of-way line of the EPB-10 Canal; and south of a line coincident with the northern property boundary of the Winding Waters Natural Area lying 4636.45 feet north of the southern right-of-way line of the EPB-10 Canal

STATE OF FLORIDA, COUNTY OF PALM BEACH
I, SHARON R. BOCK, Clerk and Comptroller
certify this to be a true and correct copy of the original
filed in my office on September 10, 2009
dated at West Palm Beach, FL on 9/10/09
By: Diane B. Bock
Deputy Clerk



APPENDIX F

**PUBLIC HEARING AND
PUBLIC COMMENT SUMMARY**

The Palm Beach Post

Palm Beach Daily News



NOTICE OF PUBLIC HEARING

The Palm Beach County Natural Areas Management Advisory Committee will hold an open house/public hearing on the initial draft management plan (draft plan) for the County-owned Winding Waters Natural Area on December 7, 2016, at the Vista Center Hearing Room Chamber, located at 2300 North Jog Road, West Palm Beach, FL. The open house will be from 5:30 pm to 6:00 pm. The public hearing will start at 6:30 pm. The purpose is to allow public comment on the draft plan. The draft plan is available online at <http://discover.pbcgov.org/erm/Publications/WindingWatersManagement-PlanDRAFT.pdf>; a printed copy may be viewed during normal business hours at the Environmental Resources Management offices located at 2300 North Jog Road, 4th Floor, West Palm Beach, FL. For more information, please contact Dave Gillings at 561-233-2400. PUB: The Palm Beach Post 11-27/2016 #677651

PBC BOCC ERM PROOF OF PUBLICATION STATE OF FLORIDA COUNTY OF PALM BEACH Before the undersigned authority personally appeared Nadia Vagedes, who on oath says that she is Call Center Legal Advertising Representative of The Palm Beach Post, a daily and Sunday newspaper, published at West Palm Beach in Palm Beach County, Florida; that the attached copy of advertising for a Notice was published in said newspaper on First date of Publication 11/27/2016 and last date of Publication 11/27/2016 Affiant further says that the said The Post is a newspaper published at West Palm Beach, in said Palm Beach County, Florida, and that the said newspaper has heretofore been continuously published in said Palm Beach County, Florida, daily and Sunday and has been entered as second class mail matter at the post office in West Palm Beach, in said Palm Beach County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that she/he has neither paid nor promised any person, firm or corporation any discount rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper. Also published in Martin and St. Lucie Counties. WIW PUBLIC HEARING Ad ID: 1325404 Ad Cost: 92.88

Signed

Sworn to and subscribed before 11/29/2016
Who is personally known to me.



JUSTIN PETERSON, Notary Public
In and for the State of Ohio
My Commission Expires July 31, 2019



**PALM BEACH COUNTY
NATURAL AREAS MANAGEMENT ADVISORY COMMITTEE PUBLIC HEARING
December 7, 2016 -- 6:30 P.M.**

**Environmental Resources Management
Palm Beach County Vista Center
VC-1W-47 Hearing Room**

AGENDA

- I. Welcome and Purpose of the Meeting
- II. Procedures for Public Participation
- III. Short Presentation on Winding Waters Natural Area Management Plan-ERM staff
- IV. Comments from the Public on Winding Waters Natural Area Management Plan
- V. Adjournment

NAMAC

PUBLIC HEARING FOR WINDING WATERS NATURAL AREA

Wednesday, December 7, 2016

MEETING SUMMARY

The meeting was held at the Vista Center in room VC-1W-47.

NAMAC member Richard Moyroud called the meeting to order at 6:30 PM. Mr. Moyroud explained the purpose of the meeting was for NAMAC to gather comments from the public regarding the staff prepared management plan for the Winding Waters Natural Area (WIW). Ms. Marion Hedgepath was also present representing NAMAC.

There were no members of the public in attendance.

Mrs. Allison Spall of ERM, gave a quick PowerPoint presentation on the WIW site, its attributes, vegetation communities, and the management options for the site. Mr. Moyroud asked staff when the multi-use trail/roadway expansion will be completed. Mr. Dave Gillings responded that the anticipated finish date will be in spring of 2017.

As there were no comments from the public, Mr. Moyroud adjourned the public hearing at 6:38 PM.

DKG

APPENDIX G

FIRE MANAGEMENT PLAN FOR THE WINDING WATERS NATURAL AREA

APPENDIX G

FIRE MANAGEMENT PLAN FOR THE WINDING WATERS NATURAL AREA

This plan contains generalized procedures that apply to all burns conducted on the Winding Waters Natural Area (natural area) (also see Section 4.3.1 of the natural area management plan). Prescribed burn units (burn units) are typically equivalent to the site's management units (see Figure 4 of the natural area management plan). A prescribed burn plan shall be prepared for each burn unit during the burn planning process.

1. GOALS

The primary goal of the prescribed burn program is to reintroduce fire to the basin marsh, depression marsh, dome swamp, mesic flatwoods, strand swamp, wet flatwoods and wet prairie natural communities at a frequency and intensity that will maintain these communities in various stages of maturity within the natural area. Ideally, the prescribed fire will be allowed to burn in a "patchy" fashion to mimic natural fire patterns. The resulting patchwork of burned and unburned areas within a burn unit will produce a mosaic of vegetation, thereby maximizing diversity within and among communities. This will provide habitat for species which typically use, or may even be restricted to, communities in a particular state of maturity. Additional goals related to the reintroduction of fire include: 1) improving habitat for plant and animal species, including listed species that depend upon fire-maintained communities; 2) helping to control invasive/non-native vegetation; and 3) reducing fuel loads to prevent catastrophic wildfires. Unit-specific goals will be established as part of each burn prescription including a desired percent consumption of ground cover and understory, and acceptable percent crown scorch and consumption.

2. GENERAL PROCEDURES

The Incident Command System is used on all prescribed burns. This system uses a pre-established chain-of-command to ensure that all communications and activities related to the prescribed burn are conducted in an organized manner. Since the Incident Command System is used by Palm Beach County Fire-Rescue and the Florida Department of Agriculture and Consumer Services' Florida Forest Service (FFS), staff from these agencies can easily assist during a prescribed burn if additional personnel are needed.

2.1 Personnel

The Palm Beach County Department of Environmental Resources Management (ERM) will provide the personnel necessary to conduct prescribed burns. Additional personnel may be requested from Palm Beach County Fire-Rescue, Palm Beach County Parks and Recreation Department, FFS, the Florida Park Service, the Florida Fish and Wildlife Conservation Commission, and trained volunteers.

Each burn team will be headed by an Incident Commander (IC) who will supervise the prescribed burn. The IC will receive authorization from FFS for any prescribed burn, oversee the burn, and make final decisions and adjustments during the burn. The IC, who may be assisted by staff, will prepare the prescribed burn plan, conduct pre-burn coordination with other agencies and homeowners' groups, make crew assignments and coordinate communications.

2.2 Equipment

ERM will provide the equipment necessary to conduct prescribed burns. All burn crew shall wear Nomex fire-resistant outer clothing, leather lace-up boots with non-slip soles, leather gloves, a plastic firefighter's helmet and eye protection, and shall carry an emergency fire shelter and personal drinking water. All crew members have been issued radios for communication during burns. A first-aid kit shall be kept in each truck.

ERM also will supply 4-wheel-drive pickup trucks (equipped with water tanks, pumps, and hoses), all-terrain vehicles, round-point shovels, fire rakes, fire flaps, and drip torches for crew use during the prescribed fire. Other fire-suppression equipment such as tractor-mounted plow units, pumper trucks, and fire engines may be supplied by assisting agencies.

2.3 Pre-burn Activities:

- Prepare specific burn prescription plan for each burn unit
- Complete pre-burn notifications
- Establish perimeter firebreaks
- Inspect burn unit to identify potentially hazardous areas or species protection needs
- Assemble and inspect necessary equipment
- Make burn crew assignments
- Prepare maps and materials for pre-burn briefing
- Notify local agencies, officials, adjacent residents and businesses
- Arrange for law enforcement and backup assistance, if necessary
- Monitor weather forecasts as the proposed burn day approaches

2.4 Burn Day Activities:

- Obtain burn authorization from FFS
- Mobilize burn crew and equipment
- Notify adjacent residents and others who have requested prior notification of the burn
- Post burn notices on site and on adjacent highways and other roads, as needed
- Obtain weather forecast for burn unit and other information necessary to determine that burn parameters will comply with prescription
- Coordinate with Palm Beach County Sheriff's Office to have deputies notify visitors to the natural area of the need to leave the site because of the pending burn
- Conduct pre-burn safety and ignition plan briefing for burn team

- Monitor weather forecasts and record on-site weather data
- Conduct test fire; conduct main burn if test fire is successful
- Mop-up and extinguish hot spots

2.5 Post-burn Activities:

- Monitor burn for rekindling of fire
- Remove burn notice signs
- Conduct post-burn review and briefing
- Evaluate burn for success in meeting environmental objectives; conduct post-burn monitoring at regular intervals
- Evaluate burn plan and burn crew for areas of improvement

3. FIRE MANAGEMENT PRESCRIPTION PREPARATION

A burn prescription will be developed for each burn unit prior to conducting a prescribed burn within that unit. The burn prescription is a carefully prepared legal document that provides strategies for reintroducing fire to the natural area in the safest manner possible. Preparation of the fire prescription involves the consideration of several factors, including, but not limited to:

- Size, location and boundaries of the burn unit
- Topography and soils of the burn unit
- Habitat type, density and crown height
- Fuel load
- Proximity of smoke-sensitive areas and any precautions taken to avoid impacts to adjacent communities, businesses and public infrastructure
- Weather-related conditions, including Dispersion Index, Drought Index, temperature, wind speed and relative humidity
- Fire behavior, including fire methods, desired behavior and outcome
- Post burn evaluations
- Fine fuel moisture
- Staffing and equipment availability
- Time needed to complete the burn
- Specific goals and objectives