Natural Resources Evaluation

Florida Department of Transportation

District 5

LPGA Boulevard PD&E Study

Limits of Project: From US 92 (SR 600) to Williamson Boulevard

Volusia County, Florida

Financial Management Number: 448456-1

ETDM Number: 14332

Date: June 2023

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated May 26, 2022 and executed by FHWA and FDOT.



LPGA BOULEVARD FROM US 92 (SR 600) TO WILLIAMSON BOULEVARD PD&E STUDY

FPID: 448456-1-22-01

DRAFT

Natural Resources Evaluation

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June 14, 2023

FDOT

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Executive Summary

The LPGA Project Development and Environment (PD&E) Study from US 92 (International Speedway Boulevard) to Williamson Boulevard was initiated to evaluate the potential of effects of enhancing safety and accommodating traffic demand along LPGA Boulevard and the Interstate-95 (I-95) interchange in the City of Daytona Beach in Volusia County. The proposed improvements involve widening of LPGA Boulevard which will include the addition of bicycle and pedestrian facilities on both sides of the road, modifications to the LPGA Boulevard/I-95 interchange, and replacement of the Tomoka River Bridge following the current Florida Department of Transportation (FDOT) design criteria. The PD&E study also involves addition of stormwater management systems, including ponds and floodplain compensation sites.

The purpose of this Natural Resources Evaluation (NRE) is to document protected species and their habitat within the project area, analyze potential impacts to those protected species and habitats from the proposed build alternative, provide effect determinations as a result of potential impacts, evaluate wetland and other surface water impacts from the proposed build alternative, identify mitigation needs and coordinate/consult with federal and state regulatory and resource agencies. The NRE is prepared in accordance with Part 2, Chapters 9 (Wetlands and Other Surface Waters), 16 (Protected Species and Habitat), 17 (Essential Fish Habitat) and 22 (Commitments) of the FDOT PD&E Manual and the current Natural Resources Evaluation Outline and Guidance (August 2022).

Protected Species

The proposed build alternative would implement avoidance and minimization measures to the greatest extent feasible. In **Section 4.0** – Protected Species and Habitat, 26 listed species and one candidate species has the potential to occur within the project area. Eight of the listed species have a moderate or high potential of occurrence and three species, the Florida sandhill crane, the gopher tortoise and the hooded pitcher plant, were observed within the project area. Pursuant to Section 7 of the ESA, **Table ES-1** lists federal and state listed species that are anticipated to receive "May Affect, Not Likely to Adversely Affect," "Potential for adverse effect," and, "No adverse effect anticipated" effect determinations. **Sections 4.2** and **4.3** describe and summarize the federal listed species that are anticipated to receive the "No Effect" determination and state-listed species that are anticipated to receive the "No effect anticipated" determination. **Section 4.4** discusses other protected species that have the potential to occur within the vicinity of the project. Of those, the American bald eagle was observed within the project area.

Table ES-1. Protected Species and the Effects Determinations

Scientific Name	Common Name	Effects Determination
Federally Listed Species		
Mycteria americana	Wood stork	May Affect, Not Likely to Adversely Affect
Drymarchon corais couperi	Eastern indigo snake	May Affect, Not Likely to Adversely Affect

Scientific Name	Common Name	Effects Determination
State Listed Species		
Antigone canadensis pratensis	Florida sandhill crane	No Adverse Effect Anticipated
Gopherus polyphemus	Gopher tortoise	No Adverse Effect Anticipated
Carex chapmanii	Chapman's sedge	No Adverse Effect Anticipated
Illicium parviflorum	Star anise	No Adverse Effect Anticipated
Pycnanthemum floridanum	Florida mountain-mint	No Adverse Effect Anticipated
Sarracenia minor	Hooded pitcher plant	No Adverse Effect Anticipated

Wetlands and Other Surface Water

The proposed build alternative is expected to result in unavoidable wetland and other surface water impacts to all wetlands and other surface waters within the existing right-of-way (ROW). The direct and indirect wetland impacts associated with the proposed build alternative are listed in **Table ES-2**. The anticipated total direct wetland impacts for the proposed build alternative is 60.65 acres consisting mostly of low quality mowed and maintained herbaceous wetlands. The anticipated surface water impacts are 15.20 acres consisting mostly of open water ponds.

Table ES-2. Anticipated Impacts and Functional Loss from the Proposed Build Alternative

Type	Number of Impact Areas	Total Impact Acreage	UMAM Functional Loss
Within Existing ROW			
Forested Wetland	28	3.26	1.62
Herbaceous Wetland	67	47.65	17.02
Shrub Wetland	2	0.19	0.07
Surface Water	19	15.20	NA
Preferred Pond and Floodplain Compensation Sites			
Forested Wetland	10	5.68	2.78
Herbaceous Wetland	7	3.94	1.84
Surface Water	3	0.03	NA

Essential Fish Habitat

The National Marine Fisheries Service (NMFS) is the regulatory agency responsible for the nation's living marine resources and their habitats, including Essential Fish Habitat (EFH). Based on the location of the project, comment received from NMFS and field review, the project will have no involvement with EFH.

1.0 Project Overview

A Natural Resources Evaluation (NRE) has been prepared in accordance with Part 2, Chapters 9 (Wetlands and other Surface Waters), 16 (Protected Species and Habitat), 17 (Essential Fish Habitat), and 22 (Commitments) of the Florida Department of Transportation (FDOT) Project Development & Environment (PD&E) Manual (July 2020) which constitutes the official FDOT wetlands and other surface waters, protected species and habitat, and essential fish habitat (EFH) policies and procedures for the purpose of meeting requirements of the National Environmental Policy Act (NEPA).

The analysis in this report conforms to FDOT's Natural Resources Evaluation Outline and Guidance (August 2022) and all applicable federal and state laws. The purpose of this analysis is to demonstrate due diligence in accordance with the state and federal regulations regarding wetlands and other surface waters, protected species and habitat, and essential fish habitat. This project has been evaluated through the Efficient Transportation Decision Making (ETDM) screening (Project #14332).

1.1 Project Description

FDOT is conducting a PD&E Study of LPGA Boulevard from US 92 (International Speedway Boulevard) to Williamson Boulevard within the City of Daytona Beach in Volusia County (approximately 6.2 miles). The proposed improvements involve widening of LPGA Boulevard which will include the addition of bicycle and pedestrian facilities, modifications to the LPGA Boulevard/Interstate-95 (I-95) interchange, replacing the Tomoka River Bridge, addition of a closed drainage system and stormwater ponds, and construction of floodplain compensation sites.

A project location map is provided in **Figure 1**. Existing LPGA Boulevard is a two-lane roadway from US 92 to Tomoka Farms Road (east of the Tomoka River), a four-lane roadway from Tomoka Farms Road to the I-95 Southbound Ramps, and a six-lane roadway from the I-95 Southbound Ramps over I-95 to Williamson Boulevard. There are 14 intersections along the corridor including ramp terminals at the I-95 interchange, nine of which are signalized.

1.2 Purpose and Need

The purpose of this project is to accommodate existing and projected future travel demand, enhance safety, and improve operations for the LPGA Boulevard corridor and the I-95 interchange.

The need for the project is based on existing and future transportation demand and safety along the LPGA Boulevard corridor and at the interchange area. Improvements are necessary to address unacceptable levels of service (LOS) (below target LOS D and LOS E) and enhance the safety of travel conditions along LPGA Boulevard and at the I-95 interchange area.



Figure 1. Project Location Map

1.2.1 Transportation Demand

LPGA Boulevard from US 92 to Williamson Boulevard is currently operating near capacity. A review of existing (2021) traffic volumes in the project area showed an Annual Average Daily Traffic (AADT) of 12,000 vehicles per day for LPGA Boulevard from US 92 to Tomoka Farms Road and an AADT of up to 44,000 vehicles per day from Tomoka Farms Road through the I-95 interchange to Williamson Boulevard. Large, approved developments and active construction projects (such as LPGA Preserve, Indian Road Warehouse, and Tomoka Village), in combination with additional planned growth in the vicinity of LPGA Boulevard, are expected to increase traffic to levels that would exceed maximum service volumes for two-lane and six-lane, non-state, signalized roadways per the 2020 FDOT Quality/Level of Service (QLOS) Handbook. Future (2050) travel demands along LPGA Boulevard are expected to double or triple in some locations. The AADT between US 92 and Tymber Creek Road is expected to reach 36,000 vehicles per day. Heavy volumes are expected east of the I-95 interchange where AADT will reach 78,000 vehicles per day in 2050. These volumes will significantly exceed the existing roadway capacity and cause LPGA Boulevard to operate at LOS F.

The target LOS for I-95 and LPGA Boulevard is LOS D per FDOT and LOS E per Volusia County. The I-95 freeway segment approaching LPGA Boulevard currently functions at LOS D or better. However, queuing has been observed on the I-95 northbound and southbound off-ramps and on westbound LPGA Boulevard west of I-95, indicating capacity deficiencies. Based on anticipated growth, the quality of traffic flow on I-95 and LPGA Boulevard in the study area is expected to decline in future years. Without improvements to the LPGA Boulevard corridor, the intersections on LPGA Boulevard as well as the I-95 off-ramps are anticipated to operate over capacity in the future resulting in longer travel times to reach workplaces, schools, and businesses.

1.2.2 Safety

A review of crash data reported in the study area for the five-year period from January 1, 2015 to December 31, 2019 indicated there were 1,354 crashes, an average of 270 crashes per year. The most predominant crash type reported for the overall study area is rear-end crashes (37%). There were 11 reported fatal crashes, 414 injury crashes and 929 property-damage-only crashes reported for the overall study area.

The highest numbers of crashes correspond to the locations with deficient LOS. These include the I-95 northbound off-ramp to LPGA Boulevard with crashes during the intersection's right turn on red condition; the I-95 southbound loop on-ramp from LPGA Boulevard westbound, and the eastbound approach of LPGA Boulevard to Williamson Boulevard. There are also high numbers of crashes at the intersections and uncontrolled access points along LPGA Boulevard. Most of LPGA Boulevard lacks pedestrian and bicycle facilities, which creates unsafe conditions for nonmotorized users. Between 2015 and 2019 six pedestrian/bicycle crashes were reported within the study area.

Without improvements to the LPGA Boulevard corridor and at the I-95 interchange, the number of crashes is expected to continue to rise as future traffic volumes increase substantially, compromising the safety for both vehicular and nonmotorized users.

1.3 Description of the Build Alternative

The Build Alternative consists of widening LPGA Boulevard to an urban typical section with different number of lanes (depending on the future travel demand), intersection improvements, redesigning to the I-95 interchange to an innovative design concept called Signalized Turbine Interchange, and addition of shared use paths on both sides of the road to accommodate pedestrians and bicycles.

The proposed improvements along LPGA Boulevard are described as follows.

1.3.1 LPGA Boulevard from US 92 to Tymber Creek Road

An urban typical section with two 12-ft travel lanes in each direction separated by a 54-ft raised grass median is proposed, a distance of 4.5 miles. The wider median will allow for future addition of two more lanes should the travel demand warrant beyond the design year for this project. Bicyclists and pedestrians will be accommodated by 14-ft shared use paths on both sides of the road. The design speed is 45 mph, and the proposed roadway improvements are within the existing 200-ft right-of-way (ROW).

1.3.2 LPGA Boulevard from Tymber Creek Road to Williamson Boulevard

An urban typical section with three to four 11-ft travel lanes in each direction separated by a variable width raised median, a distance of 1.7 miles. The wider median will allow for accommodation of up to triple left turn lanes at LPGA Boulevard and Outlet Boulevard/Technology Boulevard intersection and LPGA Boulevard and Williamson Boulevard intersection. At some intersections (and ramp terminals) exclusive right turn lanes are proposed to accommodate heavy turning traffic volumes. Bicyclists and pedestrians will be accommodated by 12-ft shared use paths on both sides of the road. The design speed is 35 mph and the proposed roadway improvements are within the existing185-ft to 320-ft of ROW.

1.3.3 Tomoka River Bridge

Tomoka River Bridge will be replaced with a single wider and longer bridge to accommodate widening of LPGA Boulevard and address bridge hydraulics including sea-level rise effect. The proposed bridge typical section for the Tomoka River Bridge is based on the typical section for the segment between Tymber Creek Road and Williamson Boulevard and includes three 11-ft travel lanes in each direction, left turn lanes, and 12-ft shared use paths on both sides of the bridge to accommodate pedestrians and bicycles. The bridge will be approximately 340 ft long.

1.3.4 Intersections

LPGA Boulevard improvements include the following intersection concepts.

- US 92 – Signalized Intersection
- Welshinger Butler Circle South – Roundabout
- Welshinger Butler Circle North – Signalized Intersection
- International Tennis Drive/International Golf Drive – Roundabout
- Tournament Drive – Signalized Intersection
- Tymber Creek Road – Signalized Intersection

- Tomoka Farms Road – Signalized Intersection with a Partial Thru-Cut and Restricted Control U Turn (RCUT)
- Outlet Boulevard/Technology Boulevard – Signalized Thru-Cut Intersection
- Williamson Boulevard – Signalized Intersection
- Concierge Boulevard – Right-In-Right-Out Intersection

1.3.5 I-95 Interchange

After consideration of the future (2050) demand volumes, potential future growth trends in the LPGA Boulevard area, and coordination with District 5, a Signalized Turbine Interchange concept was proposed to be evaluated at the I-95 interchange. This interchange concept is needed to accommodate heavy traffic flows which head to and from I-95; in addition to traffic volumes between the I-95 ramp terminals and the Outlet Boulevard/Technology Boulevard intersection. The Signalized Turbine Interchange is expected to address unbalanced and heavy traffic movements from/to I-95 and Technology Boulevard, Outlet Boulevard, and Williamson Boulevard.

The Signalized Turbine Interchange concept is an innovative low speed with signal controls interchange variant of the turbine interchange typically implemented in freeway-to-freeway (system) interchanges. Compared to a conventional high-speed turbine interchange, this concept has two levels, and its ramps are curved to connect along LPGA Boulevard with two-phase signals. The LPGA Boulevard is split into separate one-way pairs by 200 – 300 feet, providing additional queue storage of left turning vehicles without conflicting to the oncoming traffic.

The signalized turbine interchange concept spreads the traffic across westbound and eastbound LPGA Boulevard and, as a result, it moves high traffic volumes and provides enough queue storage between signalized ramp terminals. This concept would provide better safety and operational benefits than the other conventional concepts during the design year. Additionally, the Signalized Turbine Interchange can more easily allow for expansion of through lanes along LPGA Boulevard should future travel demand warrant.

2.0 Study Area and Methodology

The study area for the widening of LPGA Boulevard, modifications to the LPGA Boulevard/I-95 interchange, and replacement of the Tomoka River Bridge consisted of all areas within the existing ROW, which ranges in width between 185 feet and 320 feet and including a buffer of 75 feet from the existing ROW, based on coordination with FDOT, along all roadway portions of the project (roadway study area). In addition, assessments were performed for the 39 alternative pond site locations and six alternative floodplain compensation (FPC) locations (ponds and FPC sites study areas). The analysis assessed land use, soils, wetlands, surface waters, floodplains, and the presence of protected species and their habitats, using a desktop analysis and field reconnaissance. Field reconnaissance was conducted in March 2022 to assess conditions within the roadway widening study area. A desktop analysis was performed for all pond and floodplain compensation site alternatives. Field reconnaissance was conducted in January and February 2023 to assess conditions for the preferred pond sites and floodplain compensation sites.

3.0 Existing Conditions

3.1 Roadway Study Area

3.1.1 Land Use

The St. Johns River Water Management District (SJRWMD) Land Cover Land Use mapping was used to evaluate various land uses and habitat within the project study areas. Their Land Cover Land Use mapping uses the FDOT Florida Land Use, Cover and Forms Classification System (FLUCFCS) (1999) to classify the land use. **Table 3.1** lists the land use classifications within the roadway study area. The total acreage of each classification within the roadway study area is also provided. Refer to **Appendix A** for the SJRWMD Land Cover Land Use mapping of the project study areas.

The total area of the roadway study area is approximately 421.20 acres, which consists of 274.56 acres (65.2%) of paved roadway and mowed and maintained ROW (FLUCFCS Code 8140, Roads and Highways). According to the SJRWMD Land Cover Land Use mapping, wetlands within the roadway study area total 45.80 acres, which accounts for 34.6% of the land not classified as existing roadway (FLUCFCS 8140) or Reservoirs (FLUCFCS Code 5300). Areas classified as Reservoirs within the roadway study area consist mainly of the existing LPGA/I-95 interchange stormwater ponds. Of those areas classified as wetlands, 32.16 acres are classified as forested wetlands, making up 70% of the areas classified as wetlands.

The natural upland habitats total 28.95 acres, making up 21.9% of the land not classified as existing roadway (FLUCFCS 8140) or Reservoirs (FLUCFCS Code 5300), and Pine Plantation (FLUCFCS Code 4410) and Forest Regeneration Areas (FLUCFCS Code 4430) account for 7.9%. Most of the areas mapped as Improved Pastures (FLUCFCS Code 2110) and Field Crops (FLUCFCS Code 2150) are located southeast of the LPGA/I-95 interchange and have recently been developed. The only area classified as Other Open Lands (FLUCFCS Code 2600) is located northeast of the LPGA/I-95 interchange.

Table 3.1 | Land Use Land Cover of Roadway Study Area

FLUCFCS Code	Description	Acreage in Study Area
1200	Residential, Medium Density (2-5 units/acre)	4.19
1400	Commercial and Services	11.72
1490	Commercial and Services Under Construction	1.95
1700	Institutional	2.97
1820	Golf Courses	0.45
1860	Community Recreational Facilities	1.15
1870	Stadiums (not associated with schools, colleges, or universities)	2.66
1900	Open Land	0.11
2110	Improved Pastures	8.08

FLUCFCS Code	Description	Acreage in Study Area
2150	Field Crops	7.68
2600	Other Open Lands (Rural)	4.46
3100*	Herbaceous Upland (Dry Prairie)	8.97
3200*	Shrub and Brushland	4.38
3300*	Mixed Upland Rangeland (non-forested)	0.82
4110*	Pine Flatwoods	10.22
4200*	Upland Hardwood Forests	1.10
4340*	Upland Mixed Hardwood/Coniferous Forest	3.46
4410	Pine Plantation	5.74
4430	Forest Regeneration Areas	4.74
5100	Streams and Waterways	0.24
5300	Reservoirs (pits, ponds, dammed systems)	14.37
6170**	Mixed Wetland Hardwoods	7.20
6210**	Cypress	0.96
6250**	Hydric Pine Flatwoods	11.42
6300**	Wetland Mixed Hardwood/Coniferous Forest	12.58
6410**	Freshwater Marshes	0.27
6430**	Wet Prairies	2.73
6460**	Treeless Hydric Savanna / Mixed Scrub-Shrub Wetland	10.64
8140	Roads and Highways	274.56
8320	Electrical Power Transmission Lines	1.40
	Total Acres in Roadway **Study Area**	421.20

* Natural Upland Habitat
** Wetlands

3.1.2 National Wetlands Inventory

The U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) mapping was reviewed to assess for wetlands within the project study areas. **Table 3.2** summarizes the NWI mapping within the roadway study area. The total acreage of each classification within the roadway study area is also provided. Refer to **Appendix B** for the NWI maps for the project study areas.

NWI identifies 28.3 acres of wetlands within the roadway study area with 73% of the wetlands consisting of forested wetlands. The stormwater ponds within the LPGA/I-95 interchange account for the majority of the acreage of Palustrine, Freshwater Ponds (NWI Code PUB), and the canal that runs along the south side of Slim Pine Road accounts for the acreage of NWI Code RUB, Riverine classification.

Table 3.2 | National Wetlands Inventory Mapping of Roadway Study Area

NWI Code	Description	Acreage in Study Area
PEM	Palustrine, Freshwater Emergent Wetland	7.22
PFO	Palustrine, Freshwater Forested Wetland	20.66
PSS	Palustrine, Freshwater Scrub-Shrub Wetland	0.42
PUB	Palustrine, Freshwater Pond, Unconsolidated Bottom	10.79
RUB	Riverine, Unconsolidated Bottom	0.27

3.1.3 Soils

United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Custom Soil Resource Reports were generated for the roadway study area and for the alternative pond and floodplain compensation sites. The reports identified 19 Volusia County soil mapping units within the roadway study area and 14 within the alternative pond and floodplain compensation sites. The soil resource reports include a hydric rating map and a gopher tortoise burrowing suitability assessment of the study areas. **Table 3.3** lists the soil mapping units within the study areas along with their gopher tortoise burrowing suitability, hydric soil rating, and acreage within the roadway study area. The following soils were not rated as hydric but have a significant hydric soil component and may sometimes be associated with wetlands within the project study areas:

- 29 – Immokalee sand
- 32 – Myakka-Myakka, wet, fine sands, 0 to 2 percent slopes
- 45 – Pineda-Pineda, wet, fine sand, 0 to 2 percent slopes
- 49 – Pomona fine sand
- 60 – Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes
- 75 – Wauchula fine sand

Hydric soils total 30.5% of the roadway study area and are typically associated with wetlands. Highly suitable gopher tortoise burrowing soils made up 3.4% of the roadway study area. Soils for the alternative pond and floodplain compensation sites are discussed in **Section 3.2** Alternative Pond and Floodplain Compensation Sites. Soil maps of the study areas are provided in **Appendix C**. Refer to **Appendix D** for the soil resource report for the roadway study area.

Table 3.3 | NRCS Soil Summary

Map Unit Symbol	Map Unit Name	Gopher Tortoise Burrowing Suitability	Hydric Rating	Acreage within Roadway Study Area	Percent of Roadway Study Area
3*	Arents	Not Rated	No	1.1	0.2%
8*	Basinger fine sand, frequently ponded, 0 to 1 percent slopes	Unsuitable	Yes	0.4	0.1%
17	Daytona sand, 0 to 5 percent slopes	Highly Suited	No	8.9	2.1%
22	Electra fine sand, 0 to 5 percent slopes	Highly Suited	No	2.5	0.6%
23*	Farmton fine sand	Less Suited	No	45.4	10.8%

Map Unit Symbol	Map Unit Name	Gopher Tortoise Burrowing Suitability	Hydric Rating	Acreage within Roadway Study Area	Percent of Roadway Study Area
24**	Fluvaquents	Not Rated	Yes	NA	
25	Gator muck, 0 to 1 percent slopes, frequently flooded	Unsuitable	Yes	4.9	1.2%
29*	Immokalee sand	Less Suited	No	39.2	9.3%
32	Myakka-Myakka, wet, fine sands, 0 to 2 percent slopes	Less Suited	No	2.1	0.5%
37*	Orsino fine sand, 0 to 5 percent slopes	Highly Suited	No	3.1	0.7%
45*	Pineda-Pineda, wet, fine sand, 0 to 2 percent slopes	Unsuitable	No	6.4	1.5%
47	Pits	Not Rated		0.5	0.1%
49*	Pomona fine sand	Less Suited	No	179.0	42.5%
50*	Pomona fine sand, depressional, 0 to 2 percent slopes	Unsuitable	Yes	26.1	6.2%
51*	Pomona-St. Johns complex	Unsuitable	Yes	33.2	7.9%
53*	Pompano-Placid complex	Unsuitable	Yes	53.4	12.7%
56*	Samsula muck, frequently ponded, 0 to 1 percent slopes	Unsuitable	Yes	10.8	2.6%
60*	Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes	Less Suited	No	1.1	0.2%
75	Wauchula fine sand	Unsuitable	No	0.7	0.2%
99*	Water	Not Rated		2.6	0.6%
			Total Acres in Study Area	421.4	

* Soil types also occurring within the alternative pond and floodplain compensation sites
** Soil types only occurring within the alternative pond and floodplain compensation sites

3.2 Alternative Pond and Floodplain Compensation Sites

A desktop review was performed for the alternative pond and floodplain compensation sites to assess their existing conditions. For this project there are 39 alternative pond sites and six alternative floodplain compensation sites. SJRWMD Land Cover Land Use mapping, USFWS NWI mapping, and NRCS, Volusia County Soil data were reviewed for each alternative site and are shown in figures provided in **Appendices A**, **B**, and **C**. An NRCS Custom Soil Resource Report was generated for the alternative pond and floodplain compensation sites and is included in **Appendix E**. The entire southern two-thirds of the project occurs within hydric soils or soil types that have significant hydric soil components. **Table 3.4** summarizes the findings identifying if the ponds occur in hydric soils, soils with a significant hydric component, NWI or SJRWMD mapped wetlands, or if they abut NWI or SJRWMD mapped wetlands. **Appendix F** provides more detailed descriptions of the existing conditions of each site based on the desktop review.

Table 3.4 | Alternative Pond and Floodplain Compensation (FPC) Sites Existing Conditions

Pond/Floodplain Compensation Site	Hydric Soils	Soils with Hydric Component	Mapped NWI/FLUCFCS Wetland	Abuts Mapped NWI/FLUCFCS Wetland
Pond 1A	✓		✓	
Pond 1B*		✓		
FPC 1D*	✓	✓	✓	✓

Pond/Floodplain Compensation Site	Hydric Soils	Soils with Hydric Component	Mapped NWI/FLUCFCS Wetland	Abuts Mapped NWI/FLUCFCS Wetland
Pond 1C+2A	✓	✓		✓
FPC 1E	✓	✓		✓
Pond 2B+3A*	✓	✓		
Pond 3C+4A		✓		
Pond 3B		✓		
Pond 4B*		✓		✓
Pond 4C+5A		✓		
Pond 5B*		✓		
Pond 6C*	✓	✓		
FPC 6E*	✓		✓	
Pond 7A*	✓	✓	✓	
Pond 7B	✓		✓	
Pond 8B*		✓	✓	✓
Pond 8C		✓	✓	✓
Pond 9A		✓		
Pond 9B	✓	✓		✓
FPC 9D	✓	✓		✓
Pond 9C+10A*		✓	✓	
FPC 9E*		✓	✓	
FPC 9F		✓	✓	
Pond 10B		✓		
Pond 10C	✓	✓		✓
Pond 11A*	✓	✓	✓	✓
Pond 11C	✓	✓		✓
Pond 12B	✓			✓
Pond 12C+13A*				
Pond 13B	✓			

*** Preferred Pond and Floodplain Compensation Sites**

Pond Sites 14B, 14C, 14D, 14E, 15A, 15B, 15C, 15D, 16A, 16B, 16C, 16D, 17A, 17B, and 17C are all preferred ponds. These ponds occur within the existing LPGA/I-95 interchange infields and their stormwater ponds, roadway, and mowed and maintained ROW. All areas are classified as FLUCFCS 8140 Roads and Highways and FLUCFCS 5300 Reservoirs. Significant portions of the northeast and southeast interchange quadrants are classified as hydric soils.

3.3 Public and Other Conservation Lands

Based on review of GIS data and Volusia County Property Appraiser website, there are six public lands and conservation areas within the project area. The project will not encroach on any of the public lands or conservation areas.

- Tiger Bay State Forest (Parcel Number 523200000012, 523300000012) – This is a multi-use state forest. These parcels are also part of the Tiger Bay Wildlife Management Area (WMA) Rima Ridge Unit and SJRWMD mitigation area. The City of Daytona Beach shows the future land use zoning for this property as CONSV (Conservation).
- City of Daytona Beach Municipal Stadium (Parcel Number 522900000011). – The City of Daytona Beach owns the 50-acre Daytona Stadium (Larry Kelly Field). The City of Daytona Beach shows the future land use zoning for this property as EX-PP (Existing Potential Parks).
- Florida Tennis Center (Parcel Number 522000000150) – The City of Daytona Beach owns the 19-acre Florida Tennis Center. The City of Daytona Beach shows the future land use zoning for this property as LI-U (Low Intensity Urban).
- Indigo Community Development District Conservation Easement (Parcel Number 520900000027) – The 305-acre property is owned by the Indigo Community Development District which is a special taxing district. The City of Daytona Beach shows the future land use is BA-PP (Buffer Area / Passive Park) and CONSV (Conservation).
- Halifax Humane Society Public Dog Park (Parcel Number 520900000030) – The Halifax Humane Society owns the 8-acre parcel, which contains a public dog park. The City of Daytona Beach shows the current zoning as PD-G (Planned Development – General), and future land use zoning for this property as LI-U (Low Intensity Urban) and EX-PP (Existing Potential Parks).

3.4 Tomoka River

The project corridor traverses the Tomoka River, which is listed as an Outstanding Florida Water. The entire project corridor falls within the Tomoka River Mitigation Basin (as defined by the SJRWMD, Chapter 40C-41 FAC). The wetlands and uplands which are within 50 feet landward of the wetlands abutting the Tomoka River are designated by the SJRWMD as the Riparian Habitat Protection Zone (RHPZ). Any construction activity in these areas must adhere to the SJRWMD Riparian Wildlife Habitat Standard (Applicant's Handbook, Volume II, Section 13.5.4).

The Tomoka River is also listed as part of the Nationwide Rivers Inventory (NRI) in Florida which affords special protections from adverse impacts. FDOT sent the National Park Service (NPS) a coordination letter on January 25, 2023, seeking review and concurrence that the proposed improvements at Tomoka River would not have adverse effects on the Tomoka River's designation on the NRI. To date no response has been received. Per the NPS consultation guidance, if no response is received within 30 days, then the project can proceed though efforts to avoid or mitigate potential adverse effects to the designated river should be implemented to the extent possible.

The ETDM coordination showed Tomoka River has a Florida Department of Environmental Protection (FDEP) Submerged State Land Record by the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida (TIITF) designation.

3.5 Floodplains

The project is partially located within areas identified as Flood Hazard Zones A, AE and AH, 100-year floodplains and floodway associated with the Tomoka River, 11 Street Canal, and Thayer Canal. Roadway and bridge widening would occur in the floodplains and floodway.

The Tomoka River Floodplain is a 'conveyance' floodplain and has been designated as a FEMA Floodway and the second floodplain is a "storage" floodplain associated with the US-92 Canal, Thayer Canal, and the existing wetland.

Water flows from the west to east side of the LPGA Boulevard, and both sides of LPGA Boulevard are hydraulically connected through larger conveyances such as US-92 Canal, Thayer Canal, Tomoka River, and multiple smaller cross drains. The floodplains on the east and south side of LPGA Boulevard are mostly located in FEMA Flood Zone AH.

4.0 Protected Species and Habitat

The project study areas were evaluated for potential occurrences of federal and state listed plant and animal species in accordance with Section 7 of the Endangered Species Act (ESA) of 1973, as amended, and Chapter 5B-40 and Chapter 68A-27, Florida Administrative Code (FAC).

Section 7(a) (2) of the ESA requires every federal agency to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. In accordance with 16 United States Code (U.S.C.) 1536[(a)-(d)] of the ESA, as amended, federal agencies also impose specific requirements regarding endangered or threatened species of fish, wildlife, or plants (listed species) and habitat of such species that has been designated as critical habitat under Section 7(a) of the ESA. Such species are afforded protection under the Code of Federal Register (CFR) Title 50 Part 402 and in other legislation listed below.

Other applicable federal laws include:

- 23 CFR, Part 771, Environmental Impact and Related Procedures
- 40 CFR, Part 1500 et seq., Council on Environmental Quality, Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act
- 42 U.S.C. 4321 et seq., National Environmental Policy Act of 1969, as amended
- 16 U.S.C. 662, Section 2 of the Fish and Wildlife Coordination Act

4.1 Data Collection

The project was evaluated for potential impacts to federal and state protected species in accordance with Chapter 16 (Protected Species and Habitat) of the FDOT PD&E Manual. The objective of this assessment was to identify protected species that have the potential to occur within the study areas and to determine if any protected species or their designated critical habitat would be adversely affected by the proposed project.

Federal listed threatened and endangered species are protected under the ESA. Other species, such as the bald eagle, are not listed (or considered threatened or endangered) but are afforded protection under the Bald and Golden Eagle Protection Act (BGEPA) or Migratory Bird Treaty Act (MBTA). State-listed species are protected under Chapter 379, Florida Statutes and Chapters 68A-27 and 5B-40, FAC. Note that federal listed species are also considered state listed species.

A Florida Natural Areas Inventory (FNAI) Standard Data Report was prepared for the study areas using a 500-foot ROW buffer to cover the roadway study area and alternative pond and FPC sites. The FNAI Standard Data Report is included in **Appendix G** and provides information on natural resources within the study areas, including the presence of species habitat and species occurrences. In addition, a USFWS Information for Planning and Consultation (IPaC) resource list was requested for the project area using the same 500-foot ROW buffer and is included in **Appendix H**. The USFWS IPaC resource list identifies species federally listed or proposed to be listed and migratory birds that may be present in the area of a proposed action along with any designated critical habitat within the area of proposed action. Available GIS data for protected species and habitat were reviewed for the study areas, and the study areas were field reviewed

for the presence of protected species during field reconnaissance in March 2022 within the roadway study area and in January and February 2023 within the preferred pond and floodplain compensation sites. Refer to **Appendix I** for a map showing the locations of species observations during the field reconnaissance.

4.2 Federal Listed Species and Designated Critical Habitat

Table 4.1 provides the list of federal listed species that were identified as having the potential to occur within the study areas. The table also provides their probability of occurrence within the study areas and their project effect determinations. Each species and their effect determinations are discussed in more detail in the following subsections.

The study areas were also evaluated for Designated Critical Habitat as defined by 50 CFR § 17.94. No designated critical habitat is located within the project study areas.

Table 4.1 | Federal Listed Species Potentially Occurring within the Study Areas

Scientific Name	Common Name	Status	Probability of Occurrence in Project Area	Effect Determination
Mammals				
Perimyotis subflavus*	Tricolored bat	Proposed Endangered	Low	NA
Birds				
Aphelocoma coerulescens	Florida scrub-jay	Threatened	Low	No Effect
Dryobates borealis	Red-cockaded woodpecker	Endangered	Low	No Effect
Laterallus jamaicensis jamaicensis	Eastern black rail	Threatened	Low	No Effect
Mycteria americana	Wood stork	Threatened	Moderate	May Affect, Not Likely to Adversely Affect
Reptiles				
Caretta caretta	Loggerhead sea turtle	Threatened	None	No Effect
Chelonia mydas	Green sea turtle	Threatened	None	No Effect
Dermochelys coriacea	Leatherback sea turtle	Endangered	None	No Effect
Drymarchon corais couperi	Eastern indigo snake	Threatened	Moderate	May Affect, Not Likely to Adversely Affect
Eretmochelys imbricata	Hawksbill sea turtle	Endangered	None	No Effect
Insects				
Danaus plexippus*	Monarch butterfly	Candidate	Moderate	NA
Plants				
Deeringothamnus rugelii	Rugel's pawpaw	Endangered	None	No Effect

* Effect determinations are not applicable to species proposed for listing or candidate species.

4.2.1 Tricolored bat

The tricolored bat was recently proposed for federal listing as endangered on September 14, 2022 [87 FR 56381]. It is the smallest bat found in Florida with an approximate nine-inch wingspan and a body length of up to two inches. It is distinguishable from other bats by its pink forearms that strongly contrast with their black wings. Their fur ranges from silver-yellow to dark orange. They are known to occur in most areas of Florida, except for the Keys, however they are rarely encountered and are considered uncommon in Florida.

Tricolored bats typically roost alone. During the winter, tricolored bats roost in caves and mines where they hibernate, but in southern states where caves are sparse, they have been found to roost in roadway culverts. During the other months of the year they are known to roost in tree foliage, tree cavities, Spanish moss and in old buildings. During the summer, tricolored bats form small maternity colonies in tree foliage and palm fronds and sometimes in man-made structures such as sheds and barns. The females give birth to two pups May through June.

As stated in Section 4.4.2 of this report, bats are protected during their maternity season in Florida under 68A-4.001 FAC General Prohibitions and 68A-9.010 FAC Taking Nuisance Wildlife. Bat maternity season begins April 15th and runs through August 15th. Bats are known to roost in bridges. This project involves widening the bridge over the Tomoka River (Bridge No. 794038). This bridge was not assessed for the 2005 FDOT research report Status and Management of Bats Roosting in Bridges in Florida. No bats were observed roosting beneath the bridge during the field reconnaissance. However, FDOT will complete a bat occupancy survey of the bridge prior to construction and if bats are identified roosting in the bridge FDOT will develop a bat exclusion plan in accordance with 68A-4.001 FAC. and 68A-9.010 FAC.

Roost sites for the tricolored bat can occur anywhere there are trees with foliage, culverts, or other appropriate roosting structures. Finding tricolored bat roosts is extremely difficult since they roost in foliage and frequently roost switch. The project area does include forested habitat and multiple culverts for roosting, however nighttime foraging will not be impacted, as there are expanses of foraging habitat adjacent to the project area. If the listing status of the tri-colored bat is elevated by USFWS to Threatened or Endangered prior to construction and the Preferred Alternative is located within the consultation area, FDOT commits to initiating consultation with the USFWS to determine the appropriate survey methodology and to address USFWS regulations regarding the protection of the tri-colored bat.

4.2.2 Florida scrub-jay

The federal status for the Florida scrub-jay is threatened. Florida scrub-jays utilize oak scrub as well as scrubby flatwoods with sand pine. These habitats are fire dependent and are characterized by an open canopy of widely spaced trees and a low, shrubby understory dominated by scrub oak and saw palmetto, generally interspersed with patches of white sand. These habitats occur on well-drained to excessively well-drained soils. There is no suitable habitat present within the study areas. The FNAI Standard Data Report did not report any known occurrences of the Florida scrub-jay within the vicinity of the survey areas and the Florida scrub-jay was not observed during field reconnaissance. Therefore, it has been determined that the project will have **no effect** on the Florida scrub-jay.

4.2.3 Red-cockaded woodpecker

The red-cockaded woodpecker is listed as endangered by the USFWS due to habitat fragmentation and poor management of appropriate habitat. The FNAI Standard Data Report identified the red-cockaded woodpecker as having the potential to occur within the study areas. A large portion of the land occupied by red-cockaded woodpeckers is federally managed, however smaller populations reside on state-owned and private lands. Their distribution is dependent on remaining areas of old-growth pine forests. In north and central Florida, they prefer longleaf pine (Pinus palustris) flatwoods. There are no documented occurrences of the red-cockaded woodpecker in Volusia County and the only pinelands that will be affected by the project are pine plantations which do not provide suitable habitat for the red-cockaded woodpecker. Due to these conditions, it has been determined that the project will have **no effect** on the red-cockaded woodpecker.

4.2.4 Eastern black rail

The federal status for the Eastern black rail is threatened. It is a small, cryptic marsh bird that is no bigger than 15 centimeters in length. Male and females are generally pale to blackish gray with bright red eyes. They require dense overhead cover and prefer herbaceous, emergent wetland vegetation. Nests are well-hidden in these dense clumps of vegetation and are typically constructed over moist soil or shallow water. The FNAI Standard Data Report did not report any known occurrences of the Eastern black rail within the vicinity of the survey areas and the Eastern black rail was not observed during field reconnaissance. Considering the small amount of freshwater emergent marsh present, lack of dense emergent vegetation within marshes, and previous impacts by development, it has been determined that the project will have **no effect** on the Eastern black rail.

4.2.5 Wood stork

The federal status for the wood stork is threatened, however, USFWS has recently proposed removing it from listing (88 FR 9830, February 15, 2023). The wood stork is a large wading bird with black flight feathers and a short black tail. It utilizes freshwater and estuarine habitats for nesting, foraging, and roosting. Primary nesting sites include cypress or mangrove swamps with foraging habitat consisting of marshes, ditches, and flooded pasture with water depths ranging from two to 15 inches. The primary prey consists of fish and crayfish. The USFWS guidelines indicate that the Core Foraging Area (CFA) for the wood stork in central Florida is a 15-mile radius surrounding nesting areas. The CFA is defined as the distance storks may fly from the colony to capture prey for their young.

Suitable foraging habitat (SFH) for the wood stork is described as any area containing patches of relatively open (< 25% aquatic vegetation), calm water, and having a permanent or seasonal water depth between two and 15 inches. SFH supports and concentrates, or is capable of supporting and concentrating small fish, frogs, and other aquatic prey. Examples of SFH include, but are not limited to, freshwater marshes and stock ponds, shallow, seasonally flooded roadside or agricultural ditches, narrow tidal creeks or shallow tidal pools, managed impoundments, and depressions in cypress heads and swamp sloughs.

Based on USFWS data updated in 2021, there are no active wood stork nesting colonies occurring within a 15-mile radius of the project area, and there are few areas with suitable foraging habitat within the project area. Use of the USFWS Wood Stork Effect Determination Key (2008) (**Appendix J**), leads to a determination that the proposed project **may affect, but is not likely to adversely affect** the wood stork.

4.2.6 Sea turtles

The federal statuses for loggerhead, green, leatherback, and Kemp's ridley sea turtles are threatened or endangered. They are large marine-dwelling turtles that nest on sandy beaches. They forage and occasionally shelter in estuarine environments including submerged aquatic vegetation (SAV) beds. Sea turtle nesting habitat and critical habitat are not present within the study areas. The nearest suitable foraging habitat is located approximately 10 miles downstream of the proposed project. There are no known occurrences of sea turtles within the Tomoka River within the study area. Based on the lack of suitable nesting and foraging habitat in the project area and that there are no known occurrences of sea turtles within the vicinity of the study areas, the proposed project will have **no effect** on federally listed sea turtles.

4.2.7 Eastern indigo snake

The federal status for the eastern indigo snake is threatened. The indigo snake is a large, docile bluish-black colored snake that can reach lengths of up to eight feet. It may be found in a range of wetland and upland habitats from marsh edges to pine flatwoods and coastal dunes. It utilizes gopher tortoise burrows and other holes and cavities for shelter. The project is located within the LPGA Boulevard corridor that consists of disturbed and maintained road right-of-way. The presence of gopher tortoise burrows has been confirmed in pond sites. Considering the potential for the eastern indigo snake to be present within the area, the FDOT has committed to implement the USFWS *Standard Protection Measures for the Eastern Indigo Snake* (2021) during construction. Use of the Eastern Indigo Snake Programmatic Effect Determination Key (**Appendix J**) leads to a determination that the proposed project **may affect, but is not likely to adversely affect** the eastern indigo snake.

4.2.8 Monarch butterfly

The monarch butterfly is a candidate species for federal listing under the ESA. It is large and conspicuous with bright orange wings surrounded by a black border and covered with black veins. The black wing border also has a double row of white spots on the upper side. The adults depend on nectar-rich flowers for foraging during breeding and migration. They only lay eggs on their obligate host plant, milkweed (primarily Asclepias spp.). As such, anywhere that milkweed is present is considered monarch butterfly habitat. Mowed ROW can contain milkweed and is considered potential habitat, however, naturally occurring milkweed has become more rare and no milkweed was directly observed during field review. Monarch butterflies are present year-round in Florida and, as such, construction cannot be timed to avoid impacts to potential habitat. However, naturally occurring nectar plants will be able to reestablish within the ROW once construction is complete.

4.2.9 Rugel's pawpaw

The FNAI Standard Data Report identified Rugel's pawpaw as having the potential to occur within the study areas. Rugel's pawpaw is a rare flowering plant that is federally listed as endangered. It is found in open flatwoods with an understory of wiregrass and saw palmetto. It is a shrub with a woody base and non-woody shoots that die back in the winter. The flowers are yellow with 6 slender petals and 3 sepals while the fruit is yellow-green and roughly the shape of a peanut. Rugel's pawpaw is endemic to Volusia County. There is no potential habitat within the project area as the pine plantations present within the study areas are not maintained with fire and do not represent the drier and open conditions that Rugel's pawpaw prefers. The FNAI Standard Data Report did not report any known occurrences of Rugel's pawpaw within the vicinity of the survey areas and it was not observed during field reconnaissance. Based on the lack of suitable habitat and that there are no documented occurrences within the study areas, it has been determined that the project will have **no effect** on Rugel's pawpaw

4.3 State Listed Species

Table 4.2 provides the list of state-listed species that were identified as having the potential to occur within the study areas.

Table 4.2 | State Listed Species Potentially Occurring within the Study Areas

Scientific Name	Common Name	Status	Probability of Occurrence in Project Area	Effect Determination
Birds				
Antigone canadensis pratensis*	Florida sandhill crane	Threatened	High	No Adverse Effect Anticipated
Reptiles				
Gopherus polyphemus*	Gopher tortoise	Threatened	High	No Adverse Effect Anticipated
Plants				
Arnoglossum diversifolium	Variable-leaved Indian-plantain	Threatened	Low	No Effect Anticipated
Calopogon multiflorus	Many-flowered grass-pink	Threatened	Low	No Effect Anticipated
Carex chapmanii	Chapman's sedge	Threatened	Moderate	No Adverse Effect Anticipated
Centrosema arenicola	Sand butterfly pea	Endangered	Low	No Effect Anticipated
Conradina grandiflora	Large-flowered rosemary	Threatened	Low	No Effect Anticipated
Illicium parviflorum	Star anise	Endangered	Moderate	No Adverse Effect Anticipated
Lechea cernua	Nodding pinweed	Threatened	Low	No Effect Anticipated
Matelea floridana	Florida spiny-pod	Endangered	Low	No Effect Anticipated
Nemastylis floridana	Celestial lily	Endangered	Low	No Effect Anticipated
Nolina atopocarpa	Florida beargrass	Threatened	Low	No Effect Anticipated

Orthochilus ecristatus	Giant orchid	Threatened	Low	No Effect Anticipated
Pycnanthemum floridanum	Florida mountain-mint	Threatened	Moderate	No Adverse Effect Anticipated
Salix floridana	Florida willow	Endangered	Low	No Effect Anticipated
Sarracenia minor*	Hooded pitcher plant	Threatened	High	No Adverse Effect Anticipated

* Species with documented occurrences within the study areas during the PD&E field reconnaissance.

4.3.1 Florida sandhill crane

The Florida sandhill crane is a state threatened wading bird. The state protection status of the Florida sandhill crane is threatened. Sandhill cranes are tall gray birds with a red crown. Sandhill cranes use a variety of habitats, preferring wet prairies, marshy lake margins, wet pastures, and marshes. Sandhill cranes nest and forage in shallow, freshwater marsh habitats. Their nests are usually sequestered within wetland interiors where disturbance is less likely.

Florida sandhill cranes were observed along LPGA Boulevard during field reviews and there are freshwater marshes and stormwater ponds located within the proposed project area. Per the Florida Fish and Wildlife Conservation Commission (FWC) species guidelines (2016), pre-planning and pre-construction surveys are recommended in areas with potential to support nesting sandhill cranes to ensure active nests and flightless young are protected. Sandhill cranes breed from December through August and nest between February and April. Since the FDOT will follow the recommendations, there is **no adverse effect anticipated** on the Florida sandhill crane.

4.3.2 Gopher tortoise

The gopher tortoise is a state listed threatened species and has recently been delisted as a candidate species with the USFWS. It is a moderately sized terrestrial tortoise that prefers open, sunny locations with sandy, well-drained soils and low-growing forage plants such as wiregrass, broadleaf grasses, gopher apple, and legumes. They are found in habitats such as longleaf pine sandhills, xeric oak hammocks, scrub, pine flatwoods, dry prairies, and coastal dunes. They are a burrowing species that spend up to 80% of their time in their burrows. Their burrows are easily identified by the soft mound of sand at the entrance of their burrows.

A NRCS Gopher Tortoise Burrowing Soil Suitability Reports were run for the survey areas and are included in the soil survey reports in **Appendices D** and **E**. The roadway study area soil report identifies two small areas of highly suitable soils occurring southwest of the LPGA/I-95 interchange along the roadway. In addition, two small areas of Alternative Pond 13B occur within highly suitable soils.

Two potentially occupied burrows were observed within the Preferred Pond Site 12C+13A slightly west of the areas of highly suitable soils. The mapped soil unit for this pond site is considered a less-suited soil type for gopher tortoises. It is likely that there are more gopher tortoise burrows present within the highly suited soil units east of pond site 12C+13A and within all adjacent, less suited soil units.

Prior to construction a survey of all suitable habitat will be performed. If potentially occupied burrows are located, FDOT will procure a relocation permit from the FWC. Since the FDOT will follow the Gopher Tortoise Permitting Guidelines and regulations, there is **no adverse effect anticipated** on the gopher tortoise.

4.3.3 Variable-leaved Indian-plantain

The FNAI Standard Data Report identified variable-leaved Indian-plantain as having the potential to occur within the study areas. Variable-leaved Indian-plantain is a state listed threatened plant. It is a herbaceous perennial with slightly grooved and angled stems up to 6.5 feet tall with white to lavender flowers in a cluster at the top. It occurs in floodplain forests, banks of woodland streams, and seasonally wet wooded hammocks. The study areas include a small section of a forested wetland along the Tomoka River, however there are no documented occurrences of variable-leaved Indian plantain within Volusia County. Therefore, there is **no effect anticipated** for the variable-leaved Indian-plantain.

4.3.4 Many-flowered grass-pink

The FNAI Standard Data Report identified many-flowered grass-pink as having the potential to occur within the study areas. Many-flowered grass-pink is a state listed threatened plant. It is an orchid with thin basal leaves and a leafless flower stalk. The flowers are pink with a crest of orange bristles. It occurs in fire-maintained flatwoods among saw palmetto or edges of hammocks. There are no documented occurrences of the many-flowered grass-pink in Volusia County and the study areas do not include any natural pinelands with a regular fire regime. Since there is no suitable habitat for the many-flowered grass-pink, there is **no effect anticipated** on the many-flowered grass-pink.

4.3.5 Chapman's sedge

The FNAI Standard Data Report identified Chapman's sedge as having the potential to occur within the study areas. Chapman's sedge is a state listed threatened plant. It is an herbaceous perennial with thin leaves and flowers that are arranged as spikes on the stem. It occurs in hydric hammocks and bottomland forest, typically along river floodplains. There are documented occurrences within Volusia County but not within the study areas. The study areas contain forested wetlands though none were observed during field reconnaissance. Considering that there have been no documented occurrences of the Chapman's sedge within the vicinity of the study areas and that none were observed within the study areas during field reconnaissance there is **no adverse effect anticipated** on the Chapman's sedge.

4.3.6 Sand butterfly pea

The FNAI Standard Data Report identified sand butterfly pea as having the potential to occur within the study areas. Sand butterfly pea is a state listed endangered plant. Sand butterfly pea is a perennial vine with leaflets of three that has a distinct purple-blue flower with a large banner. It occurs in sandhills and scrubby flatwoods. Sand butterfly pea has been documented within Volusia County, but the study areas do not include suitable habitat. Since there is no suitable habitat for the sand butterfly pea, there is **no effect anticipated** on the sand butterfly pea.

4.3.7 Large-flowered rosemary

The FNAI Standard Data Report identified large-flowered rosemary as having the potential to occur within the study areas. Large-flowered rosemary is a state listed threatened plant that grows as a dense low-shrub with a minty odor and white flowers that exhibit bands of purple dots. It occurs in scrub, scrubby flatwoods, and adjacent disturbed areas. There are documented occurrences within Volusia County, however there is no suitable habitat within the study areas. Therefore, there is **no effect anticipated** on the large-flowered rosemary.

4.3.8 Star anise

The FNAI Standard Data Report identified star anise as having the potential to occur within the study areas. Star anise is a state listed endangered plant that grows as a shrub with smooth, evergreen leaves and exhibits woody, star-shaped fruit. It occurs in hydric hammocks, floodplain swamps, and bayheads. There are documented occurrences of star anise within Volusia County but not within vicinity of the study areas. The study areas contain a forested wetlands however star anise was not observed within the study areas during field reconnaissance. Therefore, there is **no adverse effect anticipated** on the star anise.

4.3.9 Nodding pinweed

The FNAI Standard Data Report identified nodding pinweed as having the potential to occur within the study areas. Nodding pinweed is a state listed threatened plant that occurs within unshaded white sands of scrub and scrubby flatwoods. There are documented occurrences within Volusia County, however, the study areas do not contain any suitable habitat for the nodding pinweed. Therefore, there is **no effect anticipated** on the nodding pinweed.

4.3.10 Florida spiny-pod

The FNAI Standard Data Report identified Florida spiny-pod as having the potential to occur within the study areas. Florida spiny-pod is a state listed endangered vine that is most easily distinguished by its bright green fruit capsule that exhibits fleshy spines. It occurs in sandhills, upland pine, and dry hammocks. There are no documented occurrences within Volusia County and no suitable habitat within the study areas. Therefore, there is **no effect anticipated** on the Florida spiny-pod.

4.3.11 Celestial lily

The FNAI Standard Data Report identified celestial lily as having the potential to occur within the study areas. Celestial lily is a state listed endangered plant. It is a perennial herb with grass-like basal leaves and a blue-purple flower with bright yellow stamens. Celestial lily occurs in fire-maintained wet flatwoods, prairies, and marshes. There are documented occurrences of celestial lily within Volusia County, however there is no suitable habitat present within the study areas. Therefore, there is **no effect anticipated** on the celestial lily.

4.3.12 Florida beargrass

The FNAI Standard Data Report identified Florida beargrass as having the potential to occur within the study areas. Florida beargrass is a state listed threatened plant that grows as a rosette with long, thin leaves and a bulb-like base. It occurs in grass areas of mesic and wet flatwoods. There are documented occurrences of Florida beargrass within Volusia County and there are wet pinelands within the study areas. However, these areas have been previously converted to pine plantations with dense canopies or significant undergrowth and a suppressed fire regime. Therefore, there is **no effect anticipated** on the Florida beargrass.

4.3.13 Giant orchid

The FNAI Standard Data Report identified giant orchid as having the potential to occur within the study areas. Giant orchid is a state listed threatened plant. It is a herbaceous perennial most easily identified by its flower stalk that can grow to five feet, exhibiting yellowish maroon flowers. It occurs in sandhill, scrub, and pine flatwoods and rocklands. There are documented occurrences of giant orchid within Volusia County, however there is no suitable habitat present in the study areas. Therefore, there is **no effect anticipated** on the giant orchid.

4.3.14 Florida mountain-mint

The FNAI Standard Data Report identified Florida mountain-mint as having the potential to occur within the study areas. Florida mountain-mint is a state listed threatened plant. It is an herbaceous perennial that grows several feet tall with square stems. White flowers with pink-purple spots develop in tight clusters toward the top of the plant. It occurs in roadside ditches and sandhill communities. There are documented occurrences in Volusia County and a significant part of the study areas are open, roadside ditches or swales. However, Florida mountain-mint was not observed withing the study areas during field reconnaissance therefore, there is **no adverse effect anticipated** on the Florida mountain-mint.

4.3.15 Florida willow

The FNAI Standard Data Report identified Florida willow as having the potential to occur within the study areas. Florida willow is a state listed endangered plant that grows as a shrub or small tree with flowers arranged as distinct catkins that are shorter than those of the common Carolina willow. Leaves are broadly lanceolate and are bright green above with a grayish-white underside. It occurs in wet, mucky soils in bottomland forests, hydric hammocks, and swamps. There are no documented occurrences of Florida willow in Volusia County. Therefore, there is **no effect anticipated** on the Florida willow.

4.3.16 Hooded pitcher plant

The hooded pitcher plant is a state listed threatened plant that was identified during field reconnaissance performed for this PD&E Study in two locations adjacent to a proposed pond and floodplain compensation site. It is a carnivorous, clumping plant with leaves that are rolled lengthwise, which allow it to trap insects. The top of the leaf is reddish and curved over the top of the pitcher with translucent white spots opposite the opening. The hooded pitcher plant is found

in mesic and wet flatwoods, marsh ecotones, and wet ditches. One cluster of hooded pitcher plant was observed during field reconnaissance performed for this PD&E Study within the Preferred Floodplain Compensation Site 9E and one cluster was observed adjacent to Pond 6C. FDOT will coordinate with the Florida Department of Agriculture and Consumer Services (FDACS) regarding this species to identify opportunities to reduce impacts to it. Therefore, there is **no adverse effect anticipated** on the hooded pitcher plant.

4.4 Other Protected Species

4.4.1 Bald eagle

The USFWS has delisted the bald eagle; however, protection continues under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d) (BGEPA), as amended, and the Migratory Bird Treaty Act (MBTA). Construction activities are restricted within 330 feet of active nest trees and the USFWS Eagle Management Guidelines are required if construction occurs within 660 feet of an active eagle nest during the nesting season (October 1 through May 15). According to the FWC eagle nest locator, there is one bald eagle nest within a one-mile radius of the project area though it has not been occupied since 2006. Refer to **Appendix I** for a map of FWC recorded bald eagle nest locations.

A bald eagle pair and nest were observed at the Daytona Beach Municipal Stadium during field reviews. This nest is in a mature pine tree more than 660 feet from the project area, just north of Welshinger-Butler Circle beyond the chain-link fence (see Species Observations in **Appendix I**). FDOT will survey for bald eagle nests during permitting and design. If a bald eagle nest is identified within 660 feet of the project, coordination will be initiated with the USFWS in accordance with the BGEPA and MBTA. Because this project will be consistent with the BGEPA and the MBTA, and since no bald eagle nests were identified near the project area, it is anticipated that the bald eagle will not be adversely affected.

4.4.2 Bats

Bats are protected during their maternity season in Florida under 68A-4.001 FAC General Prohibitions and 68A-9.010 FAC Taking Nuisance Wildlife. Bat maternity season begins April 15th and runs through August 15th. Bats are known to roost in bridges. This project involves widening the bridge over the Tomoka River (Bridge No. 794038). This bridge was not assessed for the 2005 FDOT research report *Status and Management of Bats Roosting in Bridges in Florida*. No bats were observed roosting beneath the bridge during the field reconnaissance. However, FDOT will complete a bat occupancy survey of the bridge prior to construction and if bats are identified roosting in the bridge FDOT will develop a bat exclusion plan in accordance with 68A-4.001 FAC. and 68A-9.010 FAC.

4.4.3 Florida black bear

The Florida black bear is a large mammal that inhabits large expanses of undeveloped land for foraging. The black bear has been delisted by FWC, but their populations are still managed under the FWC *Florida Black Bear Management Plan* (December 2019). Based on the *Florida Black Bear Management Plan*, the project is within a Florida Black Bear Range designated as having

frequent occurrences of the Florida black bear. Florida black bear regulations, as documented in the *Florida Black Bear Management Plan*, including the Bear Conservation Rule and the Bear Feeding Rule, will be followed during the construction phases of the project. FDOT will require contractors to remove garbage daily from the construction site or use bear-proof containers for securing of food and other debris from the project work area which may act as an attractant for the bear and report nuisance bears to the FWC Wildlife Alert hotline. Considering these measures, impacts to the Florida black bear are not anticipated.

4.5 Riparian Wildlife Habitat

The SJRWMD has implemented a Riparian Wildlife Habitat Standard for the Tomoka River and Spruce Creek Hydrologic Basins (SJRWMD Applicant's Handbook, Volume II, Section 13.5.4). The rules states, "The wetlands abutting the Tomoka River and Spruce Creek and their tributaries support an abundance and diversity of aquatic and wetland dependent wildlife. Construction, alteration, operation, maintenance, removal, or abandonment of surface water management systems within those wetlands and uplands can result in adverse changes in the habitat, diversity, abundance and food resources of aquatic and wetland dependent species."

Within the project corridor, wetlands and uplands which are within 50 feet landward of the wetlands which abut the Tomoka River are included within the RHPZ (SJRWMD Applicant's Handbook, Volume II 13.5.4 (a)(1)). Roadway and bridge improvements at the Tomoka River (**Figure 2**) have the potential to impact approximately 3.9 acres of Tomoka River RHPZ (**Figure3**). It should be noted that all improvements within this area are proposed within the existing ROW. It is anticipated that, by limiting the build alternative to the existing ROW and increasing the Tomoka River bridge horizontal clearance impacts to wetlands and riparian uplands within the basin will be significantly reduced.

The proposed improvements are designed to minimize potential impacts to the RHPZ within the existing ROW by lengthening of the bridge and creation of wildlife paths on both sides of the Tomoka River Bridge which will enhance ecological function of the upland and wetland habitat systems associated with the river. Further mitigation of unavoidable impacts will be conducted through the purchase of credits from mitigation banks as discussed in Section 5.0.

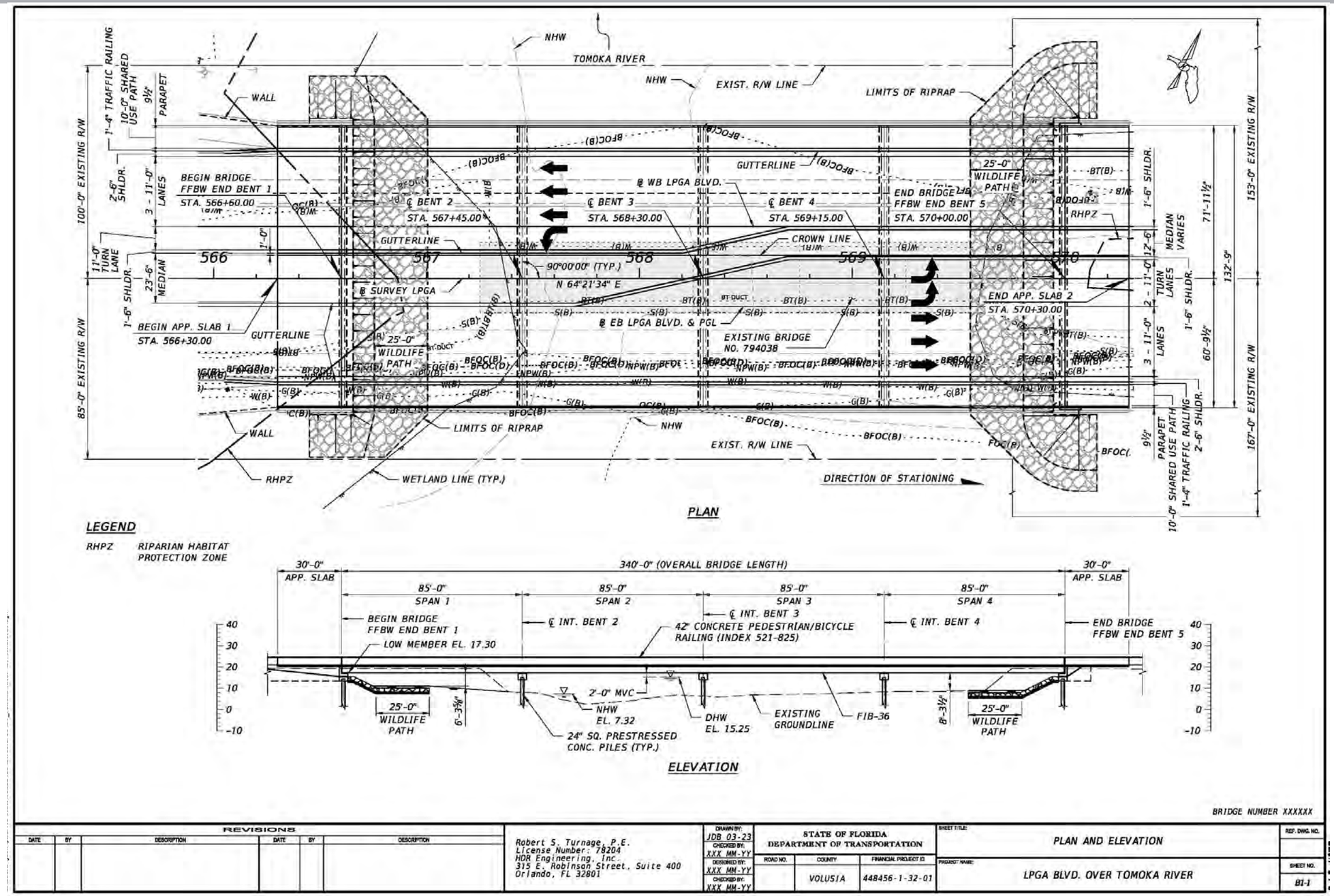


Figure 2. Proposed Tomoka River Bridge

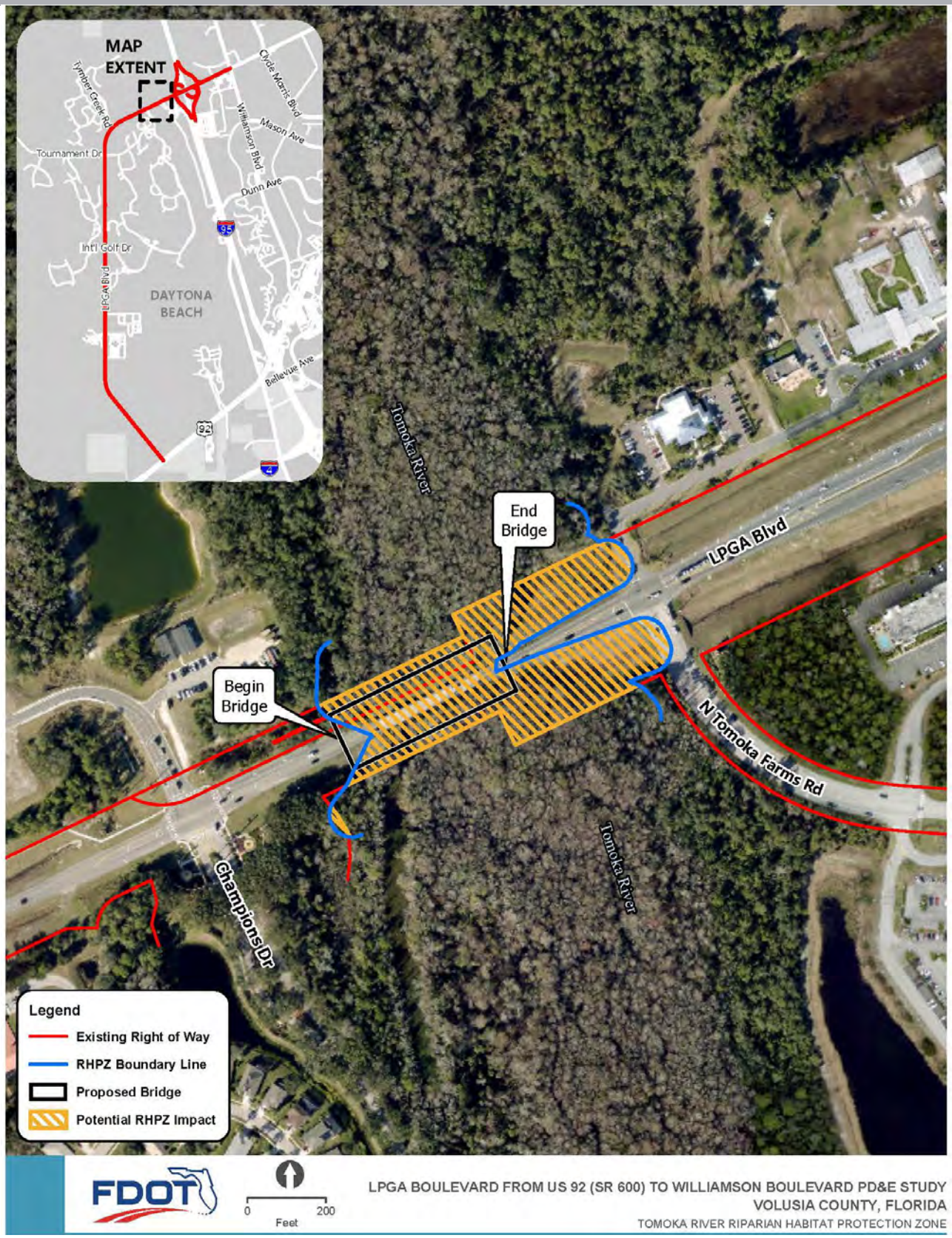


Figure 3. Tomoka River Riparian Habitat Protection Zone

5.0 Wetlands and Other Surface Waters

During ETDM coordination, the FDEP, U.S. Environmental Protection Agency (USEPA), USFWS, and SJRWMD, assigned Moderate Degrees of Effect (DOE) to wetlands and other surface waters, citing potential impacts to adjacent wetlands and the Tomoka River. The U.S. Army Corps of Engineers (USACE) and USFWS assigned a "Minimal" DOE.

The discharge of dredged or fill material into waters of the United States under the Clean Water Act of 1972 (CWA) is regulated under the USACE for the Tomoka River portion of the project (classified as retained waters). Waters of the United States in the project area beyond the retained waters of the Tomoka River fall under the jurisdiction of FDEP. The SJRWMD also regulates activities in Tomoka River RHPZ and wetlands within the project area under state wetland protection rules (Chapter 62-330, FAC, Environmental Resource Permitting). The wetland evaluation conducted and documented within this report is consistent with the requirements of the following regulations:

- Section 404 of the CWA
- Federal Executive Order 11990, Protection of Wetlands
- U.S. Department of Transportation (USDOT) Order 5660.1A, Preservation of the Nation's Wetlands
- Federal Highway Administration (FHWA) Technical Advisory T6640.8A
- Chapter 62-330, FAC, Environmental Resource Permitting
- Chapter 62-331, FAC, State 404 Program
- Chapter 62-340, FAC, Delineation of the Landward Extent of Wetlands and Surface Waters; and
- PD&E Manual Part 2, Chapter 9, Wetlands and Other Surface Waters.

5.1 Data Collection

Jurisdictional limits of wetlands and other surface waters were estimated for the project pursuant to the State of Florida's *Delineation of the Landward Extent of Wetlands and Surface Waters* (Chapter 62-340, FAC), the USACE 1987 *Wetland Delineation Manual*, and the 2012 USACE *Atlantic and Gulf Coastal Plain Regional Supplement* (Version 2.0). Field reconnaissance was conducted in March 2022 to estimate jurisdictional limits of wetlands and other surface waters within the roadway study area. Field reconnaissance was conducted in January and February 2023 to identify jurisdictional limits of wetlands and other surface waters within the preferred pond and floodplain compensation sites. A Trimble Geo7x GPS unit with sub-meter accuracy was used to record GPS points to document and map the limits of wetlands and other surface waters.

Jurisdictional wetlands and other surface waters have been classified according to the USFWS Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al., 1979) used by the USFWS NWI program.

5.2 Wetlands and Other Surface Waters

The field assessments confirmed the presence of three to four times the wetland coverage as estimated by the SJRWMD land use and NWI mapping, respectively. Within the roadway study area 112 wetlands and 25 surface waters were identified. The wetlands total 92.19 acres and the surface waters total 17.90 acres. Within the preferred pond and floodplain compensation sites 10 wetlands were identified totaling 13.20 acres. **Table 5.1** summarizes the number of wetland types and other surface waters identified with total acreages. Refer to **Appendix K** for the wetland and other surface water tables listing all wetlands identified within the study areas. Refer to **Appendix L** for delineated wetland and other surface water mapping of the study areas over aerial photography.

Table 5.1 | Wetland and Other Surface Waters Identified within the Study Areas

Type	Number of Wetlands	Total Acreage
Roadway Study Area		
Forested Wetland	34	37.34
Herbaceous Wetland	76	54.40
Shrub Wetland	2	0.45
Surface Water	25	17.90
Preferred Pond and Floodplain Compensation Sites		
Forested Wetland	6	6.04
Herbaceous Wetland	4	7.16

The majority of the herbaceous wetlands consist of areas within the mowed and maintained ROW that are dominated by low growing wetland herbs such as spikerush (*Eleocharis* spp.), pink sundew (*Drosera capillaris*), and coinwort (*Centella asiatica*). Beyond the mowed and maintained portions of the ROW, herbaceous wetlands consist of pickerelweed (*Pontederia cordata*), lizard's tail (*Saururus cernuus*), and maidencane (*Panicum hemitomon*), sawgrass (*Cladium jamaicense*), blue maidencane (*Amphicarpum muehlenbergianum*), and St. John's wort (*Hypericum fasciculatum*).

The forested wetlands typically begin just beyond the portions of mowed and maintained ROW. The majority of the forested wetlands are disturbed mixed forested wetlands and disturbed hydric pine flatwoods that consist of slash pine (*Pinus elliottii*), red maple (*Acer rubrum*), sweet bay (*Magnolia virginiana*), loblolly bay (*Gordonia lasianthus*), swamp bay (*Persea palustris*), dahoon holly (*Ilex cassine*), laurel oak (*Quercus laurifolia*), and cypress (*Taxodium* spp.).

The area along the Tomoka River contains a dense canopy dominated by cypress, black gum (Nyssa sylvatica), and red maple. Ground cover in the area includes pickerel weed, lizard's tail, and swamp fern (*Telmatoblechnum serrulatum*).

Shrub wetlands were disturbed wetlands consisting of Carolina willow (Salix caroliniana), elderberry (*Sambucus simpsonii*), primrose willow (*Ludwigia peruviana*) and Brazilian pepper (*Schinus terebinthifolia*).

5.3 Wetland and Other Surface Waters Impacts

5.3.1 Direct Wetland and Other Surface Water Impacts

The proposed project would result in impacts to all wetlands and other surface waters occurring within the existing ROW and within the preferred pond and FPC sites. The proposed roadway widening and pond sites associated with the LPGA/I-95 interchange modifications occur within the existing ROW and would result in direct permanent impacts to 97 wetlands totaling 51.10 acres and 19 surface waters totaling 15.20 acres. The preferred pond and floodplain compensation sites (not including the LPGA/I-95 interchange ponds) would result in direct permanent impacts to 17 wetlands (including wetlands within the roadway study area) totaling 9.61 acres and three surface waters (surface waters within the roadway study area) totaling 0.03 acres.

The Uniform Mitigation Assessment Method (UMAM) per Chapter 62-330.345, FAC, was used to assess all potential wetland impact areas to provide a preliminary estimate of total wetland functional loss resulting from the project. UMAM uses a scoring of 1 to 10 to assess wetlands based on three categories: Location and Landscape Support, Water Environment, and Community Structure. The following provides the methodology and justification for the scoring for each category for the impacted wetlands:

- **Location and Landscape Support** – All wetlands within the ROW score low considering their proximity to roadway. Wetlands adjacent to Tiger Bay State Forest were given a score of 5, or 4 if on the east side of the roadway opposite of the Tiger Bay State Forest. Wetlands adjacent to development were given a score of 3. Wetlands along the Tomoka River or adjacent to less dense development were given a score of 4.
- **Water Environment** – All wetlands were given a score of 4. The hydrology for all the wetland impact areas has been significantly altered due to development and the existing roadways. However, wetland WL-7AF shows signs of more significant altered hydrology showing soil subsidence exposing cypress tree roots and fallen cypress trees.
- **Community Structure** – All herbaceous wetlands within the ROW were given a score of 3, because the vegetative community structure is completely altered due to the mowing of the ROW. The few that are not mowed are heavily disturbed with nuisance and invasive species. Pond and FPC herbaceous wetlands score higher considering they are not impacted by mowing, however, they have some presence of nuisance and invasive species and/or have some disturbance to the vegetative community structure. The same criteria applies to the two shrub wetlands. Forested wetlands are all beyond the mowed portions of the ROW. They consist of the ROW disturbed forested wetland edges with disturbed soils and excessive vines, however they have low nuisance and invasive species cover. Therefore, they are given a score of 7. The pond and FPC forested wetlands are also given a score of 7 because they all have an altered tree species composition reflective of the altered hydrology and other disturbances in the area.

Typically, UMAM functional loss equates to mitigation bank credits that can be purchased to satisfy wetland mitigation requirements. The UMAM functional loss that would result from the

project for forested wetland impacts totals 4.40. The UMAM functional loss that would result from the project for herbaceous wetland impacts totals 18.86. The UMAM functional loss that would result from the project for shrub wetland impacts totals 0.07.

Table 5.2 summarizes the number of wetland types and other surface waters that would be impacted with total impact acreages and the corresponding UMAM functional loss. The delineated wetland and other surface water mapping in **Appendix L** identifies the wetland and other surface water impact areas. Refer to **Appendix M** for wetland and other surface water tables listing all wetlands and other surface waters that would be impacted and their impact acreages. Refer to **Appendix N** for the wetland impacts UMAM tables.

Table 5.2 | Summary of Wetland and Other Surface Waters Direct Permanent Impacts

Type	Number of Impact Areas	Total Impact Acreage	UMAM Functional Loss
Within Existing ROW			
Forested Wetland	28	3.26	1.62
Herbaceous Wetland	67	47.65	17.02
Shrub Wetland	2	0.19	0.07
Surface Water	19	15.20	NA
Preferred Pond and Floodplain Compensation Sites			
Forested Wetland	10	5.68	2.78
Herbaceous Wetland	7	3.94	1.84
Surface Water	3	0.03	NA

5.3.2 Mitigation

Mitigation required for wetland impacts which would result from the construction of this project would occur pursuant to Section 373.4137, F.S., to satisfy all mitigation requirements of Part IV of Chapter 373, F.S., and U.S.C. §1344. Final mitigation requirements would be determined during permitting based on the project design, using the UMAM habitat scoring, and based on negotiations with the regulatory agencies at the time of permitting. Some mitigation banks require the use of the Wetland Rapid Assessment Procedure (WRAP) to determine mitigation requirements. The purchase of mitigation bank credits from an appropriate mitigation bank will be used to satisfy mitigation requirements or other mitigation options pursuant to Section 373.4137 may be used such as the purchase of mitigation services through SJRWMD or FDEP.

The project falls within the Halifax River Watershed and the larger Daytona-St. Augustine Basin. The following lists the mitigation banks that service the project area and their current credit availability status:

- Lake Swamp Mitigation Bank – Currently this mitigation bank has no wetland mitigation credits available.

- Port Orange – This mitigation bank currently has 141 UMAM state wetland mitigation bank credits available and 216 Wetland Rapid Assessment Procedure (WRAP) federal mitigation bank credits available. They currently offer state UMAM credits at $120,000 per credit and federal WRAP credits at $50,000 per credit.
- Tiger Bay Mitigation Bank – This bank has federal and state credits available. The bank uses UMAM for both. They currently have between 30 to 40 forested credits available at the cost of $120,000 per state credits or $130,000 per dual state and federal credits.
- Farmton Mitigation Bank – This bank has federal and state credits available. The bank uses WRAP for wetland assessments for federal credits and UMAM for state credits. They currently have approximately 600 credits available between herbaceous and forested credits at the cost of $120,000 per state credits or $130,000 per dual state and federal credits.

5.3.3 Indirect and Cumulative Impacts

Short-term and long-term impacts to water quality, and the resultant effects on wetland resources caused by construction and the final project are anticipated to be low with the use of Best Management Practices (BMPs) during construction. The proposed roadway improvements and widening are those safety improvements determined to be necessary based on the development that has already occurred within the region. Every effort has been made during the preliminary design to minimize and retain impacts within the existing FDOT ROW where wetland and upland habitats are only providing minimal habitat values. Impacts to wetlands will be mitigated within the basin and therefore cumulative effects are expected to be insignificant.

5.3.4 Avoidance and Minimization

Based on preliminary design, it has been determined that there are no practical alternatives to the proposed construction in areas of wetlands and other surface waters. Avoidance of these resources has been maximized to the greatest extent possible and the design has been limited to the existing FDOT ROW to avoid and minimize impacts to higher quality wetlands outside the ROW. Further impact minimization will occur during the design and permitting phase of the project. The use of BMPs including the use of silt screens, floating turbidity barriers, and other discharge prevention measures during construction will minimize impacts to adjacent wetlands and other surface waters within the vicinity of the project. Considering that Tomoka River is an OFW, the project will need to adhere to the strict water quality standards associated with OFWs during construction.

5.3.5 Wetland Finding

The proposed project will have no significant short-term or long-term adverse impacts to wetlands. The design alternative carefully considered minimizing impacts to wetlands by keeping most of the project within the existing ROW, preventing impacts to higher quality wetlands beyond the ROW. There is no practicable alternative to construction in wetlands. Measures have been taken to avoid impacts to the extent possible. Impacts to wetlands will be mitigated for pursuant to Section 373.4137 through either the purchase of mitigation bank credits from an appropriate

mitigation bank or other mitigation options such as the purchase of mitigation services through SJRWMD or FDEP.

6.0 Essential Fish Habitat

The NMFS is the regulatory agency responsible for the nation's living marine resources and their habitats, including EFH. This authority is designated by the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), as amended. The MSFCMA defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. § 1802(10)].

The National Oceanic and Atmospheric Administration (NOAA) Essential Fish Habitat Mapper and Inland EFH Mapper were reviewed for the project area (**Appendix O**). The project area is not located within range of designated EFH species. Based on the location of the project and the comment received from NMFS the project will have no involvement with EFH. FDOT further confirmed that the Tomoka River's tidal influence terminates north of the project area through a survey analysis of hydrological data. FDOT provided this information to NMFS who responded with agreement to the determination that the project area is not tidal. **Appendix O** includes information from the hydrological analysis, the email confirmation from NMFS and a letter from FDEP confirming the project area is not tidal.

In addition, because the Tomoka River is an OFW, water quality requirements during construction will prevent degraded waters from reaching estuarine and marine habitats.

7.0 Anticipated Permits

The proposed Build Alternative would require permits from state and federal regulatory agencies for impacts to wetlands, other surface waters, water quality, and gopher tortoise burrows. Table 7.1 lists the anticipated permits associated with the construction of the Build Alternative.

Table 7.1 | Anticipated Permits for the Build Alternative

Permit Type	Agency
Section 404 Dredge and Fill Permit - Regional General Permit SAJ-92	USACE
Section 404 Dredge and Fill Permit – Individual Permit	FDEP
Individual Environmental Resource Permit (ERP)	SJRWMD
National Pollution Discharge Prevention and Elimination System (NPDES)*	FDEP
Gopher Tortoise Relocation Permit	FWC

* This permit will be obtained by the selected construction contractor.

8.0 Conclusions

FDOT conducted the LPGA PD&E Study from US 92 (International Speedway Boulevard) to Williamson Boulevard to evaluate the potential of effects of enhancing safety and accommodating traffic demand along LPGA Boulevard and the I-95 interchange in the City of Daytona Beach in Volusia County. The proposed Build Alternative would address the purpose and need, be designed to current FDOT criteria, and implement avoidance and minimization measures to the greatest extent feasible to reduce impacts to wetlands and other surface waters.

Pursuant to Section 7 of the ESA, **Tables 8.1** and **8.2** list the federal and state listed species and the effects determination for the proposed build alternative. **Table 8.3** lists the anticipated wetland and other surface water impacts for the proposed build alternative. It is anticipated that, by limiting the build alternative to within the existing ROW, impacts to intact wetlands and riparian uplands will be significantly reduced. There is no EFH involvement for this project.

Table 8.1 | Federal Listed Species with Effects Determination for the Build Alternative

Scientific Name	Common Name	Status	Effect Determination
Perimyotis subflavus*	Tricolored bat	Proposed Endangered	NA
Aphelocoma coerulescens	Florida scrub-jay	Threatened	No Effect
Dryobates borealis	Red-cockaded woodpecker	Endangered	No Effect
Laterallus jamaicensis jamaicensis	Eastern black rail	Threatened	No Effect
Mycteria americana	Wood stork	Threatened	May Affect, Not Likely to Adversely Affect
Caretta caretta	Loggerhead sea turtle	Threatened	No Effect
Chelonia mydas	Green sea turtle	Threatened	No Effect
Dermochelys coriacea	Leatherback sea turtle	Endangered	No Effect
Drymarchon corais couperi	Eastern indigo snake	Threatened	May Affect, Not Likely to Adversely Affect
Eretmochelys imbricata	Hawksbill sea turtle	Endangered	No Effect
Danaus plexippus*	Monarch butterfly	Candidate	NA
Deeringothamnus rugelii	Rugel's pawpaw	Endangered	No Effect

* Effect determinations are not applicable to species proposed for listing or candidate species.

Table 8.2 | State Listed Species with Effects Determination for the Build Alternative

Scientific Name	Common Name	Status	Effect Determination
Antigone canadensis pratensis	Florida sandhill crane	Threatened	No Adverse Effect Anticipated
Gopherus polyphemus	Gopher Tortoise	Threatened	No Adverse Effect Anticipated

Scientific Name	Common Name	Status	Effect Determination
Arnoglossum diversifolium	Variable-leaved Indian-plantain	Threatened	No Effect Anticipated
Calopogon multiflorus	Many-flowered grass-pink	Threatened	No Effect Anticipated
Carex chapmanii	Chapman's sedge	Threatened	No Adverse Effect Anticipated
Centrosema arenicola	Sand butterfly pea	Endangered	No Effect Anticipated
Conradina grandiflora	Large-flowered rosemary	Threatened	No Effect Anticipated
Illicium parviflorum	Star anise	Endangered	No Adverse Effect Anticipated
Lechea cernua	Nodding pinweed	Threatened	No Effect Anticipated
Matelea floridana	Florida spiny-pod	Endangered	No Effect Anticipated
Nemastylis floridana	Celestial lily	Endangered	No Effect Anticipated
Nolina atopocarpa	Florida beargrass	Threatened	No Effect Anticipated
Pteroglossaspis ecristata	Giant orchid	Threatened	No Effect Anticipated
Pycnanthemum floridanum	Florida mountain-mint	Threatened	No Adverse Effect Anticipated
Salix floridana	Florida willow	Endangered	No Effect Anticipated
Sarracenia minor	Hooded pitcherplant	Threatened	No Adverse Effect Anticipated

Table 8.3 | Anticipated Wetland and Other Surface Water Impacts for the Build Alternative

Type	Number of Impact Areas	Total Impact Acreage	UMAM Functional Loss
Within Existing ROW			
Forested Wetland	28	3.26	1.62
Herbaceous Wetland	67	47.65	17.02
Shrub Wetland	2	0.19	0.07
Surface Water	19	15.20	NA
Preferred Pond and Floodplain Compensation Sites			
Forested Wetland	7	5.67	2.78
Herbaceous Wetland	6	3.88	1.84
Surface Water	3	0.03	NA

8.1 Implementation Measures

Measures required to be implemented per construction procedure, standard specifications, or other agency requirements issued in a later project phase are listed below to help address project effects and facilitate efficient review of this NRE.

- Water quality impacts from construction will be avoided and minimized through the use of BMPs, including construction phasing, sediment barriers, floating turbidity curtains, silt

fences, and other techniques identified during design and permitting by the regulatory agencies and later during construction by the selected contractor.

- Activities proposed to occur over an OFW must not reduce existing water quality. Public Interest Criteria will need to be addressed as part of the review of impacts to an OFW.
- Pre-construction surveys will be conducted for nesting sandhill cranes per the FWC species guidelines (2016) to ensure active nests and flightless young are protected.
- FDOT will survey upland habitat within the project area for gopher tortoises and their burrows prior to construction. If a gopher tortoise or a potentially occupied burrow is discovered in or within 25 feet of the project construction corridor, FDOT will coordinate with the FWC to secure a Gopher Tortoise Relocation Permit.
- FDOT will survey bald eagle nests during permitting and design. If a bald eagle nest is identified within 660 feet of the project prior to or during construction, FDOT will coordinate with the USFWS and the FWC in accordance with the BGEPA and MBTA and will adhere to the USFWS Bald Eagle Management Guidelines.
- FDOT will complete a bat occupancy survey of the LPGA bridge over Tomoka River prior to construction and if bats are identified to be roosting in the bridge FDOT will incorporate a bat exclusion plan during construction in accordance with 68A-4.001 FAC and 68A-9.010 FAC.
- If federal- or state-listed plants are discovered within the construction area, FDOT will coordinate with the appropriate regulatory authority.

8.2 Commitments

The FDOT commits to implementing the following measures during the final design, permitting and construction phases of this project:

Commitments

- FDOT will adhere to the most current version of USFWS Standard Protection Measures for the Eastern Indigo Snake during construction and inspect potential eastern indigo snake refugia prior to construction.
- If the listing status of the tri-colored bat is elevated by USFWS to Threatened or Endangered prior to construction and the Preferred Alternative is located within the consultation area, FDOT commits to initiating consultation with the USFWS to determine the appropriate survey methodology and to address USFWS regulations regarding the protection of the tri-colored bat.
- Florida black bear regulations as documented in the Florida Black Bear Management Plan, including the Bear Conservation Rule and the Bear Feeding Rule, will be followed during the construction phases of the project.
- The FDOT will survey for the presence of the hooded pitcher plant within the project area prior to the construction phase and coordinate the results with the Florida Department of

Agriculture and Consumer Services (FDACS) regarding this species to identify opportunities to reduce impacts to it.

8.3 Agency Coordination

This NRE will be submitted to the USFWS, USACE, FDEP, SJRWMD, FDACS and FWC for review and to initiate coordination/consultation for the project. The resulting coordination and/or concurrence would henceforth be documented in the Environmental Document.

9.0 References

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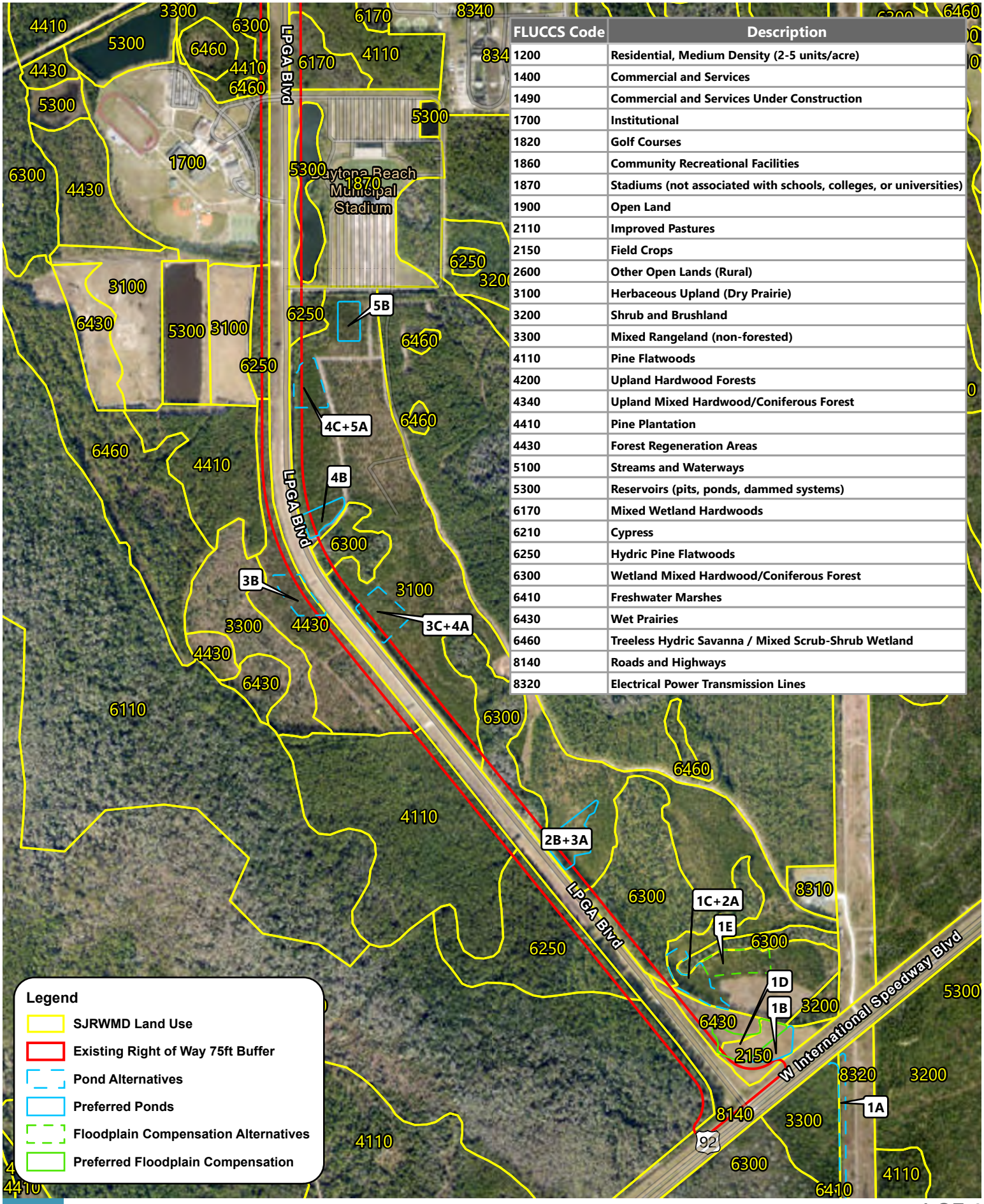
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APPENDICES

Appendix A
SJRWMD Land Cover Land Use Maps

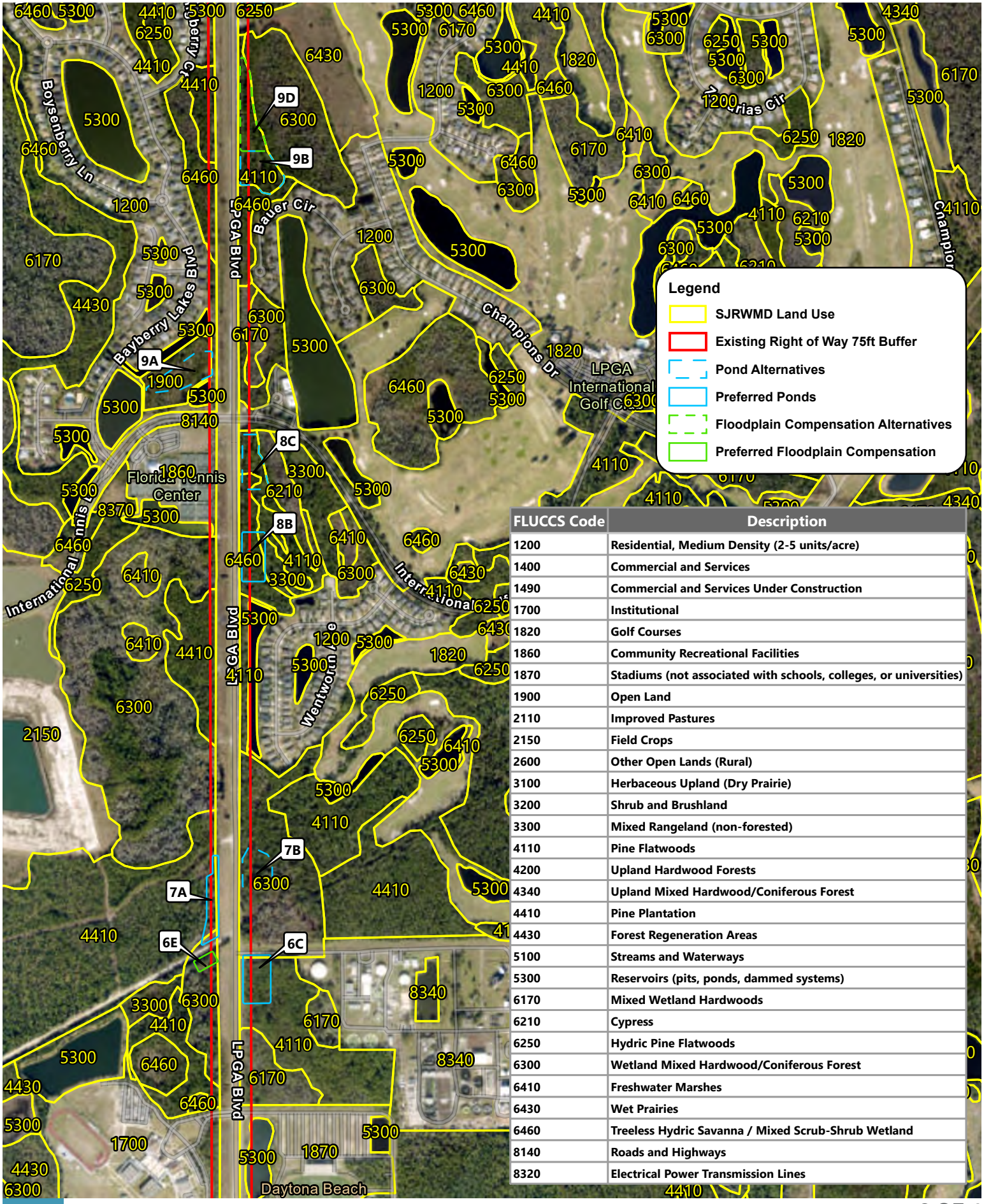


FLUCCS Code	Description
1200	Residential, Medium Density (2-5 units/acre)
1400	Commercial and Services
1490	Commercial and Services Under Construction
1700	Institutional
1820	Golf Courses
1860	Community Recreational Facilities
1870	Stadiums (not associated with schools, colleges, or universities)
1900	Open Land
2110	Improved Pastures
2150	Field Crops
2600	Other Open Lands (Rural)
3100	Herbaceous Upland (Dry Prairie)
3200	Shrub and Brushland
3300	Mixed Rangeland (non-forested)
4110	Pine Flatwoods
4200	Upland Hardwood Forests
4340	Upland Mixed Hardwood/Coniferous Forest
4410	Pine Plantation
4430	Forest Regeneration Areas
5100	Streams and Waterways
5300	Reservoirs (pits, ponds, dammed systems)
6170	Mixed Wetland Hardwoods
6210	Cypress
6250	Hydric Pine Flatwoods
6300	Wetland Mixed Hardwood/Coniferous Forest
6410	Freshwater Marshes
6430	Wet Prairies
6460	Treeless Hydric Savanna / Mixed Scrub-Shrub Wetland
8140	Roads and Highways
8320	Electrical Power Transmission Lines

FDOT

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MILES

LPGA BOULEVARD FROM US 92 (SR 600) TO WILLIAMSON BOULEVARD PD&E STUDY
VOLUSIA COUNTY, FLORIDA
SJRWMD LAND COVER LAND USE

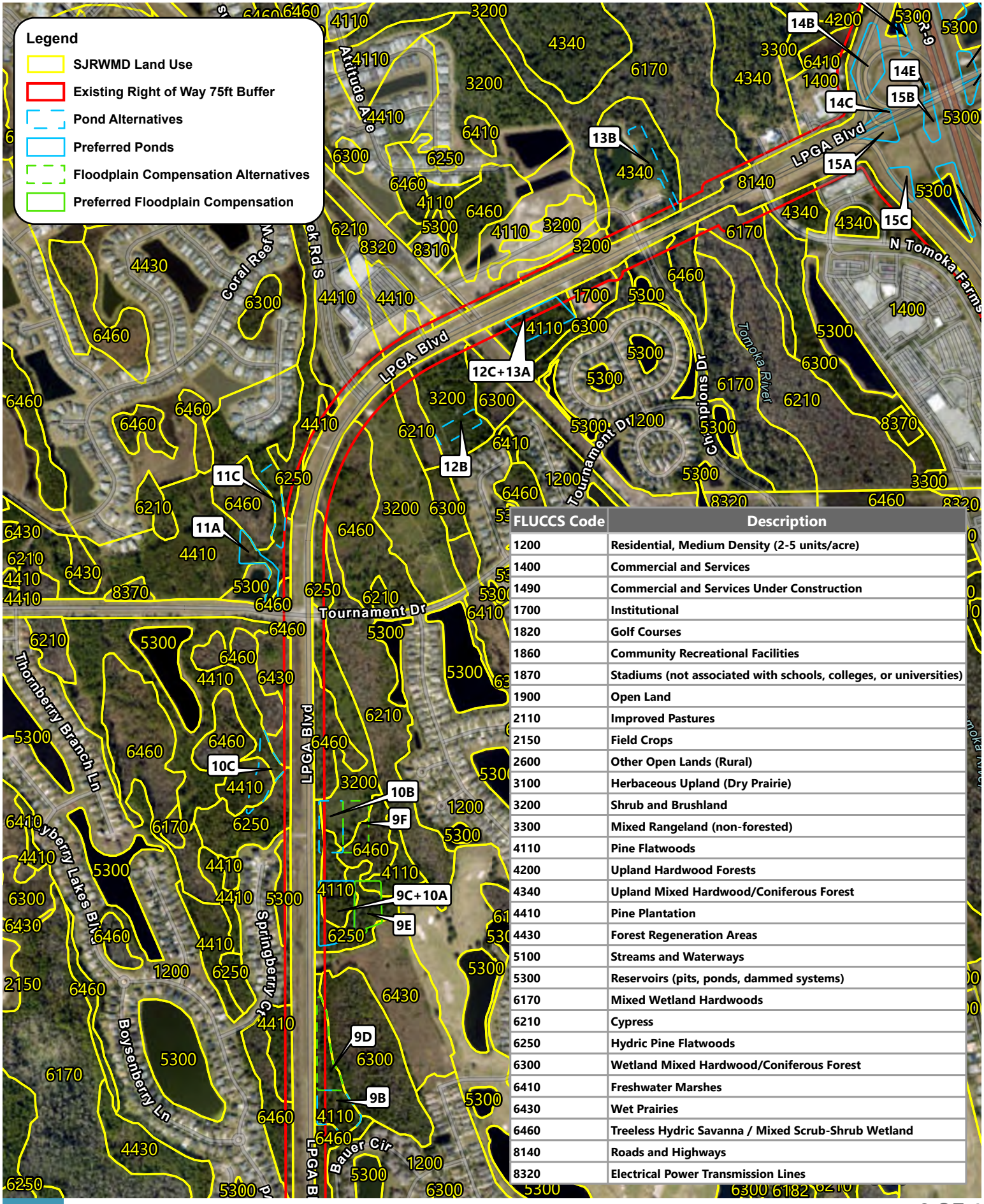


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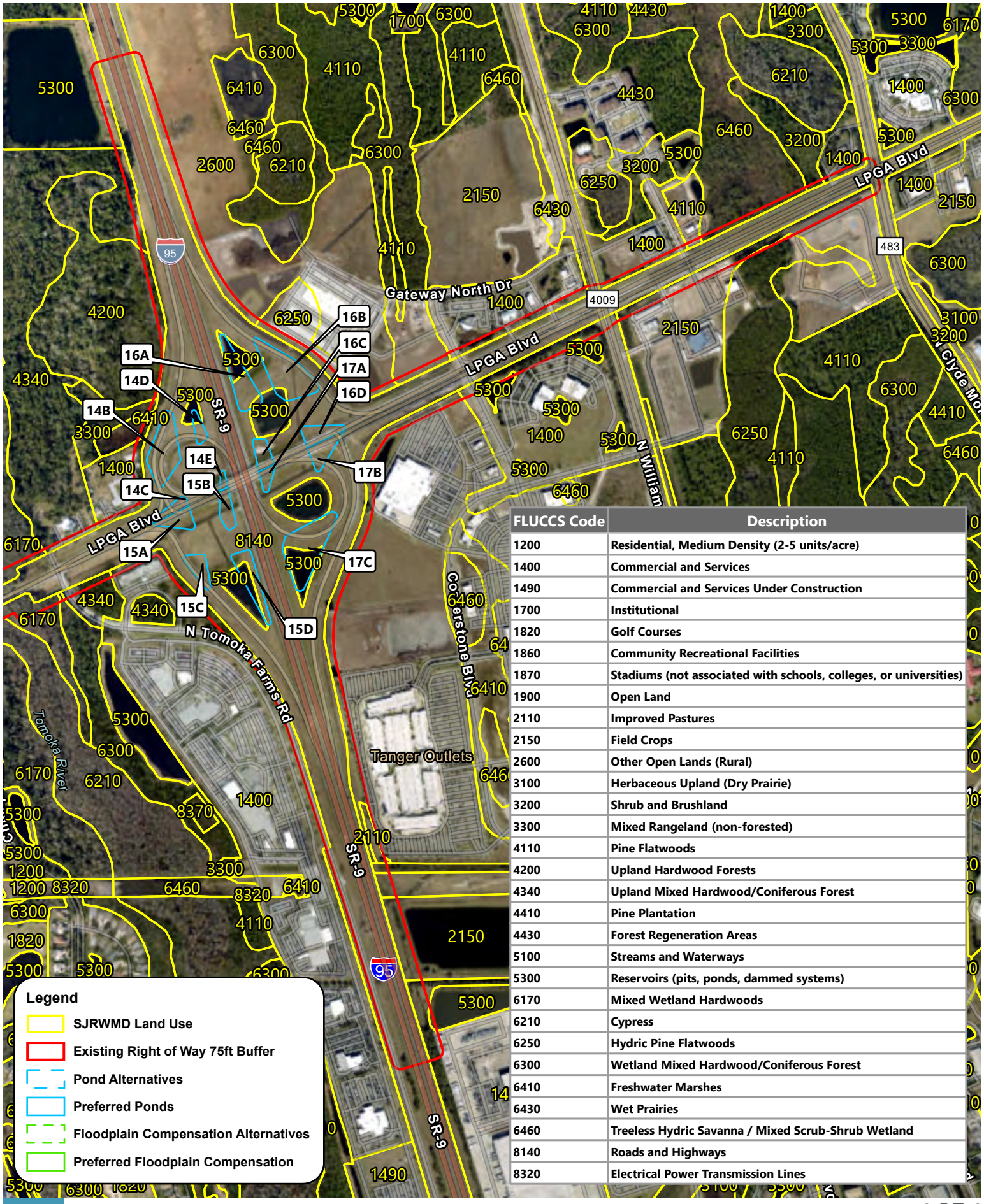


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VOLUSIA COUNTY, FLORIDA
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Legend

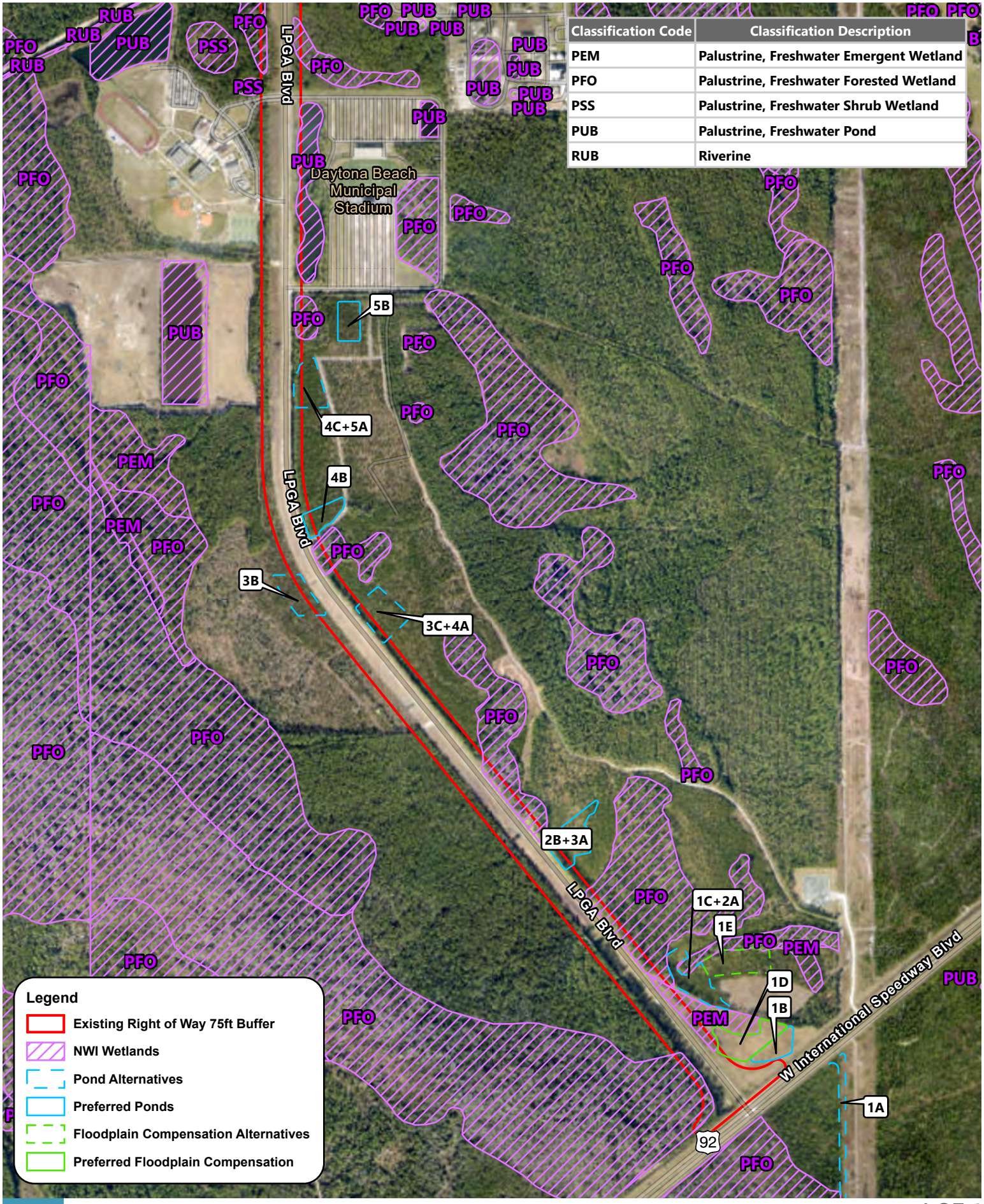
- SJRWMD Land Use
- Existing Right of Way 75ft Buffer
- Pond Alternatives
- Preferred Ponds
- Floodplain Compensation Alternatives
- Preferred Floodplain Compensation

FDOT

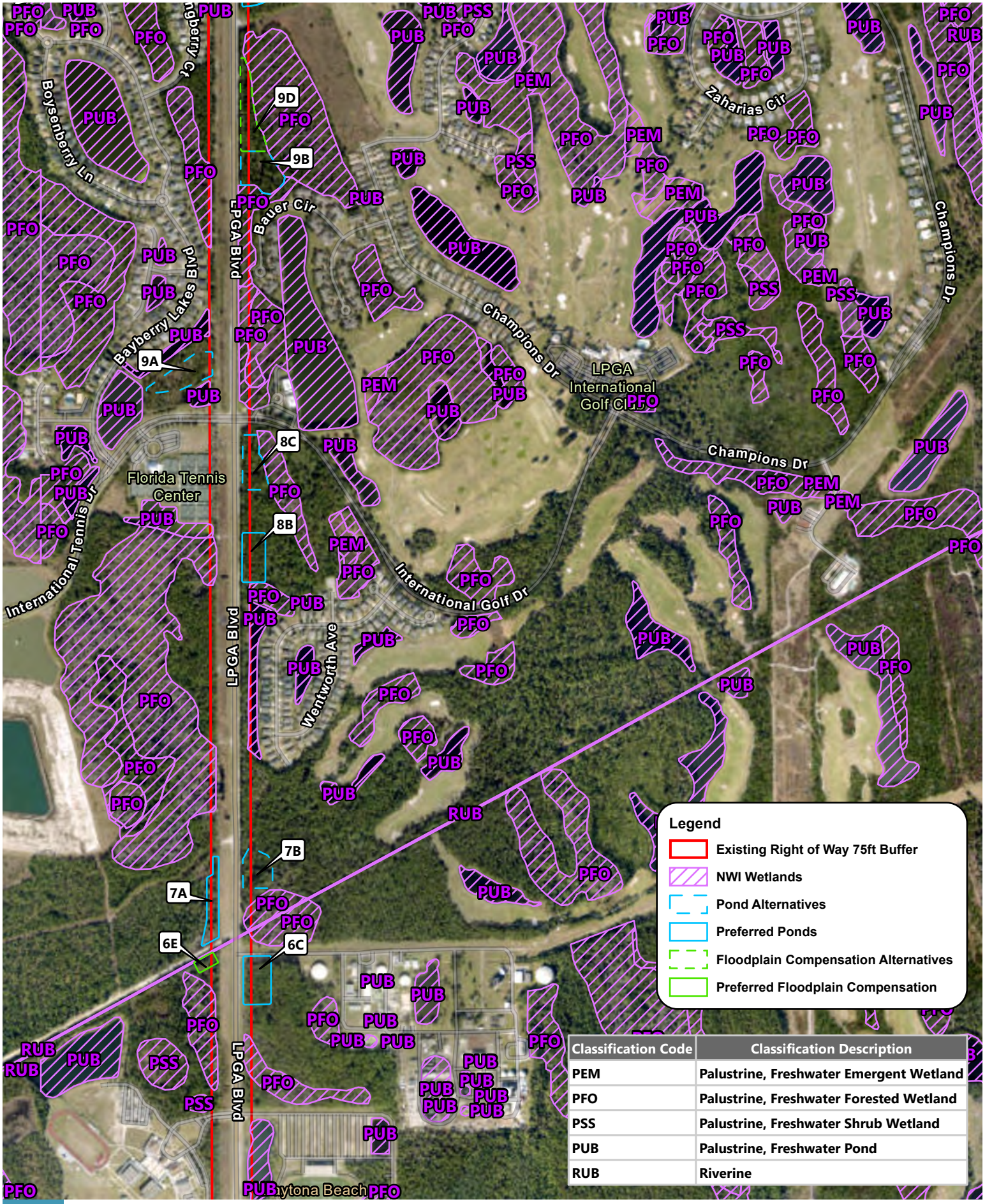
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LPGA BOULEVARD FROM US 92 (SR 600) TO WILLIAMSON BOULEVARD PD&E STUDY
VOLUSIA COUNTY, FLORIDA
SJRWMD LAND COVER LAND USE

Appendix B
National Wetlands Inventory Maps

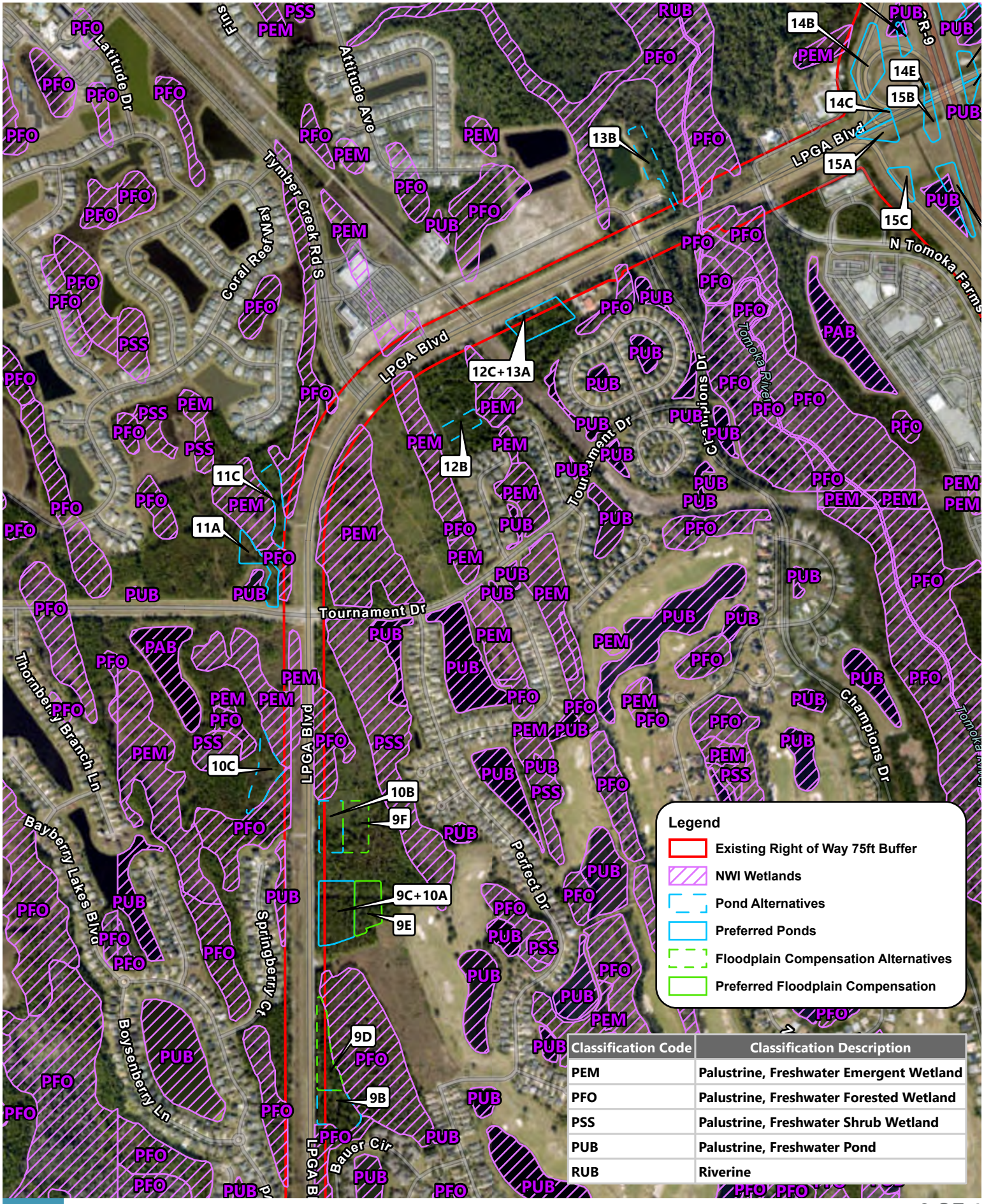


LPGA BOULEVARD FROM US 92 (SR 600) TO WILLIAMSON BOULEVARD PD&E STUDY
VOLUSIA COUNTY, FLORIDA
NWI WETLANDS



Classification Code	Classification Description
PEM	Palustrine, Freshwater Emergent Wetland
PFO	Palustrine, Freshwater Forested Wetland
PSS	Palustrine, Freshwater Shrub Wetland
PUB	Palustrine, Freshwater Pond
RUB	Riverine

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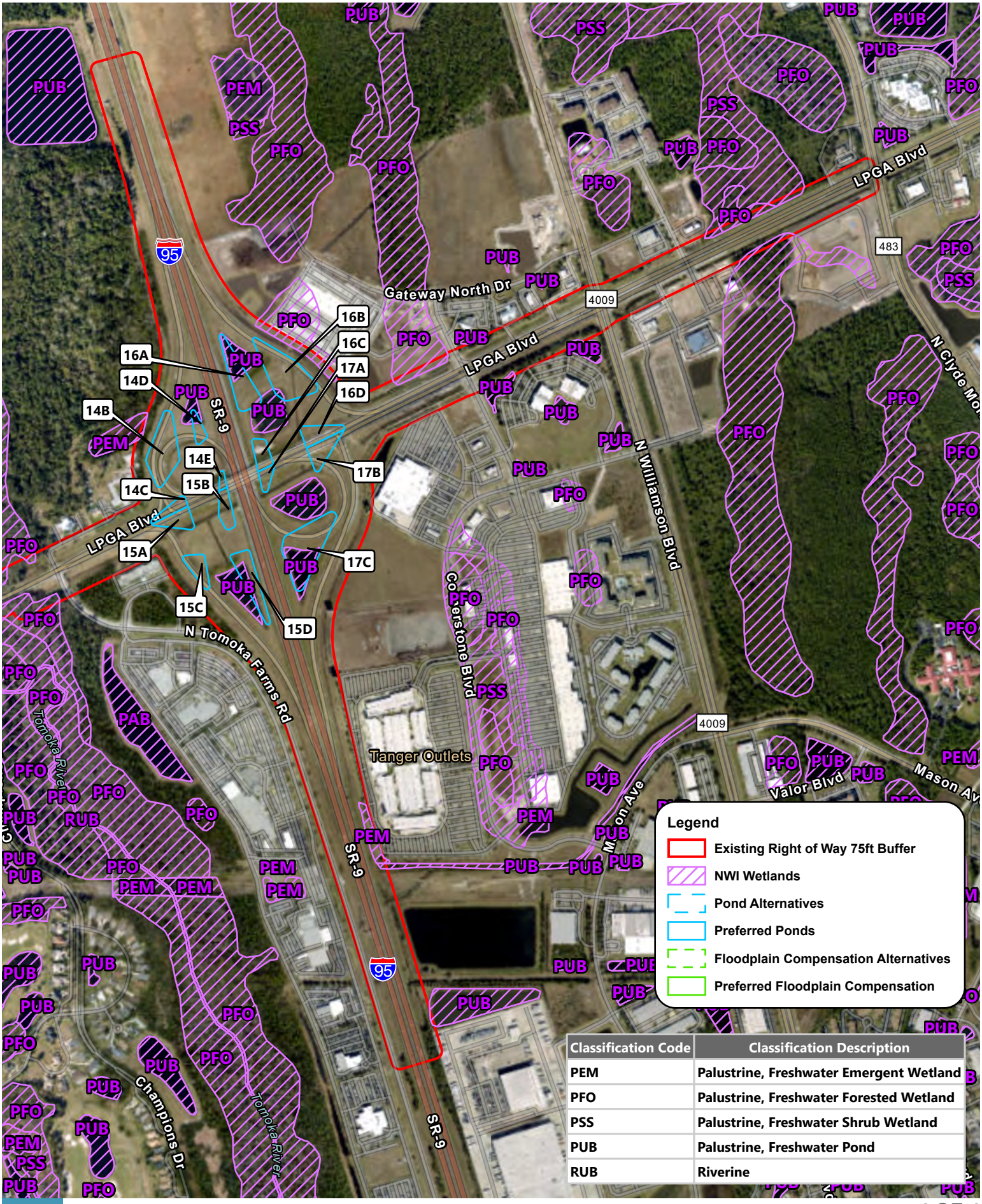


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FDOT

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MILES

LPGA BOULEVARD FROM US 92 (SR 600) TO WILLIAMSON BOULEVARD PD&E STUDY
VOLUSIA COUNTY, FLORIDA
NWI WETLANDS



Legend

- Existing Right of Way 75ft Buffer
- NWI Wetlands
- Pond Alternatives
- Preferred Ponds
- Floodplain Compensation Alternatives
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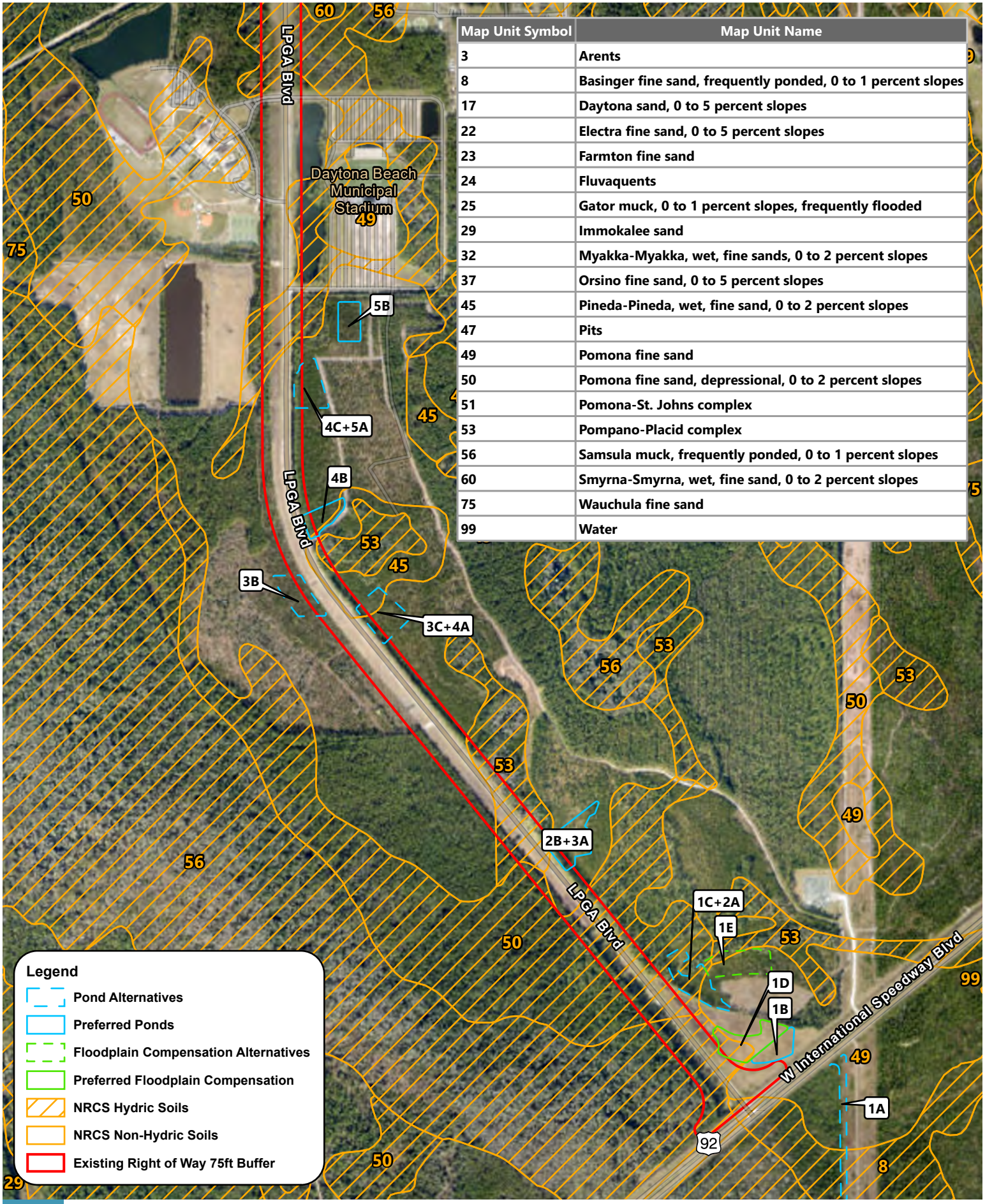
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MILES

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VOLUSIA COUNTY, FLORIDA
NWI WETLANDS

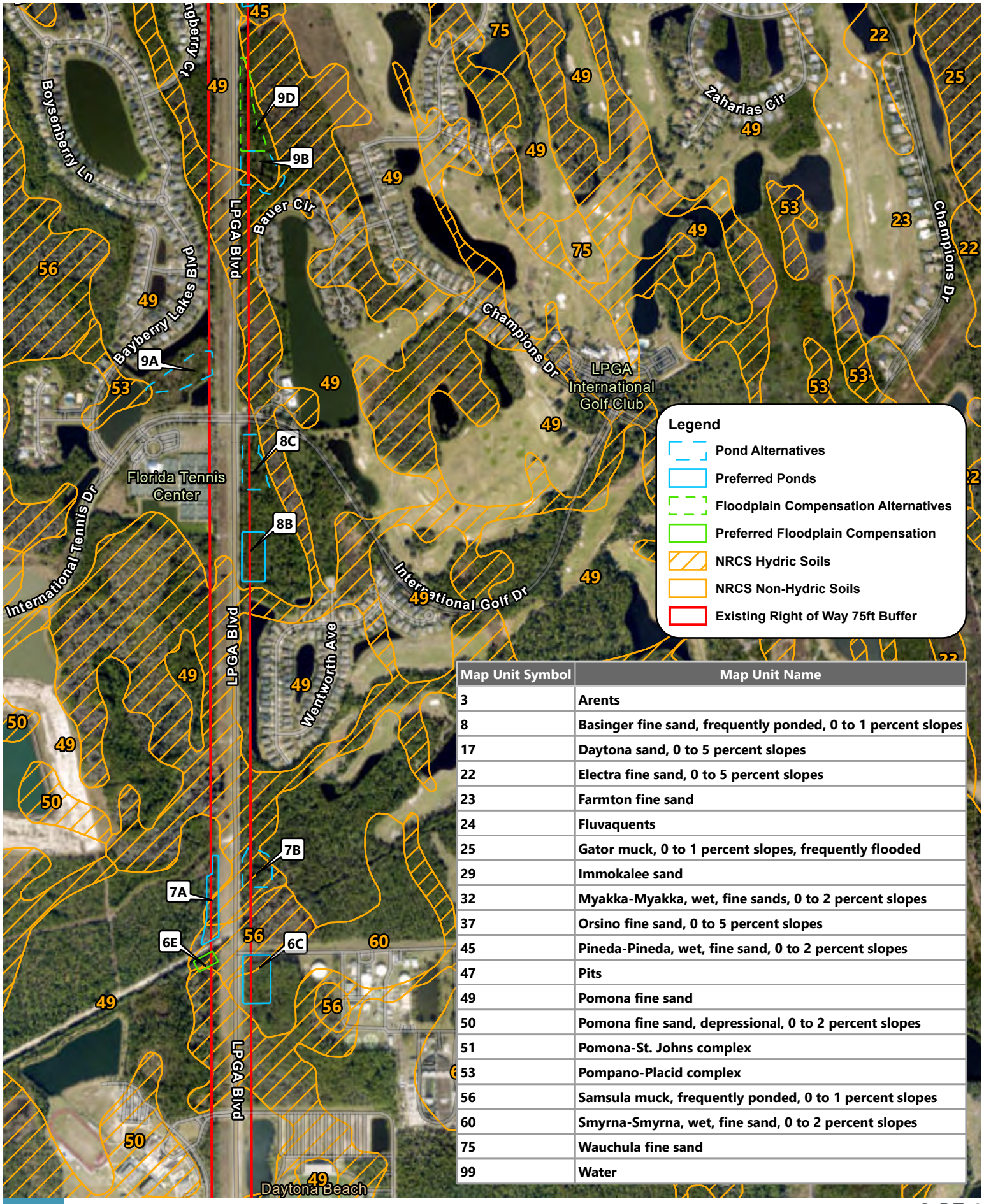
Appendix C
Soils Maps



Map Unit Symbol	Map Unit Name
3	Arents
8	Basinger fine sand, frequently ponded, 0 to 1 percent slopes
17	Daytona sand, 0 to 5 percent slopes
22	Electra fine sand, 0 to 5 percent slopes
23	Farmton fine sand
24	Fluvaquents
25	Gator muck, 0 to 1 percent slopes, frequently flooded
29	Immokalee sand
32	Myakka-Myakka, wet, fine sands, 0 to 2 percent slopes
37	Orsino fine sand, 0 to 5 percent slopes
45	Pineda-Pineda, wet, fine sand, 0 to 2 percent slopes
47	Pits
49	Pomona fine sand
50	Pomona fine sand, depressional, 0 to 2 percent slopes
51	Pomona-St. Johns complex
53	Pompano-Placid complex
56	Samsula muck, frequently ponded, 0 to 1 percent slopes
60	Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes
75	Wauchula fine sand
99	Water

0 0.1 MILES

LPGA BOULEVARD FROM US 92 (SR 600) TO WILLIAMSON BOULEVARD PD&E STUDY
VOLUSIA COUNTY, FLORIDA
NRCS SOILS

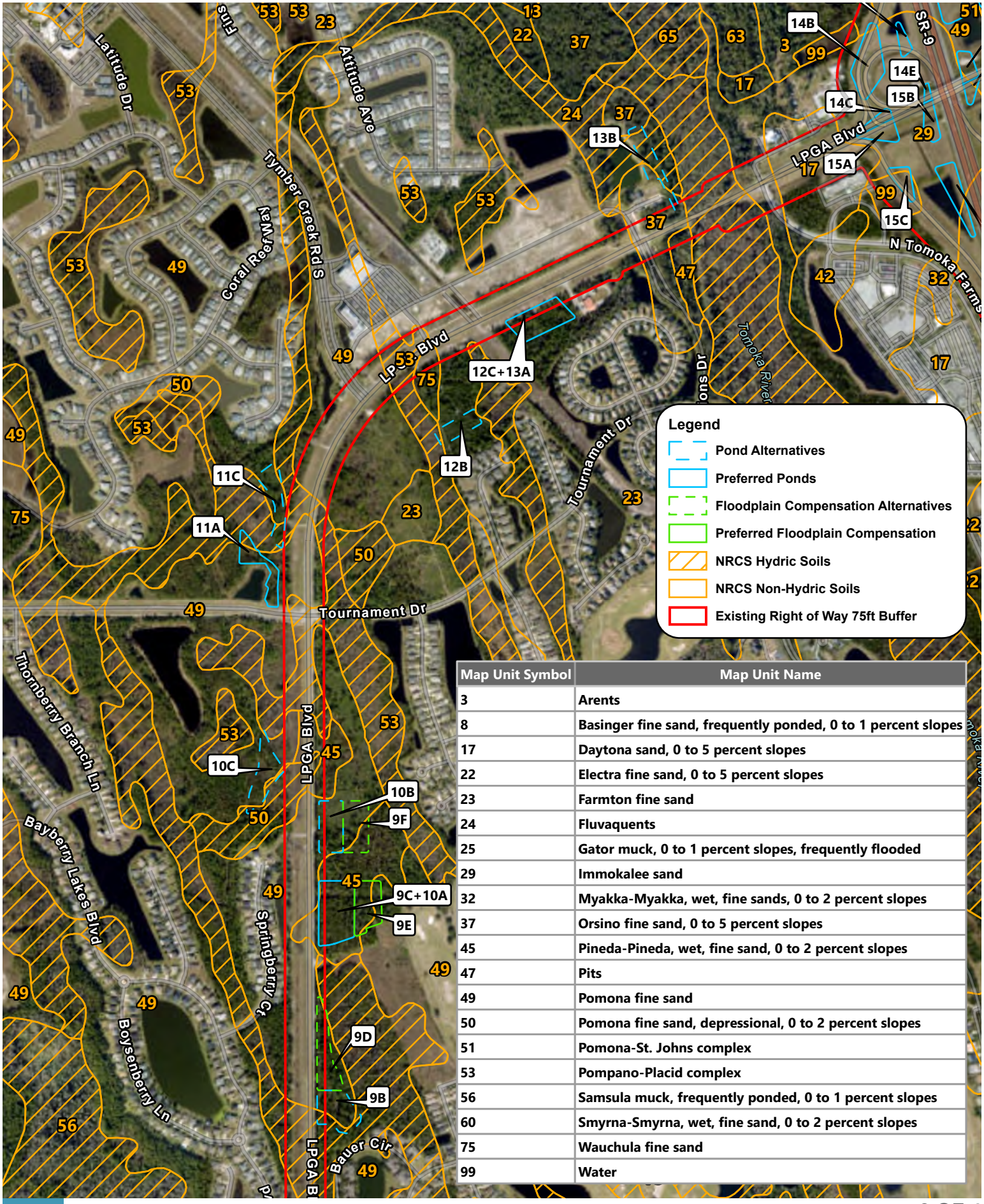


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MILES

LPGA BOULEVARD FROM US 92 (SR 600) TO WILLIAMSON BOULEVARD PD&E STUDY
VOLUSIA COUNTY, FLORIDA
NRCS SOILS

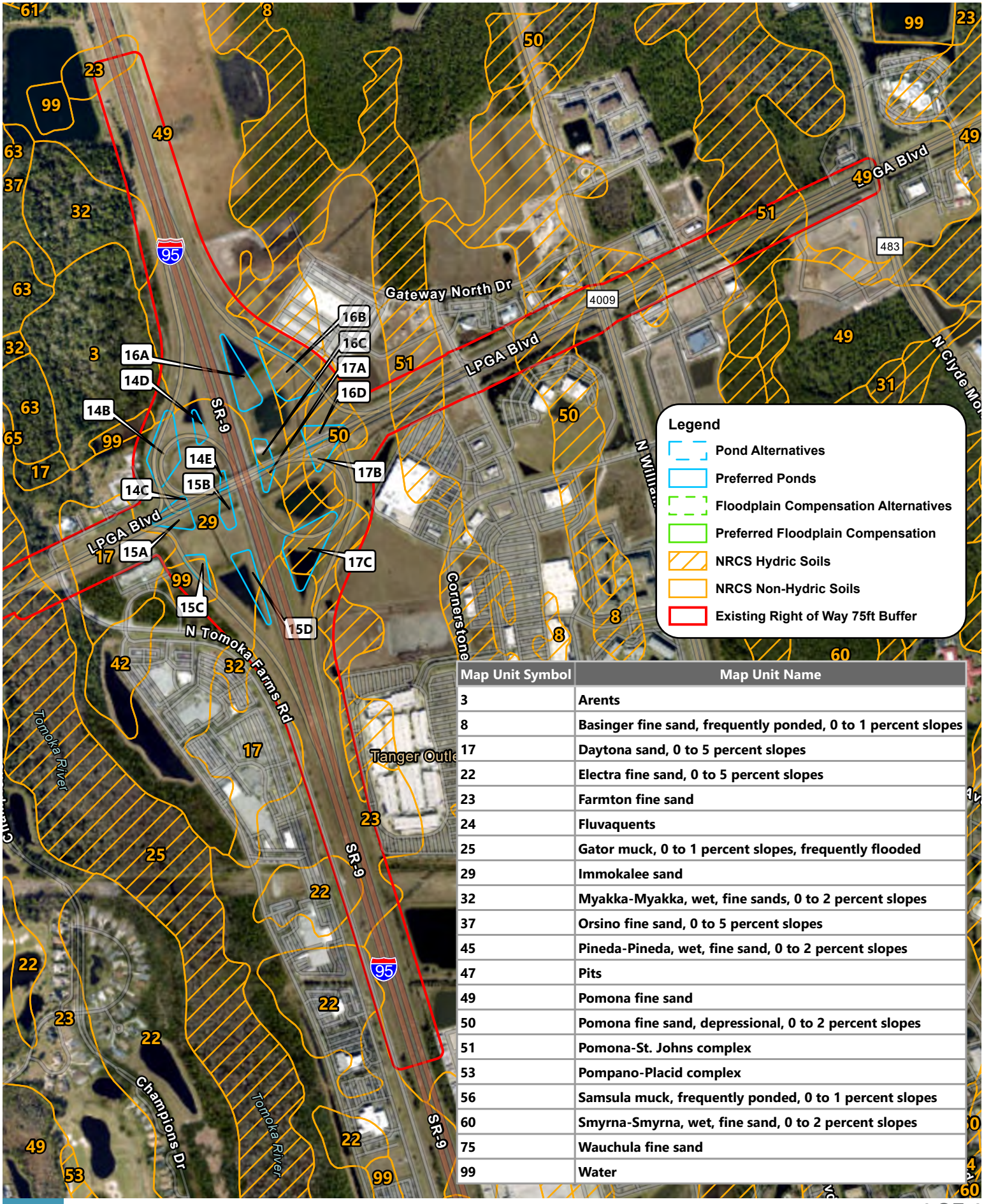


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LPGA BOULEVARD FROM US 92 (SR 600) TO WILLIAMSON BOULEVARD PD&E STUDY
VOLUSIA COUNTY, FLORIDA
NRCS SOILS



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FDOT

0 0.1
MILES

LPGA BOULEVARD FROM US 92 (SR 600) TO WILLIAMSON BOULEVARD PD&E STUDY
VOLUSIA COUNTY, FLORIDA
NRCS SOILS

Appendix D

Soil Resource Report for the Roadway Study Area

United States Department of Agriculture

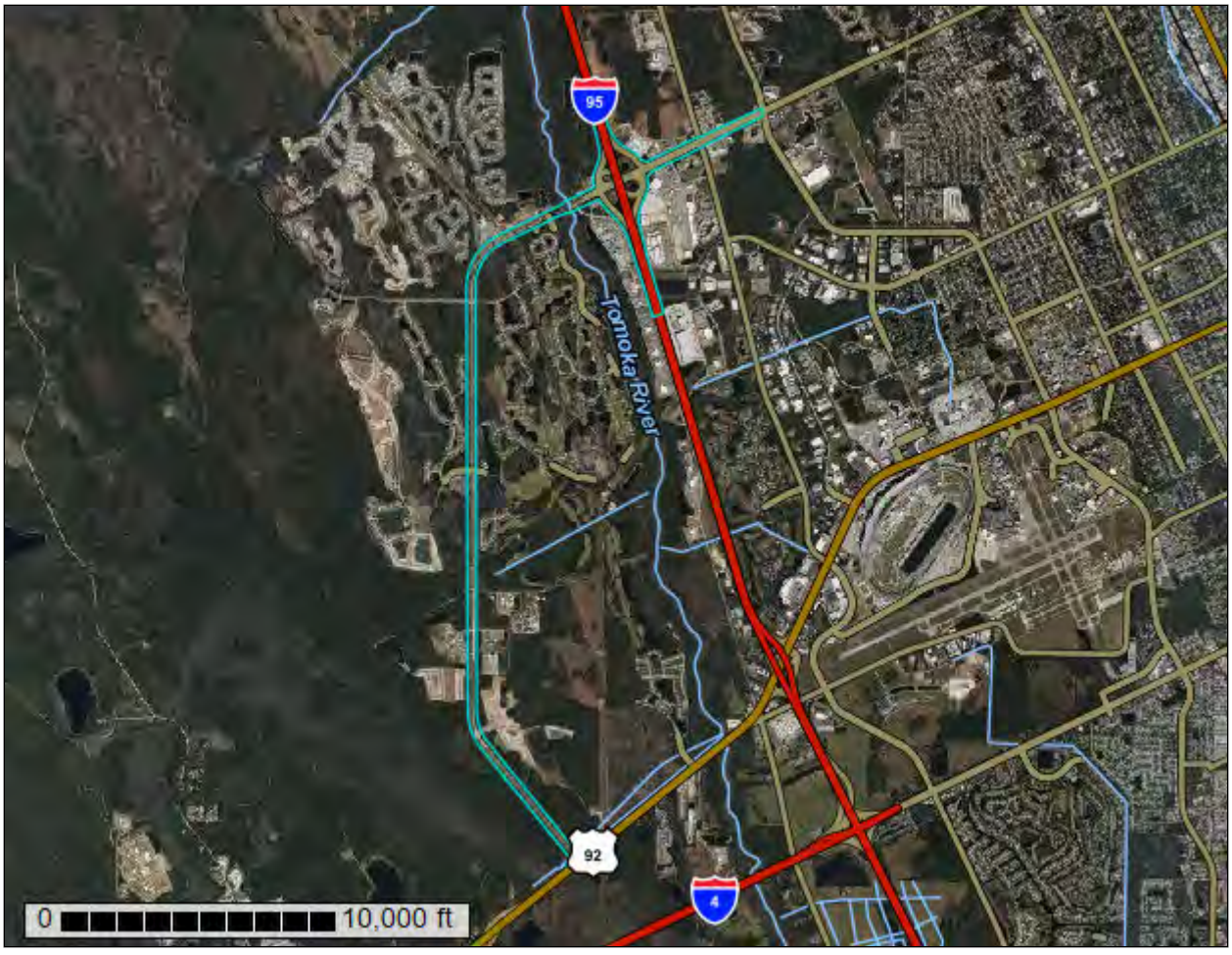
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Volusia County, Florida

LPGA 75-foot Existing Right-of-Way Roadway Buffer



March 21, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

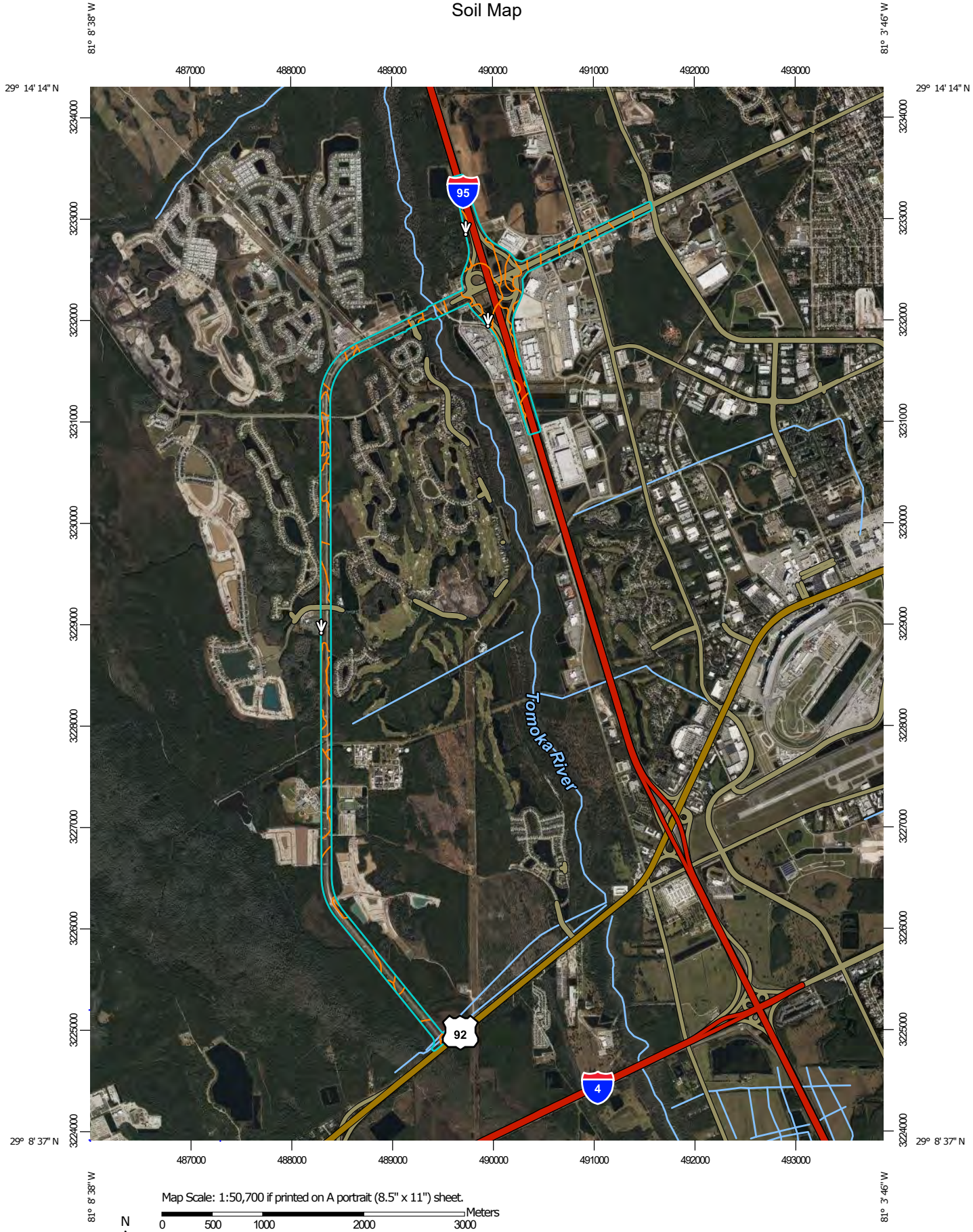
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:50,700 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 500 1000 2000 3000

Feet
0 2000 4000 8000 12000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Volusia County, Florida
Survey Area Data: Version 21, Sep 2, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 6, 2022—Feb 10, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3	Arents	1.1	0.2%
8	Basinger fine sand, frequently ponded, 0 to 1 percent slopes	0.4	0.1%
17	Daytona sand, 0 to 5 percent slopes	8.9	2.1%
22	Electra fine sand, 0 to 5 percent slopes	2.5	0.6%
23	Farmton fine sand	45.4	10.8%
25	Gator muck, 0 to 1 percent slopes, frequently flooded	4.9	1.2%
29	Immokalee sand	39.2	9.3%
32	Myakka-Myakka, wet, fine sands, 0 to 2 percent slopes	2.1	0.5%
37	Orsino fine sand, 0 to 5 percent slopes	3.1	0.7%
45	Pineda-Pineda, wet, fine sand, 0 to 2 percent slopes	6.4	1.5%
47	Pits	0.5	0.1%
49	Pomona fine sand	179.0	42.5%
50	Pomona fine sand, depressional, 0 to 2 percent slopes	26.1	6.2%
51	Pomona-St. Johns complex	33.2	7.9%
53	Pompano-Placid complex	53.4	12.7%
56	Samsula muck, frequently ponded, 0 to 1 percent slopes	10.8	2.6%
60	Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes	1.1	0.2%
75	Wauchula fine sand	0.7	0.2%
99	Water	2.6	0.6%
Totals for Area of Interest		**421.2**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic

class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Volusia County, Florida

3—Arents

Map Unit Setting

National map unit symbol: 1ntsp
Elevation: 0 to 80 feet
Mean annual precipitation: 53 to 61 inches
Mean annual air temperature: 66 to 73 degrees F
Frost-free period: 285 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Arents and similar soils: 51 percent
Arents and similar soils: 49 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arents

Setting

Landform: Rises on marine terraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Altered marine deposits

Typical profile

C1 - 0 to 10 inches: sand
C2 - 10 to 32 inches: sand
C3 - 32 to 60 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A/D
Forage suitability group: Forage suitability group not assigned (G155XB999FL)
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: No

Description of Arents

Setting

Landform: Rises on marine terraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Altered marine deposits

Typical profile

C1 - 0 to 10 inches: fine sand
C2 - 10 to 32 inches: sand
C3 - 32 to 60 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Forage suitability group: Forage suitability group not assigned (G155XB999FL)
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: No

8—Basinger fine sand, frequently ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v16v
Elevation: 0 to 70 feet
Mean annual precipitation: 43 to 55 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Basinger and similar soils: 90 percent
Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Basinger

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 14 inches: fine sand
Bh/E - 14 to 36 inches: fine sand
Cg - 36 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Minor Components

Smyrna

Percent of map unit: 5 percent
Landform: — error in exists on —
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Samsula

Percent of map unit: 3 percent

Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Floridana

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

17—Daytona sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2x9dl
Elevation: 0 to 200 feet
Mean annual precipitation: 46 to 61 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Daytona and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Daytona

Setting

Landform: Knolls on marine terraces, rises on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits and/or eolian deposits

Typical profile

A - 0 to 5 inches: sand
E - 5 to 36 inches: sand
Bh - 36 to 47 inches: sand
C - 47 to 80 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 42 to 60 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on rises, knolls, and ridges of mesic uplands (G155XB121FL)
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G155XB121FL)
Hydric soil rating: No

Minor Components

Immokalee

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Cassia

Percent of map unit: 4 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Orsino

Percent of map unit: 2 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G156BC121FL)
Hydric soil rating: No

St. lucie

Percent of map unit: 2 percent
Landform: Knolls on marine terraces, ridges on marine terraces, dunes on marine terraces
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope, riser
Down-slope shape: Convex, linear
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on ridges and dunes of xeric uplands (G155XB111FL)
Hydric soil rating: No

Satellite

Percent of map unit: 2 percent
Landform: Drainageways on flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Pompano

Percent of map unit: 1 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

22—Electra fine sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 30c6f
Elevation: 10 to 50 feet
Mean annual precipitation: 49 to 58 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Electra and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Electra

Setting

Landform: Rises on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, tread
Down-slope shape: Convex, concave
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 7 inches: fine sand
E - 7 to 47 inches: fine sand
Bh - 47 to 60 inches: fine sand
Btg - 60 to 80 inches: fine sandy loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on rises and knolls of mesic uplands (G156BC131FL)
Other vegetative classification: Sandy soils on rises and knolls of mesic uplands (G156BC131FL)
Hydric soil rating: No

Minor Components

Pomello

Percent of map unit: 8 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope, riser
Down-slope shape: Convex, linear
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Adamsville

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Tread, rise

Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Upland Hardwood Hammock (R155XY008FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Sparr

Percent of map unit: 2 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve, tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Upland Hardwood Hammock (R154XY008FL), Sandy soils on rises and knolls of mesic uplands (G154XB131FL)
Hydric soil rating: No

Ankona

Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

23—Farmton fine sand

Map Unit Setting

National map unit symbol: 1ntsg
Elevation: -20 to 120 feet
Mean annual precipitation: 53 to 61 inches
Mean annual air temperature: 66 to 73 degrees F
Frost-free period: 285 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Farmton, non-hydric, and similar soils: 70 percent
Farmton, hydric, and similar soils: 10 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Farmton, Non-hydric

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex
Across-slope shape: Linear

Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 7 inches: fine sand
E - 7 to 34 inches: fine sand
Bh - 34 to 50 inches: fine sand
Btg - 50 to 80 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Description of Farmton, Hydric

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 7 inches: fine sand
E - 7 to 34 inches: fine sand
Bh - 34 to 50 inches: fine sand
Btg - 50 to 80 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Minor Components

Basinger, depressional

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Eaugallie, non-hydric

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Immokalee, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Myakka, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Pomona, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Wauchula, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: No

25—Gator muck, 0 to 1 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2tzx0
Elevation: 0 to 100 feet
Mean annual precipitation: 45 to 61 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Gator, frequently flooded, and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gator, Frequently Flooded

Setting

Landform: Depressions on flood plains on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Herbaceous organic material over sandy and loamy marine deposits

Typical profile

Oa - 0 to 34 inches: muck
Cg1 - 34 to 46 inches: sandy clay loam

Cg2 - 46 to 52 inches: stratified fine sandy loam to sandy clay loam to loamy fine sand
Cg3 - 52 to 60 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: Frequent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very high (about 17.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: C/D
Forage suitability group: Organic soils in depressions and on flood plains (G155XB645FL)
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Minor Components

Terra ceia, frequently flooded

Percent of map unit: 6 percent
Landform: Depressions on marine terraces, flood plains on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Concave, convex, linear
Across-slope shape: Concave, linear
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Floridana, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

Pompano

Percent of map unit: 3 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave

Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Tequesta

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R156BY010FL), Organic soils in depressions and on flood plains (G156AC645FL)
Hydric soil rating: Yes

St. johns

Percent of map unit: 2 percent
Landform: Flats on marine terraces, depressions on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

29—Immokalee sand

Map Unit Setting

National map unit symbol: 1ntsn
Elevation: 0 to 150 feet
Mean annual precipitation: 53 to 61 inches
Mean annual air temperature: 66 to 73 degrees F
Frost-free period: 285 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Immokalee, non-hydric, and similar soils: 65 percent
Immokalee, hydric, and similar soils: 10 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Immokalee, Non-hydric

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 10 inches: sand

E - 10 to 34 inches: sand
Bh - 34 to 43 inches: sand
C - 43 to 85 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Description of Immokalee, Hydric

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 10 inches: sand
E - 10 to 34 inches: sand
Bh - 34 to 43 inches: sand
C - 43 to 85 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Minor Components

Basinger, depressional

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Placid

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Daytona

Percent of map unit: 4 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G155XB121FL)
Hydric soil rating: No

Myakka, non-hydric

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Smyrna, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf

Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Satellite

Percent of map unit: 3 percent
Landform: Rises on marine terraces, flats on marine terraces
Landform position (three-dimensional): Rise, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

St. johns, hydric

Percent of map unit: 3 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

32—Myakka-Myakka, wet, fine sands, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2twt7
Elevation: 0 to 160 feet
Mean annual precipitation: 38 to 68 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 310 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Myakka and similar soils: 70 percent
Myakka, wet, and similar soils: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myakka

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex
Across-slope shape: Linear

Parent material: Sandy marine deposits

Typical profile

A - 0 to 6 inches: fine sand
E - 6 to 20 inches: fine sand
Bh - 20 to 36 inches: fine sand
C - 36 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Description of Myakka, Wet

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 6 inches: fine sand
E - 6 to 20 inches: fine sand
Bh - 20 to 36 inches: fine sand
C - 36 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 3 to 18 inches
Frequency of flooding: None
Frequency of ponding: None

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Minor Components

Eaugallie

Percent of map unit: 5 percent
Landform: — error in exists on —
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Placid

Percent of map unit: 5 percent
Landform: Drainageways on marine terraces, depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Basinger

Percent of map unit: 5 percent
Landform: Flats on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Convex, concave
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

37—Orsino fine sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2x9dn
Elevation: 0 to 130 feet
Mean annual precipitation: 43 to 63 inches
Mean annual air temperature: 66 to 77 degrees F
Frost-free period: 335 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Orsino and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Orsino

Setting

Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, tread
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits and/or eolian deposits

Typical profile

A - 0 to 2 inches: fine sand
E - 2 to 23 inches: fine sand
Bw and Bh/E - 23 to 43 inches: fine sand
Bw - 43 to 62 inches: fine sand
C - 62 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 to 50.02 in/hr)
Depth to water table: About 42 to 60 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: A
Forage suitability group: Sandy soils on rises, knolls, and ridges of mesic uplands (G155XB121FL)
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G155XB121FL)
Hydric soil rating: No

Minor Components

Paola
Percent of map unit: 6 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope, riser
Down-slope shape: Convex, linear
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on ridges and dunes of xeric uplands (G155XB111FL)
Hydric soil rating: No

Cassia
Percent of map unit: 4 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Daytona
Percent of map unit: 3 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G155XB121FL)
Hydric soil rating: No

Tavares
Percent of map unit: 3 percent
Landform: Hills on marine terraces, flats on marine terraces, knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, side slope, tread, rise
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R155XY002FL), Sand Pine Scrub (R155XY001FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G155XB121FL)
Hydric soil rating: No

Immokalee
Percent of map unit: 1 percent
Landform: Flatwoods on marine terraces

Landform position (three-dimensional): Riser, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Basinger

Percent of map unit: 1 percent
Landform: Flats on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Convex, concave
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

45—Pineda-Pineda, wet, fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2svyp
Elevation: 0 to 100 feet
Mean annual precipitation: 42 to 63 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Pineda and similar soils: 45 percent
Pineda, wet, and similar soils: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pineda

Setting

Landform: Flatwoods on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 1 inches: fine sand
E - 1 to 5 inches: fine sand
Bw - 5 to 36 inches: fine sand
Btg/E - 36 to 54 inches: fine sandy loam
Cg - 54 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: No

Description of Pineda, Wet

Setting

Landform: Flats on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 1 inches: fine sand
E - 1 to 5 inches: fine sand
Bw - 5 to 36 inches: fine sand
Btg/E - 36 to 54 inches: fine sandy loam
Cg - 54 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: A/D
Forage suitability group: Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Other vegetative classification: Slough (R155XY011FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

Minor Components

Felda
Percent of map unit: 6 percent
Landform: Flats on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

Wabasso
Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Valkaria
Percent of map unit: 2 percent
Landform: Drainageways on flats on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Brynwood
Percent of map unit: 2 percent
Landform: Marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Cypress lake
Percent of map unit: 2 percent
Landform: Drainageways on marine terraces, flats on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear, convex
Across-slope shape: Concave, linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)

Hydric soil rating: Yes

47—Pits

Map Unit Composition

Pits: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pits

Setting

Landform: Marine terraces
Landform position (three-dimensional): Interfluve, dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Altered marine deposits

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Ecological site: F156BY041FL - Sandy Over Loamy Pine Flatwoods and Hammocks
Forage suitability group: Forage suitability group not assigned (G155XB999FL)
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Unranked

49—Pomona fine sand

Map Unit Setting

National map unit symbol: 1nttc
Elevation: 20 to 120 feet
Mean annual precipitation: 53 to 61 inches
Mean annual air temperature: 66 to 73 degrees F
Frost-free period: 285 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Pomona, non-hydric, and similar soils: 70 percent
Pomona, hydric, and similar soils: 10 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pomona, Non-hydric

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 18 inches: fine sand
Bh - 18 to 45 inches: fine sand
E' - 45 to 50 inches: fine sand
Btg - 50 to 60 inches: fine sandy loam
C - 60 to 70 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Description of Pomona, Hydric

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 18 inches: fine sand
Bh - 18 to 45 inches: fine sand
E' - 45 to 50 inches: fine sand
Btg - 50 to 60 inches: fine sandy loam

C - 60 to 70 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Minor Components

Basinger, depressional

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Eaugallie, non-hydric

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Immokalee, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Myakka, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Wauchula, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: No

Farmton, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

50—Pomona fine sand, depressional, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2w4h3
Elevation: 20 to 150 feet
Mean annual precipitation: 46 to 61 inches
Mean annual air temperature: 66 to 75 degrees F
Frost-free period: 285 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Pomona and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pomona

Setting

Landform: Drainageways on marine terraces, depressions on marine terraces

Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 7 inches: fine sand
E - 7 to 14 inches: fine sand
Bh - 14 to 33 inches: fine sand
E' - 33 to 53 inches: fine sand
Btg - 53 to 61 inches: fine sandy loam
C - 61 to 70 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Minor Components

Malabar

Percent of map unit: 5 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

St. johns

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear

Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Immokalee

Percent of map unit: 5 percent
Landform: Drainageways on marine terraces, depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave, linear
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Basinger

Percent of map unit: 5 percent
Landform: Depressions on marine terraces, drainageways on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

51—Pomona-St. Johns complex

Map Unit Setting

National map unit symbol: 1nttg
Elevation: 0 to 100 feet
Mean annual precipitation: 53 to 61 inches
Mean annual air temperature: 66 to 73 degrees F
Frost-free period: 285 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Pomona, depressional, and similar soils: 60 percent
St. johns, depressional, and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pomona, Depressional

Setting

Landform: Drainageways on marine terraces, depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 18 inches: fine sand
Bh - 18 to 45 inches: fine sand
E' - 45 to 50 inches: fine sand
Btg - 50 to 80 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Description of St. Johns, Depressional

Setting

Landform: Drainageways on marine terraces, depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits

Typical profile

A - 0 to 10 inches: fine sand
E - 10 to 27 inches: fine sand
Bh - 27 to 45 inches: fine sand
C - 45 to 75 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Minor Components

Eaugallie, depressional

Percent of map unit: 2 percent
Landform: Drainageways on marine terraces, depressions on marine terraces
Landform position (three-dimensional): Interfluve, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Basinger, depressional

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Malabar, hydric

Percent of map unit: 1 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Scoggin

Percent of map unit: 1 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

Placid

Percent of map unit: 1 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Immokalee, non-hydric

Percent of map unit: 1 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Pompano, depressional

Percent of map unit: 1 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Samsula

Percent of map unit: 1 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

53—Pompano-Placid complex

Map Unit Setting

National map unit symbol: 1nttj
Elevation: 0 to 100 feet
Mean annual precipitation: 53 to 61 inches
Mean annual air temperature: 66 to 73 degrees F
Frost-free period: 285 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Pompano, depressional, and similar soils: 55 percent
Placid and similar soils: 25 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pompano, Depressional

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits

Typical profile

A - 0 to 7 inches: fine sand
C - 7 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 to 50.02 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Ecological site: R156BY021FL - Mineral Isolated Swamps and Marshes
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Description of Placid

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits

Typical profile

A - 0 to 15 inches: fine sand
C - 15 to 75 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Ecological site: R156BY021FL - Mineral Isolated Swamps and Marshes
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Minor Components

Holopaw, hydric

Percent of map unit: 4 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Tequesta

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R156BY021FL - Mineral Isolated Swamps and Marshes
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Riviera, hydric

Percent of map unit: 4 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Ecological site: F156BY041FL - Sandy Over Loamy Pine Flatwoods and Hammocks
Other vegetative classification: Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

Samsula
Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R156BY020FL - Histisol Isolated Marshes and Swamps
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Malabar, hydric
Percent of map unit: 4 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

56—Samsula muck, frequently ponded, 0 to 1 percent slopes

Map Unit Setting
National map unit symbol: 2tzw9
Elevation: 0 to 250 feet
Mean annual precipitation: 44 to 63 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 335 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition
Samsula and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Samsula

Setting
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave

Across-slope shape: Concave
Parent material: Herbaceous organic material over sandy marine deposits

Typical profile

Oa1 - 0 to 24 inches: muck
Oa2 - 24 to 32 inches: muck
Cg1 - 32 to 35 inches: sand
Cg2 - 35 to 44 inches: sand
Cg3 - 44 to 80 inches: sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very high (about 13.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Forage suitability group: Organic soils in depressions and on flood plains (G155XB645FL)
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Minor Components

Kaliga

Percent of map unit: 3 percent
Landform: Depressions on flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Myakka

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Basinger

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Sanibel

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear, concave
Across-slope shape: Concave
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Floridana

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

Anclote

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Convex, concave
Across-slope shape: Linear, concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

60—Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2v171
Elevation: 0 to 150 feet
Mean annual precipitation: 38 to 62 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 300 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Smyrna, non-hydric, and similar soils: 76 percent
Smyrna, hydric, and similar soils: 20 percent
Minor components: 4 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Smyrna, Non-hydric

Setting

Landform: Flats on marine terraces, flatwoods on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 17 inches: fine sand
Bh - 17 to 27 inches: loamy fine sand
C - 27 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Description of Smyrna, Hydric

Setting

Landform: Flats on marine terraces, flatwoods on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 17 inches: fine sand
Bh - 17 to 27 inches: loamy fine sand
C - 27 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Minor Components

Basinger, depressional

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Pomona, non-hydric

Percent of map unit: 1 percent
Landform: Flatwoods on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Eaugallie, hydric

Percent of map unit: 1 percent

Landform: Flats on marine terraces, flatwoods on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R154XY003FL), Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Hydric soil rating: Yes

75—Wauchula fine sand

Map Unit Setting

National map unit symbol: 1ntv9
Elevation: 0 to 120 feet
Mean annual precipitation: 53 to 61 inches
Mean annual air temperature: 66 to 73 degrees F
Frost-free period: 285 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Wauchula, non-hydric, and similar soils: 75 percent
Wauchula, hydric, and similar soils: 10 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wauchula, Non-hydric

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 7 inches: fine sand
E - 7 to 20 inches: fine sand
Bh - 20 to 29 inches: loamy fine sand
Bw - 29 to 34 inches: fine sand
Btg - 34 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 5.95 in/hr)
Depth to water table: About 6 to 18 inches

Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A/D
Ecological site: F156BY041FL - Sandy Over Loamy Pine Flatwoods and Hammocks
Forage suitability group: Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: No

Description of Wauchula, Hydric

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 7 inches: fine sand
E - 7 to 20 inches: fine sand
Bh - 20 to 29 inches: loamy fine sand
Bw - 29 to 34 inches: fine sand
Btg - 34 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 5.95 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A/D
Ecological site: F156BY041FL - Sandy Over Loamy Pine Flatwoods and Hammocks
Forage suitability group: Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)

Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

Minor Components

Scoggin
Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R156BY021FL - Mineral Isolated Swamps and Marshes
Other vegetative classification: Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

Pineda, hydric
Percent of map unit: 4 percent
Landform: Flats on drainageways on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F156BY041FL - Sandy Over Loamy Pine Flatwoods and Hammocks
Other vegetative classification: Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

Pomona, non-hydric
Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Wabasso, non-hydric
Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

99—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Interpretive groups

Land capability classification (irrigated): None specified
Ecological site: R156BY150FL - Subaqueous Freshwater Lacustrine Habitats
Forage suitability group: Forage suitability group not assigned (G155XB999FL)
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Unranked

Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Land Classifications

Land Classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Hydric Rating by Map Unit

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

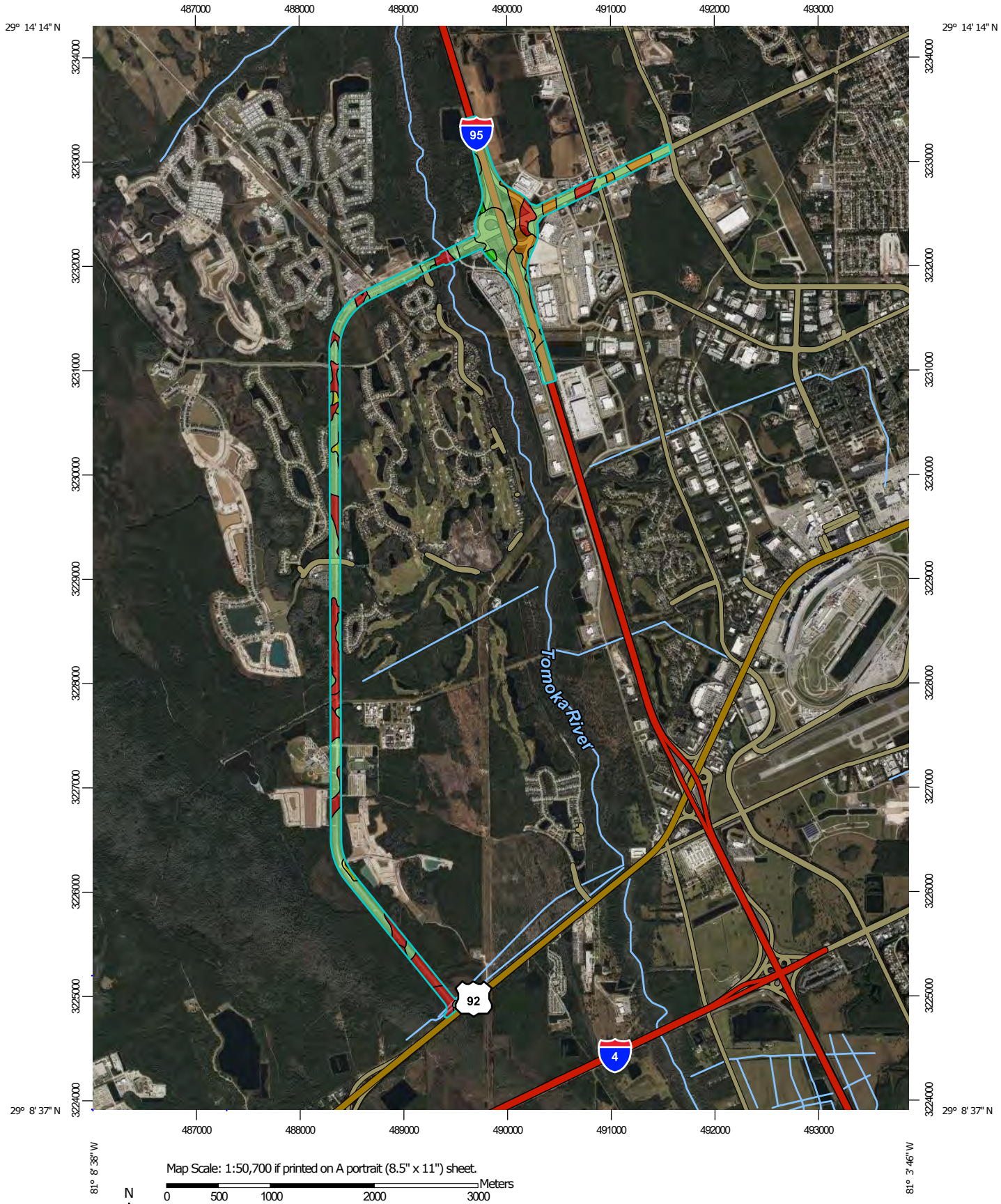
Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Map—Hydric Rating by Map Unit



Map Scale: 1:50,700 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 500 1000 2000 3000

Feet
0 2000 4000 8000 12000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Volusia County, Florida
Survey Area Data: Version 21, Sep 2, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 6, 2022—Feb 10, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydric Rating by Map Unit

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
3	Arents	0	1.1	0.2%
8	Basinger fine sand, frequently ponded, 0 to 1 percent slopes	95	0.4	0.1%
17	Daytona sand, 0 to 5 percent slopes	1	8.9	2.1%
22	Electra fine sand, 0 to 5 percent slopes	2	2.5	0.6%
23	Farmton fine sand	14	45.4	10.8%
25	Gator muck, 0 to 1 percent slopes, frequently flooded	100	4.9	1.2%
29	Immokalee sand	21	39.2	9.3%
32	Myakka-Myakka, wet, fine sands, 0 to 2 percent slopes	25	2.1	0.5%
37	Orsino fine sand, 0 to 5 percent slopes	1	3.1	0.7%
45	Pineda-Pineda, wet, fine sand, 0 to 2 percent slopes	52	6.4	1.5%
47	Pits	0	0.5	0.1%
49	Pomona fine sand	14	179.0	42.5%
50	Pomona fine sand, depressional, 0 to 2 percent slopes	100	26.1	6.2%
51	Pomona-St. Johns complex	99	33.2	7.9%
53	Pompano-Placid complex	100	53.4	12.7%
56	Samsula muck, frequently ponded, 0 to 1 percent slopes	100	10.8	2.6%
60	Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes	23	1.1	0.2%
75	Wauchula fine sand	18	0.7	0.2%
99	Water	0	2.6	0.6%
Totals for Area of Interest			**421.2**	**100.0%**

Rating Options—Hydric Rating by Map Unit

Aggregation Method: Percent Present

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Wildlife Management

Wildlife Management interpretations are tools for evaluating the suitability of the soil for various components of wildlife habitat, and as habitat of different types or species of wildlife. Example interpretations include crawfish aquaculture, burrowing animals and reptiles, grasses and legumes for food and cover, and freshwater wetland plants.

WLF - Gopher Tortoise Burrowing Suitability

This soil interpretation is intended to provide ratings based on the dominant soil characteristics that influence the suitability of the soil for excavation, maintenance, and preservation of burrows by gopher tortoises (Gopherus polyphemus). The information allows the user to identify areas of potentially suitable habitat area prior to the application of conservation practices. The ratings are for the soils in their natural condition and do not consider present land use, existing vegetation, water sources, and the presence or absence of wildlife in the area. The presence or absence of a species is determined at the local level and by many factors including soil characteristics.

The gopher tortoise (Gopherus polyphemus) is a burrowing reptile that inhabits open pine forests throughout the southeastern United States. Historically, typical gopher tortoise habitat consisted of open, frequently burned longleaf pine or longleaf pine/scrub oak uplands and flatwoods on moderately well drained to xeric soils. The burrows of a gopher tortoise are the habitat and center of normal feeding, breeding, and sheltering activity. Gopher tortoises excavate and use more than one burrow for shelter beneath the ground surface. Burrows, which may extend for more than 30 feet, provide shelter from canid predators, winter cold and summer heat.

The soil criteria that are taken into account in this soil interpretation are those that have been determined to have the most effect on burrow excavation, maintenance, and preservation. These include the soil texture, percent coarse fragments, depth to a restrictive layer or layer with greater than or equal to 35% clay, ponding or flooding frequency, slope, and depth to seasonal high water table.

Each soil criteria is assigned a numerical rating between 0 and 1. In this rating, 1 represents more suitable soil characteristics, and 0 represents less suitable soil characteristics. Each criterion is calculated separately and the lowest rating is reported as the overall soil suitability rating, representing the most limiting factor in the soil's suitability for gopher tortoise burrows.

Rating classes have been defined as follows:

Highly suited (numerical rating 0.95-1): These soils have no restrictions for use and are favorable for burrowing by gopher tortoise. Colonization and population densities may be above average if other habitat factors are not limiting.

Moderately suited (numerical rating 0.5-0.95): These soils are suitable and somewhat favorable for burrowing by gopher tortoise. Some restrictive features may limit the use of the site to a minor extent. Colonization and population densities may be average to above for the area if the other habitat requirements are met.

Less suited (numerical rating 0.05-0.5): These soils have characteristics that may limit establishment, maintenance, or use of the site by gopher tortoise. Colonization and population densities may be below average or restricted in the area due to the limiting factors even though all of the other species habitat requirements are met.

Unsuitable (numerical rating 0-0.05): These soils have characteristics that may limit establishment, maintenance, or use of the site by gopher tortoise. Areas of included soils with better drainage may provide suitable soil properties in some locations.

Not Rated: Miscellaneous areas are given a not rated status.

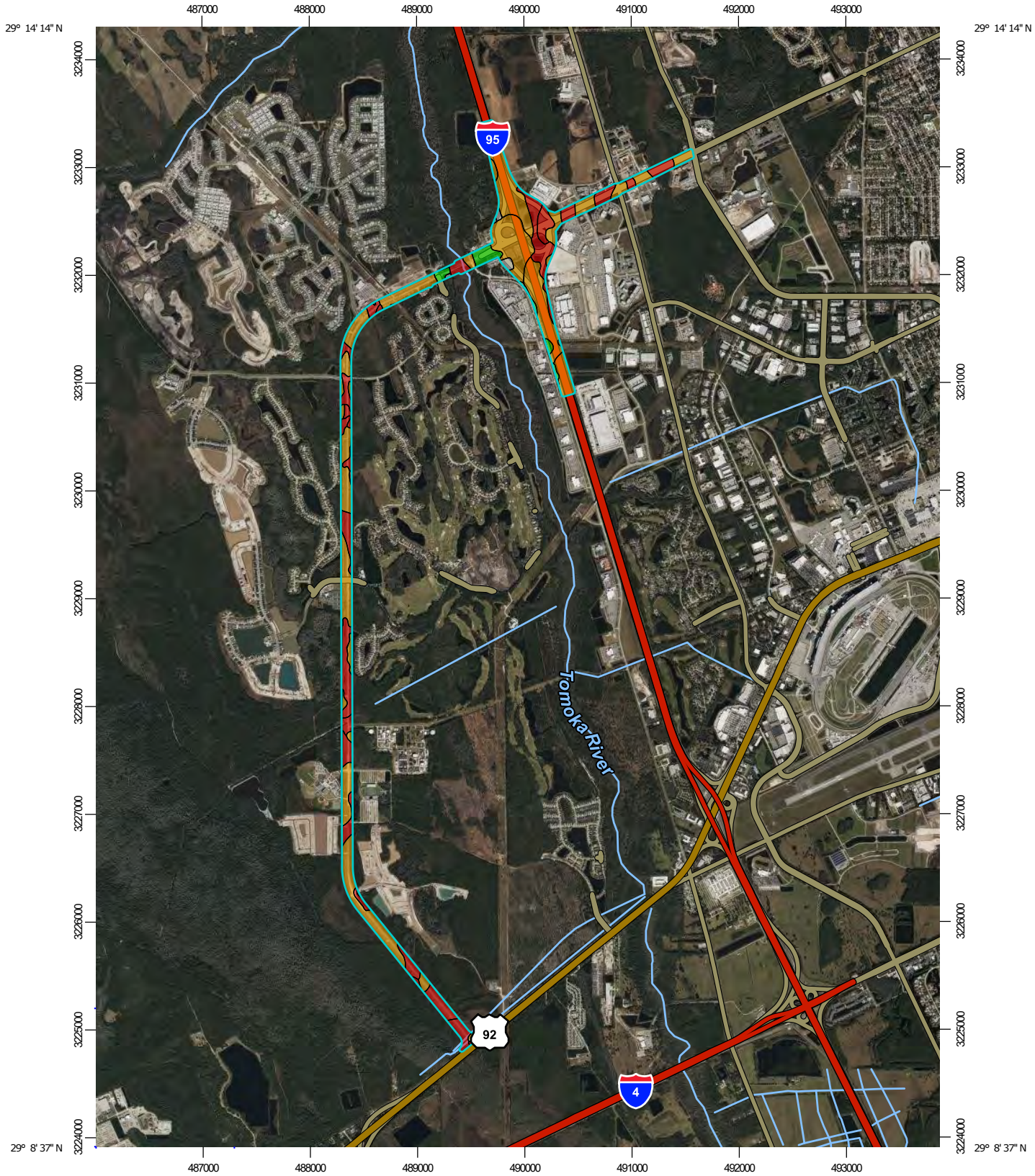
The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen, which is displayed on the report. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the Selected Soil Interpretations report with this interpretation included from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Citations:

U.S. Fish and Wildlife Service and Natural Resources Conservation Service. 2012. Gopher Tortoise (Gopherus polyphemus) Soil Classifications for the Federally Listed Range using the National Soil Information System Database, Version 1.

Map—WLF - Gopher Tortoise Burrowing Suitability



Map Scale: 1:50,700 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 500 1000 2000 3000

Feet
0 2000 4000 8000 12000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Unsuitable
- Less suited
- Moderately suited
- Highly suited
- Not rated or not available

Soil Rating Lines
- Unsuitable
- Less suited
- Moderately suited
- Highly suited
- Not rated or not available

Soil Rating Points
- Unsuitable
- Less suited
- Moderately suited
- Highly suited
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Volusia County, Florida
Survey Area Data: Version 21, Sep 2, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 6, 2022—Feb 10, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Tables—WLF - Gopher Tortoise Burrowing Suitability

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
3	Arents	Not rated	Arents (51%)		1.1	0.2%
			Arents (49%)			
8	Basinger fine sand, frequently ponded, 0 to 1 percent slopes	Unsuitable	Basinger (90%)	Ponding (0.00)	0.4	0.1%
				Water table (0.00)		
			Samsula (3%)	Ponding (0.00)		
				Water table (0.00)		
				Texture (0.50)		
			Floridana (2%)	Ponding (0.00)		
				Water table (0.00)		
17	Daytona sand, 0 to 5 percent slopes	Highly suited	Daytona (85%)		8.9	2.1%
			Cassia (4%)			
			Orsino (2%)			
			St. Lucie (2%)			
			Satellite (2%)			
22	Electra fine sand, 0 to 5 percent slopes	Highly suited	Electra (85%)		2.5	0.6%
			Pomello (8%)			
			Adamsville (3%)			
			Sparr (2%)			
23	Farmton fine sand	Less suited	Farmton, non-hydric (70%)	Water table (0.22)	45.4	10.8%
			EauGallie, non-hydric (4%)	Water table (0.22)		
			Pomona, non-hydric (3%)	Water table (0.22)		
			Immokalee, non-hydric (3%)	Water table (0.22)		
			Myakka, non-hydric (3%)	Water table (0.22)		
25	Gator muck, 0 to 1 percent slopes, frequently flooded	Unsuitable	Gator, frequently flooded (82%)	Ponding (0.00)	4.9	1.2%
				Water table (0.00)		
				Flooding (0.00)		
				Texture (0.43)		
			Terra Ceia, frequently flooded (6%)	Ponding (0.00)		
				Water table (0.00)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
				Flooding (0.00)		
				Texture (0.50)		
			Floridana, frequently flooded (5%)	Water table (0.00)		
				Flooding (0.00)		
				Texture (0.86)		
			Pompano (3%)	Water table (0.00)		
				Flooding (0.00)		
			St. Johns (2%)	Ponding (0.00)		
				Water table (0.00)		
				Flooding (0.00)		
			Tequesta (2%)	Ponding (0.00)		
				Water table (0.00)		
				Flooding (0.00)		
				Texture (0.50)		
29	Immokalee sand	Less suited	Immokalee, non-hydric (65%)	Water table (0.22)	39.2	9.3%
			Myakka, non-hydric (4%)	Water table (0.22)		
			Smyrna, non-hydric (3%)	Water table (0.22)		
32	Myakka-Myakka, wet, fine sands, 0 to 2 percent slopes	Less suited	Myakka (70%)	Water table (0.20)	2.1	0.5%
			EauGallie (5%)	Water table (0.20)		
37	Orsino fine sand, 0 to 5 percent slopes	Highly suited	Orsino (82%)		3.1	0.7%
			Paola (6%)			
			Cassia (4%)			
			Tavares (3%)			
			Daytona (3%)			
45	Pineda-Pineda, wet, fine sand, 0 to 2 percent slopes	Unsuitable	Pineda, wet (40%)	Ponding (0.00)	6.4	1.5%
				Water table (0.00)		
			Felda (6%)	Water table (0.00)		
			Valkaria (2%)	Water table (0.00)		
			Brynwood (2%)	Soil depth (0.00)		
				Water table (0.00)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
			Cypress Lake (2%)	Water table (0.00)		
				Soil depth (0.06)		
47	Pits	Not rated	Pits (100%)		0.5	0.1%
49	Pomona fine sand	Less suited	Pomona, non-hydric (70%)	Water table (0.10)	179.0	42.5%
			EauGallie, non-hydric (4%)	Water table (0.22)		
			Farmton, non-hydric (3%)	Water table (0.22)		
			Immokalee, non-hydric (3%)	Water table (0.22)		
			Myakka, non-hydric (3%)	Water table (0.22)		
50	Pomona fine sand, depressional, 0 to 2 percent slopes	Unsuitable	Pomona (80%)	Ponding (0.00)	26.1	6.2%
				Water table (0.00)		
			Basinger (5%)	Ponding (0.00)		
				Water table (0.00)		
			Malabar (5%)	Water table (0.00)		
			St. Johns (5%)	Water table (0.00)		
			Immokalee (5%)	Ponding (0.00)		
				Water table (0.00)		
51	Pomona-St. Johns complex	Unsuitable	Pomona, depressional (60%)	Ponding (0.00)	33.2	7.9%
				Water table (0.00)		
			St. Johns, depressional (30%)	Ponding (0.00)		
				Water table (0.00)		
			Basinger, depressional (2%)	Ponding (0.00)		
				Water table (0.00)		
			EauGallie, depressional (2%)	Ponding (0.00)		
				Water table (0.00)		
			Pompano, depressional (1%)	Ponding (0.00)		
				Water table (0.00)		
			Samsula (1%)	Ponding (0.00)		
				Water table (0.00)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
				Texture (0.50)		
			Malabar, hydric (1%)	Water table (0.00)		
			Scoggin (1%)	Ponding (0.00)		
				Water table (0.00)		
			Placid (1%)	Ponding (0.00)		
				Water table (0.00)		
53	Pompano-Placid complex	Unsuitable	Pompano, depressional (55%)	Ponding (0.00)	53.4	12.7%
				Water table (0.00)		
			Placid (25%)	Ponding (0.00)		
				Water table (0.00)		
			Holopaw, hydric (4%)	Water table (0.00)		
			Tequesta (4%)	Ponding (0.00)		
				Water table (0.00)		
				Texture (0.47)		
			Riviera, hydric (4%)	Water table (0.00)		
				Texture (0.82)		
			Samsula (4%)	Ponding (0.00)		
				Water table (0.00)		
				Texture (0.50)		
			Malabar, hydric (4%)	Water table (0.00)		
56	Samsula muck, frequently ponded, 0 to 1 percent slopes	Unsuitable	Samsula (85%)	Ponding (0.00)	10.8	2.6%
				Water table (0.00)		
				Texture (0.50)		
			Myakka (3%)	Ponding (0.00)		
				Water table (0.00)		
			Basinger (3%)	Ponding (0.00)		
				Water table (0.00)		
			Kaliga (3%)	Ponding (0.00)		
				Water table (0.00)		
				Texture (0.44)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
			Sanibel (2%)	Ponding (0.00)		
				Water table (0.00)		
				Texture (0.50)		
			Floridana (2%)	Ponding (0.00)		
				Water table (0.00)		
				Texture (0.91)		
			Anclote (2%)	Ponding (0.00)		
				Water table (0.00)		
60	Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes	Less suited	Smyrna, non-hydric (76%)	Water table (0.22)	1.1	0.2%
			Pomona, non-hydric (1%)	Water table (0.22)		
75	Wauchula fine sand	Unsuitable	Wauchula, non-hydric (75%)	Water table (0.02)	0.7	0.2%
				Texture (0.93)		
			Wauchula, hydric (10%)	Water table (0.00)		
				Texture (0.93)		
			Pineda, hydric (4%)	Water table (0.00)		
			Scoggin (4%)	Ponding (0.00)		
				Water table (0.00)		
			Wabasso, non-hydric (3%)	Water table (0.02)		
				Texture (1.00)		
99	Water	Not rated	Water (100%)		2.6	0.6%
Totals for Area of Interest					**421.2**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Less suited	266.7	63.3%
Unsuitable	135.9	32.3%
Highly suited	14.5	3.4%
Null or Not Rated	4.1	1.0%
Totals for Area of Interest	**421.2**	**100.0%**

Rating Options—WLF - Gopher Tortoise Burrowing Suitability

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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Appendix E

Soil Resource Report for Alternative Pond and Floodplain Compensation Sites

United States Department of Agriculture

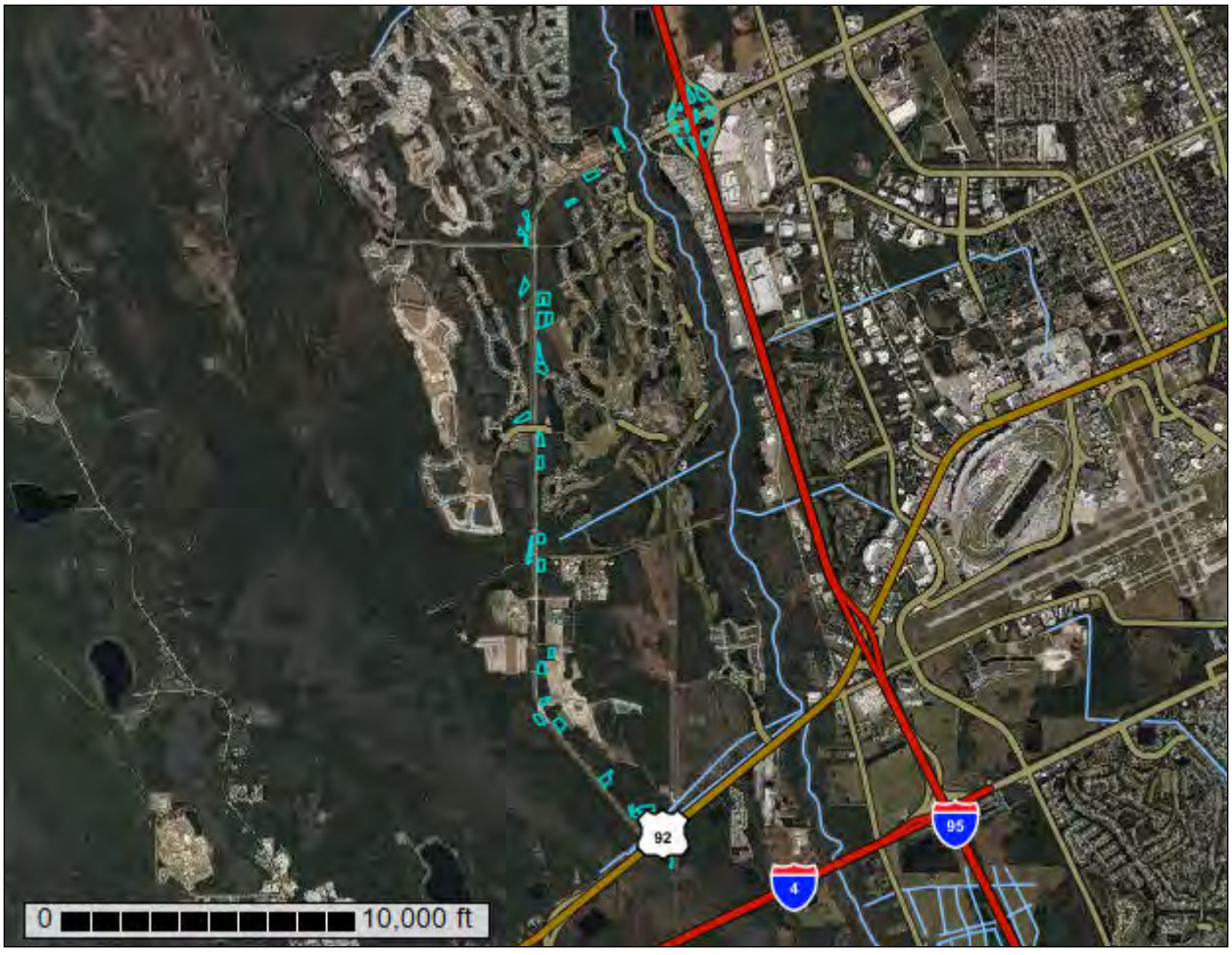
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Volusia County, Florida

LPGA Blvd from US 92 to Williamson Blvd PD&E Study



March 22, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Volusia County, Florida
Survey Area Data: Version 21, Sep 2, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 6, 2022—Feb 10, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3	Arents	0.1	0.1%
8	Basinger fine sand, frequently ponded, 0 to 1 percent slopes	0.5	0.6%
23	Farmton fine sand	4.3	5.6%
24	Fluvaquents	1.2	1.5%
29	Immokalee sand	7.0	9.1%
37	Orsino fine sand, 0 to 5 percent slopes	0.6	0.7%
45	Pineda-Pineda, wet, fine sand, 0 to 2 percent slopes	6.6	8.5%
49	Pomona fine sand	38.4	50.0%
50	Pomona fine sand, depressional, 0 to 2 percent slopes	3.9	5.0%
51	Pomona-St. Johns complex	5.8	7.5%
53	Pompano-Placid complex	4.0	5.2%
56	Samsula muck, frequently ponded, 0 to 1 percent slopes	2.4	3.1%
60	Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes	1.6	2.0%
99	Water	0.6	0.8%
Totals for Area of Interest		**76.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion

of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Volusia County, Florida

3—Arents

Map Unit Setting

National map unit symbol: 1ntsp
Elevation: 0 to 80 feet
Mean annual precipitation: 53 to 61 inches
Mean annual air temperature: 66 to 73 degrees F
Frost-free period: 285 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Arents and similar soils: 51 percent
Arents and similar soils: 49 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arents

Setting

Landform: Rises on marine terraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Altered marine deposits

Typical profile

C1 - 0 to 10 inches: sand
C2 - 10 to 32 inches: sand
C3 - 32 to 60 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A/D
Forage suitability group: Forage suitability group not assigned (G155XB999FL)
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: No

Description of Arents

Setting

Landform: Rises on marine terraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Altered marine deposits

Typical profile

C1 - 0 to 10 inches: fine sand
C2 - 10 to 32 inches: sand
C3 - 32 to 60 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Forage suitability group: Forage suitability group not assigned (G155XB999FL)
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: No

8—Basinger fine sand, frequently ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v16v
Elevation: 0 to 70 feet
Mean annual precipitation: 43 to 55 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Basinger and similar soils: 90 percent
Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Basinger

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 14 inches: fine sand
Bh/E - 14 to 36 inches: fine sand
Cg - 36 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Minor Components

Smyrna

Percent of map unit: 5 percent
Landform: — error in exists on —
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Samsula

Percent of map unit: 3 percent

Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Floridana

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

23—Farmton fine sand

Map Unit Setting

National map unit symbol: 1ntsg
Elevation: -20 to 120 feet
Mean annual precipitation: 53 to 61 inches
Mean annual air temperature: 66 to 73 degrees F
Frost-free period: 285 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Farmton, non-hydric, and similar soils: 70 percent
Farmton, hydric, and similar soils: 10 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Farmton, Non-hydric

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 7 inches: fine sand
E - 7 to 34 inches: fine sand
Bh - 34 to 50 inches: fine sand
Btg - 50 to 80 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Description of Farmton, Hydric

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 7 inches: fine sand
E - 7 to 34 inches: fine sand
Bh - 34 to 50 inches: fine sand
Btg - 50 to 80 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w

Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Minor Components

Basinger, depressional
Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Eaugallie, non-hydric
Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Immokalee, non-hydric
Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Myakka, non-hydric
Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Pomona, non-hydric
Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)

Hydric soil rating: No

Wauchula, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: No

24—Fluvaquents

Map Unit Setting

National map unit symbol: 1ntsh
Elevation: 10 to 100 feet
Mean annual precipitation: 53 to 61 inches
Mean annual air temperature: 66 to 73 degrees F
Frost-free period: 285 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Fluvaquents and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fluvaquents

Setting

Landform: Flood plains on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and loamy fluvial sediments

Typical profile

A - 0 to 7 inches: clay
Cg1 - 7 to 19 inches: sandy loam
Cg2 - 19 to 25 inches: clay
Cg3 - 25 to 38 inches: sandy loam
Cg4 - 38 to 65 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to water table: About 0 to 12 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: D
Ecological site: R156BY011FL - Mineral Floodplain Marshes and Swamps
Forage suitability group: Forage suitability group not assigned (G155XB999FL)
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Yes

Minor Components

Chobee, frequently flooded

Percent of map unit: 4 percent
Landform: Drainageways on marine terraces, flats on marine terraces, flood plains on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R156BY011FL - Mineral Floodplain Marshes and Swamps
Other vegetative classification: Loamy and clayey soils on stream terraces, flood plains, or in depressions (G155XB345FL)
Hydric soil rating: Yes

Samsula

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R156BY020FL - Histisol Isolated Marshes and Swamps
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Gator

Percent of map unit: 4 percent
Landform: Flood plains on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R156BY010FL - Histisol Floodplain Marshes and Swamps
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Bluff

Percent of map unit: 4 percent
Landform: Stream terraces on flood plains on marine terraces
Landform position (three-dimensional): Talf

Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R156BY011FL - Mineral Floodplain Marshes and Swamps
Other vegetative classification: Loamy and clayey soils on stream terraces, flood plains, or in depressions (G155XB345FL)
Hydric soil rating: Yes

Basinger, depressional
Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R156BY021FL - Mineral Isolated Swamps and Marshes
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

29—Immokalee sand

Map Unit Setting
National map unit symbol: 1ntsn
Elevation: 0 to 150 feet
Mean annual precipitation: 53 to 61 inches
Mean annual air temperature: 66 to 73 degrees F
Frost-free period: 285 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition
Immokalee, non-hydric, and similar soils: 65 percent
Immokalee, hydric, and similar soils: 10 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Immokalee, Non-hydric

Setting
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile
A - 0 to 10 inches: sand
E - 10 to 34 inches: sand
Bh - 34 to 43 inches: sand
C - 43 to 85 inches: sand

Properties and qualities
Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Description of Immokalee, Hydric

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 10 inches: sand
E - 10 to 34 inches: sand
Bh - 34 to 43 inches: sand
C - 43 to 85 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)

Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Minor Components

Basinger, depressional
Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Placid
Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Daytona
Percent of map unit: 4 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G155XB121FL)
Hydric soil rating: No

Myakka, non-hydric
Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Smyrna, non-hydric
Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Satellite

Percent of map unit: 3 percent
Landform: Rises on marine terraces, flats on marine terraces
Landform position (three-dimensional): Rise, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

St. johns, hydric

Percent of map unit: 3 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

37—Orsino fine sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2x9dn
Elevation: 0 to 130 feet
Mean annual precipitation: 43 to 63 inches
Mean annual air temperature: 66 to 77 degrees F
Frost-free period: 335 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Orsino and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Orsino

Setting

Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, tread
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits and/or eolian deposits

Typical profile

A - 0 to 2 inches: fine sand
E - 2 to 23 inches: fine sand
Bw and Bh/E - 23 to 43 inches: fine sand

Bw - 43 to 62 inches: fine sand
C - 62 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 to 50.02 in/hr)
Depth to water table: About 42 to 60 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on rises, knolls, and ridges of mesic uplands (G155XB121FL)
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G155XB121FL)
Hydric soil rating: No

Minor Components

Paola

Percent of map unit: 6 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope, riser
Down-slope shape: Convex, linear
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on ridges and dunes of xeric uplands (G155XB111FL)
Hydric soil rating: No

Cassia

Percent of map unit: 4 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Daytona

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, tread, rise
Down-slope shape: Convex
Across-slope shape: Linear

Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G155XB121FL)
Hydric soil rating: No

Tavares

Percent of map unit: 3 percent
Landform: Hills on marine terraces, flats on marine terraces, knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, side slope, tread, rise
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R155XY002FL), Sand Pine Scrub (R155XY001FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G155XB121FL)
Hydric soil rating: No

Immokalee

Percent of map unit: 1 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Riser, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Basinger

Percent of map unit: 1 percent
Landform: Flats on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Convex, concave
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

45—Pineda-Pineda, wet, fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2svyp
Elevation: 0 to 100 feet
Mean annual precipitation: 42 to 63 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Pineda and similar soils: 45 percent
Pineda, wet, and similar soils: 40 percent

Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pineda

Setting

Landform: Flatwoods on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 1 inches: fine sand
E - 1 to 5 inches: fine sand
Bw - 5 to 36 inches: fine sand
Btg/E - 36 to 54 inches: fine sandy loam
Cg - 54 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: No

Description of Pineda, Wet

Setting

Landform: Flats on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 1 inches: fine sand
E - 1 to 5 inches: fine sand
Bw - 5 to 36 inches: fine sand

Btg/E - 36 to 54 inches: fine sandy loam
Cg - 54 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Other vegetative classification: Slough (R155XY011FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

Minor Components

Felda

Percent of map unit: 6 percent
Landform: Flats on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

Wabasso

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Valkaria

Percent of map unit: 2 percent
Landform: Drainageways on flats on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave

Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Brynwood

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Cypress lake

Percent of map unit: 2 percent
Landform: Drainageways on marine terraces, flats on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear, convex
Across-slope shape: Concave, linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

49—Pomona fine sand

Map Unit Setting

National map unit symbol: 1nttc
Elevation: 20 to 120 feet
Mean annual precipitation: 53 to 61 inches
Mean annual air temperature: 66 to 73 degrees F
Frost-free period: 285 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Pomona, non-hydric, and similar soils: 70 percent
Pomona, hydric, and similar soils: 10 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pomona, Non-hydric

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 18 inches: fine sand
Bh - 18 to 45 inches: fine sand
E' - 45 to 50 inches: fine sand
Btg - 50 to 60 inches: fine sandy loam
C - 60 to 70 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Description of Pomona, Hydric

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 18 inches: fine sand
Bh - 18 to 45 inches: fine sand
E' - 45 to 50 inches: fine sand
Btg - 50 to 60 inches: fine sandy loam
C - 60 to 70 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)

Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Minor Components

Basinger, depressional

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Eaugallie, non-hydric

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Immokalee, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Myakka, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)

Hydric soil rating: No

Wauchula, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: No

Farmton, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

50—Pomona fine sand, depressional, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2w4h3
Elevation: 20 to 150 feet
Mean annual precipitation: 46 to 61 inches
Mean annual air temperature: 66 to 75 degrees F
Frost-free period: 285 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Pomona and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pomona

Setting

Landform: Drainageways on marine terraces, depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 7 inches: fine sand
E - 7 to 14 inches: fine sand
Bh - 14 to 33 inches: fine sand

E' - 33 to 53 inches: fine sand
Btg - 53 to 61 inches: fine sandy loam
C - 61 to 70 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Minor Components

Malabar

Percent of map unit: 5 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

St. johns

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Immokalee

Percent of map unit: 5 percent
Landform: Drainageways on marine terraces, depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave, linear

Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Basinger
Percent of map unit: 5 percent
Landform: Depressions on marine terraces, drainageways on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

51—Pomona-St. Johns complex

Map Unit Setting
National map unit symbol: 1nttg
Elevation: 0 to 100 feet
Mean annual precipitation: 53 to 61 inches
Mean annual air temperature: 66 to 73 degrees F
Frost-free period: 285 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition
Pomona, depressional, and similar soils: 60 percent
St. johns, depressional, and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pomona, Depressional

Setting
Landform: Drainageways on marine terraces, depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy and loamy marine deposits

Typical profile
A - 0 to 5 inches: fine sand
E - 5 to 18 inches: fine sand
Bh - 18 to 45 inches: fine sand
E' - 45 to 50 inches: fine sand
Btg - 50 to 80 inches: fine sandy loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Description of St. Johns, Depressional

Setting

Landform: Drainageways on marine terraces, depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits

Typical profile

A - 0 to 10 inches: fine sand
E - 10 to 27 inches: fine sand
Bh - 27 to 45 inches: fine sand
C - 45 to 75 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)

Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Minor Components

Eaugallie, depressional
Percent of map unit: 2 percent
Landform: Drainageways on marine terraces, depressions on marine terraces
Landform position (three-dimensional): Interfluve, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Basinger, depressional
Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Malabar, hydric
Percent of map unit: 1 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Scoggin
Percent of map unit: 1 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

Placid
Percent of map unit: 1 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Immokalee, non-hydric

Percent of map unit: 1 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Pompano, depressional

Percent of map unit: 1 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Samsula

Percent of map unit: 1 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

53—Pompano-Placid complex

Map Unit Setting

National map unit symbol: 1nttj
Elevation: 0 to 100 feet
Mean annual precipitation: 53 to 61 inches
Mean annual air temperature: 66 to 73 degrees F
Frost-free period: 285 to 315 days
Farmland classification: Not prime farmland

Map Unit Composition

Pompano, depressional, and similar soils: 55 percent
Placid and similar soils: 25 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pompano, Depressional

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits

Typical profile

A - 0 to 7 inches: fine sand
C - 7 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 to 50.02 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Ecological site: R156BY021FL - Mineral Isolated Swamps and Marshes
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Description of Placid

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits

Typical profile

A - 0 to 15 inches: fine sand
C - 15 to 75 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Ecological site: R156BY021FL - Mineral Isolated Swamps and Marshes
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Minor Components

Holopaw, hydric

Percent of map unit: 4 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Tequesta

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R156BY021FL - Mineral Isolated Swamps and Marshes
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Riviera, hydric

Percent of map unit: 4 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F156BY041FL - Sandy Over Loamy Pine Flatwoods and Hammocks
Other vegetative classification: Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

Samsula

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R156BY020FL - Histisol Isolated Marshes and Swamps
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Malabar, hydric

Percent of map unit: 4 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

56—Samsula muck, frequently ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2tzw9
Elevation: 0 to 250 feet
Mean annual precipitation: 44 to 63 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 335 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Samsula and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Samsula

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Herbaceous organic material over sandy marine deposits

Typical profile

Oa1 - 0 to 24 inches: muck
Oa2 - 24 to 32 inches: muck

Cg1 - 32 to 35 inches: sand
Cg2 - 35 to 44 inches: sand
Cg3 - 44 to 80 inches: sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very high (about 13.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Forage suitability group: Organic soils in depressions and on flood plains (G155XB645FL)
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Minor Components

Kaliga

Percent of map unit: 3 percent
Landform: Depressions on flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Myakka

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Basinger

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear

Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Sanibel

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear, concave
Across-slope shape: Concave
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Floridana

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

Anclote

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Convex, concave
Across-slope shape: Linear, concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

60—Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2v171
Elevation: 0 to 150 feet
Mean annual precipitation: 38 to 62 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 300 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Smyrna, non-hydric, and similar soils: 76 percent
Smyrna, hydric, and similar soils: 20 percent
Minor components: 4 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Smyrna, Non-hydric

Setting

Landform: Flats on marine terraces, flatwoods on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 17 inches: fine sand
Bh - 17 to 27 inches: loamy fine sand
C - 27 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Description of Smyrna, Hydric

Setting

Landform: Flats on marine terraces, flatwoods on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 17 inches: fine sand
Bh - 17 to 27 inches: loamy fine sand
C - 27 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Minor Components

Basinger, depressional

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Pomona, non-hydric

Percent of map unit: 1 percent
Landform: Flatwoods on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Eaugallie, hydric

Percent of map unit: 1 percent
Landform: Flats on marine terraces, flatwoods on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear

Other vegetative classification: South Florida Flatwoods (R154XY003FL), Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Hydric soil rating: Yes

99—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Interpretive groups

Land capability classification (irrigated): None specified
Ecological site: R156BY150FL - Subaqueous Freshwater Lacustrine Habitats
Forage suitability group: Forage suitability group not assigned (G155XB999FL)
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Unranked

Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Land Classifications

Land Classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Hydric Rating by Map Unit

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

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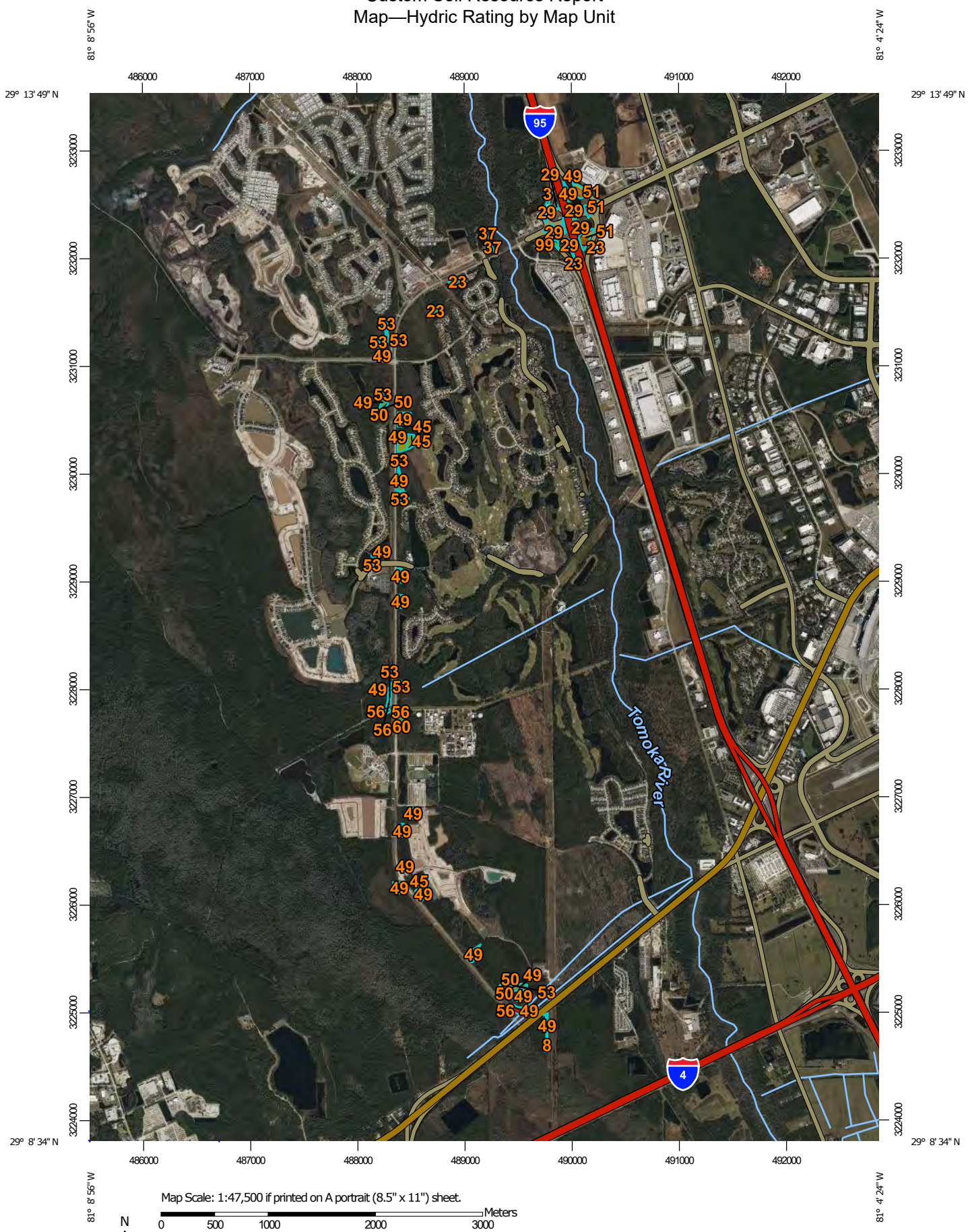
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Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

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Custom Soil Resource Report
Map—Hydric Rating by Map Unit



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Volusia County, Florida
Survey Area Data: Version 21, Sep 2, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 6, 2022—Feb 10, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydric Rating by Map Unit

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
3	Arents	0	0.1	0.1%
8	Basinger fine sand, frequently ponded, 0 to 1 percent slopes	95	0.5	0.6%
23	Farmton fine sand	14	4.3	5.6%
24	Fluvaquents	100	1.2	1.5%
29	Immokalee sand	21	7.0	9.1%
37	Orsino fine sand, 0 to 5 percent slopes	1	0.6	0.7%
45	Pineda-Pineda, wet, fine sand, 0 to 2 percent slopes	52	6.6	8.5%
49	Pomona fine sand	14	38.4	50.0%
50	Pomona fine sand, depressional, 0 to 2 percent slopes	100	3.9	5.0%
51	Pomona-St. Johns complex	99	5.8	7.5%
53	Pompano-Placid complex	100	4.0	5.2%
56	Samsula muck, frequently ponded, 0 to 1 percent slopes	100	2.4	3.1%
60	Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes	23	1.6	2.0%
99	Water	0	0.6	0.8%
Totals for Area of Interest			**76.9**	**100.0%**

Rating Options—Hydric Rating by Map Unit

Aggregation Method: Percent Present

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Wildlife Management

Wildlife Management interpretations are tools for evaluating the suitability of the soil for various components of wildlife habitat, and as habitat of different types or species of wildlife. Example interpretations include crawfish aquaculture, burrowing animals and reptiles, grasses and legumes for food and cover, and freshwater wetland plants.

WLF - Gopher Tortoise Burrowing Suitability

This soil interpretation is intended to provide ratings based on the dominant soil characteristics that influence the suitability of the soil for excavation, maintenance, and preservation of burrows by gopher tortoises (Gopherus polyphemus). The information allows the user to identify areas of potentially suitable habitat area prior to the application of conservation practices. The ratings are for the soils in their natural condition and do not consider present land use, existing vegetation, water sources, and the presence or absence of wildlife in the area. The presence or absence of a species is determined at the local level and by many factors including soil characteristics.

The gopher tortoise (Gopherus polyphemus) is a burrowing reptile that inhabits open pine forests throughout the southeastern United States. Historically, typical gopher tortoise habitat consisted of open, frequently burned longleaf pine or longleaf pine/scrub oak uplands and flatwoods on moderately well drained to xeric soils. The burrows of a gopher tortoise are the habitat and center of normal feeding, breeding, and sheltering activity. Gopher tortoises excavate and use more than one burrow for shelter beneath the ground surface. Burrows, which may extend for more than 30 feet, provide shelter from canid predators, winter cold and summer heat.

The soil criteria that are taken into account in this soil interpretation are those that have been determined to have the most effect on burrow excavation, maintenance, and preservation. These include the soil texture, percent coarse fragments, depth to a restrictive layer or layer with greater than or equal to 35% clay, ponding or flooding frequency, slope, and depth to seasonal high water table.

Each soil criteria is assigned a numerical rating between 0 and 1. In this rating, 1 represents more suitable soil characteristics, and 0 represents less suitable soil characteristics. Each criterion is calculated separately and the lowest rating is reported as the overall soil suitability rating, representing the most limiting factor in the soil's suitability for gopher tortoise burrows.

Rating classes have been defined as follows:

Highly suited (numerical rating 0.95-1): These soils have no restrictions for use and are favorable for burrowing by gopher tortoise. Colonization and population densities may be above average if other habitat factors are not limiting.

Moderately suited (numerical rating 0.5-0.95): These soils are suitable and somewhat favorable for burrowing by gopher tortoise. Some restrictive features may limit the use of the site to a minor extent. Colonization and population densities may be average to above for the area if the other habitat requirements are met.

Less suited (numerical rating 0.05-0.5): These soils have characteristics that may limit establishment, maintenance, or use of the site by gopher tortoise. Colonization and population densities may be below average or restricted in the area due to the limiting factors even though all of the other species habitat requirements are met.

Unsuitable (numerical rating 0-0.05): These soils have characteristics that may limit establishment, maintenance, or use of the site by gopher tortoise. Areas of included soils with better drainage may provide suitable soil properties in some locations.

Not Rated: Miscellaneous areas are given a not rated status.

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen, which is displayed on the report. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the Selected Soil Interpretations report with this interpretation included from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Citations:

U.S. Fish and Wildlife Service and Natural Resources Conservation Service. 2012. Gopher Tortoise (Gopherus polyphemus) Soil Classifications for the Federally Listed Range using the National Soil Information System Database, Version 1.

Map—WLF - Gopher Tortoise Burrowing Suitability



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Unsuitable
- Less suited
- Moderately suited
- Highly suited
- Not rated or not available

Soil Rating Lines
- Unsuitable
- Less suited
- Moderately suited
- Highly suited
- Not rated or not available

Soil Rating Points
- Unsuitable
- Less suited
- Moderately suited
- Highly suited
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Volusia County, Florida
Survey Area Data: Version 21, Sep 2, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 6, 2022—Feb 10, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Tables—WLF - Gopher Tortoise Burrowing Suitability

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
3	Arents	Not rated	Arents (51%)		0.1	0.1%
			Arents (49%)			
8	Basinger fine sand, frequently ponded, 0 to 1 percent slopes	Unsuitable	Basinger (90%)	Ponding (0.00)	0.5	0.6%
				Water table (0.00)		
			Samsula (3%)	Ponding (0.00)		
				Water table (0.00)		
				Texture (0.50)		
			Floridana (2%)	Ponding (0.00)		
				Water table (0.00)		
23	Farmton fine sand	Less suited	Farmton, non-hydric (70%)	Water table (0.22)	4.3	5.6%
			EauGallie, non-hydric (4%)	Water table (0.22)		
			Pomona, non-hydric (3%)	Water table (0.22)		
			Immokalee, non-hydric (3%)	Water table (0.22)		
			Myakka, non-hydric (3%)	Water table (0.22)		
24	Fluvaquents	Not rated	Fluvaquents (80%)		1.2	1.5%
29	Immokalee sand	Less suited	Immokalee, non-hydric (65%)	Water table (0.22)	7.0	9.1%
			Myakka, non-hydric (4%)	Water table (0.22)		
			Smyrna, non-hydric (3%)	Water table (0.22)		
37	Orsino fine sand, 0 to 5 percent slopes	Highly suited	Orsino (82%)		0.6	0.7%
			Paola (6%)			
			Cassia (4%)			
			Tavares (3%)			
			Daytona (3%)			
45	Pineda-Pineda, wet, fine sand, 0 to 2 percent slopes	Unsuitable	Pineda, wet (40%)	Ponding (0.00)	6.6	8.5%
				Water table (0.00)		
			Felda (6%)	Water table (0.00)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
			Valkaria (2%)	Water table (0.00)		
			Brynwood (2%)	Soil depth (0.00)		
				Water table (0.00)		
			Cypress Lake (2%)	Water table (0.00)		
				Soil depth (0.06)		
49	Pomona fine sand	Less suited	Pomona, non-hydric (70%)	Water table (0.10)	38.4	50.0%
			EauGallie, non-hydric (4%)	Water table (0.22)		
			Farmton, non-hydric (3%)	Water table (0.22)		
			Immokalee, non-hydric (3%)	Water table (0.22)		
			Myakka, non-hydric (3%)	Water table (0.22)		
50	Pomona fine sand, depressional, 0 to 2 percent slopes	Unsuitable	Pomona (80%)	Ponding (0.00)	3.9	5.0%
				Water table (0.00)		
			Basinger (5%)	Ponding (0.00)		
				Water table (0.00)		
			Malabar (5%)	Water table (0.00)		
			St. Johns (5%)	Water table (0.00)		
			Immokalee (5%)	Ponding (0.00)		
				Water table (0.00)		
51	Pomona-St. Johns complex	Unsuitable	Pomona, depressional (60%)	Ponding (0.00)	5.8	7.5%
				Water table (0.00)		
			St. Johns, depressional (30%)	Ponding (0.00)		
				Water table (0.00)		
			Basinger, depressional (2%)	Ponding (0.00)		
				Water table (0.00)		
			EauGallie, depressional (2%)	Ponding (0.00)		
				Water table (0.00)		
			Pompano, depressional (1%)	Ponding (0.00)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
				Water table (0.00)		
			Samsula (1%)	Ponding (0.00)		
				Water table (0.00)		
				Texture (0.50)		
			Malabar, hydric (1%)	Water table (0.00)		
			Scoggin (1%)	Ponding (0.00)		
				Water table (0.00)		
			Placid (1%)	Ponding (0.00)		
				Water table (0.00)		
53	Pompano-Placid complex	Unsuitable	Pompano, depressional (55%)	Ponding (0.00)	4.0	5.2%
				Water table (0.00)		
			Placid (25%)	Ponding (0.00)		
				Water table (0.00)		
			Holopaw, hydric (4%)	Water table (0.00)		
			Tequesta (4%)	Ponding (0.00)		
				Water table (0.00)		
				Texture (0.47)		
			Riviera, hydric (4%)	Water table (0.00)		
				Texture (0.82)		
			Samsula (4%)	Ponding (0.00)		
				Water table (0.00)		
				Texture (0.50)		
			Malabar, hydric (4%)	Water table (0.00)		
56	Samsula muck, frequently ponded, 0 to 1 percent slopes	Unsuitable	Samsula (85%)	Ponding (0.00)	2.4	3.1%
				Water table (0.00)		
				Texture (0.50)		
			Myakka (3%)	Ponding (0.00)		
				Water table (0.00)		
			Basinger (3%)	Ponding (0.00)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
				Water table (0.00)		
			Kaliga (3%)	Ponding (0.00)		
				Water table (0.00)		
				Texture (0.44)		
			Sanibel (2%)	Ponding (0.00)		
				Water table (0.00)		
				Texture (0.50)		
			Floridana (2%)	Ponding (0.00)		
				Water table (0.00)		
				Texture (0.91)		
			Anclote (2%)	Ponding (0.00)		
				Water table (0.00)		
60	Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes	Less suited	Smyrna, non-hydric (76%)	Water table (0.22)	1.6	2.0%
			Pomona, non-hydric (1%)	Water table (0.22)		
99	Water	Not rated	Water (100%)		0.6	0.8%
Totals for Area of Interest					**76.9**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Less suited	51.3	66.7%
Unsuitable	23.1	30.1%
Highly suited	0.6	0.7%
Null or Not Rated	1.9	2.4%
Totals for Area of Interest	**76.9**	**100.0%**

Rating Options—WLF - Gopher Tortoise Burrowing Suitability

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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Appendix F

Alternative Pond and Floodplain Compensation Sites

Existing Conditions

Pond Site 1A – Located along a cleared powerline easement. A very small portion is classified as wetlands per the NWI mapping and the SJRWMD land use mapping. However, half of the pond area is mapped as hydric soils.

Pond Site 1B – Located within a non-forested field classified as FLUCCS 2150 Field Crops and does not bisect any NWI classified wetland areas. The soils are 49 – Pomona fine sand, rated as non-hydric however, this soil type has a significant hydric soil component.

Floodplain Compensation Site 1D – Abutting Pond 1B, this site is within the same non-forested field classified as FLUCCS 2150 Field Crops however, half of the floodplain compensation site is classified as FLUCCS 6430 Wet Prairies. The site abuts an NWI classified wetland area, is partially comprised of a hydric soil, and the remaining soil type has a significant hydric soil component (MUS 49).

Pond Site 1C+2A and Floodplain Compensation Site 1E – Floodplain Compensation Site 1E directly abuts Pond Site 1C+2A. They are located within an area classified as FLUCCS 3100 Herbaceous Upland (Dry Prairie) and they avoid bisecting NWI classified wetland areas. However, they directly abut the boundaries of classified FLUCCS and NWI wetland areas. Approximately half the pond site and a quarter of the floodplain compensation site are comprised of hydric soils and the remaining soil type has a significant hydric soil component (MUS 49).

Pond Site 2B+3A – Located within an area classified as FLUCCS 3100 Herbaceous Upland (Dry Prairie) and does not bisect any NWI classified wetland areas. A very small portion occurs within hydric soils and the remaining soil type has a significant hydric soil component (MUS 49).

Pond Site 3C+4A – Located within an area classified as FLUCCS 3100 Herbaceous Upland (Dry Prairie) and does not bisect any NWI classified wetland areas or hydric soils. However, the pond site occurs within soil types that have a significant hydric soil component (MUS 45 and 49).

Pond Site 3B – Located within an area classified as FLUCCS 4430 Forest Regeneration Areas and does not bisect any NWI classified wetland areas or hydric soils. However, the pond site occurs within a soil type that has a significant hydric soil component (MUS 49).

Pond Site 4B – Located within an area classified as FLUCCS 3100 Herbaceous Upland (Dry Prairie). However, it directly abuts the boundary of a classified FLUCCS and NWI wetland area. The entire pond site occurs within soil types that have a significant hydric soil component (MUS 45 and 49).

Pond Sites 4C+5A and 5B– Located within an area classified as FLUCCS 3100 Herbaceous Upland (Dry Prairie) and do not bisect any NWI classified wetland areas or hydric soils. However, the pond sites occur within a soil type that has a significant hydric soil component (MUS 49).

Pond Site 6C – Located within an area classified as FLUCCS 4110 Pine Flatwoods and does not bisect any NWI classified wetland areas. However, approximately one third of the pond site occurs within a hydric soil type and the remaining soil type has a significant hydric soil component (MUS 60).

Floodplain Compensation Site 6E – Occurs entirely within an area classified as FLUCCS 6300 Wetland Mixed Hardwood/Coniferous Forest but does not bisect any NWI classified wetland areas. Occurs entirely within hydric soils.

Pond Site 7A – Occurs mostly within an area classified as FLUCCS 4410 Pine Plantation. A small portion bisects an area classified as FLUCCS 6300 Wetland Mixed Hardwood/Coniferous Forest. The pond site does not bisect any NWI classified wetland areas. More than half the site occurs within hydric soils and the remaining soil type has a significant hydric soil component (MUS 49).

Pond Site 7B – Occurs entirely within an area classified as FLUCCS 6300 Wetland Mixed Hardwood/Coniferous Forest but does not bisect any NWI classified wetland areas. Occurs entirely within hydric soils.

Pond Site 8B – Occurs almost entirely within an area classified as FLUCCS 6460 Treeless Hydric Savanna/Mixed Scrub-Shrub Wetland. It directly abuts an NWI classified wetland on one side. The site does not occur within hydric soils, but the soil type has a significant hydric soil component (MUS 49).

Pond Site 8C – Occurs almost entirely within an area classified as FLUCCS 3300 Mixed Rangeland (non-forested) with a small portion occurring within FLUCCS 6460 Treeless Hydric Savanna/Mixed Scrub-Shrub Wetland. The site directly abuts an NWI classified wetland area on one side. It does not occur within hydric soils, but the soil type has a significant hydric soil component (MUS 49).

Pond Site 9A – Occurs entirely within an area classified as FLUCCS 1900 Open Land and does not bisect any NWI classified wetland areas. It does not occur within hydric soils, but the soil type has a significant hydric soil component (MUS 49).

Pond Site 9B and Floodplain Compensation Site 9D – Floodplain Compensation Site 9D directly abuts Pond Site 9B. They are located within an area classified as FLUCCS 4110 Pine Flatwoods. They directly abut the boundaries of classified FLUCCS and NWI wetland areas and hydric soils. They occur almost entirely within a soil type that has a significant hydric soil component (MUS 49) with portions extending into areas of hydric soils.

Pond Site 9C+10A and Floodplain Compensation Site 9E – Floodplain Compensation Site 9E directly abuts Pond Site 9C+10A. More than half of these sites are classified as FLUCCS 6250 Hydric Pine Flatwoods. The remaining areas are classified as FLUCCS 4110 Pine Flatwoods. They do not bisect any NWI classified wetland areas or hydric soils however, they occur within soil types that have a significant hydric soil component (MUS 45 and 49).

Pond Site 10B and Floodplain Compensation Site 9F – Floodplain Compensation Site 9F directly abuts Pond Site 10B. Approximately half of the floodplain compensation site is classified as FLUCCS 6460 Treeless Hydric Savanna/Mixed Scrub-Shrub Wetland. A significant portion of the remaining areas are classified as FLUCCS 3200 Shrub and Brushland with a small portion classified as FLUCCS 4110 Pine Flatwoods. They do not bisect any NWI classified wetland areas or hydric soils however, they occur within soil types that have a significant hydric soil component (MUS 45 and 49).

Pond Site 10C – Occurs almost entirely within areas classified as FLUCCS 4410 Pine Plantation. It directly abuts FLUCCS and NWI classified wetland areas along significant portions of its boundaries. Nearly the entire site occurs within a soil type that has a significant hydric soil component (MUS 49) and small portions of the site extend into areas of hydric soils.

Pond Sites 11A and 11C – Both pond sites occur almost entirely within an areas classified as FLUCCS 4410 Pine Plantation. A small portion of Pond 11A occurs within FLUCCS 6460 Treeless Hydric Savanna/Mixed Scrub-Shrub Wetland and both ponds directly abut FLUCCS and NWI classified wetland areas along significant portions of their site boundaries. Small portions of both ponds occur within hydric soils with the remaining portions occurring within a soil type that has a significant hydric soil component (MUS 49).

Pond Site 12B – Occurs entirely within an area classified as FLUCCS 3200 Shrub and Brushland. It is bounded by FLUCCS and NWI classified wetlands on two sides. Nearly the entire site occurs within a non-hydric soil type however, two small portions extend into areas of hydric soils.

Pond Site 12C+13A – Occurs entirely within an area classified as FLUCCS 4110 Pine Flatwoods. It does not bisect or abut any NWI classified wetland areas. Occurs entirely within a non-hydric soil type.

Pond Site 13B – Occurs entirely within an area classified as FLUCCS 4340 Upland Mixed Hardwood/Coniferous Forest. It does not bisect or abut any NWI classified wetland areas, however, it occurs almost entirely within hydric soils. Two small areas of the pond site occur within soils considered highly suitable for the state listed threatened gopher tortoise.

Pond Sites 14B, 14C, 14D, 14E, 15A, 15B, 15C, 15D, 16A, 16B, 16C, 16D, 17A, 17B, and 17C all occur within the existing LPGA/I-95 interchange infields and their stormwater ponds, roadway, and mowed and maintained ROW. All areas are classified as FLUCCS 8140 Roads and Highways and FLUCCS 5300 Reservoirs. Significant portions of the northeast and southeast interchange quadrants are classified as hydric soils.

Appendix G
FNAI Standard Data Report

FLORIDA
Natural Areas
INVENTORY

1018 Thomasville Road
Suite 200-C
Tallahassee, FL 32303
850-224-8207
fax 850-681-9364
www.fnai.org

February 21, 2022

Voni Moore
HDR Inc
4830 W Kennedy Blvd, Suite 400
Tampa, FL 33609

Dear Ms. Moore,

Thank you for requesting information from the Florida Natural Areas Inventory (FNAI). At your request we have produced the following report for your project area.

The purpose of this Standard Data Report is to provide objective scientific information on natural resources located in the vicinity of a site of interest, in order to inform those involved in project planning and evaluation. This Report makes no determination of the suitability of a proposed project for this location, or the potential impacts of the project on natural resources in the area.

Project: LPGA Blvd from US 92 (SR 600) to Williamson Blvd PD&E Study

Date Received: 2/15/2022

Location: Volusia County

Element Occurrences

A search of our maps and database indicates that we currently have several element occurrences mapped in the vicinity of the study area (see enclosed map and element occurrence table). Please be advised that a lack of element occurrences in the FNAI database is not a sufficient indication of the absence of rare or endangered species on a site.

The element occurrences data layer includes occurrences of rare species and natural communities. The map legend indicates that some element occurrences occur in the general vicinity of the label point. This may be due to lack of precision of the source data, or an element that occurs over an extended area (such as a wide ranging species or large natural community). For animals and plants, element occurrences generally refer to more than a casual sighting; they usually indicate a viable population of the species. Note that some element occurrences represent historically documented observations which may no longer be extant. Extirpated element occurrences will be marked with an 'X' following the occurrence label on the enclosed map.

Likely and Potential Rare Species

In addition to documented occurrences, other rare species and natural communities may be identified on or near the site based on habitat models and species range models (see enclosed Biodiversity Matrix Report). These species should be taken into consideration in field surveys, land management, and impact avoidance and mitigation.

FNAI habitat models indicate areas, which based on land cover type, offer suitable habitat for one or more rare species that is known to occur in the vicinity. Habitat models have been developed for approximately 300 of the rarest species tracked by the Inventory, including all federally listed species.

Florida Resources
and Environmental
Analysis Center

Institute of Science
and Public Affairs

The Florida State University

FNAI species range models indicate areas that are within the known or predicted range of a species, based on climate variables, soils, vegetation, and/or slope. Species range models have been developed for approximately 340 species, including all federally listed species.

The FNAI Biodiversity Matrix Geodatabase compiles Documented, Likely, and Potential species and natural communities for each square mile Matrix Unit statewide.

CLIP

The enclosed map shows natural resource conservation priorities based on the Critical Lands and Waters Identification Project. CLIP is based on many of the same natural resource data developed for the Florida Forever Conservation Needs Assessment, but provides an overall picture of conservation priorities across different resource categories, including biodiversity, landscapes, surface waters, and aggregated CLIP priorities (that combine the individual resource categories). CLIP is also based primarily on remote sensed data and is not intended to be the definitive authority on natural resources on a site.

For more information on CLIP, visit https://www.fnai.org/services/clip.

Managed Areas

Portions of the site appear to be located within the Tiger Bay State Forest, managed by the FL Dept. of Agriculture and Consumer Services, Florida Forest Service.

The Managed Areas data layer shows public and privately managed conservation lands throughout the state. Federal, state, local, and privately managed conservation lands are included.

The Inventory always recommends that professionals familiar with Florida's flora and fauna conduct a site-specific survey to determine the current presence or absence of rare, threatened, or endangered species.

Please visit www.fnai.org/species-communities/tracking-main for county or statewide element occurrence distributions and links to more element information.

The database maintained by the Florida Natural Areas Inventory is the single most comprehensive source of information available on the locations of rare species and other significant ecological resources. However, the data are not always based on comprehensive or site-specific field surveys. Therefore this information should not be regarded as a final statement on the biological resources of the site being considered, nor should it be substituted for on-site surveys. Inventory data are designed for the purposes of conservation planning and scientific research, and are not intended for use as the primary criteria for regulatory decisions.

Information provided by this database may not be published without prior written notification to the Florida Natural Areas Inventory, and the Inventory must be credited as an information source in these publications. **The maps contain sensitive environmental information, please do not distribute or publish without prior consent from FNAI.** FNAI data may not be resold for profit.

Thank you for your use of FNAI services. An invoice will be mailed separately. If I can be of further assistance, please contact me at (850) 224-8207 or at kbrinegar@fnai.fsu.edu.

Sincerely,

Kerri Brinegar

Kerri Brinegar
GIS / Data Services

Encl

LPGA Blvd from US 92 (SR 600) to Williamson Blvd PD&E Study

Site boundaries are approximate.

Volusia County

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FLORIDA Natural Areas INVENTORY

Element Occurrences

- Animals
- Plants
- Communities
- Other
- Data Sensitive

Point Indicates General Vicinity of Element

U.S. Fish & Wildlife Service Scrub Jay Survey 1992-96

Conservation Lands

- Federal
- State
- Local
- Private
- State Aquatic Preserves

Land Acquisition Projects

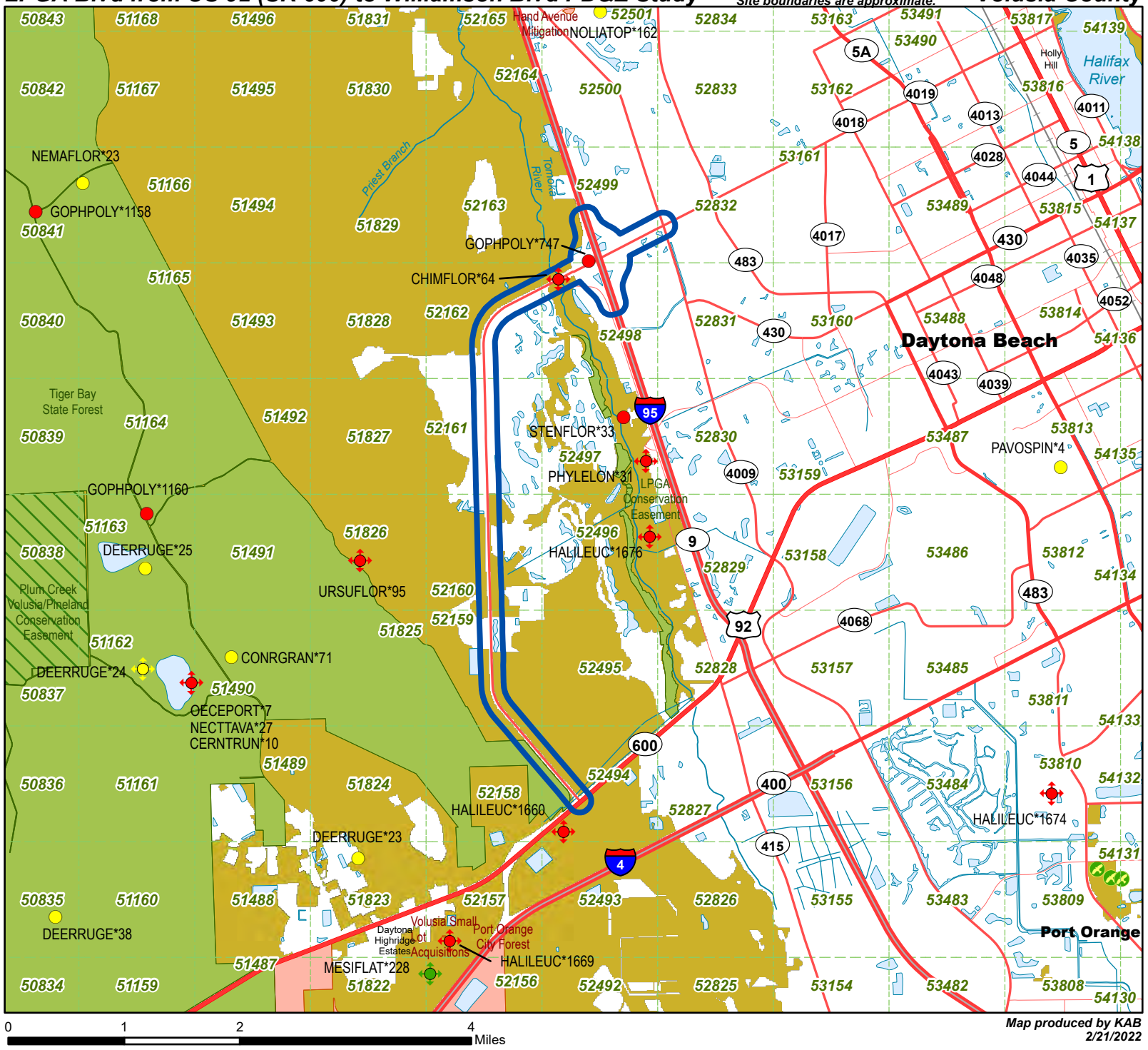
- Florida Forever Board of Trustees Projects

- FNAI Rare Species Habitat
- FNAI Biodiversity Matrix Square Mile Units

- County Boundary
- Roads
- Water

NOTE

This map contains environmentally sensitive information. Please do not distribute or publish without prior consent from FNAI. Map should not be interpreted without accompanying documents.



Map produced by KAB
2/21/2022

LPGA Blvd from US 92 (SR 600) to Williamson Blvd PD&E Study

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FLORIDA Natural Areas INVENTORY

CLIP v4.0 Resource Priorities

Biodiversity Resource Category
- Priority 1 - highest
- Priority 2
- Priority 3
- Priority 4
- Priority 5

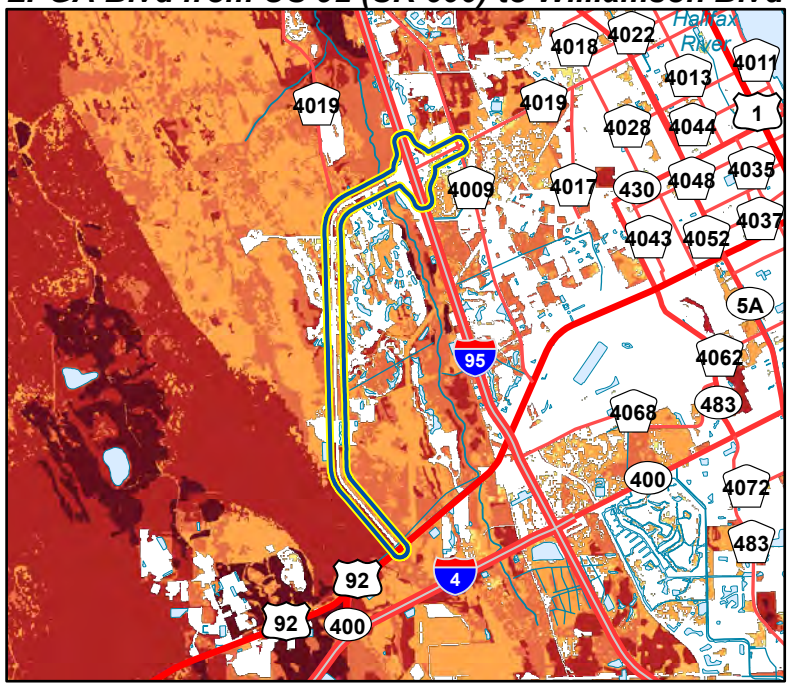
Landscape Resource Category
- Priority 1 - highest
- Priority 2
- Priority 3
- Priority 4
- Priority 5

Surface Water Resource Category
- Priority 1 - highest
- Priority 2
- Priority 3
- Priority 4
- Priority 5

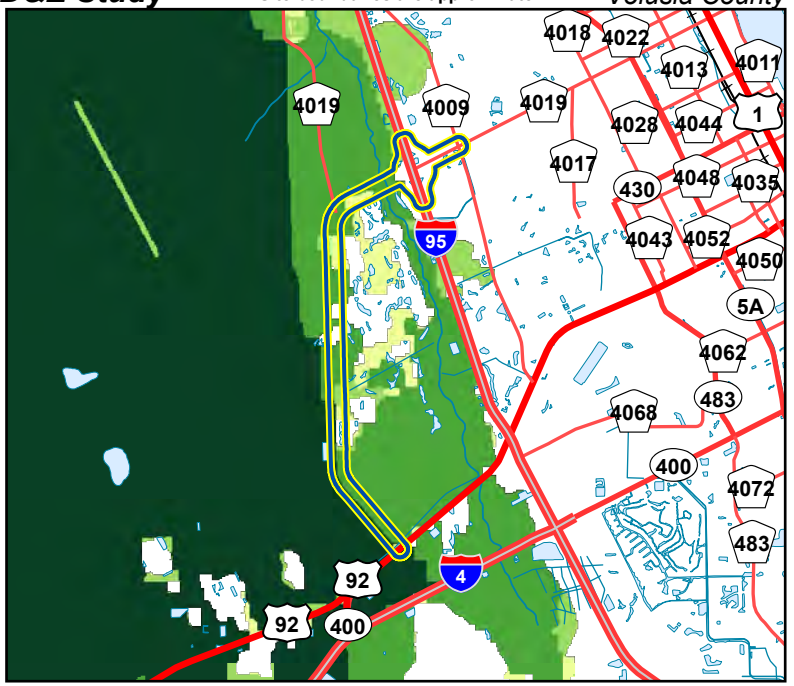
Aggregated CLIP Priorities
- Priority 1 - highest
- Priority 2
- Priority 3
- Priority 4
- Priority 5

Site Boundary

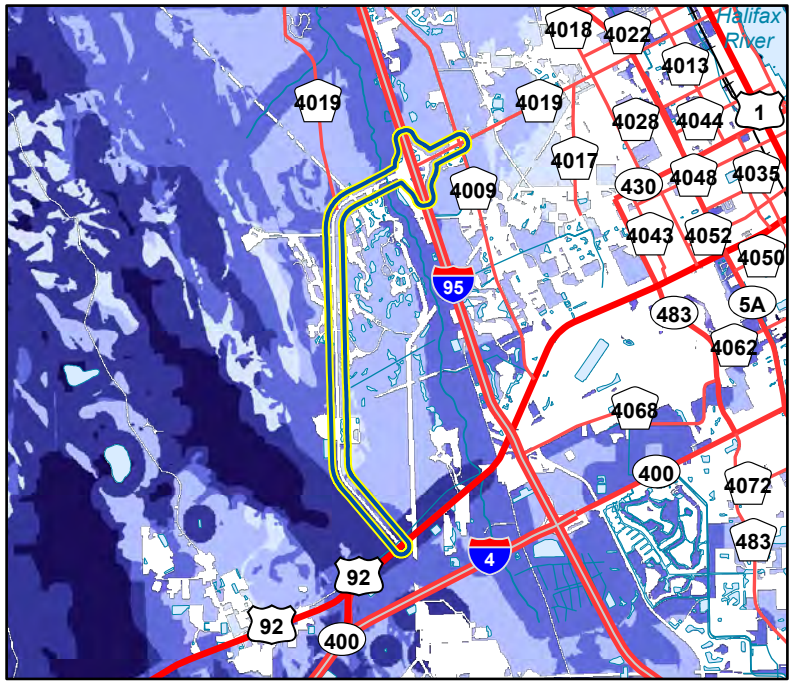
Map should not be interpreted without accompanying documents.



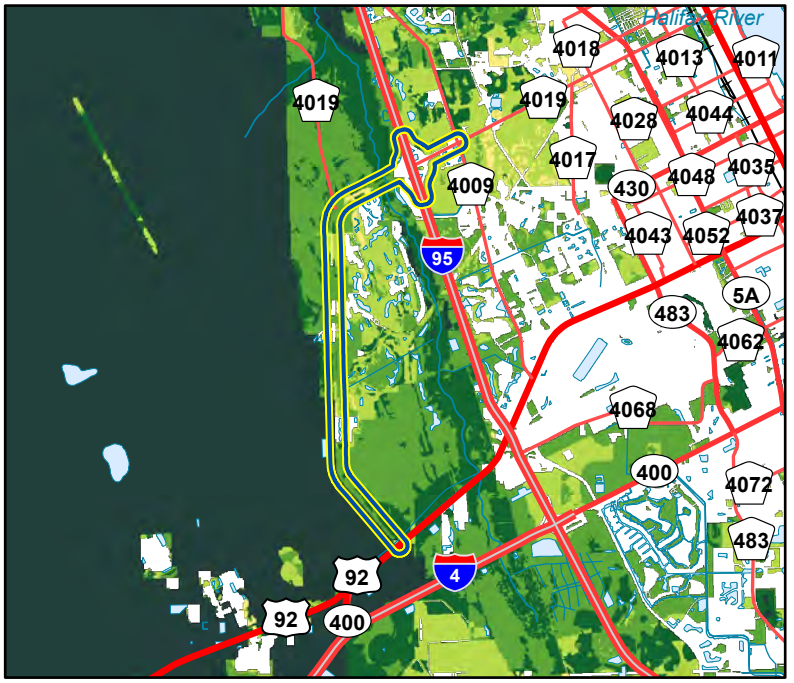
CLIP Biodiversity Resource Priorities



CLIP Landscape Resource Priorities



CLIP Surface Water Resource Priorities



CLIP Aggregated Resource Priorities

0 0.5 1 2 3 4 5 6 7 8 9 Miles

Critical Lands and Waters Identification Project (CLIP) is a cooperative effort between the FSU Florida Natural Areas Inventory, UF Center for Landscape Conservation Planning, and FL Fish & Wildlife Conservation Commission, with additional funding from FL Dept of Environmental Protection and US Fish & Wildlife Service.

Map produced by KAB
2/21/2022

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FNAI ELEMENT OCCURRENCE REPORT on or near

LPGA Blvd from US 92 (SR 600) to Williamson Blvd PD&E Study

Map Label	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing	Observation Date	Description	EO Comments
CHIMFLOR*64	*Chimarra florida*	Floridian Finger-net Caddisfly	G4	S3S4	N	N	2007-06-22	2007-06-22: No description given other than that the locality was near a river (U09RAS01FLUS).	2007-06-22: Two specimens were collected using a 15 watt black light over an alcohol-filled white pan (U09RAS01FLUS, U08RAS01FLUS).
GOPHPOLY*747	*Gopherus polyphemus*	Gopher Tortoise	G3	S3	C	ST	1991-05-31	2012: There does not appear to be any suitable habitat at this spot (M10FNA01FLUS, PNDALM01FLUS). 1991-05-31: roadside-upland grasses and scrub (U91EDE02FLUS).	1991-05-31: 1 tortoise observed (U91EDE02FLUS).
HALILEUC*1660	*Haliaeetus leucocephalus*	Bald Eagle	G5	S3	N	N	2000	2005-07-12: Source does not provide a description.	Nest status: Active, 2000; Not active, 2003, 2002, 2001; Unknown status or not assessed, 1999;(U03FWC01FLUS)
HALILEUC*1676	*Haliaeetus leucocephalus*	Bald Eagle	G5	S3	N	N	2003	2005-07-12: Source does not provide a description.	Nest status: Active, 2003; Unknown status or not assessed, 2002, 2001, 2000, 1999;(U03FWC01FLUS)
PHYLELON*31	*Phyllophaga elongata*	Elongate June Beetle	G3	S3	N	N	1935-07-05	1935-07-05: No description given (B89WOO01FLUS).	1935-07-05: One specimen was collected by I.J. Cantrall (B89WOO01FLUS).
STENFLOR*33	*Stenacron floridense*	A Mayfly	G3G4	S3S4	N	N	2008-05-06	2008-05-06: No description given (U09DEP01FLUS).	2008-05-06: Staff from the Florida Department of Environmental Protection collected this species (U09DEP01FLUS).

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FNAI ELEMENT OCCURRENCE REPORT on or near

LPGA Blvd from US 92 (SR 600) to Williamson Blvd PD&E Study

Map Label	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing	Observation Date	Description	EO Comments
URSUFLOR*95	*Ursus americanus floridanus*	Florida Black Bear	G5T4	S4	N	N	2020-11-19	Large area of pine plantation, mesic and wet flatwoods, and dome and basin swamps; Largely private commercial timberland, nurseries, and small neighborhoods; public lands are dominated by pine plantation but also have flatwoods interspersed with dome swamps and patches of scrub; Large area of sand pine and oak scrub, mesic flatwoods, sandhill, depression marshes and hardwood swamps, pine plantation; regular harvesting of sand pine (U05SIM01FLUS).	2002: 1,025-1,539 bears estimated in the primary ranges in the Ocala-St. John's region. Part of a larger population that includes Okefenokee Swamp National Wildlife Refuge in Georgia (U05SIM01FLUS). 2014: 1,198 bears estimated in the Ocala-St. John's region and 495 estimated in the Osceola region (A16HUM01FLUS). 2016: polygons created to show where bears are considered 'Abundant' and 'Common' (U16FWC01FLUS) Primary is the FWC-designated core area that represents breeding range and contains documented evidence of reproduction or female bears within available habitat, and Secondary is the FWC-designated area where bears occur within available habitat but outside primary bear range (evidence of bears without documented evidence of reproduction) (U12FWC02FLUS, U05SIM01FLUS). These boundaries are based on decades of bear observations, roadkill distribution, nuisance bear locations, and bear research projects. For detailed location data contact the FWC.

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Florida Natural Areas Inventory

Biodiversity Matrix Report

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
Matrix Unit ID: 52158					
Likely					
Deeringothamnus rugelii	Rugel's pawpaw	G1	S1	E	E
Mesic flatwoods		G4	S4	N	N
Ursus americanus floridanus	Florida Black Bear	G5T4	S4	N	N
Potential					
Antigone canadensis pratensis	Florida Sandhill Crane	G5T2	S2	N	ST
Arnoglossum diversifolium	variable-leaved Indian-plantain	G2	S2	N	T
Calopogon multiflorus	many-flowered grass-pink	G2G3	S2S3	N	T
Carex chapmannii	Chapman's sedge	G3	S3	N	T
Centrosema arenicola	sand butterfly pea	G2Q	S2	N	E
Conradina grandiflora	large-flowered rosemary	G3	S3	N	T
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	G3G4	S1	N	N
Drymarchon couperi	Eastern Indigo Snake	G3	S2?	T	FT
Gopherus polyphemus	Gopher Tortoise	G3	S3	C	ST
Gymnopogon chapmanianus	Chapman's skeletongrass	G3	S3	N	N
Illicium parviflorum	star anise	G2	S2	N	E
Lechea cernua	nodding pinweed	G3	S3	N	T
Lithobates capito	Gopher Frog	G2G3	S3	N	N
Matelea floridana	Florida spiny-pod	G2	S2	N	E
Mustela frenata peninsulae	Florida Long-tailed Weasel	G5T3?	S3?	N	N
Nemastylis floridana	celestial lily	G2	S2	N	E
Neofiber alleni	Round-tailed Muskrat	G2	S2	N	N
Nolina atopocarpa	Florida beargrass	G3	S3	N	T
Phyllophaga elongata	Elongate June Beetle	G3	S3	N	N
Pteroglossaspis ecristata	giant orchid	G2G3	S2	N	T
Pycnanthemum floridanum	Florida mountain-mint	G3	S3	N	T
Salix floridana	Florida willow	G2G3	S2S3	N	E
Matrix Unit ID: 52159					
Likely					
Mesic flatwoods		G4	S4	N	N
Ursus americanus floridanus	Florida Black Bear	G5T4	S4	N	N
Potential					
Antigone canadensis pratensis	Florida Sandhill Crane	G5T2	S2	N	ST
Arnoglossum diversifolium	variable-leaved Indian-plantain	G2	S2	N	T
Calopogon multiflorus	many-flowered grass-pink	G2G3	S2S3	N	T
Carex chapmannii	Chapman's sedge	G3	S3	N	T
Centrosema arenicola	sand butterfly pea	G2Q	S2	N	E
Conradina grandiflora	large-flowered rosemary	G3	S3	N	T
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	G3G4	S1	N	N
Deeringothamnus rugelii	Rugel's pawpaw	G1	S1	E	E
Dryobates borealis	Red-cockaded Woodpecker	G3	S2	E, PT	FE
Gopherus polyphemus	Gopher Tortoise	G3	S3	C	ST
Gymnopogon chapmanianus	Chapman's skeletongrass	G3	S3	N	N
Illicium parviflorum	star anise	G2	S2	N	E

Definitions: *Documented - Rare species and natural communities documented on or near this site.*
Documented-Historic - Rare species and natural communities documented, but not observed/reported within the last twenty years.
Likely - Rare species and natural communities likely to occur on this site based on suitable habitat and/or known occurrences in the vicinity.
Potential - This site lies within the known or predicted range of the species listed.

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Florida Natural Areas Inventory

Biodiversity Matrix Report

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
Lechea cernua	nodding pinweed	G3	S3	N	T
Lithobates capito	Gopher Frog	G2G3	S3	N	N
Matelea floridana	Florida spiny-pod	G2	S2	N	E
Mustela frenata peninsulae	Florida Long-tailed Weasel	G5T3?	S3?	N	N
Nemastylis floridana	celestial lily	G2	S2	N	E
Neofiber alleni	Round-tailed Muskrat	G2	S2	N	N
Nolina atopocarpa	Florida beargrass	G3	S3	N	T
Phyllophaga elongata	Elongate June Beetle	G3	S3	N	N
Pteroglossaspis ecristata	giant orchid	G2G3	S2	N	T
Pycnanthemum floridanum	Florida mountain-mint	G3	S3	N	T
Salix floridana	Florida willow	G2G3	S2S3	N	E

Matrix Unit ID: 52160

Likely

Mesic flatwoods		G4	S4	N	N
Ursus americanus floridanus	Florida Black Bear	G5T4	S4	N	N

Potential

Antigone canadensis pratensis	Florida Sandhill Crane	G5T2	S2	N	ST
Calopogon multiflorus	many-flowered grass-pink	G2G3	S2S3	N	T
Carex chapmannii	Chapman's sedge	G3	S3	N	T
Centrosema arenicola	sand butterfly pea	G2Q	S2	N	E
Conradina grandiflora	large-flowered rosemary	G3	S3	N	T
Deeringothamnus rugelii	Rugel's pawpaw	G1	S1	E	E
Dryobates borealis	Red-cockaded Woodpecker	G3	S2	E, PT	FE
Gopherus polyphemus	Gopher Tortoise	G3	S3	C	ST
Gymnopogon chapmanianus	Chapman's skeletongrass	G3	S3	N	N
Illicium parviflorum	star anise	G2	S2	N	E
Lechea cernua	nodding pinweed	G3	S3	N	T
Lithobates capito	Gopher Frog	G2G3	S3	N	N
Matelea floridana	Florida spiny-pod	G2	S2	N	E
Mustela frenata peninsulae	Florida Long-tailed Weasel	G5T3?	S3?	N	N
Nemastylis floridana	celestial lily	G2	S2	N	E
Neofiber alleni	Round-tailed Muskrat	G2	S2	N	N
Nolina atopocarpa	Florida beargrass	G3	S3	N	T
Phyllophaga elongata	Elongate June Beetle	G3	S3	N	N
Pteroglossaspis ecristata	giant orchid	G2G3	S2	N	T
Pycnanthemum floridanum	Florida mountain-mint	G3	S3	N	T
Salix floridana	Florida willow	G2G3	S2S3	N	E

Matrix Unit ID: 52161

Likely

Mesic flatwoods		G4	S4	N	N
Ursus americanus floridanus	Florida Black Bear	G5T4	S4	N	N

Potential

Antigone canadensis pratensis	Florida Sandhill Crane	G5T2	S2	N	ST
Calopogon multiflorus	many-flowered grass-pink	G2G3	S2S3	N	T

Definitions: *Documented - Rare species and natural communities documented on or near this site.*
Documented-Historic - Rare species and natural communities documented, but not observed/reported within the last twenty years.
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Florida Natural Areas Inventory

Biodiversity Matrix Report

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
Carex chapmannii	Chapman's sedge	G3	S3	N	T
Centrosema arenicola	sand butterfly pea	G2Q	S2	N	E
Conradina grandiflora	large-flowered rosemary	G3	S3	N	T
Deeringothamnus rugelii	Rugel's pawpaw	G1	S1	E	E
Dryobates borealis	Red-cockaded Woodpecker	G3	S2	E, PT	FE
Gopherus polyphemus	Gopher Tortoise	G3	S3	C	ST
Gymnopogon chapmanianus	Chapman's skeletongrass	G3	S3	N	N
Illicium parviflorum	star anise	G2	S2	N	E
Lithobates capito	Gopher Frog	G2G3	S3	N	N
Matelea floridana	Florida spiny-pod	G2	S2	N	E
Mustela frenata peninsulae	Florida Long-tailed Weasel	G5T3?	S3?	N	N
Nemastylis floridana	celestial lily	G2	S2	N	E
Neofiber alleni	Round-tailed Muskrat	G2	S2	N	N
Nolina atopocarpa	Florida beargrass	G3	S3	N	T
Phyllophaga elongata	Elongate June Beetle	G3	S3	N	N
Pteroglossaspis ecristata	giant orchid	G2G3	S2	N	T
Pycnanthemum floridanum	Florida mountain-mint	G3	S3	N	T
Salix floridana	Florida willow	G2G3	S2S3	N	E

Matrix Unit ID: 52162

Likely

Mesic flatwoods		G4	S4	N	N
Ursus americanus floridanus	Florida Black Bear	G5T4	S4	N	N

Potential

Antigone canadensis pratensis	Florida Sandhill Crane	G5T2	S2	N	ST
Calopogon multiflorus	many-flowered grass-pink	G2G3	S2S3	N	T
Carex chapmannii	Chapman's sedge	G3	S3	N	T
Centrosema arenicola	sand butterfly pea	G2Q	S2	N	E
Conradina grandiflora	large-flowered rosemary	G3	S3	N	T
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	G3G4	S1	N	N
Deeringothamnus rugelii	Rugel's pawpaw	G1	S1	E	E
Dryobates borealis	Red-cockaded Woodpecker	G3	S2	E, PT	FE
Gopherus polyphemus	Gopher Tortoise	G3	S3	C	ST
Gymnopogon chapmanianus	Chapman's skeletongrass	G3	S3	N	N
Illicium parviflorum	star anise	G2	S2	N	E
Lithobates capito	Gopher Frog	G2G3	S3	N	N
Matelea floridana	Florida spiny-pod	G2	S2	N	E
Nemastylis floridana	celestial lily	G2	S2	N	E
Neofiber alleni	Round-tailed Muskrat	G2	S2	N	N
Nolina atopocarpa	Florida beargrass	G3	S3	N	T
Phyllophaga elongata	Elongate June Beetle	G3	S3	N	N
Pteroglossaspis ecristata	giant orchid	G2G3	S2	N	T
Pycnanthemum floridanum	Florida mountain-mint	G3	S3	N	T
Salix floridana	Florida willow	G2G3	S2S3	N	E

Matrix Unit ID: 52494

Likely

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Florida Natural Areas Inventory

Biodiversity Matrix Report

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
Haliaeetus leucocephalus	Bald Eagle	G5	S3	N	N
Mesic flatwoods		G4	S4	N	N
Ursus americanus floridanus	Florida Black Bear	G5T4	S4	N	N
Potential					
Antigone canadensis pratensis	Florida Sandhill Crane	G5T2	S2	N	ST
Calopogon multiflorus	many-flowered grass-pink	G2G3	S2S3	N	T
Carex chapmannii	Chapman's sedge	G3	S3	N	T
Centrosema arenicola	sand butterfly pea	G2Q	S2	N	E
Conradina grandiflora	large-flowered rosemary	G3	S3	N	T
Deeringothamnus rugelii	Rugel's pawpaw	G1	S1	E	E
Drymarchon couperi	Eastern Indigo Snake	G3	S2?	T	FT
Gopherus polyphemus	Gopher Tortoise	G3	S3	C	ST
Gymnopogon chapmanianus	Chapman's skeletongrass	G3	S3	N	N
Illicium parviflorum	star anise	G2	S2	N	E
Lechea cernua	nodding pinweed	G3	S3	N	T
Lithobates capito	Gopher Frog	G2G3	S3	N	N
Matelea floridana	Florida spiny-pod	G2	S2	N	E
Mustela frenata peninsulae	Florida Long-tailed Weasel	G5T3?	S3?	N	N
Nemastylis floridana	celestial lily	G2	S2	N	E
Neofiber alleni	Round-tailed Muskrat	G2	S2	N	N
Nolina atopocarpa	Florida beargrass	G3	S3	N	T
Phyllophaga elongata	Elongate June Beetle	G3	S3	N	N
Pteroglossaspis ecristata	giant orchid	G2G3	S2	N	T
Pycnanthemum floridanum	Florida mountain-mint	G3	S3	N	T
Salix floridana	Florida willow	G2G3	S2S3	N	E
Matrix Unit ID: 52498					
Documented					
Chimarra florida	Floridian Finger-net Caddisfly	G4	S3S4	N	N
Likely					
Gopherus polyphemus	Gopher Tortoise	G3	S3	C	ST
Mesic flatwoods		G4	S4	N	N
Scrub		G2	S2	N	N
Ursus americanus floridanus	Florida Black Bear	G5T4	S4	N	N
Potential					
Antigone canadensis pratensis	Florida Sandhill Crane	G5T2	S2	N	ST
Calopogon multiflorus	many-flowered grass-pink	G2G3	S2S3	N	T
Carex chapmannii	Chapman's sedge	G3	S3	N	T
Centrosema arenicola	sand butterfly pea	G2Q	S2	N	E
Conradina grandiflora	large-flowered rosemary	G3	S3	N	T
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	G3G4	S1	N	N
Deeringothamnus rugelii	Rugel's pawpaw	G1	S1	E	E
Gymnopogon chapmanianus	Chapman's skeletongrass	G3	S3	N	N
Heterodon simus	Southern Hognose Snake	G2	S2S3	N	N
Illicium parviflorum	star anise	G2	S2	N	E
Lechea cernua	nodding pinweed	G3	S3	N	T

Definitions: *Documented - Rare species and natural communities documented on or near this site.*
Documented-Historic - Rare species and natural communities documented, but not observed/reported within the last twenty years.
Likely - Rare species and natural communities likely to occur on this site based on suitable habitat and/or known occurrences in the vicinity.
Potential - This site lies within the known or predicted range of the species listed.

1018 Thomasville Road
Suite 200-C
Tallahassee, FL 32303
(850) 224-8207
(850) 681-9364 Fax
www.fnai.org

Florida Natural Areas Inventory

Biodiversity Matrix Report

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
Lithobates capito	Gopher Frog	G2G3	S3	N	N
Matelea floridana	Florida spiny-pod	G2	S2	N	E
Nemastylis floridana	celestial lily	G2	S2	N	E
Neofiber alleni	Round-tailed Muskrat	G2	S2	N	N
Nolina atopocarpa	Florida beargrass	G3	S3	N	T
Phyllophaga elongata	Elongate June Beetle	G3	S3	N	N
Pteroglossaspis ecristata	giant orchid	G2G3	S2	N	T
Pycnanthemum floridanum	Florida mountain-mint	G3	S3	N	T
Salix floridana	Florida willow	G2G3	S2S3	N	E
Matrix Unit ID: 52499					
Likely					
Gopherus polyphemus	Gopher Tortoise	G3	S3	C	ST
Mesic flatwoods		G4	S4	N	N
Ursus americanus floridanus	Florida Black Bear	G5T4	S4	N	N
Potential					
Antigone canadensis pratensis	Florida Sandhill Crane	G5T2	S2	N	ST
Calopogon multiflorus	many-flowered grass-pink	G2G3	S2S3	N	T
Carex chapmannii	Chapman's sedge	G3	S3	N	T
Centrosema arenicola	sand butterfly pea	G2Q	S2	N	E
Conradina grandiflora	large-flowered rosemary	G3	S3	N	T
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	G3G4	S1	N	N
Deeringothamnus rugelii	Rugel's pawpaw	G1	S1	E	E
Drymarchon couperi	Eastern Indigo Snake	G3	S2?	T	FT
Gymnopogon chapmanianus	Chapman's skeletongrass	G3	S3	N	N
Heterodon simus	Southern Hognose Snake	G2	S2S3	N	N
Illicium parviflorum	star anise	G2	S2	N	E
Lechea cernua	nodding pinweed	G3	S3	N	T
Lithobates capito	Gopher Frog	G2G3	S3	N	N
Matelea floridana	Florida spiny-pod	G2	S2	N	E
Nemastylis floridana	celestial lily	G2	S2	N	E
Neofiber alleni	Round-tailed Muskrat	G2	S2	N	N
Nolina atopocarpa	Florida beargrass	G3	S3	N	T
Phyllophaga elongata	Elongate June Beetle	G3	S3	N	N
Pteroglossaspis ecristata	giant orchid	G2G3	S2	N	T
Pycnanthemum floridanum	Florida mountain-mint	G3	S3	N	T
Salix floridana	Florida willow	G2G3	S2S3	N	E
Matrix Unit ID: 52832					
Likely					
Mesic flatwoods		G4	S4	N	N
Scrub		G2	S2	N	N
Potential					
Antigone canadensis pratensis	Florida Sandhill Crane	G5T2	S2	N	ST
Calopogon multiflorus	many-flowered grass-pink	G2G3	S2S3	N	T
Carex chapmannii	Chapman's sedge	G3	S3	N	T

Definitions: *Documented - Rare species and natural communities documented on or near this site.*
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Florida Natural Areas Inventory

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Drymarchon couperi	Eastern Indigo Snake	G3	S2?	T	FT
Gopherus polyphemus	Gopher Tortoise	G3	S3	C	ST
Gymnopogon chapmanianus	Chapman's skeletongrass	G3	S3	N	N
Heterodon simus	Southern Hognose Snake	G2	S2S3	N	N
Illicium parviflorum	star anise	G2	S2	N	E
Lithobates capito	Gopher Frog	G2G3	S3	N	N
Matelea floridana	Florida spiny-pod	G2	S2	N	E
Nemastylis floridana	celestial lily	G2	S2	N	E
Neofiber alleni	Round-tailed Muskrat	G2	S2	N	N
Nolina atopocarpa	Florida beargrass	G3	S3	N	T
Phyllophaga elongata	Elongate June Beetle	G3	S3	N	N
Pteroglossaspis ecristata	giant orchid	G2G3	S2	N	T
Pycnanthemum floridanum	Florida mountain-mint	G3	S3	N	T
Salix floridana	Florida willow	G2G3	S2S3	N	E
Ursus americanus floridanus	Florida Black Bear	G5T4	S4	N	N

Definitions: *Documented - Rare species and natural communities documented on or near this site.*
Documented-Historic - Rare species and natural communities documented, but not observed/reported within the last twenty years.
Likely - Rare species and natural communities likely to occur on this site based on suitable habitat and/or known occurrences in the vicinity.
Potential - This site lies within the known or predicted range of the species listed.

Elements and Element Occurrences

An **element** is any exemplary or rare component of the natural environment, such as a species, natural community, bird rookery, spring, sinkhole, cave, or other ecological feature.

An **element occurrence (EO)** is an area of land and/or water in which a species or natural community is, or was, present. An EO should have practical conservation value for the Element as evidenced by potential continued (or historical) presence and/or regular recurrence at a given location.

Element Ranking and Legal Status

Using a ranking system developed by NatureServe and the Natural Heritage Program Network, the Florida Natural Areas Inventory assigns two ranks for each element. The global rank is based on an element's worldwide status; the state rank is based on the status of the element in Florida. Element ranks are based on many factors, the most important ones being estimated number of Element Occurrences (EOs), estimated abundance (number of individuals for species; area for natural communities), geographic range, estimated number of adequately protected EOs, relative threat of destruction, and ecological fragility.

FNAI GLOBAL ELEMENT RANK

G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences or less than 1000 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 3000 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.
GH = Of historical occurrence throughout its range, may be rediscovered (e.g., ivory-billed woodpecker).
GX = Believed to be extinct throughout range.
GXC = Extirpated from the wild but still known from captivity or cultivation.
G#? = Tentative rank (e.g., G2?).
G#G# = Range of rank; insufficient data to assign specific global rank (e.g., G2G3).
G#T# = Rank of a taxonomic subgroup such as a subspecies or variety; the G portion of the rank refers to the entire species and the T portion refers to the specific subgroup; numbers have same definition as above (e.g., G3T1).
G#Q = Rank of questionable species - ranked as species but questionable whether it is species or subspecies; numbers have same definition as above (e.g., G2Q).
G#T#Q = Same as above, but validity as subspecies or variety is questioned.
GU = Unrankable; due to a lack of information no rank or range can be assigned (e.g., GUT2).
GNA = Ranking is not applicable because the element is not a suitable target for conservation (e.g. a hybrid species).
GNR = Element not yet ranked (temporary).
GNRTNR = Neither the element nor the taxonomic subgroup has yet been ranked.

FNAI STATE ELEMENT RANK

S1 = Critically imperiled in Florida because of extreme rarity (5 or fewer occurrences or less than 1000 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 3000 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.
SH = Of historical occurrence in Florida, possibly extirpated, but may be rediscovered (e.g., ivory-billed woodpecker).
SX = Believed to be extirpated throughout Florida.
SU = Unrankable; due to a lack of information no rank or range can be assigned.
SNA = State ranking is not applicable because the element is not a suitable target for conservation (e.g. a hybrid species).
SNR = Element not yet ranked (temporary).

FEDERAL LEGAL STATUS

Legal status information provided by FNAI for information only. For official definitions and lists of protected species, consult the relevant federal agency.

Definitions derived from U.S. Endangered Species Act of 1973, Sec. 3. Note that the federal status given by FNAI refers only to Florida populations and that federal status may differ elsewhere.

C = Candidate species for which federal listing agencies have sufficient information on biological vulnerability and threats to support proposing to list the species as Endangered or Threatened.
E = Endangered: species in danger of extinction throughout all or a significant portion of its range.
E, T = Species currently listed endangered in a portion of its range but only listed as threatened in other areas
E, PDL = Species currently listed endangered but has been proposed for delisting.
E, PT = Species currently listed endangered but has been proposed for listing as threatened.
E, XN = Species currently listed endangered but tracked population is a non-essential experimental population.
T = Threatened: species likely to become Endangered within the foreseeable future throughout all or a significant portion of its range.
PE = Species proposed for listing as endangered
PS = Partial status: some but not all of the species' infraspecific taxa have federal
PT = Species proposed for listing as threatened
SAT = Treated as threatened due to similarity of appearance to a species which is federally listed such that enforcement personnel have difficulty in attempting to differentiate between the listed and unlisted species.
SC = Not currently listed, but considered a "species of concern" to USFWS.

STATE LEGAL STATUS

Provided by FNAI for information only. For official definitions and lists of protected species, consult the relevant state agency.

Animals: Definitions derived from "Florida's Endangered Species and Species of Special Concern, Official Lists" published by Florida Fish and Wildlife Conservation Commission, 1 August 1997, and subsequent updates.

C = Candidate for listing at the Federal level by the U. S. Fish and Wildlife Service
FE = Listed as Endangered Species at the Federal level by the U. S. Fish and Wildlife Service
FT = Listed as Threatened Species at the Federal level by the U. S. Fish and Wildlife Service
FXN = Federal listed as an experimental population in Florida
FT(S/A) = Federal Threatened due to similarity of appearance
ST = State population listed as Threatened by the FFWCC. Defined as a species, subspecies, or isolated population which is acutely vulnerable to environmental alteration, declining in number at a rapid rate, or whose range or habitat is decreasing in area at a rapid rate and as a consequence is destined or very likely to become an endangered species within the foreseeable future.
SSC = Listed as Species of Special Concern by the FFWCC. Defined as a population which warrants special protection, recognition, or consideration because it has an inherent significant vulnerability to habitat modification, environmental alteration, human disturbance, or substantial human exploitation which, in the foreseeable future, may result in its becoming a threatened species. (SSC* for Pandion haliaetus (Osprey) indicates that this status applies in Monroe county only.)
N = Not currently listed, nor currently being considered for listing.

Plants: Definitions derived from Sections 581.011 and 581.185(2), Florida Statutes, and the Preservation of Native Flora of Florida Act, 5B-40.001. FNAI does not track all state-regulated plant species; for a complete list of state-regulated plant species, call Florida Division of Plant Industry, 352-372-3505 or see: http://www.doacs.state.fl.us/pi/.

E = Endangered: species of plants native to Florida 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; includes all species determined to be endangered or threatened pursuant to the U.S. Endangered Species Act.
T = Threatened: 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 number as to cause them to be Endangered.
N = Not currently listed, nor currently being considered for listing.

Element Occurrence Ranking

FNAI ranks of quality of the element occurrence in terms of its viability (EORANK). Viability is estimated using a combination of factors that contribute to continued survival of the element at the location. Among these are the size of the EO, general condition of the EO at the site, and the conditions of the landscape surrounding the EO (e.g. an immediate threat to an EO by local development pressure could lower an EO rank).

A = Excellent estimated viability
A? = Possibly excellent estimated viability
AB = Excellent or good estimated viability
AC = Excellent, good, or fair estimated viability
B = Good estimated viability
B? = Possibly good estimated viability
BC = Good or fair estimated viability
BD = Good, fair, or poor estimated viability
C = Fair estimated viability
C? = Possibly fair estimated viability
CD = Fair or poor estimated viability
D = Poor estimated viability
D? = Possibly poor estimated viability
E = Verified extant (viability not assessed)
F = Failed to find
H = Historical
NR = Not ranked, a placeholder when an EO is not (yet) ranked.
U = Unrankable
X = Extirpated

*For additional detail on the above ranks see: http://www.natureserve.org/explorer/eorankguide.htm

FNAI also uses the following EO ranks:

H? = Possibly historical
F? = Possibly failed to find
X? = Possibly extirpated

The following offers further explanation of the H and X ranks as they are used by FNAI:

The rank of H is used when there is a lack of recent field information verifying the continued existence of an EO, such as (a) when an EO is based only on historical collections data; or (b) when an EO was ranked A, B, C, D, or E at one time and is later, without field survey work, considered to be possibly extirpated due to general habitat loss or degradation of the environment in the area. This definition of the H rank is dependent on an interpretation of what constitutes "recent" field information. Generally, if there is no known survey of an EO within the last 20 to 40 years, it should be assigned an H rank. While these time frames represent suggested maximum limits, the actual time period for historical EOs may vary according to the biology of the element and the specific landscape context of each occurrence (including anthropogenic alteration of the environment). Thus, an H rank may be assigned to an EO before the maximum time frames have lapsed. Occurrences that have not been surveyed for periods exceeding these time frames should not be ranked A, B, C, or D. The higher maximum limit for plants and communities (i.e., ranging from 20 to 40 years) is based upon the assumption that occurrences of these elements generally have the potential to persist at a given location for longer periods of time. This greater potential is a reflection of plant biology and community dynamics. However, landscape factors must also be considered. Thus, areas with more anthropogenic impacts on the environment (e.g., development) will be at the lower end of the range, and less-impacted areas will be at the higher end.

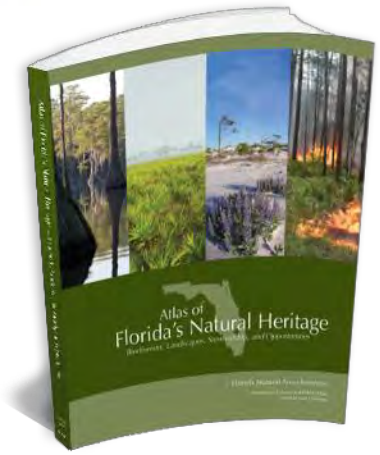
The rank of X is assigned to EOs for which there is documented destruction of habitat or environment, or persuasive evidence of eradication based on adequate survey (i.e., thorough or repeated survey efforts by one or more experienced observers at times and under conditions appropriate for the Element at that location).

ON SALE NOW

Atlas of Florida's Natural Heritage

Biodiversity, Landscapes, Stewardship, and Opportunities

The Florida Natural Areas Inventory is pleased to announce the publication of the ***Atlas of Florida's Natural Heritage: Biodiversity, Landscapes, Stewardship, and Opportunities***. This high-quality, full-color *Atlas* is sure to become a standard reference for anyone involved in the conservation, management, study, or enjoyment of Florida's rich natural resources. We hope the *Atlas* will inspire, educate, and raise awareness of and interest in biodiversity and conservation issues.



Learn more about the Atlas, view sample pages and order your copy today at:
https://www.fnai.org/publications/atlas-natural-heritage

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Appendix H
USFWS Official Species List (IPaC)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Florida Ecological Services Field Office
1339 20th Street
Vero Beach, FL 32960-3559
Phone: (772) 562-3909 Fax: (772) 562-4288
Email Address: fw4flesregs@fws.gov
https://www.fws.gov/office/florida-ecological-services

In Reply Refer To:
Project Code: 2023-0045913
Project Name: LPGA Boulevard

February 15, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. **Please include your Project Code, listed at the top of this letter, in all subsequent correspondence regarding this project.** Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of

this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Florida Ecological Services Field Office
1339 20th Street
Vero Beach, FL 32960-3559
(772) 562-3909

Project Summary

Project Code: 2023-0045913
Project Name: LPGA Boulevard
Project Type: Road/Hwy - Maintenance/Modification
Project Description: FDOT road project in Volusia County.
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@29.18857835,-81.1197574017386,14z



Counties: Volusia County, Florida

Endangered Species Act Species

There is a total of 9 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Birds

NAME	STATUS
Eastern Black Rail *Laterallus jamaicensis ssp. jamaicensis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10477	Threatened
Florida Scrub-jay *Aphelocoma coerulescens* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6174	Threatened

Reptiles

NAME	STATUS
Eastern Indigo Snake *Drymarchon couperi* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/646	Threatened
Green Sea Turtle *Chelonia mydas* Population: North Atlantic DPS There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6199	Threatened
Hawksbill Sea Turtle *Eretmochelys imbricata* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3656	Endangered
Leatherback Sea Turtle *Dermochelys coriacea* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1493	Endangered
Loggerhead Sea Turtle *Caretta caretta* Population: Northwest Atlantic Ocean DPS There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1110	Threatened

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Rugel's Pawpaw *Deeringothamnus rugelii* Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5355	Endangered

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American Kestrel *Falco sparverius paulus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9587	Breeds Apr 1 to Aug 31
American Oystercatcher *Haematopus palliatus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8935	Breeds Apr 15 to Aug 31

NAME	BREEDING SEASON
Bachman's Sparrow *Aimophila aestivalis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/6177	Breeds May 1 to Sep 30
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Sep 1 to Jul 31
Black Skimmer *Rynchops niger* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5234	Breeds May 20 to Sep 15
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Great Blue Heron *Ardea herodias occidentalis* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Jan 1 to Dec 31
Gull-billed Tern *Gelochelidon nilotica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9501	Breeds May 1 to Jul 31
Henslow's Sparrow *Ammodramus henslowii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3941	Breeds elsewhere
Lesser Yellowlegs *Tringa flavipes* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Magnificent Frigatebird *Fregata magnificens* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Oct 1 to Apr 30
Painted Bunting *Passerina ciris* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Apr 25 to Aug 15
Prairie Warbler *Dendroica discolor* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31

NAME	BREEDING SEASON
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Reddish Egret *Egretta rufescens* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/7617	Breeds Mar 1 to Sep 15
Ruddy Turnstone *Arenaria interpres morinella* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Short-billed Dowitcher *Limnodromus griseus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Swallow-tailed Kite *Elanoides forficatus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8938	Breeds Mar 10 to Jun 30
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5
Wilson's Plover *Charadrius wilsonia* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 1 to Aug 20

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

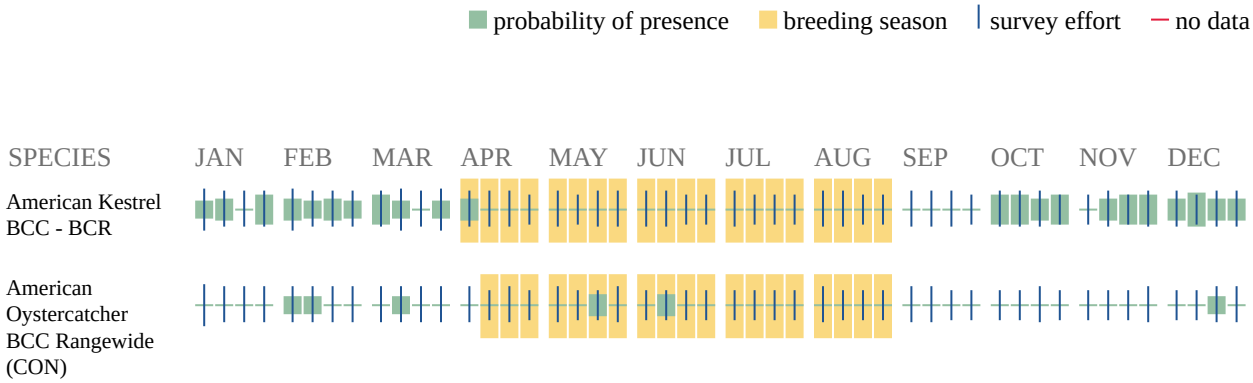
1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

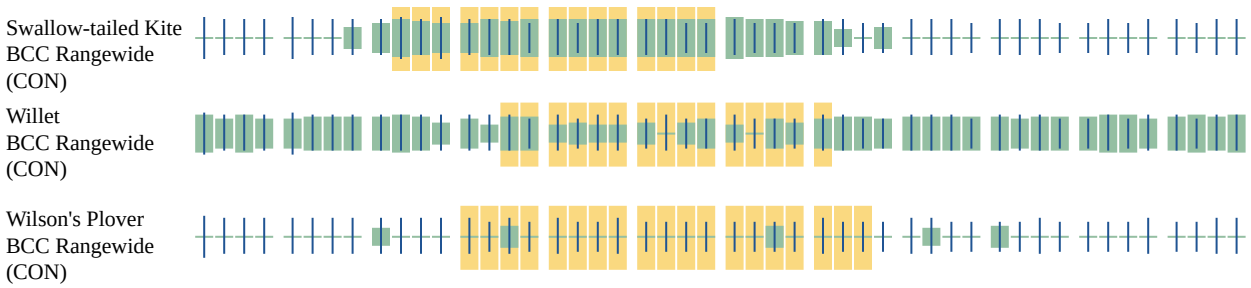
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.




Bachman's Sparrow BCC Rangewide (CON)
Bald Eagle Non-BCC Vulnerable
Black Skimmer BCC Rangewide (CON)
Chimney Swift BCC Rangewide (CON)
Great Blue Heron BCC - BCR
Gull-billed Tern BCC Rangewide (CON)
Henslow's Sparrow BCC Rangewide (CON)
Lesser Yellowlegs BCC Rangewide (CON)
Magnificent Frigatebird BCC - BCR
Painted Bunting BCC - BCR
SPECIES
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Prairie Warbler BCC Rangewide (CON)
Red-headed Woodpecker BCC Rangewide (CON)
Reddish Egret BCC Rangewide (CON)
Ruddy Turnstone BCC - BCR
Short-billed Dowitcher BCC Rangewide (CON)



Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list

of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical

Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

THERE ARE NO WETLANDS WITHIN YOUR PROJECT AREA.

IPaC User Contact Information

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State:	FL
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Appendix I
Species Observations Maps



FDOT

SPECIES OBSERVATIONS

LPGA BOULEVARD FROM US 92 (SR 600) TO WILLIAMSON BOULEVARD PD&E STUDY
VOLUSIA COUNTY, FLORIDA
PROJECT OVERVIEW



FDOT

0 200
FEET

1 OF 1

LPGA BOULEVARD FROM US 92 (SR 600) TO WILLIAMSON BOULEVARD PD&E STUDY
VOLUSIA COUNTY, FLORIDA
GOPHER TORTOISE BURROWS

Appendix J

Effect Determination Keys for Listed Species

THE CORPS OF ENGINEERS, JACKSONVILLE DISTRICT, U. S. FISH AND WILDLIFE SERVICE, JACKSONVILLE ECOLOGICAL SERVICES FIELD OFFICE AND STATE OF FLORIDA EFFECT DETERMINATION KEY FOR THE WOOD STORK IN CENTRAL AND NORTH PENINSULAR FLORIDA
September 2008

Purpose and Background

The purpose of this document is to provide a tool to improve the timing and consistency of review of Federal and State permit applications and Federal civil works projects, for potential effects of these projects on the endangered wood stork (*Mycteria americana*) within the Jacksonville Ecological Services Field Office (JAFL) geographic area of responsibility (GAR see below). The key is designed primarily for Corps Project Managers in the Regulatory and Planning Divisions and the Florida Department of Environmental Protection or its authorized designee, or Water Management Districts. The tool consists of the following dichotomous key and reference material. The key is intended to be used to evaluate permit applications and Corps' civil works projects for impacts potentially affecting wood storks or their wetland habitats. At certain steps in the key, the user is referred to graphics depicting known wood stork nesting colonies and their core foraging areas (CFA), footnotes, and other support documents. The graphics and supporting documents may be downloaded from the Corps' web page at http://www.saj.usace.army.mil/permit or at the JAFL web site at http://www.fws.gov/northflorida/WoodStorks. We intend to utilize the most recent information for both the graphics and supporting information; so should this information be updated, we will modify it accordingly. **Note: This information is provided as an aid to project review and analysis, and is not intended to substitute for a comprehensive biological assessment of potential project impacts. Such assessments are site-specific and usually generated by the project applicant or, in the case of civil works projects, by the Corps or project co-sponsor.**

Explanatory footnotes provided in the key must be closely followed whenever encountered.

Scope of the key

This key should only be used in the review of permit applications for effects determinations on wood storks within the JAFL GAR, and not for other listed species. Counties within the JAFL GAR include Alachua, Baker, Bradford, Brevard, Citrus, Clay, Columbia, Dixie, Duval, Flagler, Gilchrist, Hamilton, Hernando, Hillsborough, Lafayette, Lake, Levy, Madison, Manatee, Marion, Nassau, Orange, Pasco, Pinellas, Putnam, St. Johns, Seminole, Sumter, Suwannee, Taylor, Union, and Volusia.

The final effect determination will be based on project location and description, the potential effects to wood storks, and any measures (for example project components, special permit conditions) that avoid or minimize direct, indirect, and/or cumulative

impacts to wood storks and/or suitable wood stork foraging habitat. Projects that key to a "no effect" determination do not require additional consultation or coordination with the JAFL. Projects that key to "NLAA" also do not need further consultation; however, the JAFL staff will assist the Corps if requested, to answer questions regarding the appropriateness of mitigation options. Projects that key to a "may affect" determination equate to "likely to adversely affect" situations, and those projects should not be processed under the SPGP or any other programmatic general permit. For all "may affect" determinations, Corps Project Managers should request the JAFL to initiate formal consultation on the Wood stork.

Summary of General Wood Stork Nesting and Foraging Habitat Information

The wood stork is primarily associated with freshwater and estuarine habitats that are used for nesting, roosting, and foraging. Wood storks typically nest colonially in medium to tall trees that occur in stands located either in swamps or on islands surrounded by relatively broad expanses of open water (Ogden 1991; Rodgers et al. 1996). Successful breeding sites are those that have limited human disturbance and low exposure to land based predators. Nesting sites protected from land-based predators are characterized as those surrounded by large expanses of open water or where the nest trees are inundated at the onset of nesting and remain inundated throughout most of the breeding cycle. These colonies have water depths between 0.9 and 1.5 meters (3 and 5 feet) during the breeding season.

In addition to limited human disturbance and land-based predation, successful nesting depends on the availability of suitable foraging habitat. Such habitat generally results from a combination of average or above-average rainfall during the summer rainy season, and an absence of unusually rainy or cold weather during the winter-spring breeding season (Kahl 1964; Rodgers et al. 1987). This pattern produces widespread and prolonged flooding of summer marshes that tends to maximize production of freshwater fishes, followed by steady drying that concentrate fish during the season when storks nest (Kahl 1964). Successful nesting colonies are those that have a large number of foraging sites. To maintain a wide range of foraging opportunities, a variety of wetland habitats exhibiting short and long hydroperiods should be present. In terms of wood stork foraging, the Service (1999) describes a short hydroperiod as one where a wetland fluctuates between wet and dry in 1 to 5-month cycles, and a long hydroperiod where the wet period is greater than five consecutive months. Wood storks during the wet season generally feed in the shallow water of short-hydroperiod wetlands and in coastal habitats during low tide. During the dry season, foraging shifts to longer hydroperiod interior wetlands as they progressively dry down (though usually retaining some surface water throughout the dry season).

Because of their specialized feeding behavior, wood storks forage most effectively in shallow-water areas with highly concentrated prey. Typical foraging sites for the wood stork include freshwater marshes, depressions in cypress heads, swamp sloughs, managed impoundments, stock ponds, shallow-seasonally flooded roadside or agricultural ditches, and narrow tidal creeks or shallow tidal pools. Good foraging conditions are characterized by water that is relatively calm, open, and having water depths between 5 and 15 inches (5 and 38 cm). Preferred foraging habitat includes wetlands exhibiting a mosaic of submerged and/or emergent aquatic vegetation, and shallow, open-water areas subject to hydrologic

regimes ranging from dry to wet. The vegetative component provides nursery habitat for small fish, frogs, and other aquatic prey, and the shallow, open-water areas provide sites for concentration of the prey during daily or seasonal low water periods.

WOOD STORK KEY

Although designed primarily for use by Corps Project Managers in the Regulatory and Planning Divisions, and State Regulatory agencies or their designees, project permit applicants and co-sponsors of civil works projects may find this key and its supporting documents useful in identifying potential project impacts to wood storks, and planning how best to avoid, minimize, or compensate for any identified adverse effects.

A. Project within 2,500 feet of an active colony site[1]……*May affect*

Project more than 2,500 feet from a colony site……go to B

B. Project does not affect suitable foraging habitat[2] (SFH)…….*no effect*

Project impacts SFH[2]……go to C

C. Project impacts to SFH are less than or equal to 0.5 acre[3]…….....*NLAA*[4]

Project impacts to SFH are greater than or equal to 0.5 acre..……...go to D

D. Project impacts to SFH not within a Core Foraging Area[5] (see attached map) of a colony site, and no wood storks have been documented foraging on site…….....NLAA[4]

Project impacts to SFH are within the CFA of a colony site, or wood storks have been documented foraging on a project site outside the CFA ……..….go to E

E. Project provides SFH compensation within the Service Area of a Service-approved wetland mitigation bank or wood stork conservation bank preferably within the CFA, or consists of SFH compensation within the CFA consisting of enhancement, restoration or creation in a project phased approach that provides an amount of habitat and foraging function equivalent to that of impacted SFH (see *Wood Stork Foraging Habitat Assessment Procedure*[6] for guidance), is not contrary to the Service's *Habitat Management Guidelines For The Wood Stork In The Southeast Region* and in accordance with the CWA section 404(b)(1) guidelines……*NLAA*[4]

Project does not satisfy these elements.……....……...*May affect*

[1] An active nesting site is defined as a site currently supporting breeding pairs of wood storks, or has supported breeding wood storks at least once during the preceding 10-year period.

[2] Suitable foraging habitat (SFH) is described as any area containing patches of relatively open (< 25% aquatic vegetation), calm water, and having a permanent or seasonal water depth between 2 and 15 inches (5 to 38 cm). SFH supports and concentrates, or is capable of supporting and concentrating small fish, frogs, and other aquatic prey. Examples of SFH include, but are not limited to, freshwater marshes and stock ponds, shallow, seasonally flooded roadside or agricultural ditches, narrow tidal creeks or shallow tidal pools, managed impoundments, and depressions in cypress heads and swamp sloughs. See above *Summary of General Wood Stork Nesting and Foraging Habitat Information*.

[3] On an individual basis, projects that impact less than 0.5 acre of SFH generally will not have a measurable effect on wood storks, although we request the Corps to require mitigation for these losses when appropriate. Wood Storks are a wide ranging species, and individually, habitat change from impacts to less than 0.5 acre of SFH is not likely to adversely affect wood storks. However, collectively they may have an effect and therefore regular monitoring and reporting of these effects are important.

[4] Upon Corps receipt of a general concurrence issued by the JAFL through the Programmatic Concurrence on this key, "NLAA" determinations for projects made pursuant to this key require no further consultation with the JAFL.

[5] The U.S. Fish and Wildlife Service (Service) has identified core foraging area (CFA) around all known wood stork nesting colonies that is important for reproductive success. In Central Florida, CFAs include suitable foraging habitat (SFH) within a 15-mile radius of the nest colony; CFAs in North Florida include SFH within a 13-mile radius of a colony. The referenced map provides locations of known colonies and their CFAs throughout Florida documented as active within the last 10 years. The Service believes loss of suitable foraging wetlands within these CFAs may reduce foraging opportunities for the wood stork.

[6]This draft document, *Wood Stork Foraging Habitat Assessment Procedure*, by Passarella and Associates, Incorporated, may serve as further guidance in ascertaining wetland foraging value to wood storks and compensating for impacts to wood stork foraging habitat.

Monitoring and Reporting Effects

For the Service to monitor cumulative effects, it is important for the Corps to monitor the number of permits and provide information to the Service regarding the number of permits issued that were determined "may affect, not likely to adversely affect." It is requested that information on date, Corps identification number, project acreage, project wetland acreage, and latitude and longitude in decimal degrees be sent to the Service quarterly.

Literature Cited

Kahl, M.P., Jr. 1964. Food ecology of the wood stork (*Mycteria americana*) in Florida. Ecological Monographs 34:97-117.

Ogden, J.C. 1991. Nesting by wood storks in natural, altered, and artificial wetlands in central and northern Florida. Colonial Waterbirds 14:39-45.

Rodgers, J.A. Jr., A.S. Wenner, and S.T. Schwikert. 1987. Population dynamics of wood storks in northern and central Florida, USA. Colonial Waterbirds 10:151-156.

Rodgers, J.A., Jr., S.T. Schwikert, and A. Shapiro-Wenner. 1996. Nesting habitat of wood storks in north and central Florida, USA. Colonial Waterbirds 19:1-21.

U.S. Fish and Wildlife Service. 1999. South Florida multi-species recovery plan. Fish and Wildlife Service; Atlanta, Georgia. Available from: http://verobeach.fws.gov/Programs/Recovery/vbms5.html.

United States Department of the Interior
U. S. FISH AND WILDLIFE SERVICE
7915 BAYMEADOWS WAY, SUITE 200
JACKSONVILLE, FLORIDA 32256-7517

IN REPLY REFER TO:
August 13, 2013

Colonel Alan M. Dodd, District Engineer
Department of the Army
Jacksonville District Corps of Engineers
P.O Box 4970
Jacksonville, Florida 32232-0019
(Attn: Mr. David S. Hobbie)

RE: Update Addendum to USFWS Concurrence Letter to U.S. Army Corps of Engineers Regarding Use of the Attached Eastern Indigo Snake Programmatic Effect Determination Key

Dear Colonel Dodd:

This letter is to amend the January 25, 2010, letter to the U.S. Army Corps of Engineers regarding the use of the attached eastern indigo snake programmatic effect determination key (key). It supersedes the update addendum issued January 5, 2012.

We have evaluated the original programmatic concurrence and find it suitable and appropriate to extend its use to the remainder of Florida covered by the Panama City Ecological Services Office.

On Page 2

The following replaces the last paragraph above the signatures:

"Thank you for your continued cooperation in the effort to conserve fish and wildlife resources. Any questions or comments should be directed to Annie Dziergowski (North Florida ESO) at 904-731-3089, Harold Mitchell (Panama City ESO) at 850-769-0552, or Victoria Foster (South Florida ESO) at 772-469-4269."

On Page 3

The following replaces both paragraphs under "Scope of the key":

"This key should be used only in the review of permit applications for effects determinations for the eastern indigo snake within the State of Florida, and not for other listed species or for aquatic resources such as Essential Fish Habitat (EFH)."

On Page 4

The following replaces the first paragraph under Conservation Measures:

"The Service routinely concurs with the Corps' "not likely to adversely affect" (NLAA) determination for individual project effects to the eastern indigo snake when assurances are given that

our *Standard Protection Measures for the Eastern Indigo Snake* (Service 2013) located at: http://www.fws.gov/northflorida/IndigoSnakes/indigo-snakes.htm will be used during project site preparation and project construction. There is no designated critical habitat for the eastern indigo snake."

On Page 4 and Page 5 (Couplet D)

The following replaces D. under Conservation Measures:

D. The project will impact less than 25 acres of xeric habitat (scrub, sandhill, or scrubby flatwoods) or less than 25 active and inactive gopher tortoise burrows.....*go to* E

The project will impact more than 25 acres of xeric habitat (scrub, sandhill, or scrubby flatwoods) or more than 25 active and inactive gopher tortoise burrows and consultation with the Service is requested[2].....*"may affect"*

On Page 5

The following replaces footnote #3:

"[3]If excavating potentially occupied burrows, active or inactive, individuals must first obtain state authorization via a FWC Authorized Gopher Tortoise Agent permit. The excavation method selected should also minimize the potential for injury of an indigo snake. Applicants should follow the excavation guidance provided within the most current Gopher Tortoise Permitting Guidelines found at http://myfwc.com/gophertortoise ."

Thank you for making these amendments concerning the Eastern Indigo Snake Key. If you have any questions, please contact Jodie Smithem of my staff at the address on the letterhead, by email at jodie_smithem@fws.gov, or by calling (904)731-3134.

Sincerely,

Dawn Jennings
Acting Field Supervisor

cc:
Panama City Ecological Services Field Office, Panama City, FL
South Florida Ecological Services Field Office, Vero Beach, FL

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
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January 25, 2010

David S. Hobbie
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Service Federal Activity Code: 41420-2009-FA-0642
Service Consultation Code: 41420-2009-I-0467
41910-2010-I-0045
Subject: North and South Florida Ecological Services Field Offices Programmatic Concurrence for Use of Original Eastern Indigo Snake Key(s) Until Further Notice

Dear Mr. Hobbie:

The U.S. Fish and Wildlife Service's (Service) South and North Florida Ecological Services Field Offices (FO), through consultation with the U.S. Army Corps of Engineers Jacksonville District (Corps), propose revision to both Programmatic concurrence letters/keys for the federally threatened Eastern Indigo Snake (*Drymarchon corais couperi*), (indigo snake), and now provide one key for both FO's. The original programmatic key was issued by the South Florida FO on November 9, 2007. The North Florida FO issued a revised version of the original key on September 18, 2008. Both keys were similar in content, but reflected differences in geographic work areas between the two Field Offices. The enclosed key satisfies each office's responsibilities under the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C.1531 *et seq.*).

Footnote number 3 in the original keys indicated "A member of the excavation team should be authorized for Incidental Take during excavation through either a section 10(a)(1)(A) permit issued by the Service or an incidental take permit issued by the Florida Fish and Wildlife Conservation Commission (FWC)." We have removed this reference to a Service issued Section 10(a)(1)(A) permit, as one is not necessary for this activity. We also referenced the FWC's revised April 2009 Gopher Tortoise Permitting Guidelines with a link to their website for updated excavation guidance, and have provided a website link to our Standard Protection Measures. All other conditions and criteria apply.

We believe the implementation of the attached key achieves our mutual goal for all users to make consistent effect determinations regarding this species. The use of this key for review of projects

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located in all referenced counties in our respective geographic work areas leads the Service to concur with the Corps' determination of "may affect, not likely to adversely affect" (MANLAA) for the Eastern indigo snake. The biological rationale for the determinations is contained within the referenced documents and is submitted in accordance with section 7 of the Act.

Should circumstances change or new information become available regarding the eastern indigo snake or implementation of the key, the determinations may be reconsidered as deemed necessary.

Thank you for your continued cooperation in the effort to conserve fish and wildlife resources. Any questions or comments should be directed to either Allen Webb (Vero Beach) at 772-562-3909, extension 246, or Jay Herrington (Jacksonville) at 904-731-3326.

Sincerely,

Paul Souza
Field Supervisor
South Florida Ecological Services Office

David L. Hankla
Field Supervisor
North Florida Ecological Services Office

Enclosure

cc: electronic only
FWC, Tallahassee, Florida (Dr. Elsa Haubold)
Service, Jacksonville, Florida (Jay Herrington)
Service, Vero Beach, Florida (Sandra Sneckenberger)

Eastern Indigo Snake Programmatic Effect Determination Key

Scope of the key

This key should be used only in the review of permit applications for effects determinations within the North and South Florida Ecological Services Field Offices Geographic Areas of Responsibility (GAR), and not for other listed species or for aquatic resources such as Essential Fish Habitat (EFH). Counties within the **North** Florida GAR include Alachua, Baker, Bradford, Brevard, Citrus, Clay, Columbia, Dixie, Duval, Flagler, Gilchrist, Hamilton, Hernando, Hillsborough, Lafayette, Lake, Levy, Madison, Manatee, Marion, Nassau, Orange, Pasco, Pinellas, Putnam, St. Johns, Seminole, Sumter, Suwannee, Taylor, Union, and Volusia.

Counties in the **South** Florida GAR include Broward, Charlotte, Collier, De Soto, Glades, Hardee, Hendry, Highlands, Lee, Indian River, Martin, Miami-Dade, Monroe, Okeechobee, Osceola, Palm Beach, Polk, Sarasota, St. Lucie.

Habitat

Over most of its range, the eastern indigo snake frequents several habitat types, including pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks, edges of freshwater marshes, agricultural fields, coastal dunes, and human-altered habitats (Service 1999). Eastern indigo snakes appear to need a mosaic of habitats to complete their life cycle. Wherever the eastern indigo snake occurs in xeric habitats, it is closely associated with the gopher tortoise *(Gopherus polyphemus),* the burrows of which provide shelter from winter cold and summer desiccation (Speake et al. 1978; Layne and Steiner 1996). Interspersion of tortoise-inhabited uplands and wetlands improves habitat quality for this species (Landers and Speake 1980; Auffenberg and Franz 1982).

In south Florida, agricultural sites, such as sugar cane fields, created in former wetland areas are occupied by eastern indigo snakes (Enge pers. comm. 2007). Formerly, indigo snakes would have only occupied higher elevation sites within the wetlands. The introduction of agriculture and its associated canal systems has resulted in an increase in rodents and other species of snakes that are prey for eastern indigo snakes. The result is that indigos occur at higher densities in these areas than they did historically.

Even though thermal stress may not be a limiting factor throughout the year in south Florida, indigo snakes still seek and use underground refugia. On the sandy central ridge of central Florida, eastern indigos use gopher tortoise burrows more (62 percent) than other underground refugia (Layne and Steiner 1996). Other underground refugia used include armadillo (*Dasypus novemcinctus*) burrows near citrus groves, cotton rat (*Sigmodon hispidus*) burrows, and land crab (*Cardisoma guanhumi*) burrows in coastal areas (Service 2006). Natural ground holes, hollows at the base of trees or shrubs, ground litter, trash piles, and crevices of rock-lined ditch walls are also used (Layne and Steiner 1996). These refugia are used most frequently where tortoise burrows are not available, principally in low-lying areas off the central and coastal ridges. In extreme south Florida (the Everglades and Florida Keys), indigo snakes are found in tropical

hardwood hammocks, pine rocklands, freshwater marshes, abandoned agricultural land, coastal prairie, mangrove swamps, and human-altered habitats (Steiner et al. 1983). It is suspected that they prefer hammocks and pine forests, because most observations occur in these habitats disproportionately to their presence in the landscape (Steiner et al. 1983). Hammocks may be important breeding areas as juveniles are typically found there. The eastern indigo snake is a snake-eater so the presence of other snake species may be a good indicator of habitat quality.

Conservation Measures

The Service routinely concurs with the Corps' "not likely to adversely affect" (NLAA) determination for individual project effects to the eastern indigo snake when assurances are given that our *Standard Protection Measures for the Eastern Indigo Snake* (Service 2004) located at: http://www.fws.gov/northflorida/IndigoSnakes/indigo-snakes will be used during project site preparation and project construction. There is no designated critical habitat for the eastern indigo snake.

In an effort to reduce correspondence in effect determinations and responses, the Service is providing an Eastern Indigo Snake Effect Determination Key, similar in utility to the West Indian Manatee Effect Determination Key and the Wood Stork Effect Determination Keys presently being utilized by the Corps. If the use of this key results in a Corps' determination of "no effect" for a particular project, the Service supports this determination. If the use of this Key results in a determination of NLAA, the Service concurs with this determination and no additional correspondence will be necessary[1]. This key is subject to revisitation as the Corps and Service deem necessary.

A. Project is not located in open water or salt marsh.....*go to* B

Project is located solely in open water or salt marsh.....*"no effect"*

B. Permit will be conditioned for use of the Service's *Standard Protection Measures For The Eastern Indigo Snake* during site preparation and project construction.....*go to* C

Permit will not be conditioned as above for the eastern indigo snake, or it is not known whether an applicant intends to use these measures and consultation with the Service is requested[2] .....*"may affect"*

C. There are gopher tortoise burrows, holes, cavities, or other refugia where a snake could be buried or trapped and injured during project activities .....*go to* D

There are no gopher tortoise burrows, holes, cavities, or other refugia where a snake could be buried or trapped and injured during project activities .....*"NLAA"*

D. The project will impact less than 25 acres of xeric habitat supporting less than 25 active and inactive gopher tortoise burrows.....*go to* E

The project will impact more than 25 acres of xeric habitat or more than 25 active and inactive gopher tortoise burrows and consultation with the Service is requested[2]..... *"may affect"*

E. Any permit will be conditioned such that all gopher tortoise burrows, active or inactive, will be evacuated prior to site manipulation in the vicinity of the burrow[3]. If an indigo snake is encountered, the snake must be allowed to vacate the area prior to additional site manipulation in the vicinity. Any permit will also be conditioned such that holes, cavities, and snake refugia other than gopher tortoise burrows will be inspected each morning before planned site manipulation of a particular area, and, if occupied by an indigo snake, no work will commence until the snake has vacated the vicinity of proposed work..... *"NLAA"*

Permit will not be conditioned as outlined above and consultation with the Service is requested[2] ..... *"may affect"*

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[1]With an outcome of "no effect" or "NLAA" as outlined in this key, the requirements of section 7 of the Act are fulfilled for the eastern indigo snake and no further action is required.

[2]Consultation may be concluded informally or formally depending on project impacts.

[3] If burrow excavation is utilized, it should be performed by experienced personnel. The method used should minimize the potential for injury of an indigo snake. Applicants should follow the excavation guidance provided within the Florida Fish and Wildlife Conservation Commission's revised April 2009 Gopher Tortoise Permitting Guidelines located at **http://myfwc.com/License/Permits_ProtectedWildlife.htm#gophertortoise**. A member of the excavation team should be authorized for Incidental Take during excavation through an incidental take permit issued by the Florida Fish and Wildlife Conservation Commission.

Appendix K

List of Wetlands and Other Surface Waters within Study Areas

LPGA Blvd. from US 92 (SR 600) to Williamson Blvd PD&E Study

Wetlands within Roadway Study Area

Wetland ID	Wetland Acreage
WL-1F	6.1160
WL-1H	8.4173
WL-2F	0.7312
WL-2H	2.5341
WL-3H	2.1221
WL-4F	1.2364
WL-4H	1.2568
WL-5F	0.3509
WL-5H	0.2929
WL-6F	0.1926
WL-6H	0.6399
WL-7F	1.1449
WL-7H	1.0115
WL-8F	1.6877
WL-8H	1.3686
WL-9F	0.0995
WL-10F	3.4164
WL-10H	6.1291
WL-11F	0.3505
WL-12H	4.1791
WL-13H	0.0801
WL-14F	2.2619
WL-14H	3.2707
WL-15H	0.6710
WL-16F	0.7325
WL-17H	0.3775
WL-18F	0.6483
WL-19H	0.1867
WL-20H	0.4891
WL-21H	0.0131
WL-22H	0.0796
WL-23H	0.0197
WL-24H	0.4070
WL-25H	0.1009
WL-26F	1.5711
WL-26H	0.1228
WL-27S	0.0838
WL-28H	0.1570
WL-29H	0.1939
WL-30H	0.1221
WL-31H	0.3508
WL-32H	0.2547
WL-33H	2.8461
WL-34H	0.2710
WL-35H	0.0948
WL-36H	0.1631
WL-37H	0.0812
WL-38H	0.1720
WL-39H	0.0625
WL-40H	0.1140
WL-40H	0.1388
WL-41H	0.0278
WL-42H	0.1624
WL-43H	0.0378
WL-44H	0.2565
WL-45F	0.5126

Wetland ID	Wetland Acreage
WL-46H	0.0927
WL-47F	0.2089
WL-48H	3.3526
WL-49F	1.5350
WL-50F	1.7968
WL-51F	0.2188
WL-52F	0.7490
WL-53H	1.6957
WL-54F	1.8475
WL-54H	0.4327
WL-55F	0.0503
WL-56F	0.8105
WL-57H	0.0568
WL-58F	0.7184
WL-59F	2.5418
WL-59H	0.5415
WL-60F	0.2128
WL-61F	0.8405
WL-61H	0.1394
WL-62H	0.0053
WL-63F	1.5880
WL-63H	0.4547
WL-64H	1.4619
WL-65F	0.7588
WL-66F	0.3695
WL-67F	0.3281
WL-68H	0.0680
WL-69H	0.0511
WL-70H	0.0055
WL-71H	0.0062
WL-72H	0.2231
WL-73H	0.1008
WL-74F	0.1321
WL-74H	0.0559
WL-75F	0.1041
WL-76F	1.4753
WL-77H	0.1317
WL-78H	0.0577
WL-79H	0.5439
WL-80S	0.3688
WL-81H	0.1324
WL-82H	0.1255
WL-83H	0.7477
WL-84H	0.0438
WL-85H	0.2894
WL-86H	2.0587
WL-87H	0.0786
WL-88H	0.5967
WL-89H	0.1170
WL-90H	0.1510
WL-91H	0.3943
WL-92H	0.0240
WL-93H	0.0586
WL-94H	0.3243
WL-95H	0.4825
WL-96H	0.0245

LPGA Blvd. from US 92 (SR 600) to Williamson Blvd PD&E Study

Surface Waters within Roadway Study Area

Surface Water ID	Surface Water Acreage
SW-1	0.2875
SW-2	0.2601
SW-3	0.0077
SW-4	0.7520
SW-4	0.2645
SW-5	0.0171
SW-6	0.0122
SW-7	0.1717
SW-8	0.0342
SW-9	0.3417
SW-10	0.0933
SW-11	0.0172
SW-12	0.0414
SW-13	0.1483
SW-14	0.8270
SW-15	2.0746
SW-16	1.8812
SW-17	3.0628
SW-18	0.6320
SW-19	2.4883
SW-20	1.4901
SW-21	0.7902
SW-22	0.5222
SW-23	0.2001
SW-24	1.4853

Wetlands within Preferred Pond and Floodplain Compensation Sites

Wetland ID	Wetland Acreage
WL-1BH	6.9635
WL-2B2H	0.1268
WL-2B3H	0.0505
WL-5B1F	1.8838
WL-6C1F	0.9222
WL-7AF	0.1649
WL-8B1F	0.4972
WL-9C1F	1.4769
WL-9C2H	0.0201
WL-11A1F	1.0938

Appendix M

List of Wetland and Other Surface Water Impacts

LPGA Blvd. from US 92 (SR 600) to Williamson Blvd PD&E Study

Wetland Impact Areas within Existing ROW

Wetland ID	Wetland Acreage
WL-1F	0.2575
WL-1H	7.9483
WL-2F	0.0001
WL-2H	2.1953
WL-3H	1.6824
WL-4F	0.0884
WL-4H	1.2568
WL-5F	0.0188
WL-5H	0.2929
WL-6F	0.0225
WL-6H	0.6399
WL-7F	0.1577
WL-7H	1.0115
WL-8F	0.2215
WL-8H	1.3686
WL-9F	0.0016
WL-10F	0.0301
WL-10H	5.7154
WL-12H	4.1283
WL-14F	0.0111
WL-14H	3.0937
WL-15H	0.6710
WL-16F	0.0119
WL-17H	0.3775
WL-18F	0.0014
WL-19H	0.1867
WL-20H	0.4891
WL-21H	0.0131
WL-22H	0.0796
WL-24H	0.4070
WL-25H	0.0377
WL-26F	0.6918
WL-26H	0.0716
WL-27S	0.0838
WL-28H	0.1570
WL-29H	0.1939
WL-31H	0.3508
WL-33H	2.8360
WL-34H	0.2710
WL-35H	0.0948
WL-36H	0.1631
WL-37H	0.0812
WL-38H	0.1720
WL-39H	0.0625
WL-40H	0.1140
WL-40H	0.1388
WL-41H	0.0278
WL-44H	0.2565
WL-48H	1.3713

Wetland ID	Wetland Acreage
WL-49F	0.0858
WL-50F	0.2717
WL-51F	0.0145
WL-52F	0.0899
WL-53H	0.4849
WL-54F	0.1386
WL-54H	0.3725
WL-56F	0.0401
WL-57H	0.0568
WL-58F	0.0350
WL-59F	0.1372
WL-59H	0.5403
WL-61F	0.0897
WL-61H	0.1379
WL-63F	0.0953
WL-63H	0.4512
WL-64H	0.9861
WL-65F	0.0001
WL-67F	0.0243
WL-68H	0.0039
WL-69H	0.0511
WL-71H	0.0062
WL-72H	0.2231
WL-73H	0.1008
WL-74F	0.0318
WL-74H	0.0559
WL-75F	0.0431
WL-76F	0.6469
WL-77H	0.1317
WL-78H	0.0577
WL-79H	0.5439
WL-80S	0.1015
WL-81H	0.1324
WL-82H	0.1255
WL-83H	0.7477
WL-84H	0.0388
WL-85H	0.2058
WL-86H	1.9905
WL-87H	0.0786
WL-88H	0.5967
WL-89H	0.1170
WL-90H	0.1510
WL-91H	0.3943
WL-92H	0.0240
WL-93H	0.0586
WL-94H	0.3243
WL-95H	0.4825
WL-96H	0.0245
Total	51.0976

LPGA Blvd. from US 92 (SR 600) to Williamson Blvd PD&E Study

Surface Water Impact Areas within Existing ROW

Surface Water ID	Surface Water Acreage
SW-1	0.0566
SW-2	0.0103
SW-3	0.0077
SW-6	0.0000
SW-7	0.0991
SW-8	0.0092
SW-11	0.0172
SW-13	0.0447
SW-14	0.8270
SW-15	2.0746
SW-16	1.8812
SW-17	3.0628
SW-18	0.6320
SW-19	2.4883
SW-20	1.4901
SW-21	0.7902
SW-22	0.3110
SW-23	0.2001
SW-24	1.1972
Total	15.1995

Wetland Impact Areas within Preferred Pond and Floodplain Compensation Sites

Pond/FPC Site	Wetland ID	Wetland Acreage
Pond 1B	WL-1BH	1.1888
FPC 1D	WL-1BH	2.4468
	WL-48H	0.0466
Pond 2B+3A	WL-2B2H	0.1268
	WL-2B3H	0.0505
	WL-50F	0.0129
Pond 6C	WL-6C1F	0.9222
	WL-54H	0.0527
	WL-54F	0.4288
Pond 7A	WL-7AF	0.1649
	WL-9F	0.0977
Pond 8B	WL-8B1F	0.4972
	WL-58F	0.5078
Pond 9C+10A	WL-9C1F	1.4769
	WL-9C2H	0.0201
	WL-61F	0.4738
	WL-62H	0.0053
Pond 11A	WL-11A1F	1.0938
	Total	9.6136

Surface Water Impact Areas within Preferred Pond and Floodplain Compensation Sites

Pond/FPC Site	Wetland ID	Wetland Acreage
Pond 6C	SW-6	0.0120
	SW-5	0.0171
FPC 6E	SW-7	0.0010
	Total	0.0301

Appendix N
Wetland Impacts UMAM Tables

LPGA Blvd. from US 92 (SR 600) to Williamson Blvd PD&E Study
Wetland Impact Areas within Existing ROW
UMAM Scores for Herbaceous Wetland Impacts

			UMAM Scores							
			Current Condition			With Impact				
Wetland ID	NWI Classification	Impact Acreage	Landscape Support	Water Environment	Community Structure	Landscape Support	Water Environment	Community Structure	Delta	Functional Loss
WL-1H	PEM	7.9483	5	4	3	0	0	0	0.40	3.179
WL-2H	PEM	2.1953	5	4	3	0	0	0	0.40	0.878
WL-3H	PEM	1.6824	5	4	3	0	0	0	0.40	0.673
WL-4H	PEM	1.2568	4	4	3	0	0	0	0.37	0.465
WL-5H	PEM	0.2929	4	4	3	0	0	0	0.37	0.108
WL-6H	PEM	0.6399	4	4	3	0	0	0	0.37	0.237
WL-7H	PEM	1.0115	4	4	3	0	0	0	0.37	0.374
WL-8H	PEM	1.3686	4	4	3	0	0	0	0.37	0.506
WL-10H	PEM	5.7154	4	4	3	0	0	0	0.37	2.115
WL-12H	PEM	4.1283	3	4	3	0	0	0	0.33	1.362
WL-14H	PEM	3.0937	3	4	3	0	0	0	0.33	1.021
WL-15H	PEM	0.6710	3	4	3	0	0	0	0.33	0.221
WL-17H	PEM	0.3775	3	4	3	0	0	0	0.33	0.125
WL-19H	PEM	0.1867	3	4	3	0	0	0	0.33	0.062
WL-20H	PEM	0.4891	3	4	3	0	0	0	0.33	0.161
WL-21H	PEM	0.0131	3	4	3	0	0	0	0.33	0.004
WL-22H	PEM	0.0796	3	4	3	0	0	0	0.33	0.026
WL-24H	PEM	0.4070	3	4	3	0	0	0	0.33	0.134
WL-25H	PEM	0.0377	3	4	3	0	0	0	0.33	0.012
WL-26H	PEM	0.0716	3	4	3	0	0	0	0.33	0.024
WL-28H	PEM	0.1570	3	4	3	0	0	0	0.33	0.052
WL-29H	PEM	0.1939	3	4	3	0	0	0	0.33	0.064
WL-31H	PEM	0.3508	3	4	3	0	0	0	0.33	0.116
WL-33H	PEM	2.8360	3	4	3	0	0	0	0.33	0.936
WL-34H	PEM	0.2710	3	4	3	0	0	0	0.33	0.089
WL-35H	PEM	0.0948	3	4	3	0	0	0	0.33	0.031
WL-36H	PEM	0.1631	3	4	3	0	0	0	0.33	0.054
WL-37H	PEM	0.0812	3	4	3	0	0	0	0.33	0.027
WL-38H	PEM	0.1720	3	4	3	0	0	0	0.33	0.057
WL-39H	PEM	0.0625	3	4	3	0	0	0	0.33	0.021
WL-40H	PEM	0.1140	3	4	3	0	0	0	0.33	0.038
WL-40H	PEM	0.1388	3	4	3	0	0	0	0.33	0.046
WL-41H	PEM	0.0278	3	4	3	0	0	0	0.33	0.009
WL-44H	PEM	0.2565	3	4	3	0	0	0	0.33	0.085
WL-48H	PEM	1.3713	4	4	3	0	0	0	0.37	0.507
WL-53H	PEM	0.4849	3	4	3	0	0	0	0.33	0.16
WL-54H	PEM	0.3725	3	4	3	0	0	0	0.33	0.123
WL-57H	PEM	0.0568	3	4	3	0	0	0	0.33	0.019
WL-59H	PEM	0.5403	3	4	3	0	0	0	0.33	0.178
WL-61H	PEM	0.1379	3	4	3	0	0	0	0.33	0.046
WL-63H	PEM	0.4512	3	4	3	0	0	0	0.33	0.149
WL-64H	PEM	0.9861	3	4	3	0	0	0	0.33	0.325
WL-68H	PEM	0.0039	3	4	3	0	0	0	0.33	0.001
WL-69H	PEM	0.0511	3	4	3	0	0	0	0.33	0.017
WL-71H	PEM	0.0062	3	4	3	0	0	0	0.33	0.002
WL-72H	PEM	0.2231	3	4	3	0	0	0	0.33	0.074
WL-73H	PEM	0.1008	3	4	3	0	0	0	0.33	0.033
WL-74H	PEM	0.0559	3	4	3	0	0	0	0.33	0.018
WL-77H	PEM	0.1317	3	4	3	0	0	0	0.33	0.043
WL-78H	PEM	0.0577	3	4	3	0	0	0	0.33	0.019
WL-79H	PEM	0.5439	3	4	3	0	0	0	0.33	0.179
WL-81H	PEM	0.1324	3	4	3	0	0	0	0.33	0.044
WL-82H	PEM	0.1255	3	4	3	0	0	0	0.33	0.041
WL-83H	PEM	0.7477	3	4	3	0	0	0	0.33	0.247
WL-84H	PEM	0.0388	3	4	3	0	0	0	0.33	0.013
WL-85H	PEM	0.2058	3	4	3	0	0	0	0.33	0.068
WL-86H	PEM	1.9905	3	4	3	0	0	0	0.33	0.657
WL-87H	PEM	0.0786	3	4	3	0	0	0	0.33	0.026
WL-88H	PEM	0.5967	3	4	3	0	0	0	0.33	0.197
WL-89H	PEM	0.1170	3	4	3	0	0	0	0.33	0.039
WL-90H	PEM	0.1510	3	4	3	0	0	0	0.33	0.05
WL-91H	PEM	0.3943	3	4	3	0	0	0	0.33	0.13
WL-92H	PEM	0.0240	3	4	3	0	0	0	0.33	0.008
WL-93H	PEM	0.0586	3	4	3	0	0	0	0.33	0.019
WL-94H	PEM	0.3243	3	4	3	0	0	0	0.33	0.107
WL-95H	PEM	0.4825	3	4	3	0	0	0	0.33	0.159
WL-96H	PEM	0.0245	3	4	3	0	0	0	0.33	0.008
	Total Acres	**47.6537**							**Total Herbaceous Wetland Functional Loss**	**17.018**

LPGA Blvd. from US 92 (SR 600) to Williamson Blvd PD&E Study
Wetland Impact Areas within Existing ROW

UMAM Scores for Forested Wetland Impacts

			UMAM Scores							
			Current Condition			With Impact				
Wetland ID	NWI Classification	Impact Acreage	Landscape Support	Water Environment	Community Structure	Landscape Support	Water Environment	Community Structure	Delta	Functional Loss
WL-1F	PFO	0.2575	5	4	7	0	0	0	0.53	0.136
WL-2F	PFO	0.0001	5	4	7	0	0	0	0.53	0.000
WL-4F	PFO	0.0884	4	4	7	0	0	0	0.50	0.044
WL-5F	PFO	0.0188	4	4	7	0	0	0	0.50	0.009
WL-6F	PFO	0.0225	4	4	7	0	0	0	0.50	0.011
WL-7F	PFO	0.1577	4	4	7	0	0	0	0.50	0.079
WL-8F	PFO	0.2215	4	4	7	0	0	0	0.50	0.111
WL-9F	PFO	0.0016	4	4	7	0	0	0	0.50	0.001
WL-10F	PFO	0.0301	4	4	7	0	0	0	0.50	0.015
WL-14F	PFO	0.0111	3	4	7	0	0	0	0.47	0.005
WL-16F	PFO	0.0119	3	4	7	0	0	0	0.47	0.006
WL-18F	PFO	0.0014	3	4	7	0	0	0	0.47	0.001
WL-26F	PFO	0.6918	4	4	7	0	0	0	0.50	0.346
WL-49F	PFO	0.0858	4	4	7	0	0	0	0.50	0.043
WL-50F	PFO	0.2717	4	4	7	0	0	0	0.50	0.136
WL-51F	PFO	0.0145	4	4	7	0	0	0	0.50	0.007
WL-52F	PFO	0.0899	4	4	7	0	0	0	0.50	0.045
WL-54F	PFO	0.1386	4	4	7	0	0	0	0.50	0.069
WL-56F	PFO	0.0401	4	4	7	0	0	0	0.50	0.020
WL-58F	PFO	0.0350	3	4	7	0	0	0	0.47	0.016
WL-59F	PFO	0.1372	3	4	7	0	0	0	0.47	0.064
WL-61F	PFO	0.0897	3	4	7	0	0	0	0.47	0.042
WL-63F	PFO	0.0953	3	4	7	0	0	0	0.47	0.045
WL-65F	PFO	0.0001	3	4	7	0	0	0	0.47	0.000
WL-67F	PFO	0.0243	3	4	7	0	0	0	0.47	0.011
WL-74F	PFO	0.0318	3	4	7	0	0	0	0.47	0.015
WL-75F	PFO	0.0431	3	4	7	0	0	0	0.47	0.020
WL-76F	PFO	0.6469	4	4	7	0	0	0	0.50	0.323
	Total Acres	**3.2585**							**Total Forested Wetland Functional Loss**	**1.620**

UMAM Scores for Shrub Wetland Impacts

			UMAM Scores							
			Current Condition			With Impact				
Wetland ID	NWI Classification	Impact Acreage	Landscape Support	Water Environment	Community Structure	Landscape Support	Water Environment	Community Structure	Delta	Functional Loss
WL-27S	PSS	0.0838	4	4	3	0	0	0	0.37	0.031
WL-80S	PSS	0.1015	3	4	5	0	0	0	0.40	0.041
	Total Acres	**0.1853**							**Total Shrub Wetland Functional Loss**	**0.072**

LPGA Blvd. from US 92 (SR 600) to Williamson Blvd PD&E Study
Wetland Impact Areas within Preferred Pond and Floodplain Compensation Sites

UMAM Scores for Herbaceous Wetland Impacts

			UMAM Scores							
			Current Condition			With Impact				
Wetland ID	NWI Classification	Impact Acreage	Landscape Support	Water Environment	Community Structure	Landscape Support	Water Environment	Community Structure	Delta	Functional Loss
WL-1BH	PEM	1.1888	4	4	6	0	0	0	0.47	0.559
WL-1BH	PEM	2.4468	4	4	6	0	0	0	0.47	1.150
WL-48H	PEM	0.0446	4	4	3	0	0	0	0.37	0.017
WL-2B2H	PEM	0.1268	4	4	7	0	0	0	0.50	0.063
WL-2B3H	PEM	0.0505	4	4	7	0	0	0	0.50	0.025
WL-54H	PEM	0.0527	3	4	3	0	0	0	0.33	0.017
WL-9C2H	PEM	0.0201	4	4	5	0	0	0	0.43	0.009
WL-62H	PEM	0.0053	4	4	5	0	0	0	0.43	0.002
	Total Acres	**3.9356**							**Total Herbaceous Wetland Functional Loss**	**1.842**

UMAM Scores for Forested Wetland Impacts

			UMAM Scores							
			Current Condition			With Impact				
Wetland ID	NWI Classification	Impact Acreage	Landscape Support	Water Environment	Community Structure	Landscape Support	Water Environment	Community Structure	Delta	Functional Loss
WL-50F	PFO	0.0129	4	4	7	0	0	0	0.50	0.006
WL-6C1F	PFO	0.9222	4	4	7	0	0	0	0.50	0.461
WL-54F	PFO	0.4288	4	4	7	0	0	0	0.50	0.214
WL-7AF	PFO	0.1649	4	3	3	0	0	0	0.33	0.054
WL-9F	PFO	0.0977	4	4	7	0	0	0	0.50	0.049
WL-8B1F	PFO	0.4972	4	4	7	0	0	0	0.50	0.249
WL-58F	PFO	0.5078	3	4	7	0	0	0	0.47	0.239
WL-9C1F	PFO	1.4769	4	4	7	0	0	0	0.50	0.738
WL-61F	PFO	0.4738	3	4	7	0	0	0	0.47	0.223
WL-11A1F	PFO	1.0938	4	4	7	0	0	0	0.50	0.547
	Total Acres	**5.6760**							**Total Forested Wetland Functional Loss**	**2.78**

Appendix O
EFH Documents

EFH Mapper Report

EFH Data Notice

Essential Fish Habitat (EFH) is defined by textual descriptions contained in the fishery management plans developed by the regional fishery management councils. In most cases mapping data can not fully represent the complexity of the habitats that make up EFH. This report should be used for general interest queries only and should not be interpreted as a definitive evaluation of EFH at this location. A location-specific evaluation of EFH for any official purposes must be performed by a regional expert. Please refer to the following links for the appropriate regional resources.

Southeast Regional Office
Atlantic Highly Migratory Species Management Division

Query Results

Degrees, Minutes, Seconds: Latitude = 29º 13' 3" N, Longitude = 82º 53' 28" W
Decimal Degrees: Latitude = 29.218, Longitude = -81.109

The query location intersects with spatial data representing EFH and/or HAPCs for the following species/management units.

EFH

No Essential Fish Habitats (EFH) were identified at the report location.

Salmon EFH

No Pacific Salmon Essential Fish Habitat (EFH) were identified at the report location.

HAPCs

No Habitat Areas of Particular Concern (HAPC) were identified at the report location.

EFH Areas Protected from Fishing

No EFH Areas Protected from Fishing (EFHA) were identified at the report location.

Spatial data does not currently exist for all the managed species in this area. The following is a list of species or management units for which there is no spatial data.
****For links to all EFH text descriptions see the complete data inventory: open data inventory -->**

South Atlantic Shrimp EFH,
Brown Shrimp,
Pink Shrimp,
Rock Shrimp,
White Shrimp,
South Atlantic Dolphin Wahoo EFH,
Wahoo,
South Atlantic Sargassum EFH,
Sargassum,
South Atlantic HAPCs,
Coastal Migratory Pelagics,
Golden Crab,
Sargassum,

Spatial data does not currently exist for all the managed species in this area. The following is a list of species or management units for which there is no spatial data. ****For links to all EFH text descriptions see the complete data inventory: open data inventory -->**
Secretarial EFH, Bigeye Sand Tiger Shark, Bigeye Sixgill Shark, Caribbean Sharpnose Shark, Galapagos Shark, Narrowtooth Shark, Sevengill Shark, Sixgill Shark, Smooth Hammerhead Shark, Smalltail Shark

Moore, Voni

Subject: FW: Tomoka River along the LPGA from SR 600 to Williamson Blvd PD&E Study (FM# 448456-1)

From: Blouin, Jesse <Jesse.Blouin@dot.state.fl.us>
Sent: Monday, January 31, 2022 8:09 AM
To: Chasez, Heather <Heather.Chasez@dot.state.fl.us>; Muchuruza, Victor <victor.muchuruza@hdrinc.com>
Subject: RE: Tomoka River along the LPGA from SR 600 to Williamson Blvd PD&E Study (FM# 448456-1)

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Thanks, Heather!!

Jesse Blouin, AICP
Inwood Consulting Engineers, In-House Consultant for:
FDOT Environmental Management Office - District 5
719 S. Woodland Blvd.
DeLand, FL 32720

Direct Line: 386-943-5167
Cell Phone: 407-470-7216

From: Chasez, Heather <Heather.Chasez@dot.state.fl.us>
Sent: Monday, January 31, 2022 7:21 AM
To: Muchuruza, Victor <victor.muchuruza@hdrinc.com>; Blouin, Jesse <Jesse.Blouin@dot.state.fl.us>
Subject: FW: Tomoka River along the LPGA from SR 600 to Williamson Blvd PD&E Study (FM# 448456-1)

Good morning,

Please see below. The issue has been resolved. NMFS does not have jurisdiction for this area.

Cheers,

Heather Chasez
Environmental Specialist IV
Project Compliance Coordinator
FDOT District Five
719 S. Woodland Blvd.
DeLand, FL 32720
Phone: (386) 943-5393

From: Kurtis Gregg - NOAA Federal <kurtis.gregg@noaa.gov>
Sent: Friday, January 28, 2022 9:29 AM
To: Chasez, Heather <Heather.Chasez@dot.state.fl.us>
Subject: Re: Tomoka River along the LPGA from SR 600 to Williamson Blvd PD&E Study (FM# 448456-1)

EXTERNAL SENDER: Use caution with links and attachments.

Hi Heather,

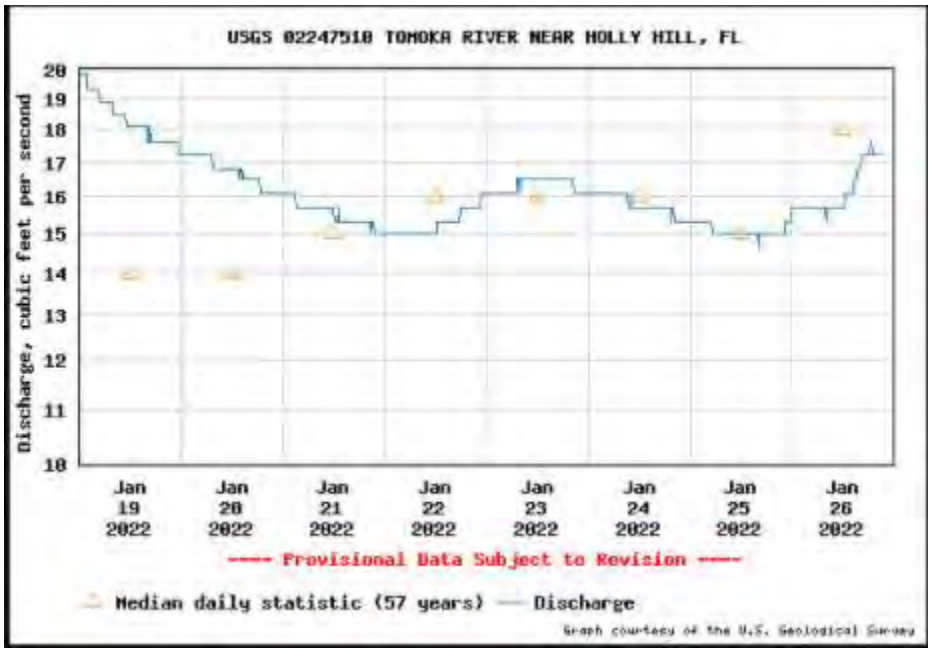
Based on your email and attached information, I agree the LPGA bridge does not appear to be tidal. I do not believe an EFH consultation is required for the proposed bridge work, however the initial determination is up to the federal action agency (FDOT if FHWA funded or USACE/USCG if permitting). I have also reviewed information regarding Endangered Species Act listed species. I do not see a route to effect for any ESA listed species under NMFS' purview. Based on these findings, the NMFS recommends avoidance or minimization and mitigation of unavoidable impacts to wetlands within and adjacent to the project area under the Fish and Wildlife Coordination Act. Please let me know if you have any questions about these comments.

Thanks,

Kurtis

On Thu, Jan 27, 2022 at 5:03 PM Chasez, Heather <Heather.Chasez@dot.state.fl.us> wrote:

> Hello Kurtis,
>
> To follow up on our previous coordination, the project team has looked further into this and has determined that this area is not tidally influenced. Below is how they made that determination.
>
> 1. They reviewed the FEMA info for Volusia County (the Flood Insurance Rate Maps [FIRMs] and the Flood Insurance Study [FIS]). The FIS includes river profiles which can provide the limits of coastal/flooding (storm surge) for the 100-year event, which would also provide the limits of tidal influence for the 100-year event. In this case, the flood profile for the Tomoka shows the upstream limits of coastal effects in the vicinity of the US 1 crossing, well downstream of LPGA Blvd. A coastal engineer at INTERA also reviewed this, and he confirmed this finding. The Tomoka River profile from FIA is attached. The FIRM maps are too large to attach to this email, so please let me know if you require them and I will send them via FTA. Both show some river cross sections, which help identify where you are along the river.
>
> 2. There is also a USGS gauge station at the LPGA crossing. Info can be found at https://waterdata.usgs.gov/nwis/nwismap/?site_no=02247510&agency_cd=USGS
>
> They checked the daily water elevations for the past week, and there is no indication of tidal flow – see the below graph of river stages over the past few days, there is no tidal fluctuation



Additionally, correspondence received from a FDEP PLS has also confirmed that this area is non-tidal, please see the attached letter.

Please review and let me know whether you concur or if you need additional information.

Thank you,

Heather Chasez

Environmental Specialist IV

Project Compliance Coordinator

FDOT District Five

719 S. Woodland Blvd.

DeLand, FL 32720

Phone: (386) 943-5393

--
Kurtis Gregg,
Natural Resource Specialist,
NOAA, National Marine Fisheries Service,
Southeast Regional Office,
Habitat Conservation Division
400 N. Congress Avenue, Suite 270
West Palm Beach. FL 33401

Office Phone (561) 291-9843

Limit of tidal influence at approx. US 1 crossing (cross section E)

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTP://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes *Zone X*

OTHER AREAS
- NO SCREEN Areas of Minimal Flood Hazard *Zone X*
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Accredited or Provisionally Accredited Levee, Dike, or Floodwall
- Non-accredited Levee, Dike, or Floodwall

OTHER FEATURES
- E 18.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
- 8 Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1 - 877 - FEMA - MAP (1 - 877 - 336 - 2627) or visit the FEMA Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and / or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction. To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1 - 800 - 638 - 6620.

Base Map information shown on this FIRM was provided in digital format by Volusia County Growth and Resource Management, Volusia County GIS Department, Florida Department of Transportation, U.S. Fish and Wildlife Service, U.S.Geological Survey and FEMA.

SCALE

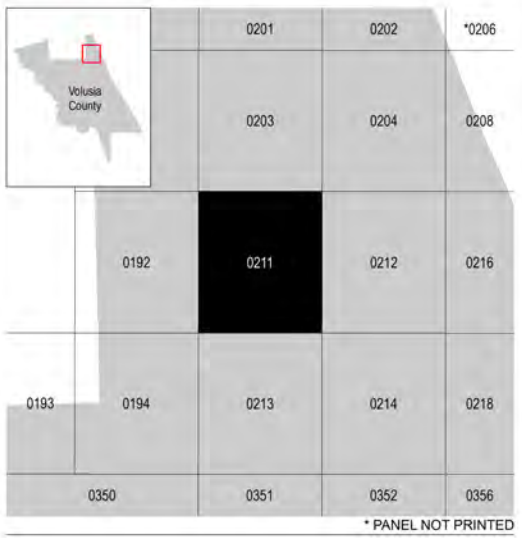
Map Projection:
State Plane Transverse Mercator, Florida East Zone 0901;
North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD88

1 inch = 500 feet 1:6,000

0 500 1,000 2,000 Feet

0 125 250 500 Meters

PANEL LOCATOR



* PANEL NOT PRINTED

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

VOLUSIA COUNTY, FLORIDA
And Incorporated Areas

PANEL 211 OF 930

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
ORMOND BEACH, CITY OF	125136	0211	K
VOLUSIA COUNTY	125155	0211	K

VERSION NUMBER
2.3.3.2

MAP NUMBER
12127C0211K

MAP REVISED
September 29, 2017

NOTES TO USERS

map is for use in administering the National Flood Insurance Program. It not necessarily identify all areas subject to flooding, particularly from local ge sources of small size. The **community map repository** should be ted for possible updated or additional flood hazard information.

tain more detailed information in areas where **Base Flood Elevations** s) and/or **floodways** have been determined, users are encouraged to d the Flood Profiles and Floodway Data and/or Summary of Stillwater tions tables contained within the Flood Insurance Study (FIS) report that npanies this FIRM. Users should be aware that BFEs shown on the FIRM sent rounded whole-foot elevations. These BFEs are intended for flood nce rating purposes only and should not be used as the sole source of elevation information. Accordingly, flood elevation data presented in the FIS should be utilized in conjunction with the FIRM for purposes of uction and/or floodplain management.

tal Base Flood Elevations shown on this map apply only landward of 0.0 American Vertical Datum of 1988. Users of this FIRM should be aware that al flood elevations are also provided in the Summary of Stillwater tions table in the Flood Insurance Study report for this jurisdiction. tions shown in the Summary of Stillwater Elevations table should be used nstruction and/or floodplain management purposes when they are higher he elevations shown on this FIRM.

daries of the **floodways** were computed at cross sections and interpolated en cross sections. The floodways were based on hydraulic considerations egard to requirements of the National Flood Insurance Program. Floodway s and other pertinent floodway data are provided in the Flood Insurance report for this jurisdiction.

n areas not in Special Flood Hazard Areas may be protected by **flood ol structures**. Refer to Section 2.4 "Flood Protection Measures" of the Insurance Study report for information on flood control structures for this ction.

rojection used in the preparation of this map was Florida State Plane East (FIPS zone 0901). The **horizontal datum** was the North American Datum 83 (NAD 83), GRS1980 Spheroid. Differences in datum, spheroid, tion or State Plane zones used in the production of FIRMs for adjacent ctions may result in slight positional differences in map features across ction boundaries. These differences do not affect the accuracy of this

, elevations on this map are referenced to the North American Vertical n of 1988. These flood elevations must be compared to structure and d elevations referenced to the same **vertical datum**. For information ding conversion between the National Geodetic Vertical Datum of 1929 and orth American Vertical Datum of 1988, visit the National Geodetic Survey te at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at llowing address:

Information Services
A, NNGS12
nal Geodetic Survey
D-3, #9202
East-West Highway
Spring, Maryland, 20910-3282
713-3242

tain current elevation, description, and/or location information for **bench** s shown on this map, please contact the Information Services Branch of National Geodetic Survey at **(301) 713-3242**, or visit its website at www.ngs.noaa.gov/.

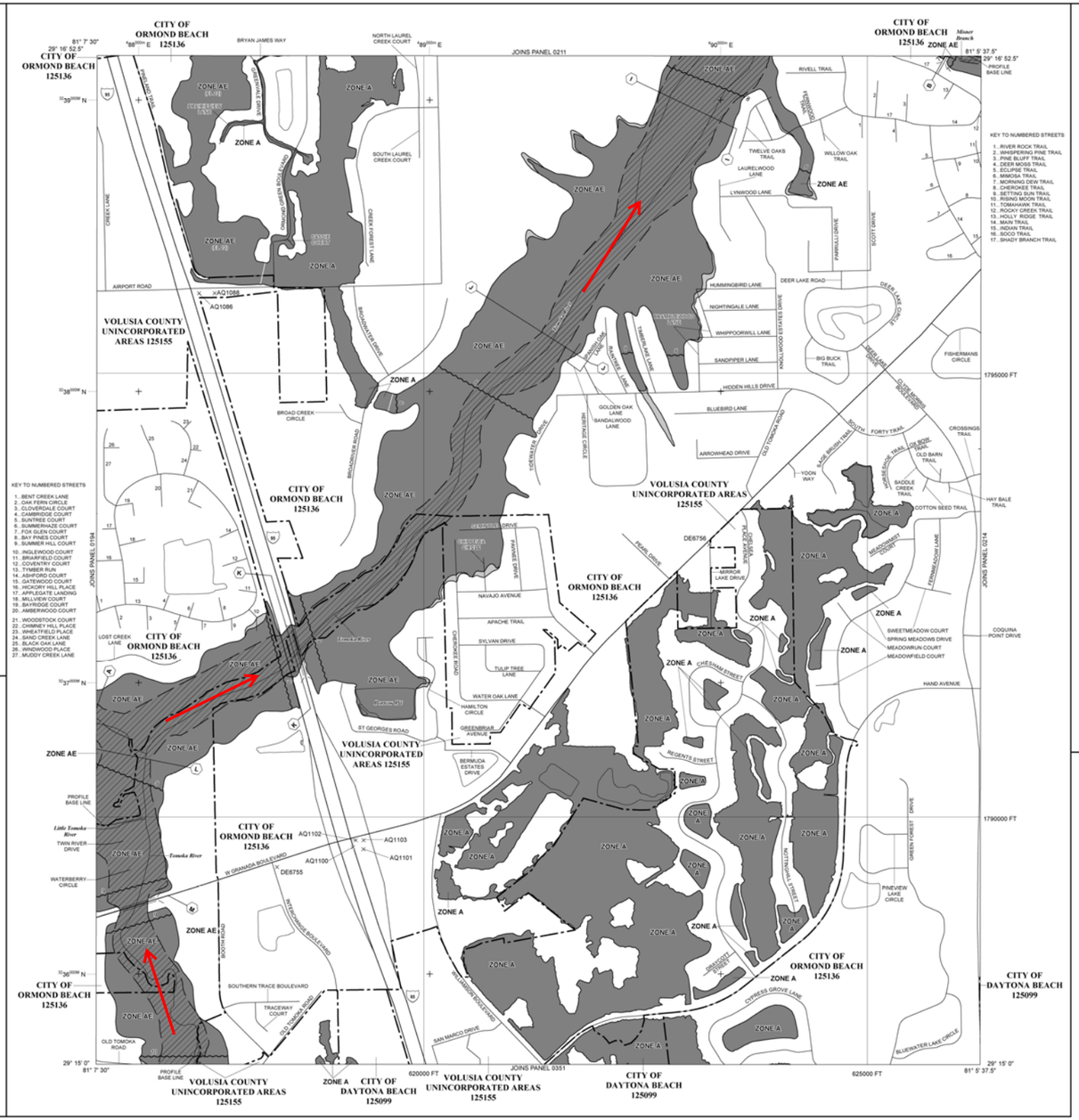
Map information shown on this FIRM was provided in digital format by the sia County, Florida GIS Department at a scale of 1:12,000 or larger from graphy dated 2006 or later.

n updated topographic information, this map reflects more detailed and date **stream channel configurations and floodplain delineations** than shown on the previous FIRM for this jurisdiction. As a result, the Flood es and Floodway Data tables may reflect stream channel distances that from what is shown on the map. Also, the road to floodplain relationships revised streams may differ from what is shown on previous maps.

orate limits shown on this map are based on the best data available at the of publication. Because changes due to annexations or de-annexations may occurred after this map was published, map users should contact priate community officials to verify current corporate limit locations.

e refer to the separately printed **Map Index** for an overview map of the showing the layout of map panels; community map repository addresses; Listing of Communities table containing National Flood Insurance Program for each community as well as a listing of the panels on which each unity is located.

information and questions about this map, available products associated this FIRM including historic versions of this FIRM, how to order products or National Flood Insurance Program in general, please call the FEMA Map rmation eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Service Center website at http://msc.fema.gov. Available products may e previously issued Letters of Map Change, a Flood Insurance Study rt, and/or digital versions of this map. Many of these products can be ed or obtained directly from the website. Users may determine the current date for each FIRM panel by visiting the FEMA Map Service Center website calling the FEMA Map Information eXchange.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood a 1% chance of being equaled or exceeded in any given year. The Special Flood Haz the area subject to flooding by the 1% annual chance flood. Areas of Special Flo include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the wat elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Ele determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); depths determined. For areas of alluvial fan flooding, velocities also d

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual ch flood by a flood control system that was subsequently decertified. Zo AR indicates that the former flood control system is being restored to protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations deter

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Ele determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be k encroachment so that the 1% annual chance flood can be carried without substantial in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 squa mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Are

Floodplain Boundary

Floodway Boundary

Zone D Boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different B Flood Elevations, flood depths or flood velocities.

Limit of Moderate Wave Action

513 Base Flood Elevation line and value; elevation in feet*

(EL 987) Base Flood Elevation value where uniform within zone; ele feet*

*Referenced to the North American Vertical Datum of 1988

A — A Cross section line

23 — 23 Transect line

Culvert

Bridge

Footbridge

45° 02' 08", 93° 02' 12" Geographic coordinates referenced to the North American D 1983 (NAD 83) Western Hemisphere

9849000mN 1000-meter Universal Transverse Mercator grid ticks, zone

4989000FT 5000-foot grid values: Florida State Plane coordinate syste zone (FIPS Zone 0901), Lambert Conformal Conic

DX5510 Bench mark (see explanation in Notes to Users section of t panel)

M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
APRIL 15, 2002

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
February 19, 2014 - to update corporate limits, to reflect updated topographic informati add and change Base Flood Elevations, to add floodways, to add and change Special designations.

For community map revision history prior to countywide mapping, refer to the Communit History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance ag call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0213J

FIRM
FLOOD INSURANCE RATE M

VOLUSIA COUNTY, FLORIDA
AND INCORPORATED ARE

PANEL 213 OF 930
(SEE MAP INDEX FOR FIRM PANEL LA

CONTAINS:

COMMUNITY	NUMBER	PANEL
DAYTONA BEACH, CITY OF	125099	0213
ORMOND BEACH, CITY OF	125136	0213
VOLUSIA COUNTY	125155	0213

Notice to User: The **Map Number** show should be used when placing map or **Community Number** shown above s used on insurance applications for the community.

MAP NU
12127C
MAP REV
FEBRUARY 19,

Federal Emergency Management

does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Florida State Plane East zone (FIPS zone 0901). The **horizontal datum** was the North American Datum of 1983 (NAD 83), GRS1980 Spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland, 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov/.

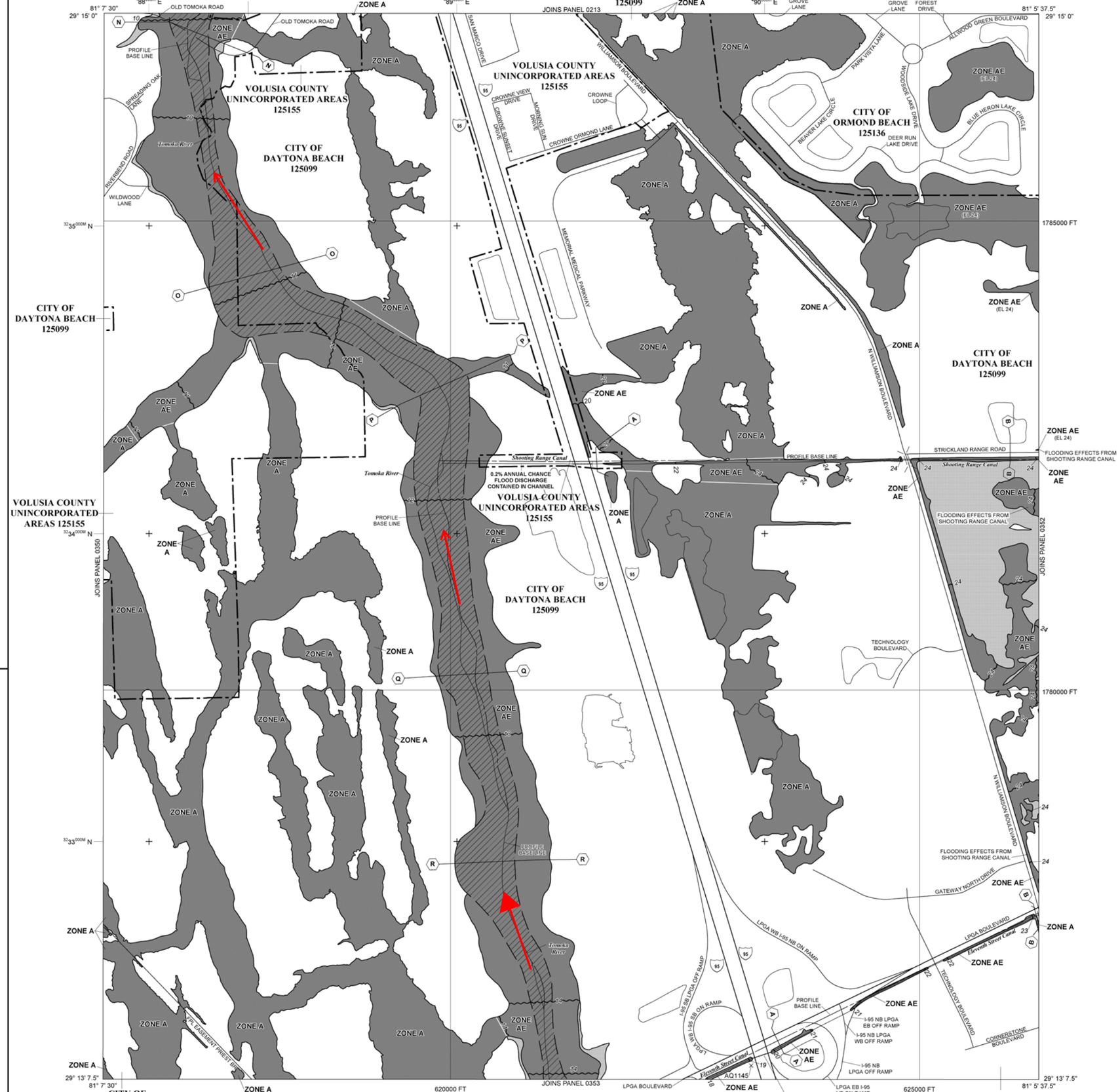
Base Map information shown on this FIRM was provided in digital format by the Volusia County, Florida GIS Department at a scale of 1:12,000 or larger from photography dated 2006 or later.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.



The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain Boundary

Floodway Boundary

Zone D Boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

Limit of Moderate Wave Action

513 — Base Flood Elevation line and value; elevation in feet*

(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

Cross section line

Transect line

Culvert

Bridge

Footbridge

45° 02' 08", 93° 02' 12" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere

4989000 N — 1000-meter Universal Transverse Mercator grid ticks, zone 17

4989000FT — 5000-foot grid values: Florida State Plane coordinate system, East zone (FIPS Zone 0901), Lambert Conformal Conic

DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)

M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
APRIL 15, 2002

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
February 19, 2014 - to update corporate limits, to reflect updated topographic information, to add and change Base Flood Elevations, to add floodways, to add and change Special Flood Hazard Areas, to incorporate previsously issued Letters of Map Revision, and to change zone designations.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0351H

FIRM

FLOOD INSURANCE RATE MAP

VOLUSIA COUNTY, FLORIDA AND INCORPORATED AREAS

PANEL 351 OF 930
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DAYTONA BEACH, CITY OF	125099	0351	H
ORMOND BEACH, CITY OF	125136	0351	H
VOLUSIA COUNTY	125155	0351	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
12127C0351H

NOTES TO USERS

map is for use in administering the National Flood Insurance Program. It not necessarily identify all areas subject to flooding, particularly from local age sources of small size. The **community map repository** should be sted for possible updated or additional flood hazard information.

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Information Services
NGS, NNGS12
nal Geodetic Survey
D-3, #9202
East-West Highway
Spring, Maryland, 20910-3282
713-3242

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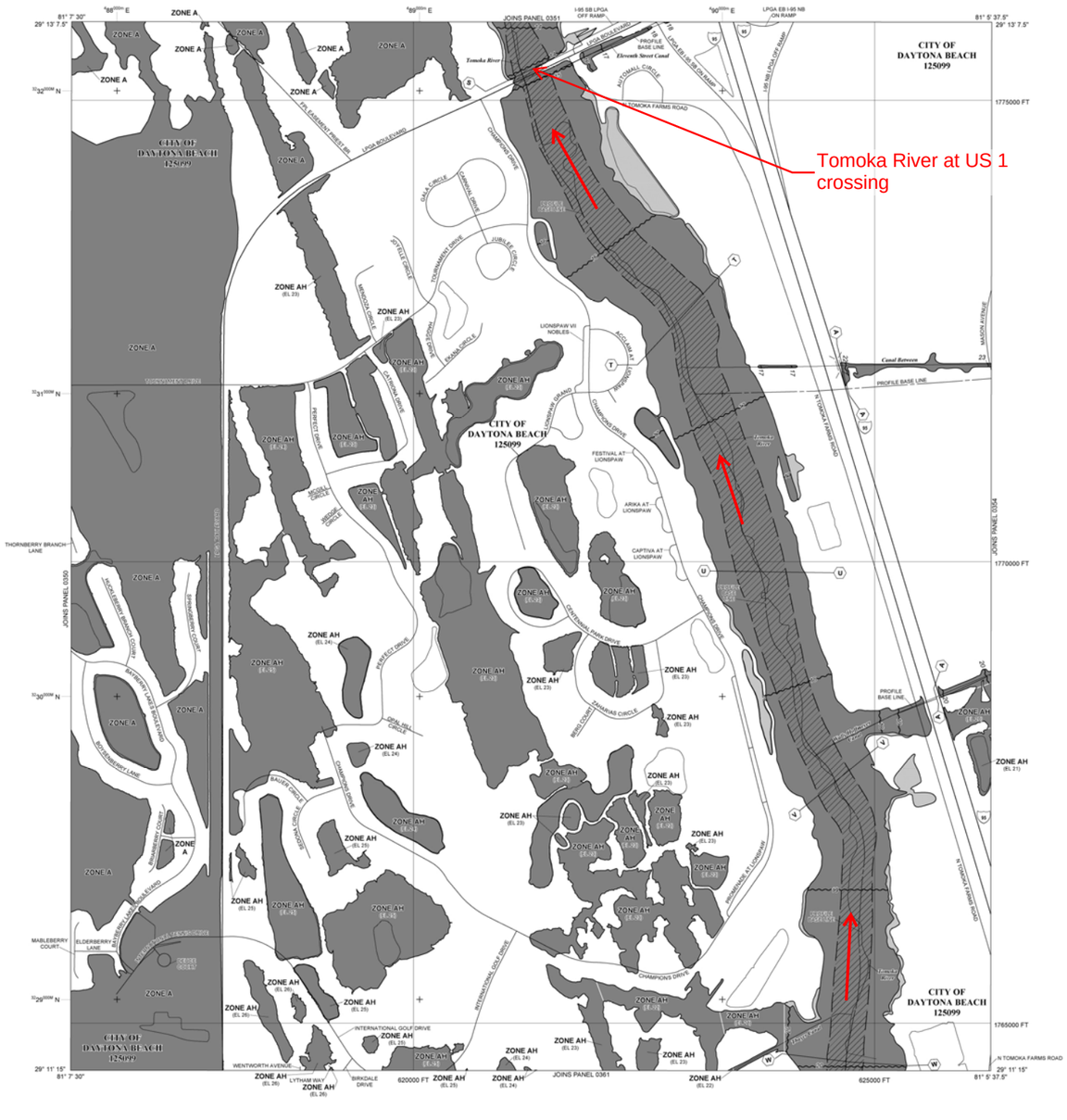
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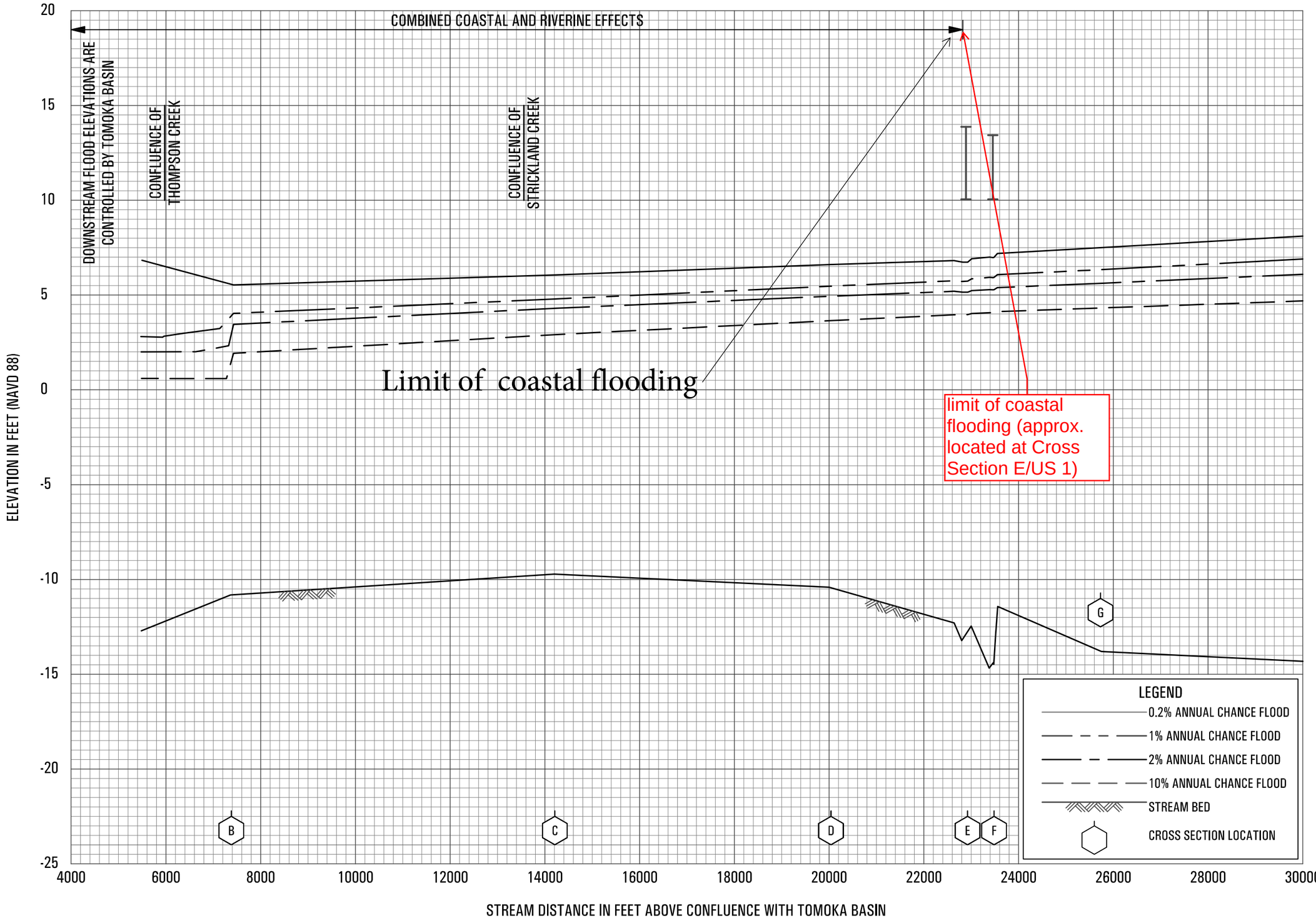
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CITY OF DAYTONA BEACH 125099
Tomoka River at US 1 crossing
JOINS PANEL 0351
JOINS PANEL 0354
JOINS PANEL 0350
JOINS PANEL 0361
I-95 SB LPGA OFF RAMP
LPGA EB I-95 NB ON RAMP
I-95 SB EXIT RAMP
I-95 EXIT RAMP
TOMOKA FARMS ROAD
N TOMOKA FARMS ROAD
PROFILE BASE LINE
Canal Between 23
Tomoka River
Eleventh Street Canal
ZONE A
ZONE AH
ZONE AH (EL 23)
ZONE AH (EL 24)
ZONE AH (EL 25)
ZONE AH (EL 26)
ZONE AH (EL 21)
ZONE AH (EL 22)
ZONE AH (EL 23)
ZONE AH (EL 24)
ZONE AH (EL 25)
ZONE AH (EL 26



FLOOD PROFILES

TOMOKA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUSIA COUNTY, FL

AND INCORPORATED AREAS

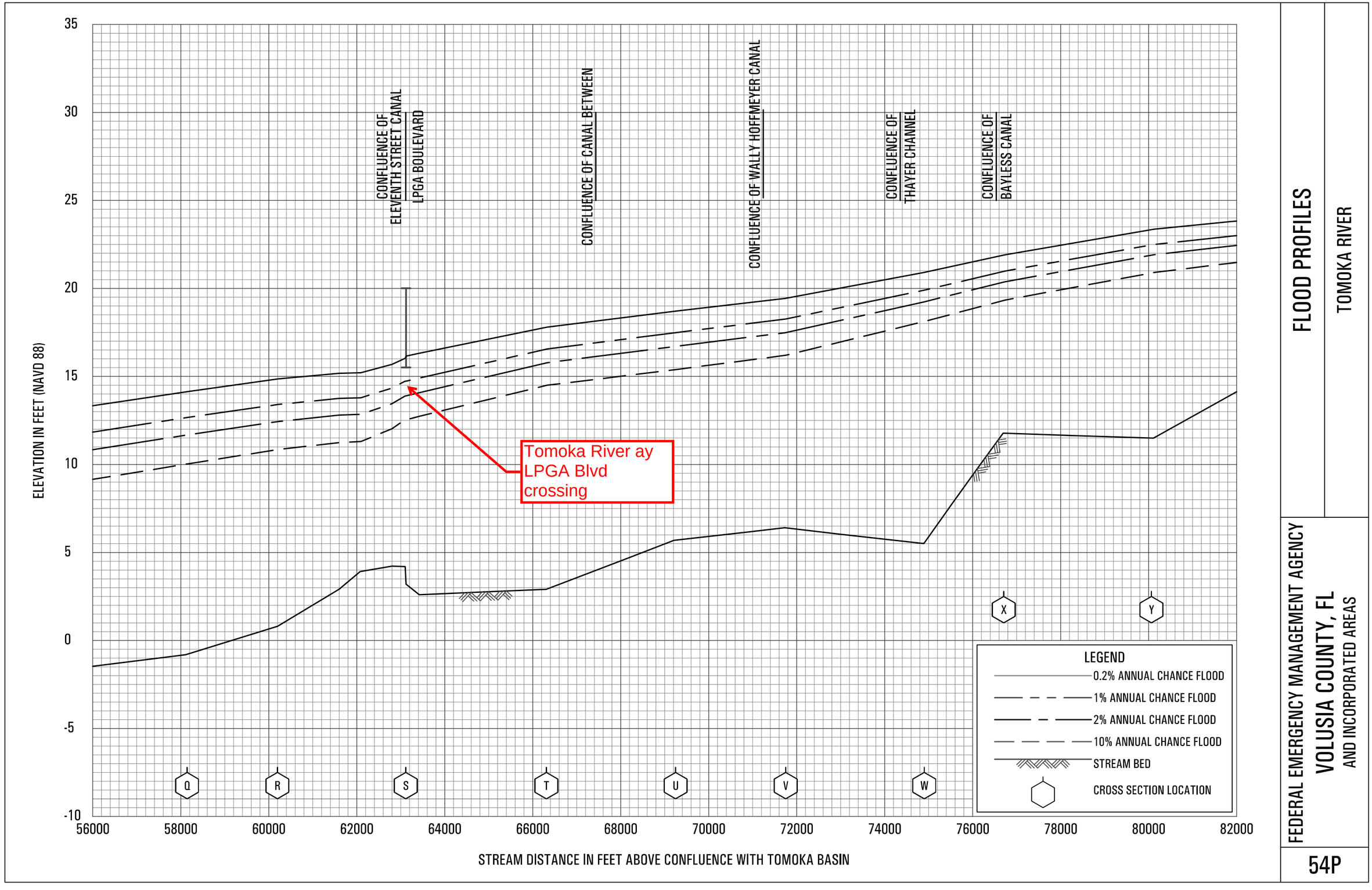
FLOOD PROFILES

TOMOKA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUSIA COUNTY, FL

AND INCORPORATED AREAS



FLOOD PROFILES

TOMOKA RIVER

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FLOOD PROFILES

TOMOKA RIVER

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FLORIDA DEPARTMENT OF Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, FL 32399

Ron DeSantis
Governor

Jeanette Nuñez
Lt. Governor

Shawn Hamilton
Secretary

Memorandum

TO: Victor Muchuruza, PhD, P.E. PTOE
HDR
315 East Robinson Street, Suite 400
Orlando, FL 32801-1949
Email: Victor.Muchuruza@hdrinc.com

FROM: Kevin Mears, PLS II
Email: Kevin.Mears@FloridaDEP.gov

SUBJECT: Safe Upland Line (SUL)
River/Lake: Tomoka River
County: Volusia
STR: Section 9, Township 15 South, Range 32 East
Location: LPGA Boulevard crossing Tomoka River

DATE: January 27, 2022

Dear Mr. Muchuruza:

This portion of the Tomoka River is non-tidal. Available records in our Title and Records Section indicate that state ownership is below the Ordinary High Water Line (OHWL), subject to easements. Contact dsl.fax@dep.state.fl.us for more information.

The OHWL is an ambulatory boundary that will shift in response to long term natural changes in the shoreline (i.e., accretion, erosion, reliction and submergence). An OHWL has not been determined at this site. There is insufficient data available to determine a Safe Upland Line (SUL) elevation at this location. The top of bank along the natural shoreline may be used as the SUL, which is at or above the OHWL.

Please contact me at the letterhead address, mail station 105, or by phone at (850) 245-2640.



Florida Department of Transportation District 5

Environmental Management Office

719 S. Woodland Blvd.

DeLand, FL 32720