

NATURAL RESOURCES EVALUATION

Florida Department of Transportation Florida's Turnpike Enterprise

Project Development and Environment (PD&E) Study

Widen Florida's Turnpike (SR 91) from South of Kissimmee Park Road to US 192

Mile Post 238.5 - 242.5

Osceola County, Florida

Financial Project Identification Number: 441224-1-22-01

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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 December 14, 2016 and executed by the FHWA and FDOT.

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Executive Summary

The Florida Department of Transportation, Florida's Turnpike Enterprise (FTE) is conducting a Project Development and Environment (PD&E) Study to evaluate the capacity improvement needs associated with the Turnpike, from south of Kissimmee Park Road (KPR) to US 192. This study includes the assessment of interchange configuration alternatives at Kissimmee Park Road and at US 192. Two primary roadway/interchange alternatives, along with pond site alternatives are under evaluation, as well as the No-build alternative. This Natural Resources Evaluation (NRE) provides details of the existing natural conditions within the study area of all Build alternative options.

Natural and artificial wetland and surface water impacts, including freshwater cypress, mixed wetland forests and mixed wetland hardwoods occur within the study area. Estimated acreage of wetland impacts and their ecological functional value are further described in Section 2.3. There are multiple mitigation banks with state and federal credits that can provide mitigation for wetland impacts associated with the Least Environmentally Damaging Practicable Alternative (LEPDA). FDOT will adhere to the provisions of chapter 373.4137, Florida Statutes in selection of appropriate wetland mitigation.

Species-specific surveys for federally protected species may be required, depending upon the selected preferred alternative. Informal consultation with the United States Fish and Wildlife Service (USFWS) will be initiated in early design phase by the FTE to determine if surveys are warranted. This project is not anticipated to have an adverse effect on state listed species or species protected under other federal regulations outside of the Endangered Species Act. Furthermore, there is no critical habitat within the project study area and no Essential Fish Habitat (EFH) within the project study area.

A modification of the Individual Permit (IP) from South Florida Water Management District (SFWMD) will be required for this project. It is anticipated that a Standard Permit (SP) from the US Army Corps of Engineers (USACE) will be required, due to the anticipated acreage of wetland and surface water impacts. This project will also require a Florida Fish and Wildlife Conservation Commission (FWC) Gopher Tortoise Relocation Permit and Notice of Intent (NOI) to use the Construction Generic Permit (GCP), authorized through the Florida Department of Environmental Protection (FDEP).

1.0 Project Overview

1.1 Project Description

The PD&E study is located along Florida's Turnpike and begins south of Kissimmee Park Road to Irlo Bronson Memorial Highway (US 192). Limits of the study area are shown on the Location Map in Appendix A. Study alternatives are further described below and include alternative pond sites and interchange locations associated with Kissimmee Park Road. The study area is in close proximity to multiple municipalities including the City of Kissimmee, City of St. Cloud and unincorporated Osceola County.

The environmental review and consultation, as well as other actions required by federal environmental laws for this project are carried out by FDOT's Florida's Turnpike Enterprise pursuant to 23 United States Code 327 as well as a Memorandum of Understanding (December 14, 2016), executed by FDOT and the Federal Highway Administration (FHWA). This Natural Resources Evaluation is prepared in accordance with the FDOT PD&E Manual, Part 2, Chapters 9, 16, and 17, published July 1, 2020. The purpose of this NRE is to document potential occurrence of protected species and their habitat located within the alternatives of the study.

This evaluation also provides estimated impacted acreage of wetlands, surface waters, and other surface waters (OSWs) within each of the proposed project alternatives, as well as anticipated wetland functional value as it relates to mitigation requirements. Lastly, this report summarizes anticipated state and federal permits required for the proposed project during design phase. There is no EFH located within the study area; therefore further discussion of this resource element is not provided.

1.2 Purpose and Need

Florida's Turnpike Enterprise (FTE) is conducting a Project Development and Environment (PD&E) Study to evaluate the proposed widening of Florida's Turnpike from south of Kissimmee Park Road to north of Irlo Bronson Memorial Highway (US 192). The primary purpose and need of the project is to improve emergency evacuation capability while enhancing regional connectivity. These needs are based on existing and future traffic needs of the St. Cloud approved Comprehensive Plan and to improve overall safety of the existing roadway system.

There is also a specific need to evaluate improvements to the existing interchanges within the study corridor. Modification of the Kissimmee Park Road interchange is being proposed to address existing traffic congestion and related safety issues. Traffic at the Turnpike southbound off-ramp terminal intersection currently experiences long delays and queues during the evening commute. Queues extend along the full length of the ramp onto the mainline. This is mainly due to the heavy southbound off-ramp left-turn traffic demand which exceeds the capacity of the existing single left turn lane. Also, eastbound right-turn queues at the adjacent Old Canoe Creek Road intersection extend upstream to the interchange ramp terminals, compounding the backups along the southbound off-ramp and mainline. As traffic demand continues to increase in the future, traffic operations are expected to deteriorate further within the interchange.

There is also a need to complete the Kissimmee Park Road partial interchange by adding access ramps to and from the south. Travel demand on the Turnpike through much of Orange and Osceola County has increased significantly within the past five years. The Turnpike system has continued to grow as a commuter facility serving trips between urban centers, as well as an important component of local transportation systems, and as mentioned above, continues to be a critical route for emergency evacuation. As demand for local access grows, continued increase in traffic volumes at existing interchanges will result in further congestion and potential for vehicular accidents.

1.3 ETDM Screening Summary

In December 2017, FTE solicited agency comments using the Efficient Transportation Decision Making (ETDM) screening tool. Detailed agency comments can be viewed on FDOT's website at <https://etdmpub.fl-a-etat.org/est/> and searching under the ETDM Project Number 14329. Notable natural resource comments include requests from the USFWS and FWC to survey for the potential occurrence of multiple federally and state protected species. Both SFWMD and USACE comments noted natural wetlands within the project boundary and cited a need for permits. Further details regarding species that may be affected by the proposed project are provided below. No other notable natural environmental comments were provided in the Screening Report.

1.4 Design Alternatives

Originally five build alternatives (along with a No-build alternative) were considered at the beginning of the PD&E study that included interchange improvements along the corridor. They included the No-Build Alternative and Alternatives 1, 2, 3a, 3b, and 4. Alternatives 1, 2, and 3a were eliminated during preliminary stages of traffic analysis as they did not meet future traffic and FDOT Design Manual criteria. Alternatives 3b and 4 were carried forward to further analysis for consideration, and are currently the primary alternatives. Throughout the remainder of this document, Alternative 3b is referred to as Alternative 1 and Alternative 4 is referred to as Alternative 2, respectively, including in reference exhibits.

Alternative 1 will add capacity to Florida's Turnpike through the addition of travel lanes from south of Kissimmee Park Road to US 192. The Turnpike will be widened from the existing 4-lane section (2 lanes in each direction) to an ultimate 8-lane section (4 lanes in each direction). This alternative includes modifications to the existing Kissimmee Park Road interchange and direct connections between Florida's Turnpike and Old Canoe Creek Road, located approximately $\frac{3}{4}$ of a mile south of Kissimmee Park Road. The existing Kissimmee Park Road interchange only provides northbound on-ramp and southbound off-ramp connections with the Turnpike. The interchange improvements will add a southbound on-ramp and northbound off-ramp as well as modifications to the existing ramps. This alternative also includes a proposed southbound on-ramp from US 192 at the location of the existing US 192 partial interchange.

Alternative 2 will add capacity to Florida's Turnpike through the addition of travel lanes from south of Kissimmee Park Road to US 192. The Turnpike will be widened from the existing 4-lane section (2 lanes in each direction) to an ultimate 8-lane section (4 lanes in each direction). This alternative has a proposed new Turnpike interchange at an extension of W. New Nolte Road,

located approximately ½ of a mile north of Kissimmee Park Road. This new interchange will provide all directional access to and from the Turnpike. The existing ramps at the Kissimmee Park Road interchange will be removed, however the overpass will remain for local access. The proposed interchange features a diverging diamond configuration, which offers improved capacity with a smaller footprint. Direct connections between Florida's Turnpike and Old Canoe Creek Road will be located approximately ½ of a mile south of Kissimmee Park Road. The alternative also includes a proposed southbound on-ramp from US 192 at the location of the existing US 192 partial interchange.

Pond Design alternatives are provided within the study area and include up to three alternative sites per basin. Drainage design options associated with each alternative, and the potential habitat and wetland impacts is further described in the appropriate sections of the report below. Pond Site Alternatives are displayed on the Pond Site Alternatives Maps in Appendix A.

As discussed above, both alternatives improve lane capacity by widening to the inside median, shifting drainage design to the outside edge of the Right-of-Way (ROW) boundary. No shift in alignment or alignment alternatives are considered due to the northern adjacent segment being under final design and currently funded for construction. Therefore, final alignment and alternatives connecting directly to the KPR segment have been evaluated by FHWA representatives at FDOT. Furthermore, this segment is in the final permitting stages with both state and federal regulatory agencies. Lastly, the final Location Design Concept Approval (LCDA) was accepted in 2017 for this roadway segment. With these considerations, the chosen alignment, from south of KPR to US 192, has been designed to align cohesively with the typical section in the abutting northern segment. An alignment match with the northern segment also ensures FDOT Design Manual standards are met according to profile requirements, sight distance safety and previous commitments to avoid impacts to existing Florida Gas and Transmission utility lines. Maps depicting Alternatives 1 and 2 are located in Appendix A.

The No-Build Alternative is also considered by FTE for this corridor; it assumes that no improvement to capacity, safety or intersections are proposed. No further evaluation of natural resources impacts is provided for the No-Build Alternative, as it would not further impact any wetlands or protected species habitat.

1.5 Existing Conditions

1.5.1 Land Use – Natural Communities

A significant portion of land use within the study area includes limited access highways and facilities and includes surrounding commercial and residential development east of the Turnpike. Agricultural and low density residential developments are the dominant land use west of the existing corridor. Florida Land Use Code and Classification System (FLUCCS) categories are provided in the FLUCCS Maps in Appendix A. Natural vegetative communities that have the potential to support protected species, including upland forested and herbaceous lands and pastures, as well as wetland communities are further described below in the Protected Species and Wetlands and Surface Waters sections.

1.5.2 Soils

Soils within the project corridor have been mapped in accordance with data provided by the National Resources Conservation Service (NRCS). For details regarding soil name, class number, and hydric class unit, please refer to the Soils Map in Appendix A. A detailed description of the soils within the study corridor are provided in the Preliminary Geotechnical Evaluation, to be provided under separate cover.

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2.0 Wetland and Surface Waters

2.1 Data Collection

Prior to field surveys, environmental scientists reviewed the most current information regarding the location and extent of wetlands in the project area. The wetlands and other habitats were defined according to the FLUCCS categories. The information included, but was not limited to:

- USGS Topographic Maps
- USFWS National Wetlands Inventory (NWI)
- Natural Resources Conservation Service (NRCS) Soil Survey of Osceola County
- SFWMD Land Use and Cover Forms
- Florida Natural Areas Inventory Landcover Maps and Online Matrix (2019)
- Florida Geographic Database Library (FGDL)
- Efficient Transportation Decision Making (ETDM) Screening Tool

2.2 Wetland and Surface Water Assessment Methodology

A wetland and surface water evaluation was performed within the study limits, focusing on interchange areas within and directly adjacent to the existing mainline and pond site alternatives. The wetland evaluation relied on literature reviews and limited field surveys to identify the approximate location and extent of natural and artificial wetlands and surface waters, while assessing their ecological value using the Unified Mitigation Assessment Methodology (UMAM). Environmental scientists used information to evaluate potential direct and indirect effects to wetlands, including the potential cumulative impacts to those wetlands in the general regional area. Practicable measures to avoid and/or minimize impacts to those wetlands are proposed in Section 2.3.1 – Avoidance and Minimization.

This wetland evaluation was also performed in accordance with Presidential Executive Order 11990 (“Protection of Wetlands”), U.S. Department of Transportation Order 5660.1A (“Preservation of the Nation’s Wetlands”), Federal Highway Administration Technical Advisory T6640.8A regarding the preparation of environmental documents, and Chapter 18, Wetlands and Other Surface Waters, of FDOT’s PD&E Manual.

The approximate extent of natural and artificial wetlands and surface waters was identified using the methodology described in Rule 62-340, Florida Administrative Code, *Delineation of the Landward Extent of Wetlands and Surface Waters*, the *Corps of Engineers Wetland Delineation Manual* (USACE, 1987) and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region* (USACE, 2010). While delineation techniques adhered to the above-referenced regulations, it should be noted that there is a significant amount of improved agricultural pasture within the study area. Portions of these pastures, if impacted for drainage or roadway design, contain hydric characteristics and may be considered jurisdictional wetlands. Through the use of infrared aerial review, unimproved pasture areas that may be jurisdictional wetlands are shown on the Wetland and OSW Maps in Appendix A.

2.2.1 Existing Wetlands and Other Surface Waters

The following descriptions of these communities are provided below and can be found on the Wetland and Surface Water Maps in Appendix A:

FLUCCS 510, Streams and Waterways

NWI: POW, Palustrine Open Water, permanently flooded

There is one canal located within the project study area, formally known the C-31 Canal, (also known as the St. Cloud Canal). The canal, within the existing ROW limits, is lined with fabriform and is surrounded by maintained/mowed uplands, dominated by bahiagrass (*Paspalum notatum*).

FLUCCS 530D, Partially Forested, (Upland-Cut) Other Surface Waters

NWI: POW, Palustrine Open Water, permanently flooded

Within the Turnpike ROW limits, Other Surface Waters (OSWs) are roadside ditches, commonly known as borrow areas, that were historically dredged from uplands. Side slopes of these drainage features are at least 3:1 in ratio; they typically hold greater than two feet of water, depending upon the season. Historically created primarily in upland areas during the original construction of the Turnpike, these borrow areas are overgrown with woody vegetation, primarily mature Brazilian pepper (*Schinus terebinthifolia*), red maple (*Acer rubrum*), scattered immature oak (*Quercus* spp.) and pines (*Pinus* spp.), with other opportunistic herbaceous species including cattail (*Typha* spp.) and various ferns including Virginia chain fern (*Woodwardia* spp.), Boston fern (*Nephrolepis exaltata*) and bracken fern (*Pteridium* spp.). They are not suitable foraging habitat for wading birds, primarily due to water elevation and highly dense vegetation.

FLUCCS 534, Reservoirs Less than 10 Acres

NWI: POW, Palustrine Open Water, permanently flooded

Within the study area, there are two artificial impoundments of water. One is located near Kissimmee Park Road and is a permitted stormwater pond, surrounded by upland scrub, pine and hardwood forests. The second area is a historic borrow pit, not part of a permitted stormwater system. Neither of these waterbodies provide significant habitat for protected species.

FLUCCS 617, Mixed Wetland Hardwoods

NWI: PSS6, Palustrine, Scrub-Shrub, Deciduous

Mixed wetland hardwoods in the study area are composed of mature and immature red maple, live oaks (*Quercus virginiana*) along the edge of system, wax myrtle (*Morella cerifera*), and water oak (*Quercus nigra*). Mid-story and ground covers consist of Brazilian pepper, swamp fern (*Blechnum serrulatum*), American beautyberry (*Callicarpa americana*), and Florida elderberry (*Sambucus nigra*).

FLUCCS 621, Cypress

NWI: PFO6F, Palustrine, Forested, Deciduous, Semi permanently flooded

These wetlands are dominated by both bald and pond cypress (*Taxodium* sp.). Some cypress domes within the study area have a scattered understory of wax myrtle, red

maple, and additional immature cypress. The shrub and ground cover near the edge of these systems consist of immature Brazilian pepper, pennywort (*Hydrocotyle sp.*), and bahiagrass.

FLUCCS 630, Wetland Forested Mixed

NWI: PFO6F, Palustrine, Forested, Deciduous, Semi permanently flooded

These forested systems have a canopy dominated by cypress, pine, oak, red maple, swamp tupelo (*Nyssa biflora*) and live oak. The midstory consists of wax myrtle, Brazilian pepper and Carolina willow (*Salix caroliniana*). Ground cover is comprised of bahiagrass and grapevine (*Vitis sp.*).

FLUCCS 630D, Partially Forested, (Wetland-Cut) Surface Waters

NWI: POW, Palustrine Open Water, permanently flooded

These surface waters are wide and deep roadside ditches, commonly known as borrow areas. They are likely historically dredged from wetlands. Side slopes of these drainage features are at least 3:1 in ratio; they typically hold greater than two feet of water, depending upon the season. Historically created primarily in upland areas during the original construction of the Turnpike, these borrow areas are overgrown with woody vegetation, primarily mature Brazilian pepper, red maple, scattered immature oak and pines, with other opportunistic herbaceous species including cattail and various ferns. They are not suitable foraging habitat for wading birds, primarily due to water elevation and highly dense vegetation.

2.3 Wetland and Surface Water Impacts

2.3.1 Avoidance and Minimization

Section 404 of the Clean Water Act requires an applicant to choose the Least Environmentally Damaging Practicable Alternative (LEDPA) for the preferred alternative. Additionally, Statewide Environmental Resource Permit (SWERP) regulations require an applicant to eliminate and reduce wetland impacts to the greatest “practicable extent” unless those impacts are low in quality or mitigation for impacts is higher in ecological value and regionally significant.

Because of the existing Turnpike corridor matching the approved widening segment directly north of the study area, and due to significant unground utilities, impacts to wetlands and surface waters cannot be completely avoided if a build alternative is selected. However, the majority of these impacts will occur to low-quality surface waters that are primarily vegetated with Brazilian pepper and other opportunistic species. There are two primary corridor/interchange alternatives under consideration within the study area. Wetland impacts associated with either alternative will be minimized to the greatest practicable extent widening to the inside of the corridor, which is proposed on both Alternative 1 and Alternative 2. Furthermore, per FDOT Design Manual, Type B fencing along the entire LA corridor is proposed to minimize indirect impacts to off-site wetlands.

Drainage design alternatives are currently under evaluation of minimizing natural wetland impacts where possible. Techniques such as hydroperiod evaluation of adjacent wetlands and potential use of clay liners, expansion of existing pond sites and maximization of existing borrow areas within the ROW are being reviewed as options, to avoid further impacts to natural wetland communities. Consideration must also be given to potential impacts to federally and state protected species and their habitat. Portions of the project study area contain suitable habitat for protected species. As design engineers consider the preferred pond sites for each basin, wetland impacts will be minimized to the greatest practicable extent.

2.3.2 Direct Impacts

Impacts to both alternatives are compared below and include the interchange reconfiguration design for each alignment. Impacts assume the entire existing ROW corridor will be utilized and that all existing surface waters will be relocated to the edge of the existing FTE limits. These estimates assume pond sites selected in each basin will have the largest wetland impacts acreage, when compared to other alternatives in the same basin. Proposed stormwater systems for each alternative are included in the impact acreage provided below. Thus, the estimates are conservative for FTE forecasting of mitigation funds.

Per UMAM criteria, Landscape Support, Community Structure and Water Environment were primary factors in consideration of the system's ecological value. As previously described, upland-cut surface waters along the existing mainline corridor are dominated with Brazilian pepper and other invasive species. These borrow areas contain sufficient mature canopy to be forested per FDOT FLUCCS manual criteria, as they include scattered water and laurel oak, red maple and slash pine. Because these surface waters are created in uplands, contain no suitable foraging habitat and will be replaced, mitigation will not be proposed for temporary impacts. Therefore, no UMAM score is provided below for OSWs. It is anticipated that mitigation will be required for wetland-cut surface waters from both state and federal regulatory agencies.

The recommended Build Alternative, Alternative 2, may incur up to 73 acres of direct impacts to wetlands, SWs, and OSWs. Of the 73 acres of direct impacts, approximately 59 acres are wetlands (primarily forested), 12 acres are historically wetland-cut SWs, and 2 acres are OSWs. It is estimated that approximately 18 acres of indirect impacts to wetlands and wetland-cut SWs may also occur as a result of the project. Therefore, the total direct and indirect wetland, SW, and OSW impact acreage is estimated at 91 acres.

Analyzed under conceptual design, wetland impacts associated with Alternative 1 are similar in acreage to estimates for Alternative 2. The average UMAM score for natural wetland systems and SWs for the project is 0.4 UMAM Functional Units. Using the estimated acreages provided above, approximately 31 UMAM credits from a state and federally approved mitigation bank will offset direct and indirect functional loss. The following table provides a summary of all estimated impacts for alignment and drainage design alternatives.

Table 2.3-1: Alternatives 1 & 2 Wetland Impacts and Estimated Functional Loss

Impact Acreage Alternative 1	Impact Acreage Alternative 2	Wetland or Surface Water FLUCCS Category	Estimated UMAM Functional Loss
n/a	Up to 1 acre	534 (Upland Cut Borrow Area)	Not Applicable
Up to 2 acres	Up to 1 acre	530D (Upland-Cut, Other Surface Waters)	Not Applicable
Up to 12 acres	Up to 13 acres	630D (Wetland-Cut Surface Waters)	0.4
Up to 59 acres	Up to 58 acres	617/630 (Forested Wetlands)	0.4

2.3.3 Indirect Impacts

Indirect impacts to wetlands and surface waters off-site are not anticipated along the corridor mainline, as wetland systems within and directly abutting the existing limited-access facility are highly disturbed and comprised of invasive and exotic flora species. Additionally, these systems have been exposed to highway lighting and noise for over fifty years. As stated above, it is estimated that approximately 18 acres of indirect impacts to wetlands and wetland-cut SWs may also occur as a result of the project.

The proposed interchange connection in Alternative 1 and 2 also connect to a permitted local county roadway that is in final design phase. Therefore, because of the existing LA facility in place for over fifty years, intense agricultural operations west of the corridor, and prior connecting roadway network, neither alternative is anticipated to induce significant indirect impacts to wetlands and surface waters within the study area.

Measures to avoid indirect impacts associated with the proposed pond design will be considered during early design phase and impacts to the scattered higher quality wetlands within the study area will be minimized to the greatest practicable extent. While there may be impacts to wetlands within the pond sites west of the corridor, indirect impacts are not expected to be significant, and will be assessed with regulatory agencies during design and permitting.

FTE will furthermore ensure that an approved Stormwater Pollution Prevention Plan (SWPPP) is implemented during construction to prevent sediment and untreated stormwater runoff into adjacent off-site wetlands and will comply with all National Pollutant Discharge Elimination System (NPDES) criteria during construction activities. The proposed treatment system for the expanded corridor will provide improved treatment and attenuation for offsite systems in the adjacent properties.

2.3.4 Potential Cumulative Impacts

Cumulative effects on the environment result from the incremental impacts of the action when added with other past, present and reasonably foreseeable future actions, regardless of the agency or private entity that undertakes that action. Neither alternative is anticipated to significantly contribute to cumulative effects in the regional area, due to previous existing commercial and residential development. Additionally, all proposed future development of existing agricultural lands, west of the corridor, were zoned and approved in local county comprehensive plans prior to the commencement of the project's planning phase and PD&E study. The primary purpose of this project is to re-develop the existing Turnpike corridor and provide a safe facility that meets current traffic demands of the surrounding area as well as necessary emergency evacuation.

3.0 Endangered Species Biological Assessment Methods

3.1 Data Collection and Survey Methodology

Literature reviews, agency database searches, and field reviews were conducted to document the potential presence of federal and state protected species, their habitat, and any critical habitat within the study area. Field reviews were completed during August and September 2018 and in May and August 2019. Reviewed information sources and databases included, but were not limited to, the following:

- Environmental Systems Research Institute (ESRI) World Imagery (ESRI 2019)
- Florida Geographic Data Library (FGDL 2019)
- USFWS Datasets and Consultation Area Maps
 - Critical Habitat for Threatened and Endangered Species (USFWS 2018a)
 - Protected Species Consultation Areas (USFWS 2016)
 - Wood Stork Rookeries and Core Foraging Areas (USFWS 2018)
 - Caracara Documented Historic Nest Sites (USFWS 2017)
 - South Florida Crested Caracara Consultation Area (USFWS 2003)
 - South Florida Scrub Jay Consultation Area (USFWS 2003)
 - Everglades Snail Kite Consultation Area and Critical Habitat (USFWS 2003)
 - South Florida Grasshopper Sparrow Consultation Area (USFWS 200)
- Florida Natural Areas Inventory Online Database Matrix (July 2019)
- FWC Databases
 - Eagle Nest Locator Website (FWC 2019)
 - Water Bird Colony Locator Website (FWC 2019)
 - Florida Black Bear Roadkill Occurrences (FWC 2018)

Each species discussed below was assigned a potential for occurrence within the project area based on the data review, field observations, presence of suitable habitat, and the species' known ranges. While the project is in the Consultation Area (CA) for the red-cockaded woodpecker (*Leuconotopicus borealis*), sand skink (*Plestiodon [Neoseps] reynoldsi*), bluetail mole skink (*Plestiodon [Eumeces] egregius lividus*), and Lake Wales Ridge Plants, the project is anticipated to have “no effect” on these species, due to no observation of these species, no habitat (per USFWS survey guidelines) within the Alternatives proposed, and no historic documented occurrence of these species.

As of October 7, 2020, the USFWS has listed an additional species, the eastern black rail (*Laterallus jamaicensis jamaicensis*), which will likely have a CA within the project's study area. As CA boundaries and habitat survey guidelines are still under development, no specific information is provided below regarding the black rail, however, FDOT is committed to continued coordination regarding all listed species, during design phase, as well as those specific species discussed below.

New guidance has also been released from FWC regarding the southeastern American kestrel (*Falco sparverius paulus*). FDOT is in the process of coordination for specific survey requirements, to confirm whether surveys are necessary for this project. FDOT is required,

through the State ERP process, to coordinate with FWC during design phase, to ensure the project has no adverse impact to this species or any other additional state regulations that may change after completion of the PD&E study.

3.2 Protected Species Occurrence

3.2.1 Federally Protected Fauna

3.2.1.1 Eastern indigo snake (*Drymarchon corais couperi*)

The Eastern indigo snake is listed as threatened by the USFWS (2019). This species occurs throughout Florida and utilizes a variety of habitats including swamps, wet prairies, unimproved and improved pastures, xeric pinelands, and scrub areas. The scrub habitat and undeveloped pastures west of the study area provide suitable habitat for the Eastern indigo snake. Indigo snakes were not observed during field reviews and there are no documented occurrences of this species within the vicinity of the project (FNAI 2019). Therefore, the potential for occurrence for this species within the study area is moderate.

As a protection measure for the species the USFWS will require implementation of the latest version of the *USFWS Standard Protection Measures for the Eastern indigo snake* (USFWS 2017 - See Appendix B) during any construction within suitable habitat. Further surveys determining the extent of potentially occupied gopher tortoise (*Gopherus polyphemus*) burrows and refinement of the preferred intersection alternative will provide greater clarity to determine if the project “**may affect not likely to adversely affect**” the Eastern indigo snake.

3.2.1.2 Wood stork (*Mycteria americana*)

The project area is located within the foraging habitat for three documented wood stork colonies. The Wood stork is federally designated as a Threatened species by USFWS and FWC. Wood storks are primarily associated with freshwater and estuarine habitats and usually construct nests in stands of medium to tall trees in swamps or islands surrounded by open water.

Based on a review of the Wood stork Effect Determination Key for South Florida dated May 18, 2010 (See Appendix C), the both alternative alignments “**may affect, but is not likely to adversely affect**” the wood stork. This determination is based on the project not being located within 2,500 feet of an active colony and any proposed impacts to suitable foraging habitat (SFH) being compensated within the service area of an USFWS approved mitigation bank, as described in Section 7 of the NRE. A foraging prey analysis has not been conducted since the project is anticipated to impact less than 5 acres of wetlands classified as wood stork suitable foraging habitat. Sufficient replacement of SFH will likely be provided within the proposed stormwater system, compared to pre-existing conditions; therefore, no further required mitigation for this species is anticipated.

3.2.1.3 Florida scrub jay (*Aphelocoma canadensis pratensis*)

The project is within the consultation area for the Florida scrub jay, a listed threatened species by the USFWS (Appendix D - USFWS South Florida Consultation Area Map). The Florida scrub jay prefers xeric oak habitats with well-drained sandy soils that are adapted to periodic drought and frequent fires. Three classes of scrub jay habitat are defined by the *USFWS Species Conservation Guidelines, South Florida, Florida Scrub Jay* (USFWS 2004):

- Type I – any upland plant community in which the percent cover of the substrate by scrub oak species is 15 percent or more.
- Type II – any plant community, not meeting the definition of Type I habitat, in which one or more scrub oak species is represented.
- Type III – any upland or seasonally dry wetland within 400 meters (0.25 mile) of any area designated as Type I or Type II habitats.

Initial field reviews revealed the Type I, II, and III habitat within the study area. Specifically, there is over 25 acres of contiguous Type I habitat west of Florida's Turnpike, within and directly adjacent to Interchange Alternative 2. No scrub jay were observed during general wildlife surveys, and there are no historic meta-populations documented in the regional area since 1992, based on available data (USFWS-1999 surveys, FNAI 2019). Assuming surveys are conducted, consultation occurs, and appropriate mitigation is provided for any impacts to suitable jay habitat, the project **"may affect not likely to adversely affect"** the Florida scrub-jay.

3.2.1.4 Audubon's crested caracara (*Polyborus plancus audubonii*)

The project is within the USFWS consultation area for Audubon's crested caracara, which is listed as threatened by the USFWS. The crested caracara inhabits large prairies and pastures in south-central Florida. It prefers nesting in cabbage palms, but has also been reported to nest in other tree species. No crested caracara nests have been documented within or adjacent to the study area (FNAI 2019); the nearest reported nest was an observation of an active nest approximately 17 miles east of the project. Additionally, no caracara were observed during field reviews. However, much of the study area occurs within unimproved and improved pastures, which may provide suitable nesting habitat for the caracara. The presence of potentially suitable habitat, but lack of observations and documented occurrences results in a low potential of caracara occurrence within the study area. Considering recent requirements of USFWS to conduct surveys for the northern segment of the Turnpike abutting this project, it is anticipated that surveys will also be required to confirm the absence of Audubon's crested caracara. Under the assumption that surveys reveal no occurrence of caracara nests within 1500 meters of the project site, the project **"may affect, but is not likely to adversely affect"** the caracara. The extent of required survey efforts will be determined during consultation with the USFWS.

3.2.1.5 Florida grasshopper sparrow (*Ammodramus savannarum floridanus*)

This project is located within the consultation area for the Florida grasshopper sparrow. The Florida grasshopper sparrow is listed as endangered by USFWS and FWC due to habitat loss and degradation. The preferred habitat for the grasshopper sparrow has been described as dry prairie that is relatively open and low in stature and consists of treeless, poorly drained grasslands with a history of frequent fires. Although, there is no native dry prairie habitat for the Florida grasshopper sparrow in the project limits, from multiple field and desktop reviews it is concluded that the improved pastures within multiple pond sites and both alternative 1 and 2 have similar communities to dry prairies. Therefore, both alternatives may impact potentially suitable habitat for the grasshopper sparrow. Currently, the USFWS recognizes six known distinct populations remaining for this species, with the closest publicly known population (on Three Lakes Wildlife Management Area (WMA)) approximately 15 miles south of the study boundary. However, the WMA has recently instituted repopulation efforts of this species, releasing several captive bred birds. Both project alternatives include potential pond sites with suitable habitat for this species. Surveys may be required to confirm absence, and coordination will occur with USFWS to determine the extent of surveys, if warranted and depending on final design limits. Assuming absence of this species post survey work, if warranted by USFWS, it is anticipated that the project **“may affect but is not likely to adversely affect”** the grasshopper sparrow.

3.2.1.6 Everglade snail kite (*Rostrhamus sociabilis*)

This project is located within the consultation for the Everglade snail kite. The Everglade snail kite is listed as Endangered by FWS and FWC. There are no documented snail kite nests within a 20 mile radius of the subject property. No snail kites, evidence of snail kites or suitable habitat was observed on-site during field visits, within either of the proposed design alternatives. Additionally, the study area is located well outside of USFWS designated critical snail kite habitat (See Appendix D). No further surveys are recommended for this species given the proposed alternatives. Therefore, project **“may affect, but is not likely to adversely affect”** the Everglade snail kite.

3.2.1.7 Bald eagle (*Haliaeetus leucocephalus*)

The bald eagle was removed from the ESA in 2007 and Florida’s Endangered and Threatened Species list in 2008; however, the eagle remains protected under the Bald and Golden Eagle Protection Act, the MBTA and Florida’s bald eagle rule, Chapter 68A-16.002, Florida Administrative Code. The nearest bald eagle’s nest (Nest ID OS 098) during the 2018-2019 nesting season was located approximately 680 feet from the project area, west of the Kissimmee Park Road Interchange in an artificial structure. In May 2019, the nest site was not present in the tower. Field observations in July 2020, showed a newly constructed nest in the same tower location as the originally documented OS 098 nest site. The newly constructed

nest site is still outside of the 660' protection zone of conceptual design for both alternatives.

Seven more eagle nest sites have been documented in the regional area but also all outside of the 660' protection zone. Updated surveys and data review from FWC annual flight surveys will be used during design phase to ensure that no active nest sites are located within the 660, and if necessary, coordination with USFWS will occur to ensure that proper monitoring and permits are in place prior to construction.

At the current time, due to no nests within 660' of either alternative, the proposed project should not require an Incidental Take (IT) permit for the bald eagle.

3.2.1.8 Florida bonneted bat (*Eumops floridanus*)

The Florida bonneted bat is listed in the state of Florida as endangered. The consultation area for the bonneted bat has recently been expanded by USFWS to include the KPR study area. The updated Effect Determination Key and additional guidance provides multiple Best Management Practices (BMPs) that are available to implement in design and construction to minimize habitat impacts. Because there is significant amount of suitable foraging and roosting habitat within the Alternative 1 and 2 alignment and pond sites, it is anticipated that acoustic surveys will be required during design phase to confirm absence or presence of this species within the project limits. Should acoustic surveys confirm presence of the Florida bonneted bat, implementation of BMPs and mitigation will be provided to ensure no net loss of habitat. With BMPs and mitigation, if warranted, it is anticipated the project **“may affect, but will not likely adversely affect”** the bonneted bat.

3.2.2 State Listed and Other Species

3.2.2.1 Gopher tortoise (*Gopherus polyphemus*)

The gopher tortoise is listed as threatened by the FWC. Multiple gopher tortoise burrows were observed during general wildlife surveys within the study area and are shown on the Wildlife Occurrence Map in Appendix A. Additionally, much of the upland habitat, including improved pastures and scrub habitat within the study area may provide suitable habitat for the gopher tortoise. The documented burrows and suitable habitat present result in a high likelihood of gopher tortoise occurrence within the study area. The FWC requires adherence to the most current version of the *Gopher Tortoise Permitting Guidelines* (FWC 2017) when performing any earth disturbing activities within 25 feet of any gopher tortoise burrows. If work occurs within 25 feet of a burrow, permitting prior to construction is typically required by FWC. If these guidelines are followed, including the excavation and relocation of any potentially affected tortoises, there is **“no adverse effect anticipated”** for the gopher tortoise from the project.

3.2.2.2 Burrowing Owl (*Athene cunicularia*)

The Florida burrowing owl is listed as threatened by the FWC. The burrowing owl is also protected under the MBTA. This species inhabits sparsely vegetated, sandy habitats throughout peninsular Florida. Within both alternatives, portions of unimproved pastures and Type I/II scrub habitat within the study area (FLUCCS 434) provide suitable habitat for the Florida burrowing owl. No burrowing owls or owl burrows were observed during general wildlife surveys, and there are no documented occurrences of this species within the vicinity of the project (FNAI 2019). A burrowing owl survey should be performed during project design phase to confirm absence of the species. If burrowing owls are present, then appropriate conservation measures will be implemented in coordination with the FWC, and all necessary permits will be obtained for relocation. Thus, **“no adverse effect is anticipated”** for the Florida burrowing owl.

3.2.2.3 Other State Protected Wading Birds

Several state-listed species of wading birds have the potential to nest within the study areas. The little blue heron (*Egretta caerulea*), tricolored heron (*Egretta tricolor*), sandhill crane (*Antigone canadensis pratensis*) and roseate spoonbill (*Platalea ajaja*) are each listed as threatened by the FWC. Suitable foraging and roosting habitat for each of these species exists within the wetlands and other surface waters within the study area. Spoonbills, while observed inland, normally breed and nest along coastal habitat. Due to the presence of foraging and nesting habitat for other inland nesting wading birds, and because multiple alternative pond sites having potential nesting habitat, surveys for little blue heron, tricolored heron, and sandhill crane nests are recommended during the design phase. Because the roseate spoonbill primarily breeds and nests along the coast rather than inland, no nest sites are anticipated to be found for this species. Appropriate consultation measures will be incorporated should a nest site of any protected wading bird be observed during design phase, and wetlands and other surface waters will be appropriately mitigated. With these actions in place, cumulatively there should be no adverse effect on any wading bird species for these species.

3.2.3 Candidate and Potentially Listed Species

Within the study area, there is suitable habitat for one Candidate species, the gopher tortoise. The gopher tortoise is currently under evaluation by USFWS for consideration of federal listing under the ESA. At this time, it is not anticipated that this species will be listed during the design/permitting phase of this project.

In addition to the gopher tortoise, the monarch butterfly (*Danaus plexippus*) is not officially a candidate species; however, populations have significantly declined in recent years. Thus, this species is also under consideration for listing under the ESA. Anticipating that the monarch will become listed within the next two calendar years, FDOT has begun a statewide draft plan for implementing a programmatic Biological Opinion for the Monarch butterfly.

During design phase of this project, the listing status of these species along with the state plan will be monitored accordingly.

3.3 Listed Species Impacts

3.3.1 Avoidance and Minimization of Impacts

Avoidance and minimization measures are meant to significantly reduce and/or avoid impacts to protected species and their habitat that would otherwise occur as a result of the project's construction. FDOT has developed a process to include Modified Special Provisions as well as other dedicated processes to avoid and/or minimize effects to state and federally protected species within the project corridor. Additionally, there are specific protection measures for some species (i.e. Eastern Indigo Snake) that will be implemented during construction to avoid and minimize impacts. Project specific measures to avoid and minimize impacts associated with the recommended alternatives are further summarized in the commitments section at the end of this report.

3.3.2 Potential Direct Effects

Potential Direct Effects to both federal and state protected species are provided below in a summary table. For Interchange Alternatives 1 and 2, anticipated direct impacts include all habitat necessary for maintained ROW to the proposed FDOT property line, when parcel acquisition is necessary for that alternative. Specific ESA Federal Effect Determinations for federally protected species are provided in the sections; however, a summary of each alternative is provided below in to provide further general comparison of direct effects. Independent of the final selected pond sites per basin, there are potential effects to protected species due to the corridor alternatives, per current USFWS Standard Local Operating Procedures (SLOPES), Effect Determination Keys, and species-specific survey guidance documents. Therefore, no further detailed analysis of specific pond sites per basin is provided, as the USFWS will likely require surveys for these species, due to roadway alternative design. The following table summarizes the effect determinations and anticipated potential adverse effects on federally and state protected species, as they are described above.

Table 3.2-1: Comparison of Alternatives – Potential Effect Determinations

Common Name	Scientific Name	Alternative 1	Alternative 2
Gopher Tortoise	<i>Gopherus polyphemus</i>	No adverse effect anticipated	No adverse effect anticipated
Eastern Indigo Snake	<i>Drymarchon corais couperi</i>	MANLAA	MANLAA
Audubon's Crested Caracara	<i>Polyborus plancus audubonii</i>	MANLAA	MANLAA
Bald Eagle	<i>Haliaeetus leucocephalus</i>	MANLAA	MANLAA
Florida Sandhill Crane	<i>Antigone canadensis pratensis</i>	No adverse effect anticipated	No adverse effect anticipated
Florida Scrub Jay	<i>Aphelocoma coerulescens</i>	May Affect	MANLAA
Little Blue Heron	<i>Egretta caerulea</i>	No adverse effect anticipated	No adverse effect anticipated
Roseate Spoonbill	<i>Platalea ajaja</i>	No adverse effect anticipated	No adverse effect anticipated
Tricolored Heron	<i>Egretta tricolor</i>	No adverse effect anticipated	No adverse effect anticipated
Wood Stork	<i>Mycteria americana</i>	MANLAA	MANLAA
Florida Burrowing Owl	<i>Athene cunicularia</i>	No adverse effect anticipated	No adverse effect anticipated
Grasshopper Sparrow	<i>Ammodramus savannarum floridanus</i>	MANLAA	MANLAA
Florida bonneted bat	<i>Eumops floridanus</i>	MANLAA	MANLAA

4.0 Regulatory Agency Coordination

FTE construction and maintenance activities are regulated by numerous environmental laws and regulations administered by state and federal agencies. These agencies have established environmental programs to conserve, protect, manage, and control the air, land, water, and natural resources of the state or the United States. The following is a list of anticipated permits needed from the state and federal agencies for the proposed project.

Although the FTE intends to avoid and minimize wetland impacts to the greatest extent practicable, unavoidable wetland impacts, will be offset to fulfill the requirements of 33 U.S.C. § 1344 and Part IV of Chapter 373, Florida Statutes. FTE will coordinate with USACE, USFWS, SFWMD and FWC during the design and permit phases of the project to identify the appropriate mitigation.

4.1 US Army Corps of Engineers Permit

The USACE regulates discharge of material into waters of the United States under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act of 1899. For Standard Permits, the issuance of a Water Quality Certification, is required prior to the issuance of a Section 404 Dredge and Fill Permit. This Water Quality Certification (WQC) is obtained with the issuance of a state Environmental Resource Permit issued by the FDEP or Water Management District.

The proposed project will likely require a SP. If formal consultation with USFWS is necessary after federally listed species-specific surveys are performed, the Corps can facilitate consultation through their permitting process, and the USFWS can issue a Biological Opinion (BO) concurrently with Corps review.

4.2 NPDES Permit

A National Pollutant Discharge Elimination System (NPDES) permit is required because the proposed project will disturb more than one acre of land, and the stormwater runoff will discharge to waters of the state. A Stormwater Pollution Prevention Plan (SWPPP) will be developed and implemented during construction. FDOT will be required to submit a Notice of Intent (NOI) to use this permit with the FDEP at least two days prior to the commencement of construction. This permit program is administered through the FDEP NPDES program, delegated to the state of Florida by the Environmental Protection Authority (EPA).

4.3 Environmental Resource Permits and associated approvals

Chapter 62-330, Florida Administrative Code, authorizes the SFWMD to require an Environmental Resource Permit (ERP) for the proposed roadway capacity improvements. The proposed project will likely require a major modification to Individual Permits previously issued for Florida's Turnpike.

Under the ERP program, activities located on the C-31 canal (St. Cloud Canal) should not require any state lands easements, as the canal is not considered Sovereign Submerged Lands (SSL).

SFWMD will be required to consult with the USACE and obtain approval from the Corps during ERP permitting, under Section 408 of the federal Civil Works Program, for any potential impacts to the C-31 canal. This approval is anticipated to be issued in the form of a Right-of-Way (ROW) permit.

Lastly, FDEP records show that one wetland system at the US 192 interchange may have a recorded regulatory Conservation Easement (CE). The CE was recorded as mitigation for historic wetland impacts. Therefore, the District and FDEP will require that FTE submit a partial release request during the design and permitting phase of this project. No records of the recorded easement are available online, requiring further investigation of potentially recorded documents which will occur during early design phase.

4.4 Gopher Tortoise Relocation Permit – FWC

It is anticipated that either alternative will impact active gopher tortoise burrows within the project study area. As such, a permit to relocate potentially occupied burrows will be necessary from FWC to obtain. Updated 100% surveys in suitable habitat, within the limits of construction, should commence approximately 90 days prior to FDOT letting, to allow for the permitting and relocation of tortoises.

4.5 Commitments and Conclusions

FTE is committed to avoid and minimize impacts to protected resources, including protected species and wetlands, when practicable. In order to avoid or minimize impacts to wetlands, protected species and their habitats, FDOT commits to the following:

1. The United States Fish and Wildlife Service (USFWS) Standard Protection Measures for the Eastern Indigo Snake (*Drymarchon corais couperi*) will be implemented to assure that the Eastern Indigo Snake will not be adversely impacted by the project.
2. A gopher tortoise (*Gopherus polyphemus*) survey within 25-feet of construction limits (including roadway footprint, construction staging areas, and stormwater management ponds) will be performed prior to the start of the project construction, per FWC guidelines. FTE will secure any relocation permits needed and ensure that gopher tortoises are relocated prior to construction.
3. Impacts to suitable foraging habitat for the federally protected wood stork (*Mycteria americana*) will be mitigated through the purchase of credits from a USFWS approved mitigation bank pursuant to Section 373.4137, Florida Statute (F.S.) or as otherwise agreed to by FDOT and the appropriate regulatory agencies. FTE will consult with USFWS through the USACE Permitting process and provide documentation that "impacts to wood stork foraging habitat are offset."
4. FDOT will initiate technical assistance with USFWS to confirm species that have Consultation Areas (CA) inside the study boundary, to obtain concurrence on Degree of Effect (DOE) and confirm requirements for species-specific surveys. FDOT will provide one seasonal species-specific survey for Audubon's crested caracara (*Polyborus plancus*)

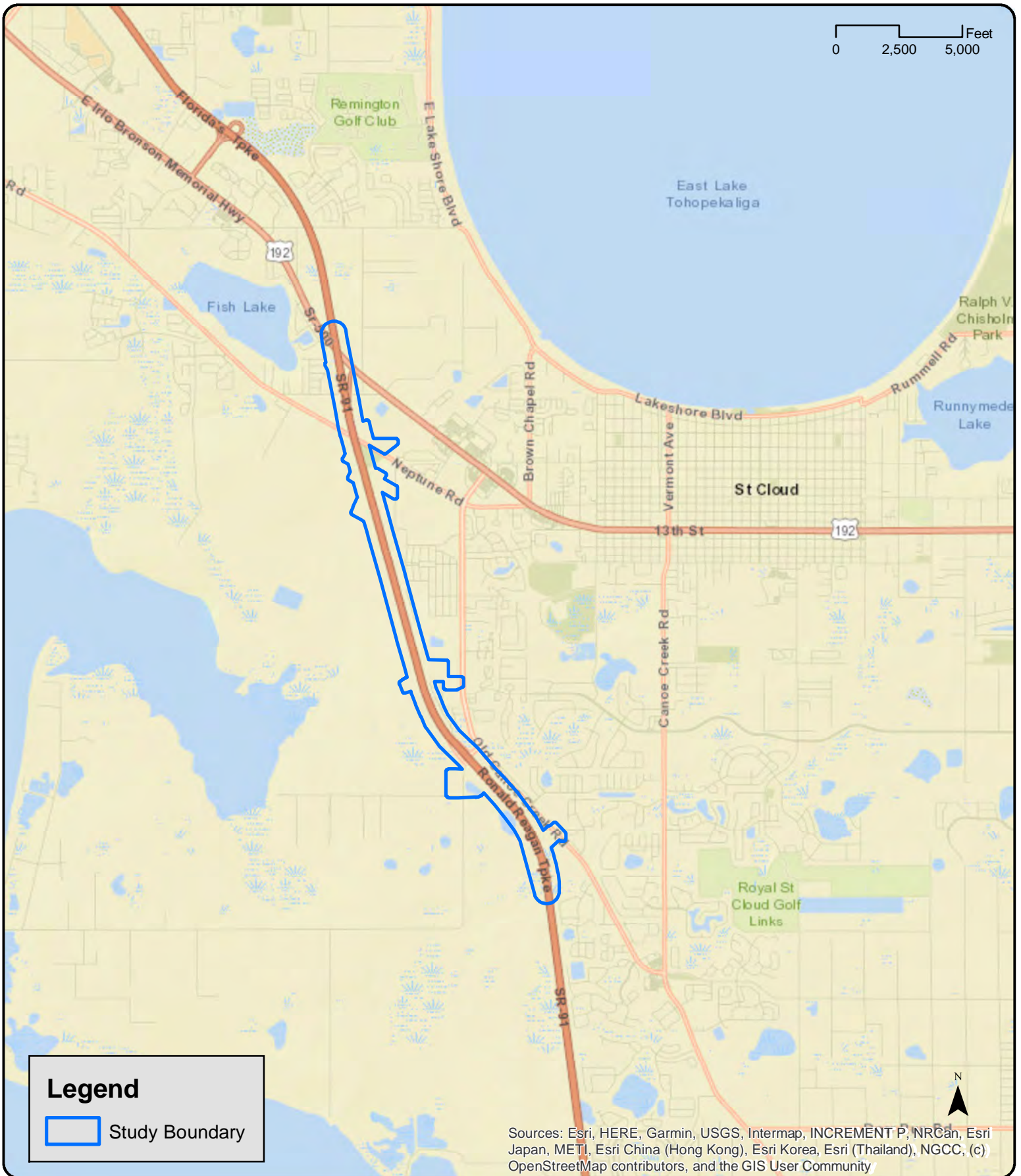
audubonii) and Florida scrub jay (*Aphelocoma coerulescens*) prior to project letting, to confirm absence.

5. FDOT will provide an updated review for potential occurrence of bald eagle (*Haliaeetus leucocephalus*) nests, which will be conducted at least three (3) months prior to project letting, to ensure no nest sites are adversely affected within 660-feet of the project limits.

As the project moves into design phase, consultation and pre-application meetings with state and federal agencies listed above in Section 4.0 will commence. Once a preferred alternative has been selected, species-specific surveys, as early as January 2021, may be required, to meet schedule timeframes and ensure permits and other approvals are obtained in time for the project to meet production schedule.

Appendix A

DRAFT



Regional Location Map

Project Development and Environment (PD&E) Study

Widening Florida's Turnpike (SR 91)

from South of Kissimmee Park Road to US 192 in Osceola County

Financial Project ID No.: 441224-1-22-01





Aerial Map Project Development and Environment (PD&E) Study Widening Florida's Turnpike (SR 91)

from South of Kissimmee Park Road to US 192 in Osceola County

Financial Project ID No.: 441224-1-22-01

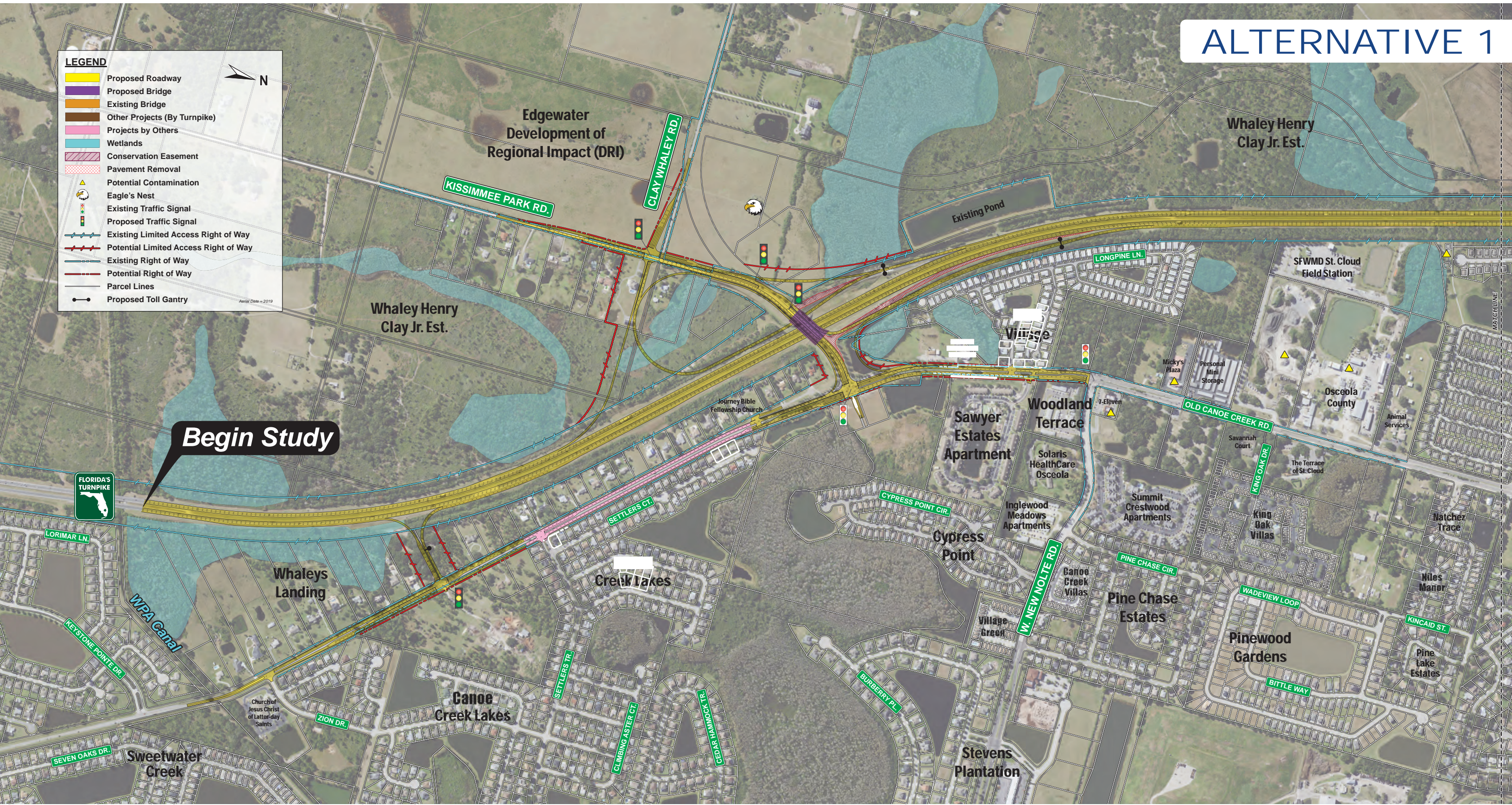


ALTERNATIVE 1

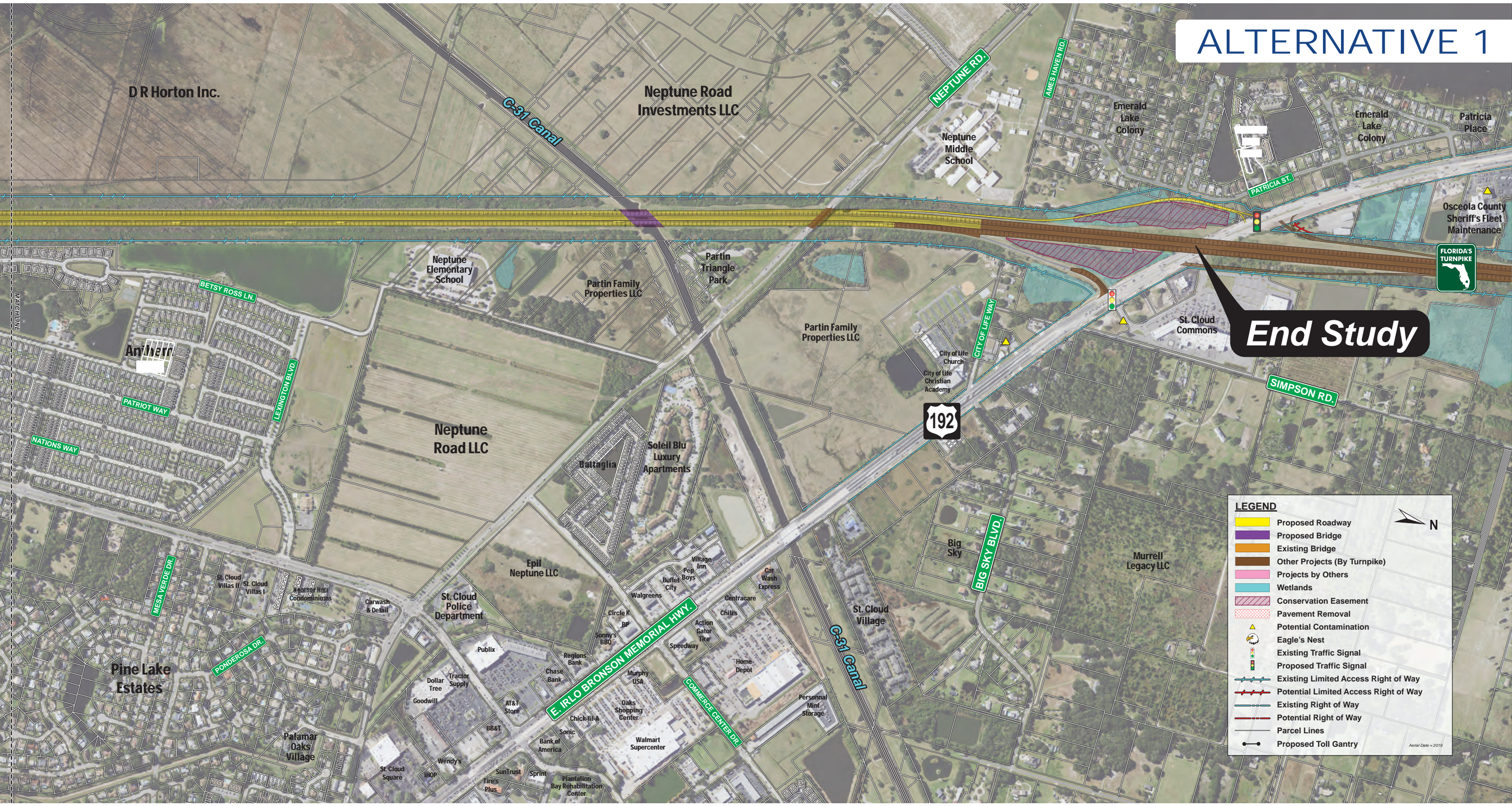
LEGEND

- Proposed Roadway
- Proposed Bridge
- Existing Bridge
- Other Projects (By Turnpike)
- Projects by Others
- Wetlands
- Conservation Easement
- Pavement Removal
- Potential Contamination
- Eagle's Nest
- Existing Traffic Signal
- Proposed Traffic Signal
- Existing Limited Access Right of Way
- Potential Limited Access Right of Way
- Existing Right of Way
- Potential Right of Way
- Parcel Lines
- Proposed Toll Gantry

Aerial Date = 2019



ALTERNATIVE 1



End Study

LEGEND

Proposed Roadway

Proposed Bridge

Existing Bridge

Other Projects (By Turnpike)

Projects by Others

Wetlands

Conservation Easement

Pavement Removal

Potential Contamination

Eagle's Nest

Existing Traffic Signal

Proposed Traffic Signal

Existing Limited Access Right of Way

Potential Limited Access Right of Way

Existing Right of Way

Potential Right of Way

Parcel Lines

Proposed Toll Gantry

N

Aerial Date = 2019

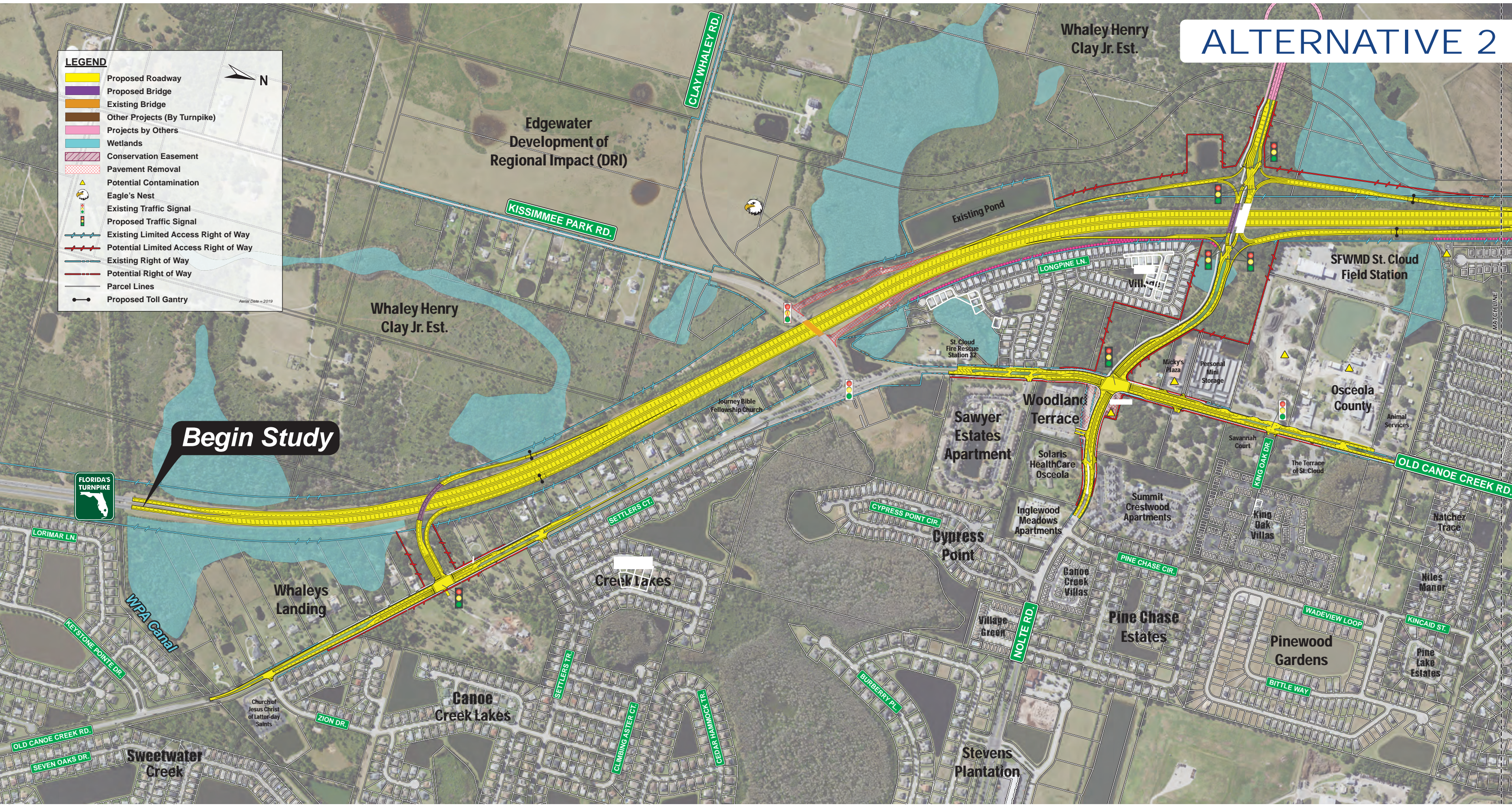
ALTERNATIVE 2

LEGEND

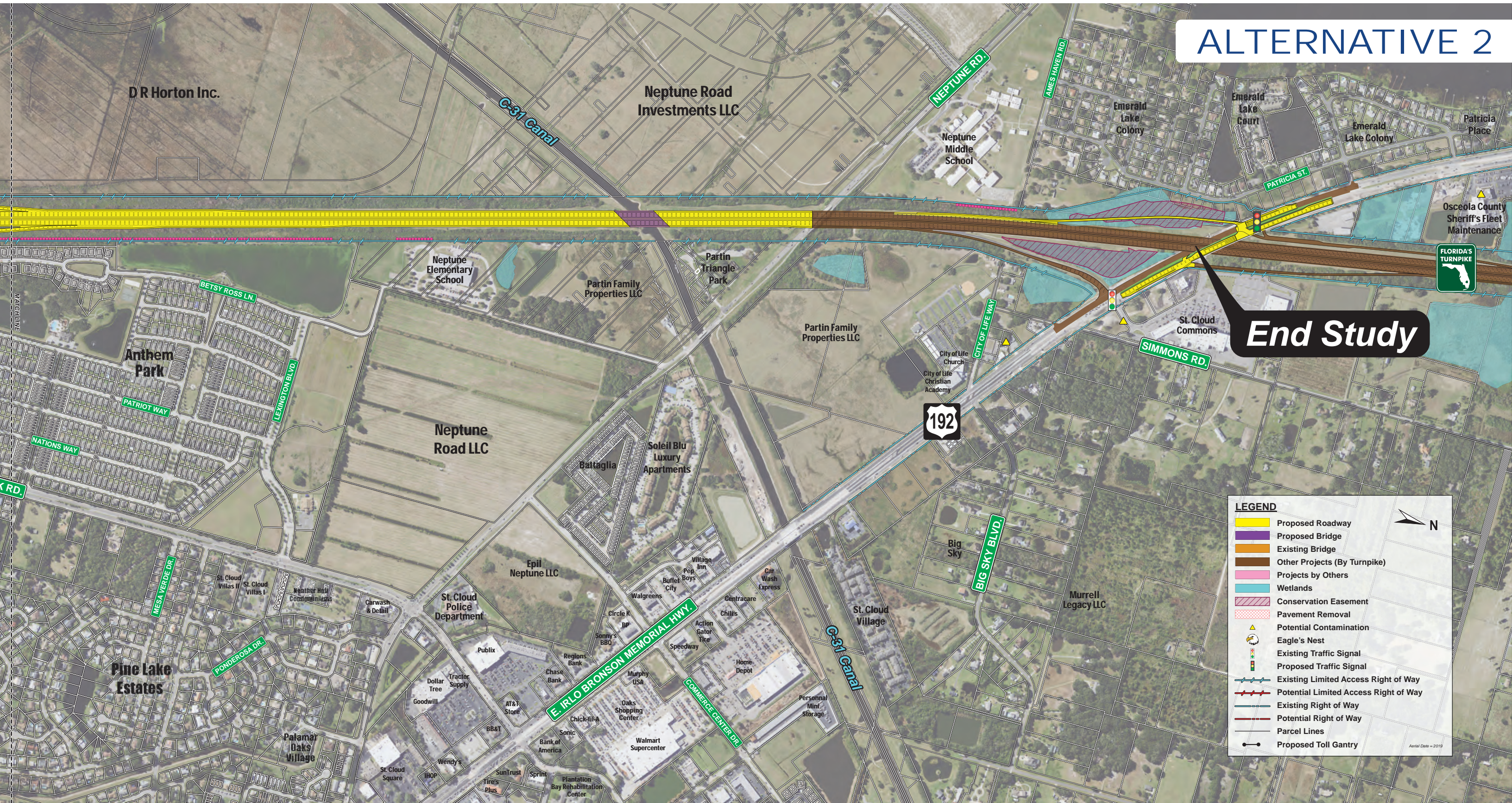
- Proposed Roadway
- Proposed Bridge
- Existing Bridge
- Other Projects (By Turnpike)
- Projects by Others
- Wetlands
- Conservation Easement
- Pavement Removal
- Potential Contamination
- Eagle's Nest
- Existing Traffic Signal
- Proposed Traffic Signal
- Existing Limited Access Right of Way
- Potential Limited Access Right of Way
- Existing Right of Way
- Potential Right of Way
- Parcel Lines
- Proposed Toll Gantry

N

Aerial Date = 2019



ALTERNATIVE 2



End Study

LEGEND

Proposed Roadway

Proposed Bridge

Existing Bridge

Other Projects (By Turnpike)

Projects by Others

Wetlands

Conservation Easement

Pavement Removal

Potential Contamination

Eagle's Nest

Existing Traffic Signal

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Existing Right of Way

Potential Right of Way

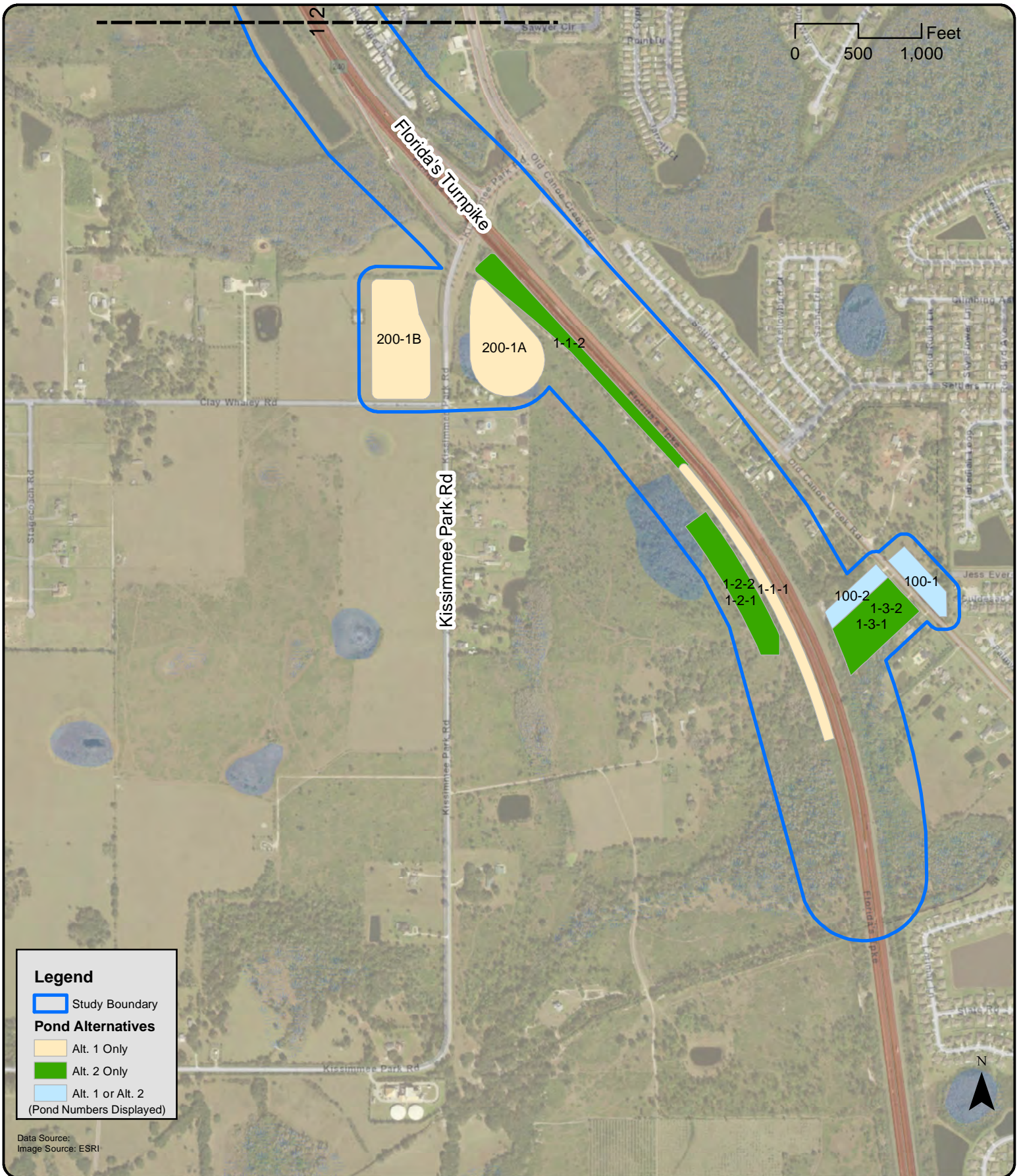
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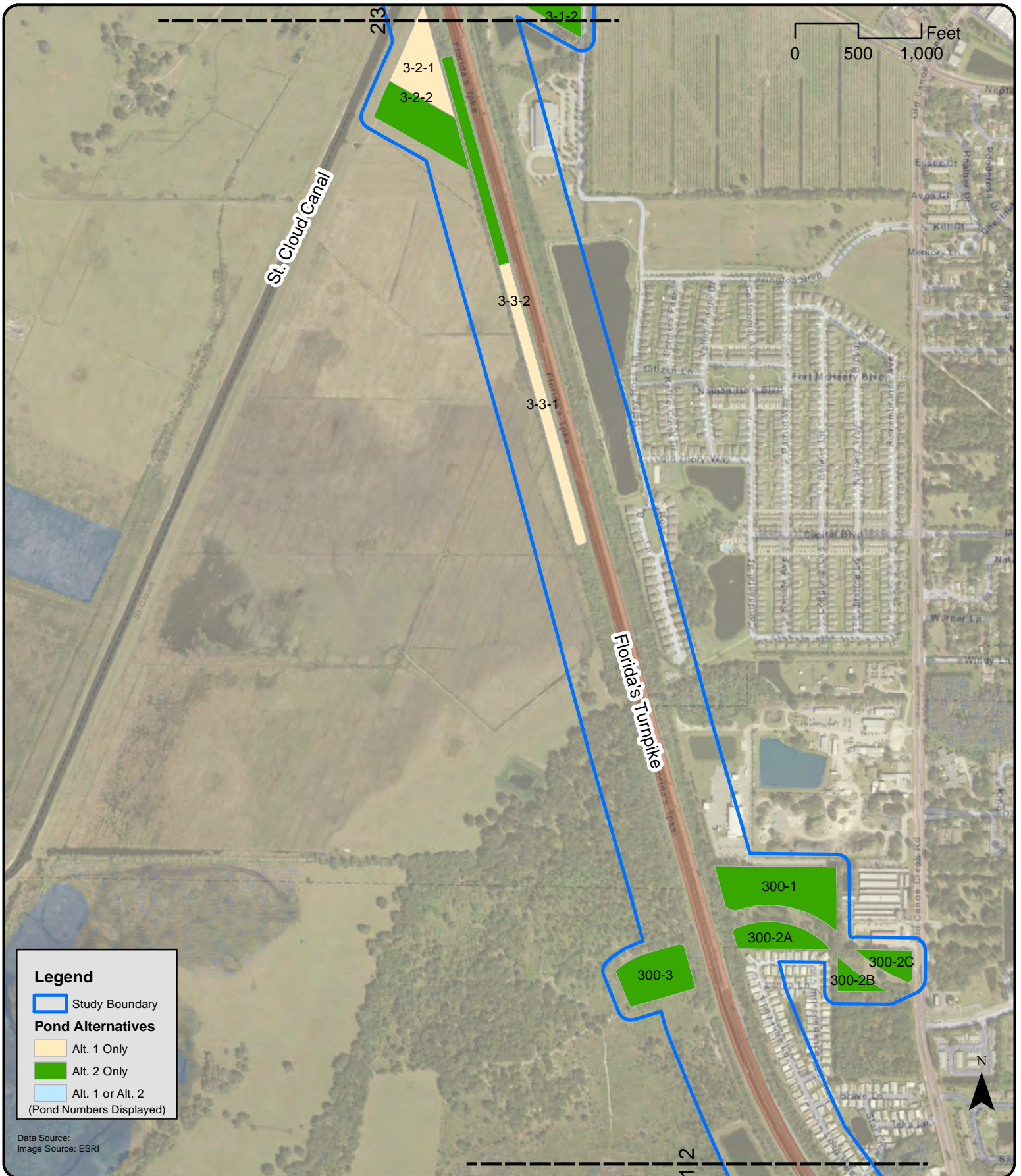
Proposed Toll Gantry

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Pond Alternatives Map- Sheet 2

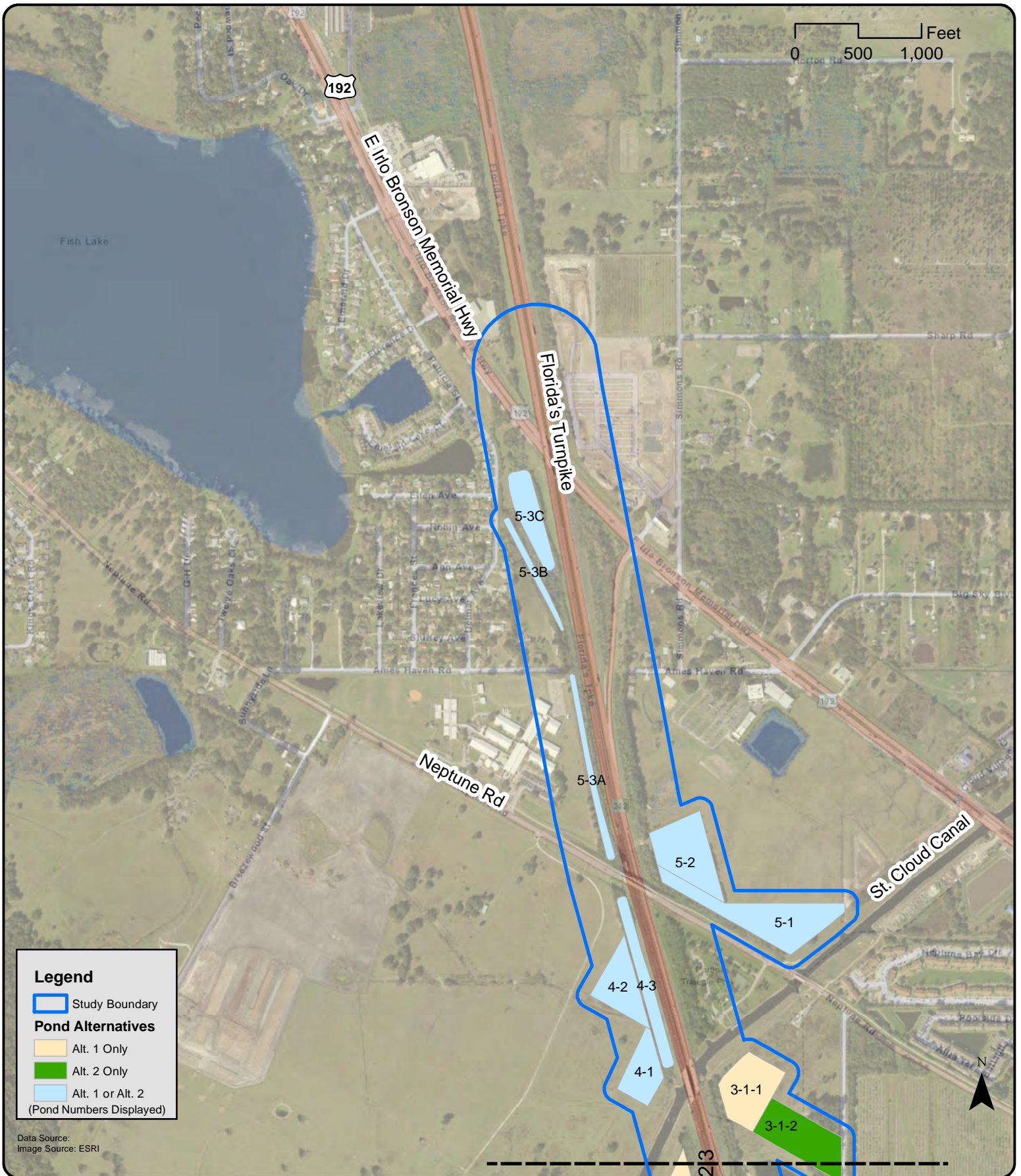
Project Development and Environment (PD&E) Study

Widening Florida's Turnpike (SR 91)

from South of Kissimmee Park Road to US 192 in Osceola County

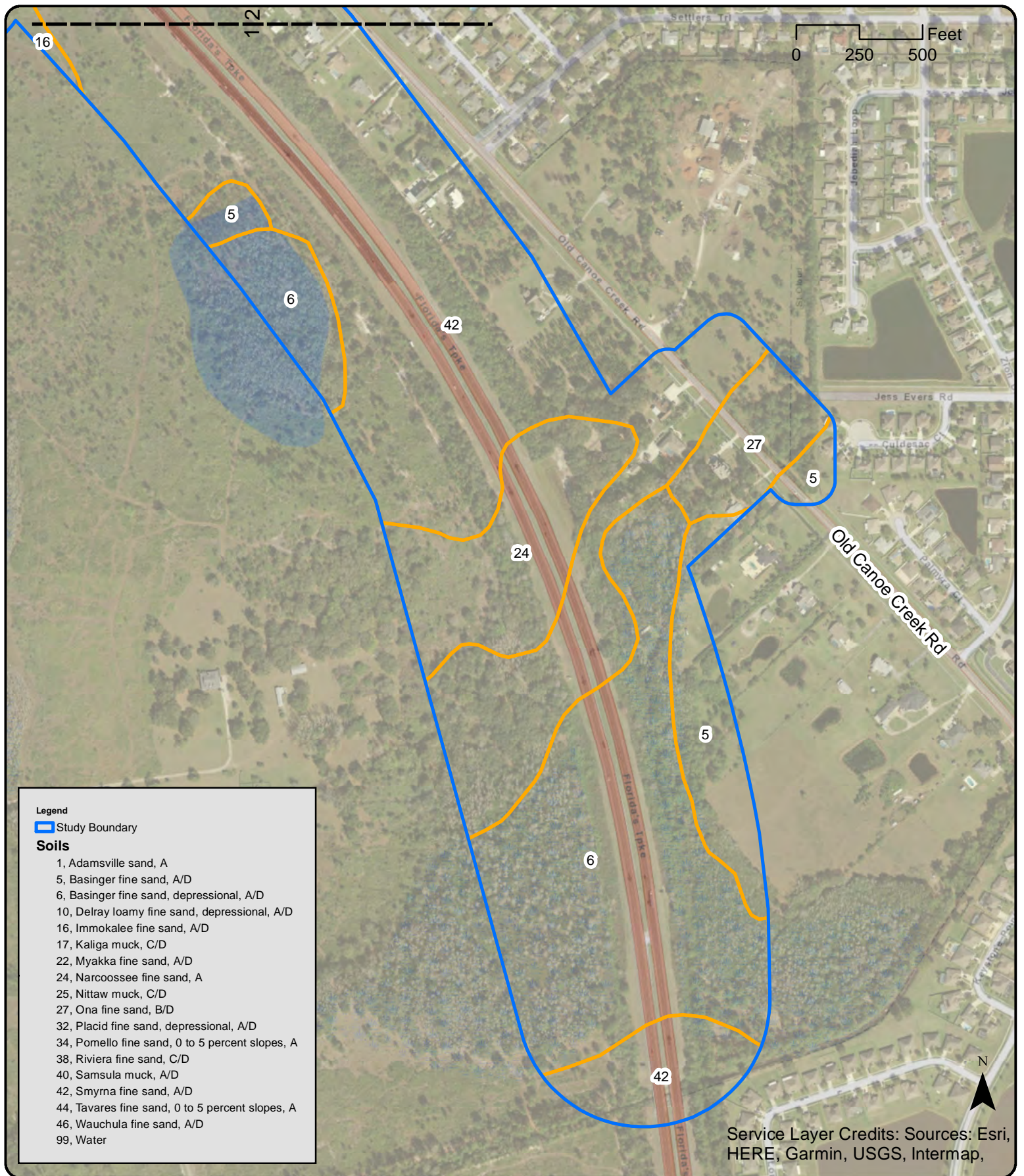
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Pond Alternatives Map- Sheet 3
Project Development and Environment (PD&E) Study
Widening Florida's Turnpike (SR 91)
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Soils Map- Sheet 1

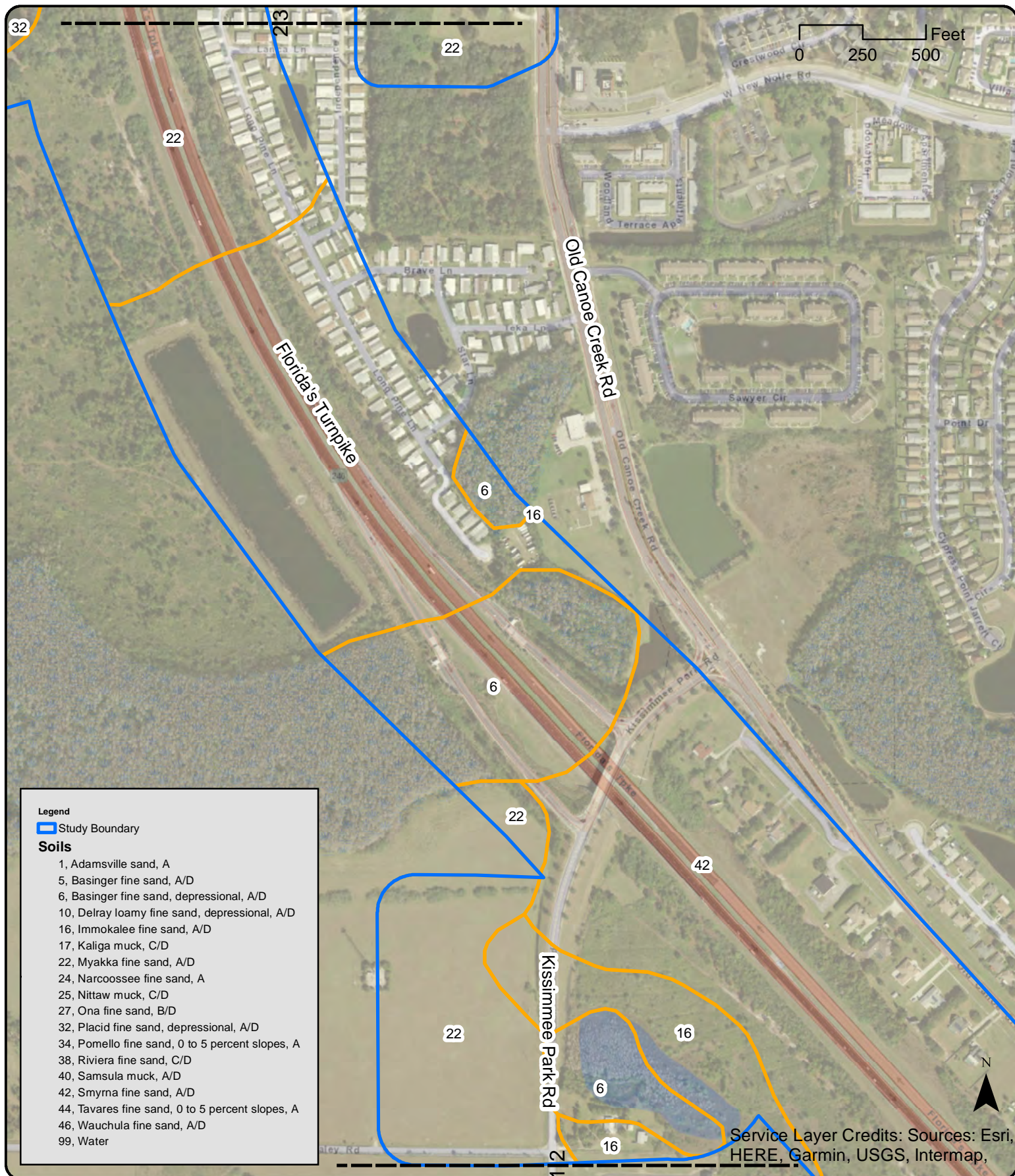
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Soils Map- Sheet 2

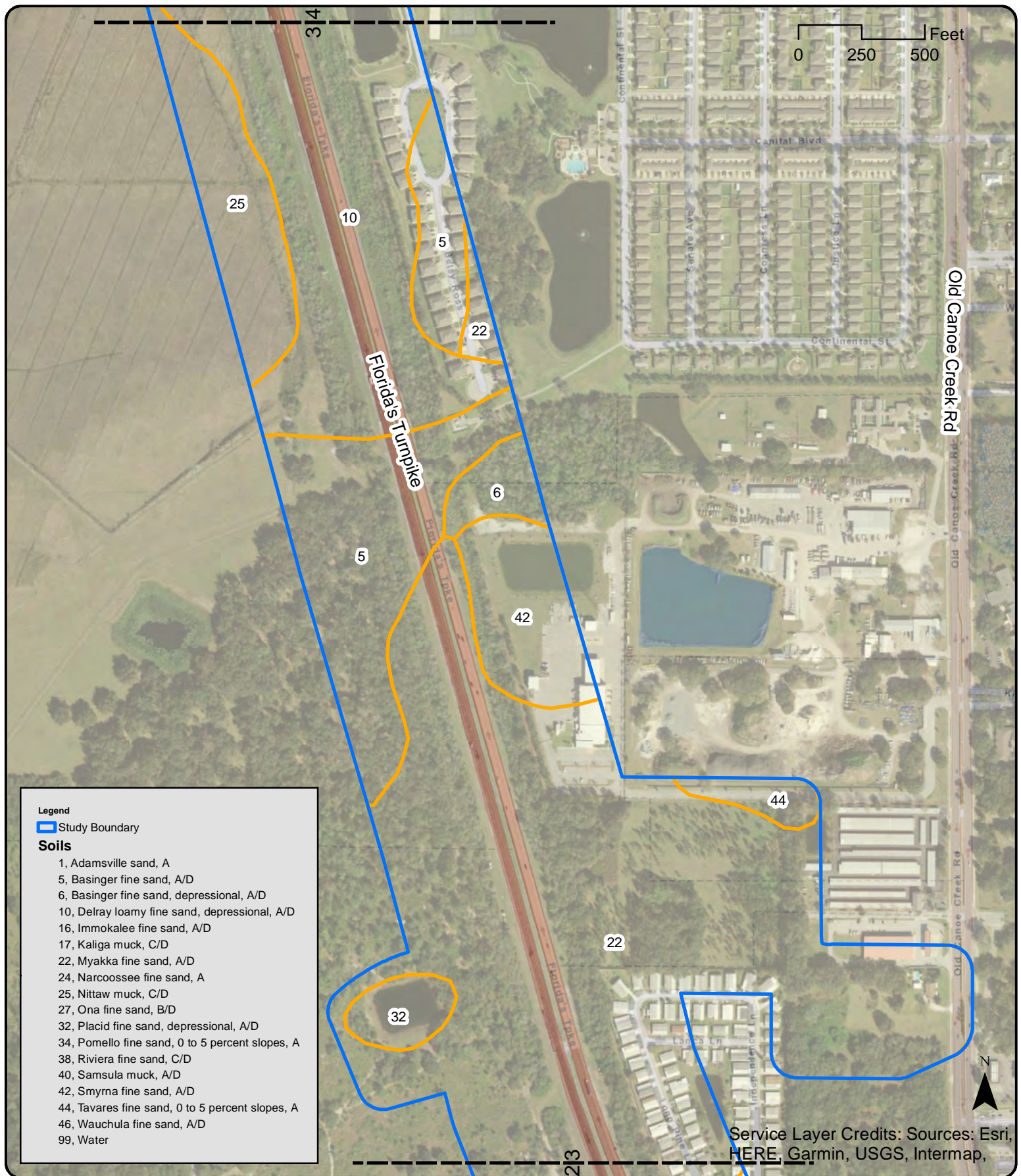
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Soils Map- Sheet 3

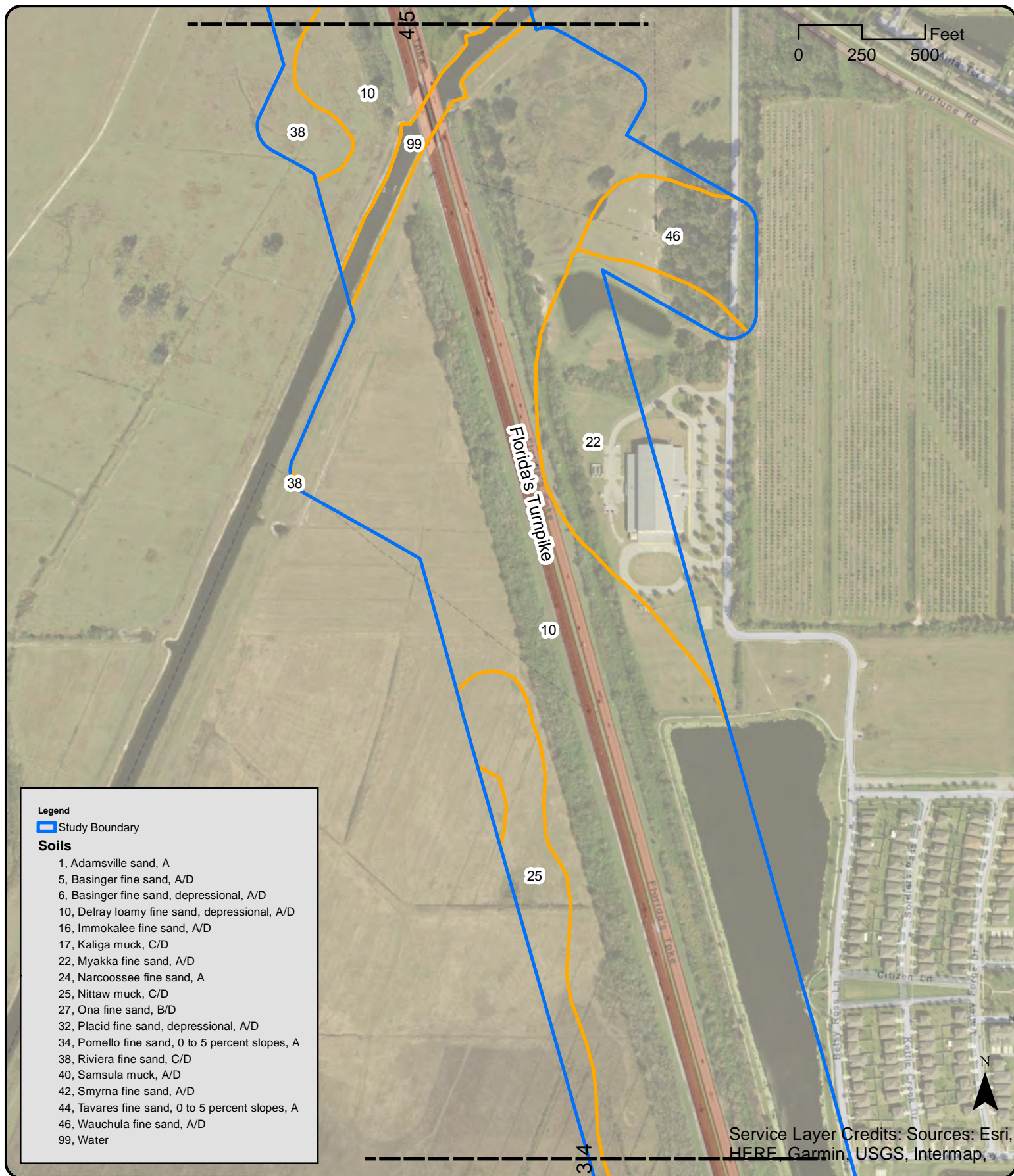
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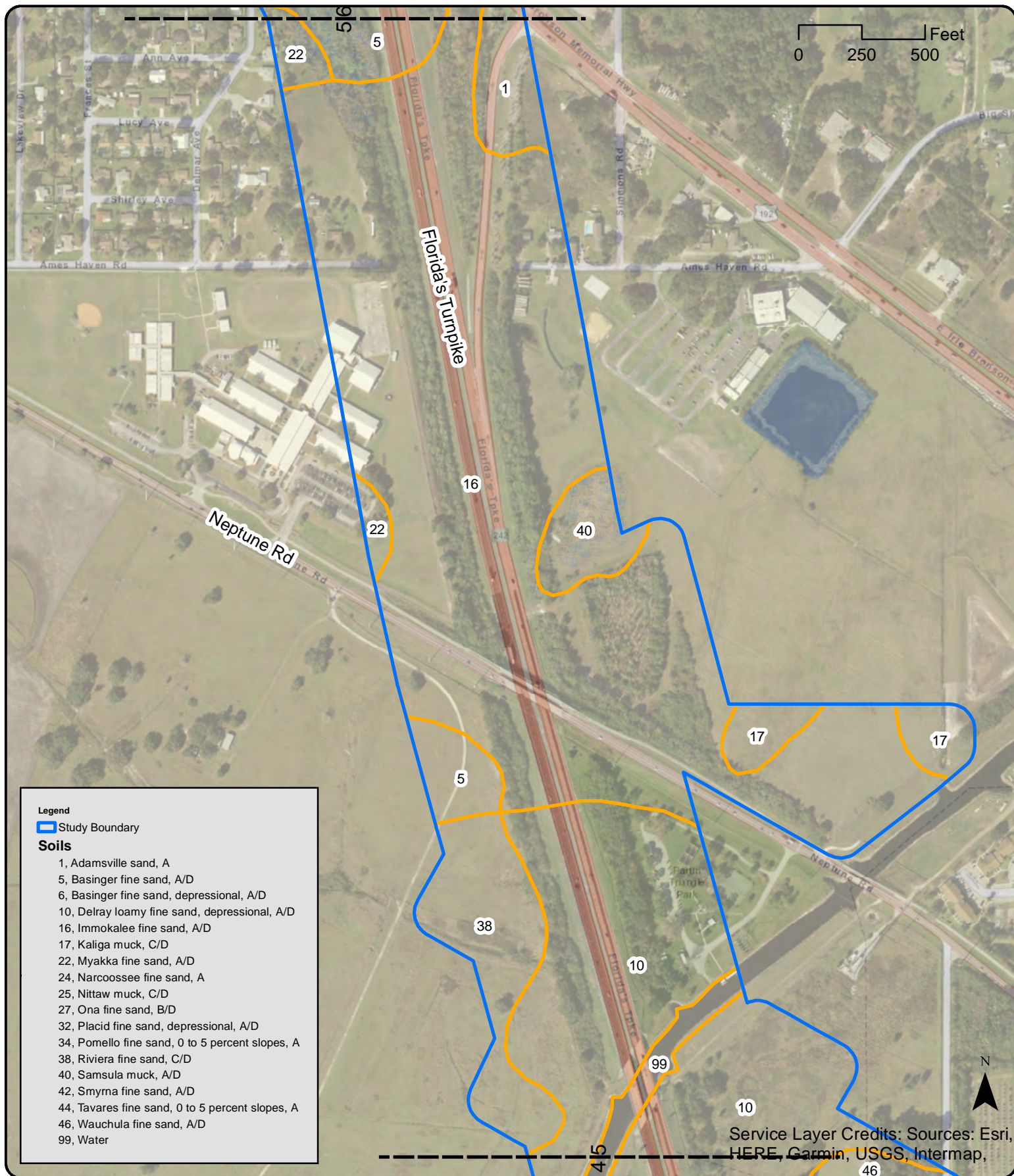
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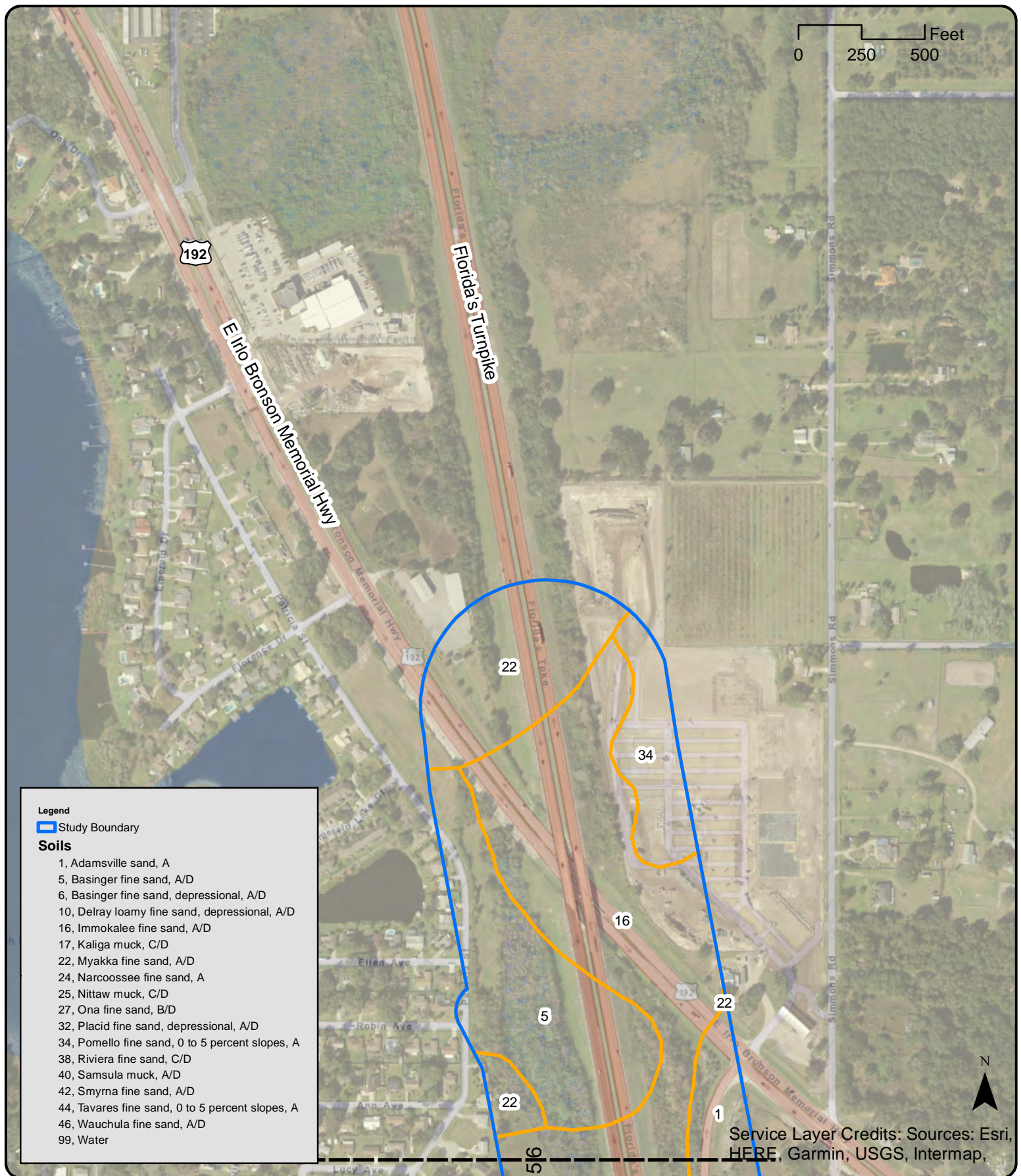
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Soils Map- Sheet 6

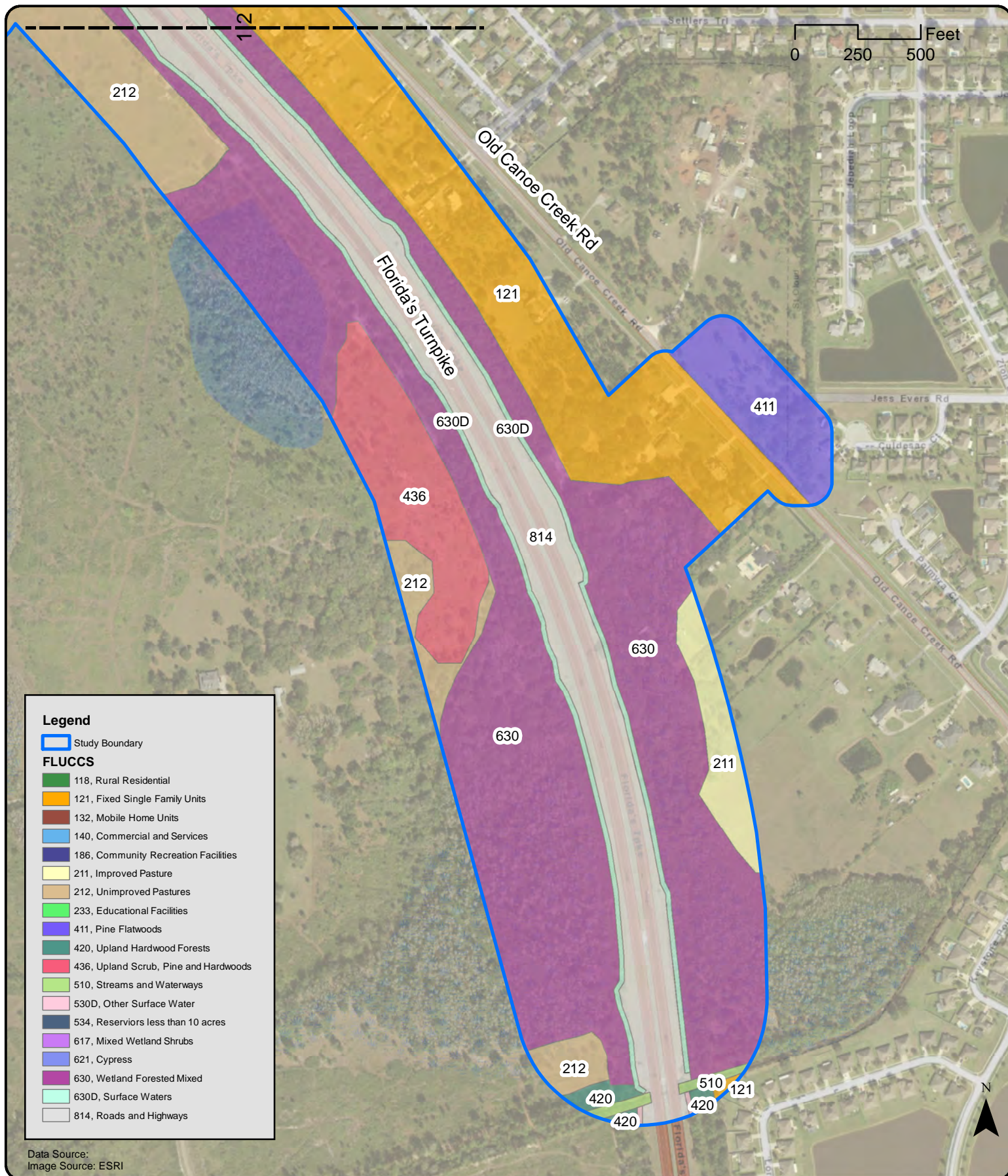
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FLUCCS Map- Sheet 1

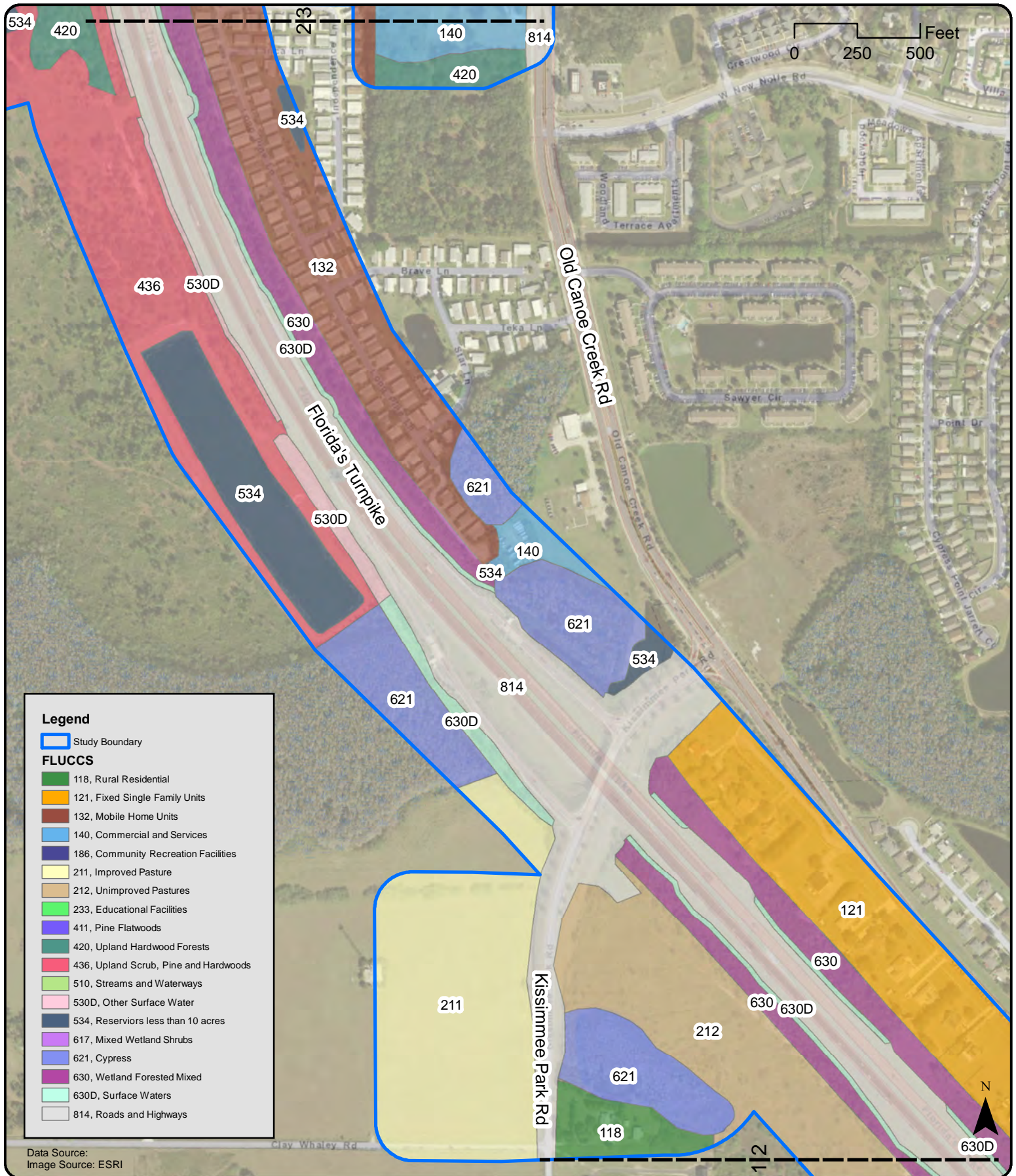
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FLUCCS Map- Sheet 2

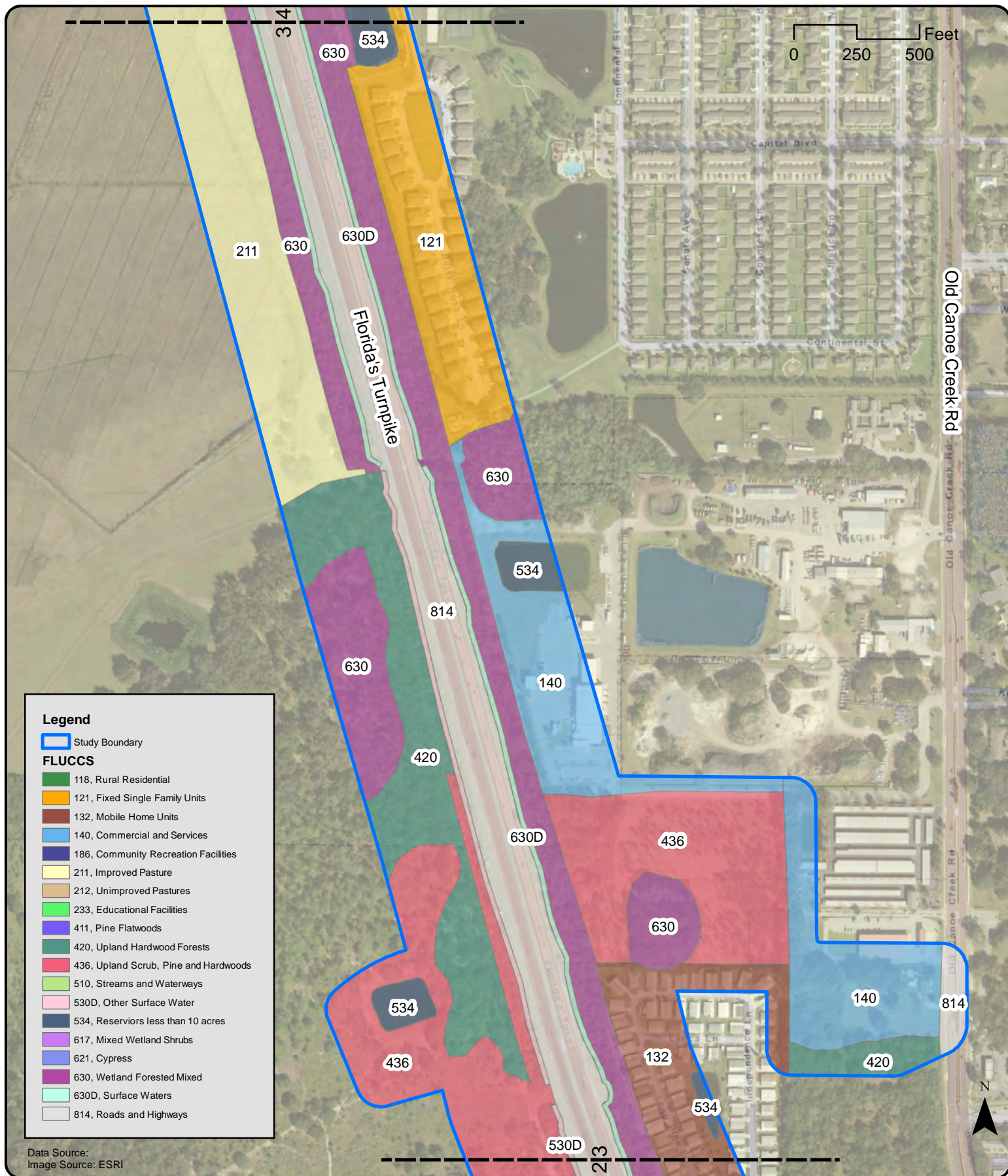
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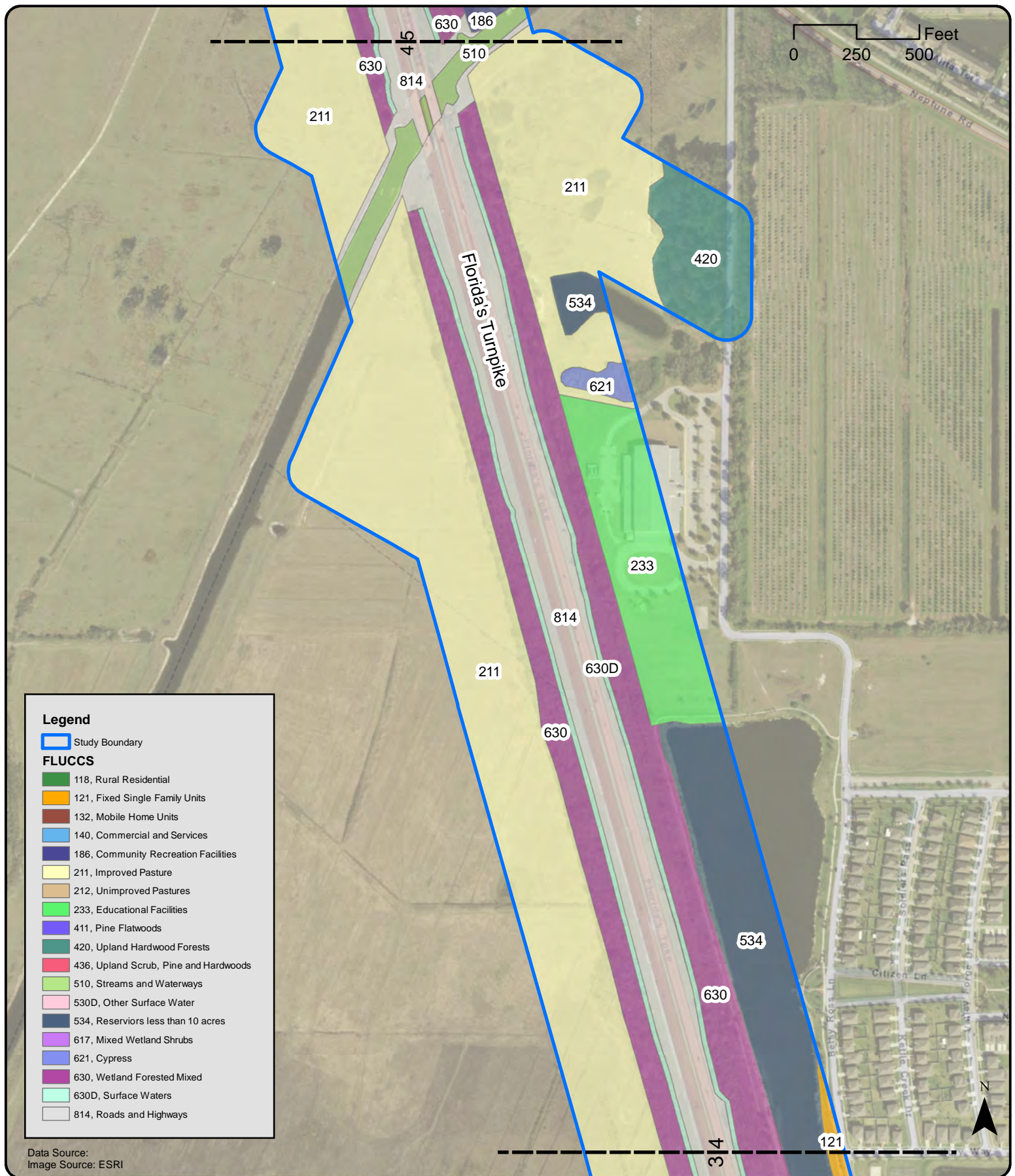
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FLUCCS Map- Sheet 4

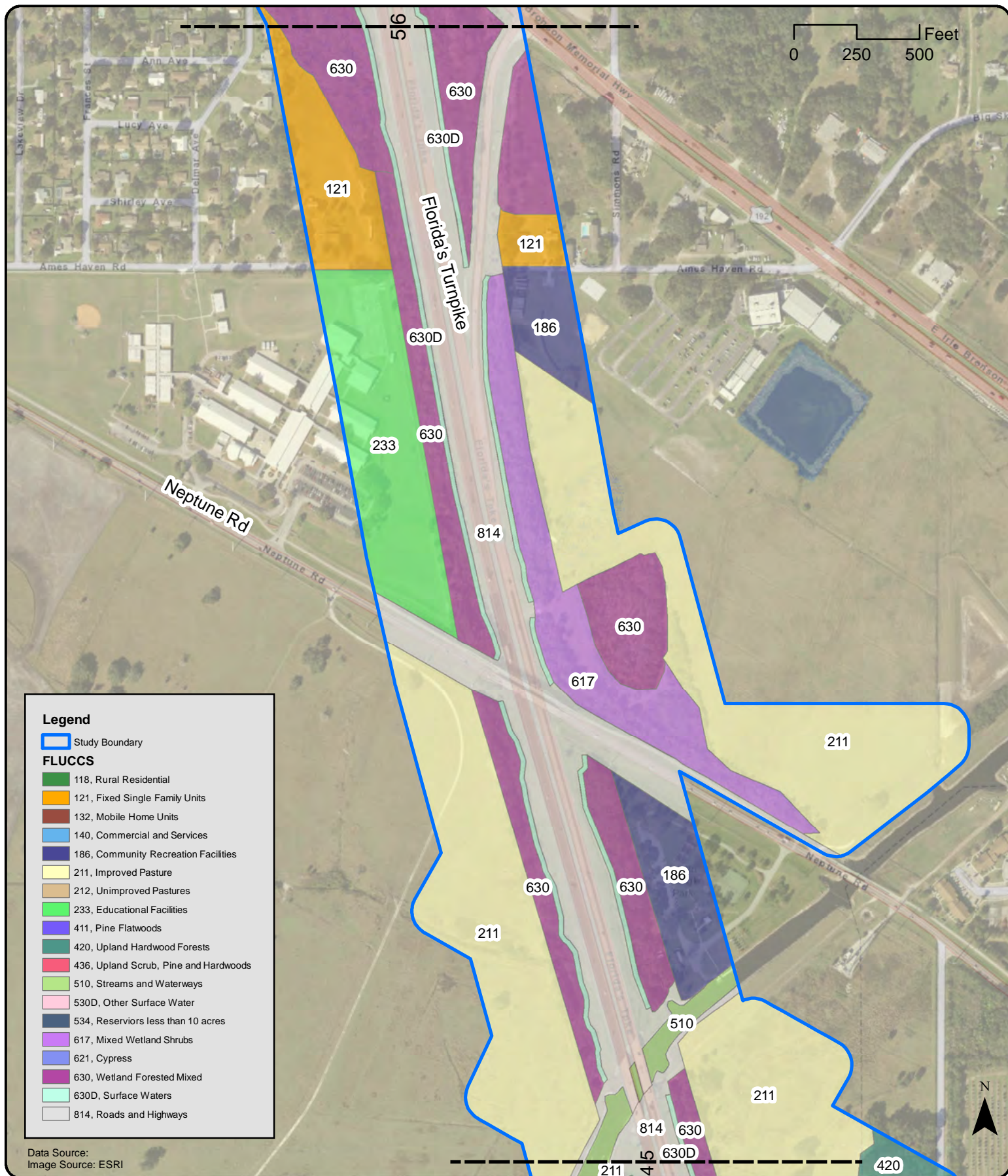
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FLUCCS Map- Sheet 5

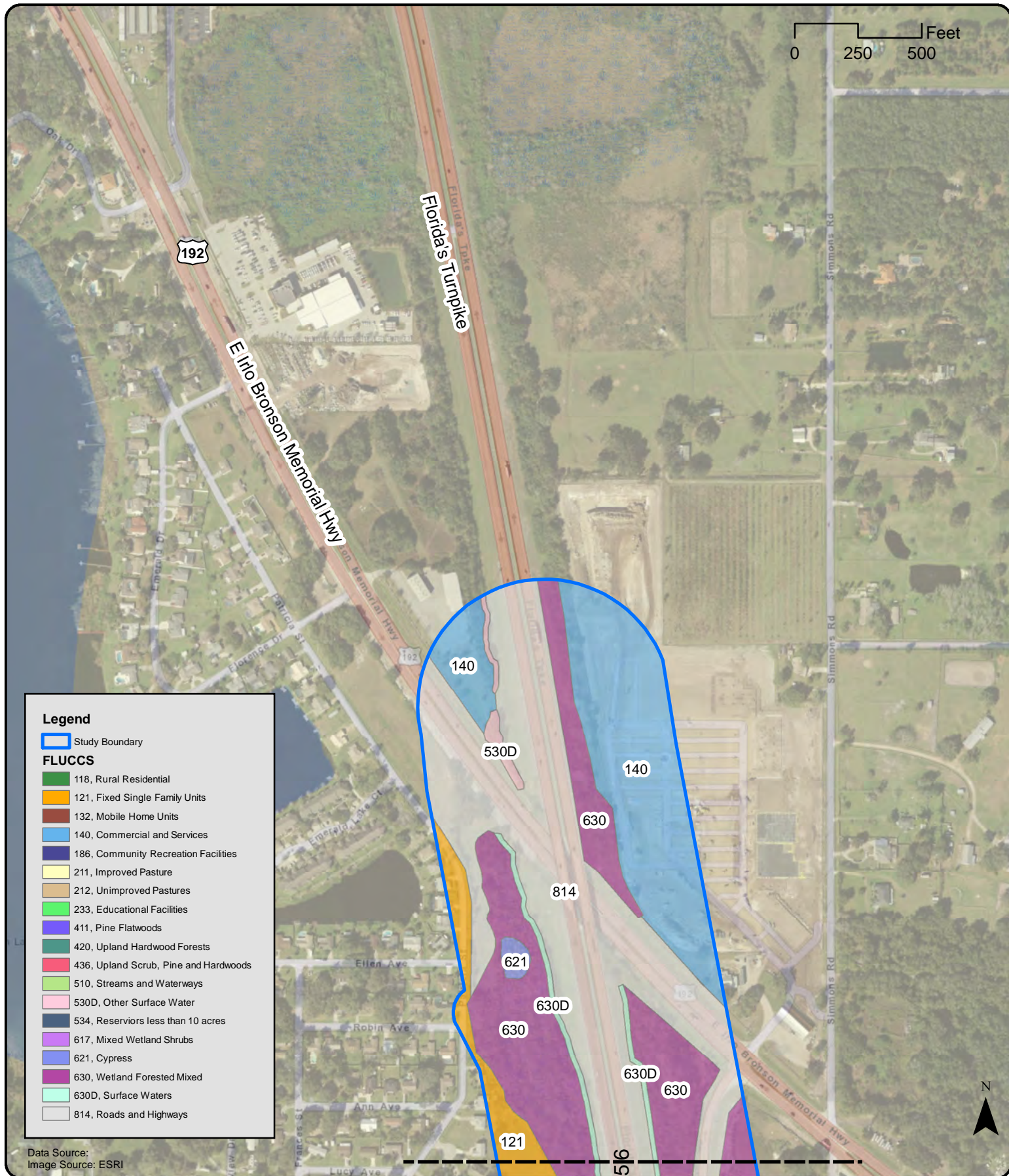
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Financial Project ID No.: 441224-1-22-01





FLUCCS Map- Sheet 6

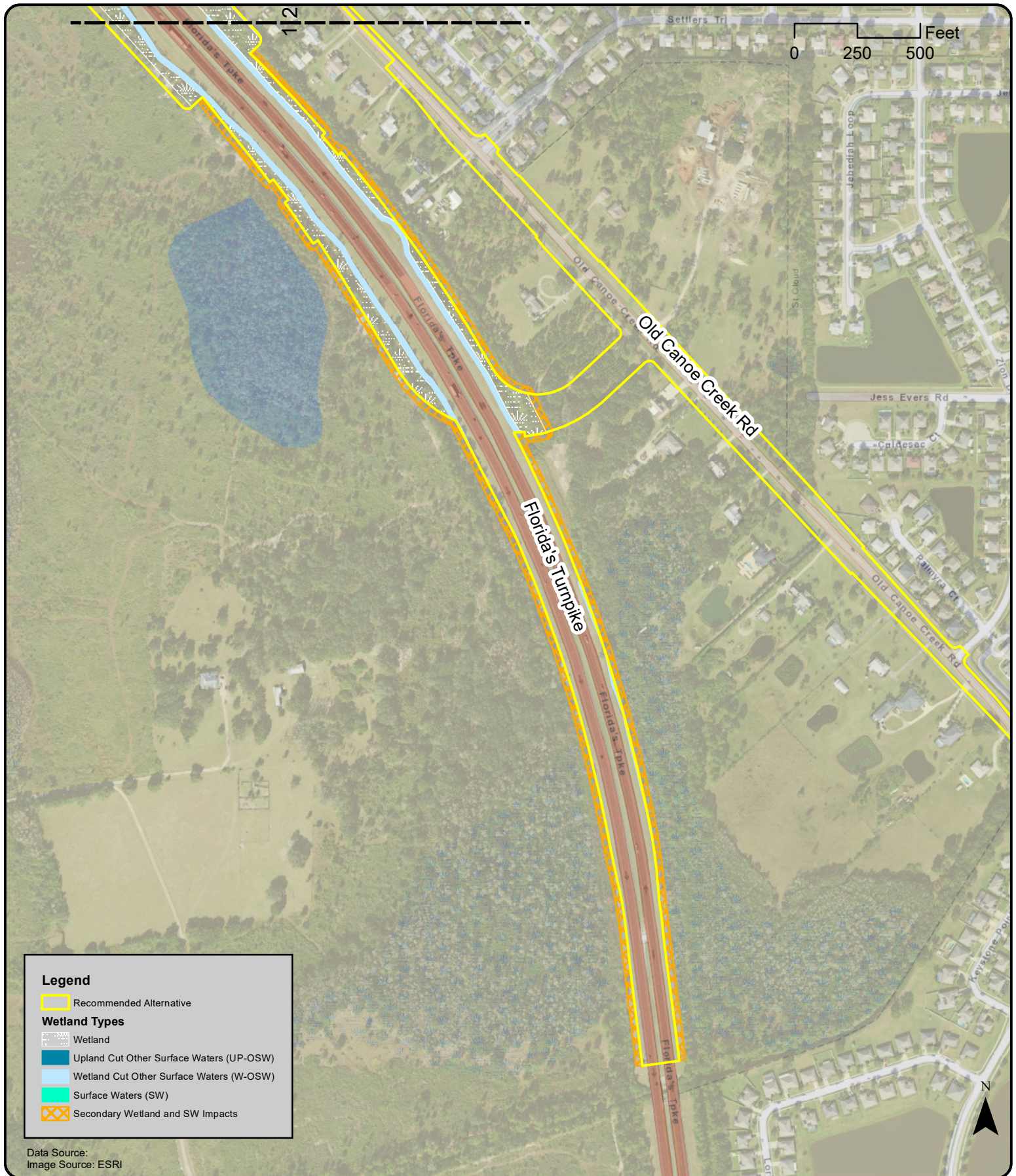
Project Development and Environment (PD&E) Study

Widening Florida's Turnpike (SR 91)

from South of Kissimmee Park Road to US 192 in Osceola County

Financial Project ID No.: 441224-1-22-01





Wetland and Surface Water Map- Sheet 1

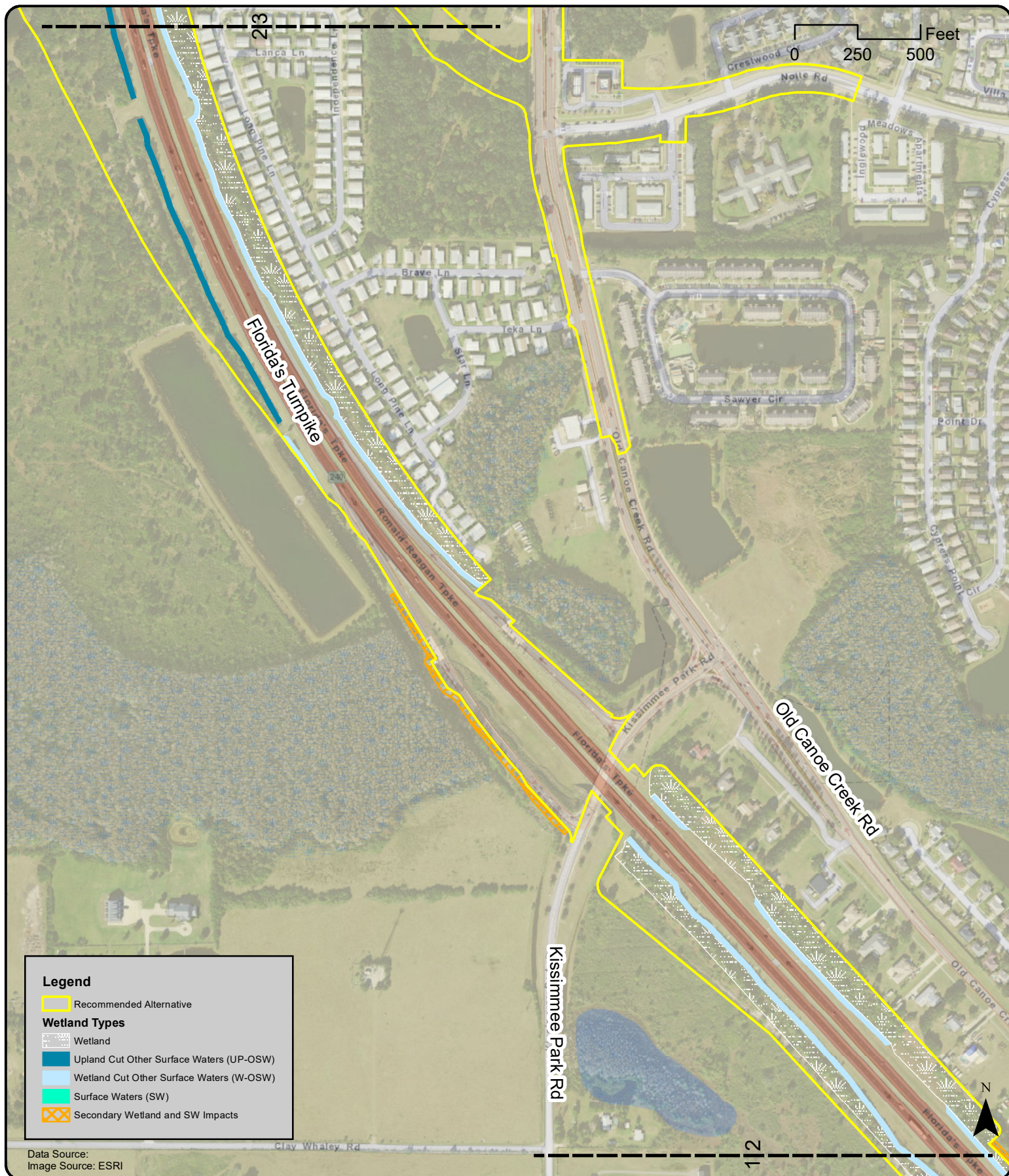
Project Development and Environment (PD&E) Study

Widening Florida's Turnpike (SR 91)

from South of Kissimmee Park Road to US 192 in Osceola County

Financial Project ID No.: 441224-1-22-01





Wetland and Surface Water Map- Sheet 2

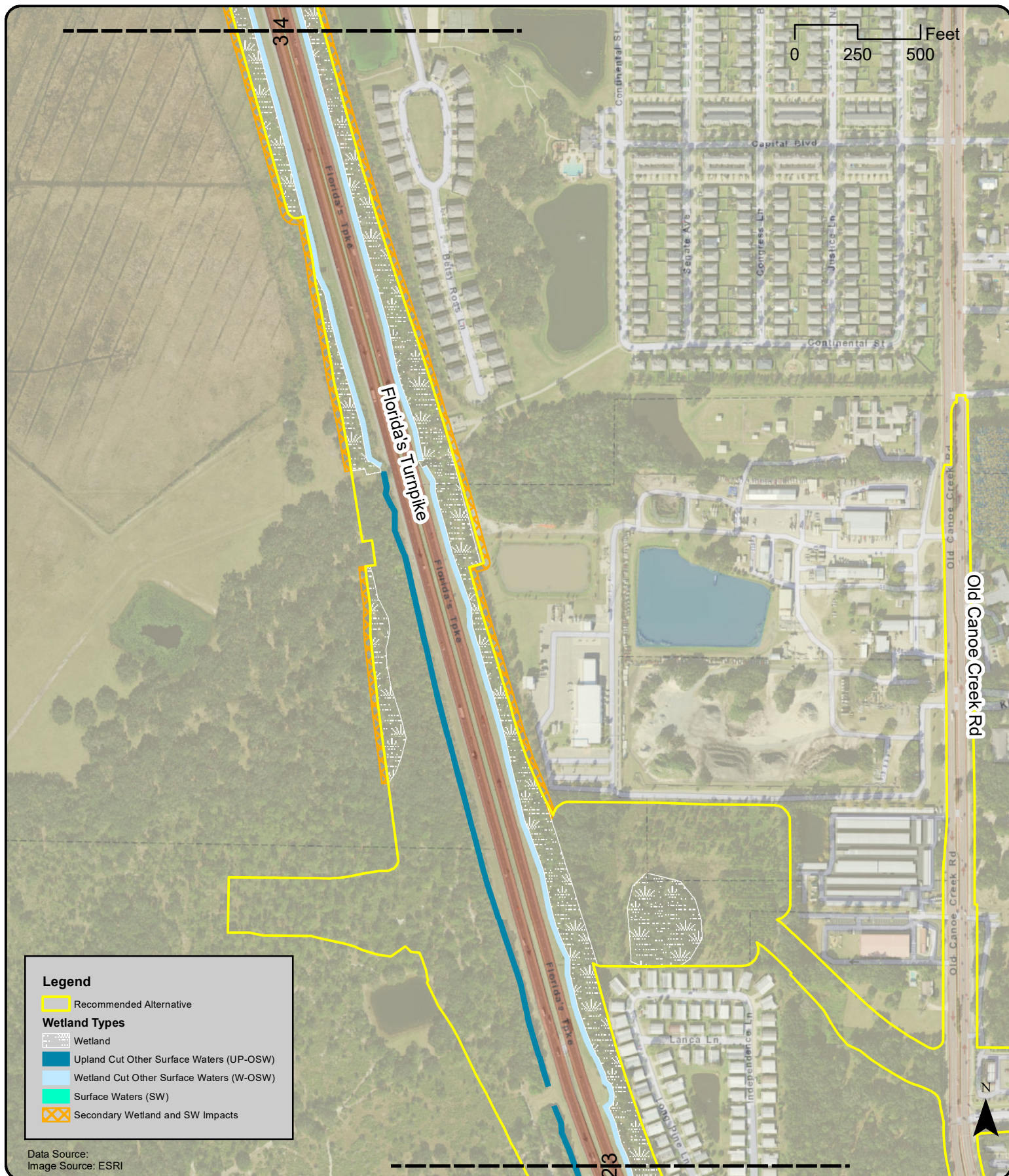
Project Development and Environment (PD&E) Study

Widening Florida's Turnpike (SR 91)

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Financial Project ID No.: 441224-1-22-01



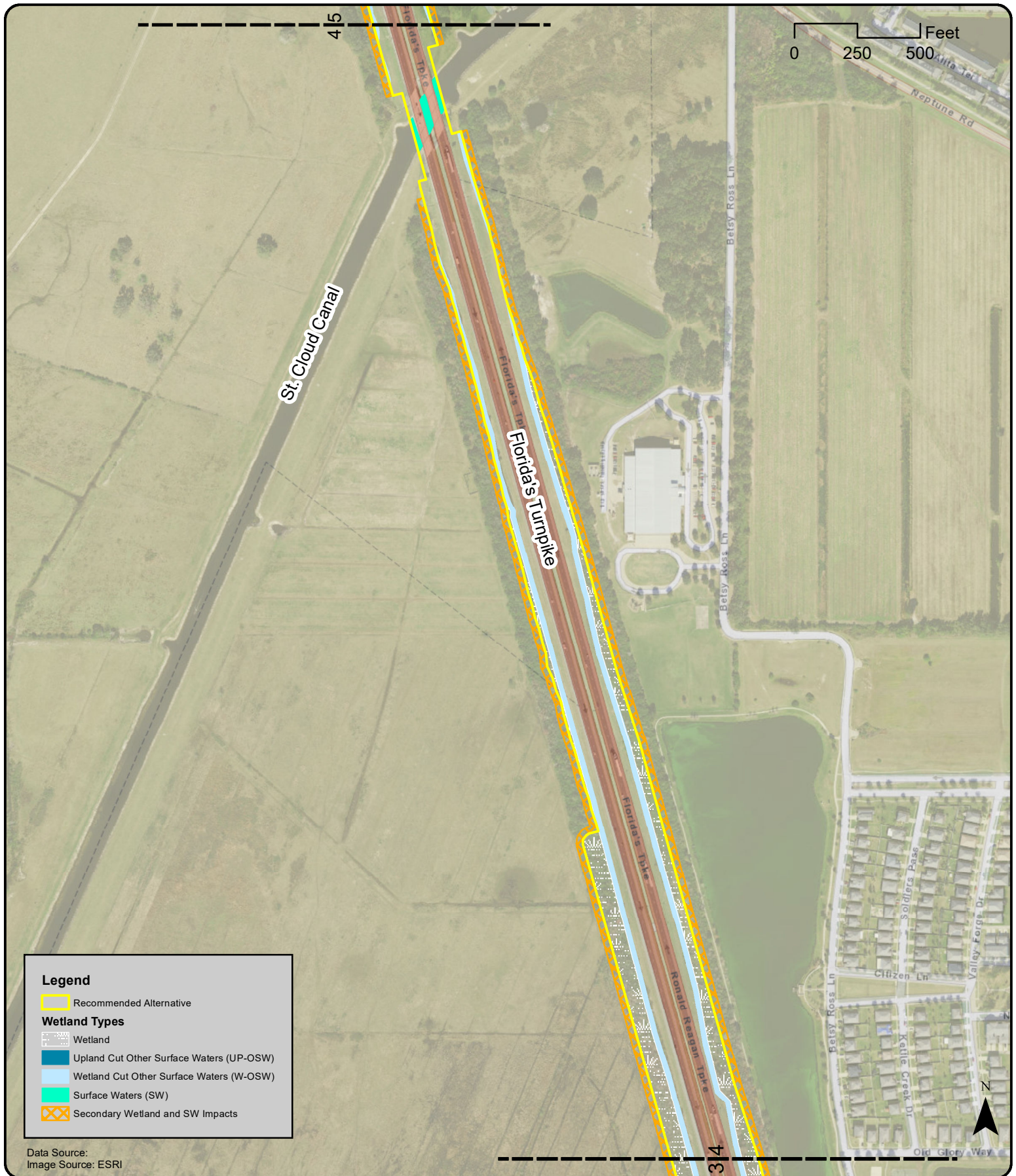


Wetland and Surface Water Map- Sheet 3 Project Development and Environment (PD&E) Study Widening Florida's Turnpike (SR 91)

from South of Kissimmee Park Road to US 192 in Osceola County

Financial Project ID No.: 441224-1-22-01



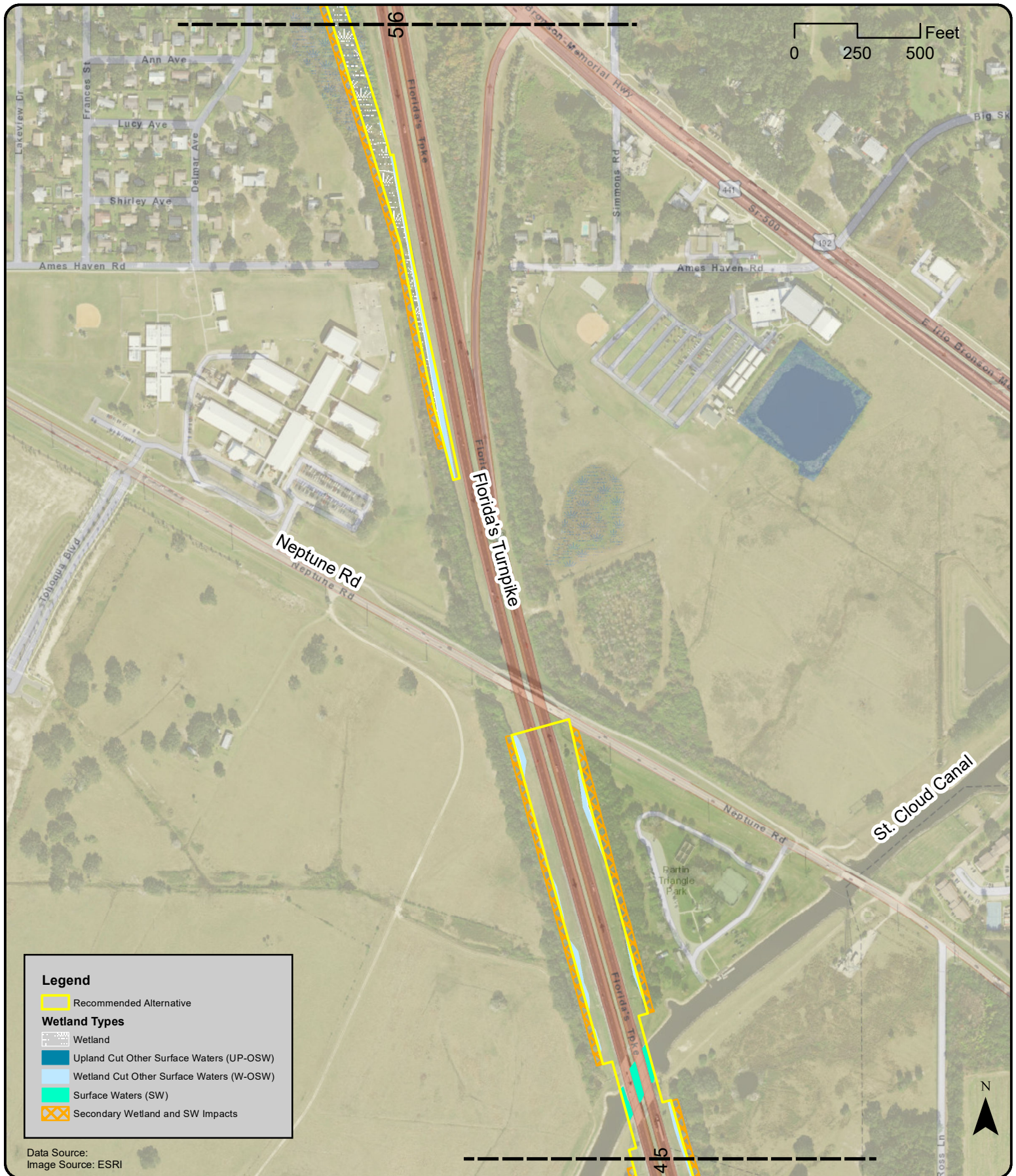


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from South of Kissimmee Park Road to US 192 in Osceola County

Financial Project ID No.: 441224-1-22-01





Wetland and Surface Water Map- Sheet 5

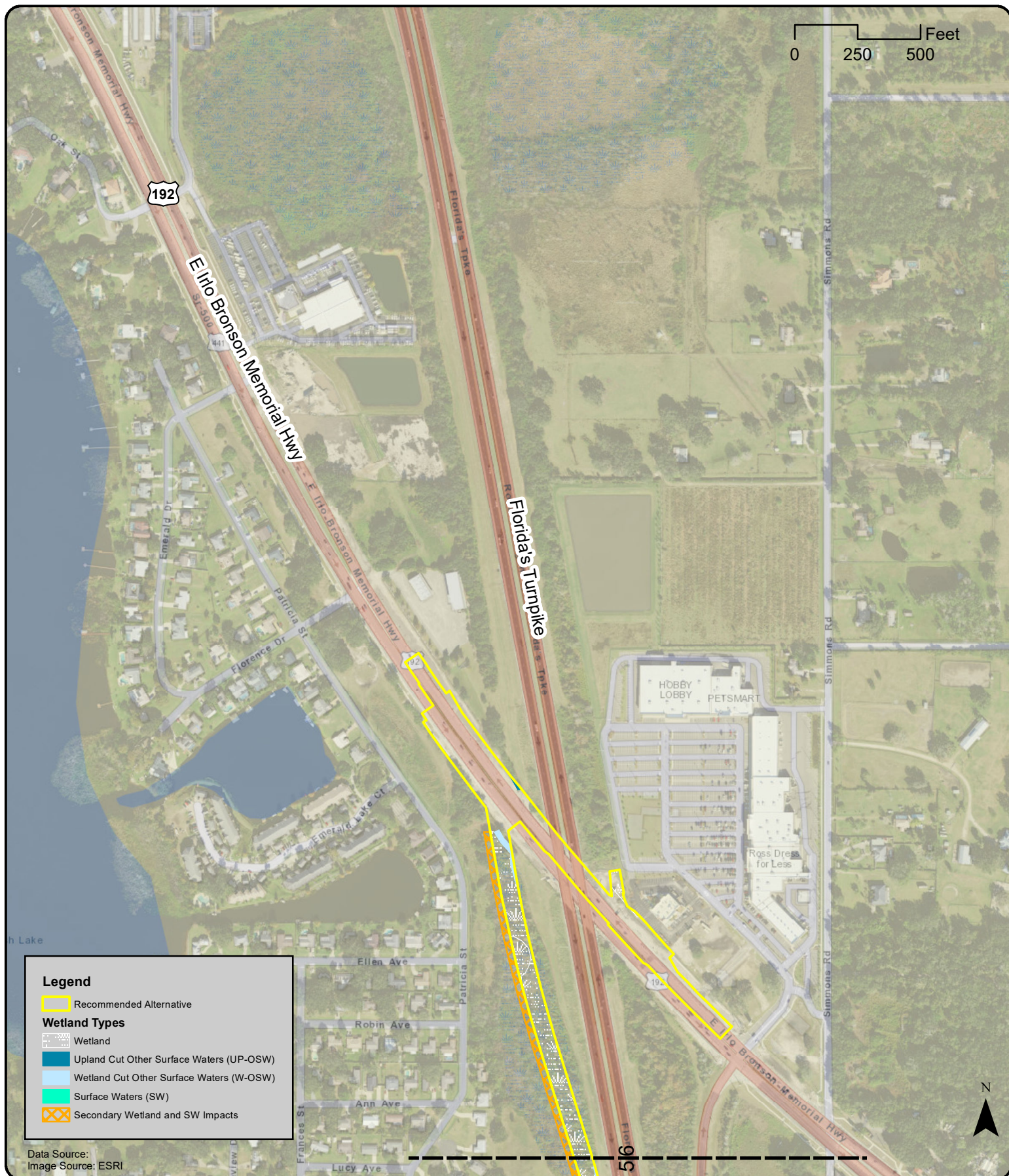
Project Development and Environment (PD&E) Study

Widening Florida's Turnpike (SR 91)

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Financial Project ID No.: 441224-1-22-01





Wetland and Surface Water Map- Sheet 6

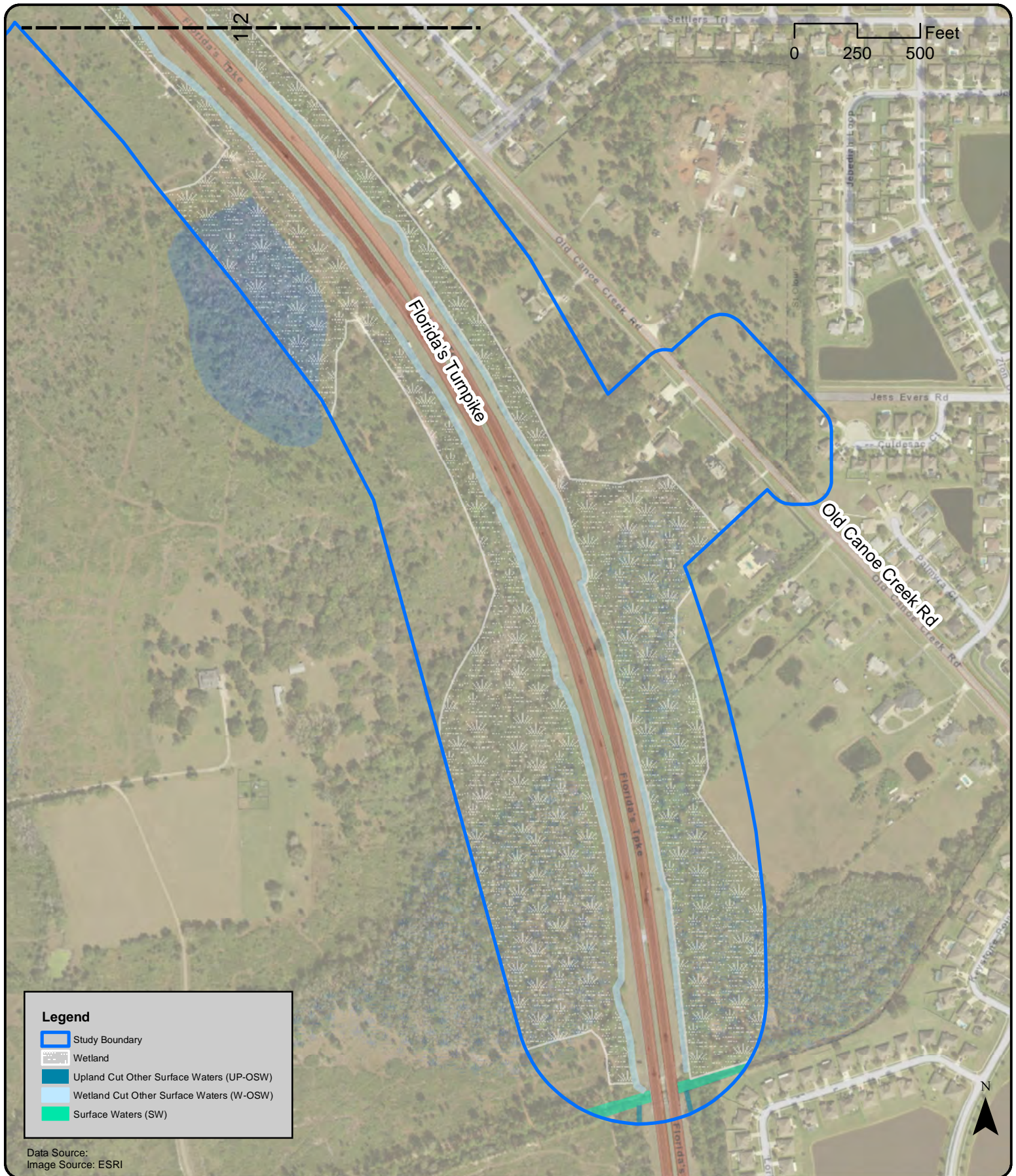
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Widening Florida's Turnpike (SR 91)

from South of Kissimmee Park Road to US 192 in Osceola County

Financial Project ID No.: 441224-1-22-01





Wetland and Surface Water Map- Sheet 1

Project Development and Environment (PD&E) Study

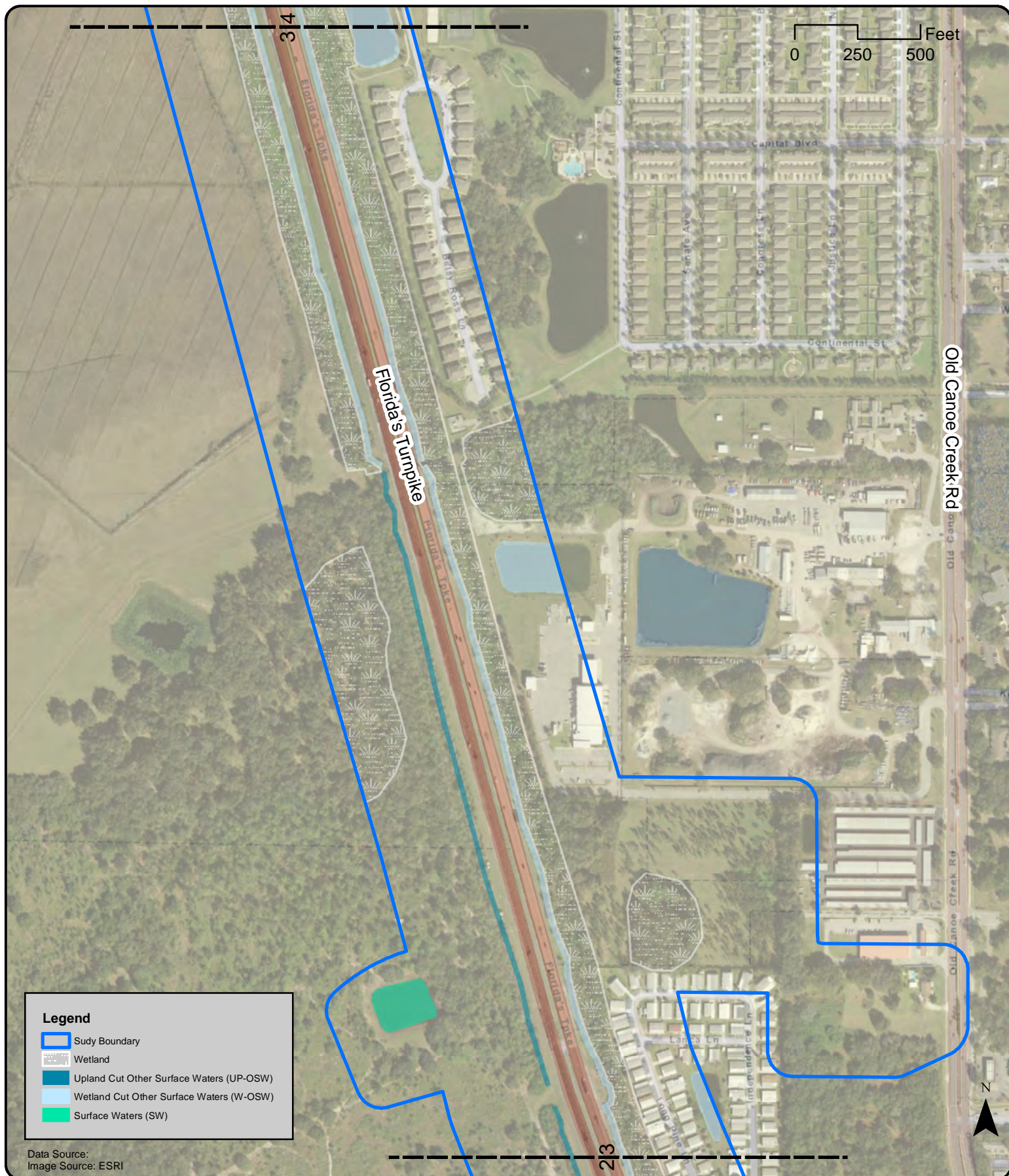
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from South of Kissimmee Park Road to US 192 in Osceola County

Financial Project ID No.: 441224-1-22-01





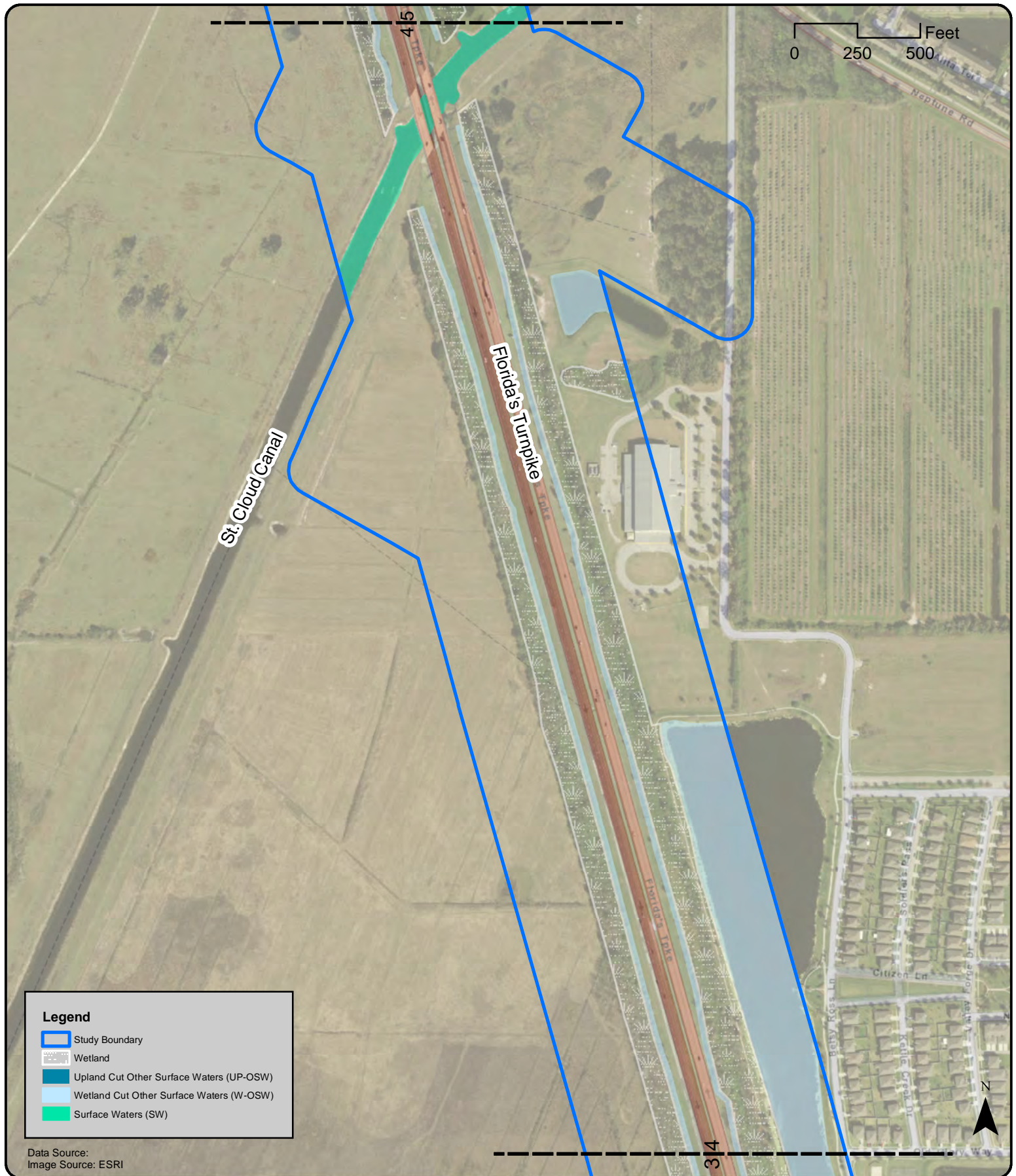


Wetland and Surface Water Map- Sheet 3 Project Development and Environment (PD&E) Study Widening Florida's Turnpike (SR 91)

from South of Kissimmee Park Road to US 192 in Osceola County

Financial Project ID No.: 441224-1-22-01



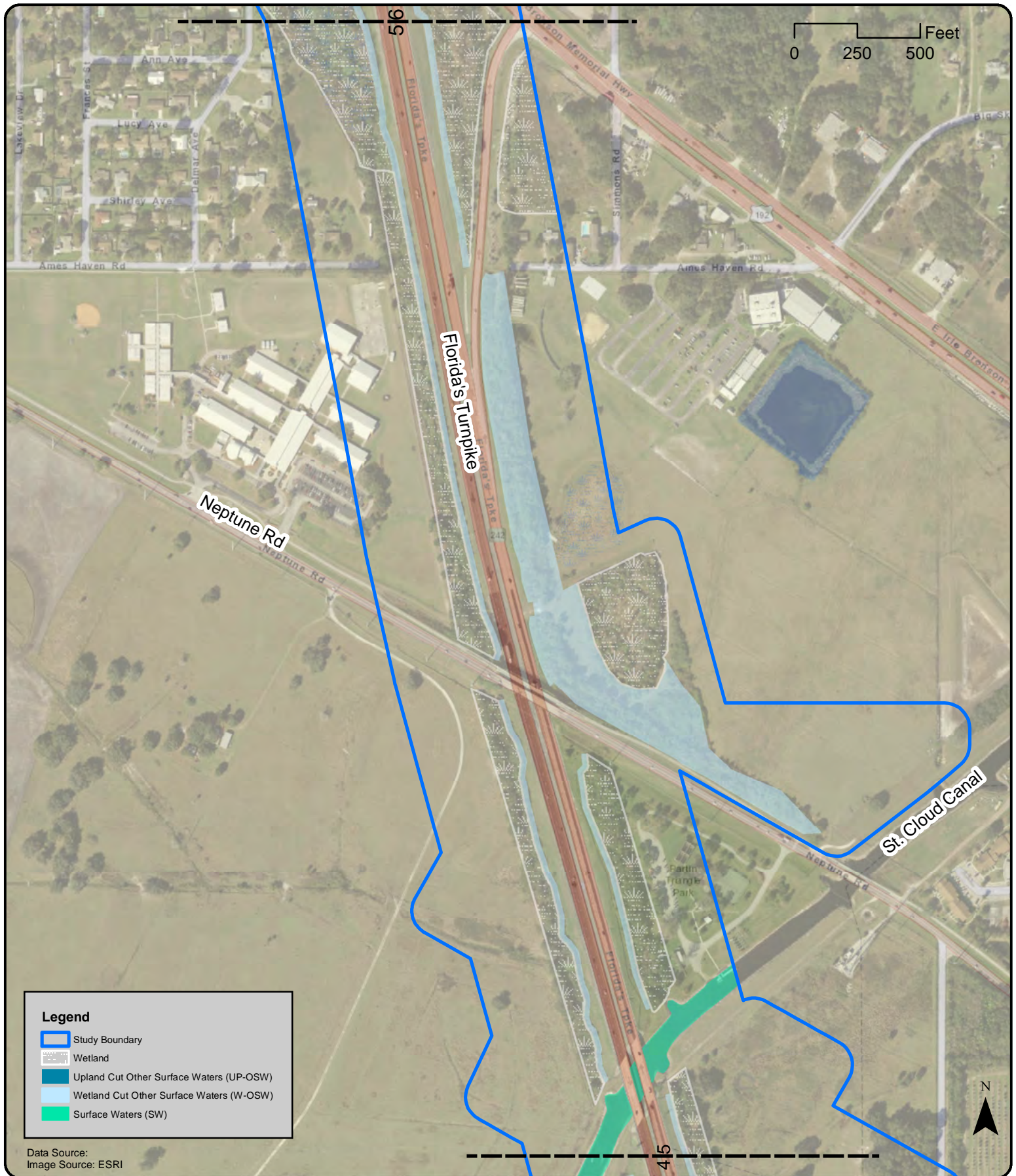


Wetland and Surface Water Map- Sheet 4 Project Development and Environment (PD&E) Study Widening Florida's Turnpike (SR 91)

from South of Kissimmee Park Road to US 192 in Osceola County

Financial Project ID No.: 441224-1-22-01





Wetland and Surface Water Map- Sheet 5

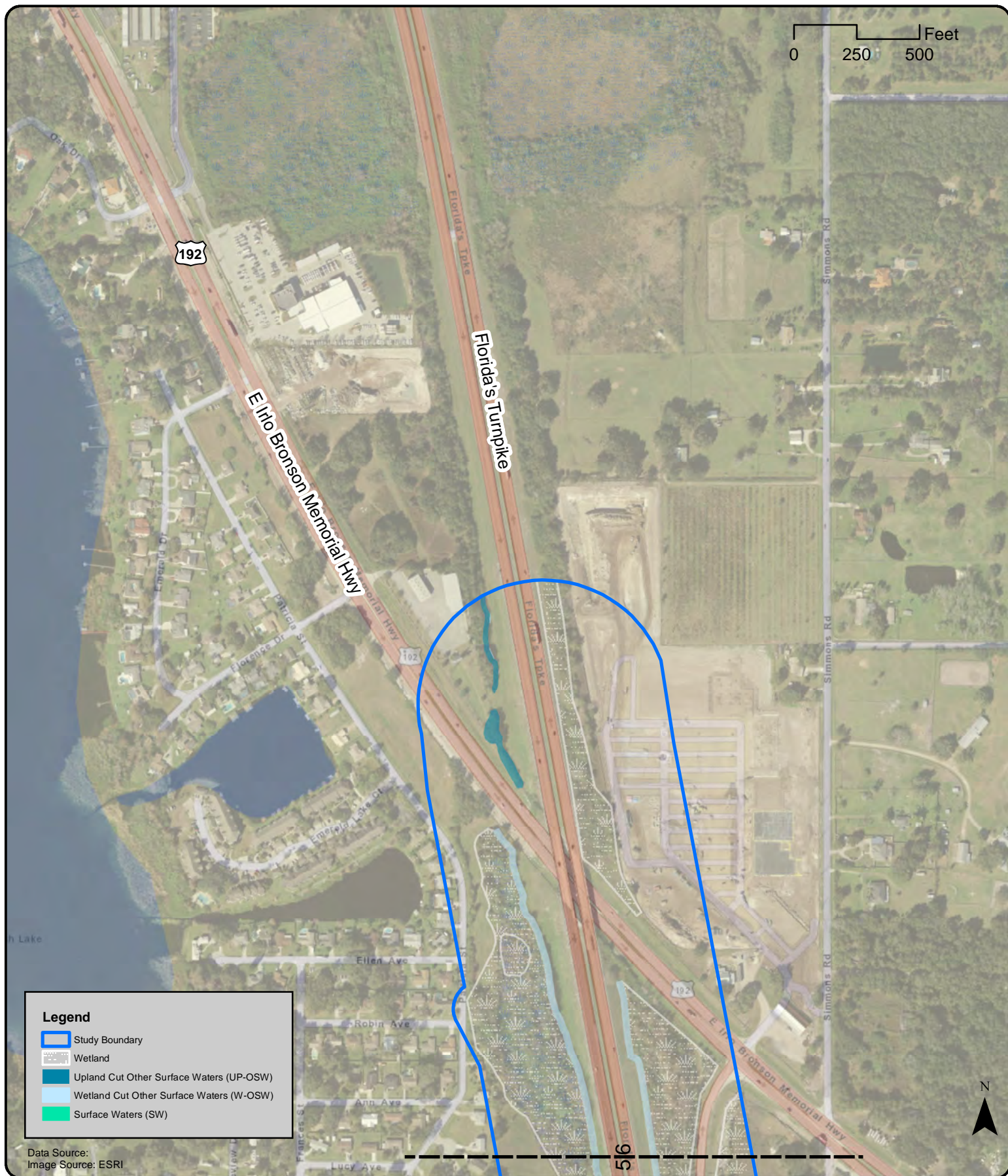
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Widening Florida's Turnpike (SR 91)

from South of Kissimmee Park Road to US 192 in Osceola County

Financial Project ID No.: 441224-1-22-01





Wetland and Surface Water Map- Sheet 6

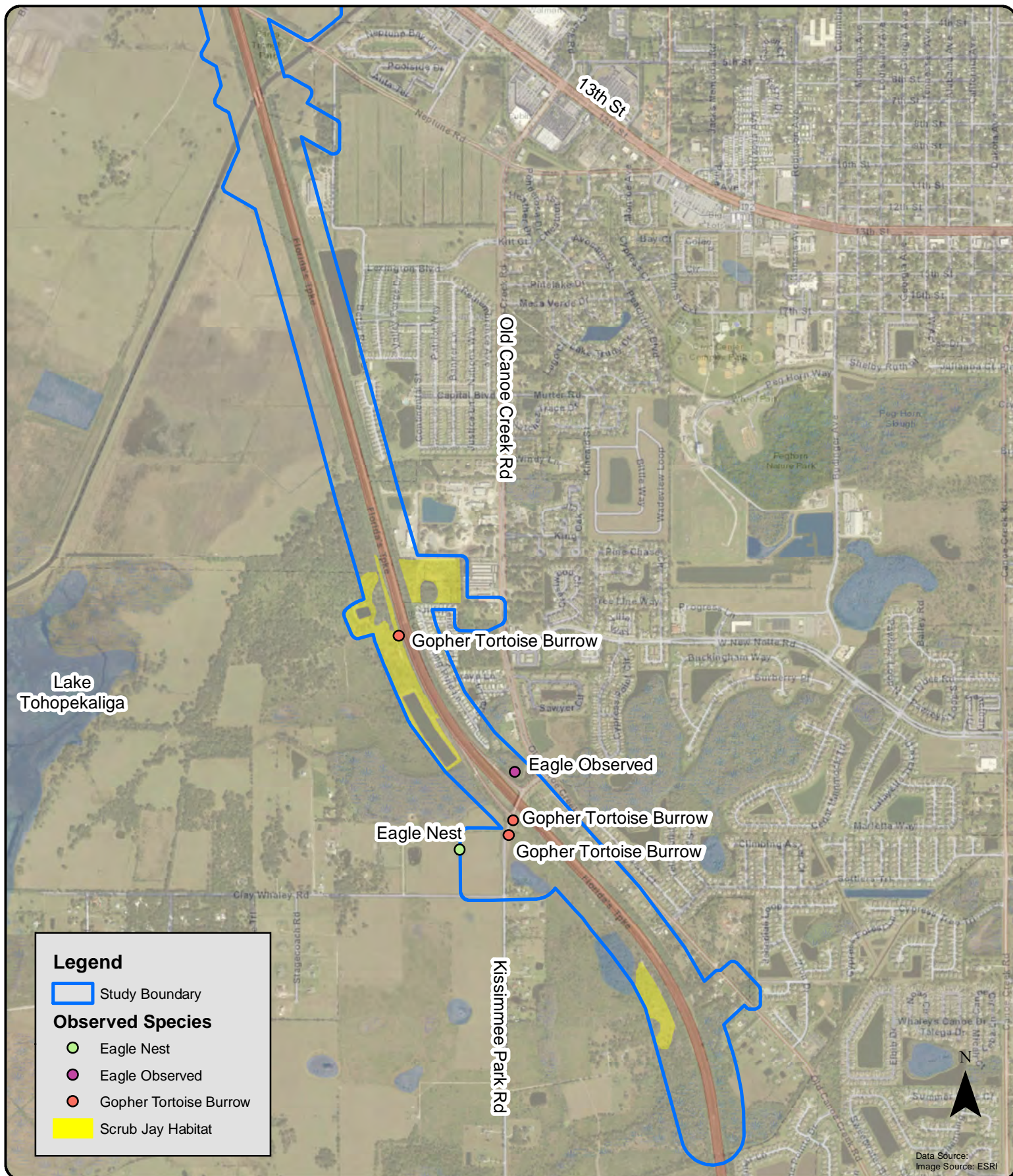
Project Development and Environment (PD&E) Study

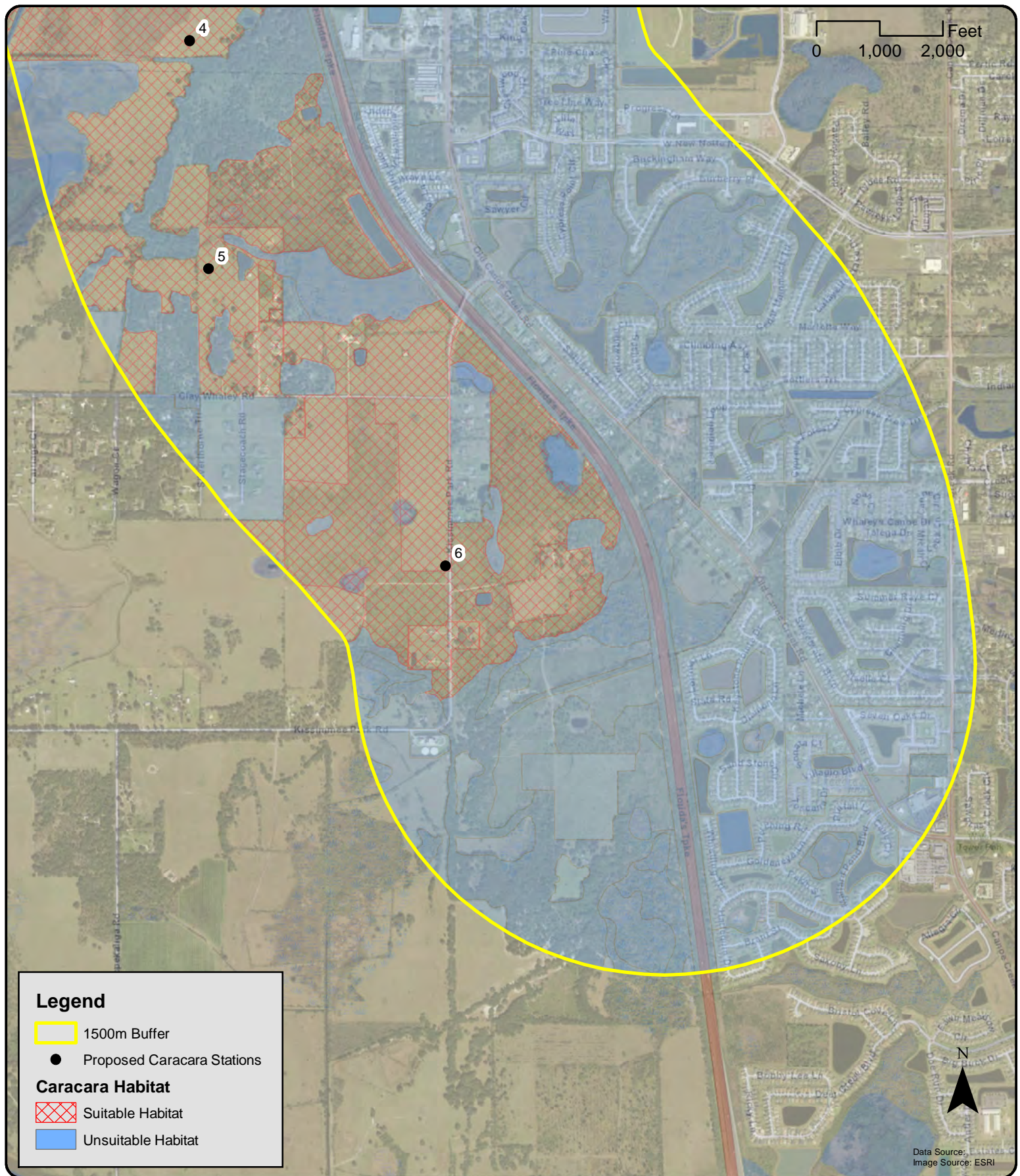
Widening Florida's Turnpike (SR 91)

from South of Kissimmee Park Road to US 192 in Osceola County

Financial Project ID No.: 441224-1-22-01







Purposed Station Map for Audubon's Crested Caracara Project Development and Environment (PD&E) Study Widening Florida's Turnpike (SR 91)

from South of Kissimmee Park Road to US 192 in Osceola County

Financial Project ID No.: 441224-1-22-01



Appendix B

DRAFT

STANDARD PROTECTION MEASURES FOR THE EASTERN INDIGO SNAKE
U.S. Fish and Wildlife Service
August 12, 2013

The eastern indigo snake protection/education plan (Plan) below has been developed by the U.S. Fish and Wildlife Service (USFWS) in Florida for use by applicants and their construction personnel. At least **30 days prior** to any clearing/land alteration activities, the applicant shall notify the appropriate USFWS Field Office via e-mail that the Plan will be implemented as described below (North Florida Field Office: jaxregs@fws.gov; South Florida Field Office: verobeach@fws.gov; Panama City Field Office: panamacity@fws.gov). As long as the signatory of the e-mail certifies compliance with the below Plan (including use of the attached poster and brochure), no further written confirmation or “approval” from the USFWS is needed and the applicant may move forward with the project.

If the applicant decides to use an eastern indigo snake protection/education plan other than the approved Plan below, written confirmation or “approval” from the USFWS that the plan is adequate must be obtained. At least 30 days prior to any clearing/land alteration activities, the applicant shall submit their unique plan for review and approval. The USFWS will respond via e-mail, typically within 30 days of receiving the plan, either concurring that the plan is adequate or requesting additional information. A concurrence e-mail from the appropriate USFWS Field Office will fulfill approval requirements.

The Plan materials should consist of: 1) a combination of posters and pamphlets (see **Poster Information** section below); and 2) verbal educational instructions to construction personnel by supervisory or management personnel before any clearing/land alteration activities are initiated (see **Pre-Construction Activities** and **During Construction Activities** sections below).

POSTER INFORMATION

Posters with the following information shall be placed at strategic locations on the construction site and along any proposed access roads (a final poster for Plan compliance, to be printed on 11” x 17” or larger paper and laminated, is attached):

DESCRIPTION: The eastern indigo snake is one of the largest non-venomous snakes in North America, with individuals often reaching up to 8 feet in length. They derive their name from the glossy, blue-black color of their scales above and uniformly slate blue below. Frequently, they have orange to coral reddish coloration in the throat area, yet some specimens have been reported to only have cream coloration on the throat. These snakes are not typically aggressive and will attempt to crawl away when disturbed. Though indigo snakes rarely bite, they should NOT be handled.

SIMILAR SNAKES: The black racer is the only other solid black snake resembling the eastern indigo snake. However, black racers have a white or cream chin, thinner bodies, and WILL BITE if handled.

LIFE HISTORY: The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. Although they have a preference for uplands, they also utilize some wetlands

and agricultural areas. Eastern indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. Females may lay from 4 - 12 white eggs as early as April through June, with young hatching in late July through October.

PROTECTION UNDER FEDERAL AND STATE LAW: The eastern indigo snake is classified as a Threatened species by both the USFWS and the Florida Fish and Wildlife Conservation Commission. “Taking” of eastern indigo snakes is prohibited by the Endangered Species Act without a permit. “Take” is defined by the USFWS as an attempt to kill, harm, harass, pursue, hunt, shoot, wound, trap, capture, collect, or engage in any such conduct. Penalties include a maximum fine of \$25,000 for civil violations and up to \$50,000 and/or imprisonment for criminal offenses, if convicted.

Only individuals currently authorized through an issued Incidental Take Statement in association with a USFWS Biological Opinion, or by a Section 10(a)(1)(A) permit issued by the USFWS, to handle an eastern indigo snake are allowed to do so.

IF YOU SEE A LIVE EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and allow the live eastern indigo snake sufficient time to move away from the site without interference;
- Personnel must NOT attempt to touch or handle snake due to protected status.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Immediately notify supervisor or the applicant’s designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- If the snake is located in a vicinity where continuation of the clearing or construction activities will cause harm to the snake, the activities must halt until such time that a representative of the USFWS returns the call (within one day) with further guidance as to when activities may resume.

IF YOU SEE A DEAD EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and immediately notify supervisor or the applicant’s designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Thoroughly soak the dead snake in water and then freeze the specimen. The appropriate wildlife agency will retrieve the dead snake.

Telephone numbers of USFWS Florida Field Offices to be contacted if a live or dead eastern indigo snake is encountered:

North Florida Field Office – (904) 731-3336

Panama City Field Office – (850) 769-0552

South Florida Field Office – (772) 562-3909

PRE-CONSTRUCTION ACTIVITIES

1. The applicant or designated agent will post educational posters in the construction office and throughout the construction site, including any access roads. The posters must be clearly visible to all construction staff. A sample poster is attached.
2. Prior to the onset of construction activities, the applicant/designated agent will conduct a meeting with all construction staff (annually for multi-year projects) to discuss identification of the snake, its protected status, what to do if a snake is observed within the project area, and applicable penalties that may be imposed if state and/or federal regulations are violated. An educational brochure including color photographs of the snake will be given to each staff member in attendance and additional copies will be provided to the construction superintendent to make available in the onsite construction office (a final brochure for Plan compliance, to be printed double-sided on 8.5" x 11" paper and then properly folded, is attached). Photos of eastern indigo snakes may be accessed on USFWS and/or FWC websites.
3. Construction staff will be informed that in the event that an eastern indigo snake (live or dead) is observed on the project site during construction activities, all such activities are to cease until the established procedures are implemented according to the Plan, which includes notification of the appropriate USFWS Field Office. The contact information for the USFWS is provided on the referenced posters and brochures.

DURING CONSTRUCTION ACTIVITIES

1. During initial site clearing activities, an onsite observer may be utilized to determine whether habitat conditions suggest a reasonable probability of an eastern indigo snake sighting (example: discovery of snake sheds, tracks, lots of refugia and cavities present in the area of clearing activities, and presence of gopher tortoises and burrows).
2. If an eastern indigo snake is discovered during gopher tortoise relocation activities (i.e. burrow excavation), the USFWS shall be contacted within one business day to obtain further guidance which may result in further project consultation.
3. Periodically during construction activities, the applicant's designated agent should visit the project area to observe the condition of the posters and Plan materials, and replace them as needed. Construction personnel should be reminded of the instructions (above) as to what is expected if any eastern indigo snakes are seen.

POST CONSTRUCTION ACTIVITIES

Whether or not eastern indigo snakes are observed during construction activities, a monitoring report should be submitted to the appropriate USFWS Field Office within 60 days of project completion. The report can be sent electronically to the appropriate USFWS e-mail address listed on page one of this Plan.

Appendix C

DRAFT



United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960



May 18, 2010

Donnie Kinard
Chief, Regulatory Division
Jacksonville District Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

Service Federal Activity Code: 41420-2007-FA-1494
Service Consultation Code: 41420-2007-I-0964
Subject: South Florida Programmatic
Concurrence
Species: Wood Stork

Dear Mr. Kinard:

This letter addresses minor errors identified in our January 25, 2010, wood stork key and as such, supplants the previous key. The key criteria and wood stork biomass foraging assessment methodology have not been affected by these minor revisions.

The Fish and Wildlife Service's (Service) South Florida Ecological Services Office (SFESO) and the U.S. Army Corps of Engineers Jacksonville District (Corps) have been working together to streamline the consultation process for federally listed species associated with the Corps' wetland permitting program. The Service provided letters to the Corps dated March 23, 2007, and October 18, 2007, in response to a request for a multi-county programmatic concurrence with a criteria-based determination of "may affect, not likely to adversely affect" (NLAA) for the threatened eastern indigo snake (*Drymarchon corais couperi*) and the endangered wood stork (*Mycteria americana*) for projects involving freshwater wetland impacts within specified Florida counties. In our letters, we provided effect determination keys for these two federally listed species, with specific criteria for the Service to concur with a determination of NLAA.

The Service has revisited these keys recently and believes new information provides cause to revise these keys. Specifically, the new information relates to foraging efficiencies and prey base assessments for the wood stork and permitting requirements for the eastern indigo snake. This letter addresses the wood stork key and is submitted in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C. 1531 *et seq.*). The eastern indigo snake key will be provided in a separate letter.

Wood stork

Habitat

The wood stork is primarily associated with freshwater and estuarine habitats that are used for nesting, roosting, and foraging. Wood storks typically construct their nests 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, 1996; Rodgers et al. 1996). Successful colonies are those that have limited human disturbance and low exposure to land-based predators. Nesting colonies 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.

Successful nesting generally involves combinations 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, which 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 sites, a variety of wetland types should be present, with both short and long hydroperiods. The Service (1999) describes a short hydroperiod as a 1 to 5-month wet/dry cycle, and a long hydroperiod as greater than 5 months. During the wet season, wood storks generally feed in the shallow water of the 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).

Wood storks occur in a wide variety of wetland habitats. Typical foraging sites for the wood stork include freshwater marshes and stock ponds, shallow, seasonally flooded roadside and agricultural ditches, narrow tidal creeks and shallow tidal pools, managed impoundments, and depressions in cypress heads and swamp sloughs. Because of their specialized feeding behavior, wood storks forage most effectively in shallow-water areas with highly concentrated prey. Through tactolocation, or grope feeding, wood storks in south Florida feed almost exclusively on fish between 2 and 25 centimeters [cm] (1 and 10 inches) in length (Ogden et al. 1976). Good foraging conditions are characterized by water that is relatively calm, uncluttered by dense thickets of aquatic vegetation, and having a water depth between 5 and 38 cm (5 and 15 inches) deep, although wood storks may forage in other wetlands. Ideally, preferred foraging wetlands would include a mosaic of emergent and shallow open-water areas. The emergent 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 seasonal dry-down of the wetland.

Conservation Measures

The Service routinely concurs with the Corps' "may affect, not likely to adversely affect" determination for individual project effects to the wood stork when project effects are insignificant due to scope or location, or if assurances are given that wetland impacts have been avoided, minimized, and adequately compensated such that there is no net loss in foraging potential. We utilize our *Habitat Management Guidelines for the Wood Stork in the Southeast Region* (Service 1990) (Enclosure 1) (HMG) in project evaluation. The HMG is currently under review and once final will replace the enclosed HMG. There is no designated critical habitat for the wood stork.

The SFESO recognizes a 29.9 kilometer [km] (18.6-mile) core foraging area (CFA) around all known wood stork colonies in south Florida. Enclosure 2 (to be updated as necessary) provides locations of colonies and their CFAs in south Florida that have been documented as active within the last 10 years. The Service believes loss of suitable wetlands within these CFAs may reduce foraging opportunities for the wood stork. To minimize adverse effects to the wood stork, we recommend compensation be provided for impacts to foraging habitat. The compensation should consider wetland type, location, function, and value (hydrology, vegetation, prey utilization) to ensure that wetland functions lost due to the project are adequately offset. Wetlands offered as compensation should be of the same hydroperiod and located within the CFAs of the affected wood stork colonies. The Service may accept, under special circumstances, wetland compensation located outside the CFAs of the affected wood stork nesting colonies. On occasion, wetland credits purchased from a "Service Approved" mitigation bank located outside the CFAs could be acceptable to the Service, depending on location of impacted wetlands relative to the permitted service area of the bank, and whether or not the bank has wetlands having the same hydroperiod as the impacted wetland.

In an effort to reduce correspondence in effect determinations and responses, the Service is providing the Wood Stork Effect Determination Key below. 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 determination¹. This Key is subject to revisitation as the Corps and Service deem necessary.

The Key is as follows:

- A. Project within 0.76 km (0.47 mile)² of an active colony site³ "may affect"⁴
- Project impacts Suitable Foraging Habitat (SFH)⁵ at a location greater than 0.76 km (0.47 mile) from a colony site..... "go to B"

¹ With an outcome of "no effect" or "NLAA" as outlined in this key, and the project has less than 20.2 hectares (50 acres) of wetland impacts, the requirements of section 7 of the Act are fulfilled for the wood stork and no further action is required. For projects with greater than 20.2 hectares (50 acres) of wetland impacts, written concurrence of NLAA from the Service is necessary.

² Within the secondary zone (the average distance from the border of a colony to the limits of the secondary zone is 0.76 km (2,500 feet, or 0.47 mi).

³ An active colony is defined as a colony that is currently being used for nesting by wood storks or has historically over the last 10 years been used for nesting by wood storks.

⁴ Consultation may be concluded informally or formally depending on project impacts.

⁵ Suitable foraging habitat (SFH) includes wetlands that typically have shallow-open water areas that are relatively calm and have a permanent or seasonal water depth between 5 to 38 cm (2 to 15 inches) deep. Other shallow non-wetland water bodies are also SFH. 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, small ponds, shallow, seasonally flooded roadside or agricultural ditches, seasonally flooded pastures, narrow tidal creeks or shallow tidal pools, managed impoundments, and depressions in cypress heads and swamp sloughs.

- Project does not affect SFH.....“no effect”.
- B. Project impact to SFH is less than 0.20 hectare (one-half acre)⁶.....NLAA¹”
- Project impact to SFH is greater in scope than 0.20 hectare (one-half acre).....go to C
- C. Project impacts to SFH not within the CFA (29.9 km, 18.6 miles) of a colony sitego to D
- Project impacts to SFH within the CFA of a colony sitego to E
- D. Project impacts to SFH have been avoided and minimized to the extent practicable; compensation (Service approved mitigation bank or as provided in accordance with Mitigation Rule 33 CFR Part 332) for unavoidable impacts is proposed in accordance with the CWA section 404(b)(1) guidelines; and habitat compensation replaces the foraging value matching the hydroperiod⁷ of the wetlands affected and provides foraging value similar to, or higher than, that of impacted wetlands. See Enclosure 3 for a detailed discussion of the hydroperiod foraging values, an example, and further guidance⁸..... NLAA¹”
- Project not as above..... “may affect”⁴”
- E. Project provides SFH compensation in accordance with the CWA section 404(b)(1) guidelines and is not contrary to the HMG; habitat compensation is within the appropriate CFA or within the service area of a Service-approved mitigation bank; and habitat compensation replaces foraging value, consisting of wetland enhancement or restoration matching the hydroperiod⁷ of the wetlands affected, and provides foraging value similar

⁶ On an individual basis, SFH impacts to wetlands less than 0.20 hectare (one-half acre) generally will not have a measurable effect on wood storks, although we request that the Corps require mitigation for these losses when appropriate. Wood storks are a wide ranging species, and individually, habitat change from impacts to SFH less than one-half acre are 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.

⁷ Several researchers (Flemming et al. 1994; Ceilley and Bortone 2000) believe that the short hydroperiod wetlands provide a more important pre-nesting foraging food source and a greater early nestling survivor value for wood storks than the foraging base (grams of fish per square meter) than long hydroperiod wetlands provide. Although the short hydroperiod wetlands may provide less fish, these prey bases historically were more extensive and met the foraging needs of the pre-nesting storks and the early-age nestlings. Nest productivity may suffer as a result of the loss of short hydroperiod wetlands. We believe that most wetland fill and excavation impacts permitted in south Florida are in short hydroperiod wetlands. Therefore, we believe that it is especially important that impacts to these short hydroperiod wetlands within CFAs are avoided, minimized, and compensated for by enhancement/restoration of short hydroperiod wetlands.

⁸ For this Key, the Service requires an analysis of foraging prey base losses and enhancements from the proposed action as shown in the examples in Enclosure 3 for projects with greater than 2.02 hectares (5 acres) of wetland impacts. For projects with less than 2.02 hectares (5 acres) of wetland impacts, an individual foraging prey base analysis is not necessary although type for type wetland compensation is still a requirement of the Key.

to, or higher than, that of impacted wetlands. See Enclosure 3 for a detailed discussion of the hydroperiod foraging values, an example, and further guidance⁸ “NLAA¹”

Project does not satisfy these elements “may affect⁴”

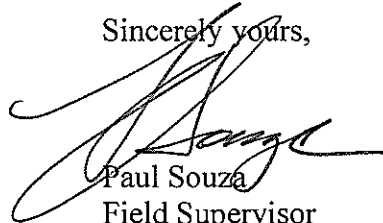
This Key does not apply to Comprehensive Everglades Restoration Plan projects, as they will require project-specific consultations with the Service.

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 where the effect determination was: “may affect, not likely to adversely affect.” We request that the Corps send us an annual summary consisting of: project dates, Corps identification numbers, project acreages, project wetland acreages, and project locations in latitude and longitude in decimal degrees.

Thank you for your cooperation and effort in protecting federally listed species. If you have any questions, please contact Allen Webb at extension 246.

Sincerely yours,



Paul Souza
Field Supervisor
South Florida Ecological Services Office

Enclosures

cc: w/enclosures (electronic only)
Corps, Jacksonville, Florida (Stu Santos)
EPA, West Palm Beach, Florida (Richard Harvey)
FWC, Vero Beach, Florida (Joe Walsh)
Service, Jacksonville, Florida (Billy Brooks)

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HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION



**HABITAT MANAGEMENT GUIDELINES
FOR THE WOOD STORK IN THE
SOUTHEAST REGION**

Prepared by

John C. Ogden
Acting Program Manager
Wildlife Research
Everglades National Park

for the

Southeast Region
U.S. Fish and Wildlife Service

Cover design by
Florida Power & Light Company
Miami, Florida

HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

Introduction

A number of Federal and state laws and/or regulations prohibit, cumulatively, such acts as harrassing, disturbing, harming, molesting, pursuing, etc., wood storks, or destroying their nests (see Section VII). Although advisory in nature, these guidelines represent a biological interpretation of what would constitute violations of one or more of such prohibited acts. Their purpose is to maintain and/or improve the environmental conditions that are required for the survival and well-being of wood storks in the southeastern United States, and are designed essentially for application in wood stork/human activity conflicts (principally land development and human intrusion into stork use sites). The emphasis is to avoid or minimize detrimental human-related impacts on wood storks. These guidelines were prepared in consultations with state wildlife agencies and wood stork experts in the four southeastern states where the wood stork is listed as Endangered (Alabama, Florida, Georgia, South Carolina).

General

The wood stork is a gregarious species, which nests in colonies (rookeries), and roosts and feeds in flocks, often in association with other species of long-legged water birds. Storks that nest in the southeastern United States appear to represent a distinct population, separate from the nearest breeding population in Mexico. Storks in the southeastern U.S. population have recently (since 1980) nested in colonies scattered throughout Florida, and at several central-southern Georgia and coastal South Carolina sites. Banded and color-marked storks from central and southern Florida colonies have dispersed during non-breeding seasons as far north as southern Georgia, and the coastal counties in South Carolina and southeastern North Carolina, and as far west as central Alabama and northeastern Mississippi. Storks from a colony in south-central Georgia have wintered between southern Georgia and southern Florida. This U.S. nesting population of wood storks was listed as endangered by the U.S. Fish and Wildlife Service on February 28, 1984 (*Federal Register* 49(4):7332-7335).

Wood storks use freshwater and estuarine wetlands as feeding, nesting, and roosting sites. Although storks are not habitat specialists, their needs are exacting enough, and available habitat is limited enough, so that nesting success and the size of regional populations are closely regulated by year-to-year differences in the quality and quantity of suitable habitat. Storks are especially sensitive to environmental conditions at feeding sites; thus, birds may fly relatively long distances either daily or between regions annually, seeking adequate food resources.

All available evidence suggests that regional declines in wood stork numbers have been largely due to the loss or degradation of essential wetland habitat. An understanding of the qualities of good stork habitat should help to focus protection efforts on those sites

that are seasonally important to regional populations of wood storks. Characteristics of feeding, nesting, and roosting habitat, and management guidelines for each, are presented here by habitat type.

I. Feeding habitat.

A major reason for the wood stork decline has been the loss and degradation of feeding habitat. Storks are especially sensitive to any manipulation of a wetland site that results in either reduced amounts or changes in the timing of food availability.

Storks feed primarily (often almost exclusively) on small fish between 1 and 8 inches in length. Successful foraging sites are those where the water is between 2 and 15 inches deep. Good feeding conditions usually occur where water is relatively calm and uncluttered by dense thickets of aquatic vegetation. Often a dropping water level is necessary to concentrate fish at suitable densities. Conversely, a rise in water, especially when it occurs abruptly, disperses fish and reduces the value of a site as feeding habitat.

The types of wetland sites that provide good feeding conditions for storks include: drying marshes or stock ponds, shallow roadside or agricultural ditches, narrow tidal creeks or shallow tidal pools, and depressions in cypress heads or swamp sloughs. In fact, almost any shallow wetland depression where fish tend to become concentrated, either through local reproduction or the consequences of area drying, may be used by storks.

Nesting wood storks do most of their feeding in wetlands between 5 and 40 miles from the colony, and occasionally at distances as great as 75 miles. Within this colony foraging range and for the 110-150 day life of the colony, and depending on the size of the colony and the nature of the surrounding wetlands, anywhere from 50 to 200 different feeding sites may be used during the breeding season.

Non-breeding storks are free to travel much greater distances and remain in a region only for as long as sufficient food is available. Whether used by breeders or non-breeders, any single feeding site may at one time have small or large numbers of storks (1 to 100+), and be used for one to many days, depending on the quality and quantity of available food. Obviously, feeding sites used by relatively large numbers of storks, and/or frequently used areas, potentially are the more important sites necessary for the maintenance of a regional population of birds.

Differences between years in the seasonal distribution and amount of rainfall usually mean that storks will differ between years in where and when they feed. Successful nesting colonies are those that have a large number of feeding site options, including sites that may be suitable only in years of rainfall extremes. To maintain the wide range of feeding site options requires that many different wetlands, with both relatively short and long annual hydroperiods, be preserved. For example, protecting only the larger wetlands, or those with longer annual hydroperiods, will result in the eventual loss of smaller, seemingly less important wetlands. However, these small scale wetlands are crucial as the only available feeding sites during the wetter periods when the larger habitats are too deeply flooded to be used by storks.

II. Nesting habitat.

Wood storks nest in colonies, and will return to the same colony site for many years so long as that site and surrounding feeding habitat continue to supply the needs of the birds. Storks require between 110 and 150 days for the annual nesting cycle, from the period of courtship until the nestlings become independent. Nesting activity may begin as early as December or as late as March in southern Florida colonies, and between late February and April in colonies located between central Florida and South Carolina. Thus, full term colonies may be active until June-July in south Florida, and as late as July-August at more northern sites. Colony sites may also be used for roosting by storks during other times of the year.

Almost all recent nesting colonies in the southeastern U.S. have been located either in woody vegetation over standing water, or on islands surrounded by broad expanses of open water. The most dominant vegetation in swamp colonies has been cypress, although storks also nest in swamp hardwoods and willows. Nests in island colonies may be in more diverse vegetation, including mangroves (coastal), exotic species such as Australian pine (*Casuarina*) and Brazilian Pepper (*Schinus*), or in low thickets of cactus (*Opuntia*). Nests are usually located 15-75 feet above ground, but may be much lower, especially on island sites when vegetation is low.

Since at least the early 1970's, many colonies in the southeastern U.S. have been located in swamps where water has been impounded due to the construction of levees or roadways. Storks have also nested in dead and dying trees in flooded phosphate surface mines, or in low, woody vegetation on mounded, dredge islands. The use of these altered wetlands or completely "artificial" sites suggests that in some regions or years storks are unable to locate natural nesting habitat that is adequately flooded during the normal breeding season. The readiness with which storks will utilize water impoundments for nesting also suggests that colony sites could be intentionally created and maintained through long-term site management plans. Almost all impoundment sites used by storks become suitable for nesting only fortuitously, and therefore, these sites often do not remain available to storks for many years.

In addition to the irreversible impacts of drainage and destruction of nesting habitat, the greatest threats to colony sites are from human disturbance and predation. Nesting storks show some variation in the levels of human activity they will tolerate near a colony. In general, nesting storks are more tolerant of low levels of human activity near a colony when nests are high in trees than when they are low, and when nests contain partially or completely feathered young than during the period between nest construction and the early nestling period (adults still brooding). When adult storks are forced to leave their nests, eggs or downy young may die quickly (<20 minutes) when exposed to direct sun or rain.

Colonies located in flooded environments must remain flooded if they are to be successful. Often water is between 3 and 5 feet deep in successful colonies during the nesting season. Storks rarely form colonies, even in traditional nesting sites, when they are dry, and may abandon nests if sites become dry during the nesting period. Flooding in colonies may be most important as a defense against mammalian predators. Studies of stork colonies in Georgia and

Florida have shown high rates of raccoon predation when sites dried during the nesting period. A reasonably high water level in an active colony is also a deterrent against both human and domestic animal intrusions.

Although nesting wood storks usually do most feeding away from the colony site (>5 miles), considerable stork activity does occur close to the colony during two periods in the nesting cycle. Adult storks collect almost all nesting material in and near the colony, usually within 2500 feet. Newly fledged storks, near the end of the nesting cycle, spend from 1-4 weeks during the fledging process flying locally in the colony area, and perched in nearby trees or marshy spots on the ground. These birds return daily to their nests to be fed. It is essential that these fledging birds have little or no disturbance as far out as one-half mile within at least one or two quadrants from the colony. Both the adults, while collecting nesting material, and the inexperienced fledglings, do much low, flapping flight within this radius of the colony. At these times, storks potentially are much more likely to strike nearby towers or utility lines.

Colony sites are not necessarily used annually. Regional populations of storks shift nesting locations between years, in response to year-to-year differences in food resources. Thus, regional populations require a range of options for nesting sites, in order to successfully respond to food availability. Protection of colony sites should continue, therefore, for sites that are not used in a given year.

III. Roosting habitat.

Although wood storks tend to roost at sites that are similar to those used for nesting, they also use a wider range of site types for roosting than for nesting. Non-breeding storks, for example, may frequently change roosting sites in response to changing feeding locations, and in the process, are inclined to accept a broad range of relatively temporary roosting sites. Included in the list of frequently used roosting locations are cypress "heads" or swamps (not necessarily flooded if trees are tall), mangrove islands, expansive willow thickets or small, isolated willow "islands" in broad marshes, and on the ground either on levees or in open marshes.

Daily activity patterns at a roost vary depending on the status of the storks using the site. Non-breeding adults or immature birds may remain in roosts during major portions of some days. When storks are feeding close to a roost, they may remain on the feeding grounds until almost dark before making the short flight. Nesting storks traveling long distances (>40 miles) to feeding sites may roost at or near the latter, and return to the colony the next morning. Storks leaving roosts, especially when going long distances, tend to wait for mid-morning thermals to develop before departing.

IV. Management zones and guidelines for feeding sites.

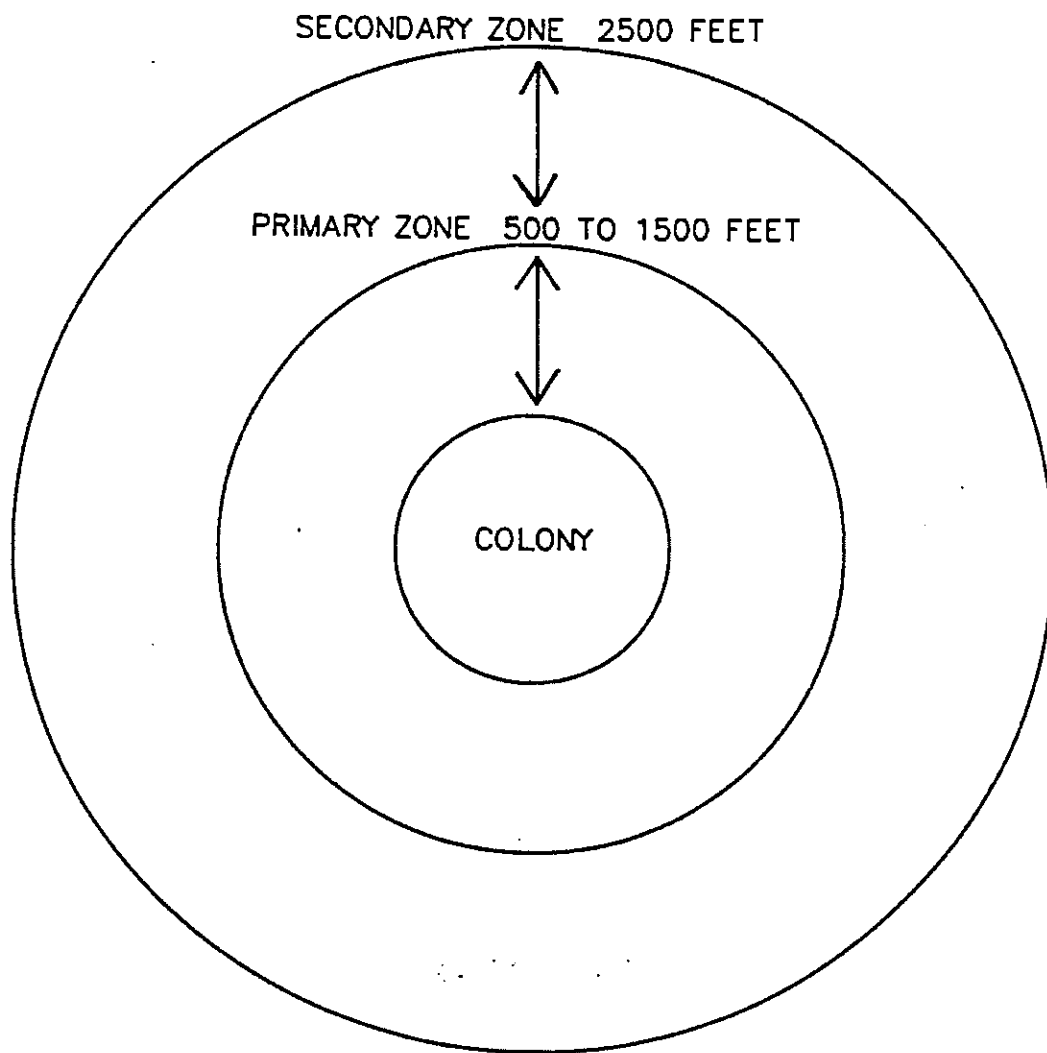
To the maximum extent possible, feeding sites should be protected by adherence to the following protection zones and guidelines:

- A. There should be no human intrusion into feeding sites when storks are present. Depending upon the amount of screening vegetation, human activity should be no closer than between 300 feet (where solid vegetation screens exist) and 750 feet (no vegetation screen).

- B. Feeding sites should not be subjected to water management practices that alter traditional water levels or the seasonally normal drying patterns and rates. Sharp rises in water levels are especially disruptive to feeding storks.
- C. The introduction of contaminants, fertilizers, or herbicides into wetlands that contain stork feeding sites should be avoided, especially those compounds that could adversely alter the diversity and numbers of native fishes, or that could substantially change the characteristics of aquatic vegetation. Increase in the density and height of emergent vegetation can degrade or destroy sites as feeding habitat.
- D. Construction of tall towers (especially with guy wires) within three miles, or high power lines (especially across long stretches of open country) within one mile of major feeding sites should be avoided.

V. Management zones and guidelines for nesting colonies.

- A. Primary zone: This is the most critical area, and must be managed according to recommended guidelines to insure that a colony site survives.
 - 1. Size: The primary zone must extend between 1000 and 1500 feet in all directions from the actual colony boundaries when there are no visual or broad aquatic barriers, and never less than 500 feet even when there are strong visual or aquatic barriers. The exact width of the primary zone in each direction from the colony can vary within this range, depending on the amount of visual screen (tall trees) surrounding the colony, the amount of relatively deep, open water between the colony and the nearest human activity, and the nature of the nearest human activity. In general, storks forming new colonies are more tolerant of existing human activity, than they will be of new human activity that begins after the colony has formed.
 - 2. Recommended Restrictions:
 - a. Any of the following activities within the primary zone, at any time of the year, are likely to be detrimental to the colony:
 - (1) Any lumbering or other removal of vegetation, and
 - (2) Any activity that reduces the area, depth, or length of flooding in wetlands under and surrounding the colony, except where periodic (less than annual) water control may be required to maintain the health of the aquatic, woody vegetation, and
 - (3) The construction of any building, roadway, tower, power line, canal, etc.
 - b. The following activities within the primary zone are likely to be detrimental to a colony if they occur when the colony is active:
 - (1) Any unauthorized human entry closer than 300 feet of the colony, and



- (2) Any increase or irregular pattern in human activity anywhere in the primary zone, and
 - (3) Any increase or irregular pattern in activity by animals, including livestock or pets, in the colony, and
 - (4) Any aircraft operation closer than 500 feet of the colony.
- B. Secondary Zone: Restrictions in this zone are needed to minimize disturbances that might impact the primary zone, and to protect essential areas outside of the primary zone. The secondary zone may be used by storks for collecting nesting material, for roosting, loafing, and feeding (especially important to newly fledged young), and may be important as a screen between the colony and areas of relatively intense human activities.
 - 1. Size: The secondary zone should range outward from the primary zone 1000-2000 feet, or to a radius of 2500 feet of the outer edge of the colony.
 - 2. Recommended Restrictions:
 - a. Activities in the secondary zone which may be detrimental to nesting wood storks include:
 - (1) Any increase in human activities above the level that existed in the year when the colony first formed, especially when visual screens are lacking, and
 - (2) Any alteration in the area's hydrology that might cause changes in the primary zone, and
 - (3) Any substantial (>20 percent) decrease in the area of wetlands and woods of potential value to storks for roosting and feeding.
 - b. In addition, the probability that low flying storks, or inexperienced, newly-fledged young will strike tall obstructions, requires that high-tension power lines be no closer than one mile (especially across open country or in wetlands) and tall trans-mission towers no closer than 3 miles from active colonies. Other activities, including busy highways and commercial and residential buildings may be present in limited portions of the secondary zone at the time that a new colony first forms. Although storks may tolerate existing levels of human activities, it is important that these human activities not expand substantially.

VI. Roosting site guidelines.

The general characteristics and temporary use-patterns of many stork roosting sites limit the number of specific management recommendations that are possible:

- A. Avoid human activities within 500-1000 feet of roost sites during seasons of the year and times of the day when storks may be present. Nocturnal activities in active roosts may be especially disruptive.

- B. Protect the vegetative and hydrological characteristics of the more important roosting sites--those used annually and/or used by flocks of 25 or more storks. Potentially, roosting sites may, some day, become nesting sites.

VII. Legal Considerations.

A. Federal Statutes

The U.S. breeding population of the wood stork is protected by the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)(Act). The population was listed as endangered on February 28, 1984 (49 Federal Register 7332); wood storks breeding in Alabama, Florida, Georgia, and South Carolina are protected by the Act.

Section 9 of the Endangered Species Act of 1973, as amended, states that it is unlawful for any person subject to the jurisdiction of the United States to take (defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.") any listed species anywhere within the United States.

The wood stork is also federally protected by its listing (50 CFR 10.13) under the Migratory Bird Treaty Act (167 U.S.C. 703-711), which prohibits the taking, killing or possession of migratory birds except as permitted.

B. State Statutes

1. State of Alabama

Section 9-11-232 of Alabama's Fish, Game, and Wildlife regulations curtails the possession, sale, and purchase of wild birds. "Any person, firm, association, or corporation who takes, catches, kills or has in possession at any time, living or dead, any protected wild bird not a game bird or who sells or offers for sale, buys, purchases or offers to buy or purchase any such bird or exchange same for anything of value or who shall sell or expose for sale or buy any part of the plumage, skin, or body of any bird protected by the laws of this state or who shall take or willfully destroy the nests of any wild bird or who shall have such nests or eggs of such birds in his possession, except as otherwise provided by law, shall be guilty of a misdemeanor..."

Section 1 of the Alabama Nongame Species Regulation (Regulation 87-GF-7) includes the wood stork in the list of nongame species covered by paragraph (4). "It shall be unlawful to take, capture, kill, possess, sell, trade for anything of monetary value, or offer to sell or trade for anything of monetary value, the following nongame wildlife species (or any parts or reproductive products of such species) without a scientific collection permit and written permission from the Commissioner, Department of Conservation and Natural Resources,..."

2. State of Florida

Rule 39-4.001 of the Florida Wildlife Code prohibits "taking, attempting to take, pursuing, hunting, molesting, capturing, or killing (collectively defined as "taking"), transporting, storing, serving, buying, selling,

possessing, or wantonly or willingly wasting any wildlife or freshwater fish or their nests, eggs, young, homes, or dens except as specifically provided for in other rules of Chapter 39, Florida Administrative Code.

Rule 39-27.011 of the Florida Wildlife Code prohibits "killing, attempting to kill, or wounding any endangered species." The "Official Lists of Endangered and Potentially Endangered Fauna and Flora in Florida" dated 1 July 1988, includes the wood stork, listed as "endangered" by the Florida Game and Fresh Water Fish Commission.

3. State of Georgia

Section 27-1-28 of the Conservation and Natural Resources Code states that "Except as otherwise provided by law, rule, or regulation, it shall be unlawful to hunt, trap, fish, take, possess, or transport any nongame species of wildlife..."

Section 27-1-30 states that, "Except as otherwise provided by law or regulation, it shall be unlawful to disturb, mutilate, or destroy the dens, holes, or homes of any wildlife; "

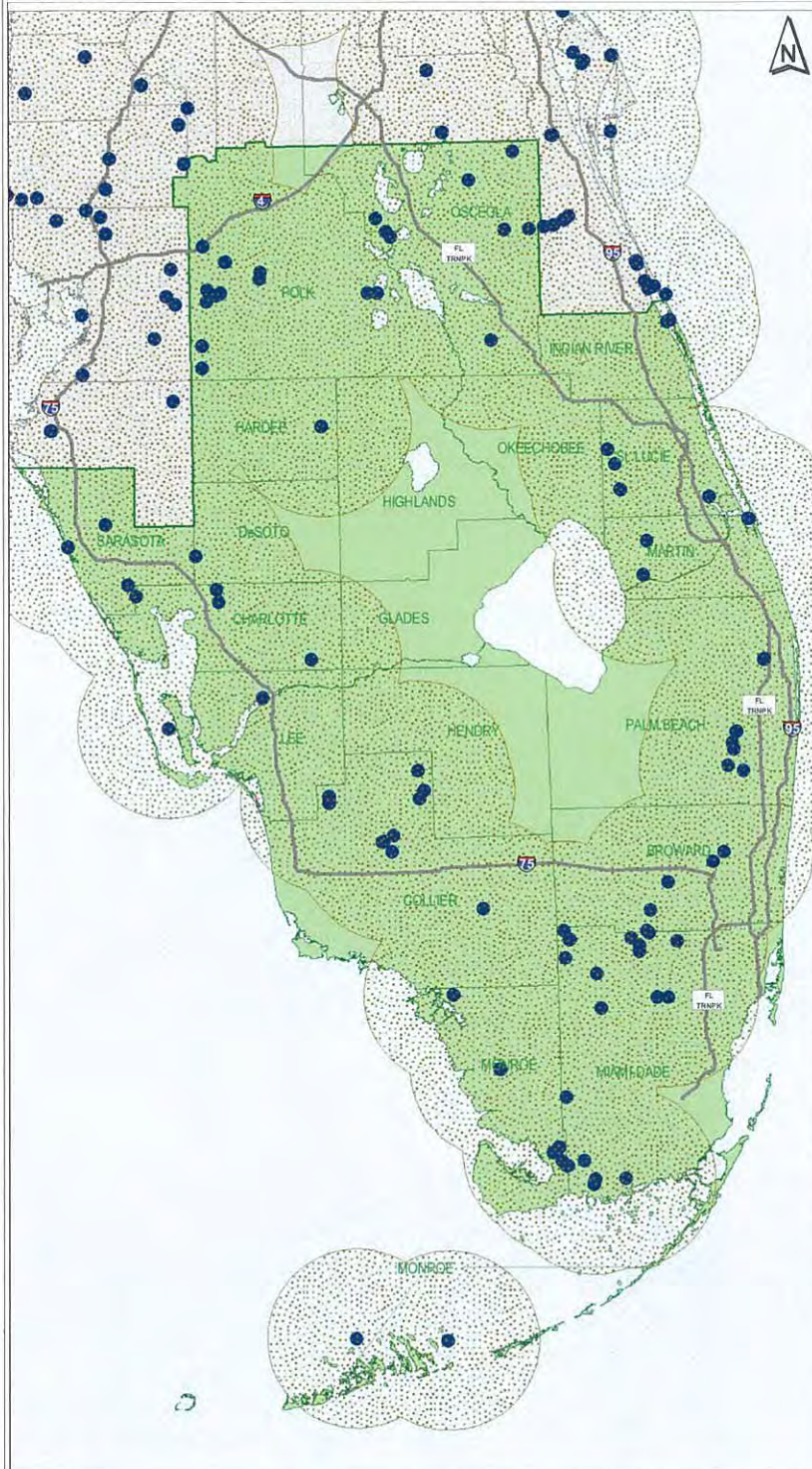
Section 27-3-22 states, in part, "It shall be unlawful for any person to hunt, trap, take, possess, sell, purchase, ship, or transport any hawk, eagle, owl, or any other bird or any part, nest, or egg thereof..."

The wood stork is listed as endangered pursuant to the Endangered Wildlife Act of 1973 (Section 27-3-130 of the Code). Section 391-4-13-.06 of the Rules and Regulations of the Georgia Department of Natural Resources prohibits harassment, capture, sale, killing, or other actions which directly cause the death of animal species protected under the Endangered Wildlife Act. The destruction of habitat of protected species on public lands is also prohibited.

4. State of South Carolina

Section 50-15-40 of the South Carolina Nongame and Endangered Species Conservation Act states, "Except as otherwise provided in this chapter, it shall be unlawful for any person to take, possess, transport, export, process, sell, or offer of sale or ship, and for any common or contract carrier knowingly to transport or receive for shipment any species or subspecies of wildlife appearing on any of the following lists: (1) the list of wildlife indigenous to the State, determined to be endangered within the State...(2) the United States' List of Endangered Native Fish and Wildlife... (3) the United States' List of Endangered Foreign Fish and Wildlife ..."

Wood Stork



Nesting Colonies Core Foraging Areas

1999 to 2005

- Colony Location
- Core Foraging Area
- South Florida Service Area



Produced by:
South Florida Ecological Services Office
<http://verobeach.fws.gov>
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Enclosure 3

Wood Stork Foraging Analysis: Excerpts of concepts and procedure as presented by the Service in this appendix may be viewed in detail in any one of our recent Biological Opinions for project related impacts to the wood stork. These documents can be found at the internet website address <http://www.fws.gov/filedownloads/ftp%5verobeach>.

Foraging Habitat

Researchers have shown that wood storks forage most efficiently and effectively in habitats where prey densities are high and the water shallow and canopy open enough to hunt successfully (Ogden et al. 1978, Browder 1984, Coulter 1987). Prey availability to wood storks is dependent on a composite variable consisting of density (number or biomass/m²) and the vulnerability of the prey items to capture (Gawlik 2002). For wood storks, prey vulnerability appears to be largely controlled by physical access to the foraging site, water depth, the density of submerged vegetation, and the species-specific characteristics of the prey. For example, fish populations may be very dense, but not available (vulnerable) because the water depth is too deep (greater than 30 cm) for storks or the tree canopy at the site is too dense for storks to land. Calm water, about 5-40 cm (2-16 in) in depth, and free of dense aquatic vegetation is ideal (Coulter and Bryan 1993).

Coulter and Bryan's (1993) study suggested that wood storks preferred ponds and marshes, and visited areas with little or no canopy more frequently. Even in foraging sites in swamps, the canopy tended to be sparse. They suggested that open canopies may have contributed to detection of the sites and more importantly may have allowed the storks to negotiate landing more easily than at closed-canopy sites. In their study, the median amount of canopy cover where wood stork foraging was observed was 32 percent. Other researchers (P.C. Frederick, University of Florida, personal communication 2006; J.A. Rodgers, FWC, personal communication 2006) also confirm that wood storks will forage in woodlands, though the woodlands have to be fairly open and vegetation not very dense. Furthermore, the canopies must be open enough for wood storks to take flight quickly to avoid predators.

Melaleuca-infested Wetlands: As discussed previously, wetland suitability for wood stork foraging is partially dependent on vegetation density. Melaleuca is a dense-stand growth plant species, effectively producing a closed canopy and dense understory growth pattern that generally limits a site's accessibility to foraging by wading birds. However, O'Hare and Dalrymple (1997) suggest moderate infestations of melaleuca may have little effect on some species' productivity (*i.e.*, amphibians and reptiles) as long as critical abiotic factors such as hydrology remain. They also note as the levels of infestation increase, usage by wetland dependent species decreases. Their studies also showed that the number of fish species present in a wetland system remain stable at certain levels of melaleuca. However, the availability of the prey base for wood storks and other foraging wading birds is reduced by the restriction of access caused from dense and thick exotic vegetation. Wood storks and other wading birds can forage in these systems in open area pockets (*e.g.*, wind blow-downs), provided multiple conditions are optimal (*e.g.*, water depth, prey density). In O'Hare and Dalrymple's study (1997), they identify five cover types (Table 1) and

provide information on the number of wetland dependent bird species and the number of individuals observed within each of these vegetation classes (Table 2).

Table 1: Vegetation classes

DMM	75-100 percent mature dense melaleuca coverage
DMS or (SDM)	75-100 percent sapling dense melaleuca coverage
P75	50-75 percent melaleuca coverage
P50	0-50 percent melaleuca coverage
MAR (Marsh)	0-10 percent melaleuca coverage

The number of wetland-dependent species and individuals observed per cover type is shown below in columns 1, 2, and 3 (Table 2). To develop an estimate of the importance a particular wetland type may have (based on density and aerial coverage by exotic species) to wetland dependent species, we developed a foraging suitability value using observational data from O'Hare and Dalrymple (1997). The Foraging Suitability Value as shown in column 5 (Table 2) is calculated by multiplying the number of species by the number of individuals and dividing this value by the maximum number of species and individuals combined ($12 \times 132 = 1,584$). The results are shown below for each of the cover types in O'Hare and Dalrymple (1997) study (Table 1). As an example, for the P50 cover type, the foraging suitability is calculated by multiplying 11 species times 92 individuals for a total of 1,012. Divide this value by 1,584, which is the maximum number of species times the maximum number of individuals ($12 \times 132 = 1,584$). The resultant is 0.6389 or 64 percent ($11 \times 92 = 1012 / 1584 \times 100 = 63.89$).

Table 2: Habitat Foraging Suitability

Cover Type	# of Species (S)	# of Individuals (I)	S*I	Foraging Suitability
DMM	1	2	2	0.001
DMS	4	10	40	0.025
P75	10	59	590	0.372
P50	11	92	1,012	0.639
MAR	12	132	1,584	1.000

This approach was developed to provide us with a method of assessing wetland acreages and their relationship to prey densities and prey availability. We consider wetland dependent bird use to be a general index of food availability. Based on this assessment we developed an exotic foraging suitability index (Table 3):

Table 3. Foraging Suitability Percentages

Exotic Percentage	Foraging Suitability (percent)
Between 0 and 25 percent exotics	100
Between 25 and 50 percent exotics	64
Between 50 and 75 percent exotics	37
Between 75 and 90 percent exotics	3
Between 90 and 100 percent exotics	0

In our assessment however, we consider DMM to represent all exotic species densities between 90 and 100 percent and DMS to represent all exotic species densities between 75 and 90 percent. In our evaluation of a habitat's suitability, the field distinction between an exotic coverage of

90 percent and 100 percent in many situations is not definable, therefore unless otherwise noted in the field reports and in our analysis; we consider a suitability value of 3 percent to represent both densities.

Hydroperiod: The hydroperiod of a wetland can affect the prey densities in a wetland. For instance, research on Everglades fish populations using a variety of quantitative sampling techniques (pull traps, throw traps, block nets) have shown that the density of small forage fish increases with hydroperiod. Marshes inundated for less than 120 days of the year average ± 4 fish/m²; whereas, those flooded for more than 340 days of the year average ± 25 fish/m² (Loftus and Eklund 1994, Trexler et al. 2002).

The Service (1999) described a short hydroperiod wetland as wetlands with between 0 and 180-day inundation, and long hydroperiod wetlands as those with greater than 180-day inundation. However, Trexler et al. (2002) defined short hydroperiod wetlands as systems with less than 300 days per year inundation. In our discussion of hydroperiods, we are considering short hydroperiod wetlands to be those that have an inundation of 180 days or fewer.

The most current information on hydroperiods in south Florida was developed by the SFWMD for evaluation of various restoration projects throughout the Everglades Protection Area. In their modeling efforts, they identified the following seven hydroperiods:

Table 4. SFWMD Hydroperiod Classes – Everglades Protection Area

Hydroperiod Class	Days Inundated
Class 1	0-60
Class 2	60-120
Class 3	120-180
Class 4	180-240
Class 5	240-300
Class 6	300-330
Class 7	330-365

Fish Density per Hydroperiod: In the Service's assessment of project related impacts to wood storks, the importance of fish data specific to individual hydroperiods is the principle basis of our assessment. In order to determine the fish density per individual hydroperiod, the Service relied on the number of fish per hydroperiod developed from throw-trap data in Trexler et al.'s (2002) study and did not use the electrofishing data also presented in Trexler et al.'s study that defined fish densities in catch per unit effort, which is not hydroperiod specific. Although the throw-trap sampling generally only samples fish 8 cm or less, the Service believes the data can be used as a surrogate representation of all fish, including those larger than 8 cm, which are typically sampled by either electrofishing or block net sampling.

We base this evaluation on the following assessment. Trexler et al.'s (2002) study included electrofishing data targeting fish greater than 8 cm, the data is recorded in catch per unit effort and in general is not hydroperiod specific. However, Trexler et al. (2002) notes in their assessment of the electrofishing data that in general there is a correlation with the number of fish per unit effort per changes in water depth. In literature reviews of electrofishing data by Chick et

al. (1999 and 2004), they note that electrofishing data provides a useful index of the abundance of larger fish in shallow, vegetated habitat, but length, frequency, and species compositional data should be interpreted with caution. Chick et al. (2004) also noted that electrofishing data for large fish (> 8cm) provided a positive correlation of the number of fish per unit effort (abundance) per changes in hydroperiod. The data in general show that as the hydroperiod decreases, the abundance of larger fishes also decreases.

Studies by Turner et al. (1999), Turner and Trexler (1997), and Carlson and Duever (1979) also noted this abundance trend for fish species sampled. We also noted in our assessment of prey consumption by wood storks in the Ogden et al. (1976) study (Figure 4) (discussed below), that the wood stork's general preference is for fish measuring 1.5 cm to 9 cm, although we also acknowledged that wood storks consume fish larger than the limits discussed in the Ogden et al. (1976) study. A similar assessment is reference by Trexler and Goss (2009) noting a diversity of size ranges of prey available for wading birds to consume, with fish ranging from 6 to 8 cm being the preferred prey for larger species of wading birds, particularly wood storks (Kushlan et al. 1975).

Therefore, since data were not available to quantify densities (biomass) of fish larger than 8 cm to a specific hydroperiod, and Ogden et al.'s (1976) study notes that the wood stork's general preference is for fish measuring 1.5 cm to 9 cm, and that empirical data on fish densities per unit effort correlated positively with changes in water depth, we believe that the Trexler et al. (2002) throw-trap data represents a surrogate assessment tool to predict the changes in total fish density and the corresponding biomass per hydroperiod for our wood stork assessment.

In consideration of this assessment, the Service used the data presented in Trexler et al.'s (2002) study on the number of fish per square-meter per hydroperiod for fish 8 cm or less to be applicable for estimating the total biomass per square-meter per hydroperiod for all fish. In determining the biomass of fish per square-meter per hydroperiod, the Service relied on the summary data provided by Turner et al. (1999), which provides an estimated fish biomass of 6.5 g/m² for a Class 7 hydroperiod for all fish and used the number of fish per square-meter per hydroperiod from Trexler et al.'s data to extrapolate biomass values per individual hydroperiods.

Trexler et al.'s (2002) studies in the Everglades provided densities, calculated as the square-root of the number of fish per square meter, for only six hydroperiods; although these cover the same range of hydroperiods developed by the SFWMD. Based on the throw-trap data and Trexler et al.'s (2002) hydroperiods, the square-root fish densities are:

Table 5. Fish Densities per Hydroperiod from Trexler et al. (2002)

Hydroperiod Class	Days Inundated	Fish Density
Class 1	0-120	2.0
Class 2	120-180	3.0
Class 3	180-240	4.0
Class 4	240-300	4.5
Class 5	300-330	4.8
Class 6	330-365	5.0

Trexler et al.'s (2002) fish densities are provided as the square root of the number of fish per square meter. For our assessment, we squared these numbers to provide fish per square meter, a simpler calculation when other prey density factors are included in our evaluation of adverse effects to listed species from the proposed action. We also extrapolated the densities over seven hydroperiods, which is the same number of hydroperiods characterized by the SFWMD. For example, Trexler et al.'s (2002) square-root density of a Class 2 wetland with three fish would equate to a SFWMD Model Class 3 wetland with nine fish. Based on the above discussion, the following mean annual fish densities were extrapolated to the seven SFWMD Model hydroperiods:

Table 6. Extrapolated Fish Densities for SFWMD Hydroperiods

Hydroperiod Class	Days Inundated	Extrapolated Fish Density
Class 1	0-60	2 fish/m ²
Class 2	60-120	4 fish/m ²
Class 3	120-180	9 fish/m ²
Class 4	180-240	16 fish/m ²
Class 5	240-300	20 fish/m ²
Class 6	300-330	23 fish/m ²
Class 7	330-365	25 fish/m ²

Fish Biomass per Hydroperiod: A more important parameter than fish per square-meter in defining fish densities is the biomass these fish provide. In the ENP and WCA-3, based on studies by Turner et al. (1999), Turner and Trexler (1997), and Carlson and Duever (1979), the standing stock (biomass) of large and small fishes combined in unenriched Class 5 and 6 hydroperiod wetlands averaged between 5.5 to 6.5 grams-wet-mass/m². In these studies, the data was provided in g/m² dry-weight and was converted to g/m² wet-weight following the procedures referenced in Kushlan et al. (1986) and also referenced in Turner et al. (1999). The fish density data provided in Turner et al. (1999) included both data from samples representing fish 8 cm or smaller and fish larger than 8 cm and included summaries of Turner and Trexler (1997) data, Carlson and Duever (1979) data, and Loftus and Eklund (1994) data. These data sets also reflected a 0.6 g/m² dry-weight correction estimate for fish greater than 8 cm based on Turner et al.'s (1999) block-net rotenone samples.

Relating this information to the hydroperiod classes developed by the SFWMD, we estimated the mean annual biomass densities per hydroperiod. For our assessment, we considered Class 7 hydroperiod wetlands based on Turner et al. (1999) and Trexler et al. (2002) studies to have a mean annual biomass of 6.5 grams-wet-mass/m² and to be composed of 25 fish/m². The remaining biomass weights per hydroperiod were determined as a direct proportion of the number of fish per total weight of fish for a Class 7 hydroperiod (6.5 grams divided by 25 fish equals 0.26 grams per fish).

For example, given that a Class 3 hydroperiod has a mean annual fish density of 9 fish/m², with an average weight of 0.26 grams per fish, the biomass of a Class 3 hydroperiod would be 2.3 grams/m² (9*0.26 = 2.3). Based on the above discussion, the biomass per hydroperiod class is:

Table 7. Extrapolated Mean Annual Fish Biomass for SFWMD Hydroperiods

Hydroperiod Class	Days Inundated	Extrapolated Fish Biomass
Class 1	0-60	0.5 gram/m ²
Class 2	60-120	1.0 gram/m ²
Class 3	120-180	2.3 grams/m ²
Class 4	180-240	4.2 grams/m ²
Class 5	240-300	5.2 grams/m ²
Class 6	300-330	6.0 grams/m ²
Class 7	330-365	6.5 grams/m ²

Wood stork suitable prey size: Wood storks are highly selective in their feeding habits and in studies on fish consumed by wood storks, five species of fish comprised over 85 percent of the number and 84 percent of the biomass of over 3,000 prey items collected from adult and nestling wood storks (Ogden et al. 1976). Table 8 lists the fish species consumed by wood storks in Ogden et al. (1976).

Table 8. Primary Fish Species consumed by Wood Storks from Ogden et al. (1976)

Common name	Scientific name	Percent Individuals	Percent Biomass
Sunfishes	<i>Centrarchidae</i>	14	44
Yellow bullhead	<i>Italurus natalis</i>	2	12
Marsh killifish	<i>Fundulus confluentus</i>	18	11
Flagfish	<i>Jordenella floridae</i>	32	7
Sailfin molly	<i>Poecilia latipinna</i>	20	11

These species were also observed to be consumed in much greater proportions than they occur at feeding sites, and abundant smaller species [e.g., mosquitofish (*Gambusia affinis*), least killifish (*Heterandria formosa*), bluefin killifish (*Lucania goodei*)] are under-represented, which the researchers believed was probably because their small size did not elicit a bill-snapping reflex in these tactile feeders (Coulter et al. 1999). Their studies also showed that, in addition to selecting larger species of fish, wood storks consumed individuals that are significantly larger (>3.5 cm) than the mean size available (2.5 cm), and many were greater than 1-year old (Ogden et al. 1976, Coulter et al. 1999). However, Ogden et al. (1976) also found that wood storks most likely consumed fish that were between 1.5 and 9.0 cm in length (Figure 4 in Ogden et al. 1976).

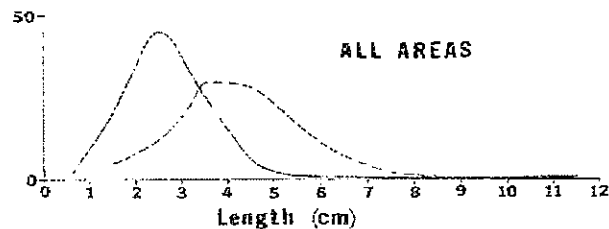


FIGURE 4. Length frequency distribution of fish available to and consumed by Wood Storks in different habitats.

In Ogden et al.'s (1976) Figure 4, the dotted line is the distribution of fish consumed and the solid line is the available fish. Straight interpretation of the area under the dotted line curve

represents the size classes of fish most likely consumed by wood storks and is the basis of our determination of the amount of biomass that is within the size range of fish most likely consumed by wood storks, which in this example is a range size of 1.5 to 9.0 cm in length.

Wood stork suitable prey base (biomass per hydroperiod): To estimate that fraction of the available fish biomass that might be consumed by wood storks, the following analysis was conducted. Trexler et al.'s (2002) 2-year throw trap data of absolute and relative fish abundance per hydroperiod distributed across 20 study sites in the ENP and the WCAs was considered to be representative of the Everglades fish assemblage available to wood storks (n = 37,718 specimens of 33 species). Although Trexler et al.'s (2002) data was based on throw-trap data and representative of fish 8 cm or smaller, the Service believes the data set can be used to predict the biomass/m² for total fish (those both smaller and larger than 8 cm). This approach is also supported, based on our assessment of prey consumption by wood storks in Ogden et al.'s (1976) study (Figure 4), that the wood storks general preference is for fish measuring 1.5 cm to 9 cm and is generally inclusive of Trexler et al.'s (2002) throw-trap data of fish 8 cm or smaller.

To estimate the fraction of the fish biomass that might be consumed by wood storks, the Service, using Trexler et al.'s (2002) throw-trap data set, determined the mean biomass of each fish species that fell within the wood stork prey size limits of 1.5 to 9.0 cm. The mean biomass of each fish species was estimated from the length and wet mass relationships for Everglades' ichthyofauna developed by Kushlan et al. (1986). The proportion of each species that was outside of this prey length and biomass range was estimated using the species mean and variance provided in Table 1 in Kushlan et al. (1986). These biomass estimates assumed the length and mass distributions of each species was normally distributed and the fish biomass could be estimated by eliminating that portion of each species outside of this size range. These biomass estimates of available fish prey were then standardized to a sum of 6.5 g/m² for Class 7 hydroperiod wetlands (Service 2009).

For example, Kushlan et al. (1986) lists the warmouth (*Lepomis gulosus*) with a mean average biomass of 36.76 g. In fish samples collected by Trexler et al. (2002), this species accounted for 0.048 percent ($18/37,715=0.000477$) of the Everglades freshwater ichthyofauna. Based on an average biomass of 36.76 g (Kushlan et al. 1986), the 0.048 percent representation from Trexler et al. (2002) is equivalent to an average biomass of 1.75 g ($36.76*0.048$) or 6.57 percent ($1.75/26.715$) of the estimated average biomass (26.715 g) of Trexler et al.'s (2002) samples (Service 2009).

Standardizing these data to a sample size of 6.5 g/m², the warmouth biomass for long hydroperiod wetlands would be about 0.427 g (Service 2009). However, the size frequency distribution (assumed normal) for warmouth (Kushlan et al. 1986) indicate 48 percent are too large for wood storks and 0.6 percent are too small (outside the 1.5 cm to 9 cm size range most likely consumed), so the warmouth biomass within the wood stork's most likely consumed size range is only 0.208 g ($0.427*(0.48+0.006)=0.2075$) in a 6.5 g/m² sample. Using this approach summed over all species in long hydroperiod wetlands, only 3.685 g/m² of the 6.5 g/m² sample consists of fish within the size range likely consumed by wood storks or about 57 percent ($3.685/6.5*100=56.7$) of the total biomass available.

An alternative approach to estimate the available biomass is based on Ogden et al. (1976). In their study (Table 8), the sunfishes and four other species that accounted for 84 percent of the biomass eaten by wood storks totaled 2.522 g of the 6.5 g/m² sample (Service 2009). Adding the remaining 16 percent from other species in the sample, the total biomass would suggest that 2.97 g of a 6.5 g/m² sample are most likely to be consumed by wood storks or about 45.7 percent (2.97/6.5=0.4569)

The mean of these two estimates is 3.33g/m² for long hydroperiod wetlands (3.685 + 2.97 = 6.655/ 2 = 3.33). This proportion of available fish prey of a suitable size (3.33 g/m² / 6.5 g/m² = 0.51 or 51 percent) was then multiplied by the total fish biomass in each hydroperiod class to provide an estimate of the total biomass of a hydroperiod that is the appropriate size and species composition most likely consumed by wood storks.

As an example, a Class 3 SFWMD model hydroperiod wetland with a biomass of 2.3 grams/m², adjusted by 51 percent for appropriate size and species composition, provides an available biomass of 1.196 grams/m². Following this approach, the biomass per hydroperiod potentially available to predation by wood storks based on size and species composition is:

Table 9. Wood Stork Suitable Prey Base (fish biomass per hydroperiod)

Hydroperiod Class	Days Inundated	Fish Biomass
Class 1	0-60	0.26 gram/m ²
Class 2	60-120	0.52 gram/m ²
Class 3	120-180	1.196 grams/m ²
Class 4	180-240	2.184 grams/m ²
Class 5	240-300	2.704 grams/m ²
Class 6	300-330	3.12 grams/m ²
Class 7	330-365	3.38 grams/m ²

Wood Stork-Wading Bird Prey Consumption Competition: In 2006, (Service 2006), the Service developed an assessment approach that provided a foraging efficiency estimate that 55 percent of the available biomass was actually consumed by wood storks. Since the implementation of this assessment approach, the Service has received comments from various sources concerning the Service's understanding of Fleming et al.'s (1994) assessment of prey base consumed by wood storks versus prey base assumed available to wood stork and the factors included in the 90 percent prey reduction value.

In our original assessment, we noted that, "*Fleming et al. (1994) provided an estimate of 10 percent of the total biomass in their studies of wood stork foraging as the amount that is actually consumed by the storks. However, the Fleming et al. (1994) estimate also includes a second factor, the suitability of the foraging site for wood storks, a factor that we have calculated separately. In their assessment, these two factors accounted for a 90 percent reduction in the biomass actually consumed by the storks. We consider these two factors as equally important and are treated as equal components in the 90 percent reduction; therefore, we consider each factor to represent 45 percent of the reduction. In consideration of this approach, Fleming et al.'s (1994) estimate that 10 percent of the biomass would actually be consumed by the storks would be added to the 45 percent value for an estimate that 55 percent (10 percent plus the remaining 45 percent) of the available biomass would actually be consumed by the storks and is the factor we believe represents the amount of the prey base that is actually consumed by the stork.*"

In a follow-up review of Fleming et al.'s (1994) report, we noted that the 10 percent reference is to prey available to wood storks, not prey consumed by wood storks. We also noted the 90 percent reduction also includes an assessment of prey size, an assessment of prey available by water level (hydroperiod), an assessment of suitability of habitat for foraging (openness), and an assessment for competition with other species, not just the two factors considered originally by the Service (suitability and competition). Therefore, in re-evaluating of our approach, we identified four factors in the 90 percent biomass reduction and not two as we previously considered. We believe these four factors are represented as equal proportions of the 90 percent reduction, which corresponds to an equal split of 22.5 percent for each factor. Since we have accounted previously for three of these factors in our approach (prey size, habitat suitability, and hydroperiod) and they are treated separately in our assessment, we consider a more appropriate foraging efficiency to represent the original 10 percent and the remaining 22.5 percent from the 90 percent reduction discussed above. Following this revised assessment, our competition factor would be 32.5 percent, not the initial estimate of 55 percent.

Other comments reference the methodology's lack of sensitivity to limiting factors, i.e., is there sufficient habitat available across all hydroperiods during critical life stages of wood stork nesting and does this approach over emphasize the foraging biomass of long hydroperiod wetlands with a corresponding under valuation of short hydroperiod wetlands. The Service is aware of these questions and is examining alternative ways to assess these concerns. However, until further research is generated to refine our approach, we continue to support the assessment tool as outlined.

Following this approach, Table 10 has been adjusted to reflect the competition factor and represents the amount of biomass consumed by wood storks and is the basis of our effects assessments (Class 1 hydroperiod with a biomass 0.26 g, multiplied by 0.325, results in a value of 0.08 g [$0.26 \times 0.325 = 0.08$]) (Table 10).

Table 10 Actual Biomass Consumed by Wood Storks

Hydroperiod Class	Days Inundated	Fish Biomass
Class 1	0-60	0.08 gram/m ²
Class 2	60-120	0.17 gram/m ²
Class 3	120-180	0.39 grams/m ²
Class 4	180-240	0.71 grams/m ²
Class 5	240-300	0.88 grams/m ²
Class 6	300-330	1.01 grams/m ²
Class 7	330-365	1.10 grams/m ²

Sample Project of Biomass Calculations and Corresponding Concurrence Determination

Example 1:

An applicant is proposing to construct a residential development with unavoidable impacts to 5 acres of wetlands and is proposing to restore and preserve 3 acres of wetlands onsite. Data on the onsite wetlands classified these systems as exotic impacted wetlands with greater than 50

percent but less than 75 percent exotics (Table 3) with an average hydroperiod of 120-180 days of inundation.

The equation to calculate the biomass lost is: The number of acres, converted to square-meters, times the amount of actual biomass consumed by the wood stork (Table 10), times the exotic foraging suitability index (Table 3), equals the amount of grams lost, which is converted to kg.

Biomass lost $(5 \times 4,047 \times 0.39 \text{ (Table 10)} \times 0.37 \text{ (Table 3)}) = 2,919.9 \text{ grams or } 2.92 \text{ kg}$

In the example provided, the 5 acres of wetlands, converted to square-meters ($1 \text{ acre} = 4,047 \text{ m}^2$) would provide 2.9 kg of biomass ($5 \times 4,047 \times 0.39 \text{ (Table 10)} \times 0.37 \text{ (Table 3)} = 2,919.9 \text{ grams or } 2.9 \text{ kg}$), which would be lost from development.

The equation to calculate the biomass from the preserve is the same, except two calculations are needed, one for the existing biomass available and one for the biomass available after restoration.

Biomass Pre: $(3 \times 4,047 \times 0.39 \text{ (Table 10)} \times 0.37 \text{ (Table 3)}) = 1,751.95 \text{ grams or } 1.75 \text{ kg}$

Biomass Post: $(3 \times 4,047 \times 0.39 \text{ (Table 10)} \times 1 \text{ (Table 3)}) = 4,734.99 \text{ grams or } 4.74 \text{ kg}$

Net increase: $4.74 \text{ kg} - 1.75 \text{ kg} = 2.98 \text{ kg Compensation Site}$

Project Site Balance $2.98 \text{ kg} - 2.92 \text{ kg} = 0.07 \text{ kg}$

The compensation proposed is 3 acres, which is within the same hydroperiod and has the same level of exotics. Following the calculations for the 5 acres, the 3 acres in its current habitat state, provides 1.75 kg ($3 \times 4,047 \times 0.39 \text{ (Table 10)} \times 0.37 \text{ (Table 3)} = 1,751.95 \text{ grams or } 1.75 \text{ kg}$) and following restoration provides 4.74 kg ($3 \times 4,047 \times 0.39 \text{ (Table 10)} \times 1 \text{ (Table 3)} = 4,734.99 \text{ grams or } 4.74 \text{ kg}$), a net increase in biomass of 2.98 kg ($4.74 - 1.75 = 2.98$).

Example 1: 5 acre wetland loss, 3 acre wetland enhanced – same hydroperiod - NLAA

Hydroperiod	Existing Footprint		On-site Preserve Area				Net Change*	
			Pre Enhancement		Post Enhancement			
	Acres	Kgrams	Acres	Kgrams	Acres	Kgrams	Acres	Kgrams
Class 1 - 0 to 60 Days								
Class 2 - 60 to 120 Days								
Class 3 - 120 to 180 Days	5	2.92	3	1.75	3	4.74	(5)	0.07
Class 4 - 180 to 240 Days								
Class 5 - 240 to 300 Days								
Class 6 - 300 to 330 Days								
Class 7 - 330 to 365 days								
TOTAL	5	2.92	3	1.75	3	4.74	(5)	0.07

*Since the net increase in biomass from the restoration provides 2.98 kg and the loss is 2.92 kg, there is a positive outcome (4.74-1.75-2.92=0.07) in the same hydroperiod and Service concurrence with a NLAA is appropriate.

Example 2:

In the above example, if the onsite preserve wetlands were a class 4 hydroperiod, which has a value of 0.71. grams/m² instead of a class 3 hydroperiod with a 0.39 grams/m² [Table 10]), there would be a loss of 2.92 kg of short hydroperiod wetlands (as above) and a net gain of 8.62 kg of long-hydroperiod wetlands.

Biomass lost: $(5 \times 4,047 \times 0.39 \text{ (Table 10)} \times 0.37 \text{ (Table 3)}) = 2,919.9 \text{ grams or } 2.92 \text{ kg}$

The current habitat state of the preserve provides 3.19 kg $(3 \times 4,047 \times 0.71 \text{ (Table 10)} \times 0.37 \text{ (Table 3)}) = 3,189.44 \text{ grams or } 3.19 \text{ kg}$ and following restoration the preserve provides 8.62 kg $(3 \times 4,047 \times 0.71 \text{ (Table 10)} \times 1 \text{ (Table 3)}) = 8,620.11 \text{ grams or } 8.62 \text{ kg}$, thus providing a net increase in class 4 hydroperiod biomass of 5.43 kg $(8.62 - 3.19 = 5.43)$.

Biomass Pre: $(3 \times 4,047 \times 0.71 \text{ (Table 10)} \times 0.37 \text{ (Table 3)}) = 3,189.44 \text{ grams or } 3.19 \text{ kg}$

Biomass Post: $(3 \times 4,047 \times 0.71 \text{ (Table 10)} \times 1 \text{ (Table 3)}) = 8,620.11 \text{ grams or } 8.62 \text{ kg}$

Net increase: $8.62 \text{ kg} - 3.19 \text{ kg} = 5.43 \text{ kg}$

Project Site Balance $5.43 \text{ kg} - 2.92 \text{ kg} = 2.51 \text{ kg}$

Example 2: 5 acre wetland loss, 3 acre wetland enhanced – different hydroperiod – May Affect

Hydroperiod	Existing Footprint		On-site Preserve Area				Net Change*	
			Pre Enhancement		Post Enhancement			
	Acres	Kgrams	Acres	Kgrams	Acres	Kgrams	Acres	Kgrams
Class 1 - 0 to 60 Days								
Class 2 - 60 to 120 Days								
Class 3 - 120 to 180 Days	5	2.92					(5)	-2.92
Class 4 - 180 to 240 Days			3	3.19	3	8.62	0	5.43
Class 5 - 240 to 300 Days								
Class 6 - 300 to 330 Days								
Class 7 - 330 to 365 days								
TOTAL	5	2.92	3	3.19	3	8.62	(5)	2.51

In this second example, even though there is an overall increase in biomass, the biomass loss is a different hydroperiod than the biomass gain from restoration, therefore, the Service could not concur with a NLAA and further coordination with the Service is appropriate.

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August 1, 2017

Donnie Kinard
U.S. Army Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

Subject: Consultation Key for the Eastern Indigo Snake – Revised

Dear Mr. Kinard:

This letter revises and replaces the January 25, 2010, and August 13, 2013, letters to the U.S. Army Corps of Engineers (Corps) regarding the use of the eastern indigo snake programmatic effect determination key (Key) for projects occurring within the South Florida Ecological Service's Office (SFESO) jurisdiction. This revision supersedes all prior versions of the Key in the SFESO area. The purpose of this revision is to clarify portions of the previous keys based on questions we have been asked, specifically related to habitat and refugia used by eastern indigo snakes (*Drymarchon corais couperi*), in the southern portion of their range and within the jurisdiction of the SFESO. This Key is provided pursuant to the Service's authorities under the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C.1531 *et seq.*). This Key revision has been assigned Service Consultation Code: 41420-2009-I-0467-R001.

The purpose of this Key is to assist the Corps (or other Federal action agency) in making appropriate effects determinations for the eastern indigo snake under section 7 of the Act, and streamline informal consultation with the SFESO for the eastern indigo snake when the proposed action can be walked through the Key. The Key is a tool available to the Corps (or other Federal action agency) for the purposes of expediting section 7 consultations. There is no requirement to use the Key. There will be cases when the use of the Key is not appropriate. These include, but are not limited to: where project specific information is outside of the scope of the Key or instances where there is new biological information about the species. In these cases, we recommend the Corps (or other Federal action agency) initiates traditional consultation pursuant to section 7 of the Act, and identify that consultation is being requested outside of the Key.

This Key uses project size and home ranges of eastern indigo snakes as the basis for making determinations of "may affect, but is not likely to adversely affect" (NLAA) and "may affect, and is likely to adversely affect" (may affect). Suitable habitat for the eastern indigo snake consists of a mosaic of habitats types, most of which occur throughout South Florida. Information on home ranges for individuals is not available in specific habitats in South Florida. Therefore, the SFESO uses the information from a 26-year study conducted by Layne and Steiner (1996) at Archbold Biological Station, Lake Placid, Florida, as the best available

information. Layne and Steiner (1996) determined the average home range size for a female eastern indigo snake was 46 acres and 184 acres for a male.

Projects that would remove/destroy less than 25 acres of eastern indigo snake habitat are expected to result in the loss of a portion of an eastern indigo snakes home range that would not impair the ability of the individual to feed, breed, and shelter. Therefore, the Service finds that take would not be reasonably certain to occur due to habitat loss. However, these projects have the potential to injure or kill an eastern indigo snake if the individual is crushed by equipment during site preparation or other project aspects. The Service's *Standard Protection Measures for the Eastern Indigo Snake* (Service 2013 or most current version) and the excavation of underground refugia (where a snake could be buried, trapped and/or injured), when implemented, are designed to avoid these forms of take. Consequently, projects less than 25 acres that include the Service's *Standard Protection Measures for the Eastern Indigo Snake* (Service 2013 or most current version) and a commitment to excavate underground refugia as part of the proposed action would be expected to avoid take and thus, may affect, but are not likely to adversely affect the species.

If a proposed project would impact less than 25 acres of vegetated eastern indigo snake habitat (not urban/ human-altered) completely surrounded by urban development, and an eastern indigo snake has been observed on site, the Key should not be used. The Service recommends formal consultation for this situation because of the expected increased value of the vegetated habitat within the individual's home range.

Projects that would remove 25 acres or more of eastern indigo snake habitat could remove more than half of a female eastern indigo snakes home range. This loss of habitat within a home range would be expected to significantly impair the ability of that individual to feed, breed, and shelter. Therefore, the Service finds take through habitat loss would be reasonably certain to occur and formal consultation is appropriate. Furthermore, these projects have the potential to injure or kill an eastern indigo snake if the individual is crushed by equipment during site preparation or other project aspects. The Service's *Standard Protection Measures for the Eastern Indigo Snake* (Service 2013 or most current version) and the excavation of underground refugia (where a snake could be buried, trapped and/or injured), when implemented, are designed to avoid these forms of take.

Eastern indigo snakes use a variety of habitat and are difficult to detect. Therefore, site specific information on the land use, observations of eastern indigo snakes within the vicinity, as well as other factors, as appropriate, will all be considered by the Service when making a final recommendation on the appropriate effects determination and whether it is appropriate to conclude consultation with the Corps (or other Federal action agency) formally or informally for projects that will impact 25 acres or more of habitat. Accordingly, when the use of the Key results in a determination of "may affect," the Corps (or other Federal action agency) is advised that consultation may be concluded informally or formally, depending on the project specific effects to eastern indigo snakes. Technical assistance from the Service can assist you in making a determination prior to submitting a request for consultation. In circumstances where the Corps (or other Federal action agency) desires to proceed with a consultation request prior to receiving

additional technical assistance from the Service, we recommend the agency documents the biological rationale for their determination and proceed with a request accordingly.

If the use of the Key results in a determination of “no effect,” no further consultation is necessary with the SFESO. If the use of the Key results in a determination of “NLAA,” the SFESO concurs with this determination based on the rationale provide above, and no further consultation is necessary for the effects of the proposed action on the eastern indigo snake. For “no effect” or “NLAA” determinations, the Service recommends that the Corps (or other Federal action agency) documents the pathway used to reach your no effect or NLAA determination in the project record and proceed with other species analysis as warranted.

Eastern Indigo Snake Programmatic Effect Determination Key
Revised July 2017
South Florida Ecological Service Office

Scope of the Key

This Key should be used only in the review of permit applications for effects determinations for the eastern indigo snake (*Drymarchon corais couperi*) within the South Florida Ecological Service's Office (SFESO) area (Broward, Charlotte, Collier, De Soto, Glades, Hardee, Hendry, Highlands, Lee, Indian River, Martin, Miami-Dade, Monroe, Okeechobee, Osceola, Palm Beach, Polk, Sarasota, and St. Lucie Counties). There is no designated critical habitat for the eastern indigo snake.

This Key is subject to revision as the Corps (or other Federal action agency) and Service deem necessary and in particular whenever there is new information on eastern indigo snake biology and effects of proposed projects.

The Key is a tool available to the Corps (or other Federal action agency) for the purposes of expediting section 7 consultations. There is no requirement to use the Key. There will be cases when the use of the Key is not appropriate. These include, but are not limited to: where project specific information is outside of the scope of the Key or instances where there is new biological information about the species. In these cases, we recommend the Corps (or other Federal action agency) initiates traditional consultation pursuant to section 7 of the Act, and identify that consultation is being requested outside of the Key.

Habitat

Habitat use varies seasonally between upland and wetland areas, especially in the more northern parts of the species' range. In southern parts of their range eastern indigo snakes are habitat generalists which use most available habitat types. Movements between habitat types in northern areas of their range may relate to the need for thermal refugia (protection from cold and/or heat).

In northern areas of their range eastern indigo snakes prefer an interspersed of tortoise-inhabited sandhills and wetlands (Landers and Speake 1980). In these northern regions eastern indigo

snakes most often use forested areas rich with gopher tortoise burrows, hollowed root channels, hollow logs, or the burrows of rodents, armadillos, or land crabs as thermal refugia during cooler seasons (Lawler 1977; Moler 1985a; Layne and Steiner 1996). The eastern indigo snake in the northern region is typically classified as a longleaf pine savanna specialist because here, in the northern four-fifths of its range, the eastern indigo snake is typically only found in vicinity of xeric longleaf pine–turkey oak sandhills inhabited by the gopher tortoise (Means 2006).

In the milder climates of central and southern Florida, comprising the remaining one fifth of its range, thermal refugia such as those provided by gopher tortoise burrows may not be as critical to survival of indigo snakes. Consequently, eastern indigo snakes in these regions use a more diverse assemblage of habitats such as pine flatwoods, scrubby flatwoods, floodplain edges, sand ridges, dry glades, tropical hammocks, edges of freshwater marshes, muckland fields, coastal dunes, and xeric sandhill communities; with highest population concentrations of eastern indigo snakes occurring in the sandhill and pineland regions of northern and central Florida (Service 1999). Eastern indigo snakes have also been found on agricultural lands with close proximity to wetlands (Zeigler 2006).

In south Florida, agricultural sites (*e.g.*, sugar cane fields and citrus groves) are occupied by eastern indigo snakes. The use of sugarcane fields by eastern indigo snakes was first documented by Layne and Steiner in 1996. In these areas there is typically an abundance of wetland and upland ecotones (due to the presence of many ditches and canals), which support a diverse prey base for foraging. In fact, some speculate agricultural areas may actually have a higher density of eastern indigo snakes than natural communities due to the increased availability of prey. Gopher tortoise burrows are absent at these locations but there is an abundance of both natural and artificial refugia. Enge and Endries (2009) reporting on the status of the eastern indigo snake included sugarcane fields and citrus groves in a Global Information Systems (GIS)-base map of potential eastern indigo snake habitat. Numerous sightings of eastern indigo snakes within sugarcane fields have been reported within south Florida (Florida Fish and Wildlife Conservation Commission Indigo Snake Database [Enge 2017]). A recent study associated with the Comprehensive Everglades Restoration Plan (CERP) (A-1 FEB Project formerly A-1 Reservoir; Service code: 41420-2006-F-0477) documented eastern indigo snakes within sugarcane fields. The snakes used artificial habitats such as piles of limerock, construction debris, and pump stations. Recent studies also associated with the CERP at the C-44 Project (Service code: 41420-2009-FA-0314), and C-43 Project (Service code: 41420-2007-F-0589) documented eastern indigo snakes within citrus groves. The snakes used artificial habitats such as boards, sheets of tin, construction debris, pipes, drain pipes in abandoned buildings and septic tanks.

In extreme south Florida (*i.e.*, the Everglades and Florida Keys), eastern indigo snakes also utilize tropical hardwood hammocks, pine rocklands, freshwater marshes, abandoned agricultural land, coastal prairie, mangrove swamps, and human-altered habitats. Though eastern indigo snakes have been found in all available habitats of south Florida it is thought they prefer hammocks and pine forests since most observations occur there and use of these areas is disproportionate compared to the relatively small total area of these habitats (Steiner *et al.* 1983).

Even though thermal stress may not be a limiting factor throughout the year in south Florida, eastern indigo snakes still seek and use underground refugia. On the sandy central ridge of central Florida, eastern indigo snakes 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 (Layne and Steiner 1996; Wilson and Porras 1983). 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.

Minimization Measures

The Service developed protection measures for the eastern indigo snake “Standard Protection Measures for the Eastern Indigo Snake” (Service 2013) located at:

https://www.fws.gov/verobeach/ReptilesPDFs/20130812_EIS%20Standard%20Protection%20Measures_final.pdf. These protection measures (or the most updated version) are considered a minimization measure for projects proposed within eastern indigo snake habitat.

Determinations

If the use of this Key results in a determination of “**no effect**,” no further consultation is necessary with the SFESO.

If the use of this Key results in a determination of “**NLAA**,” the SFESO concurs with this determination and no further consultation is necessary for the effects of the proposed action on the eastern indigo snake.

For no effect or NLAA determinations, the Corps (or other Federal action agency) should make a note in the project file indicating the pathway used to reach your no effect or NLAA determination.

If a proposed project would impact less than 25 acres of vegetated eastern indigo snake habitat (not urban/ human-altered) completely surrounded by urban development, and an eastern indigo snake has been observed on site, the subsequent Key should not be used. The Service recommends formal consultation for this situation because of the expected increased value of the vegetated habitat within the individual’s home range.

If the use of this Key results in a determination of “**may affect**,” consultation may be concluded informally or formally depending on project effects to eastern indigo snakes. Technical assistance from the Service can assist you in making a determination prior to submitting a request for consultation. In circumstances where the Corps desires to proceed with a consultation request prior to receiving additional technical assistance from the Service, we recommend the Corps document the biological rationale for their determination and proceed with a request accordingly.

- 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 most current guidance for Standard Protection Measures For The Eastern Indigo Snake (currently 2013) 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.....**may affect**
- C. The project will impact less than 25 acres of eastern indigo snake habitat (*e.g.*, sandhill, scrub, pine flatwoods, pine rocklands, scrubby flatwoods, high pine, dry prairie, coastal prairie, mangrove swamps, tropical hardwood hammocks, hydric hammocks, edges of freshwater marshes, agricultural fields [including sugar cane fields and active, inactive, or abandoned citrus groves], and coastal dunes).....go to D
 The project will impact 25 acres or more of eastern indigo snake habitat (*e.g.*, sandhill, scrub, pine flatwoods, pine rocklands, scrubby flatwoods, high pine, dry prairie, coastal prairie, mangrove swamps, tropical hardwood hammocks, hydric hammocks, edges of freshwater marshes, agricultural fields [including sugar cane fields and active, inactive, or abandoned citrus groves], and coastal dunes).....**may affect**
- D. The project has no known holes, cavities, active or inactive gopher tortoise burrows, or other underground refugia where a snake could be buried, trapped and/or injured during project activities.....**NLAA**
 The project has known holes, cavities, active or inactive gopher tortoise burrows, or other underground refugia where a snake could be buried, trapped and /or injured.....go to E
- E. Any permit will be conditioned such that all gopher tortoise burrows, active or inactive, will be excavated prior to site manipulation in the vicinity of the burrow¹. If an eastern 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 eastern indigo snake, no work will commence until the snake has vacated the vicinity of proposed work.....**NLAA**²
 Permit will not be conditioned as outlined above.....**may affect**

End Key

¹ If excavating potentially occupied burrows, active or inactive, individuals must first obtain state authorization via a Florida Fish and Wildlife Conservation Commission 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>.

² Please note, if the proposed project will impact less than 25 acres of vegetated eastern indigo snake habitat (not urban/ human-altered) completely surrounded by urban development, and an eastern indigo snake has been observed on site, NLAA is not the appropriate conclusion. The Service recommends formal consultation for this situation because of the expected increased value of the vegetated habitat within the individual's home range

Working with the Fish and Wildlife Foundation of Florida, the Service has established a fund to support conservation and recovery for the eastern indigo snake. Any project that has the potential to affect the eastern indigo snake and/or its habitat is encouraged to make a voluntary contribution to this fund. If you would like additional information about how to make a contribution and how these monies are used to support eastern indigo snake recovery please contact Ashleigh Blackford, Connie Cassler, or José Rivera at 772-562-3559.

This revised Key is effective immediately upon receipt by the Corps. Should circumstances change or new information become available regarding the eastern indigo snake and/or implementation of the Key, the determinations herein may be reconsidered and this Key further revised or amended.

Thank you for your continued cooperation in the effort to conserve fish and wildlife resources. If you have any questions or comments regarding this Key, please contact the SFESO at 772-562-3909.

Sincerely,



Roxanna Hinzman
Field Supervisor
South Florida Ecological Services

Cc:

Corps, Jacksonville, Florida (Dale Beter, Muriel Blaisdell, Ingrid Gilbert, Angela Ryan,
Irene Sadowski, Victoria White, Alisa Zarbo)
Service, Athens, Georgia (Michelle Elmore)
Service, Jacksonville, Florida (Annie Dziergowski)
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United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960
October 22, 2019



Shawn Zinszer
U.S. Army Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

Subject: Consultation Key for the Florida bonneted bat; 04EF2000-2014-I-0320-R001

Dear Mr. Zinszer:

This letter replaces the December 2013, Florida bonneted bat guidelines provided to the U.S. Army Corps of Engineers (Corps) to assist your agency with effect determinations within the range of the Florida bonneted bat (*Eumops floridanus*). This October 2019 revision supersedes all prior versions. The enclosed *Florida Bonneted Bat Consultation Guidelines* and incorporated *Florida Bonneted Bat Consultation Key* (Key) are provided pursuant to the U.S. Fish and Wildlife Service's (Service) authorities under the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C.1531 *et seq.*). This letter, guidelines, and Key have been assigned Service Consultation Code: 41420- 04EF2000-2014-I-0320-R001.

The purpose of the guidelines and Key is to aid the Corps (or other Federal action agency) in making appropriate effect determinations for the Florida bonneted bat under section 7 of the Act, and streamline informal consultation with the Service for the Florida bonneted bat when the proposed action is consistent with the Key. There is no requirement to use the Key. There will be cases when the use of the Key is not appropriate. These include, but are not limited to: where project specific information is outside of the scope of the Key, applicants do not wish to implement the identified survey or best management practices, or if there is new biological information about the species. In these cases, we recommend the Corps (or other Federal action agency) initiate traditional consultation pursuant to section 7 of the Act, and identify that consultation is being requested outside of the Key.

This Key uses type of habitat (*i.e.*, roosting or foraging), survey results, and project size as the basis for making determinations of "may affect, but is not likely to adversely affect" (MANLAA) and "may affect, and is likely to adversely affect" (LAA). The Key is structured to focus on the type(s) of habitat that will be affected by a project. When proposed project areas provide features that could support roosting of Florida bonneted bats, it is considered roosting habitat. If evaluation of roosting habitat determines that roosting is not likely, then the area is subsequently evaluated for its value to the species as foraging habitat.

Roosting habitat

The guidelines describe the features of roosting habitat. When a project is proposed in roosting habitat, the likelihood that roosting is occurring is evaluated through surveys (*i.e.*, full acoustic or limited roost). When a roost is expected and the proposed activity will affect that roost, formal consultation is required. This is because the proposed activity is expected to take individuals through the destruction of the roost and the appropriate determination is that the project may affect, and is likely to adversely affect (LAA) the species. When roosting is expected, but all impacts to the roost can be avoided, and only foraging habitat (without roost structure) will be affected, the Service finds that it is reasonable to conclude that the proposed action is not likely to impair feeding, breeding, or sheltering. Thus, the proposed project may affect, but is not likely to affect the Florida bonneted bat (MANLAA).

The exception to this logic path is if the proposed action will affect more than 50 acres of foraging habitat in proximity to the roost. Under this scenario, we anticipate that the loss of the larger amount of foraging habitat near the roost could significantly impair feeding of young and overall breeding (*i.e.*, LAA). Consequently, these projects would require formal consultation to analyze the effect of the incidental take.

If the roost surveys demonstrate that roosting is not likely, the project is then evaluated for its effects to foraging habitat. Our evaluation of these actions is described below. The exception is for projects less than or equal to 5 acres if a limited roost survey is conducted. Limited roost surveys rely on peeping and visual surveys to determine whether roosting is likely. On these small projects, this survey strategy is believed to be more economical and is considered a reasonable effort to evaluate the potential for roosting. The Service acknowledges that this approach is less reliable in evaluating the likelihood of roosting when it is not combined with acoustic surveys. Therefore, when limited roost surveys are conducted for projects that are less than or equal to 5 acres in size and the determination is that roosting is not likely, we conclude that the proposed project may affect, but is not likely to adversely affect the species (MANLAA).

Foraging habitat

The guidelines describe the features of foraging habitat. Data informing the home range size of the Florida bonneted bats is limited. Global Positioning System (GPS) and radio-telemetry data for Florida bonneted bats documents that they move large distances and likely have large home ranges. Data from recovered GPS satellite tags on Florida bonneted bats tagged at Babcock-Webb Wildlife Management Area (BWWMA) found the maximum distance detected from a capture site was 24.2 mi (38.9 km); the greatest path length travelled in a single night was 56.3 mi (90.6 km) (Ober 2016; Webb 2018a-b). At BWWMA, researchers found that most individual locations were within one mile of the roost (point of capture) (Ober 2015). Additional data collected during the month of December documented the mean maximum distance Florida bonneted bats (n=8) with tags traveled from the roost was 9.5 mi (Webb 2018b).

The Service recognizes that the movement information comes from only one site (BWWMA and vicinity), and data are from small numbers (n=20) of tagged individuals for only short periods of time (Webb 2018a-b). We expect that across the Florida bonneted bat's range differences in

habitat quality, prey availability, and other factors will result in variable habitat use and home range sizes between locations. Foraging distances and home range sizes in high quality habitats are expected to be smaller while foraging distances and home range sizes in low quality habitat would be expected to be larger. Regardless, we use these studies as our best available information to evaluate when changes to foraging habitat may have an effect on the species ability to feed, breed, and shelter and subsequently result in incidental take. When considering where most of the nightly activity was observed, we calculate a foraging area centered on a roost with a 1 mile radius would include approximately 2,000 acres, and a foraging area centered on a 9.5 mile radius would encompass approximately 181,000 acres, on any given night.

Given the Service's limited understanding of how the Florida bonneted bat moves throughout its home range and selects foraging areas, we choose to use 50 acres of habitat as a conservative estimate to when loss of foraging habitat may affect the fitness of an individual to the extent that it would impair feeding and breeding. Projects that would remove, destroy or convert less than 50 acres of Florida bonneted bat foraging habitat are expected to result in a loss of foraging opportunities; however, this decrease is not expected to significantly impair the ability of the individual to feed and breed. Consequently, projects impacting less than 50 acres of foraging habitat that implement the identified best management practices in the Key would be expected to avoid take, and the appropriate determination is that the project may affect, but is not likely to adversely affect the species (MANLAA).

Next, the Service incorporated the level of bat activity into our Key to evaluate when a foraging area may have greater value to the species. When surveys document high bat activity, we deduce that this area has increased value and importance to the species. Thus, when high bat activity is detected in parcels with greater than 50 acres of foraging habitat, we anticipate that the loss, destruction, or conversion of this habitat could significantly impair the ability of an individual to feed and breed (*i.e.*, LAA); thus formal consultation is warranted.

If surveys do not indicate high bat activity, we anticipate that loss of this additional foraging habitat may affect, but is not likely to adversely affect the species (MANLAA). This is because although the acreage is large, the area does not appear to be important at the landscape scale of nightly foraging. Therefore, its loss is not anticipated to significantly impair the ability of an individual to feed or breed.

The exception to this approach is for projects greater than 50 acres when they occur in potential roosting habitat that is not found to support roosting or high bat activity. Under this scenario, the Service concludes that the loss of the large acreage of suitable roosting habitat has the potential to significantly impair the ability of an individual to breed or shelter (*i.e.*, LAA) because the species is cavities for roosting are expected to be limited range wide and the project will impair these limited opportunities for roosting.

Determinations

The Corps (or other Federal action agency) may reach one of several determinations when using this Key. Regardless of the determination, when acoustic bat surveys have been conducted, the Service requests that these survey results are provided to our office to increase our knowledge of

the species and improve our consultation process. Surveys results and reports should be transmitted to the Service at FBBsurveyreport@fws.gov or mail electronic file to U.S. Fish and Wildlife Service, Attention Florida bonneted bat surveys, 1339 20th Street, Vero Beach, Florida 32960. When formal consultation is requested, survey results and reports should be submitted with the consultation request to verobeach@fws.gov.

No effect: If the use of the Key results in a determination of “no effect,” no further consultation is necessary with the Service. The Service recommends that the Corps (or other Federal action agency) documents the pathway used to reach the determination in the project record and proceeds with other species analyses as warranted.

May Affect, Not Likely to Adversely Affect (MANLAA): In this Key we have identified two ways that consultation can conclude informally, MANLAA-P and MANLAA-C.

MANLAA-P: If the use of the Key results in a determination of “MANLAA- P,” the Service concurs with this determination based on the rationale provide above, and no further consultation is necessary for the effects of the proposed action on the Florida bonneted bat. The Service recommends that the Corps (or other Federal action agency) documents the pathway used to reach the determination in the project record and proceeds with other species analyses as warranted.

MANLAA-C: If the use of the Key results in a determination of MANLAA-C, further consultation with the Service is required to confirm that the Key has been used properly, and the Service concurs with the evaluation of the survey results. Survey results should be submitted with the consultation request.

May Affect, Likely to Adversely Affect (LAA) - When the determination in the Key is “LAA” technical assistance with the Service and modifications to the proposed action may enable the project to be reevaluated and conclude with a MANLAA-C determination. Under other circumstance, “LAA” determinations will require formal consultation.

Working with the Fish and Wildlife Foundation of Florida, the Service has established a fund to support conservation and recovery for the Florida bonneted bat. Any project that has the potential to affect the Florida bonneted bat and/or its habitat is encouraged to make a voluntary contribution to this fund. If you would like additional information about how to make a contribution and how these monies are used to support Florida bonneted bat recovery please contact Ashleigh Blackford, Connie Cassler, or José Rivera at 772-562-3909.

This revised Key is effective immediately upon receipt by the Corps. Should circumstances change or new information become available regarding the Florida bonneted bat and/or implementation of the Key, the determinations herein may be reconsidered and this Key further revised or amended. We have established an email address to collect comments on the Key and the survey protocols at: FBBguidelines@fws.gov.

Thank you for your continued cooperation in the effort to conserve fish and wildlife resources. If you have any questions regarding this Key, please contact the South Florida Ecological Services Office at 772-562-3909.

Sincerely,



Roxanna Hinzman
Field Supervisor
South Florida Ecological Services

Enclosure

Cc: electronic only

Corps, Jacksonville, Florida (Dale Beter, Muriel Blaisdell, Ingrid Gilbert, Alisa Zarbo, Melinda Charles-Hogan, Susan Kaynor, Krista Sabin, John Fellows)

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**U.S. Fish and Wildlife Service
South Florida Ecological Services Office**

FLORIDA BONNETED BAT CONSULTATION GUIDELINES

October - 2019

The U.S. Fish and Wildlife Service's South Florida Ecological Services Field Office (Service) developed the Florida Bonneted Bat Consultation Guidelines (Guidelines) to assist in avoiding and minimizing potential negative effects to roosting and foraging habitat, and assessing effects to the Florida bonneted bat (*Eumops floridanus*) from proposed projects. The Consultation Key within the Guidelines assists applicants in evaluating their proposed projects and identifying the appropriate consultation paths under sections 7 and 10 of the Endangered Species Act of 1973 (Act), as amended (87 Stat. 884; 16 U.S.C. 1531 *et seq.*). These Guidelines are primarily for use in evaluating regulatory projects where development and land conversions are anticipated. These Guidelines focus on conserving roosting structures in natural and semi-natural environments. The following Consultation Area map (Figure 1 and Figure 2, Appendix A), Consultation Flowchart (Figure 3), Consultation Key, Survey Framework (Appendices B-C), and **Best Management Practices (BMPs)** (Appendix D) are based upon the best available scientific information. As more information is obtained, these Guidelines will be revised as appropriate. If you have comments, or suggestions on these Guidelines or the Survey Protocols (Appendix B and C), please email your comments to FBBguidelines@fws.gov. These comments will be reviewed and incorporated in an annual review.

Terms in bold are further defined in the Glossary.

Wherever possible, proposed development projects within the Consultation Area should be designed to avoid and minimize take of Florida bonneted bats and to retain their habitat. Applicants are encouraged to enter into early technical assistance/consultation with the Service so we may provide recommendations for avoiding and minimizing adverse effects. Although these Guidelines focus on the effects of a proposed action (*e.g.*, development) on natural habitat, (*i.e.*, non-urban), Appendix E also provides Best Management Practices for Land Management Projects.

If you are renovating an existing artificial structure (*e.g.*, building) within the urban environment with or without additional ground disturbing activities, these Guidelines do not apply. The Service is developing separate guidelines for consultation in these situations. Until the urban guidelines are complete, please contact the Service for additional guidance.

The final listing rule for the Florida bonneted bat (Service 2013) describes threats identified for the species. Habitat loss and degradation, as well as habitat modification, have historically affected the species. Florida bonneted bats are different from most other Florida bat species because they are reproductively active through most of the year, and their large size makes them capable of foraging long distances from their roost (Ober *et al.* 2016). Consequently, this species is vulnerable to disturbances around the roost during a greater portion of the year and considerations about foraging habitat extend further than the localized roost.

Use of Consultation Area, Flowchart, and Key

Figure 1 shows the Consultation Area for the Florida bonneted bat where this consultation guidance applies. For information on how the Consultation Area was delineated see Appendix A. The Consultation Flowchart (Figure 3) and Consultation Key direct project proponents through a series of couplets that will provide a conclusion or determination for potential effects to the Florida bonneted bat. *Please Note: If additional listed species, or candidate or proposed species, or designated or proposed critical habitat may be affected, a separate evaluation will be needed for these species/critical habitats.*

Currently, the Consultation Flowchart (Figure 3) and Consultation Key cannot be used for actions proposed within the urban development boundary in Miami-Dade and Broward County. The urban development boundary is part of the Consultation Area, but it is excluded from these Guidelines because Florida bonneted bats use this area differently (roosting largely in artificial structures), and small natural foraging areas are expected to be important. Applicants with projects in this area should contact the Service for further guidance and individual consultation.

Determinations may be either “no effect,” “may affect, but is not likely to adversely affect” (**MANLAA**), or “may affect, and is likely to adversely affect” (**LAA**). An applicant’s willingness and ability to alter project designs could sufficiently minimize effects to Florida bonneted bats and allow for a **MANLAA** determination for this species (informal consultation). The Service is available for early technical assistance/consultation to offer recommendations to assist in project design that will minimize effects. When take cannot be avoided, applicants and action agencies are encouraged to incorporate compensation to offset adverse effects. The Service can assist with identifying compensation options (*e.g.*, conservation on site, conservation off-site, contributions to the Service’s Florida bonneted bat conservation fund, *etc.*).

Using the Key and Consultation Flowchart

- “No effect” determinations do not need Service concurrence.
- “May affect, but is not likely to adversely affect” **MANLAA**. Applicants will be expected to incorporate the appropriate BMPs to reach a **MANLAA** determination.
 - **MANLAA-P** (in blue in Consultation Flowchart) have programmatic concurrence through the transmittal letter of these Guidelines, and therefore no further consultation with the Service is necessary unless assistance is needed in interpreting survey results.
 - **MANLAA-C** (in black in Consultation Flowchart) determinations require further consultation with the Service.
- “May affect, and is likely to adversely affect” (**LAA**) determinations require consultation with the Service. Project modifications could change the **LAA** determinations in numbers 5, 8, 9, 11, 12, and 17 to **MANLAA**. When take cannot be avoided, **LAA** determinations will require a biological opinion.
- The Service requests copies of surveys used to support all determinations. If a survey is required by the Consultation Key and the final determination is “no effect” or “MANLAA-P”, send the survey to FBBsurveyreport@fws.gov, or mail electronic file to U.S. Fish and Wildlife Service, Attention Florida bonneted bat surveys, 1339 20th Street, Vero Beach, Florida 32960. If a survey is required by the Consultation Key and the determination is “MANLAA-C” or “LAA”, submit the survey in the consultation request.

For the purpose of making a decision at Couplet 2: If any potential roosting structure is present, then the habitat is classified as **potential roosting habitat**, and the left half of the flowchart should be followed (see Figure 3). We recognize that roosting habitat may also be used by Florida bonneted bats for foraging. If the project site only consists of **foraging habitat** (*i.e.*, no suitable roosting structures), then the right side of the flowchart should be followed beginning at step 13.

For couplets 11 and 12: **Potential roosting habitat** is considered **Florida bonneted bat foraging habitat** when a determination is made that roosting is not likely.

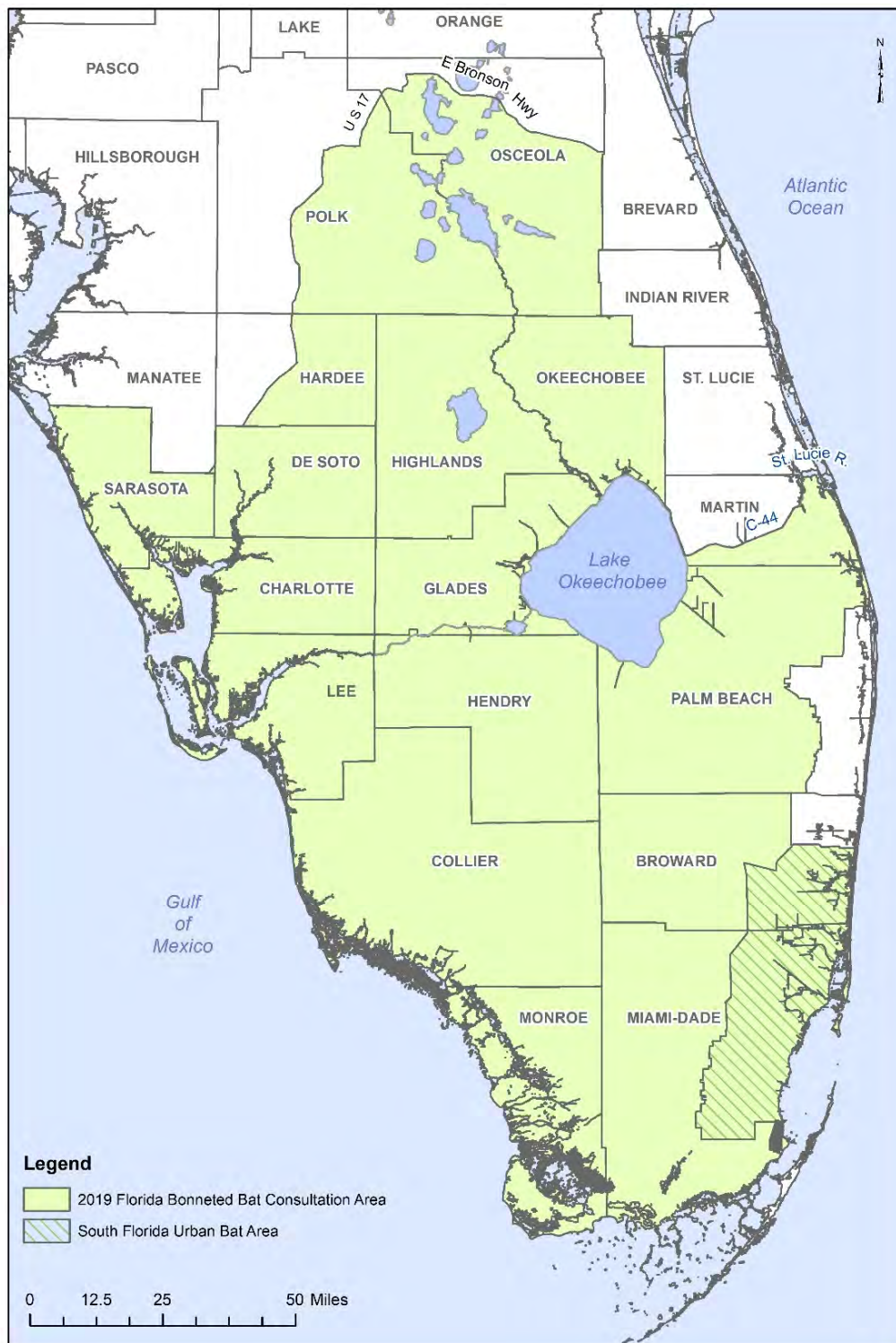


Figure 1. Florida Bonneted Bat Consultation Area. Hatched area (Figure 2) identifies the urban development boundary in Miami-Dade and Broward County. Applicants with projects in this area should contact the Service for specific guidance addressing this area and individual consultation. The Consultation Key should not be used for projects in this area.

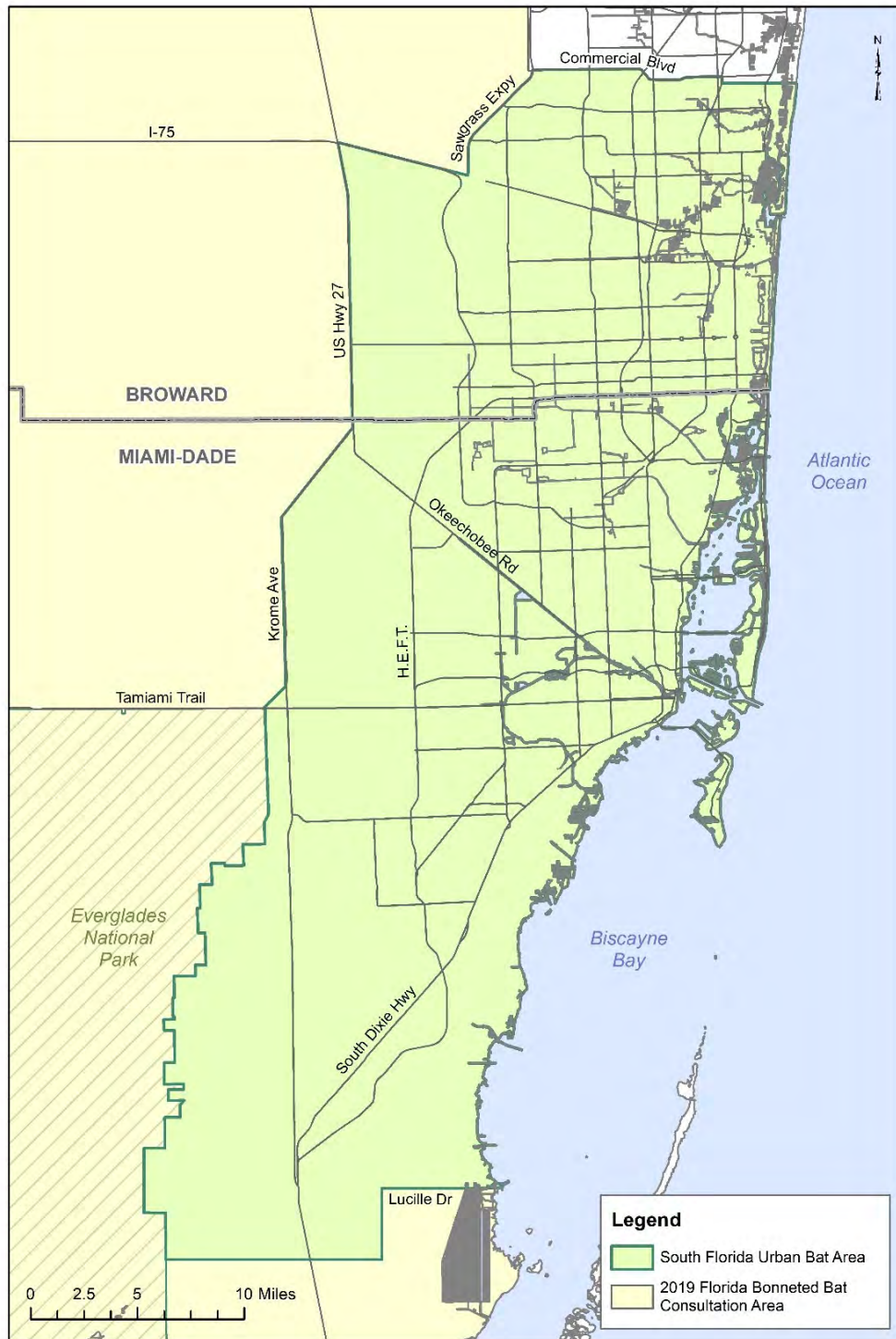


Figure 2. Urban development boundary in Miami-Dade and Broward County. The Consultation Key should not be used for projects in this area. Applicants with projects in this South Florida Urban Bat Area should contact the Service for specific guidance addressing this area and individual consultation.

Florida Bonneted Bat Consultation Key[#]

Use the following key to evaluate potential effects to the Florida bonneted bat (FBB) from the proposed project. Refer to the Glossary as needed.

- 1a. Proposed project or land use change is partially or wholly within the Consultation Area (Figure 1).....**Go to 2**
- 1b. Proposed project or land use change is wholly outside of the Consultation Area (Figure 1).....**No Effect**

- 2a. Potential FBB roosting habitat exists within the project area.....**Go to 3**
- 2b. No potential FBB roosting habitat exists within the project area.....**Go to 13**

- 3a. Project size/footprint* \leq 5 acres (2 hectares)..... **Conduct Limited Roost Survey (Appendix C)**
then **Go to 4**
- 3b. Project size/footprint* $>$ 5 acres (2 hectares).....**Conduct Full Acoustic/Roost Surveys (Appendix B)** then
Go to 6

- 4a. Results show FBB roosting is likely**Go to 5**
- 4b. Results do not show FBB roosting is likely.....**MANLAA-P if BMPs (Appendix D) used and survey reports are submitted. Programmatic concurrence.**

- 5a. Project will affect roosting habitat.....**LAA⁺ Further consultation with the Service required.**
- 5b. Project will not affect roosting habitat..... **MANLAA-C with required BMPs (Appendix D). Further consultation with the Service required.**

- 6a. Results show some FBB activity.....**Go to 7**
- 6b. Results show no FBB activity.....**No Effect**

- 7a. Results show FBB roosting is likely.....**Go to 8**
- 7b. Results do not show FBB roosting is likely.....**Go to 10**

- 8a. Project will not affect roosting habitat.....**Go to 9**
- 8b. Project will affect roosting habitat.....**LAA⁺ Further consultation with the Service required.**

- 9a. Project will affect* $>$ 50 acres (20 hectares) (wetlands and uplands) of foraging habitat.....**LAA⁺ Further consultation with the Service required.**
- 9b. Project will affect* \leq 50 acres (20 hectares) (wetlands and uplands) of foraging habitat..... **MANLAA-C with required BMPs (Appendix D). Further consultation with the Service required.**

- 10a. Results show high FBB activity/use.....**Go to 11**
- 10b. Results do not show high FBB activity/use.....**Go to 12**

- 11a. Project will affect* $>$ 50 acres (20 hectares) (wetlands and uplands) of FBB habitat (roosting and/or foraging)..... **LAA⁺ Further consultation with the Service required.**
- 11b. Project will affect* \leq 50 acres (20 hectares) (wetlands and uplands) of FBB habitat (roosting and/or foraging)..... **MANLAA-C with required BMPs (Appendix D). Further consultation with the Service required.**

- 12a. Project will affect* $>$ 50 acres (20 hectares) (wetlands and uplands) of FBB habitat..... **LAA⁺ Further consultation with the Service required.**
- 12b. Project will affect* \leq 50 acres (20 hectares) (wetlands and uplands) of FBB habitat..... **MANLAA-P if BMPs (Appendix D) used and survey reports are submitted. Programmatic concurrence.**

- 13a. FBB foraging habitat exists within the project area and foraging habitat will be affected.....**Go to 14**
- 13b. FBB foraging habitat exists within the project area and foraging habitat will not be affected **OR** no FBB foraging habitat exists within the project area.....**No Effect**
- 14a. Project size* > 50 acres (20 hectares) (wetlands and uplands)**Go to 15**
- 14b. Project size* ≤ 50 acres (20 hectares) (wetlands and uplands) **MANLAA-P if BMPs (Appendix D) used. Programmatic concurrence.**
- 15a. Project is within 8 miles (12.9 kilometers) of high quality potential roosting areas^.....**Conduct Full Acoustic Survey (Appendix B) and Go to 16**
- 15b. Project is not within 8 miles (12.9 kilometers) of high quality potential roosting area^.....**MANLAA-P if BMPs (Appendix D) used. Programmatic concurrence.**
- 16a. Results show some FBB activity.....**Go to 17**
- 16b. Results show no FBB activity.....**No Effect**
- 17a. Results show high FBB activity/use.....**LAA+ Further consultation with the Service required.**
- 17b. Results do not show high FBB activity/use..... **MANLAA-P if BMPs (Appendix D) used and survey reports submitted. Programmatic concurrence.**

If you are within the urban environment and you are renovating an existing artificial structure (with or without additional ground disturbing activities), these Guidelines do not apply. The Service is developing separate guidelines for consultation in these situations. Until the urban guidelines are complete, please contact the Service for additional guidance

*Includes wetlands and uplands that are going to be altered along with a 250- foot (76.2- meter) buffer around these areas if the parcel is larger than the altered area.

*Project modifications could change the LAA determinations in numbers 5, 8, 9, 11, 12, and 17 to **MANLAA** determinations.

^Determining if **high quality potential roosting areas** are within 8 mi (12.9 km) of a project is intended to be a desk-top exercise looking at most recent aerial imagery, not a field exercise.

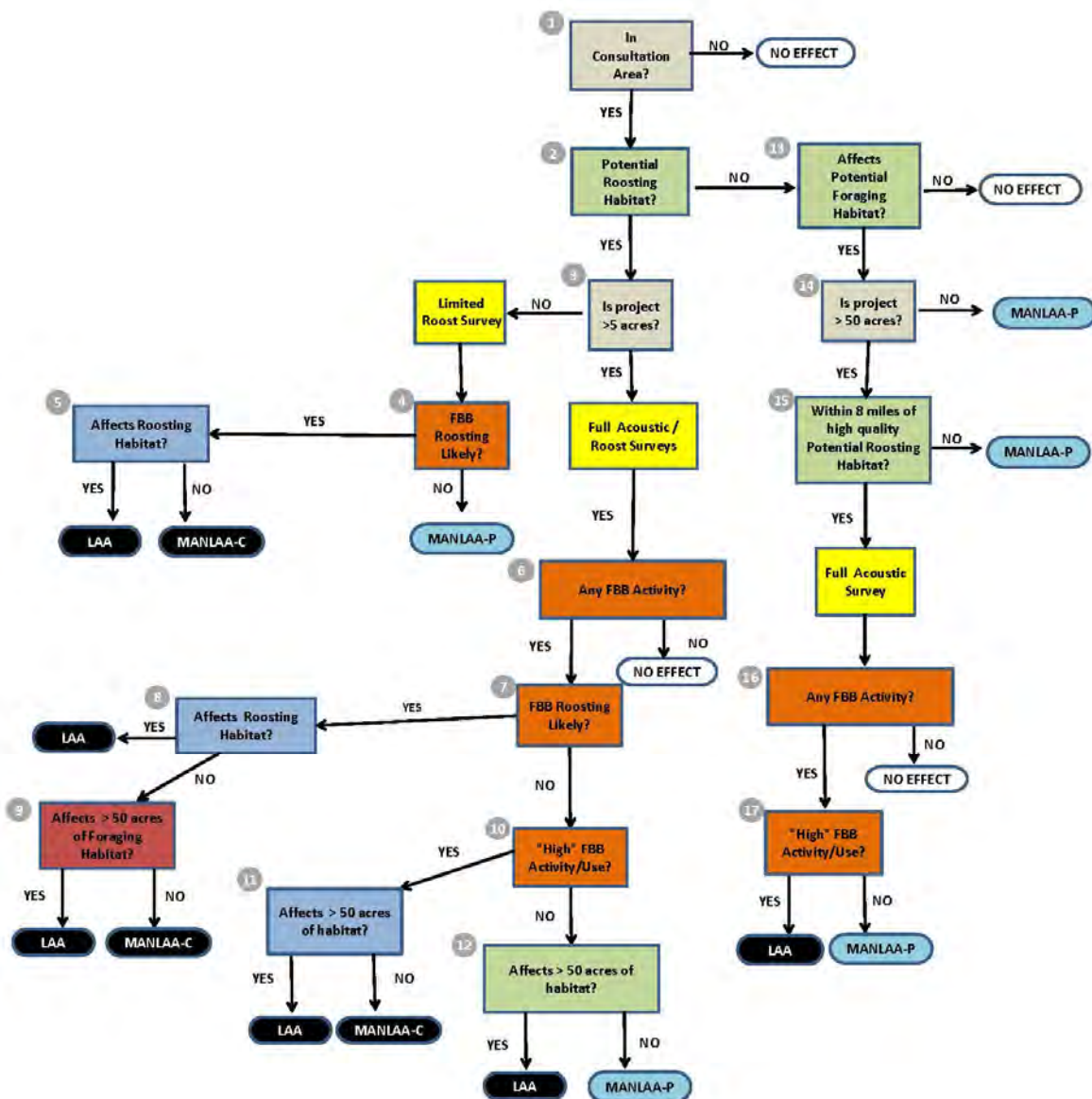


Figure 3. Florida bonneted bat Consultation Flowchart. “No effect” determinations do not need Service concurrence. “May affect, but not likely to adversely affect”, **MANLAA-P**, in blue have programmatic concurrence through the transmittal letter of these Guidelines, and therefore no further consultation with the Service is necessary unless assistance is needed in interpreting survey results. **MANLAA-C** determinations in black require further consultation with the Service. Applicants are expected to incorporate the appropriate **BMPs** to reach a **MANLAA** determination. “May affect, and is likely to adversely affect”, **LAA**, (also in black) determinations require consultation with the Service. Further consultation with the Service may identify project modifications that could change the **LAA** determinations in numbers 5, 8, 9, 11, 12, and 17 to **MANLAA** determinations. The Service requests Florida bonneted bat survey reports for all determinations.

GLOSSARY

BMPs – Best Management Practices. Recommendations for actions to conserve roosting and foraging habitat to be implemented before, during, and after proposed development, land use changes, and land management activities.

FBB Activity – Florida bonneted bat (FBB) activity is when any Florida bonneted bat calls are recorded during an acoustic survey or human observers see or hear Florida bonneted bats on a site.

FORAGING HABITAT - Comprised of relatively open (*i.e.*, uncluttered or reduced numbers of obstacles, such as fewer tree branches and leaves, in the flight environment) areas to find and catch prey, and sources of drinking water. In order to find and catch prey, Florida bonneted bats forage in areas with a reduced number of obstacles. This includes: open fresh water, permanent or seasonal freshwater wetlands, within and above wetland and upland forests, wetland and upland shrub, and agricultural lands (Bailey *et al.* 2017). In urban and residential areas drinking water, prey base, and suitable foraging can be found at golf courses, parking lots, and parks in addition to relatively small patches of natural habitat.

FULL ACOUSTIC/ROOST SURVEY - This is a comprehensive survey that will involve systematic acoustic surveys (*i.e.*, surveys conducted 30 minutes prior to sunset to 30 minutes after sunrise, over multiple consecutive nights). Depending upon acoustic results and habitat type, targeted roost searches through thorough visual inspection using a tree-top camera system or observations at emergence (*e.g.*, looking and listening for bats to come out of tree cavities around sunset) or more acoustic surveys may be necessary. See Appendix B for a full description.

HIGH FBB ACTIVITY/USE - High Florida bonneted bat (FBB) activity/use or importance of an area can be defined using several parameters (*e.g.*, types of calls, numbers of calls). An area will be considered to have high FBB activity/use if ANY of the following are found: (a) multiple FBB feeding buzzes are detected; (b) FBB social calls are recorded; (c) large numbers of Florida bonneted bat calls (9 or more) are recorded throughout one night. Each of these parameters is considered to indicate that an area is actively used and important to FBBs, however, the Service will further evaluate the activity/use of the area within the context of the site (*i.e.*, spatial distribution of calls, site acreage, habitat on site, as well as adjacent habitat) and provide additional guidance.

HIGH QUALITY POTENTIAL ROOSTING AREAS - Sizable areas (>50 acres) [20 hectares] that contain large amounts of high-quality, natural roosting structure – (*e.g.*, predominantly native, mature trees; especially pine flatwoods or other areas with a large number of cavity trees, tree hollows, or high woodpecker activity).

LAA - May Affect, and is Likely to Adversely Affect. The appropriate conclusion if any adverse effect to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not: discountable, insignificant, or

beneficial [see definition of “may affect, but is not likely to adversely affect” (**MANLAA**)]. In the event the overall effect of the proposed action is beneficial to the listed species, but also is likely to cause some adverse effects, then the proposed action is “likely to adversely affect” the listed species. If incidental take is anticipated to occur as a result of the proposed action, an “is likely to adversely affect” (**LAA**) determination should be made. An “is likely to adversely affect” determination requires the initiation of formal section 7 consultation.

LIMITED ROOST SURVEY - This is a reduced survey that may include the following methods: acoustics, observations at emergence (*e.g.*, looking and listening for bats to come out of tree cavities around sunset), and visual inspection of trees with cavities or loose bark using tree-top cameras (or combination of these methods). Methods are fairly flexible and dependent upon composition and configuration of project site and willingness and ability of applicant and partners to conserve roosting structures on site. See also Appendix C for a full description.

MANLAA - May Affect, but is Not Likely to Adversely Affect. The appropriate conclusion when effects on listed species are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur. To use these Guidelines and Consultation Key applicants must incorporate the appropriate **BMPs** (Appendix D) to reach a **MANLAA** determination.

In this Consultation Key we have identified two ways that consultation can conclude informally, **MANLAA-P** and **MANLAA-C**:

MANLAA-P: programmatic concurrence is provided through the transmittal letter of these Guidelines, no additional consultation is required with the Service for Florida bonneted bats. All survey results must be submitted to Service.

MANLAA-C: further consultation with the Service is required to confirm that the Consultation Key has been used properly, and the Service concurs with the evaluation of the survey results. Request for consultation must include survey results.

NO EFFECT - The appropriate conclusion when the action agency determines its proposed action will not affect listed species or designated critical habitat.

POTENTIAL ROOSTING HABITAT - Includes forest and other areas with tall, mature trees or other areas with suitable roost structures (*e.g.*, utility poles, artificial structures). Forest is defined as all types including: pine flatwoods, scrubby flatwoods, pine rocklands, royal palm hammocks, mixed or hardwood hammocks, cypress, sand pine scrub, or other forest types. (Forrest types currently include exotic forests such as melaleuca, please contact the Service for additional guidance as needed). More specifically, this includes habitat in which suitable structural features for breeding and sheltering are present. In general, roosting habitat contains one or more of the following structures: tree snags, and trees with cavities, hollows, deformities, decay, crevices, or loose bark. Structural characteristics are of primary importance.

Florida bonneted bats have been found roosting in habitat with the following structural features, but may also occur outside of these parameters:

- trees greater than 33 feet (10 meters) in height, greater than 8 inches (20 centimeters) in diameter at breast height (DBH), with cavity elevations higher than 16 feet (5 meters) above ground level (Braun de Torrez 2019);
- areas with a high incidence of large or mature live trees with various deformities (*e.g.*, large cavities, hollows, broken tops, loose bark, and other evidence of decay) (*e.g.*, pine flatwoods);
- rock crevices (*e.g.*, limestone in Miami-Dade County); and/or
- artificial structures, mimicking natural roosting conditions (*e.g.*, bat houses, utility poles, buildings), situated in natural or semi-natural habitats.

In order for a building to be considered a roosting structure, it should be a minimum of 15 feet high and contain one or more of the following features: chimneys, gaps in soffits, gaps along gutters, or other structural gaps or crevices (outward entrance approximately 1 inch (2.5 centimeters) in size or greater. Structures similar to the above (*e.g.*, bridges, culverts, minimum of 15 feet high) are expected to also provide roosting habitat, based upon the species' morphology and behavior (Keeley and Tuttle 1999). Florida bonneted bat roosts will be situated in areas with sufficient open space for these bats to fly (*e.g.*, open or semi-open canopy, canopy gaps, above the canopy, and edges which provide relatively uncluttered conditions [*i.e.*, reduced numbers of obstacles, such as fewer tree branches and leaves, in the flight environment]).

For the purpose of this Consultation Key: Roosting habitat refers to habitat with structures that can be used for daytime and maternity roosting. Roosting at night between periods of foraging can occur in a broader range of structure types. For the purposes of this guidance we are focusing on day roosting habitat.

ROOSTING IS LIKELY– Determining likelihood of roosting is challenging. The Service has provided the following definition for the express purpose of these Guidelines. Researchers use additional cues to assist in locating roosts. As additional indicators are identified and described we expect our Guidelines will be improved.

In this Consultation Key the Service will consider the following evidence indicative that roosting is likely nearby (*i.e.*, reasonably certain to occur) if **ANY** of the following are documented: (a) Florida bonneted bat calls are recorded within 30 minutes before sunset to 1½ hours following sunset or within 1½ hours before sunrise; (b) emergence calls are recorded; (c) human observers see (or hear) Florida bonneted bats flying from or to potential roosts; (d) human observers see and identify Florida bonneted bats within a natural roost or artificial roost; and/or (e) other bat sign (*e.g.*, guano, staining, etc.) is found that is identified to be Florida bonneted bat through additional follow-up.

In addition to the aforementioned events, researchers consider roosting likely in an area when (1) large numbers of Florida bonneted bat calls are recorded throughout the night (*e.g.*, ≥ 25 files per night at a single acoustic station when 5 second file lengths are recorded); (2) large numbers of FBB calls are recorded over multiple nights (*e.g.*, an average of ≥ 20 files per night from a single detector when 5 second file lengths are recorded); or (3) social calls are recorded. Because social calls and large numbers of calls recorded over one or more nights can be indicative of high

FBB activity/use or when roosting is likely, the Service is choosing not to use these as indicators to make the determination that roosting is likely. Instead we are relying on the indicators that are only expected to occur at or very close to a roost location [(a)-(e) above].

TAKE - to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct. [ESA §3(19)] Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined by the Service as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. [50 CFR §17.3].

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Appendix A. Delineation and Justification for Consultation Area

The Consultation Area (Figure 1) represents the general range of the species. The Consultation Area represents the area within which consideration should be given to potential effects to Florida bonneted bats from proposed projects or actions. Coordination and consultation with the Service helps to determine whether proposed actions and activities may affect listed species. This Consultation Area defines the area where proposed actions and activities may affect the Florida bonneted bat.

This area was delineated using confirmed presence data, key habitat features, reasonable flight distances and home range sizes. Where data were lacking, we used available occupancy models that predict probability of occurrence (Bailey *et al.* 2017). Below we describe how each one of these data sources was used to determine the overall Consultation Area.

Presence data: Presence data included locations for: (1) confirmed Florida bonneted bat acoustic detections; (2) known roost sites (occupied or formerly occupied; includes natural roosts, bat houses, and utility poles); (3) live Florida bonneted bats observed or found injured; (4) live Florida bonneted bats captured during research activities; and (5) Florida bonneted bats reported as dead. The Geographic Information Systems (GIS) dataset incorporates information from January 2003 to May 2019.

The vast majority of the presence data came from acoustic surveys. The species' audible, low frequency, distinct, echolocation calls are conducive for acoustic surveys. However, there are limitations in the range of detection from ultrasonic devices, and the fast, high-flying habits of this species can confound this. Overall, detection probabilities for Florida bonneted bats are generally considered to be low. For example, in one study designed to investigate the distribution and environmental associations of Florida bonneted bat, Bailey *et al.* 2017 found overall nightly detection probability was 0.29. Based on the estimated detection probabilities in that study, it would take 9 survey nights (1 detector per night) to determine with 95% certainty whether Florida bonneted bat are present at a sampling point. Positive acoustic detection data are extremely valuable. However, it is important to recognize that there are issues with false negatives due to limitations of equipment, low detection probabilities, difference in detection due to prey availability and seasonal movement over the landscape, and in some circumstances improperly conducted surveys (*i.e.*, short duration or in unsuitable weather conditions).

Key habitat features: We considered important physical and biological features with a focus on potential roosting habitat and applied key concepts of bat conservation (*i.e.*, need to conserve roosting habitat, foraging habitat, and prey base). To date, all known natural Florida bonneted bat roosts (n=19) have been found in live trees and snags of the following types: slash pine, longleaf pine, royal palm, and cypress (Braun de Torrez 2018). Several of the recent roost discoveries are located in fire-maintained vegetation communities, and it appears that Florida bonneted bats are fire-adapted and can benefit from prescribed burn regimes that closely mimic historical fire patterns (Ober *et al.* 2018).

From a landscape and roosting perspective, we consider key habitat features to include forested areas and other areas with mature trees, wetlands, areas used by red-cockaded woodpeckers

(*Picoides borealis*; RCW), and fire-managed and other conservation areas. However, recent work suggests that Florida bonneted bats do not use pinelands more than other land cover types (Bailey *et al.* 2017). In fact, Bailey *et al.* 2017 detected Florida bonneted bats in all land cover types investigated in their study (e.g., agricultural, developed, upland, and wetland). For the purposes of these consultation guidelines, we are focusing on the conservation of potential roosting habitats across the species' range. However, we also recognize the need for comprehensive consideration of foraging habitats, habitat connectivity, and long-term suitability.

Flight distances and home range sizes: Like most bats, Florida bonneted bats are colonial central-place foragers that exploit distant and scattered resources (Rainho and Palmeirim 2011). Morphological characteristics (narrow wings, high wing-aspect ratio) make *Eumops* spp. well-adapted for efficient, low-cost, swift, and prolonged flight in open areas (Findley *et al.* 1972, Norberg and Rayner 1987). Other *Eumops* including Underwood's mastiff bat (*Eumops underwoodi*), and Greater mastiff bat or Western mastiff bat (*Eumops perotis*) are known to forage and/or travel distances ranging from 6.2 miles to 62 miles from the roost with multiple studies documenting flight distances approximately 15- 18 miles from the roost (Tibbitts *et al.* 2002, Vaughn 1959 as cited in Best *et al.* 1996, Siders *et al.* 1999, Siders 2005, Vaughan 1959 as cited in Siders 2005.)

Like other *Eumops*, Florida bonneted bats are strong fliers, capable of travelling long distances (Belwood 1992). Recent Global Positioning System (GPS) and radio-telemetry data for Florida bonneted bats documents that they also move large distances and likely have large home ranges. Data from recovered GPS satellite tags on Florida bonneted bats tagged at Babcock-Webb Wildlife Management Area (WMA), found the maximum distance detected from a capture site was 24.2 mi (38.9 km); the greatest path length travelled in a single night was 56.3 mi (90.6 km) (Ober 2016; Webb 2018a-b). Additional data collected during the month of December documented the mean maximum distance of Florida bonneted bats (n=8) with tags traveled from the roost was 9.5 mi (Webb 2018b). The Service recognizes that the movement information comes from only one site (Babcock-Webb WMA and vicinity), and data are from small numbers (n=20) of tagged individuals for only short periods of time (Webb 2018a-b). We expect that across the Florida bonneted bat's range differences in habitat quality, prey availability, and other factors will result in variable habitat use and home range sizes between locations. Foraging distances and home range sizes in high quality habitats are expected to be smaller while foraging distances and home range sizes in low quality habitat would be expected to be larger. Consequently, because Babcock-Webb WMA provides high quality roosting habitat, this movement data could represent the low end of individual flight distances from a roost.

Given the species' morphology and habits (e.g., central-place forager) and considering available movement data from other *Eumops* and Florida bonneted bats discussed above, we opted to use 15 miles (24 km) as a reasonable estimate of the distance Florida bonneted bats would be expected to travel from a roost on any given night. For the purposes of delineating a majority of the Consultation Area, we used available confirmed presence point location data and extended out 15 miles (24 km), with modifications for habitat features (as described above). As more movement data are obtained and made available, this distance estimate may change in the future.

Occupancy model – Research by Bailey *et al.* (2017) indicates the species' range is larger than previously known. Their model performed well across a large portion of the previously known

range when considering confirmed Florida bonneted bat locations; thus it is anticipated to be useful where limited information is available for the species.

We used the model output from Bailey *et al.* (2017) to more closely examine areas where we are data-deficient (*i.e.*, areas where survey information is particularly lacking). We considered 0.27 probability of occurrence a filter for high likelihood of occurrence because 0.27 was the model output for Babcock-Webb WMA, an area where Florida bonneted bats are known to occupy and heavily use. Large portions of Sarasota, Martin, and Palm Beach counties were identified as having probability of occurrence of 0.27. The consultation area should include areas where the species has a high likelihood of occurring. Based on this reasoned approach, all of Sarasota County, portions of Martin County, and greater parts of Palm Beach County were included in the Consultation Area.

We recognize that there are areas in the northern portion of the range where the model is less successful predicting occurrence based on the known Florida bonneted bat locations (*i.e.*, the model predicts low likelihood of occurrence on Avon Park Air Force range, where the species is known to roost). Consequently, the Service is proactively working with partners to conduct surveys in the areas added based on the model to confirm that inclusion of these portions of the aforementioned counties is appropriate. The Consultation Area may be adjusted based on changes in this information.

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Appendix B: Full Acoustic / Roost Survey Framework

Purpose: The purpose of this survey is to: (1) determine if Florida bonneted bats are likely to be actively roosting or using the site; (2) locate active roost(s) and avoid the loss of the structure, if possible; and, (3) avoid or minimize the take of individuals. In some cases, changes in project designs or activities can help avoid and minimize take. For example, project proponents may be able to retain suspected roosts or conserve roosting and foraging habitats. Changing the timing or nature of activities can also help reduce the losses of non-volant young or effects to pregnant or lactating females. If properly conducted, acoustic surveys are the most effective way to determine presence and assess habitat use. If the applicant is unable to follow or does not want to follow the Full Acoustic/Roost Survey framework when recommended according to the Key, the Corps (or other Action Agency) will not be able to use these Guidelines and will need to provide a biologically supported rationale using the best available information for their determination in their request for consultation.

General Description: This is a *comprehensive survey effort*, and robust acoustic surveys (*i.e.*, surveys conducted 30 minutes prior to sunset to 30 minutes after sunrise, over multiple nights) are a fundamental component of the approach. Depending upon acoustic results and habitat type, it may also include: observations at emergence (*e.g.*, emergence surveys during which observers look and listen for bats to come out of roost structures around sunset), visual inspection of trees/snags (*i.e.*, those with cavities, hollows, and loose bark) and other roost structures with tree-top cameras, or follow-up targeted acoustic surveys. Methods are dependent upon composition and configuration of project site and willingness and ability of applicant and partners to conserve roosting and foraging habitats on site.

General Survey Protocol:

[Note: The Service will provide more information in separate detailed survey protocols in the near future. This will include specific information on: detector types, placement, orientation, verification of proper functioning, analysis, reporting requirements, etc.]

- Approach is intended for project sites > 5 acres (2 hectares).
- For sites containing roosting habitat, acoustic surveys should primarily focus on assessing roosting habitat within the project site that will be lost or modified (*i.e.*, areas that will not be conserved), and locations on the property within 250 feet (76.2 meters) of areas that will not be conserved. This will help avoid or minimize the loss of an active roost and individuals. Secondly, since part of the purpose is to determine if Florida bonneted bats are using the site, acoustic devices should also be placed near open water and wetlands to maximize chances of detection and aid in assessing foraging habitat that may be lost.
- For sites that do not contain ANY roosting habitat, but do contain foraging habitat (see Figure 3 - Consultation Flowchart and Key, Step 2 [no], Step 13 [yes]), efforts should focus on assessing foraging habitat within the project site that will be lost or modified (*i.e.*, areas that will not be conserved).
- Acoustic surveys should be performed by those who are trained and experienced in setting up, operating, and maintaining acoustic equipment; and retrieving, saving,

analyzing, and interpreting data. Surveyors should have completed one or more of the available bat acoustic courses/workshops, or be able to show similar on-the-job or academic experience (Service 2018).

- Due to the variation in the quality of recordings, the influence of clutter, the changing performances of software packages over time, and other factors, manual verification is recommended (Loeb *et al.* 2015). Files that are identified to species from auto-ID programs must be visually reviewed and manually verified by experienced personnel.
- Acoustic devices should be set up to record from 30 minutes prior to sunset to 30 minutes after sunrise for multiple nights, under suitable weather conditions.
- Acoustic surveys can be conducted any time of year as long as weather conditions meet the criteria. If any of the following weather conditions exist at a survey site during acoustic sampling, note the time and duration of such conditions, and repeat the acoustic sampling effort for that night: (a) temperatures fall below 65°F (18.3°C) during the first 5 hours of survey period; (b) precipitation, including rain and/or fog, that exceeds 30 minutes or continues intermittently during the first 5 hours of the survey period; and (c) sustained wind speeds greater than 9 miles/hour (4 meters/second; 3 on Beaufort scale) for 30 minutes or more during the first 5 hours of the survey period (Service 2018). At a minimum, nightly weather conditions for survey sites should be checked using the nearest NOAA National Weather Service station and summarized in the survey reports. Although not required at this time, it has been demonstrated that conducting surveys on warm nights late in the spring can help maximize detection probabilities (Ober *et al.* 2016; Bailey *et al.* 2017).
- Acoustic devices should be calibrated and properly placed. Microphones should be directed away from surrounding vegetation, not beneath tree canopy, away from electrical wires and transmission lines, away from echo-producing surfaces, and away from external noises. Directional microphones should be aimed to sample the majority of the flight path/zone. Omnidirectional microphones should be deployed on a pole in the center of the flight path/zone and oriented horizontally. For monitoring possible roost sites, microphones should be directed to maximize likelihood of detection.
- To standardize recordings, acoustic device recordings should have a 2-second trigger window and a maximum file length of 15 seconds.
- The number of acoustic survey sites and nights needed for the assessment is dependent upon the overall acreage of suitable habitat proposed to be impacted by the action.
 - For non-linear projects, a minimum of 16 detector nights per 20 acres of suitable habitat expected to be impacted is recommended.
 - For linear projects (*e.g.*, roadways, transmission lines), a minimum of five detector nights per 0.6 mi (0.97 km) is recommended. Detectors can be moved to multiple locations within each kilometer surveyed, but must remain in a single location throughout any given night.
 - For any site, and in particular for sites > 250 acres, please contact the Service to assist in designing an appropriate approach.
- If results of acoustic surveys show **high Florida bonneted bat activity** or **Florida bonneted bat roosting likely** (*e.g.*, high activity early in the evening) (see definitions in Glossary), follow-up methods such as emergence surveys, visual inspection of the roosting structures, or follow-up acoustic surveys are recommended to locate potential roosts. Using a combination of methods may be helpful.

- For bat emergence surveys, multiple observers should be stationed at potential roosts if weather conditions (as above) are suitable. Surveyors should be quietly stationed 30 minutes before sunset so they are ready to look and listen for emerging FBBs from sunset to 1½ hours after sunset. When conducting emergence surveys it is best to orient observers so that the roost is silhouetted in the remaining daylight; facing west can help maximize the ability to notice movement of animals out of a roost structure.
- Visual inspection of trees with cavities and loose bark during the day may be helpful. Active RCW trees should not be visually inspected during the RCW breeding season (April 15 through June 15).
- Visual inspection alone is not recommended due to the potential for roosts to be too high for cameras to reach, too small for cameras to fit, or shaped in a way that contents are out of view (Braun de Torrez *et al.* 2016).
- If roosting is suspected on site, use tree-top cameras during the day to search those trees/snags or other structures that have potential roost features (*i.e.*, cavities, hollows, crevices, or other structure for permanent shelter). If unsuccessful (*e.g.*, cannot see entire contents within a given cavity, cannot reach cavity, cannot see full extent of cavity) OR occupied roosts are found with the tree-top camera within the area in which high Florida bonneted bat activity/likely Florida bonneted bats roosting were identified, we recommend emergence surveys and/or acoustics to verify occupancy and/or identify bat species.
- Provide report showing effort, methods, weather conditions, findings, and summary of acoustic data relating to Florida bonneted bats (*e.g.*, # of calls, time of calls, and station number) organized by the date on which the data were collected. Sonograms of all calls with signatures at or below 20kHz shall be included in the report. The report shall be provided to the Corps project manager assigned to the project for which the survey was conducted and to the Service via the email address verobeach@fws.gov. **Raw acoustic data should be provided to the Service for all surveys. Raw acoustic data should be provided as “all raw data” and “all raw data with signatures at or below 20kHz”. Data can be submitted to the Service via flash drive, memory stick, or hard drive. Data can be submitted digitally to verobeach@fws.gov or via mail to U.S. Fish and Wildlife Service, Attn: Florida bonneted bat data manager, 1339 20th Street, Vero Beach, Florida 32960.**
- Negative surveys are valid for 1 year after completion of the survey.

If you have comments, or suggestions on this survey protocols, please email your comments to FBBguidelines@fws.gov. These comments will be reviewed and incorporated in an annual review.

Literature Cited – Appendix B

- Bailey, A.M., H.K. Ober, A.R. Sovie, and R.A. McCleery. 2017. Impact of land use and climate on the distribution of the endangered Florida bonneted bat. *Journal of Mammalogy*. 98:1586-1593.
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Appendix C: Limited Roost Survey Framework

Purpose: The purpose of this survey is to: (1) determine if Florida bonneted bats are likely to be actively roosting within suitable structures on-site; (2) locate active roost(s) and avoid the loss of the structure, if possible; and, (3) avoid or minimize the take of individuals. In some cases, changes in project designs or activities can help avoid and minimize take. For example, applicants and partners may be able to retain the suspected roosts or conserve roosting and foraging habitats. Changing the timing of activities can also help reduce the losses of non-volant young or effects to pregnant or lactating females.

General Description: This is a *reduced survey effort* that may include the following methods: visual inspection of trees/snags (*i.e.*, those with cavities, hollows, and loose bark) and other roost structures with tree-top cameras, observations at emergence (*e.g.*, emergence surveys during which observers look and listen for bats to come out of roost structures around sunset), acoustic surveys, or a combination of these methods. Methods are fairly flexible and dependent upon composition and configuration of project site and willingness and ability of applicant and partners to conserve roosting habitat on site.

General Survey Protocol:

[Note: The Service will provide more information in separate, detailed survey protocols in the near future. This will include specific information on: detector types, placement, orientation, verification of proper functioning, analysis, reporting requirements, etc.]

- Approach is **intended only for small project sites** (*i.e.*, sites ≤ 5 acres [2 hectares]).
- Efforts should focus on assessing potential roosting structures within the project site that will be lost or modified (*i.e.*, areas that will not be conserved), or are located on the property within 250 feet (76.2 meters) of areas that will not be conserved.

Identification of potential roost structures

- This step is necessary prior to any of the methods that follow.
- Run line transects through roosting habitat close enough that all trees and snags are easily inspected. Transect spacing will vary with habitat structure and season from a maximum of 91 m (300 ft) between transects in very open pine stands to 46 m (150 ft) or less in areas with dense mid-story. Transects should be oriented north to south, to optimize cavity detectability because many RCW cavity entrances are oriented in a westerly direction (Service 2004).
- Visually inspect all trees and snags or other structures for evidence of cavities, hollows, crevices that can be used for permanent shelter. Using binoculars, examine structures for cavities, loose bark, hollows, or other crevices that are large enough for Florida bonneted bats (diameter of opening $>$ or $=$ to 1 inch (2.5 cm) (Braun de Torrez *et al.* 2016).
- When potential roosting structures are found, record their location in the field using a Global Positioning System (GPS) unit.

Visual Inspection of trees and snags with tree-top cameras

- Visually inspect all cavities using a video probe (peeper) and assess the cavity contents.

Active RCW trees should not be visually inspected during the RCW breeding season (April 15 through June 15).

- Visual inspection alone is valid only when the entire cavity is observed and the contents can be identified. Typically, acoustics at emergence will also be needed to definitively identify bat species, if bats are present or suspected.
- If bats are suspected, or if contents cannot be determined, or if the entire cavity cannot be observed with the video probe; follow methods for an Acoustic Survey or an Emergence Survey (below). If the Corps (or other action agency) or applicant does not wish to conduct acoustic or emergence surveys, the Corps (or other action agency) cannot use the key and must request formal consultation with the Service.
- Record tree species or type of cavity structure, tree diameter and height, cavity height, cavity orientation and cavity contents.

Emergence Surveys

- For bat emergence surveys, multiple observers should be stationed at potential roosts if weather conditions (as described below in Acoustic Surveys) are suitable.
- Surveyors should be quietly stationed 30 minutes prior to sunset so they are ready to look and listen for emerging Florida bonneted bats from sunset to 1½ hours after sunset.
- When conducting emergence surveys it is best to orient observers so that the roost is silhouetted in the remaining daylight; facing west can help maximize the ability to notice movement of animals out of a roost structure.
- Record number of bats that emerged, the time of emergence, and if bat calls were heard.

Acoustic surveys

- Acoustic surveys should be performed by those who are trained and experienced in setting up, operating, and maintaining acoustic equipment; and retrieving, saving, analyzing, and interpreting data. Surveyors should have completed one or more of the available bat acoustic courses/workshops, or be able to show similar on-the-job or academic experience (Service 2018).
- Due to the variation in the quality of recordings, the influence of clutter, and the changing performances of software packages over time, and other factors, manual verification is recommended (Loeb *et al.* 2015). Files that are identified to species from auto-ID programs must be visually reviewed and manually verified by experienced personnel.
- Acoustic devices should be set up to record from 30 minutes prior to sunset to 30 minutes after sunrise for multiple nights, under suitable weather conditions.
- Acoustic surveys can be conducted any time of year as long as weather conditions meet the criteria. If any of the following weather conditions exist at a survey site during acoustic sampling, note the time and duration of such conditions, and repeat the acoustic sampling effort for that night: (a) temperatures fall below 65°F (18.3°C) during the first 5 hours of survey period; (b) precipitation, including rain and/or fog, that exceeds 30 minutes or continues intermittently during the first 5 hours of the survey period; and (c) sustained wind speeds greater than 9 miles/hour (4 meters/second; 3 on Beaufort scale) for 30 minutes or more during the first 5 hours of the survey period (Service 2018). At a minimum, nightly weather conditions for survey sites should be checked using the nearest NOAA National Weather Service station and summarized in the survey reports. Although not required at this time, it has been demonstrated that conducting surveys on

warm nights late in the spring can help maximize detection probabilities (Ober *et al.* 2016; Bailey *et al.* 2017).

- Acoustic devices should be calibrated and properly placed. Microphones should be directed away from surrounding vegetation, not beneath tree canopy, away from electrical wires and transmission lines, away from echo-producing surfaces, and away from external noises. Directional microphones should be aimed to sample the majority of the flight path/zone. Omnidirectional microphones should be deployed on a pole in the center of the flight path/zone and oriented horizontally. For monitoring possible roost sites, microphones should be directed to maximize likelihood of detection.
- To standardize recordings, acoustic device recordings should have a 2-second trigger window and a maximum file length of 15 seconds.
- Acoustic surveys should be conducted over a minimum of four nights.
- If acoustic devices cannot be left in place for the entire night for multiple nights as above, then a combination of short acoustic surveys (from sunset and extending for 1½ hours), stationed observers for emergence surveys or visual inspection of trees/snags with tree-top cameras may be acceptable. Contact the Service for guidance under this circumstance.

Reporting

- Provide report showing effort, methods, weather conditions, findings, and summary of acoustic data relating to Florida bonneted bat by date (*e.g.*, # of calls, time of calls). Sonograms of all calls with signatures at or below 20kHz shall be included in the report. The report shall be provided to the Corps project manager assigned to the project for which the survey was conducted and to the Service via the email address **verobeach@fws.gov**. **Raw acoustic data should be provided to the Service for all surveys. Raw acoustic data should be provided as “all raw data” and “all raw data with signatures at or below 20kHz”. Data can be submitted to the Service via flash drive, memory stick, or hard drive. Data can be submitted digitally to verobeach@fws.gov or via mail to U.S. Fish and Wildlife Service, Attn: Florida bonneted bat data manager, 1339 20th Street, Vero Beach, Florida 32960.**
- Negative surveys are valid for 1 year after completion of the survey

If you have comments, or suggestions on this survey protocols, please email your comments to FBBguidelines@fws.gov. These comments will be reviewed and incorporated in an annual review.

Literature Cited – Appendix C

- Bailey, A.M., H.K. Ober, A.R. Sovie, and R.A. McCleery. 2017. Impact of land use and climate on the distribution of the endangered Florida bonneted bat. *Journal of Mammalogy*. 98:1586-1593.
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<https://www.fws.gov/verobeach/BirdsPDFs/200407SlopesCompleteRedCockadedWoodpecker.pdf>
- U.S. Fish and Wildlife Service. 2018. Range-wide Indiana bat survey guidelines.
<https://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/2018RangewideIBatSurveyGuidelines.pdf>

Appendix D: Best Management Practices (BMPs) for Development Projects

Ongoing research and monitoring will continue to increase the understanding of the Florida bonneted bat and its habitat needs and will continue to inform habitat and species management recommendations. These BMPs incorporate what is known about the species and also include recommendations that are beneficial to all bat species in Florida. These BMPs are intended to provide recommendations for improving conditions for use by Florida bonneted bats, and to help conserve Florida bonneted bats that may be foraging or roosting in an area.

The BMPs required to reach a “may affect, but is not likely to adversely affect” (MANLAA) determination vary depending on the couplet from the Consultation Key used to reach that particular MANLAA. The requirements for each couplet are provided below followed by the list of BMPs. If the applicant is unable or does not want to do the required BMPs, then the Corps (or other Action Agency) will not be able to use this Guidance and formal consultation with the Service is required.

Couplet Number for MANLAA from Consultation Key	Required BMPs
4b	BMP number 1 if more than 3 months has occurred between the survey and start of the project, and any 3 BMPs out of BMPs 4 through 13
5b	BMP number 2, and any 3 BMPs out of BMPs 3 through 13
9b	BMPs number 2 and 3, and any 4 BMPs out of BMPs 5 through 13
11b	BMPs number 1 and 4, and any 4 BMPs out of BMPs 5 through 13
12b	BMP number 1, and any 3 BMPs out of BMPs 3 through 13
14b	Any 2 BMPs out of BMPs 3 through 13
15b	Any 3 BMPs out of BMPs 3 through 13
17b	Any 4 BMPs out of BMPs 3 through 13

BMPs for development, construction, and other general activities:

1. If potential roost trees or structures need to be removed, check cavities for bats within 30 days prior to removal of trees, snags, or structures. When possible, remove structure outside of breeding season (*e.g.*, January 1 – April 15). If evidence of use by any bat species is observed, discontinue removal efforts in that area and coordinate with the Service on how to proceed.
2. When using heavy equipment, establish a 250 foot (76 m) buffer around known or suspected roosts to limit disturbance to roosting bats.
3. For every 5 acres of impact, retain a minimum of 1.0 acre of native vegetation. If upland habitat is impacted, then upland habitat with native vegetation should be retained.
4. For every 5 acres of impact, retain a minimum of 0.25 acre of native vegetation. If upland habitat is impacted, then upland habitat with native vegetation should be retained..
5. Conserve open freshwater and wetland habitats to promote foraging opportunities and avoid impacting water quality. Created/restored habitat should be designed to replace the function of native habitat.

6. Conserve and/or enhance riparian habitat. A 50-ft (15.2 m) buffer is recommended around water bodies and stream edges. In cases where artificial water bodies (*i.e.*, stormwater ponds) are created, enhance edges with native plantings especially in cases in which wetland habitat was affected.
7. Avoid or limit widespread application of insecticides (*e.g.*, mosquito control, agricultural pest control) in areas where Florida bonneted bats are known or expected to forage or roost.
8. Conserve natural vegetation to promote insect diversity, availability, and abundance. For example, retain or restore 25% of the parcel in native contiguous vegetation.
9. Retain mature trees and snags that could provide roosting habitat. These may include live trees of various sizes and dead or dying trees with cavities, hollows, crevices, and loose bark. See “Roosting Habitat” in “Background” above.
10. Protect known Florida bonneted bat roost trees, snags or structures and trees or snags that have been historically used by Florida bonneted bats for roosting, even if not currently occupied, by retaining a 250 foot (76 m) disturbance buffer around the roost tree, snag, or structure to ensure that roost sites remain suitable for use in the future.
11. Avoid and minimize the use of artificial lighting, retain natural light conditions, and install wildlife friendly lighting (*i.e.*, downward facing and lowest lumens possible). Avoid permanent night-time lighting to the greatest extent practicable.
12. Incorporate engineering designs that discourage bats from using buildings or structures. If Florida bonneted bats take residence within a structure, contact the Service and Florida Fish and Wildlife Conservation Commission prior to attempting removal or when conducting maintenance activities on the structure.
13. Use or allow prescribed fire to promote foraging habitat.

Appendix E: Additional Best Management Practices (BMPs) for Land Management Projects

Ecological Land Management

The Service reviews and develops Ecological Land Management projects that use land management activities to restore and maintain native, natural communities that are beneficial to bats. These activities include prescribed fire, mechanical treatments to reduce vegetation densities, timber thinning to promote forest health, trail maintenance, and the treatment of exotic vegetation. The following BMPs provide recommendations for conserving Florida bonneted bat roosting and foraging habitat during ecological land management activities. The Service recommends incorporating these BMP into ecological land management plans.

If potential roost trees need to be removed, check cavities for bats prior to removal of trees or snags. If evidence of use by any bat species is observed, discontinue removal efforts in that area and coordinate with the Service on how to proceed.

Ecological Land Management BMPs:

- Protect potential roosting habitat during ecological land management activities, if feasible. Avoid removing trees or snags with cavities.
- Rake and/or manually clear vegetation around the base of known or suspected roost trees to remove fuel prior to prescribed burning.
- If possible, use ignition techniques such as spot fires or backing fire to limit the intensity of fire around the base of the tree or snag containing the roost. The purpose of this action is to prevent the known or suspected roost tree or snag from catching fire and also to attempt to limit the exposure of the roosting bats to heat and smoke. A 250-ft (76 m) buffer is recommended.
- If prescribed fire is being implemented to benefit Florida bonneted bats, Braun de Torrez et al. (2018) noted that fire in the dry/spring season could be most beneficial.
- When creating firebreaks or conducting fire-related mechanical treatment, mark and avoid any known or suspected bat roosts.
- When using heavy equipment, establish a buffer of 250 feet (76 m) around known roosts to limit disturbance to roosting bats.
- Establish forest management efforts to maintain tree species and size class diversity to ensure long-term supply of potential roost sites.
- For every 5 acres (2 hectares) of timber that is harvested, retain a clump of trees 1-2 acres (0.4 - 0.8 hectare) in size containing potential roost trees, especially pines and royal palms (live or dead). Additionally, large snags in open canopy should be preserved.

Literature Cited – Appendix E

Braun de Torrez, E.C., H.K. Ober, and R.A. McCleery. 2018. Activity of an Endangered Bat Increases Immediately Following Prescribed Fire. *The Journal of Wildlife Management*.

Appendix D

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Florida Scrub-jay

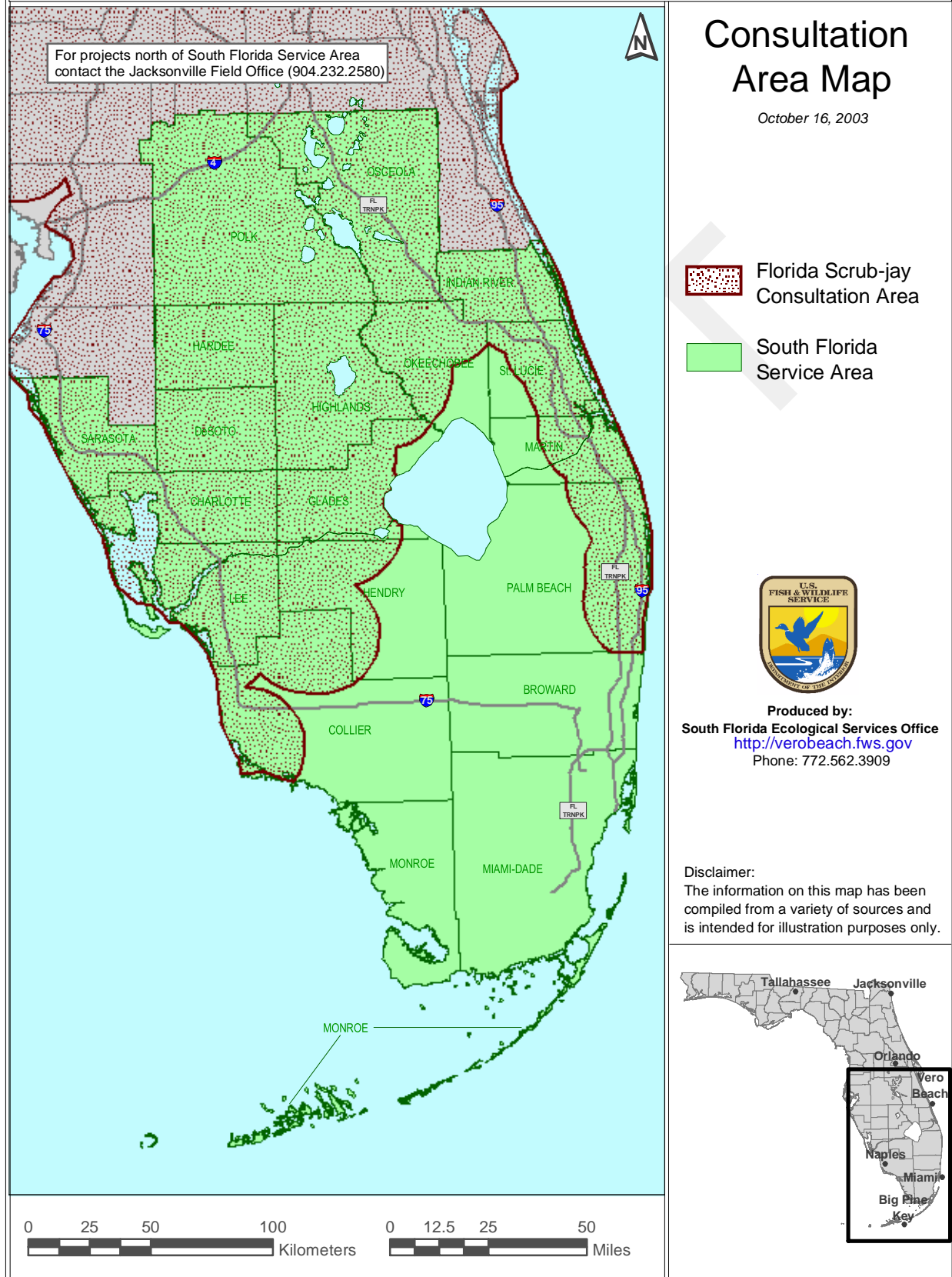


Figure 1.

Florida Grasshopper Sparrow

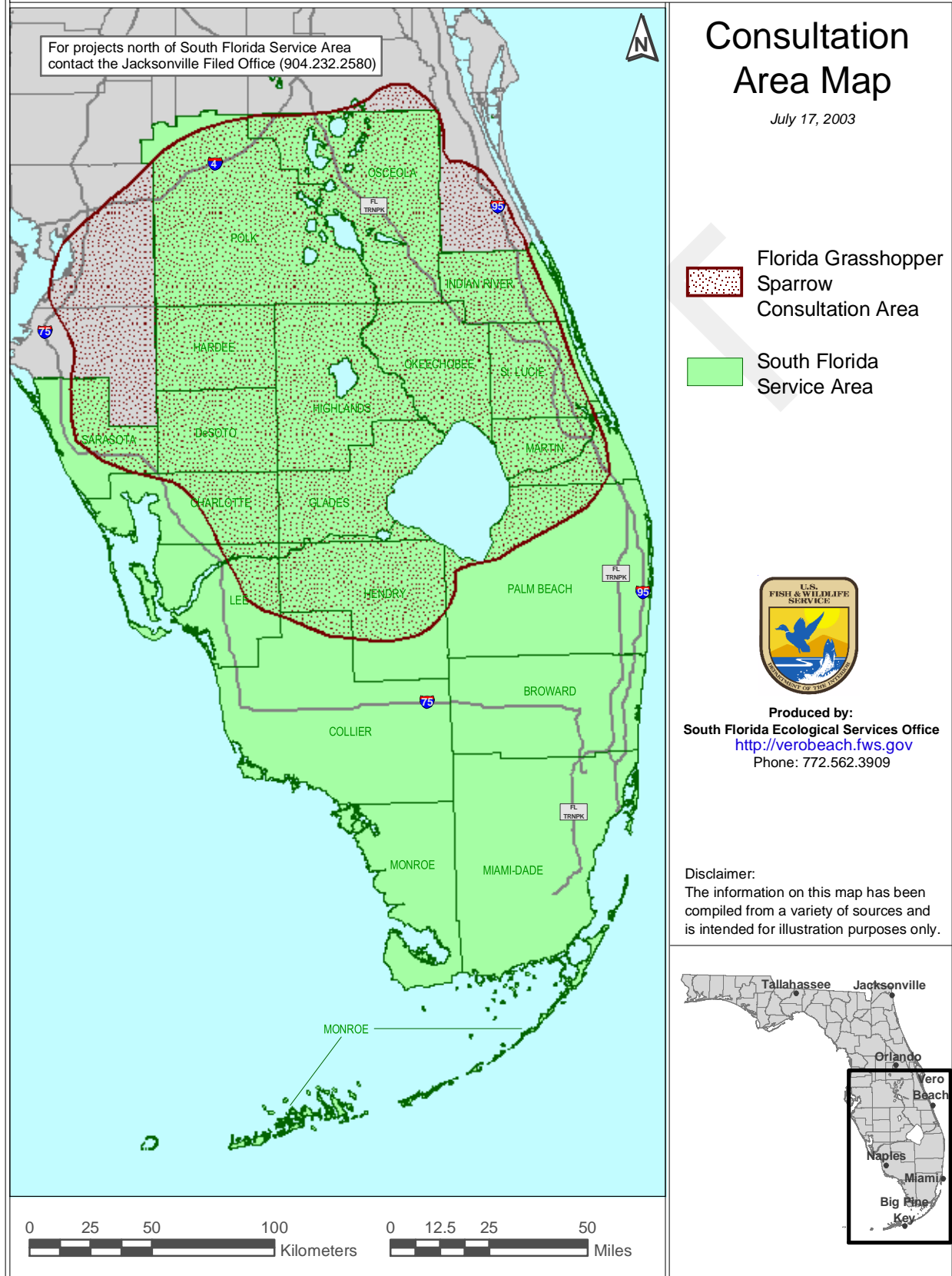


Figure 1.



July 17, 2003

 South Florida
Service Area



Disclaimer:
The information on this map has been
compiled from a variety of sources and
is intended for illustration purposes only.



Figure 1.

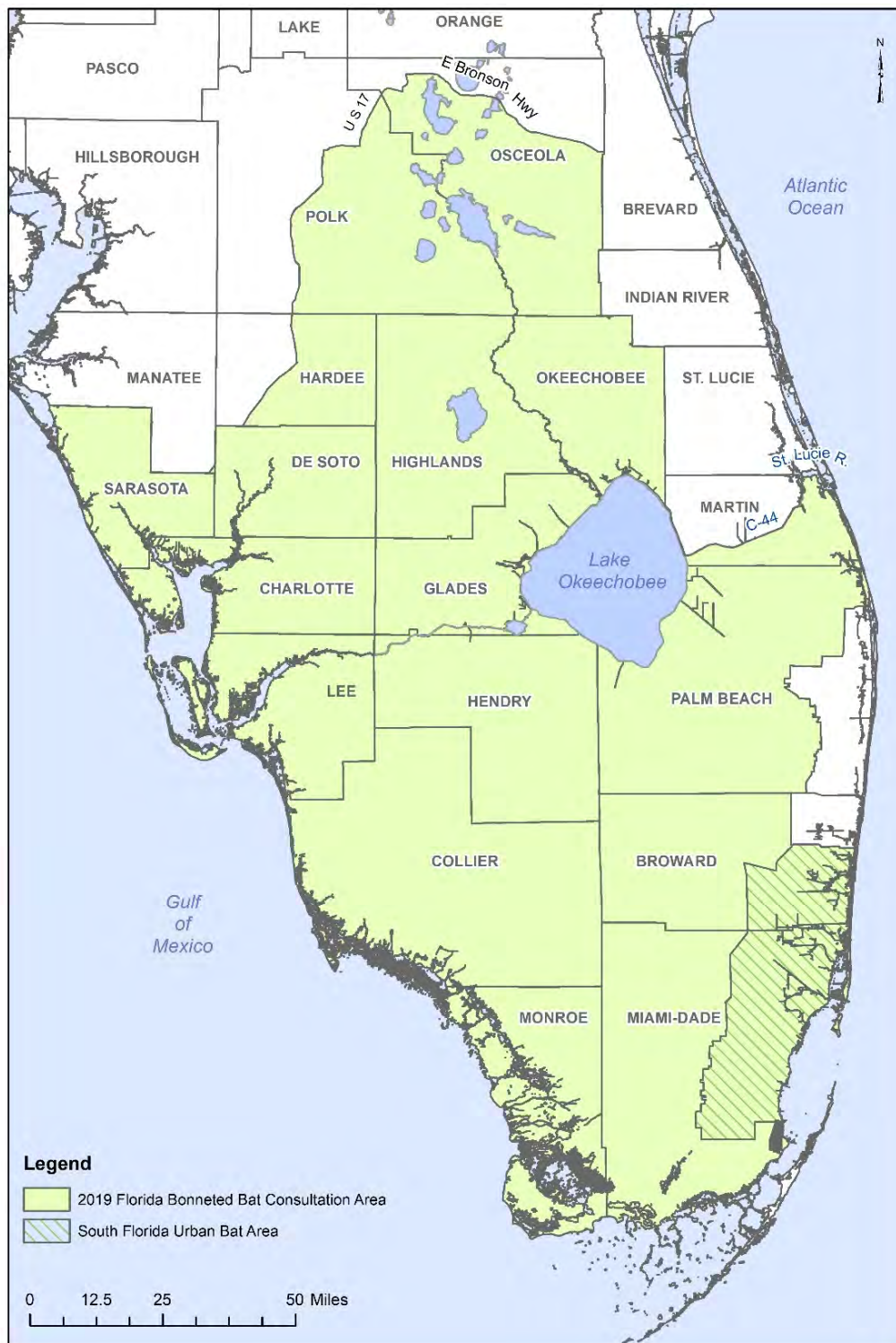


Figure 1. Florida Bonneted Bat Consultation Area. Hatched area (Figure 2) identifies the urban development boundary in Miami-Dade and Broward County. Applicants with projects in this area should contact the Service for specific guidance addressing this area and individual consultation. The Consultation Key should not be used for projects in this area.