

Little Manatee River Nature Preserve

Conceptual Restoration Plan Feasibility Report

October 2018



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1 Introduction

The "Little Manatee River Nature Preserve" (Preserve) is comprised of approximately 7,359.47 acres of land distributed along an approximately 30-mile segment of the Little Manatee River, an Outstanding Florida Water. The Preserve is predominantly located in Hillsborough County, with a small area located in northern Manatee County, in Sections 19 – 21, 25, 27 – 30, 32 and 36, Township 32S, Range 19E, Sections 4 – 6, 11 – 15, 21 – 26, 28, 30 – 34, Township 32S, Range 20E, Sections 17 – 20, Township 32S, Range 21E (Figure 1). The Preserve is cooperatively owned and managed by the Southwest Florida Water Management District (SWFWMD) and Hillsborough County, having been acquired in pieces over the past three decades.

The purpose of the Little Manatee River Ecosystem Conceptual Restoration Master Plan project (Project) is to map and assess the distribution and character of existing habitats and hydrologic conditions throughout the Preserve and identify restoration opportunities within the 7,359.47 acres of publicly-owned lands. In its current condition, the Preserve encompasses a range of natural and altered habitat types, with the river consisting of tidally influenced conditions on the western extent to a freshwater system to the east.

The Project was divided into a number of tasks, the most important of which included:

- Site reconnaissance to map the approximate extent of the existing habitats throughout the 7,359.47-acre Preserve (inclusive of archaeological resources, utilities, areas of contamination, etc.) and assess their apparent condition.
- Development of a Conceptual Restoration Plan for the reestablishment of the hydrology, salinity gradients, oligohaline (low salinity) environments, and ecosystems as they existed, to the extent possible, prior to anthropogenic impacts, as well as incorporating treatment of any watershed runoff prior to its discharge into the Little Manatee River.
- Development of the prioritization matrix of identified restoration projects, providing guidance on the order of implementation of the restoration projects throughout the Little Manatee River Nature Preserve.

An additional critical task is the Restoration Feasibility Report, which provides the Project's conceptual plan and guidance for the proposed restoration, inclusive of potential problems and estimated costs associated with the completion of specific phases of the plan. This report and the complete field data set is the deliverable for this task. All field data and notes are available for review via request to SWFWMD.

During the development of the conceptual restoration plans, the decision was made to divide the Project into ten distinct Project Areas. These areas were established based on spatial proximity to each other, similar ecology, and hydrology and are depicted in Figure 2. For each of the ten Project Areas, a conceptual restoration map was developed that delineated the acreages of areas proposed for preservation, restoration, enhancement, and wetland creation. The development of these maps are explained in Section 3.

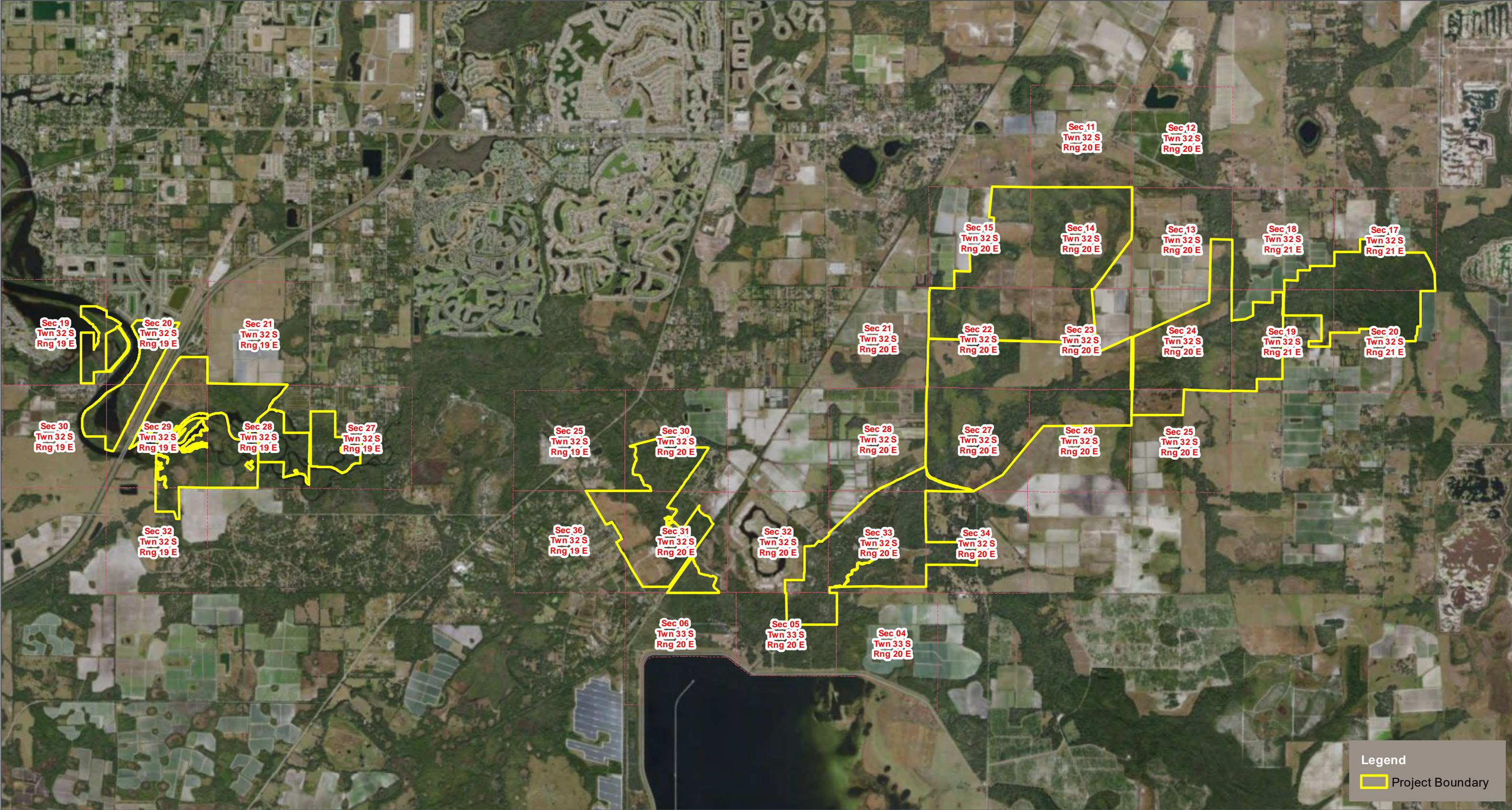


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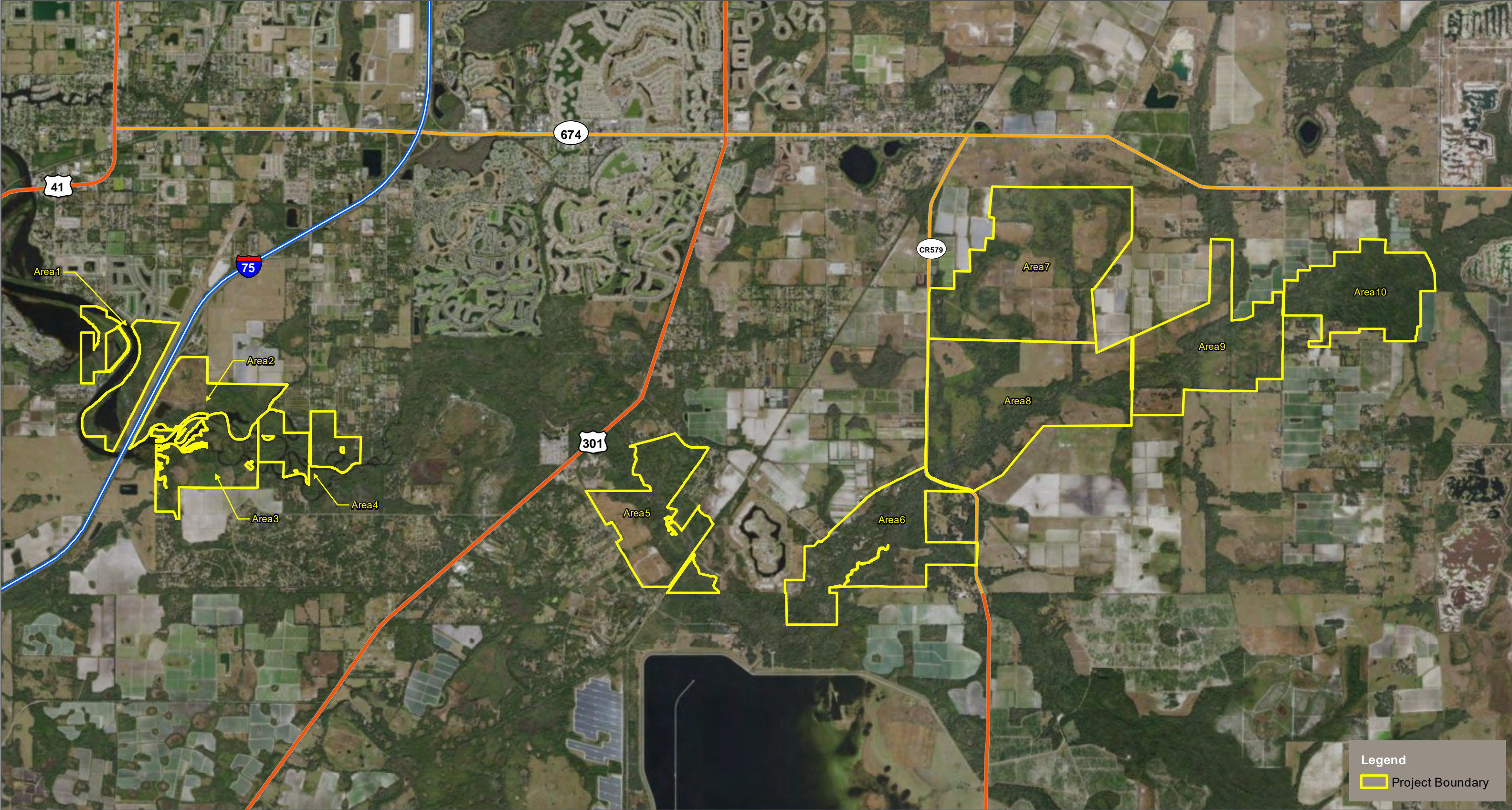
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0 4,800 9,600 Feet
0 1,463 2,926 Meters

Figure 1. Preserve Location Map
Little Manatee River Nature Preserve
Hillsborough and Manatee County, Florida



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0

4,800

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Figure 2. Project Area Location Map
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2 Preserve Habitat Descriptions

To understand the current condition of the Preserve and to identify and assess habitat restoration opportunities, the onsite habitats were visually inspected and described using the Florida Land Use, Cover and Forms Classification System (FLUCFCS, FDOT, 1999). For ease of mapping and reporting, the Preserve was subdivided into ten distinct Project Areas (Figure 2). These areas were established based on parcel location, proximity to each other, ecological characteristics, and hydrology.

Prior to visiting each area, Cardno ecologists acquired and reviewed available data and reports to complete a preliminary desktop analysis of the Preserve. Data and reports compiled to assist with the preliminary review included:

- Current and Historic Aerial Imagery –
 - 2017 imagery provided by SWFWMD
 - 1938, 1951, and 1957 imagery available through the University of Florida Digital Collections
- 2007 LiDAR Data provided by SWFWMD
- 2011 Land Use Data provided by SWFWMD
- Hillsborough County Property Appraiser Parcel Data
- Manatee County Property Appraiser Parcel Data
- 1958 USDA Hillsborough County Soil Survey
- 2015 USDA Soil Survey
- USGS Quadrangle Maps
- Little Manatee River Nature Preserve Land Management and Land Use Plan (Hillsborough County, 2009)
- Upper Little Manatee River Preserve Conceptual Management Plan (Hillsborough County, 2001)
- Little Manatee River Comprehensive Watershed Management Plan (SWFWMD, 2002)
- Tampa Bay Estuary Program Habitat Master Plan Update, (PBSJ, 2010)
- Florida Fish and Wildlife Conservation Commission Bald Eagle Nest Database
- Florida Natural Areas Inventory
- SWFWMD Permits Map
- Listed Species Observations provided by Hillsborough County Staff

Where access to the Preserve was available, site inspections were conducted by a combination of pedestrian and vehicular transects to approximate the location, extent and characteristic of the communities to develop habitat descriptions used to complete the land use map. For those areas in or along the river which were not accessible by foot (e.g. islands, coastal wetlands), habitats were assessed by boat. Field data and photographs collected for each area were compiled and converted into a GIS based habitat map based on FLUCFCS descriptions. In general, the results of the mapping found that, consistent with the aerial imagery, a large portion of the Preserve has been impacted by human related disturbances, most notably conversion to agriculture, including crop production and ranching, along with associated ditching to increase the amount of arable land. Prior to active site management by Hillsborough County, a historical lack of habitat management (e.g., fire suppression, etc.) on native habitats has resulted in communities that have become more overgrown and densely wooded over time. It is important to note that the habitat conditions outlined in this report are representative of the general

conditions and extent observed during the 2017 and 2018 field review effort and that natural or man-made changes in the landscape over time are expected.

A detailed description of each of the ten Project Areas based on their documented individual habitat types, including observations of Florida Exotic Pest Plant Council Category 1 and 2 invasive plants (FLEPPC 2017) is provided in the following section. Complete field notes are available within the project database delivered to SWFWMD and is available for review via request to SWFWMD. Aerial photographs of the individual Project Area are provided in Appendix A and the mapped habitats are graphically depicted in Appendix B. Representative photographs of each Project Area are provided in Appendix C. A summary of documented observations of listed species is provided in Section 3.1.

2.1 Ecosystem Conditions by Project Area

Area 1 - Area 1 is located at the western extent of the Preserve (Figure 2), west of Interstate 75 (I-75), and consists of 367.51 acres of mostly native or desirable habitats that include a mix of forested uplands, coastal wetlands, and open water located on the east and west side of the Little Manatee River. A review of historical aerial photographs indicates that human related disturbance to this area is limited to a small area that has regenerated with desirable vegetation. Currently, the vegetative composition is generally comprised of predominantly desirable species, with sparse amounts of non-native, nuisance vegetation (Appendix B). Given that Area 1 is composed of extensive areas of native wetland and upland habitats preservation and enhancement activities (non-native removal, selective burning, and supplemental native plantings) are considered most appropriate restoration activities for Area 1.

Habitats encountered during field surveys are documented with site photos (Appendix C), described below and summarized in Table 2-1.

Hardwood Conifer Mixed (FLUCFCS 434, ±130.43 acres)

This habitat consists of forested areas with a mix of upland conifers and hardwoods. The canopy contains a mix of slash pine (*Pinus elliottii*), sand pine (*Pinus clausa*), red cedar (*Juniperus virginiana*), laurel oak (*Quercus laurifolia*), and live oak (*Quercus virginiana*) with minor amounts of cabbage palm (*Sabal palmetto*). The understory is dominated by saw palmetto (*Serenoa repens*) with minor amounts of gallberry (*Ilex glabra*), shiny lyonia (*Lyonia lucida*), and Brazilian pepper (*Schinus terebinthifolius*). The herbaceous layer is relatively sparse in many areas due to a thick canopy and leaf litter. Some herbaceous species include shiny blueberry (*Vaccinium myrsinites*), saw greenbriar (*Smilax bona-nox*), beautyberry (*Callicarpa americana*), winged sumac (*Rhus copallina*), Caesar weed (*Urena lobata*), and Carolina jasmine (*Gelsemium sempervirens*).

Bays and Estuaries (FLUCFCS 540, ±80.77 acres)

Bays and estuaries are unvegetated, open water areas associated with the tidally influenced portion of the Little Manatee River, including Hayes Bayou and Bolster Bayou.

Saltwater Marshes (FLUCFCS 642, ±54.97 acres)

These habitats are dominated by cordgrasses and leather ferns (*Acrostichum danaeifolium*). Other species intermixed within include minor amounts of red mangrove (*Rhizophora mangle*), black rush (*Juncus roemerianus*), and southern cattail (*Typha latifolia*). Along the upland edges of these habitats, moderate amounts of cabbage palm and Brazilian pepper are present.

Mixed Rangeland (FLUCFCS 330, ±40.37 acres)

These areas in general are dominated by saw palmetto with scattered sand pine and live oak. This habitat includes pockets of open sandy areas as well as portions that are overgrown with muscadine grape (*Vitis rotundifolia*). Other species that occur within this habitat type include hog plum (*Spondias purpurea*), cabbage palm, broomsedges (*Andropogon* spp.), wiregrass (*Aristida stricta*), shiny blueberry, and black root (*Pterocaulon pycnostachyum*).

Pine Flatwoods (FLUCFCS 411, ±39.00 acres)

These areas consist of a sparse canopy of slash pine with a thick understory of saw palmetto. Other shrub species also include gallberry, tar flower (*Bejaria racemosa*), shiny lyonia, and wax myrtle (*Myrica cerifera*). Herbaceous species are not very prevalent due to a thick shrub layer and leaf litter but include wiregrass, shiny blueberry, dayflower (*Commelina diffusa*), and witchgrass (*Dichanthelium commutatum*).

Xeric Oak (FLUCFCS 421, ±8.78 acres)

One area of xeric oak occurs within Area 1. This area contains a scattered canopy of sand live oaks (*Quercus geminata*), live oaks, and myrtle oaks (*Quercus myrtifolia*) with minor amounts of slash pine. The understory is dominated by sparse saw palmetto, rusty lyonia (*Lyonia ferruginea*), shiny lyonia, and tar flower. Dominant herbs include wiregrass, black root, rustweed (*Polypremum procumbens*), and bracken fern (*Pteridium aquilinum*). Patches of open sandy areas occur throughout this habitat type.

Exotic Wetland Hardwoods (FLUCFCS 619, ±7.08 acres)

This habitat type is very similar to the Brazilian pepper habitat described below with dense stands of Brazilian pepper but also containing scattered melaleuca (*Melaleuca quinquenervia*). Very little to no ground cover exists as a result of the thick shrub layer.

Wetland Forested Mixed (FLUCFCS 630, ±4.43 acres)

This habitat type includes mixed wetland forest communities in which neither hardwoods nor conifers achieve dominance of the crown composition. Canopy species include bald cypress (*Taxodium distichum*), water tupelo (*Nyssa aquatica*), red maple, dahoon holly (*Ilex cassine*), and laurel oak. Shrubs and herbs are mostly limited to hummocks and include wax myrtle, shiny lyonia, buttonbush (*Cephalanthus occidentalis*), royal fern (*Osmunda regalis* var. *spectabilis*), cinnamon fern (*Osmunda cinnamomea*), saw greenbrier, and poison ivy (*Toxicodendron radicans*).

Freshwater Marshes (FLUCFCS 641, ±0.85 acres)

Multiple isolated freshwater marshes occur within Area 1. In general, these habitat types contain no canopy and little to no shrub cover. Dominant species include maidencane (*Panicum hemitomon*), arrowhead (*Sagittaria lancifolia*), cordgrass (*Spartina bakeri*), creeping ludwigia (*Ludwigia repens*), and pockets of open water.

Ditch (FLUCFCS 511, ±0.40 acres)

Ditches in the area are shallow, man-made linear features created to facilitate removal of surface water. In Area 1, this feature consists of a conveyance ditch which runs from the adjacent residential development from the north to the Little Manatee River.

Brazilian Pepper (FLUCFCS 422, ±0.33 acres)

These areas are almost completely dominated by a dense stand of Brazilian pepper. Very little to no desirable species occur in these areas as this species is an aggressive invader that quickly outcompetes other plant species.

Reservoir (FLUCFCS 530, ±0.10 acres)

The reservoir is categorized as an impoundment of water that occurs southwest of the Little Manatee River and is completely encircled by hardwood conifer mixed habitat.

Table 2-1 Area 1 Habitats

FLUCFCS Habitat Description	FLUCFCS Code	Acres
Hardwood Conifer Mixed	434	130.43
Bays and Estuaries	540	80.77
Saltwater Marshes	642	54.97
Mixed Rangeland	330	40.37
Pine Flatwoods	411	39.00
Xeric Oak	421	8.78
Exotic Wetland Hardwoods	619	7.08
Wetland Forested Mixed	630	4.43
Freshwater Marshes	641	0.85
Ditch	511	0.40
Brazilian Pepper	422	0.33
Reservoirs	530	0.10
Total		367.51

Area 2 - Area 2 is located adjacent to Area 1, east of I-75, in the western extent of the Preserve, on the north shore of the river (Figure 2). This area consists of 383.25 acres of native and altered habitat, dominated by open rangeland, forested uplands and coastal wetlands and open water and intertidal habitat associated with the river (Appendix B). Overall, Area 2 consists of a mix of native communities that tend to follow the riparian corridor, while non-native communities occupy historically disturbed areas adjacent to existing agricultural operations and roadways located more distant from the river. This portion of the site also contains wetland mitigation associated with Florida Department of Transportation (FDOT) projects. Restoration activities for this area includes targeted non-native species removal, upland habitat creation within the existing disturbed footprint and creation of wetland communities, both freshwater and estuarine, which will be expected to polish stormwater runoff and ultimately improve water quality and community diversity over time.

Habitats encountered during field surveys are documented with site photos (Appendix C), described below and summarized Table 2-2.

Mixed Rangeland (FLUCFCS 330, ±144.64 acres)

These areas are dominated by tall grasses and herbs with scattered shrubs. The mixed rangeland within Area 2 contains areas heavily dominated by cogon grass (*Imperata cylindrica*) which forms dense thickets resulting in a monoculture of this species. Many areas show evidence of herbicide treatment to the cogon grass. Where cogon grass is not present desirable herbaceous species dominate and include broomsedges, rustweed, flat top goldenrod (*Euthamia caroliniana*), dog fennel (*Eupatorium capillifolium*), wiregrass, loose strife (*Lythrum alatum* var. *lanceolatum*), smut grass (*Sporobolus indicus*), and sweet broom (*Scoparia dulcis*). Scattered shrubs include Brazilian pepper, winged sumac, gallberry, low growing cabbage palms, and wax myrtle. Minor amounts of slash pine are also present.

Pine Flatwoods (FLUCFCS 411, ±88.33 acres)

These areas consist of a moderate canopy of slash pine with a thick understory of saw palmetto. Other shrub species include gallberry, shiny lyonia, winged sumac, and wax myrtle. Minor amounts of sweet bay (*Magnolia virginiana*) are scattered throughout some of these areas. Herbaceous species are not very prevalent due to a thick shrub layer and leaf litter but include wiregrass, shiny blueberry, dayflower,

witchgrass, muscadine grape, saw greenbriar, and Carolina jasmine. Pockets within this habitat type are heavily overgrown with muscadine grape resulting in little to no herbaceous cover.

Hardwood Conifer Mixed (FLUCFCS 434, ±48.99 acres)

Within Area 2, this habitat type consists of low density live oaks, laurel oaks, slash pine, sand pines, and longleaf pines (*Pinus palustris*). The shrub layer is dominated by saw palmetto, hog plum, Brazilian pepper, beautyberry, scrub plum, and young oaks. The herbaceous layer is sparse in some areas due to canopy, leaf litter, and a thick shrub layer. Herbaceous species include bracken fern, saw greenbriar, broomsedges, muscadine grape, black root, and minor amounts of wiregrass.

Wetland Forested Mixed (FLUCFCS 630, ±36.55 acres)

This habitat type includes mixed wetland forest communities in which neither hardwoods nor conifers achieve dominance of the crown composition. Canopy species include red maple, dahoon holly, bald cypress, sweet bay, red bay (*Persea borbonia*), water oak and laurel oak. Shrubs include wax myrtle, shiny lyonia, scattered Brazilian pepper and buttonbush. The herbaceous layer in many areas are dominated by ferns which include leather fern, royal fern, cinnamon fern, and chain fern. The northern most portion of this habitat type within Area 2 is heavily dominated by Brazilian pepper.

Saltwater Marshes (FLUCFCS 642, ±16.35 acres)

These areas in general are dominated by cordgrasses and leather ferns. Other species intermixed within include minor amounts of red mangrove, black rush, and southern cattail. Along the upland edges of these habitats, moderate amounts of cabbage palm, and wax myrtle occur.

Bays and Estuaries (FLUCFCS 540, ±15.72 acres)

Bays and estuaries are inlets or arms of the sea that extend into the land. These areas include portions of land along the Little Manatee River in addition to Hayes Bayou and Bolster Bayou and consist of open water.

Reservoirs (FLUCFCS 530 ±11.13 acres)

This habitat type consists of a large, unvegetated borrow pond located in the western section of Area 2. This pond was formerly used as a source of fill FDOT road construction.

Streams and Waterways (FLUCFCS 510, ±9.46 acres)

This category includes rivers, creeks, canals and other linear water bodies. This habitat type is largely unvegetated and includes the Little Manatee River and associated waterways.

Shrub and Brushland (FLUCFCS 320, ±6.46 acres)

This habitat occurs within the north east corner of Area 2 and is dominated by dense stands of saw palmetto. Minor amounts of slash pine, laurel oaks, and live oaks occur along the edges of this area. Other shrub species that are present include winged sumac, shiny lyonia, rusty lyonia, wax myrtle and gallberry. Herbaceous cover is limited due to a thick cover of saw palmetto but the more dominant species include wiregrass, black root, saw greenbriar, and muscadine grape.

Cabbage Palm (FLUCFCS 428, ±3.05 acres)

This habitat type is dominated overall by cabbage palms, with some areas forming dense stands with very little herbaceous cover due to a thick canopy. In areas where the cabbage palms are less dense scattered shrubs and a thick herbaceous layer is present. Shrubs include wax myrtle, Brazilian pepper, gallberry, and beautyberry. Herbaceous cover is dominated by broomsedges but also contains smut grass, Caesar weed, black root, bahiagrass, and dog fennel.

Wetland Shrub (FLUCFCS 631, ±2.09 acres)

Wetland shrub habitats within Area 2 include wetland habitats with a scattered to dense component of shrubby species. These include buttonbush, wax myrtle, saltbush (*Baccharis halimifolia*), shiny lyonia, primrose willow, and Carolina willow (*Salix caroliniana*). Dominant herbaceous vegetation includes maidencane, soft rush, and cordgrass. Other herbaceous species in these areas include broomsedges, pennywort (*Hydrocotyle umbellata*), coinwort (*Centella asiatica*), pepper weed (*Polygonum hydropiperoides*), and dayflower.

Freshwater Marshes (FLUCFCS 641, ±0.31 acres)

One isolated freshwater marsh occurs within Area 2. In general, these habitat types contain no canopy and little to no shrub cover. Dominant species include maidencane, arrowhead, cordgrass, creeping ludwigia, dog fennel, primrose willow, camphor weed, and scattered wax myrtle along the edges. Pockets of open standing water are present in the deeper zones of these areas.

Residential Low Density <2 Dwelling Units (FLUCFCS 110 ± 0.17 acres)

A portion of the Area 2 boundary is located within an existing residential property boundary adjacent both the riverine corridor and northwest area boundary. In this case this habitat is highly managed residential shoreline.

Table 2-2 Area 2 Habitats

FLUCFCS Habitat Description	FLUCFCS Code	Acres
Mixed Rangeland	330	144.64
Pine Flatwoods	411	88.33
Hardwood Conifer Mixed	434	48.99
Wetland Forested Mixed	630	36.55
Saltwater Marshes	642	16.35
Bays and Estuaries	540	15.72
Reservoirs	530	11.13
Streams and Waterways	510	9.46
Shrub and Brushland	320	6.46
Cabbage Palm	428	3.05
Wetland Shrub	631	2.09
Freshwater Marshes	641	0.31
Residential Low Density < 2 Dwelling Units	110	0.17
Total		383.25

Area 3 - Area 3 contains 390.46 acres of land located on the southwestern extent of the Preserve, on the south shore of the river, and consists of coastal wetlands and open water and intertidal habitat associated with the river, upland forested habitat, and fallow land formerly used for agriculture (Appendix B). Area 3 has considerable areas of non-native communities which have become established in the abandoned agricultural fields, mixed with substantial existing native wetland habitats which will likely benefit from enhancement of existing native communities, restoration of upland habitats, and creation of additional freshwater/estuarine wetland communities.

Habitats encountered during field surveys are documented with site photos (Appendix C), described below and summarized in Table 2-3.

Saltwater Marshes (FLUCFCS 642, ±110.93 acres)

These areas in general are dominated by cordgrasses and leather ferns. Other species intermixed within include minor amounts of red mangrove, black rush, and southern cattail. Along the upland edges of these habitats, moderate amounts of cabbage palm, and wax myrtle occur.

Hardwood Conifer Mixed (FLUCFCS 434, ±97.21 acres)

This habitat contains forested areas in which neither upland conifers nor hardwoods are dominant. The canopy contains a mix of slash pine, laurel oak, water oak and live oak with minor amounts of cabbage palm. The understory is dominated by saw palmetto with minor amounts of gallberry, shiny lyonia, and Brazilian pepper. The herbaceous layer is relatively sparse in many areas due to a thick canopy and leaf litter. Some herbaceous species include shiny blueberry, saw greenbrier, beautyberry, winged sumac, Caesar weed, and Carolina jasmine.

Other Shrubs and Brush (FLUCFCS 329, ±76.02 acres)

Habitats of shrub and brush within Area 3 contain large amounts of low growing cabbage palm. No other canopy species occur in these areas. Cogon grass is prevalent throughout resulting in a monoculture in some locations. Shrubby species that occur here include wax myrtle, saltbush, and minor amounts of winged sumac. Overall, the herbaceous layer is dominated by broomsedges, smut grass, bahiagrass, rustweed, and black root.

Brazilian Pepper (FLUCFCS 422, ±32.46 acres)

These areas are almost completely dominated by thick stands of Brazilian pepper with scattered low growing cabbage palm throughout. Very little to no desirable species occur in these areas as this species is an aggressive invader that quickly outcompetes other plant species. In open areas, groundcover is dominated by broomsedges and smut grass.

Streams and Waterways (FLUCFCS 510, ±23.93 acres)

This category includes rivers, creeks, canals and other linear water bodies. This area is largely unvegetated and includes the Little Manatee River and associated waterways.

Bays and Estuaries (FLUCFCS 540, ±16.38 acres)

Bays and estuaries are inlets or arms of the sea that extend into the land. These areas include portions of land along the Little Manatee River in addition to Hayes Bayou and Bolster Bayou and consist of open water.

Stream and Lake Swamps (Bottomland) (FLUCFCS 615, ±9.17 acres)

This community, often referred to as bottomland, is usually found on but not restricted to river, creek, and lake flood plain or overflow areas. This habitat type usually has a wide variety of hardwood canopy species. These species include red maple, dahoon holly, water tupelo, laurel oak, water oak, slash pine, red bay, sweet bay and cabbage palm. The shrub layer in much of these areas is sparse and consists of young cabbage palm, buttonbush, wax myrtle, saltbush, and shiny lyonia. Herbaceous species in many of these areas are sparse due to a thick canopy. Some of these species include cinnamon fern, various sedges (*Cyperus spp.*), dayflower, coinwort, pennywort, and creeping ludwigia.

Wetland Shrub (FLUCFCS 631 ±8.68 acres)

Wetland shrub habitats within Area 3 include wetland habitats with a scattered to dense component of shrubby species. These include buttonbush, wax myrtle, saltbush, shiny lyonia, primrose willow, and Carolina willow. Dominant herbaceous vegetation includes maidencane, soft rush, and cordgrass. Other herbaceous species in these areas include broomsedges, pennywort, coinwort, pepper weed, and dayflower.

Upland Hardwood Forests (FLUCFCS 420, ±5.85 acres)

These areas consist of a canopy dominated by hardwoods which include live oak and laurel oak. Other canopy species that occur include slash pine, cabbage palm, and red cedar. The shrub layer is dominated by scattered stands of saw palmetto, young cabbage palm, wax myrtle, gallberry, and shiny lyonia. Some of the more prevalent herbaceous species include shiny blueberry, bahiagrass, wiregrass, dayflower, saw greenbriar, poison ivy, broomsedges, and coinwort.

Cropland and Pastureland (FLUCFCS 210, ±4.25 acres)

This area occurs along the western boundary of Area 3. No canopy or shrub species occur in this habitat type. Dominant herbaceous vegetation include bahiagrass, Bermuda grass, smut grass, broom sedges and Florida pusley (*Richardia scabra*).

Wax Myrtle Willow (FLUCFCS 429, ±3.88 acres)

This habitat type is almost completely dominated by wax myrtle and contains minor amounts of Carolina willow, and saltbush. Scattered cabbage palms and laurel oaks occur throughout. Some open areas within this community are overgrown with saw greenbriar and muscadine grape. Some of the more dominant herbaceous species include broomsedges, coinwort, pennywort, dayflower, soft rush, and cord grass.

Wetland Forested Mixed (FLUCFCS 630, ±0.92 acres)

This habitat type includes mixed wetland forest communities in which neither hardwoods nor conifers achieve dominance of the crown composition. Canopy species include red maple, dahoon holly, bald cypress, sweet bay, red bay, water oak and laurel oak. Shrubs include wax myrtle, shiny lyonia, scattered Brazilian pepper and buttonbush. The herbaceous layer in many areas are dominated by ferns which include leather fern, royal fern, cinnamon fern, and chain fern.

Ditch (FLUCFCS 511, ±0.58 acres)

The area categorized as a ditch consist of a remnant feature reflective of the past agriculture use of the site. This ditch is currently used as a channelized conveyance connecting the adjacent agricultural land along the south central boundary to the Little Manatee River.

Pine Flatwoods (FLUCFCS 411, ±0.20 acres)

A small area of pine flatwoods occurs in the southeast portion of Area 3. This area consist of a moderate canopy of slash pine with a thick understory of saw palmetto. Other shrub species include gallberry, shiny lyonia, winged sumac, and wax myrtle. Minor amounts of sweet bay are scattered throughout some of these areas. Herbaceous species are not very prevalent due to a thick shrub layer and leaf litter but include wiregrass, shiny blueberry, dayflower, witchgrass, muscadine grape, saw greenbriar, and Carolina jasmine.

Table 2-3 Area 3 Habitats

FLUCFCS Habitat Description	FLUCFCS Code	Acres
Saltwater Marshes	642	110.93
Hardwood Conifer Mixed	434	97.21
Other Shrubs and Brush	329	76.02
Brazilian Pepper	422	32.46
Streams and Waterways	510	23.93
Bays and Estuaries	540	16.38
Stream and Lake Swamps (Bottomland)	615	9.17
Wetland Shrub	631	8.68

FLUCFCS Habitat Description	FLUCFCS Code	Acres
Upland Hardwood Forests Part 1	420	5.85
Cropland and Pastureland	210	4.25
Wax Myrtle Willow	429	3.88
Wetland Forested Mixed	630	0.92
Ditch	511	0.58
Pine Flatwoods	411	0.20
Total		390.46

Area 4 - Area 4 is located adjacent to the western boundary of the Little Manatee River State Park and encompasses 283.25 acres of land. This area of the Preserve contains a mix of forested uplands and wetlands, as well as open water associated with the tidally influenced Little Manatee River (Appendix B). This area is predominately native upland and wetland communities that are largely intact and will likely require only preservation/enhancement land management activities in the near term.

Habitats encountered during field surveys are documented with site photos (Appendix C), described below and summarized in Table 2-4.

Sand Pine (FLUCFCS 413, ±89.94 acres)

These habitat types generally have a canopy dominated by sand pines although other canopy species such as live oak, laurel oak, and slash pine also occur throughout. A thick understory of saw palmetto is present throughout much of this habitat type. Other shrub species include gallberry, shiny lyonia, rusty lyonia winged sumac, and wax myrtle. Herbaceous species are not very prevalent due to a thick shrub layer and leaf litter but include wiregrass, shiny blueberry, dayflower, witchgrass, muscadine grape, saw greenbrier, and Carolina jasmine. Minor amounts of cogon grass are present restricted mainly to some existing trails.

Stream and Lake Swamps (bottomland) (FLUCFCS 615, ±87.66 acres)

This community, often referred to as bottomland, is usually found on but not restricted to river, creek, and lake flood plain or overflow areas. This habitat type usually has a wide variety of hardwood canopy species. These species include red maple, dahoon holly, water tupelo, laurel oak, water oak, slash pine, red bay, sweet bay and cabbage palm. The shrub layer in much of these areas is sparse and consists of young cabbage palm, buttonbush, wax myrtle, saltbush, and shiny lyonia. Herbaceous species in many of these areas are sparse due to a thick canopy. Some of these species include cinnamon fern, various sedges, dayflower, coinwort, pennywort, leather fern, and creeping ludwigia.

Streams and Waterways (FLUCFCS 510, ±32.45 acres)

This category includes rivers, creeks, canals and other linear water bodies. This area is largely unvegetated and includes the Little Manatee River and associated waterways.

Pine Flatwoods (FLUCFCS 411, ±27.36 acres)

This habitat type occurs in the northeast portion of Area 4. This area consists of a scattered canopy of slash pine with a thick understory of low growing saw palmetto. Other shrub species include gallberry, shiny lyonia, rusty lyonia, winged sumac, and wax myrtle. Herbaceous species are not very prevalent due to a thick shrub layer and leaf litter but include wiregrass, shiny blueberry, dayflower, witchgrass, muscadine grape, saw greenbrier, and Carolina jasmine.

Saltwater Marshes (FLUCFCS 642, ±22.77 acres)

These areas in general are dominated by cordgrasses and leather ferns. Other species intermixed within include minor amounts of red mangrove, black rush, and southern cattail. Along the upland edges of these habitats, moderate amounts of cabbage palm, Brazilian pepper, slash pine, and wax myrtle occur.

Hardwood Conifer Mixed (FLUCFCS 434, ±18.05 acres)

Within Area 4, one hardwood conifer mixed habitat type occurs as an upland island amongst wetlands and river channel. The canopy is a mix of slash pine, red cedar, laurel oak, and live oak. Cabbage palms also occur scattered throughout. The shrub layer is dominated by saw palmetto but scattered Brazilian pepper are present. The herbaceous layer is sparse in many areas due to a thick canopy and shrub layer but consists mainly of shiny blueberry, saw greenbrier, beautyberry, winged sumac, Caesar weed, and Carolina jasmine. Small areas of cogon grass occur throughout.

Freshwater Marshes (FLUCFCS 641, ±4.56 acres)

Isolated freshwater marshes occur scattered throughout Area 4. In general, these habitat types contain no canopy and little to no shrub cover. Dominant species include leather fern and southern cattail but also include maidencane, cordgrass, primrose willow, and scattered wax myrtle and Brazilian pepper along the edges. Standing water was present throughout this habitat

Reservoir (FLUCFCS 530, ±0.41 acres)

The area classified as a reservoirs is a small, shallow man-made pond associated with a single-family residence. It is comprised of open water and limited vegetative cover.

Roads and Highways (FLUCFCS 814, ±0.05 acres)

This category consists of a road or highway with sparse natural habitats and communities occurring along its course. This area is located along the north eastern area boundary.

Table 2-4 Area 4 Habitats

FLUCFCS Habitat Description	FLUCFCS Code	Acres
Sand Pine	413	89.94
Stream and Lake Swamps (Bottomland)	615	87.66
Streams and Waterways	510	32.45
Pine Flatwoods	411	27.36
Saltwater Marshes	642	22.77
Hardwood Conifer Mixed	434	18.05
Freshwater Marshes	641	4.56
Reservoirs	530	0.41
Roads and Highways	814	0.05
Total		283.25

Area 5 - Area 5 is located to the east of US Highway 301 and includes 667.80 acres of land, much of which is highly disturbed from ongoing property uses, including use by off-road recreational vehicles that have contributed to the loss of groundcover along the riparian corridor and has resulted in significant erosion along the Little Manatee River and the associated floodplain. In addition, a portion of this part of the Preserve also contains the remains of the early twentieth-century town of Willow that was abandoned

in the 1930s. The vegetative characteristic of this area is reflective of the historic and ongoing human disturbances and is dominated by open fallow land and forested upland and wetland communities (Appendix B).

Habitats encountered during field surveys are documented with site photos (Appendix C), described below and summarized in Table 2-5.

Other Open Lands (Rural) (FLUCFCS 260, ±159.30 acres)

Overall, much of these areas are dominated by undesirable species. Large patches of cogon grass occur throughout with scattered stands of Brazilian pepper. In wetter areas, associated with eroded conditions, non-native grasses including torpedo grass (*Panicum repens*) are dominant. Other species present in these areas include scattered persimmon (*Diospyros virginiana*), natal grass, various sedges, beggar ticks, hairy indigo (*Indigofera hirsuta*), dog fennel, and finger grass (*Eustachys petraea*). Areas of unvegetated open sand occur in this habitat type, mostly the result of recreational off-road activity.

Hardwood Conifer Mixed (FLUCFCS 434, ±140.88 acres)

These habitats are forested areas in which neither upland conifers nor hardwoods achieve dominance. The canopy contains a mix of slash pine, laurel oak, water oak and live oak with minor amounts of cabbage palm. The understory is dominated by scattered saw palmetto with minor amounts of gallberry, shiny lyonia, and Brazilian pepper. The herbaceous layer is relatively sparse in many areas due to a thick canopy and leaf litter. Some herbaceous species include shiny blueberry, saw greenbrier, beautyberry, winged sumac, Caesar weed, saw greenbrier, and Carolina jasmine.

Stream and Lake Swamps (bottomland) (FLUCFCS 615, ±132.86 acres)

This community, often referred to as bottomland, is usually found on but not restricted to river, creek, and lake flood plain or overflow areas. This habitat type usually has a wide variety of hardwood canopy species. These species include Carolina willow, red maple, dahoon holly, water tupelo, laurel oak, water oak, slash pine, red bay, sweet bay and cabbage palm. The shrub layer in much of these areas is sparse and consists of young cabbage palm, buttonbush, wax myrtle, saltbush, and shiny lyonia. Herbaceous species in many of these areas are sparse due to a thick canopy. Some of these species include cinnamon fern, various sedges, dayflower, coinwort, pennywort, royal fern, and creeping ludwigia.

Pine Flatwoods (FLUCFCS 411, ±124.52 acres)

This habitat type consist of a moderate canopy dominated by slash pine. Other canopy species include sand pine, longleaf pine, and live oak. A moderate to thick understory of low growing saw palmetto is present throughout. Other shrub species include gallberry, shiny lyonia, rusty lyonia winged sumac, and wax myrtle. Herbaceous species are not very prevalent due to a thick shrub layer and leaf litter but include wiregrass, shiny blueberry, dayflower, witchgrass, muscadine grape, saw greenbrier, and Carolina jasmine. Small patches of cogon grass are scattered throughout this habitat type.

Wetland Forested Mixed (FLUCFCS 630, ±33.29 acres)

This habitat type includes mixed wetland forest communities in which neither hardwoods nor conifers achieve dominance of the crown composition. Canopy species include red maple, dahoon holly, bald cypress, sweet bay, red bay, water oak and laurel oak. Shrubs include wax myrtle, shiny lyonia, scattered Brazilian pepper and buttonbush. The herbaceous layer in many areas are dominated by ferns which include creeping ludwigia, dayflower, netted chain fern (*Woodwardia areolata*), royal fern, cinnamon fern, and chain fern.

Other Shrubs and Brush (FLUCFCS 329, ±23.58 acres)

Habitats of shrub and brush within Area 5 contain large amounts of Brazilian pepper and low growing cabbage palm. No other canopy species occur in these areas. Cogon grass is prevalent throughout resulting in a monoculture in some locations. Other shrubby species that occur here include wax myrtle, saltbush, and minor amounts of winged sumac. Overall, the herbaceous layer is dominated by broomsedges, smut grass, bahiagrass, and rustweed.

Shrub and Brushland (FLUCFCS 320, ±22.68 acres)

Small areas of this habitat type occur throughout Area 5. Some of these areas are dominated by Carolina willow while others are dominated by Brazilian pepper. Other shrub species present include wax myrtle, beautyberry, and saltbush. Some areas have a thick herbaceous layer of cogon grass. Where cogon grass is not present, other herbaceous species include skunk vine (*Paederia foetida*), saw greenbriar, natal grass, beggar tick (*Bidens alba*), ragweed, and winged sumac.

Freshwater Marshes (FLUCFCS 641, ±10.41 acres)

Isolated freshwater marshes occur scattered throughout Area 5. In general, these habitat types contain no canopy and little to no shrub cover. Dominant species include red root (*Lachnanthes caroliniana*), red maple saplings, St. John's wort (*Hypericum fasciculatum*), and southern cattail, but also include maidencane, cordgrass, primrose willow, and scattered wax myrtle and Brazilian pepper along the edges. Standing water was present throughout these habitat types likely due to the summer rains during the site reconnaissance.

Upland Hardwood Forests (FLUCFCS 420, ±8.16 acres)

These areas consist of a canopy dominated by hardwoods which include live oak and laurel oak. Other canopy species that occur include slash pine, cabbage palm, and red cedar. The shrub layer is dominated by scattered stands of saw palmetto, young cabbage palm, wax myrtle, gallberry, and shiny lyonia. Some of the more prevalent herbaceous species include bracken fern, shiny blueberry, bahiagrass, wiregrass, dayflower, saw greenbriar, poison ivy, broomsedges, and coinwort.

Streams and Waterways (FLUCFCS 510, ±6.81 acres)

This category includes the open water habitat associated with the Little Manatee River and interconnected waterways.

Ditch (FLUCFCS 511, ±3.32 acres)

The area categorized as a ditch consists of a remnant feature reflective of the past agriculture use of the site. In Area 5, a series of ditches are present which convey surface water from the adjacent development into the Little Manatee River.

Wetland Shrub (FLUCFCS 631, ±1.09 acres)

One wetland shrub habitat occurs within Area 5. This wetland is dominated by Carolina willow with smaller amounts of Brazilian pepper, wax myrtle, buttonbush, and saltbush. The herbaceous layer is dominated by cogon grass with some areas overgrown with skunk vine.

Lakes Less Than 10 Acres (FLUCFCS 524, ± 0.70 acres)

Lakes are composed of inland water bodies excluding reservoirs that are less than 10 acres (4 hectares) which are dominant features. A small lake is located within Area 5 and is composed of open water and associated littoral habitats along the fringes.

Reservoir (FLUCFCS 530, ±0.20 acres)

Reservoirs are artificial impoundments of water typically used for irrigation, flood control water supplies and recreation opportunities. An existing small impoundment is located along the northwest Area boundary.

Table 2-5 Area 5 Habitats

FLUCFCS Habitat Description	FLUCFCS Code	Acres
Other Open Lands <Rural>	260	159.30
Hardwood Conifer Mixed	434	140.88
Stream and Lake Swamps (Bottomland)	615	132.86
Pine Flatwoods	411	124.52
Wetland Forested Mixed	630	33.29
Other Shrubs And Brush	329	23.58
Shrub and Brushland	320	22.68
Freshwater Marshes	641	10.41
Upland Hardwood Forests Part 1	420	8.16
Streams and Waterways	510	6.81
Ditch	511	3.32
Wetland Shrub	631	1.09
Lakes Less Than 10 Acres	524	0.70
Reservoirs	530	0.20
Total		667.80

Area 6 – Area 6 is 846.63 acres located west of County Road 579 along the south central extent of the Preserve and includes the only portion of the Preserve partially located within Manatee County. Much of the land in Area 6 was historically used as a citrus grove which is now regenerating as an oak dominated wooded upland. Overall, dominant habitats on this area are comprised of forested uplands and wetlands (Appendix B). Considering the altered condition of the onsite habitats, there are numerous opportunities for upland restoration and wetland creation.

Habitats encountered during field surveys are documented with site photos (Appendix C), described below and summarized in Table 2-6.

Hardwood Conifer Mixed (FLUCFCS 434, ±252.38 acres)

These habitat types occur scattered throughout Area 6. Water oak is the most prevalent canopy species in these areas. Other canopy species include a mix of slash pine, laurel oak and live oak with minor amounts of cabbage palm. The understory is dominated by saw palmetto with minor amounts of gallberry, shiny lyonia, and Brazilian pepper. The herbaceous layer is relatively sparse in many areas due to a thick canopy and leaf litter. Some herbaceous species include Boston fern (*Nephrolepis exaltata*), muscadine grape, shiny blueberry, saw greenbrier, beautyberry, winged sumac, Caesar weed, and Carolina jasmine.

Stream and Lake Swamps (bottomland) (FLUCFCS 615, ±216.06 acres)

This community, often referred to as bottomland, is usually found on but not restricted to river, creek, and lake flood plain or overflow areas. This habitat type usually has a wide variety of hardwood canopy species. These species include sweet gum (*Liquidambar styraciflua*), Carolina willow, red maple, dahoon holly, water tupelo, laurel oak, water oak, slash pine, red bay, sweet bay and cabbage palm. The shrub layer in much of these areas is sparse and consists of young cabbage palm, buttonbush, wax myrtle, saltbush, and shiny lyonia. Herbaceous species in many of these areas are sparse due to a thick canopy.

Some of these species include cinnamon fern, chain fern, various sedges, dayflower, coinwort, pennywort, royal fern, and creeping ludwigia.

Upland Hardwood Forests (FLUCFCS 420, ±144.52 acres)

These areas consist of a canopy dominated by hardwoods which include live oak, water oak, and laurel oak. Other canopy species that occur include slash pine, cabbage palm, and red cedar. The shrub layer is dominated by scattered stands of saw palmetto, young cabbage palm, wax myrtle, gallberry, and shiny lyonia. Some of the more prevalent herbaceous species include shiny blueberry, bahiagrass, wiregrass, dayflower, saw greenbriar, poison ivy, broomsedges, and bracken fern.

Cropland and Pastureland (FLUCFCS 210, ±64.09 acres)

This area of cleared land is primarily dominated by pasture grasses and sedges. Scattered cabbage palm, laurel oaks, and live oaks occur throughout. Open sandy areas occur along the edges of this habitat type. The dominant herbaceous vegetation includes Bermuda grass, bahiagrass, and natal grass. Small patches of cogon grass are present.

Other Open Lands (Rural) (FLUCFCS 260, ±60.05 acres)

Overall, these areas are relatively open with very little canopy of scattered slash pines, laurel oaks, and live oaks. Small stands of Brazilian pepper and wax myrtle occur throughout as do scattered patches of open sandy areas. This habitat type is dominated by pasture grasses including smut grass, bahiagrass, Bermuda grass, natal grass, and some patches of cogon grass.

Wetland Forested Mixed (FLUCFCS 630, ±54.53 acres)

This habitat type includes mixed wetland forest communities in which neither hardwoods nor conifers achieve dominance of the crown composition. Canopy species include red maple, dahoon holly, bald cypress, sweet bay, red bay, water oak and laurel oak. Shrubs include wax myrtle, shiny lyonia, scattered Brazilian pepper and buttonbush. The herbaceous layer in many areas is dominated by ferns which include leather fern, royal fern, cinnamon fern, and chain fern.

Pine Flatwoods (FLUCFCS 411, ±32.85 acres)

These areas consist of a scattered canopy of slash pine, sand pine, and a minor amount of laurel oaks, and live oaks with a thick understory of low growing saw palmetto. Other shrub species include gallberry, shiny lyonia, rusty lyonia winged sumac, and wax myrtle. Herbaceous species are not very prevalent due to a thick shrub layer and leaf litter but include wiregrass, shiny blueberry, dayflower, witchgrass, muscadine grape, saw greenbriar, and Carolina jasmine.

Roads and Highways (FLUCFCS 814, ±7.16 acres)

This category consists of an existing paved road located along the northern boundary of the area.

Streams and Waterways (FLUCFCS 510, ±6.93 acres)

This category includes the open water habitat associated with the Little Manatee River.

Palmetto Prairies (FLUCFCS 321, ±4.01 acres)

This habitat type includes areas in which saw palmetto is the most dominant vegetation. Other common species observed in these areas include rusty lyonia, shiny lyonia, gallberry, wiregrass, black root, rustweed, tar flower, and shiny blueberry. Some open sandy areas occur throughout. Scattered slash pine and live oak occur along the edges of this habitat.

Other Shrubs and Brush (FLUCFCS 329, ±2.65 acres)

One area of this habitat type occurs within Area 6. This area is relatively open with very little canopy of scattered slash pines, laurel oaks, and live oaks. Small stands of saw palmetto occur throughout as do

scattered patches of open sandy areas. This habitat type is dominated by pasture grasses including smut grass, bahiagrass, Bermuda grass, natal grass, and some patches of cogon grass.

Shrub and Brushland (FLUCFCS 320, ±1.40 acres)

This habitat occurs within the north east corner of Area 2 and is dominated by dense stands of saw palmetto. Minor amounts of slash pine, laurel oaks, and live oaks occur along the edges of this area. Other shrub species that are present include winged sumac, shiny lyonia, wax myrtle and gallberry. Herbaceous cover is limited due to a thick cover of saw palmetto but the more dominant species include wiregrass, black root, saw greenbriar, and muscadine grape.

Table 2-6 Area 6 Habitats

FLUCFCS Habitat Description	FLUCFCS Code	Acres
Hardwood Conifer Mixed	434	252.38
Stream and Lake Swamps (Bottomland)	615	216.06
Upland Hardwood Forests Part 1	420	144.52
Cropland and Pastureland	210	64.09
Other Open Lands <Rural>	260	60.05
Wetland Forested Mixed	630	54.53
Pine Flatwoods	411	32.85
Roads and Highways	814	7.16
Streams and Waterways	510	6.93
Palmetto Prairies	321	4.01
Other Shrubs and Brush	329	2.65
Shrub and Brushland	320	1.40
Total		846.63

Area 7 - Area 7 encompasses 1,455.36 acres of land located along the north central extent of the Preserve, south of Wimauma and east of County Road 579. A large portion of this area has been used for agriculture and contains a considerable area of fallow crop land that bifurcate existing native communities into a northern and southern section. Communities within the northern section are mixed upland communities with patchy freshwater wetland communities, while the southern area is predominately freshwater wetlands with small pockets of upland communities (Appendix B). Furthermore, gopher tortoises were present within the project area at the time of site visit.

Habitats encountered during field surveys are documented with site photos (Appendix C), described below and summarized in Table 2-7.

Stream and Lake Swamps (bottomland) (FLUCFCS 615, ±357.33 acres)

This community, often referred to as bottomland, is usually found on but not restricted to river, creek, and lake flood plain or overflow areas. This habitat type usually has a wide variety of hardwood canopy species. These species include sweet bay, Carolina willow, red maple, dahoon holly, water tupelo, laurel oak, water oak, slash pine, red bay, and cabbage palm. The shrub layer in much of these areas is sparse and consists of young cabbage palm, buttonbush, wax myrtle, saltbush, and shiny lyonia. Herbaceous species in many of these areas are sparse due to a thick canopy. Some of these species include cinnamon fern, various sedges, dayflower, coinwort, pennywort, royal fern, and creeping ludwigia.

Fallow Crop Land (FLUCFCS 261, ±321.43 acres)

These areas include harvested agriculture land not currently in crop production. Some patches of cogon grass are present throughout but the area is primarily dominated by bahiagrass. Other herbaceous species include dog fennel, ragweed, sweet broom, and smut grass.

Other Open Lands (Rural) (FLUCFCS 260, ±164.48 acres)

Overall, these areas are relatively open and contain no canopy or shrub species. This habitat type is dominated by pasture grasses including smut grass, bahiagrass, Bermuda grass, and natal grass. Large patches of cogon grass occur throughout with the heaviest coverage occurring in the northern area of this habitat type within Area 7. Evidence of a recent burn in this area was observed.

Xeric Oak (FLUCFCS 421, ±115.08 acres)

Two sections of this habitat type occur within Area 7. The northern xeric oak habitat consist of some overgrown areas containing live oak, sand live oak, myrtle oak, sand pine, and slash pine with an understory of saw palmetto. The southern area of xeric oak consists of only live oak in the canopy with a thick layer of low growing saw palmetto. Herbs include wiregrass, black root, shiny blueberry, witchgrass, broomsedges, and beautyberry.

Shrub and Brushland (FLUCFCS 320, ±112.28 acres)

This habitat occurs throughout Area 7 and is dominated by dense stands of saw palmetto. Minor amounts of slash pine, laurel oaks, and live oaks occur along the edges of this area. Other shrub species that are present include winged sumac, shiny lyonia, rusty lyonia, wax myrtle and gallberry. Herbaceous cover is limited due to a thick cover of saw palmetto but the more dominant species include wiregrass, black root, saw greenbriar, and muscadine grape.

Other Shrubs and Brush (FLUCFCS 329, ±110.88 acres)

This area is relatively open with very little canopy of scattered slash pines, laurel oaks, and live oaks. Small stands of saw palmetto, saltbush, and Brazilian pepper occur throughout as do scattered patches of open sandy areas. This habitat type is dominated by pasture grasses including smut grass, bahiagrass, Bermuda grass, natal grass, and some patches of cogon grass. Other species present include Caesar weed, sweet broom, frogs bit (*Phyla nodiflora*), blackberry (*Rubus argutus*), and dog fennel.

Palmetto Prairies (FLUCFCS 321, ±107.32 acres)

This habitat type includes areas in which saw palmetto is the most dominant vegetation. Other common species observed in these areas include rusty lyonia, shiny lyonia, gallberry, wiregrass, black root, rustweed, tar flower, and shiny blueberry. Some open sandy areas occur throughout. Scattered slash pine and live oak occur along the edges of this habitat.

Pine Flatwoods (FLUCFCS 411, ±46.04 acres)

These areas consist of a scattered canopy of slash pine, sand pine, and a minor amount of laurel oaks, and live oaks with a thick understory of low growing saw palmetto. Other shrub species include gallberry, shiny lyonia, rusty lyonia winged sumac, and wax myrtle. Herbaceous species are not very prevalent due to a thick shrub layer and leaf litter but include wiregrass, shiny blueberry, dayflower, witchgrass, muscadine grape, saw greenbriar, and Carolina jasmine.

Live Oak (FLUCFCS 427, ±39.37 acres)

These areas in general have a thick canopy of live oak with minor amounts of laurel oak. A thick understory of saw palmetto, and in some areas heavy cover of muscadine grape occur throughout. Herbaceous species are sparse due to a dense canopy and shrub layer. Some areas appear to have evidence of habitat maintenance and controlled burns.

Hardwood Conifer Mixed (FLUCFCS 434, ±37.82 acres)

These habitat types occur scattered throughout Area 7. Laurel oak and slash pine are the most prevalent canopy species in these areas. Other canopy species include a mix of water oak and live oak with minor amounts of cabbage palm. The understory is dominated by saw palmetto with minor amounts of gallberry, shiny lyonia, and Brazilian pepper. The herbaceous layer is relatively sparse in many areas due to a thick canopy and leaf litter. Some herbaceous species include Boston fern, muscadine grape, shiny blueberry, saw greenbrier, beautyberry, ragweed, winged sumac, Caesar weed, and Carolina jasmine.

Improved Pastures (FLUCFCS 211, ±21.99 acres)

This habitat type includes cleared areas with no canopy or shrub layer, composed mainly of pasture grasses. Overall, the entire area is dominated by bahiagrass and Bermuda grass. Other prevalent species include smut grass, ragweed, dog fennel, and broomsedges.

Wetland Shrub (FLUCFCS 631, ±10.38 acres)

Wetland shrub habitats within Area 7 include wetland habitats with a scattered to dense component of shrubby species. These include buttonbush, wax myrtle, Brazilian pepper, saltbush, shiny lyonia, primrose willow, and Carolina willow. Dominant herbaceous vegetation includes maidencane, soft rush, and cordgrass. Other herbaceous species in these areas include broomsedges, pennywort, coinwort, pepper weed, and dayflower. Many of these areas are densely vegetated and overgrown.

Freshwater Marshes (FLUCFCS 641, ±8.77 acres)

Two herbaceous marshes occur in Area 7. In general, these habitat types contain no canopy and little to no shrub cover. Dominant species include red root, red maple saplings, St. John's wort, and southern cattail, but also include maidencane, cordgrass, primrose willow, scattered wax myrtle and Brazilian pepper along the edges. Standing water was present throughout these habitat types.

Wet Prairies (FLUCFCS 643, ±0.69 acres)

This habitat type is composed predominantly of grassy vegetation on hydric soils that is distinguished from marshes by having less water and shorter herbage. Herbaceous species that occur in this habitat include creeping ludwigia, maidencane, carpet grass (*Axonopus furcatus*) arrowhead, yellow eyed grass (*Xyris fimbriata*), lemon bacopa (*Bacopa caroliniana*), and soft rush.

Cropland and Pastureland (FLUCFCS 210, ±0.61 acres)

This area of cleared land is primarily dominated by pasture grasses and sedges. The dominant herbaceous vegetation includes Bermuda grass, bahiagrass, and natal grass. Small patches of cogon grass are present.

Streams and Waterways (FLUCFCS 510, ±0.32 acres)

This category includes rivers, creeks, canals and other linear water bodies that are uninterrupted running through the south eastern extent of Area 7.

Ditch (FLUCFCS 511, ±0.31 acres)

The area categorized as a ditch consist of a remnant feature reflective of the past agriculture use of the site. This ditch is currently used as a channelized conveyance between the abandoned agricultural land and the Little Manatee River.

Roads and Highways (FLUCFCS 814, ±0.23 acres)

This category consists of an existing paved road located along the western boundary of the area.

Upland Hardwood Forests Part 1 (FLUCFCS 420, ±0.03 acres)

These areas consist of a canopy dominated by hardwoods which include live oak and laurel oak. Other canopy species that occur include slash pine and cabbage palm. The shrub layer is dominated by

scattered stands of saw palmetto, young cabbage palm, wax myrtle, and gallberry. Some of the more prevalent herbaceous species include bracken fern, shiny blueberry, saw greenbriar, and broomsedges.

Table 2-7 Area 7 Habitats

FLUCFCS Habitat Description	FLUCFCS Code	Acres
Stream and Lake Swamps (Bottomland)	615	357.33
Fallow Crop Land	261	321.43
Other Open Lands <Rural>	260	164.48
Xeric Oak	421	115.08
Shrub and Brushland	320	112.28
Other Shrubs and Brush	329	110.88
Palmetto Prairies	321	107.32
Pine Flatwoods	411	46.04
Live Oak	427	39.37
Hardwood Conifer Mixed	434	37.82
Improved Pastures	211	21.99
Wetland Shrub	631	10.38
Freshwater Marshes	641	8.77
Wet Prairies	643	0.69
Cropland and Pastureland	210	0.61
Streams and Waterways	510	0.32
Ditch	511	0.31
Roads and Highways	814	0.23
Upland Hardwood Forests Part 1	420	0.03
Total		1455.36

Area 8 - Area 8 is on the eastern extent of the Preserve and contains 1,423.96 acres located north and south of the Little Manatee River, much of which has been used for agriculture. This area also contains lesser amounts of native habitats which are generally restricted to the central riverine corridor (wetland communities) and extend toward the northwestern boundary (upland communities). The land surrounding Area 8 is bordered by extensive active agricultural operations with the majority being pasture habitats (improved and unimproved), occurring contiguous to the previously described agricultural operations (Appendix B). Burrowing owls are located within the open pasture habitat in Area 8.

Habitats encountered during field surveys are documented with site photos (Appendix C), described below and summarized in Table 2-8.

Pine Flatwoods (FLUCFCS 411, ±302.13 acres)

This area consists of a scattered canopy of slash pine with a thick understory of low growing saw palmetto. Other shrub species include gallberry, shiny lyonia, rusty lyonia winged sumac, and wax myrtle. Herbaceous species are not very prevalent due to a thick shrub layer and leaf litter but include wiregrass, shiny blueberry, dayflower, witchgrass, muscadine grape, saw greenbriar, and Carolina jasmine.

Stream and Lake Swamps (bottomland) (FLUCFCS 615, ±275.10 acres)

This community, often referred to as bottomland, is usually found on but not restricted to river, creek, and lake flood plain or overflow areas. This habitat type usually has a wide variety of hardwood canopy species. These species include Carolina willow, red maple, dahoon holly, water tupelo, laurel oak, water oak, slash pine, red bay, sweet bay and cabbage palm. The shrub layer in much of these areas is sparse and consists of young cabbage palm, buttonbush, wax myrtle, saltbush, and shiny lyonia. Herbaceous species in many of these areas are sparse due to a thick canopy. Some of these species include cinnamon fern, various sedges, dayflower, coinwort, pennywort, royal fern, and creeping ludwigia.

Hardwood Conifer Mixed (FLUCFCS 434, ±200.54 acres)

These habitats are forested areas in which neither upland conifers nor hardwoods achieve dominance. The canopy contains a mix of slash pine, laurel oak, water oak and live oak with minor amounts of cabbage palm. The understory is dominated by scattered saw palmetto with minor amounts of gallberry, shiny lyonia, and Brazilian pepper. The herbaceous layer is relatively sparse in many areas due to a thick canopy and leaf litter. Some herbaceous species include shiny blueberry, saw greenbriar, beautyberry, winged sumac, Caesar weed, saw greenbriar, and Carolina jasmine.

Improved Pastures (FLUCFCS 211, ±198.69 acres)

This habitat type includes cleared areas with no canopy or shrub layer, composed mainly of pasture grasses. Overall, the entire area is dominated by bahiagrass and Bermuda grass. Other prevalent species include smut grass, ragweed, dog fennel, and broomsedges.

Unimproved Pastures (FLUCFCS 212, ±141.62 acres)

These habitats consist of cleared areas that have gone unmanaged allowing trees and shrubs to recruit. Scattered live oaks, laurel oaks, and slash pines occur throughout. Patches of shrubs are present and consist mainly of gallberry, wax myrtle, and minor amounts of Brazilian pepper. The herbaceous cover is primarily dominated by pasture grasses such as bahiagrass, Bermuda grass, and smut grass but also contains dog fennel, broomsedges, beautyberry, and sweet broom.

Fallow Crop Land (FLUCFCS 261, ±108.96 acres)

These areas include harvested agriculture land not currently in crop production. Some patches of cogon grass are present throughout but the area is primarily dominated by bahiagrass. Other herbaceous species include sand spur, dog fennel, ragweed, sweet broom, and smut grass.

Other Shrubs and Brush (FLUCFCS 329, ±55.06 acres)

Habitats of shrub and brush within Area 8 contain moderate amounts of Brazilian pepper and low growing cabbage palm. No other canopy species occur in these areas. Cogon grass is prevalent throughout resulting in a monoculture in some locations. Other shrubby species that occur here include wax myrtle, saltbush, and minor amounts of winged sumac. Overall, the herbaceous layer is dominated by broomsedges, smut grass, bahiagrass, Caesar weed, and rustweed.

Upland Hardwood Forests (FLUCFCS 420, ±43.35 acres)

These areas consist of a canopy dominated by hardwoods which include live oak and laurel oak. Other canopy species that occur include slash pine, cabbage palm, and red cedar. The shrub layer is dominated by scattered stands of saw palmetto, young cabbage palm, wax myrtle, gallberry, and shiny lyonia. Some of the more prevalent herbaceous species include shiny blueberry, bahiagrass, wiregrass, dayflower, saw greenbriar, poison ivy, broomsedges, and coinwort.

Palmetto Prairies (FLUCFCS 321, ±26.63 acres)

This habitat type includes areas in which saw palmetto is the most dominant vegetation. Other common species observed in these areas include rusty lyonia, shiny lyonia, gallberry, wiregrass, black root, rustweed, tar flower, and shiny blueberry. Some open sandy areas occur throughout. Scattered slash pine and live oak throughout this habitat type.

Shrub and Brushland (FLUCFCS 320, ±22.42 acres)

This habitat type is dominated by dense stands of saw palmetto. Minor amounts of slash pine, laurel oaks, and live oaks are present. Other shrub species that are present include winged sumac, Brazilian pepper, shiny lyonia, wax myrtle and gallberry. Herbaceous cover is limited due to a thick cover of saw palmetto but the more dominant species include wiregrass, black root, saw greenbriar, broomsedges, Caesar weed, and muscadine grape. Patches of cogon grass are present throughout.

Wetland Forested Mixed (FLUCFCS 630, ±10.29 acres)

This habitat type includes mixed wetland forest communities in which neither hardwoods nor conifers achieve dominance of the crown composition. Canopy species include red maple, dahoon holly, bald cypress, sweet bay, red bay, water oak and laurel oak. Shrubs include wax myrtle, shiny lyonia, scattered Brazilian pepper and buttonbush. The herbaceous layer in many areas is dominated by ferns which include leather fern, royal fern, cinnamon fern, and chain fern.

Freshwater Marshes (FLUCFCS 641, ±8.24 acres)

Isolated freshwater marshes occur scattered throughout Area 8. In general, these habitat types contain no canopy and little to no shrub cover. Dominant herbaceous species in these habitats includes maidencane, sand cord grass, and St. John's wort. Other herbaceous species present include pennywort, coinwort, creeping ludwigia, and minor amounts of torpedo grass. Minor amounts of buttonbush are present in some of these freshwater marshes.

Roads and Highways (FLUCFCS 814, ±7.29 acres)

This category consists of an existing paved road located on the southwest portion of this area.

Live Oak (FLUCFCS 427, ±7.25 acres)

These areas in general have a thick canopy of live oak with minor amounts of laurel oak. A thick understory of saw palmetto, and in some areas heavy cover of muscadine grape occur throughout. Other shrubs include shiny lyonia, rusty lyonia, beautyberry, and wax myrtle. Herbaceous species are sparse due to a dense canopy and shrub layer. Some herbaceous species present include black root, wiregrass, and rustweed.

Ditch (FLUCFCS 511, ±5.98 acres)

The area categorized as a ditch consists of a remnant feature reflective of the past agriculture use of the site. This ditch is currently used as a channelized conveyance between the agricultural land and the Little Manatee River.

Streams and waterways (FLUCFCS 510, ±4.05 acres)

This category includes the open water habitat associated with the Little Manatee River.

Wetland Shrub (FLUCFCS 631, ±4.03 acres)

Overall, this habitat type is dominated by dense stands of shrubby species. These include buttonbush, wax myrtle, saltbush, shiny lyonia, primrose willow, and Carolina willow. Dominant herbaceous vegetation includes maidencane, soft rush, and cordgrass. Other herbaceous species in these areas include broomsedges, pennywort, coinwort, pepper weed, and dayflower.

Reservoir (FLUCFCS 530, ±1.10 acres)

This habitat consists of a shallow pond that is naturally revegetating.

Other Open Lands (Rural) (FLUCFCS 260, ±0.99 acres)

Overall, these areas are relatively open and contain no canopy or shrub species. This habitat type is dominated by pasture grasses including smut grass, bahiagrass, Bermuda grass, and natal grass.

Reservoirs Less Than 10 Acres (FLUCFCS 534, ± 0.24 acres)

This is a small artificial impoundments of water consisting of open water and a shallow littoral shelf.

Table 2-8 Area 8 Habitats

FLUCFCS Habitat Description	FLUCFCS Code	Acres
Pine Flatwoods	411	302.13
Stream and Lake Swamps (Bottomland)	615	275.10
Hardwood Conifer Mixed	434	200.54
Improved Pastures	211	198.69
Unimproved Pastures	212	141.62
Fallow Crop Land	261	108.96
Other Shrubs and Brush	329	55.06
Upland Hardwood Forests Part 1	420	43.35
Palmetto Prairies	321	26.63
Shrub and Brushland	320	22.42
Wetland Forested Mixed	630	10.29
Freshwater Marshes	641	8.24
Roads and Highways	814	7.29
Live Oak	427	7.25
Ditch	511	5.98
Streams and Waterways	510	4.05
Wetland Shrub	631	4.03
Reservoirs	530	1.10
Other Open Lands <Rural>	260	0.99
Reservoirs Less Than 10 Acres	534	0.24
Total		1423.96

Area 9 - Area 9 is 879.67 acres located in the eastern extent of the project boundary and consists of fallow crop land, forested uplands, and stream and lake swamps (Appendix B). Within Area 9 over 100 acres are fallow crop lands located along the northern and southern boundaries adjacent to existing active agricultural activities. Similar to Area 8, the remaining upland and wetland communities are located along the riverine corridor and more centrally located. It should also be noted that there is a small Hillsborough County wetland mitigation site located on the western portion of this area.

Habitats encountered during field surveys are documented with site photos (Appendix C), described below and summarized in Table 2-9.

Other Shrubs and Brush (FLUCFCS 329, ±191.83 acres)

Habitats of shrub and brush within Area 9 contain moderate amounts of Brazilian pepper and low growing cabbage palm. No other canopy species occur in these areas. Cogon grass is prevalent throughout resulting in a monoculture in some locations. Other shrubby species that occur here include wax myrtle, saltbush, and minor amounts of winged sumac. Overall, the herbaceous layer is dominated by broomsedges, smut grass, bahiagrass, Caesar weed, and rustweed.

Stream and Lake Swamps (bottomland) (FLUCFCS 615, \pm 158.23 acres)

This community, often referred to as bottomland, is usually found on but not restricted to river, creek, and lake flood plain or overflow areas. This habitat type usually has a wide variety of hardwood canopy species. These species include Carolina willow, red maple, dahoon holly, water tupelo, laurel oak, water oak, slash pine, red bay, sweet bay and cabbage palm. The shrub layer in much of these areas is sparse and consists of young cabbage palm, buttonbush, wax myrtle, saltbush, and shiny lyonia. Herbaceous species in many of these areas are sparse due to a thick canopy. Some of these species include cinnamon fern, various sedges, dayflower, coinwort, pennywort, royal fern, and creeping ludwigia.

Fallow Crop Land (FLUCFCS 261, \pm 100.81 acres)

These areas include harvested agriculture land not currently in crop production. Some patches of cogon grass are present throughout but the area is primarily dominated by bahiagrass. Other herbaceous species include hairy indigo, sand spur, dog fennel, ragweed, sweet broom, and smut grass. Scattered wax myrtle, saltbush, and Brazilian pepper occur throughout.

Pine Flatwoods (FLUCFCS 411, \pm 87.92 acres)

This area consists of a scattered canopy of slash pine with a thick understory of low growing saw palmetto. Other shrub species include gallberry, shiny lyonia, rusty lyonia winged sumac, and wax myrtle. Herbaceous species are not very prevalent due to a thick shrub layer and leaf litter but include wiregrass, shiny blueberry, dayflower, witchgrass, muscadine grape, saw greenbriar, and Carolina jasmine.

Cropland and Pastureland (FLUCFCS 210, \pm 80.55 acres)

This area of cleared land is primarily dominated by pasture grasses and sedges. Scattered cabbage palm, laurel oaks, and live oaks occur throughout. Open sandy areas occur along the northern edges of this habitat type. The dominant herbaceous vegetation include Bermuda grass, bahiagrass, and natal grass. Small patches of cogon grass are present.

Palmetto Prairies (FLUCFCS 321, \pm 69.00 acres)

This habitat type includes areas in which saw palmetto is the most dominant vegetation. Other common species observed in these areas include rusty lyonia, shiny lyonia, gallberry, wiregrass, black root, rustweed, tar flower, and shiny blueberry. Some open sandy areas occur throughout. Scattered slash pine and live oak are throughout this habitat type.

Hardwood Conifer Mixed (FLUCFCS 434, \pm 58.16 acres)

Laurel oak and slash pine are the most prevalent canopy species in these areas. Other canopy species include a mix of water oak and live oak with minor amounts of cabbage palm. The understory is dominated by saw palmetto with minor amounts of gallberry, shiny lyonia, and Brazilian pepper. The herbaceous layer is relatively sparse in many areas due to a thick canopy and leaf litter. Some herbaceous species include Boston fern, muscadine grape, shiny blueberry, saw greenbriar, beautyberry, ragweed, winged sumac, Caesar weed, and Carolina jasmine.

Upland Hardwood Forests Part 1 (FLUCFCS 420, \pm 45.76 acres)

These areas consist of a canopy dominated by hardwoods which include live oak and laurel oak. Other canopy species that occur include slash pine, cabbage palm, and red cedar. The shrub layer is dominated by scattered stands of saw palmetto, young cabbage palm, wax myrtle, gallberry, and shiny lyonia. Some of the more prevalent herbaceous species include shiny blueberry, bahiagrass, wiregrass, dayflower, saw greenbriar, poison ivy, broomsedges, and coinwort.

Wetland Forested Mixed (FLUCFCS 630, \pm 18.83 acres)

This habitat type includes mixed wetland forest communities in which neither hardwoods nor conifers achieve dominance of the crown composition. Canopy species include red maple, dahoon holly, bald cypress, sweet bay, red bay, water oak and laurel oak. Shrubs include wax myrtle, shiny lyonia, scattered

Brazilian pepper and buttonbush. The herbaceous layer in many areas are dominated by ferns which include leather fern, royal fern, cinnamon fern, and chain fern.

Wetland Shrub (FLUCFCS 631, ±17.29 acres)

These habitat types are dominated by a thick shrub layer consisting primarily of saltbush but also contain wax myrtle, primrose willow, and buttonbush. Laurel oaks and cabbage palms were present along some outskirts of these areas. Standing water was present in some of these habitat types. Herbaceous species include St. John's wort, lance leaved arrowhead, hemp vine (*Mikania scandens*), coinwort, pennywort, and royal fern.

Shrub and Brushland (FLUCFCS 320, ±13.39 acres)

This habitat is dominated by dense stands of saw palmetto. Minor amounts of slash pine, laurel oaks, and live oaks occur along the edges of this area. Other shrub species that are present include winged sumac, shiny lyonia, wax myrtle and gallberry. Herbaceous cover is limited due to a thick cover of saw palmetto but the more dominant species include wiregrass, black root, saw greenbriar, and muscadine grape.

Ditch (FLUCFCS 511, ±7.83 acres)

The area categorized as a ditch consists of a remnant feature reflective of the past agriculture use of the site. This ditch is currently used as a channelized conveyance between the agricultural land and the Little Manatee River.

Live Oak (FLUCFCS 427, ±7.43 acres)

This habitat type consists of a thick canopy dominated by live oak. Other canopy species include minor amounts of slash pine, laurel oak, and myrtle oak. The understory is dominated by saw palmetto but also includes shiny lyonia, rusty lyonia, and wax myrtle. The herbaceous layer is sparse in many areas due to a thick canopy and shrub layer but includes species such as shiny blueberry, wiregrass, broomsedges, rustweed, and witchgrass.

Freshwater Marshes (FLUCFCS 641, ±6.59 acres)

In general, these habitat types contain no canopy and little to no shrub cover. Dominant species include red root, chain fern, St. John's wort, broomsedges, and maidencane but also include cordgrass, primrose willow, and scattered wax myrtle and Brazilian pepper along the edges. Standing water was present throughout these habitat types at the time of site visits which occurred during the summer months.

Upland Scrub, Pine and Hardwoods (FLUCFCS 436, ±5.51 acres)

This habitat type occurs in the northern portion of Area 9 and consists of an upland area with scattered live oak and slash pine. Patches of saw palmetto and winged sumac occur throughout. Overall, this area is relatively open, herbaceous species include wiregrass, paw paw (*Asimina obovate*), black root, rust weed and shiny blueberry.

Residential Low Density <2 Dwelling Units (FLUCFCS 110, ±3.15 acres)

A single-family residential housing unit is located along the southwestern boundary border.

Row Crops (FLUCFCS 214, ±1.75 acres)

A small area of row crops is present in the north east portion of Area 9. These fields are actively planted and harvested in well-defined rows.

Willow and Elderberry (FLUCFCS 618, ±1.62 acres)

This habitat type occurs along the southern boundary of Area 9. This shrubby wetland is dominated by a dense stand of Carolina willow but also includes saltbush and wax myrtle. Minor amounts of laurel oak and slash pine occur along the edges of this system. Herbaceous species include dog fennel, hemp vine, soft rush, chain fern, maidencane, pennywort, and camphor weed (*Pluchea rosea*).

Other Open Lands (Rural) (FLUCFCS 260, ±1.26 acres)

Overall, these areas are relatively open and contain no canopy or shrub species. This habitat type is located adjacent to agricultural activities along the northcentral boundary and is dominated by pasture grasses including smut grass, bahiagrass, Bermuda grass, and natal grass.

Reservoir (FLUCFCS 530, ±1.22 acres)

This feature is a small, open-water pond associated with a network of ditches entering into this site from the adjacent agriculture fields.

Streams and Waterways (FLUCFCS 510, ±0.94 acres)

This category includes the open water habitat associated with the Little Manatee River.

Reservoirs Less Than 10 Acres (FLUCFCS 534, ± 0.40 acres)

This is a shallow pond associated with the former agriculture use of the property. It is characterized as open water with vegetated littoral shelves.

Improved Pastures (FLUCFCS 211, ±0.20 acres)

This habitat type includes cleared areas with no canopy or shrub layer, composed mainly of pasture grasses. Overall, the entire area is dominated by bahiagrass and Bermuda grass. Other prevalent species include smut grass, ragweed, dog fennel, and broomsedges.

Table 2-9 Area 9 Habitats

FLUCFCS Habitat Description	FLUCFCS Code	Acres
Other Shrubs and Brush	329	191.83
Stream and Lake Swamps (Bottomland)	615	158.23
Fallow Crop Land	261	100.81
Pine Flatwoods	411	87.92
Cropland and Pastureland	210	80.55
Palmetto Prairies	321	69.00
Hardwood Conifer Mixed	434	58.16
Upland Hardwood Forests Part 1	420	45.76
Wetland Forested Mixed	630	18.83
Wetland Shrub	631	17.29
Shrub and Brushland	320	13.39
Ditch	511	7.83
Live Oak	427	7.43
Freshwater Marshes	641	6.59
Upland Scrub, Pine and Hardwoods	436	5.51
Residential Low Density < 2 Dwelling Units	110	3.15
Row Crops	214	1.75
Willow and Elderberry	618	1.62
Other Open Lands <Rural>	260	1.26
Reservoirs	530	1.22

FLUCFCS Habitat Description	FLUCFCS Code	Acres
Streams and Waterways	510	0.94
Reservoirs Less Than 10 Acres	534	0.40
Improved Pastures	211	0.20
Total		879.67

Area 10 - Area 10 is the eastern-most portion of the Preserve and consists of 661.58 acres of forested uplands and wetlands. Overall, Area 10 is dominated by native upland and wetland communities with small pockets of pasturelands and cogon grass located along the southwestern and northwestern boundary (Appendix B). Given that Area 10 is composed of extensive areas of native wetland and upland habitats preservation and enhancement activities (non-native removal, understory burns, and supplemental native planting) are appropriate.

Habitats encountered during field surveys are documented with site photos (Appendix C), described below and summarized in Table 2-10.

Stream and Lake Swamp (Bottomland) (FLUCFCS 615, ±254.18 acres)

This community, often referred to as bottomland, is usually found on but not restricted to river, creek, and lake flood plain or overflow areas. This habitat type usually has a wide variety of hardwood canopy species. These species include Carolina willow, red maple, dahoon holly, water tupelo, laurel oak, water oak, slash pine, red bay, sweet bay and cabbage palm. The shrub layer in much of these areas is sparse and consists of young cabbage palm, buttonbush, wax myrtle, saltbush, and shiny lyonia. Herbaceous species in many of these areas are sparse due to a thick canopy. Some of these species include cinnamon fern, various sedges, dayflower, coinwort, pennywort, royal fern, and creeping ludwigia.

Conifer Mixed (FLUCFCS 434, ±173.53 acres)

These habitats are forested areas in which neither upland conifers nor hardwoods achieve dominance. The canopy contains a mix of slash pine, laurel oak, water oak and live oak with minor amounts of cabbage palm. The understory is dominated by scattered saw palmetto with minor amounts of gallberry, shiny lyonia, and Brazilian pepper. The herbaceous layer is relatively sparse in many areas due to a thick canopy and leaf litter. Some herbaceous species include shiny blueberry, saw greenbriar, beautyberry, winged sumac, Caesar weed, saw greenbriar, and Carolina jasmine.

Pine Flatwoods (FLUCFCS 411, ±111.25 acres)

This habitat type consist of a moderate canopy dominated by slash pine. Other canopy species include sand pine, longleaf pine, and live oak. A moderate to thick understory of low growing saw palmetto is present throughout. Other shrub species include gallberry, shiny lyonia, rusty lyonia winged sumac, and wax myrtle. Herbaceous species are not very prevalent due to a thick shrub layer and leaf litter but include wiregrass, shiny blueberry, dayflower, witchgrass, muscadine grape, saw greenbriar, and Carolina jasmine. Small patches of cogon grass are scattered throughout this habitat type.

Wetland Forested Mixed (FLUCFCS 630, ±57.47 acres)

This habitat type includes mixed wetland forest communities in which neither hardwoods nor conifers achieve dominance of the crown composition. Canopy species include red maple, dahoon holly, bald cypress, sweet bay, red bay, water oak and laurel oak. Shrubs include wax myrtle, shiny lyonia, scattered Brazilian pepper and buttonbush. The herbaceous layer in many areas are dominated by ferns which include leather fern, royal fern, cinnamon fern, and chain fern.

Cropland and Pastureland (FLUCFCS 210, ±33.46 acres)

This area of cleared land is primarily dominated by pasture grasses and sedges. Scattered cabbage palm, laurel oaks, and live oaks occur throughout. Open sandy areas occur along the northern edges of

this habitat type. The dominant herbaceous vegetation include Bermuda grass, bahiagrass, and natal grass. Small patches of cogon grass are present.

Woodland Pastures (FLUCFCS 213, ±16.73 acres)

This habitat appears to be regenerating pasture and now contains a mix of pasture grasses and sedges intermixed with saw palmetto, winged sumac, shiny lyonia, wax myrtle and gallberry, and minor amounts of canopy species including slash pine, laurel oaks, and live oaks.

Shrub and Brushland (FLUCFCS 320, ±7.02 acres)

This habitat is dominated by dense stands of saw palmetto. Minor amounts of slash pine, laurel oaks, and live oaks occur along the edges of this area. Other shrub species that are present include winged sumac, shiny lyonia, wax myrtle and gallberry. Herbaceous cover is limited due to a thick cover of saw palmetto but the more dominant species include wiregrass, black root, saw greenbriar, and muscadine grape.

Bay Swamps (FLUCFCS 611, ±2.22 acres)

This forested wetland habitat is dominated by sweet bay and loblolly bay (*Gordonia lasianthus*) with minor amounts of laurel oak and water oak along the outskirts. Shrubs include wax myrtle, Carolina willow, and minor amounts of saw palmetto. Herbaceous species present consist of chain fern, netted chain fern (*Woodwardia areolata*), Virginia creeper (*Parthenocissus quinquefolia*), cinnamon fern, and royal fern.

Herbaceous (Dry Prairie) (FLUCFCS 310, ±1.92 acres)

Upland prairie grasses which occur in non-hydric soils but may occasionally inundated by water. Overall these areas lack canopy cover and are dominated by grasses, sedges, rushes, palmettos and wire grasses.

Other Open Lands (Rural) (FLUCFCS 260, ±1.85 acres)

Overall, these areas are relatively open and contain no canopy or shrub species. This habitat type is dominated by pasture grasses including smut grass, bahiagrass, Bermuda grass, and natal grass.

Freshwater Marshes (FLUCFCS 641, ±0.99 acres)

In general, these habitat types contain no canopy and little to no shrub cover. Dominant species include red root, chain fern, St. John's wort, broomsedges, and maidencane but also include cordgrass, primrose willow, and scattered wax myrtle and Brazilian pepper along the edges. Standing water was present throughout these habitat types.

Cogon Grass (FLUCFCS 311, ±0.77 acres)

This small area is completely dominated by cogon grass. Due to how dense this species grows, no other herbaceous species occur in this area. Scattered wax myrtle and Brazilian pepper occur throughout.

Streams and Waterways (FLUCFCS 510, ±0.10 acres)

This category includes the open water habitat associated with the Little Manatee River.

Transportation (FLUCFCS 810, ±0.09 acres)

This area consists of the remnants of a former rail corridor, which currently exists as a raised bed and deteriorating wooden support structures.

Table 2-10 Area 10 Habitats

FLUCS Habitat Description	FGLUCS Code	Acres
Stream and Lake Swamps (Bottomland)	615	254.18
Hardwood Conifer Mixed	434	173.53
Pine Flatwoods	411	111.25
Wetland Forested Mixed	630	57.47
Cropland and Pastureland	210	33.46
Woodland Pastures	213	16.73
Shrub and Brushland	320	7.02
Bay Swamps	611	2.22
Herbaceous (Dry Prairie)	310	1.92
Other Open Lands <Rural>	260	1.85
Freshwater Marshes	641	0.99
Cogon Grass	311	0.77
Streams and Waterways	510	0.10
Transportation	810	0.09
Total		661.58

3 Conceptual Restoration Plan

As part of the Little Manatee River Ecosystem Restoration Master Plan, Cardno was tasked with developing a conceptual framework to identify restoration activities that incorporate onsite habitat issues, described in the previous section, with specific restoration activities that address these issues. The following restoration categories are proposed within the conceptual master plan and are described below:

- Upland preservation/enhancement is employed in habitats that are dominated by native species but may require additional planting, targeted non-native plant removal and/or fire management techniques.
- Wetland preservation/enhancement is similar to upland preservation/enhancement in that it is best used in habitats that are dominated by native habitats and may require supplemental native plantings, spot removal of non-native plant species and/or use of fire management techniques.
- Freshwater wetland creation is a much more intensive activity best used in habitats that are dominated by non-native plant communities or that have water quality issues and may be achieved from a combination of historic wetland restoration and new complimentary wetland creation. New freshwater wetlands require intensive earthwork, planting and non-native and nuisance plant maintenance.
- Estuarine wetland creation is also an intensive restoration category that focuses on creating new estuarine wetland communities in areas that are dominated by non-native communities. This activity requires extensive earthwork, vegetation removal and replanting of native communities.
- Upland restoration activities are suggested in areas that lack native plant communities and utilizes a combination of intensive planting, non-native plant removal and fire to manage and promote native habitats.

Using these factors, each of the ten Preserve areas were reviewed with conceptual restoration recommendations developed based on the above descriptions assigned to the habitats. The resulting Conceptual Restoration Plans are provided in Appendix D. The following table provides a summary of the conceptual restoration activities by both Area and Restoration Activity that are proposed within all ten Project Areas (Table 3-1).

Table 3-1 Summary of Conceptual Restoration Activities by both Area and Restoration Activity (#1-5) Proposed Within all Ten Project Areas

Project Area	Upland Preservation/ Enhancement	Wetland Preservation/ Enhancement	Freshwater Wetland Creation	Estuarine Wetland Creation	Upland Restoration
Area 1	X	X	X	X	X
Area 2	X	X	X	X	X
Area 3	X	X	X	X	X
Area 4	X	X			
Area 5	X	X	X		X
Area 6	X	X	X		X
Area 7	X	X	X		X

Project Area	Upland Preservation/ Enhancement	Wetland Preservation/ Enhancement	Freshwater Wetland Creation	Estuarine Wetland Creation	Upland Restoration
Area 8	X	X	X		X
Area 9	X	X			X
Area 10	X	X			X

3.1 Conceptual Restoration Plan Project Area Key Issues

As a part of the Conceptual Restoration Plan development, several important issues associated with each of the ten Project Areas were evaluated. These factors included site access, unauthorized encroachment, cultural resource issues, the presence of listed/threatened species of special concern, what portions of the Project Areas they are located in, what avoidance measures should be taken, and a description of the proposed restoration activity; upland restoration, upland preservation/enhancement, freshwater wetland creation, estuarine wetland creation, or wetland preservation/enhancement. Proposed restoration activities within each Project Area are divided into two overall categories: 1) preservation/enhancement of existing communities that are dominated by native plants but require additional planting and/or removal of non-native species followed by active site management; or 2) restoration and/or habitat creation for areas that are dominated by non-native plant species. Following any habitat enhancement/restoration/creation, post project site maintenance will be vital to the long term success of the habitats.

Project Area 1 (Figures 2 and Appendix D)

- Site access - This site may pose significant issues for restoration efforts as this area is difficult to access for both people and equipment. Some of this area may only be accessible by boat. The east bank of the river can be accessed from the right-of-way (ROW) along I-75. Gates with Hillsborough County and/or District locks are located along Stephens Road, River Bend Drive, and the ROW along I-75.
- Unauthorized encroachment -Is not an issue at this time. No unauthorized use or evidence thereof was observed.
- Cultural Resource Issues - There is one known cultural resource recorded within the Project Area boundaries. Additional cultural resource investigations may be required prior to any restoration construction activities.
- Presence of listed/threatened species – The following species have been observed by Hillsborough County staff within Area 1: Florida Golden Aster (*Chrysopsis floridana*), Garberia (*Garberia heterophylla*), Shell Mound Prickley Pear (*Opuntia stricta*), and Curtiss Milkweed (*Asclepias curtissi*). Cardno staff also encountered active gopher tortoise (*Gopherus polyphemus*) burrows within the project area.
- Proposed restoration activities - Area 1 consists of large areas of native habitats along both the river corridor and the adjacent upland areas. Restoration activities within Area 1 are concentrated on preservation/enhancement of 246.31 acres of existing wetland and upland communities with supplemental native plantings and non-native plant removal where appropriate. Additional native upland restoration efforts (40.29 acres) are concentrated within existing north east boundary of the Project Area. Further water quality improvement opportunities exist within an existing stormwater conveyance ditch by creating both a freshwater (0.17 acre) and estuarine wetland (0.20 acre) to polish stormwater flows originating from a high density housing unit, located adjacent to the northern

project boundary. Open water (80.54 acres) is also present within the project area and has not been identified for any restoration activities.

Project Area 2 (Figures 2 and Appendix D)

- a. Site Access - Two access points were used during the field surveys for this area. One can be accessed from the Hillsborough County I-75 Northbound rest stop and is located just north of the most northeastern proposed piezometer location. The second access point is located off of 23rd Street East which requires meandering through existing agriculture areas to another gate to the southwest which then allows entry into Area 2. These gates all utilize either Hillsborough County and/or District locks.
- b. Unauthorized Encroachment - No unauthorized use or evidence thereof was observed.
- c. Cultural Resource Issues - There is one known cultural resource located within the Project Area boundaries. Additional cultural resource investigation may be required prior to implementation of proposed restoration activities.
- d. Presence of listed/threatened species - Gopher tortoise burrows were observed within the mixed hardwood conifer habitat type of Area 2. Additionally, Hillsborough County staff have encountered the following species within Area 2: Florida Sandhill Crane, Golden Leather Fern (*Acrostichum aureum*) (on cabbage palms), and Hand Fern (*Ophioglossum palmatum*).
- e. Proposed restoration activities - Overall restoration within Area 2 is concentrated on creation of 31.25 acres of additional wetland communities within existing disturbed habitats located along the northwestern area boundary. These additional wetlands are composed of new freshwater wetlands, augmentation of an existing freshwater FDOT mitigation wetland by expanding littoral habitats and the creation of an estuarine wetland connection to the Little Manatee River. Moreover, upland restoration/enhancement and native community reestablishment is proposed within an existing disturbed upland habitat and consists of 126.42 acres of native upland restoration activities (prescribed burns, native plantings and removal of non-native communities). The remaining 201.30 acres within Area 2 consist of both upland and wetland preservation/enhancement activities. Piezometer installation is suggested prior to any further design phases to establish baseline data and determine feasibility for each proposed freshwater and estuarine wetland.

Project Area 3 (Figures 2 and Appendix D)

- a. Site Access - This site may pose some issues for restoration efforts as this area is difficult to access for both people and equipment. Two main access points are present for Area 3 both of which are on either the most eastern and western ends of this area making access to the middle portions difficult. One gate is located at the northern end of Long Rifle Drive which only allows limited access for vehicles and machinery due to multiple tributaries of the Little Manatee River. The second access point is located off of an unnamed dirt road that occurs along Lightfoot Road. This gate allows vehicular access to the most eastern portion of the area. Other areas along the river, mostly consisting of wetland preservation and enhancement, may only be accessed by boat.
- b. Unauthorized Encroachment - No unauthorized use or evidence thereof was observed.
- c. Cultural Resource Issues - Not of concern for this area.
- d. Presence of listed/threatened species - Hillsborough County staff has encountered the following species within Area 3: Florida Scrub-jay (*Aphelocoma coerulescens*) (in 1990s), Pygmy Fringe Tree (*Chionanthus pygmaeus*), and Garberia. Cardno staff encountered the gopher tortoise during the site visit.
- e. Proposed restoration activities - As described previously in Chapter 2, Area 3 has significant areas of non-native communities along with substantial areas of historical disturbance. A total of 18.81 acres

of freshwater and estuarine wetland creation is proposed within Area 3 to polish agricultural runoff from an existing ditch and divert it through two freshwater wetlands with final polishing and discharge in the Little Manatee River from a new estuarine wetland connection. An additional estuarine wetland is proposed to mitigate historical habitat losses by providing new native communities and further water quality treatment of sheet flows prior to discharge. 95.07 acres of upland restoration is proposed along the southern boundary of Area 2 which has agriculture impacts, to reestablish native upland communities. Finally, upland preservation/enhancement and wetland preservation/enhancement is proposed for the remaining 236.75 acres. Piezometer installation is recommended within all proposed wetland creation areas in order to establish baseline data and determine feasibility for each proposed freshwater and estuarine wetland prior to design and permitting.

Project Area 4 (Figures 2 and Appendix D)

- a. Site Access - Much of the access for areas of proposed wetland preservation and enhancement may only be accessible by boat. Gates, with either Hillsborough County and/or District locks, are located along 24th Street SE and allow access to much of the proposed upland preservation and enhancement areas. Other gates granting access to the eastern portions of the area are located along 27th Street SE.
- b. Unauthorized Encroachment - No unauthorized use or evidence thereof was observed.
- c. Cultural Resource Issues -Not of concern for this area.
- d. Presence of listed/threatened species - Gopher tortoises have been observed in Area 4 by Hillsborough County staff.
- e. Proposed restoration activities - Area 4 is composed of native upland and wetland communities that are likely to require preservation and enhancement activities such as spot removal/treatment of non-native species and supplemental plantings of native species within both wetland and upland communities totaling 254.9 acres.

Project Area 5 (Figures 2 and Appendix D)

- a. Site Access - Area 5 contains several authorized access points which provide easy access for work in this area. Other gates containing either Hillsborough County and/or District locks are present along Dug Creek Road which allow access to the more northern portions of this area.
- b. Unauthorized Encroachment - Area 5 is a known hotspot for illegal off-road activities and is frequently utilized by the off-road ATV enthusiasts. ATVs and other unauthorized uses were observed during surveys. Police are regularly called to this site in response to trespassing and gunfire. Trash, campsites, bullet casings, and evidence of off-road vehicles are present throughout.
- c. Cultural Resource Issues - Within Area 5 is the site of the Willow community, a timber processing community that existed during the early 1900s. This area contains a large recorded archaeological site that may require additional investigation prior to any proposed restoration activities.
- d. Presence of listed/threatened species - Within Area 5, gopher tortoise burrows were found in the mixed hardwood conifer habitat type in the southern most portion and pine flatwoods in the northern portion of this area. Hillsborough County has also observed Florida Golden Aster within the portion of this area accessed off of Dug Creek Road.
- e. Proposed restoration activities - Area 5 is a unique site in that it has both cultural and unauthorized encroachment issues occurring onsite which has a direct impact on any proposed restoration activity. Currently, 186.61 acres of upland restoration are proposed to mitigate for existing erosional issues associated with anthropogenic impacts that occur along the southwestern boundary. Three additional freshwater wetlands, totaling 19.94 acres, are recommended to provide additional onsite stormwater

polishing, erosion control and reestablishment of native wetland communities. The remaining 461.25 acres are composed of predominately native communities that require both wetland and upland preservation/enhancement activities. Piezometer installation is suggested for each of the proposed wetland areas to establish baseline data and determine feasibility for each proposed freshwater wetland prior to design and permitting activities.

Project Area 6 (Figures 2 and Appendix D)

- a. Site Access - The majority of the western portion of this area can be accessed by multiple Hillsborough County and/or District locked gates located along Saffold Road. A small portion of the eastern side of the area can also be accessed by a gate located along CR 579. Certain portions of the eastern side of the area will pose restrictions to access due to wetland areas and low water crossings. The southern portion of the project area is located within Manatee County which can also be accessed off Saffold Road.
- b. Unauthorized Encroachment - No unauthorized use or evidence thereof observed.
- c. Cultural Resource Issues - There are two recorded archaeological resources located within Area 6. Additional cultural resource investigations may be required prior to any creation, restoration or enhancement work.
- d. Presence of listed/threatened species - Gopher tortoise burrows were observed in the open lands and mixed hardwood conifer habitat types within the northeastern portion of this area.
- e. Proposed restoration activities - Native communities dominate Area 6 and require either supplemental plantings or selective removal of existing non-native plant communities totaling 712.85 acres of preservation/enhancement of either upland or wetland communities. Creation of 9.82 acres of freshwater wetland creation is proposed to provide water quality treatment of sheet flows and create native habitats. An additional 123.96 acres of upland restoration are proposed for native habitat reestablishment within disturbed areas occurring along the northwestern and south central area boundaries. Piezometer installation to establish baseline data and determine feasibility for each freshwater wetland, is recommended, prior to design and permitting.

Project Area 7 (Figures 2 and Appendix D)

- a. Site Access - All of the southwestern and much of the central portions of this area can be accessed by a gate located along CR 579 in the southwestern boundary. The northern portions of this area can be accessed by a gate located along Leonard Lee Road and a gate on CR 674. Overall, Area 7 has good access throughout.
- b. Unauthorized Encroachment - No unauthorized use or evidence thereof observed.
- c. Cultural Resource Issues - There are seven recorded cultural resources within Area 7. Although Cardno designed the proposed restoration activities to avoid recorded resources, it is prudent to ground truth and verify the absence or presence of cultural resource prior to commencing any proposed restoration activities.
- d. Presence of listed/threatened species – Gopher tortoises were observed by Cardno staff during field visits. The following species have been documented within Area 7 by Hillsborough County staff: Florida Sandhill Crane, Catesby's Lily (*Lilium catesbaei*), Crested Fringe Orchid (*Platanthera cristata*), Spreading Pinweed (*Lechea divaricate*), and Wood Stork (*Mycteria americana*) (foraging).
- e. Proposed restoration activities - Area 7 is dominated by non-native communities and consist of numerous fallow agricultural fields. Creation of six new native freshwater wetland areas totaling 21.83 acres will polish agricultural runoff and establish new native wetland communities. Piezometer installation is proposed to establish baseline data and determine feasibility for each proposed freshwater wetland prior to design and permitting. Additional restoration activities are focused on

reclaiming existing fallow agricultural fields and restoring native communities of 711.38 acres of upland communities. The remaining 722.15 acres are preservation/enhancement activities within existing upland and wetland communities.

Project Area 8 (Figures 2 and Appendix D)

- a. Site Access - The vast majority of this area can be accessed by multiple gates along CR 579 in addition to a gate located along Leonard Lee Road. Overall, there is good access with existing dirt roads and trails.
- b. Unauthorized Encroachment - No unauthorized use or evidence thereof observed. Currently, there is an active cattle management agreement on this area.
- c. Cultural Resource Issues – There are no concerns for this area.
- d. Presence of listed/threatened species – Cardno staff observed gopher tortoise burrows within the pine flatwoods, shrub and brushland, and palmetto prairies throughout Area 8. Florida burrowing owls and their burrows were also observed in the eastern section of improved pasture within this area. Additionally, Golden Leather Fern (*Acrostichum aureum*), Many-flowered Grass Pink (*Calopogon multiflorus*), non-crested elophia (*Eulophia ecristata*), and cardinal flower (*Lobelia cardinalis*) were also observed by Hillsborough County staff within Area 8.
- e. Proposed restoration activities - Area 8 is bordered by agricultural fields with non-native communities occurring along both the northern and southern fringes of the area, with the remaining central riverine corridor composed of existing native communities. A total of nine new freshwater wetlands, totaling 52.24 acres, are proposed to polish agricultural runoff and create additional native communities. Piezometer installations are proposed to establish baseline data and determine feasibility for each proposed freshwater wetland prior to design and permitting. Upland restoration activities focus on restoring 487.40 acres of uplands. The remaining 884.32 acres are mostly native species of uplands and wetlands which will require spot treatment/removal of non-native communities and supplemental planting of native upland and freshwater wetland communities.

Project Area 9 (Figures 2 and Appendix D)

- a. Site Access - The southern portion of this area overall has good access to vehicles with gates present along both Grange Hall Road and Flowers Road, however, access during the wet season can be restricted as a result of standing water. The northern portion of this area poses restricted access as the only known gate to this area is located along Leonard Lee Road and many of these areas are not drivable.
- b. Unauthorized Encroachment - No unauthorized use or evidence thereof was observed.
- c. Cultural Resource Issues - There are two known cultural resources located within Area 9. Further cultural resource investigations may be required prior to commencement of construction activities.
- d. Presence of listed/threatened species - A small number of gopher tortoise burrows were observed within Area 9. These burrows generally occurred within the pine flatwoods, shrub and brushland, and mixed hardwood conifer forest habitat types. One pair of sandhill cranes were observed foraging within the fallow cropland on the far west side of Area 9 and Sherman's fox squirrel (*Sciurus niger shermani*) (confirmed nesting per Hillsborough County staff) was also observed within Area 9.
- e. Proposed restoration activities - Area 9 has a total of six new freshwater wetlands proposed, totaling 71.19 acres. Proposed freshwater wetlands will polish agricultural runoff that exists within the Project Area. Ten piezometers are proposed for installation to establish baseline data and determine feasibility for each proposed freshwater wetland prior to design and permitting. There is also 351.59 acres of upland restoration within Area 9. The remaining 456.89 acres of native upland and

freshwater wetland communities will require preservation/ enhancement with spot removal of non-native communities and supplemental plantings.

Project Area 10 (Figures 2 and Appendix D)

- a. Site Access - The western, southern, and central portions of this site can be accessed by multiple gates with Hillsborough County and/or District locks located along Grange Hall Road. The eastern most portions of this area are accessed via a gate located along Grange Hall Road adjacent to offsite agriculture fields. The vast majority of the northern area is accessible only on foot. Note that several of the interior roads are currently in disrepair with multiple washouts and vegetation growth.
- b. Unauthorized Encroachment - No unauthorized use or evidence thereof was observed.
- c. Cultural Resource Issues - Area 10 contains one known recorded cultural resource that may warrant an additional cultural resource investigation prior to any restoration activities that involve earthwork or heavy equipment operation.
- d. Presence of listed/threatened species - No listed species were observed within Area 10 during the site inspections.
- e. Proposed restoration activities - Area 10 consists of large areas of native upland and wetland communities that occur throughout the project area. Currently, 599.83 acres are identified for preservation/enhancement including removal of non-native plants, supplemental plantings, and prescribed burns. Restoration of 61.75 acres of upland communities is suggested in existing disturbed areas located along the southwestern and northwestern boundaries.

3.2 Conceptual Restoration Plan Budget Estimates

Using the prepared Conceptual Restoration Plan for the Preserve, planning level costs were developed utilizing costs from both the SWIM program (average cost per acre restored) as well as industry averages based on Cardno experience. From these acreages and planning level thresholds, cost estimates were developed for each of the restoration categories using the following planning level costs.

- \$3,000 per acre for upland preservation/enhancement
- \$3,000 per acre for wetland preservation/enhancement
- \$3,000 per acre for upland restoration
- \$35,000 per acre wetland creation (freshwater and estuarine)

The costs were then summed to provide a total cost of restoration for each Project Area and included in a summary table. Additionally, total costs were also calculated for each of five proposed conceptual categories; upland restoration, upland preservation/enhancement, freshwater wetland creation, estuarine wetland creation, and wetland preservation/enhancement. The resulting estimated budget is provided in the following tables.

Table 3-2 Project Area 1 Restoration Costs

Restoration Category	Restoration Acreage	Restoration Cost Per Acre	Total Cost of Restoration
Upland Restoration	40.29	\$3,000.00	\$120,870.00
Upland Preservation/Enhancement	178.64	\$3,000.00	\$535,920.00
Wetland Preservation/Enhancement	67.67	\$3,000.00	\$203,010.00
Freshwater Wetland Creation	0.17	\$35,000.00	\$5,950.00
Estuarine Wetland Creation	0.20	\$35,000.00	\$7,000.00
Total	286.97		\$872,750.00

Table 3-3 Project Area 2 Restoration Costs

Restoration Category	Restoration Acreage	Restoration Cost Per Acre	Total Cost of Restoration
Upland Restoration	126.42	\$3,000.00	\$379,260.00
Upland Preservation/Enhancement	145.41	\$3,000.00	\$436,230.00
Wetland Preservation/Enhancement	55.89	\$3,000.00	\$167,670.00
Freshwater Wetland Creation	30.49	\$35,000.00	\$1,067,150.00
Estuarine Wetland Creation	0.76	\$35,000.00	\$26,600.00
Total	358.97		\$2,076,910.00

Table 3-4 Project Area 3 Restoration Costs

Restoration Category	Restoration Acreage	Restoration Cost Per Acre	Total Cost of Restoration
Upland Restoration	95.07	\$3,000.00	\$285,210.00
Upland Preservation/Enhancement	106.62	\$3,000.00	\$319,860.00
Wetland Preservation/Enhancement	130.13	\$3,000.00	\$390,390.00
Freshwater Wetland Creation	14.78	\$35,000.00	\$517,300.00
Estuarine Wetland Creation	4.03	\$35,000.00	\$141,050.00
Total	350.63		\$1,653,810.00

Table 3-5 Project Area 4 Restoration Costs

Restoration Category	Restoration Acreage	Restoration Cost Per Acre	Total Cost of Restoration
Upland Restoration	0.00	\$3,000.00	\$0.00
Upland Preservation/Enhancement	135.40	\$3,000.00	\$406,200.00
Wetland Preservation/Enhancement	119.50	\$3,000.00	\$358,500.00
Freshwater Wetland Creation	0.00	\$35,000.00	\$0.00
Estuarine Wetland Creation	0.00	\$35,000.00	\$0.00
Total	254.90		\$764,700.00

Table 3-6 Project Area 5 Restoration Costs

Restoration Category	Restoration Acreage	Restoration Cost Per Acre	Total Cost of Restoration
Upland Restoration	186.61	\$3,000.00	\$559,830.00
Upland Preservation/Enhancement	274.05	\$3,000.00	\$822,150.00
Wetland Preservation/Enhancement	187.2	\$3,000.00	\$561,600.00
Freshwater Wetland Creation	19.94	\$35,000.00	\$697,900.00
Estuarine Wetland Creation	0.0	\$35,000.00	\$0.00
Total	667.8		\$2,641,480

Table 3-7 Project Area 6 Restoration Costs

Restoration Category	Restoration Acreage	Restoration Cost Per Acre	Total Cost of Restoration
Upland Restoration	123.96	\$3,000.00	\$371,880.00
Upland Preservation/Enhancement	437.14	\$3,000.00	\$1,311,420.00
Wetland Preservation/Enhancement	275.71	\$3,000.00	\$827,130.00
Freshwater Wetland Creation	9.82	\$35,000.00	\$343,700.00
Estuarine Wetland Creation	0.0	\$35,000.00	\$0.00
Total	846.63		\$2,854,130.00

Table 3-8 Project Area 7 Restoration Costs

Restoration Category	Restoration Acreage	Restoration Cost Per Acre	Total Cost of Restoration
Upland Restoration	711.38	\$3,000.00	\$2,134,140.00
Upland Preservation/Enhancement	345.35	\$3,000.00	\$1,036,050.00
Wetland Preservation/Enhancement	376.8	\$3,000.00	\$1,130,400.00
Freshwater Wetland Creation	21.83	\$35,000.00	\$764,050.00
Estuarine Wetland Creation	0.0	\$35,000.00	\$0.00
Total	1,455.36		\$5,064,640.00

Table 3-9 Project Area 8 Restoration Costs

Restoration Category	Restoration Acreage	Restoration Cost Per Acre	Total Cost of Restoration
Upland Restoration	487.40	\$3,000.00	\$1,462,200.00
Upland Preservation/Enhancement	587.81	\$3,000.00	\$1,763,430.00
Wetland Preservation/Enhancement	296.51	\$3,000.00	\$889,530.00
Freshwater Wetland Creation	52.24	\$35,000.00	\$1,828,400.00
Estuarine Wetland Creation	0.0	\$35,000.00	\$0.00
Total	1,423.96		\$5,943,560.00

Table 3-10 Project Area 9 Restoration Costs

Restoration Category	Restoration Acreage	Restoration Cost Per Acre	Total Cost of Restoration
Upland Restoration	351.59	\$3,000.00	\$1,054,770.00
Upland Preservation/Enhancement	284.10	\$3,000.00	\$852,300.00
Wetland Preservation/Enhancement	172.79	\$3,000.00	\$518,370.00
Freshwater Wetland Creation	71.19	\$35,000.00	\$2,491,650.00
Estuarine Wetland Creation	0.00	\$35,000.00	\$0.00
Total	879.67		\$4,917,090.00

Table 3-11 Project Area 10 Restoration Costs

Restoration Category	Restoration Acreage	Restoration Cost Per Acre	Total Cost of Restoration
Upland Restoration	61.75	\$3,000.00	\$185,250.00
Upland Preservation/Enhancement	284.78	\$3,000.00	\$854,340.00
Wetland Preservation/Enhancement	315.05	\$3,000.00	\$945,150.00
Freshwater Wetland Creation	0.00	\$35,000.00	\$0.00
Estuarine Wetland Creation	0.00	\$35,000.00	\$0.00
Total	661.58		\$1,984,740.00

3.3 Restoration Costs Summary

Table 3.12 is a summary of restoration costs for all ten Project Areas. The table shows a total of ±7,186 acres that will require some level of enhancement/preservation, restoration, or wetland creation. All costs are estimates only and are provided for planning purposes as actual design and construction costs may vary significantly from the following costs. The estimated total cost to complete all the restoration activities is approximately \$28.8 million. Tables 3.12 and 3-13 illustrate the differences in costs between the proposed restoration activities and the total number of acres per activity.

Table 3-12 Summary of Restoration Costs for all Project Areas and Restoration Activities

Project Area	Restoration Acreage	Total Cost of Restoration
1	286.97	\$872,750.00
2	358.97	\$2,076,910.00
3	350.63	\$1,653,810.00
4	254.9	\$764,700.00
5	667.8	\$2,641,480.00
6	846.63	\$2,854,130.00
7	1,455.36	\$5,064,640.00
8	1,423.96	\$5,943,560.00
9	879.67	\$4,917,090.00
10	661.58	\$1,984,740.00
Total	7,186.47	\$28,773,810.00

Table 3-13 Summary of Restoration Costs for all Restoration Activities

Restoration Category	Restoration Acreage	Restoration Cost Per Acre	Total Cost of Restoration
Upland Restoration	2184.47	\$3,000.00	\$6,553,410.00
Upland Preservation/Enhancement	2779.30	\$3,000.00	\$8,337,900.00
Freshwater Wetland Creation	220.46	\$35,000.00	\$7,716,100.00
Estuarine Wetland Creation	4.99	\$35,000.00	\$174,650.00
Wetland Preservation/Enhancement	1997.25	\$3,000.00	\$5,991,750.00

3.4 Prioritization of Project Areas for Restoration

A Ranking Criteria Matrix was developed by SWFWMD, Hillsborough County, and Cardno staff to provide an overall prioritization and ranking of restoration activities within the ten identified Project Areas (Table 3-14). The 13 Ranking Matrix criteria are mostly environmental oriented but also include site access, site security, cultural resources, and post restoration maintenance costs. It is important to note that this criteria was developed as a first cut for identifying priority areas for future restoration with the understanding that over time both the priorities and priority areas are likely to change.

Representatives from SWFWMD, Hillsborough County, and Cardno assigned numerical values to each of the criteria for the ten Project Areas:

- Criteria did not apply = 0
- A “No” answer to the criteria = 1
- A “Yes” answer to the criteria = 2
- Criteria has a negative impact = -1

The matrix was populated and values were summed for each Project Area. Higher scores represent the highest restoration priority and lower scores represent lower priorities for restoration which are typically areas with large native communities and fewer restoration opportunities. Table 3-14 contains the Ranking Matrix with numerical scores for each criteria and totaled scores for each Project Area. Table 3-15 is the ranking priority for restoration of the Project Areas from highest to lowest score. Project Area 8, Area 7, and Area 3 were ranked the top three priority areas for restoration activities (Table 3-15).

Table 3-14 Restoration Ranking Criteria Matrix

Ranking Criteria Matrix Project Areas	1	2	3	4	5	6	7	8	9	10
Lead to improved water quality	1	2	2	1	2	1	2	2	2	1
Improve groundwater recharge in a water resource caution area	1	2	2	1	2	2	1	2	2	1
Reestablish natural hydroperiod	1	1	1	1	2	1	2	2	2	1
Enhance, protect or restore natural community population identified by either state or federal agencies as severely limited, endangered or threatened	2	2	2	1	2	2	2	2	2	2
Contribute to native species diversity in the region	2	2	2	1	2	2	2	2	2	2
Site dominated by non-native vegetation	1	1	2	1	2	1	2	2	2	1

Ranking Criteria Matrix Project Areas	1	2	3	4	5	6	7	8	9	10
Enhance a unique, regionally scarce or imperiled community	2	2	2	1	2	2	2	2	2	2
Prevent continued habitat loss or damage due to pollution or environmental degradation	0	0	2	0	2	0	2	2	2	0
No Social issues within project vicinity *	1	1	1	-1	-1	1	1	1	1	1
No Archaeological issues *	1	1	1	1	-1	1	1	1	1	1
No Site security issues*	1	1	1	1	-1	1	1	1	1	1
Intensive Post project operation and maintenance *	1	-1	-1	0	-1	1	-1	-1	-1	1
Easy site access*	-1	-1	2	2	2	-1	2	2	-1	-1
Total	13	13	19	10	14	14	19	20	17	13

*Negative Ranking Criteria

Table 3-15 Project Area Restoration Priority Ranking

Project Area	Ranking Priority Score
8	20
7	19
3	19
9	17
5	14
6	14
1	13
2	13
10	13
4	10

4 Summary

Goals of the Little Manatee River Corridor Restoration Plan Project were: 1) map and assess the distribution and character of existing habitats, hydrological conditions, and archaeological resources throughout the 7359.47 acres of publicly owned preserve lands along the Little Manatee River; 2) create preliminary proposed plans for the preservation, enhancement, restoration, and/or creation of estuarine, freshwater, and upland habitats (habitat mosaics) for the corridor tracts. A time series of historical and current aerials were evaluated to better understand original habitats and the changes to the landscape over time, followed by in-depth GPS field mapping of all habitats throughout the preserve. The corridor parcels have undergone significant changes since the early-to-mid 1900s. Preserve lands currently encompass a range of natural and altered habitat types; anthropological habitat impacts include widespread agricultural uses, timber harvests, a borrow pit, robust growth and distribution of non-native vegetation, and altered drainage patterns via ditching/diking.

Ten project sectors (283.25 to 1455.36 acres in size) were delineated along the corridor, with conceptual project plans proposed for each sector involving combinations of habitat preservation, enhancement, restoration, and/or creation. Large expanses of intact upland and wetland habitats (4776.55 acres) are proposed for preservation/enhancement (i.e., non-native plants removed, with additional native plant species installed as warranted). Widespread historic pine flatwoods communities (2184.47 acres) are proposed for restoration. Degraded/destroyed relic freshwater wetlands are being targeted for restoration and, in many cases, enlarged to provide additional freshwater habitats. As part of the project's design, some freshwater wetlands are proposed to intercept offsite agricultural drainage, a design which will foster partial cleansing (i.e., "polishing") of stormwater prior to its discharge to the Little Manatee River. Installation and monitoring of 40 piezometers is recommended throughout areas targeted for wetland projects (225.45 acres); the water level data will be used to determine the feasibility of the wetland project and, if feasible, to improve project designs. Although limited due to site conditions, some additional estuarine fisheries habitats are proposed (4.99 acres), which can help establish important low salinity nursery areas. Lastly, project designs will help restore altered hydrologies of sectors.

Weighted ranking criteria were established to prioritize habitat projects with the 10 sectors, and a priority list was created for consideration of the order of implementation of habitat projects. Project footprints total 7186.47 acres of preserved/enhanced/restored/created habitats for a preliminary estimated (current) cost of \$28,773,810; individual projected costs were detailed per project sector per habitat type.

This plan should be considered a conceptual blueprint for habitat projects throughout the corridor. Due to estimated costs, completion of this project is envisioned to be done in phases over a 10-20+ year period. As such, this document should be viewed as a framework plan, providing guidance on possible habitat projects. Actual design and project implementation will depend upon additional data collection (e.g., piezometer data, etc.), recognizing that habitats and site conditions existing today will change over time due to plant community maturation, the probable spread of non-native vegetation, and new impacts as a result of changes in adjacent private properties (i.e., development, new drainage patterns, etc.). In addition, it would not be unreasonable to assume project costs will increase over time.

While areas proposed for upland preservation/enhancement/restoration can proceed with SWFWMD and Hillsborough County staff designs and (currently) no environmental permitting, all wetland work will require fully engineered plans and multiple permits from various environmental agencies (e.g., Florida Department of Environmental Protection, U. S. Army Corps of Engineers, Environmental Protection Commission of Hillsborough County). The majority (if not all) of this project is envisioned to be performed by the Surface Water Improvement and Management (SWIM) Program of the Southwest Florida Water Management District in partnership with the Conservation and Environmental Lands Management Department (CELMD) of Hillsborough County. To expedite completion of these proposed projects, aside from annual agency/county budgeting, creative funding opportunities (i.e., grants) should be explored by SWIM and CELMD. As a component of the projects, funding also must address post-project site management. Site management will be imperative for the long term success of the rehabilitation of the Little Manatee River corridor public properties. The importance of these habitat projects for the future of Tampa Bay and its watershed cannot be understated for the wildlife and public that will endeavor to use these environmental resources.

5 References

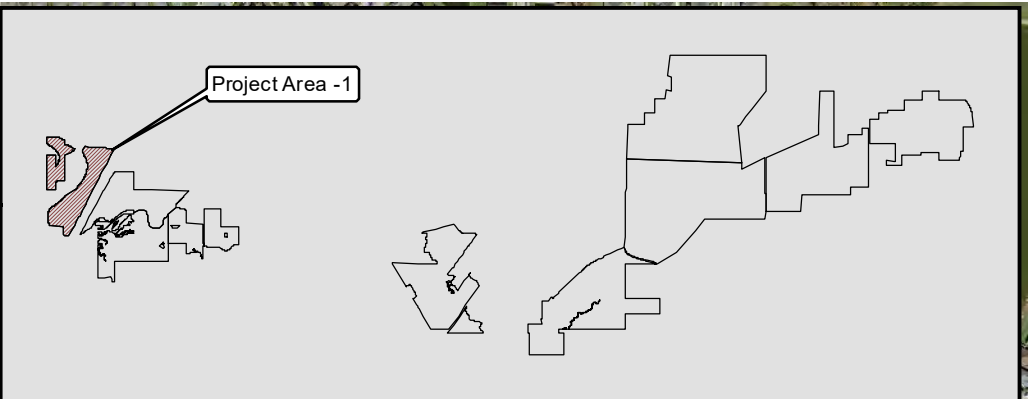
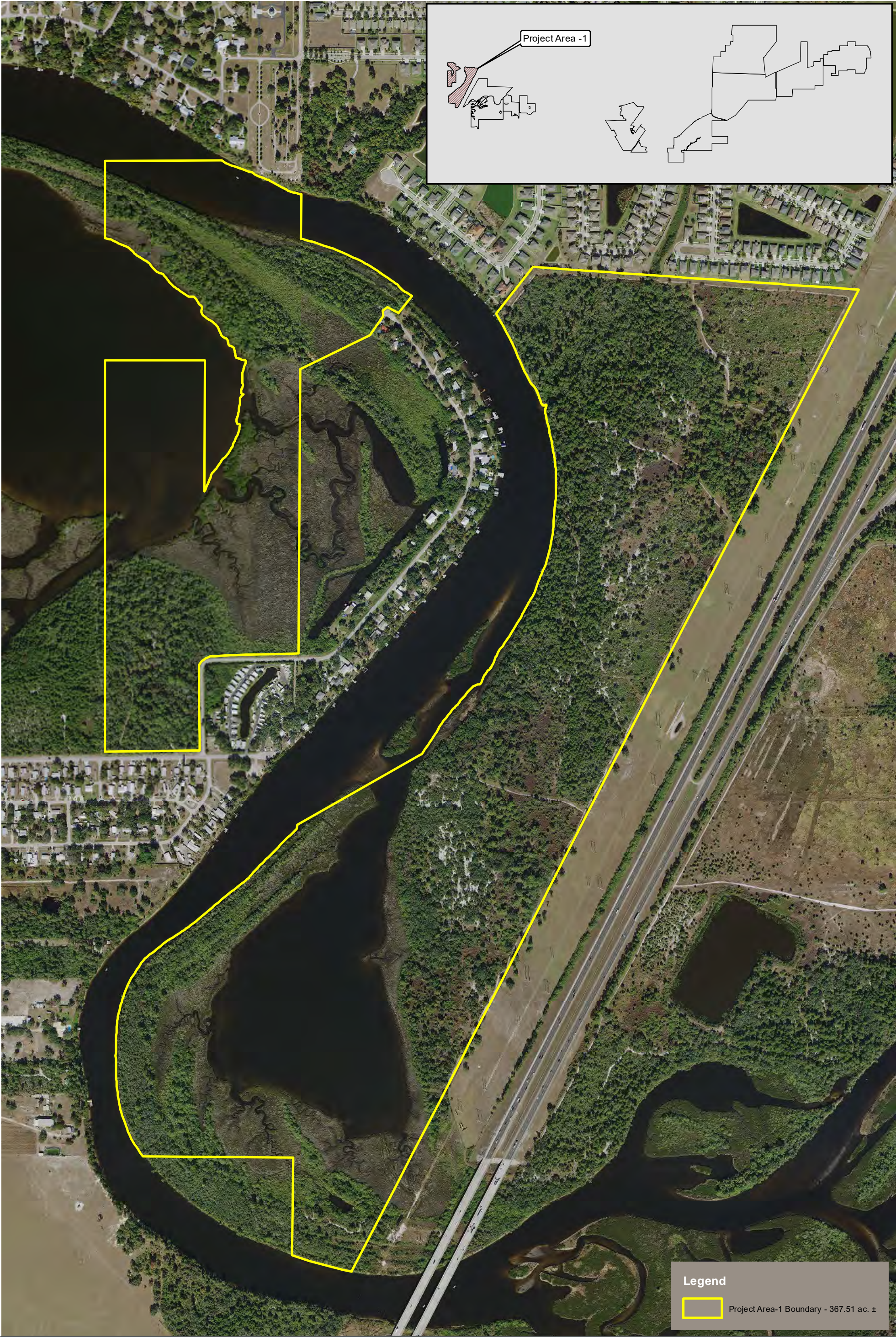
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Conceptual Restoration
Plan Feasibility Report

APPENDIX

A

AERIAL PHOTOGRAPHS



Legend

Project Area-1 Boundary - 367.51 ac. ±

Aerial Map - Area 1
Little Manatee River Preserve Location
Hillsborough County, Florida

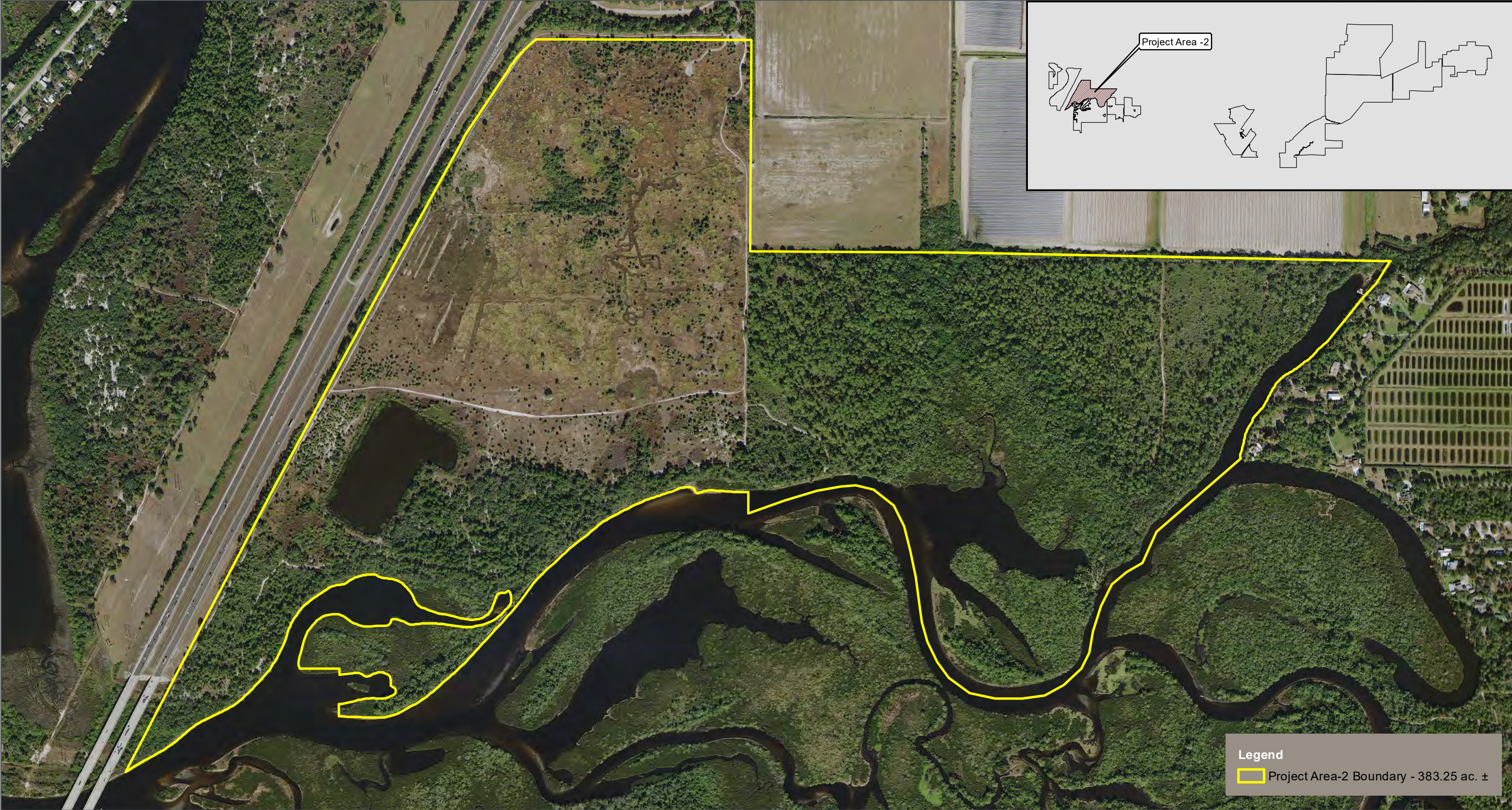


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Image: 2017
Data Source:

Sec 19-20, 29-30
Twp 32 S
Rng 19 E

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Image:2017

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Sec 20, 28-29
Twp 32 S
Rng 19 E

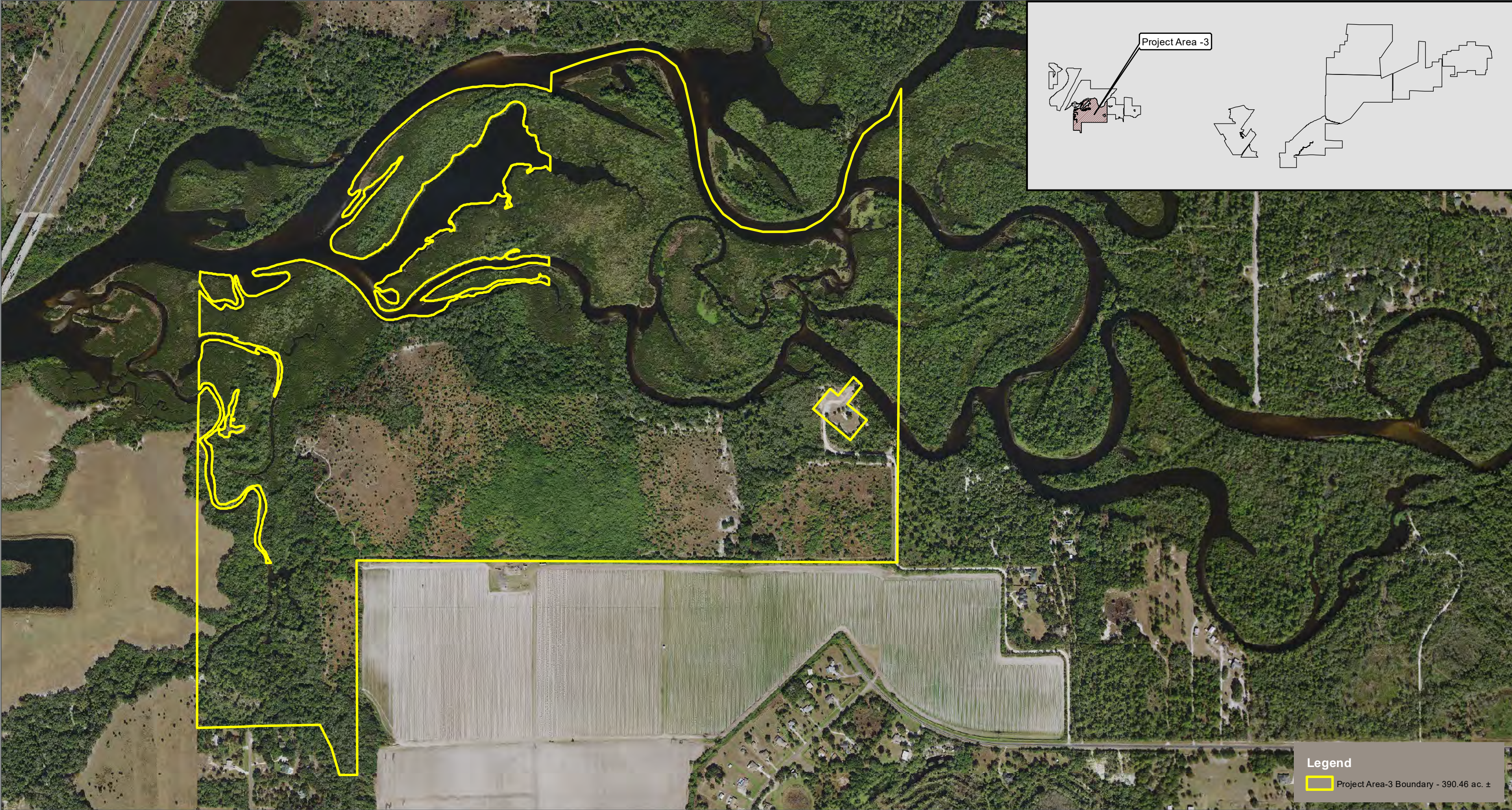
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Aerial Map - Area 2

Little Manatee River Preserve Location
Hillsborough County, Florida



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Legend
Project Area-3 Boundary - 390.46 ac. ±





Image:2017
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Sec 28-29, 32
Twp 32 S
Rng 19 E

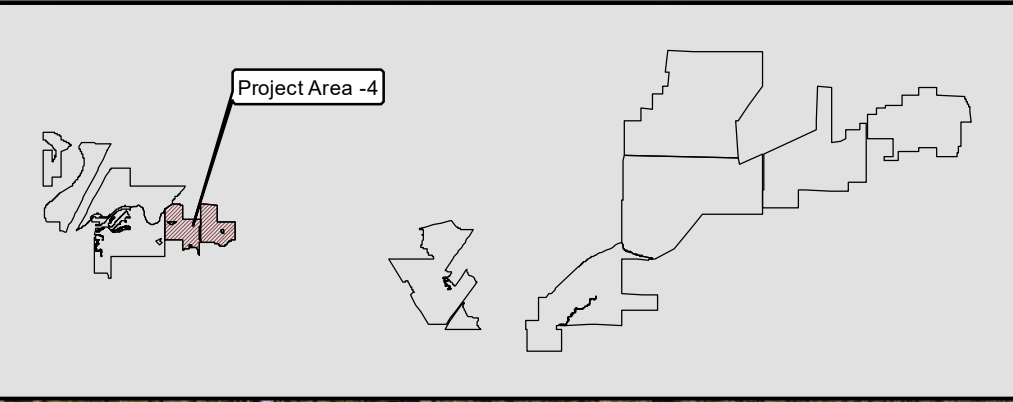
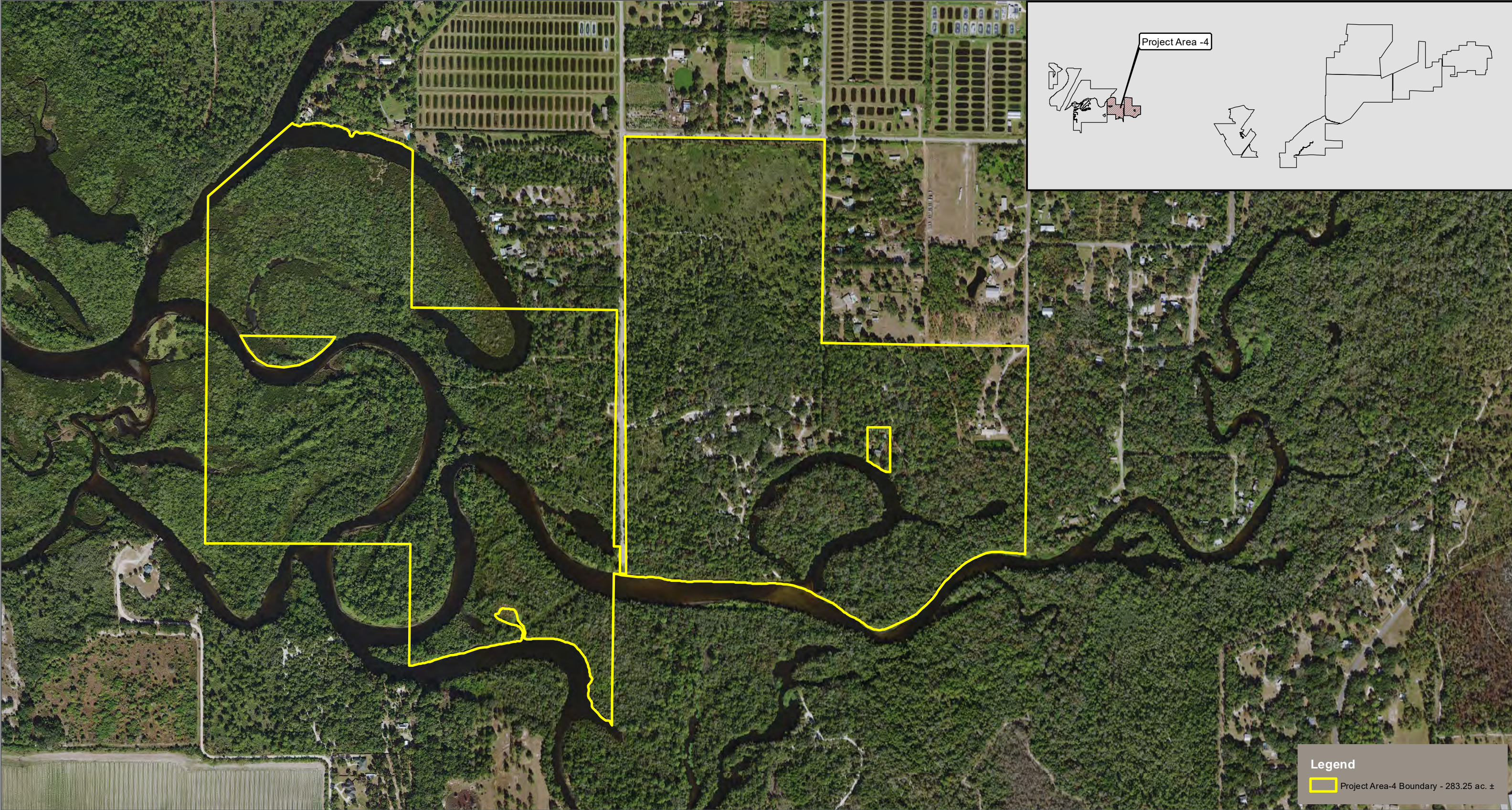
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Aerial Map - Area 3


Little Manatee River Preserve Location
Hillsborough County, Florida



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Legend

 Project Area-4 Boundary - 283.25 ac. ±




Image:2017
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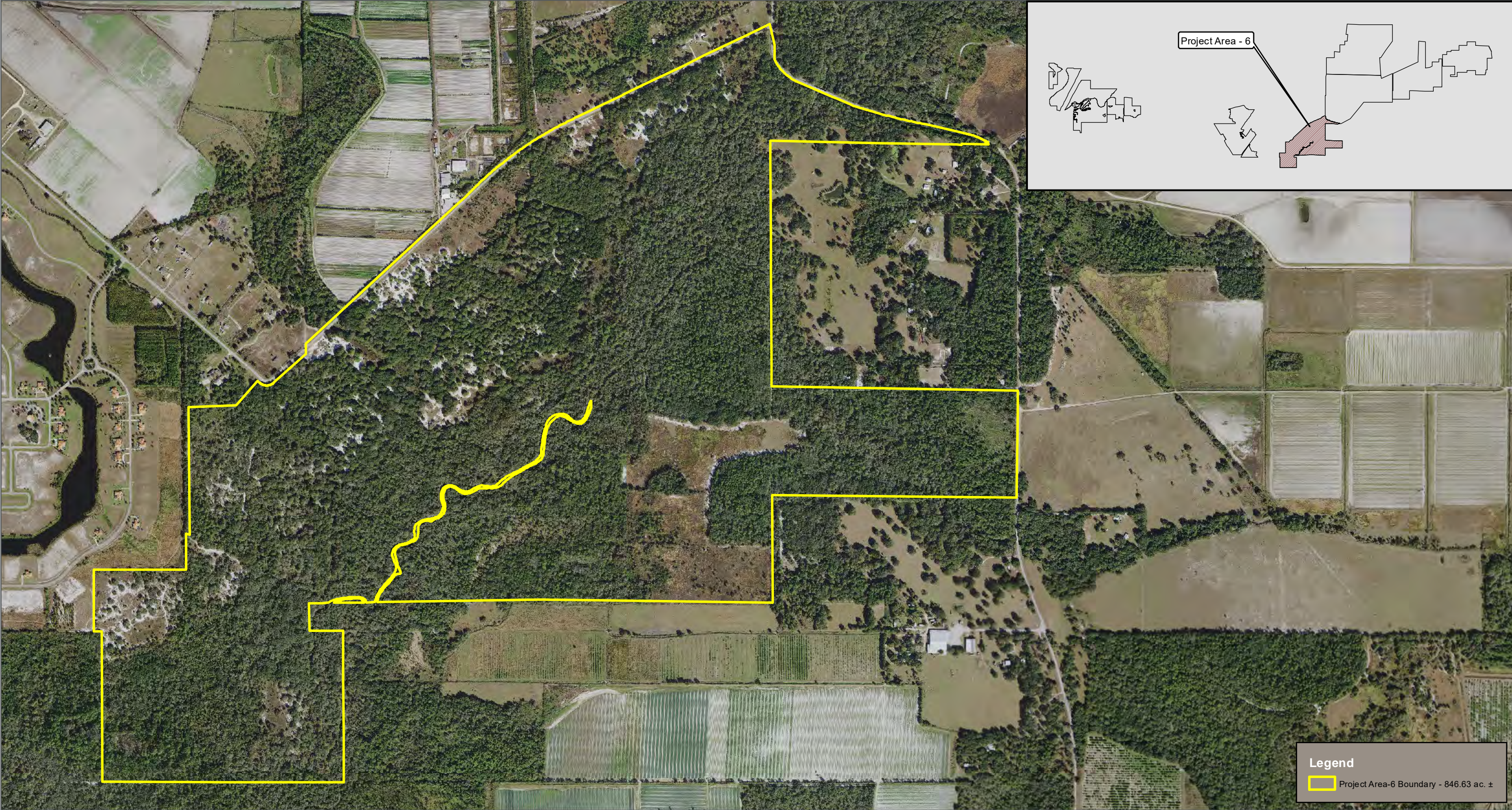
Aerial Map - Area 4

Little Manatee River Preserve Location
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0 1,000 2,000 Feet
0 305 610 Meters

Aerial Map - Area 6

Little Manatee River Preserve Location
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Aerial Map - Area 7

Little Manatee River Preserve Location
Hillsborough County, Florida



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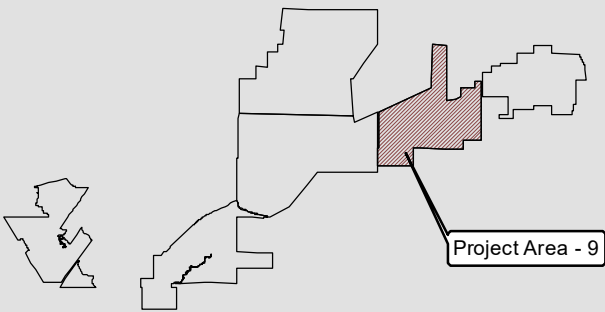
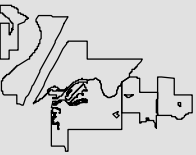
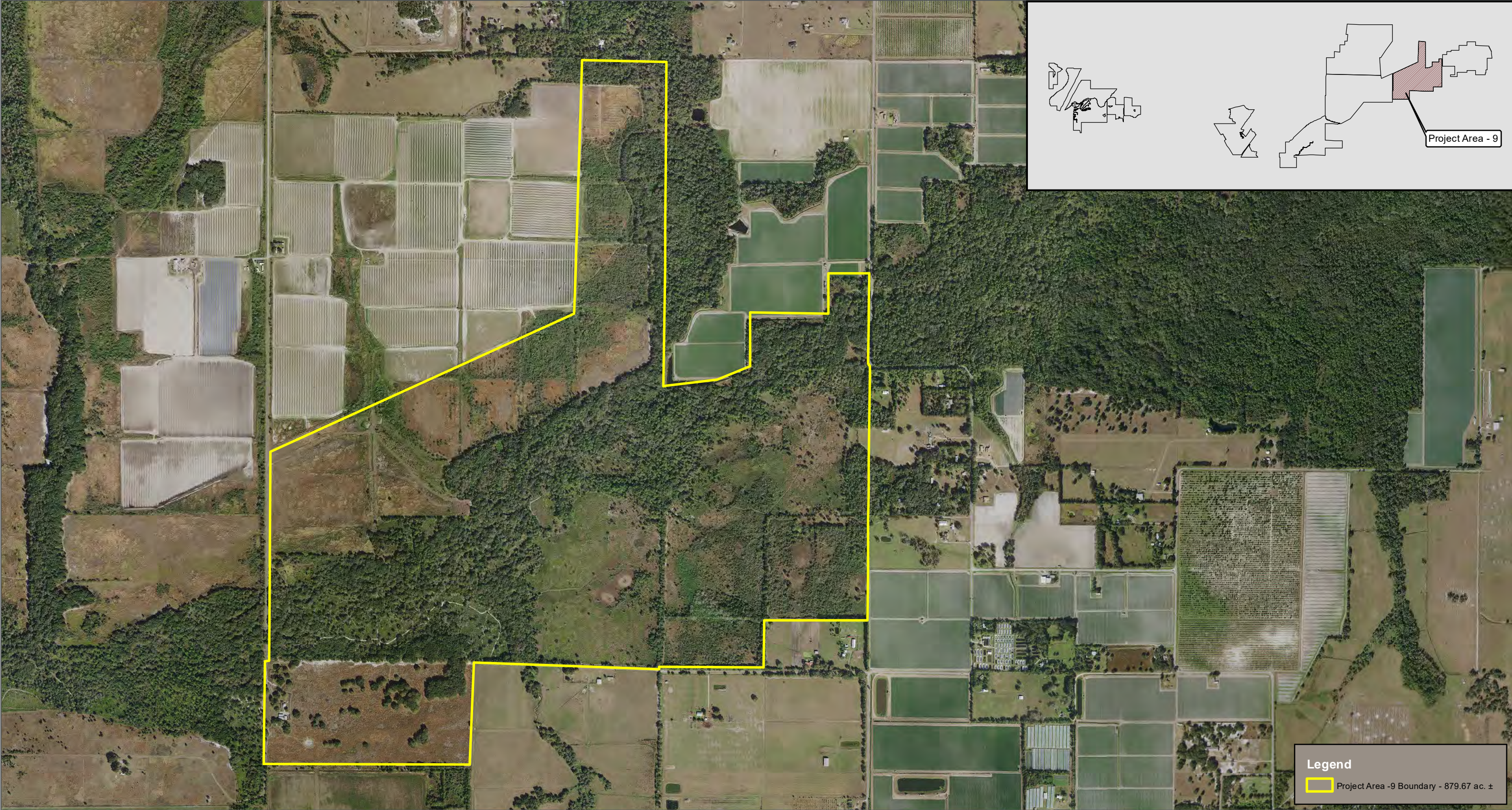
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Aerial Map- Area 8

Little Manatee River Preserve Location
Hillsborough County, Florida

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Legend
Project Area -9 Boundary - 879.67 ac. ±



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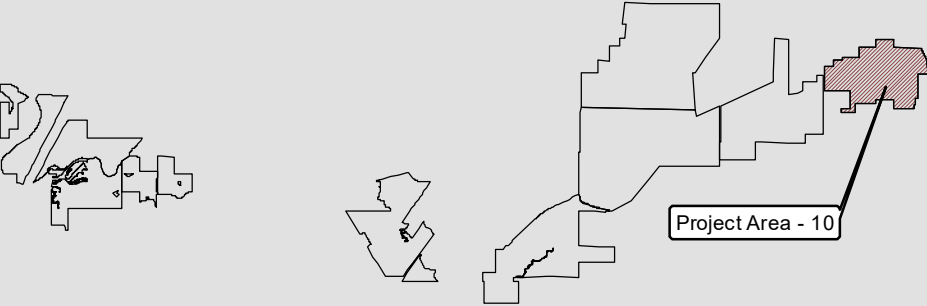
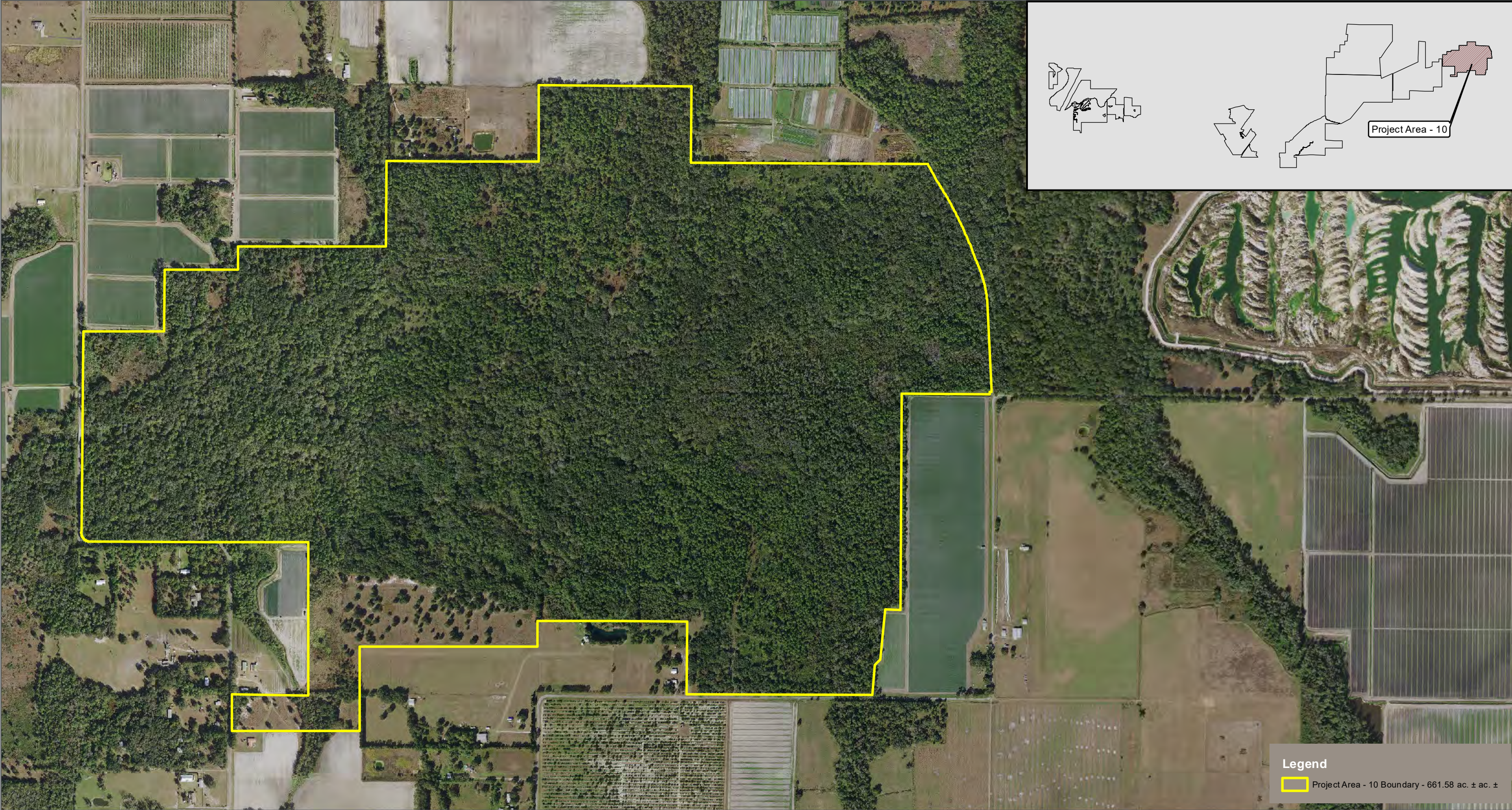
0 1,200 2,400 Feet
0 366 732 Meters

Aerial Map- Area 9

Little Manatee River Preserve Location
Hillsborough County, Florida



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Legend
Project Area - 10 Boundary - 661.58 ac. ± ac. ±



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0 800 1,600 Feet
0 244 488 Meters

Aerial Map- Area 10

Little Manatee River Preserve Location
Hillsborough County, Florida



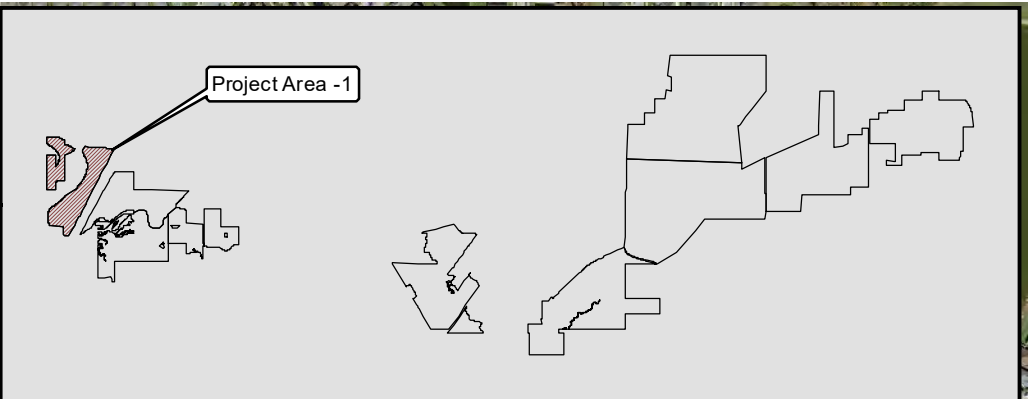
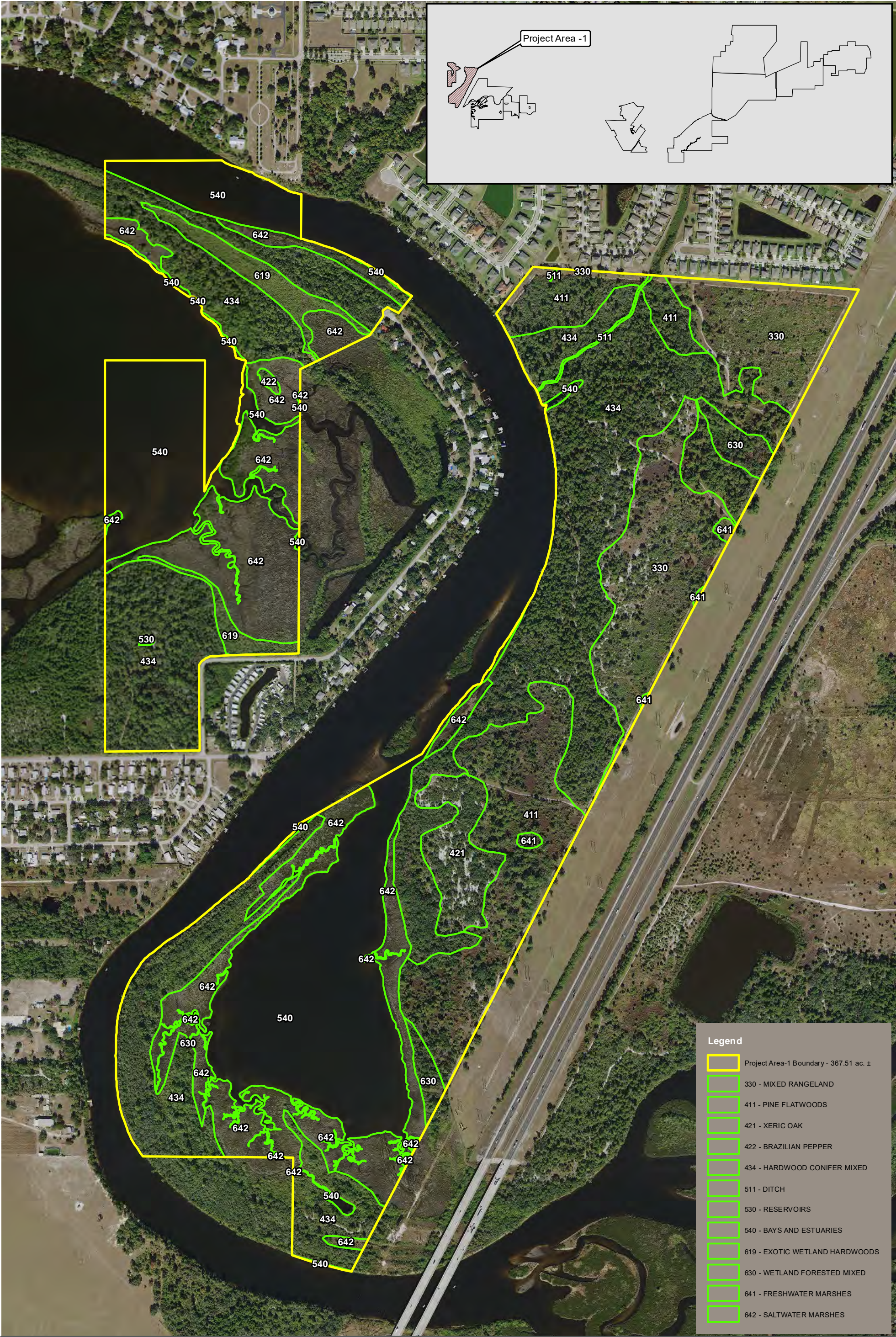
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APPENDIX

B

LAND USE MAPS



Legend

- Project Area-1 Boundary - 367.51 ac. ±
- 330 - MIXED RANGELAND
- 411 - PINE FLATWOODS
- 421 - XERIC OAK
- 422 - BRAZILIAN PEPPER
- 434 - HARDWOOD CONIFER MIXED
- 511 - DITCH
- 530 - RESERVOIRS
- 540 - BAYS AND ESTUARIES
- 619 - EXOTIC WETLAND HARDWOODS
- 630 - WETLAND FORESTED MIXED
- 641 - FRESHWATER MARSHES
- 642 - SALTWATER MARSHES



Image: 2017
Data Source:

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Rng 19 E

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Land Use Map - Area 1
Little Manatee River Preserve Location
Hillsborough County, Florida



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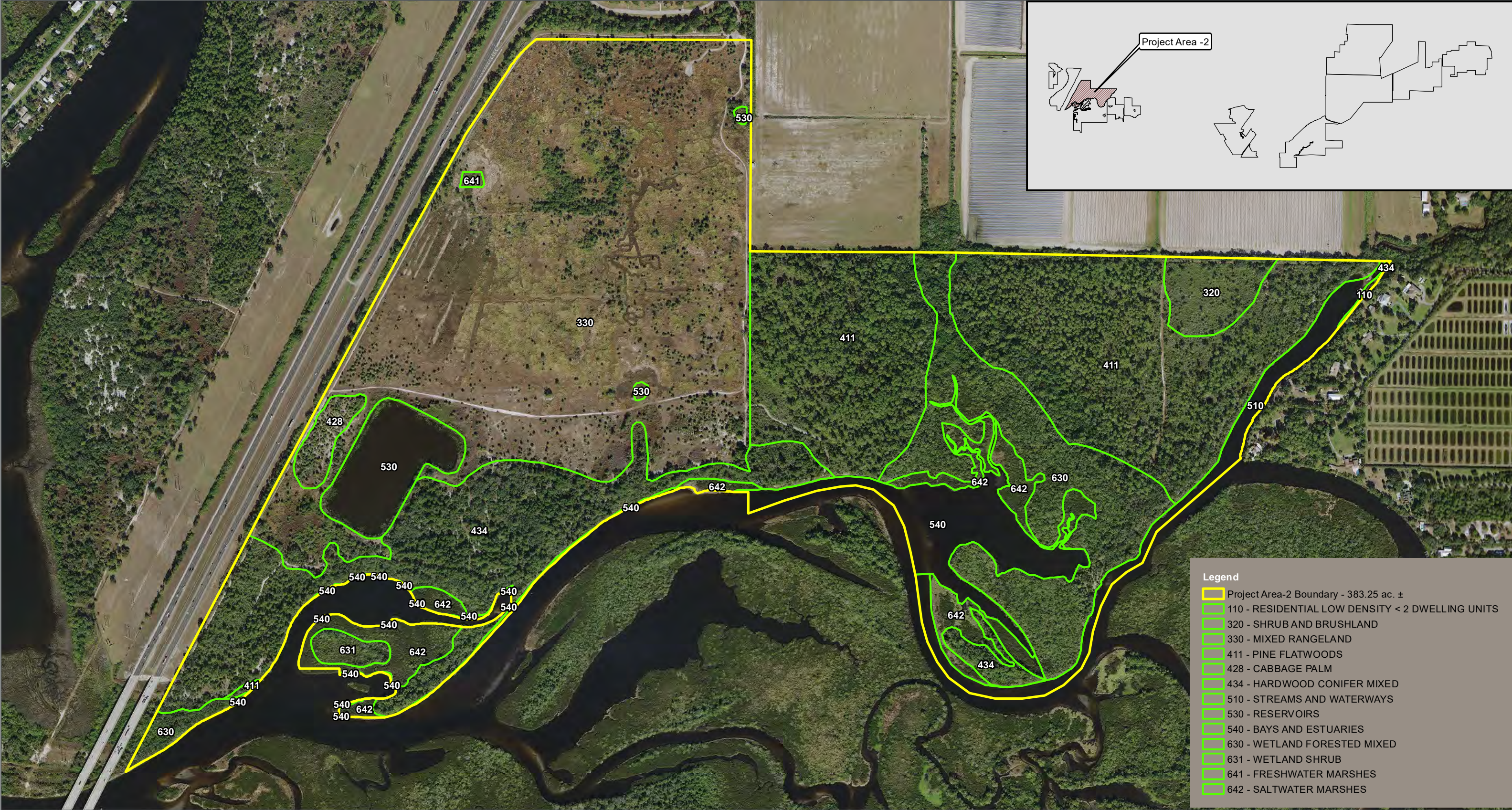


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Sec 20, 28-29
Twp 32 S
Rng 19 E

0 600 1,200 Feet
0 183 366 Meters

Land Use Map - Area 2

Little Manatee River Preserve Location
Hillsborough County, Florida



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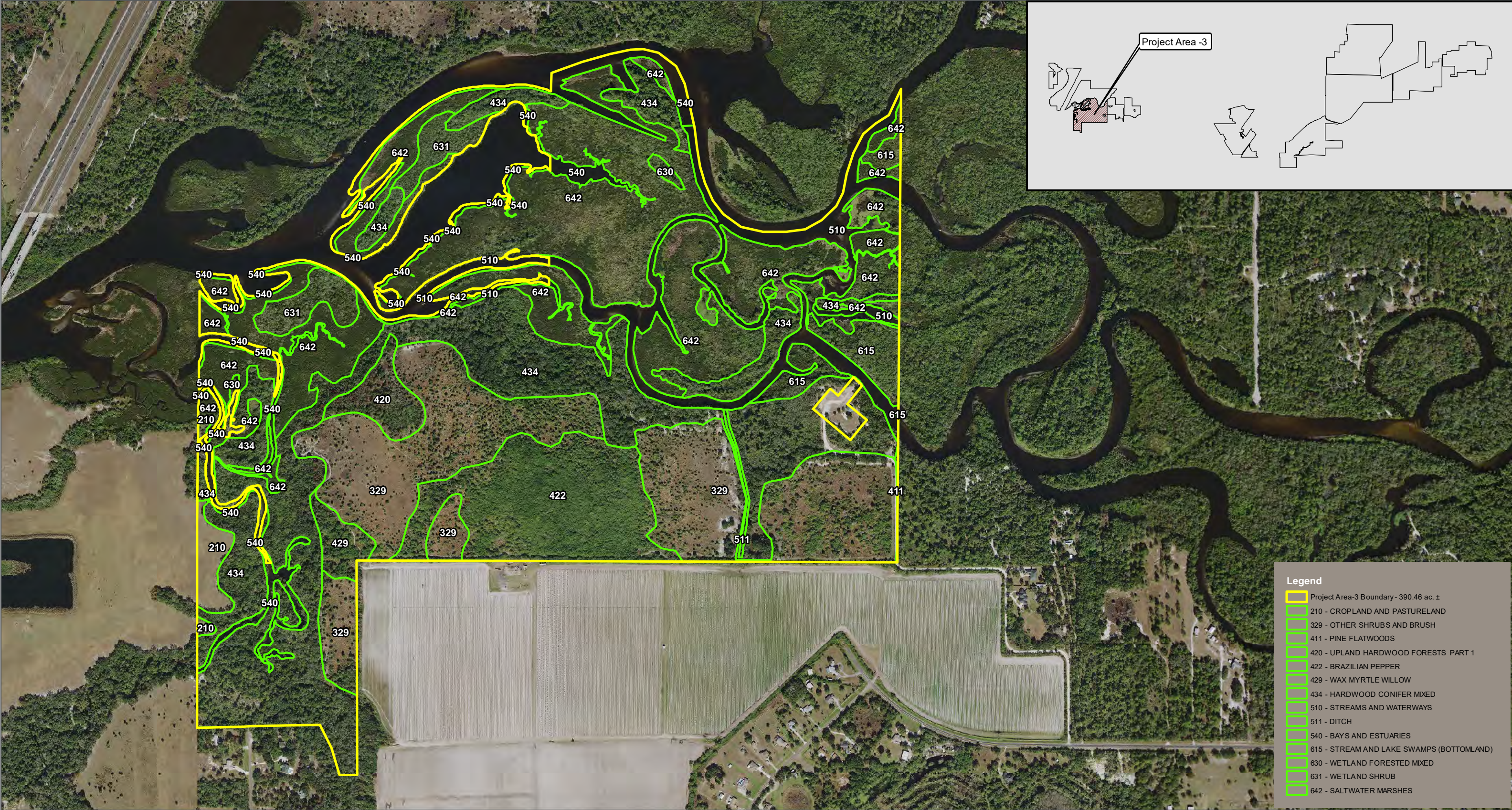


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Land Use Map - Area 3

Little Manatee River Preserve Location
Hillsborough County, Florida



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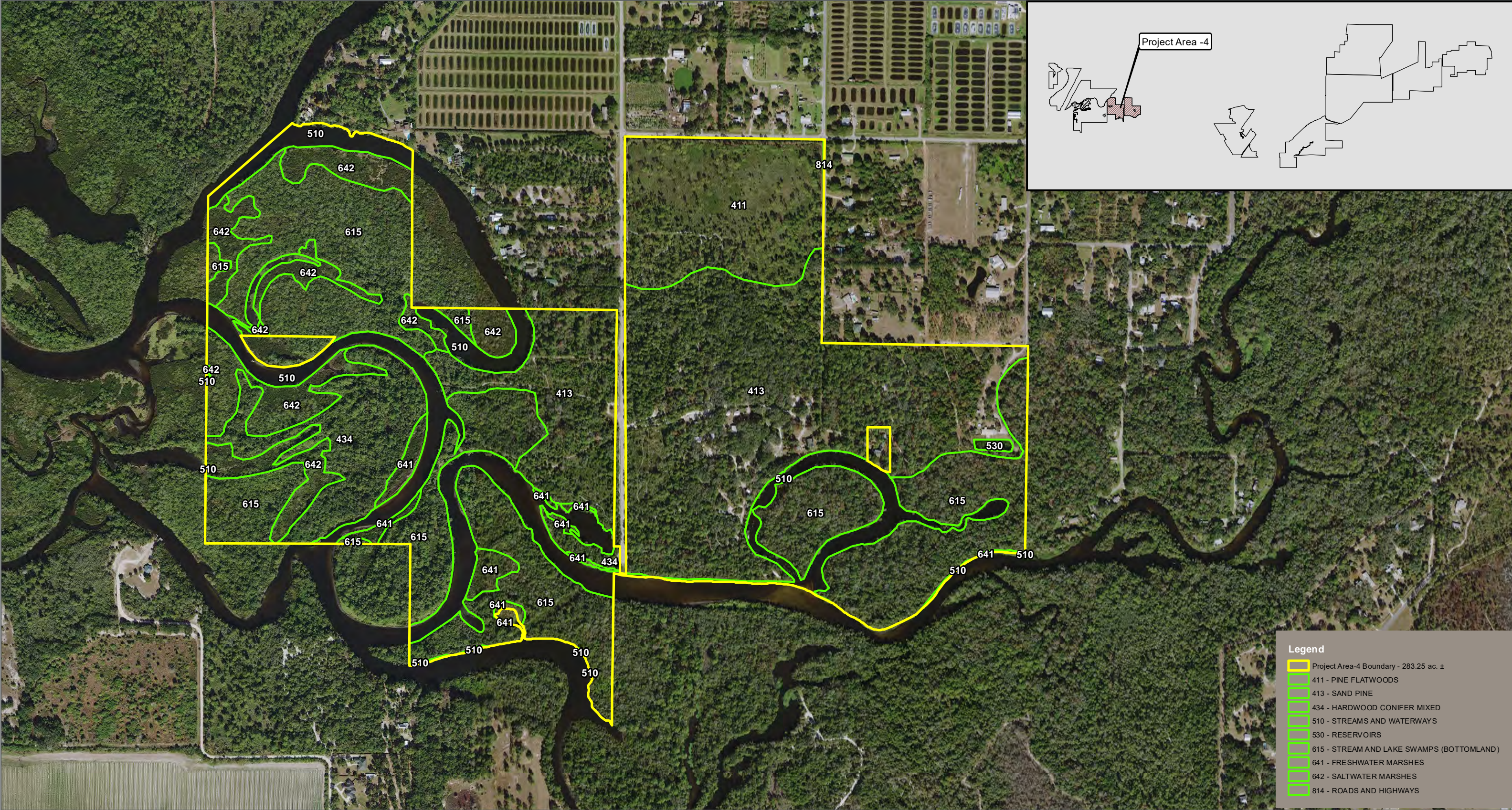


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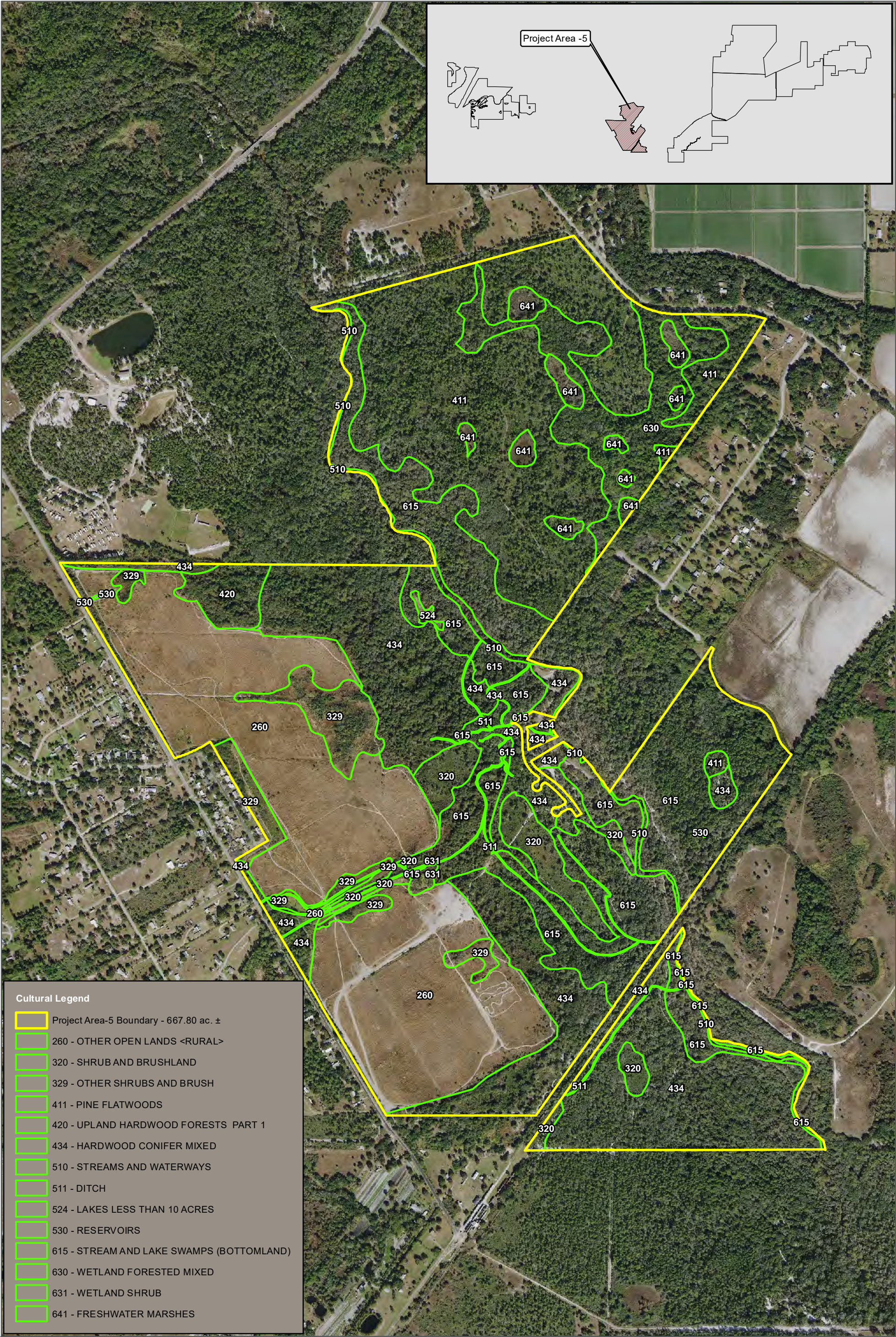
0 600 1,200 Feet
0 183 366 Meters

Land Use Map - Area 4

Little Manatee River Preserve Location
Hillsborough County, Florida



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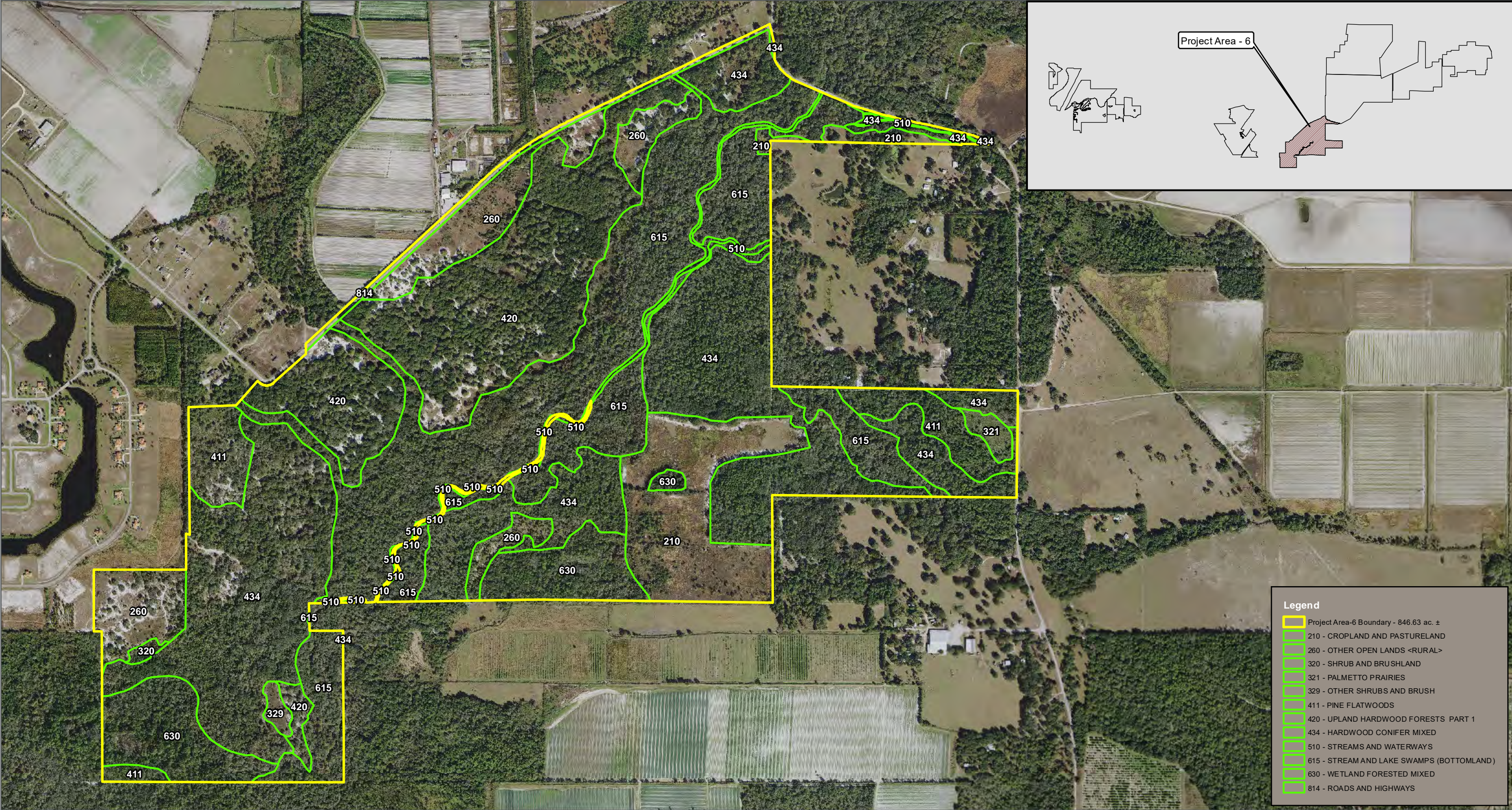


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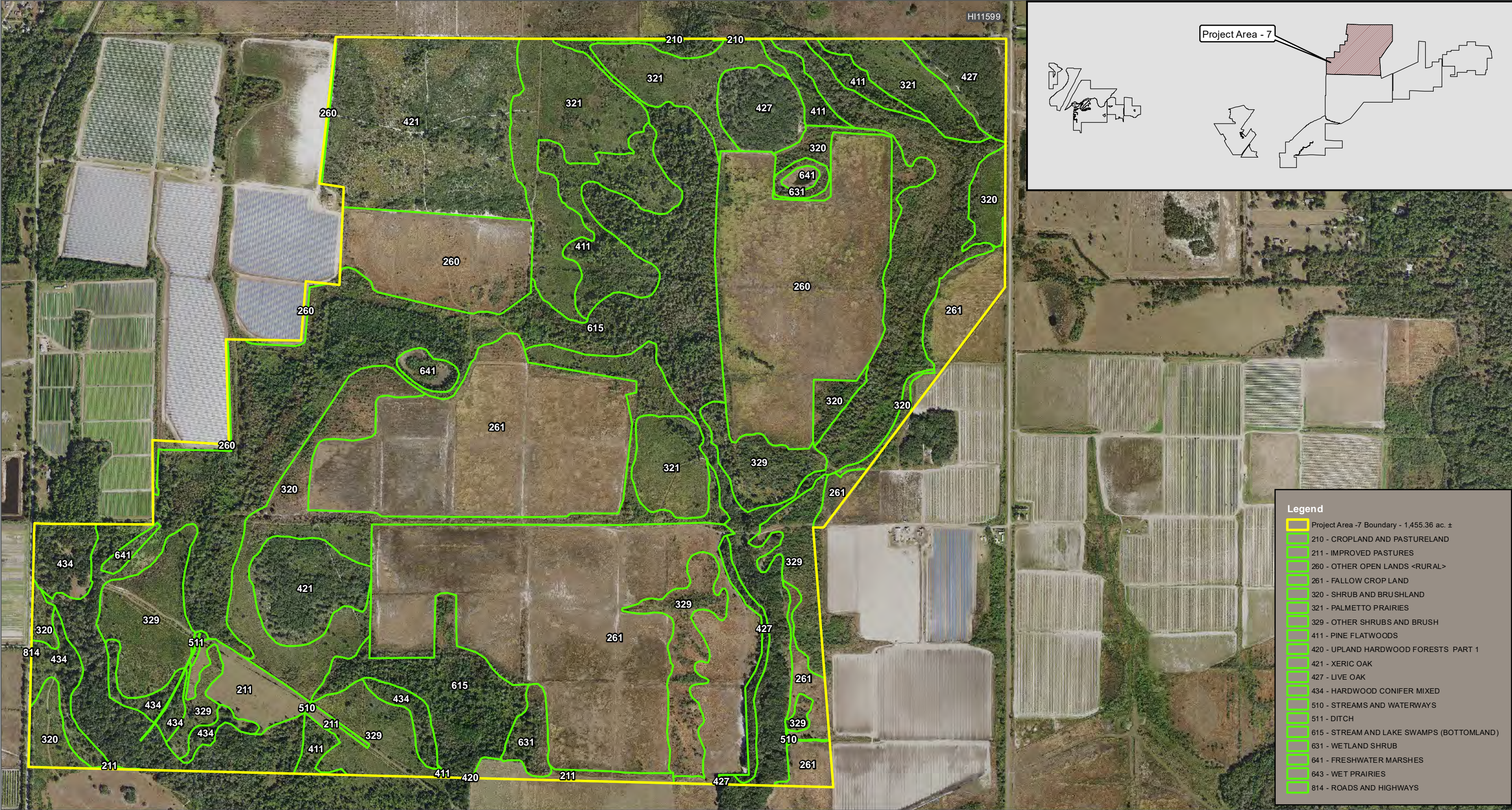


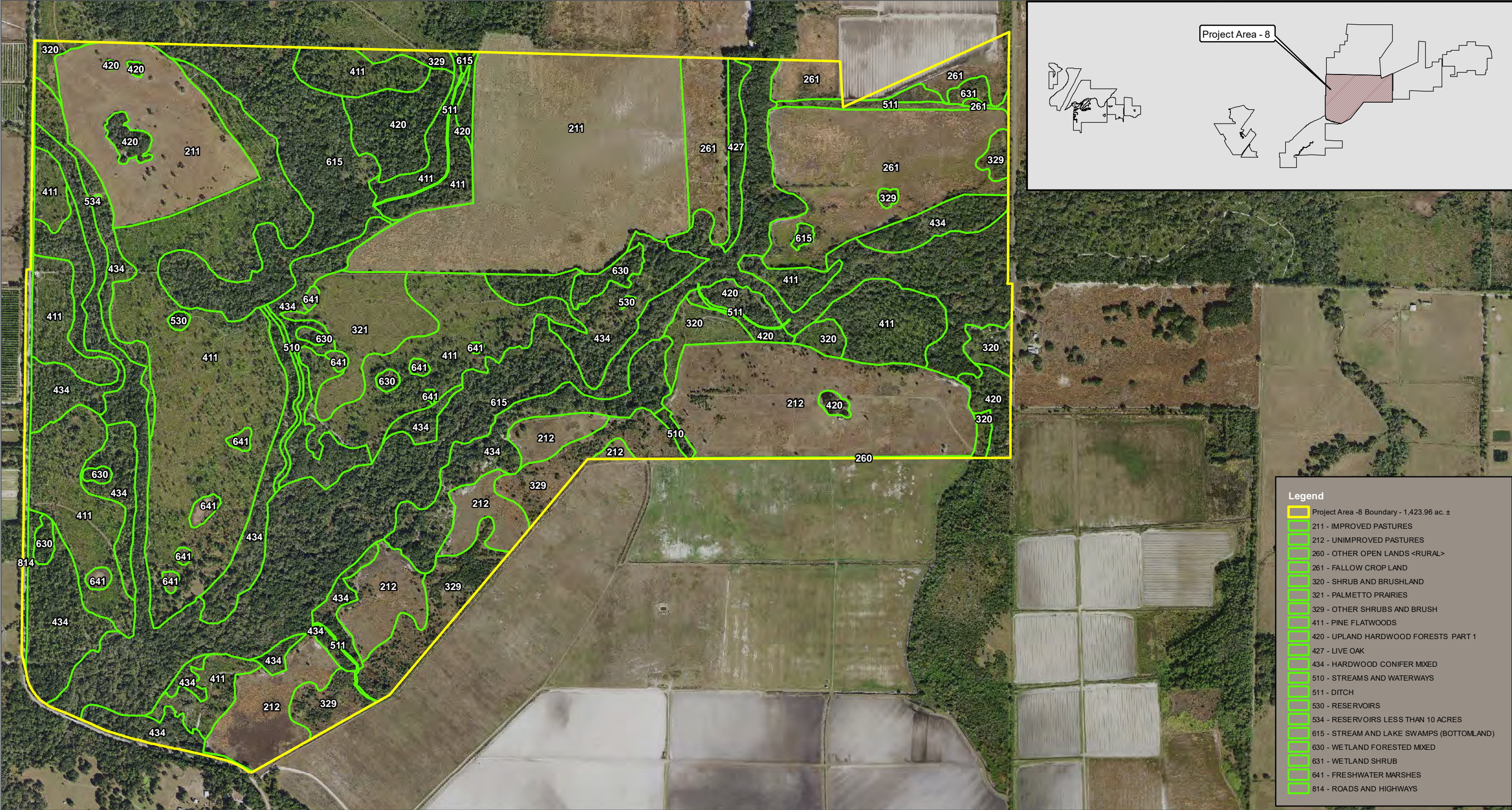
Land Use Map - Area 6

Little Manatee River Preserve Location
Hillsborough and Manatee County, Florida



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0 1,000 2,000 Feet
0 305 610 Meters

Land Use Map - Area 8

Little Manatee River Preserve Location
Hillsborough County, Florida



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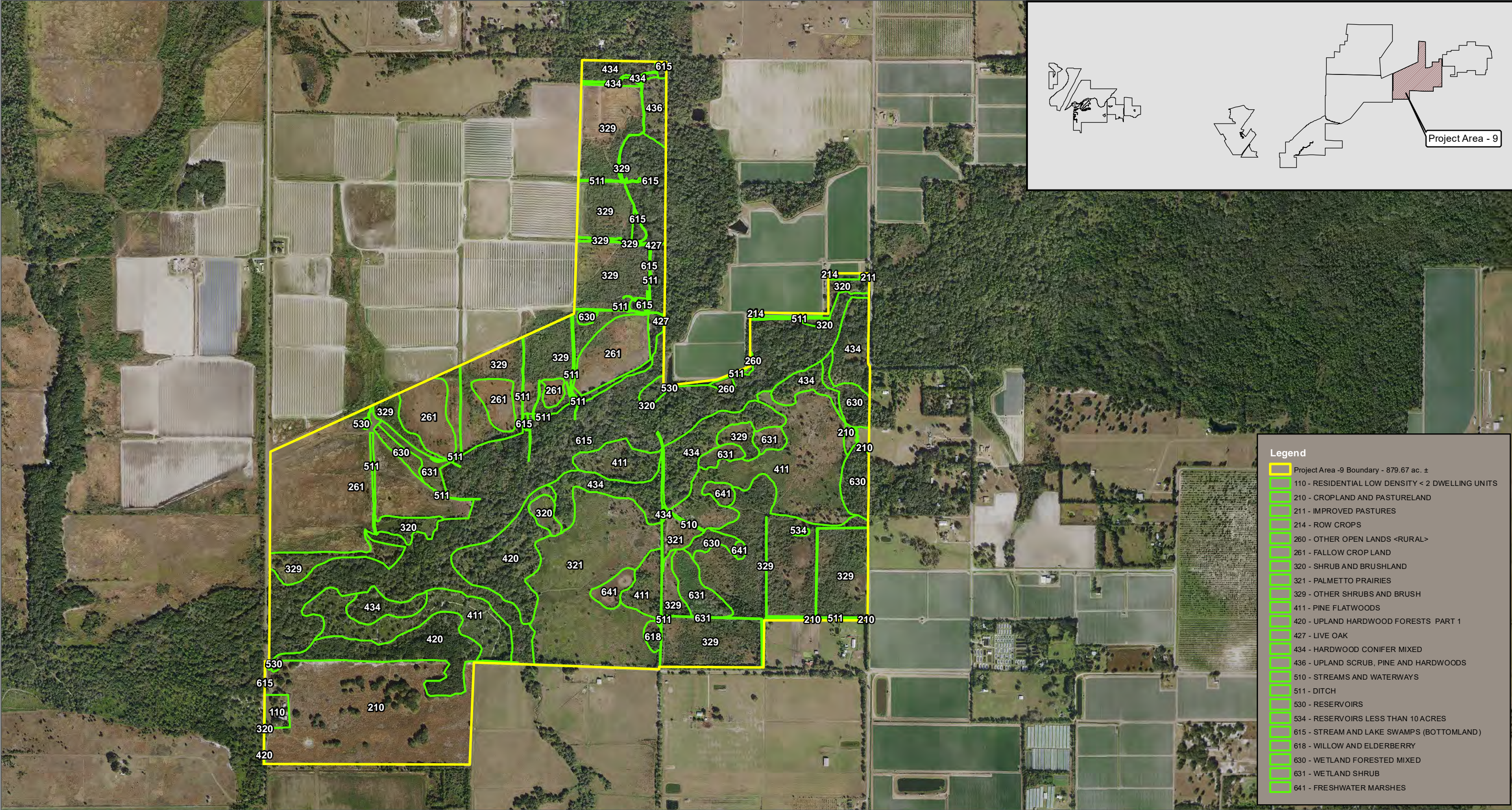


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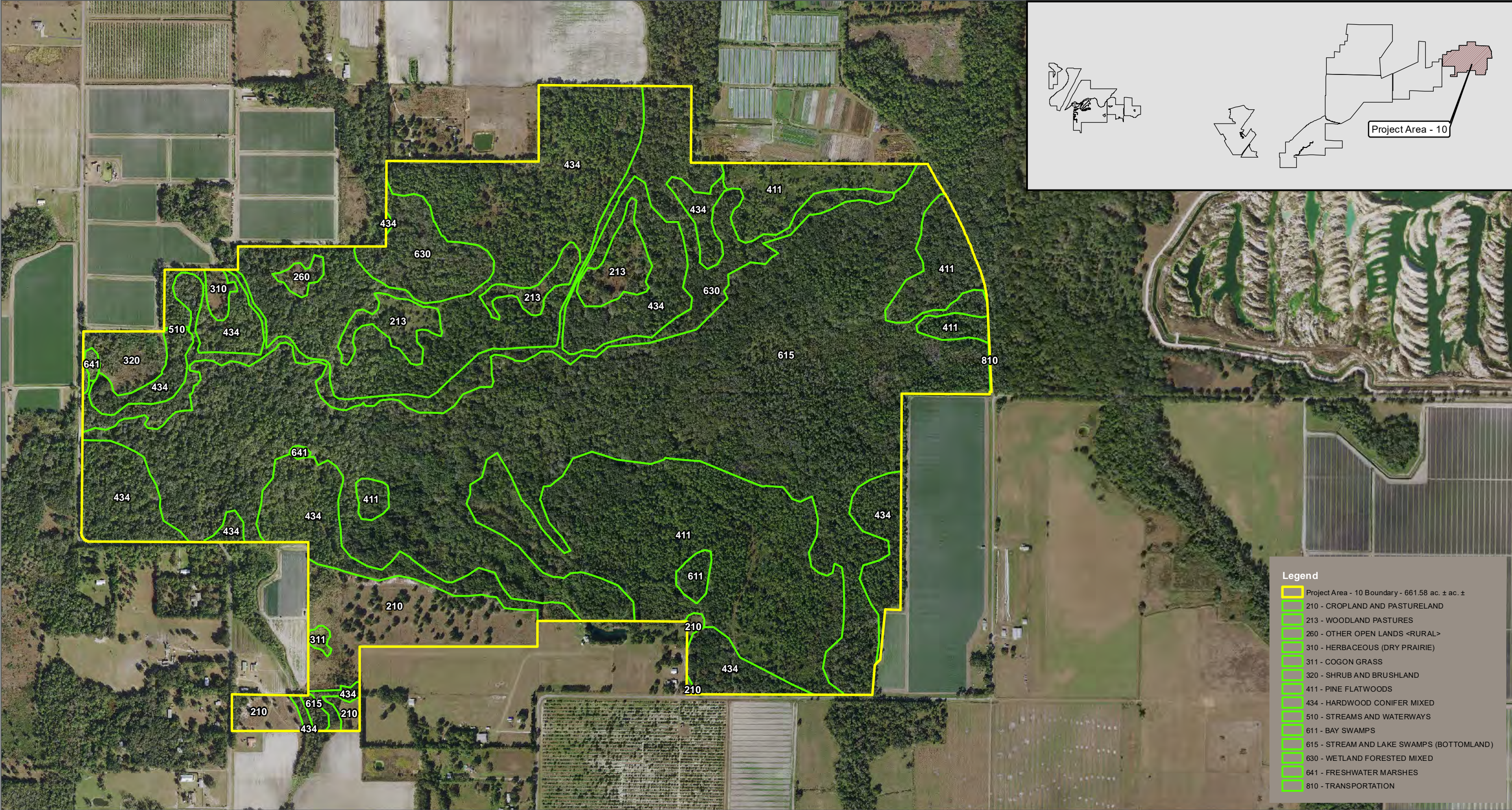
0 1,200 2,400 Feet
0 366 732 Meters

Land Use Map - Area 9

Little Manatee River Preserve Location
Hillsborough County, Florida



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Sec 17-20
Twp 32 S
Rng 21 E

0 800 1,600 Feet
0 244 488 Meters

Land Use Map- Area 10

Little Manatee River Preserve Location
Hillsborough County, Florida



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APPENDIX

C

SITE PHOTOGRAPHS

Area 1



Hardwood Conifer Mixed (FLUCFCS 434) habitat



Hardwood Conifer Mixed (FLUCFCS 434) habitat

Area 1



Bays and Estuaries (FLUCFCS 540) habitat



Bays and Estuaries (FLUCFCS 540) habitat

Area 2



Mixed Rangeland (FLUCFCS 330) habitat



Mixed Rangeland (FLUCFCS 330) habitat

Area 2



Pine Flatwoods (FLUCFCS 411) habitat



Pine Flatwoods (FLUCFCS 411) habitat

Area 3



Other Shrubs and Brush (FLUCFCS 329) habitat



Other Shrubs and Brush (FLUCFCS 329) habitat

Area 3



Hardwood Conifer Mixed (FLUCFCS 434) habitat



Hardwood Conifer Mixed (FLUCFCS 434) habitat

Area 4



Sand Pine (FLUCFCS 413) habitat



Sand Pine (FLUCFCS 413) habitat

Area 4



Stream and Lake Swamps (Bottomland) (FLUCFCS 615) habitat



Stream and Lake Swamps (Bottomland) (FLUCFCS 615) habitat

Area 5



Other Open Lands (Rural) (FLUCFCS 260) habitat



Other Open Lands (Rural) (FLUCFCS 260) habitat

Area 5



Hardwood Conifer Mixed (FLUCFCS 434) habitat



Hardwood Conifer Mixed (FLUCFCS 434) habitat

Area 6



Hardwood Conifer Mixed (FLUCFCS 434) habitat



Hardwood Conifer Mixed (FLUCFCS 434) habitat

Area 6



Stream and Lake Swamps (Bottomland) (FLUCFCS 615) habitat



Stream and Lake Swamps (Bottomland) (FLUCFCS 615) habitat

Area 7



Fallow Cropland (FLUCFCS 261) habitat



Fallow Cropland (FLUCFCS 261) habitat

Area 7



Stream and Lake Swamps (Bottomland) (FLUCFCS 615) habitat



Stream and Lake Swamps (Bottomland) (FLUCFCS 615) habitat

Area 8



Pine Flatwoods (FLUCFCS 411) habitat



Pine Flatwoods (FLUCFCS 411) habitat

Area 8



Stream and Lake Swamps (Bottomland) (FLUCFCS 615) habitat



Stream and Lake Swamps (Bottomland) (FLUCFCS 615) habitat

Area 9



Other Shrub and Brush (FLUCFCS 329) habitat



Other Shrub and Brush (FLUCFCS 329) habitat

Area 9



Stream and Lake Swamps (Bottomland) (FLUCFCS 615) habitat



Stream and Lake Swamps (Bottomland) (FLUCFCS 615) habitat

Area 10



Stream and Lake Swamps (Bottomland) (FLUCFCS 615) habitat



Stream and Lake Swamps (Bottomland) (FLUCFCS 615) habitat

Area 10



Hardwood Conifer Mixed (FLUCFCS 434) habitat



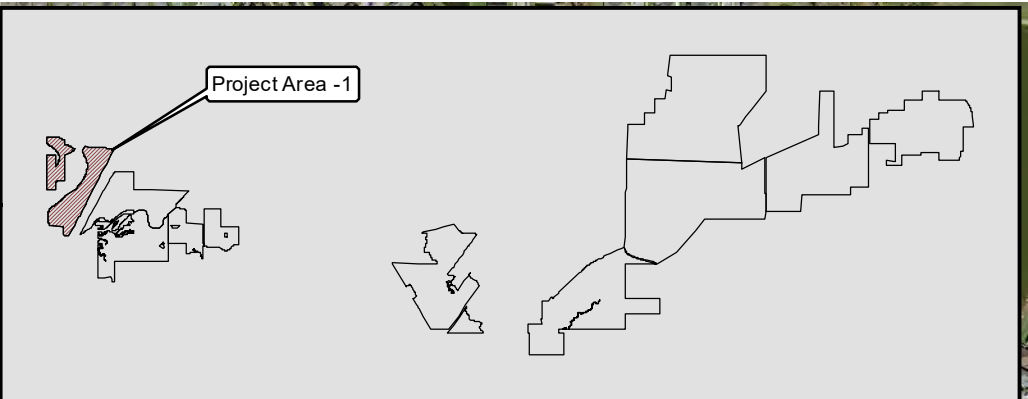
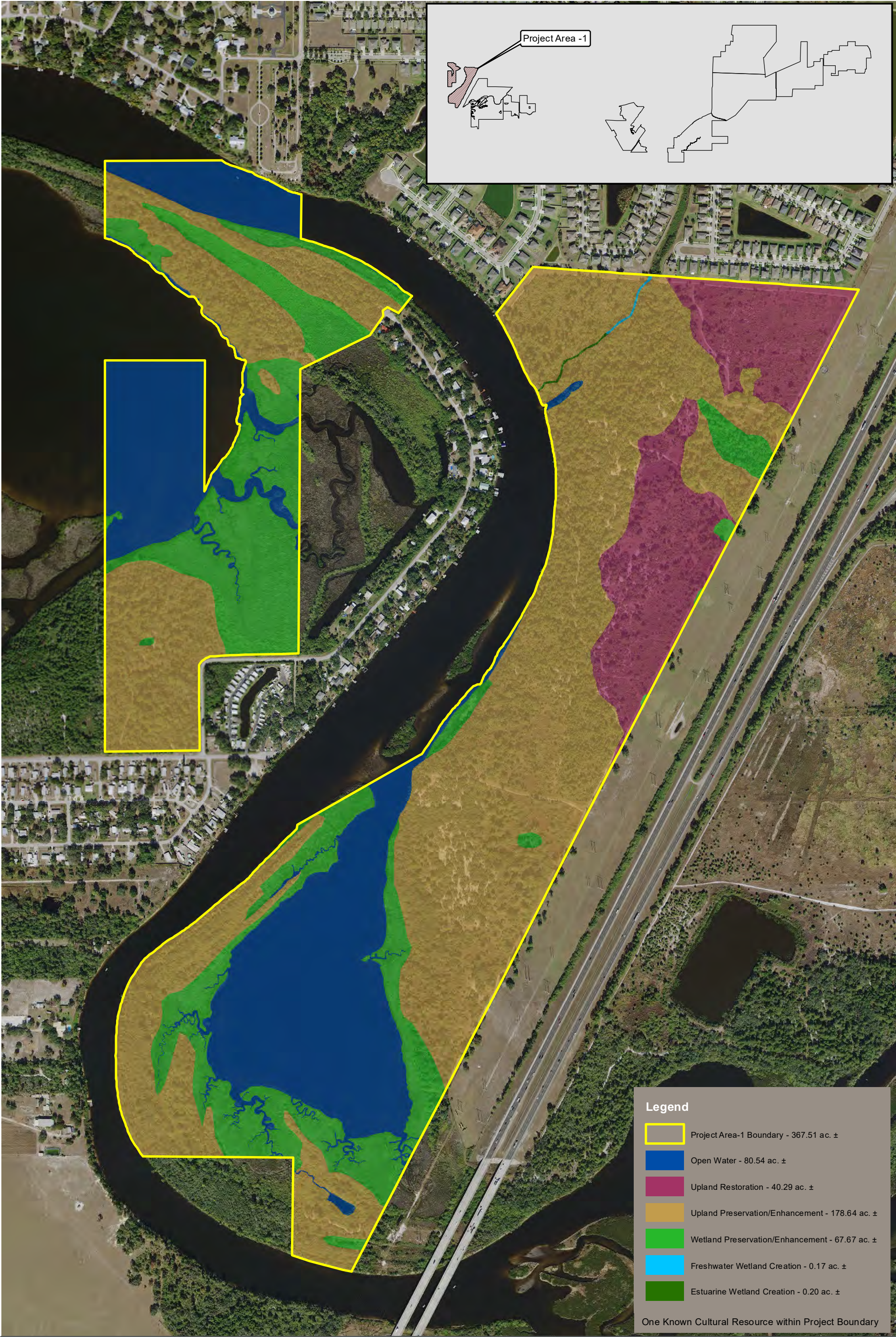
Hardwood Conifer Mixed (FLUCFCS 434) habitat

Conceptual Restoration
Plan Feasibility Report

APPENDIX

D

CONCEPTUAL RESTORATION
PLANS



Legend

- Project Area-1 Boundary - 367.51 ac. ±
- Open Water - 80.54 ac. ±
- Upland Restoration - 40.29 ac. ±
- Upland Preservation/Enhancement - 178.64 ac. ±
- Wetland Preservation/Enhancement - 67.67 ac. ±
- Freshwater Wetland Creation - 0.17 ac. ±
- Estuarine Wetland Creation - 0.20 ac. ±

One Known Cultural Resource within Project Boundary



Image:2017
Data Source:

Sec 19-20,29-30
Twp 32 S
Rng 19 E

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Conceptual Restoration Plan - Area 1
Little Manatee River Preserve
Hillsborough County, Florida



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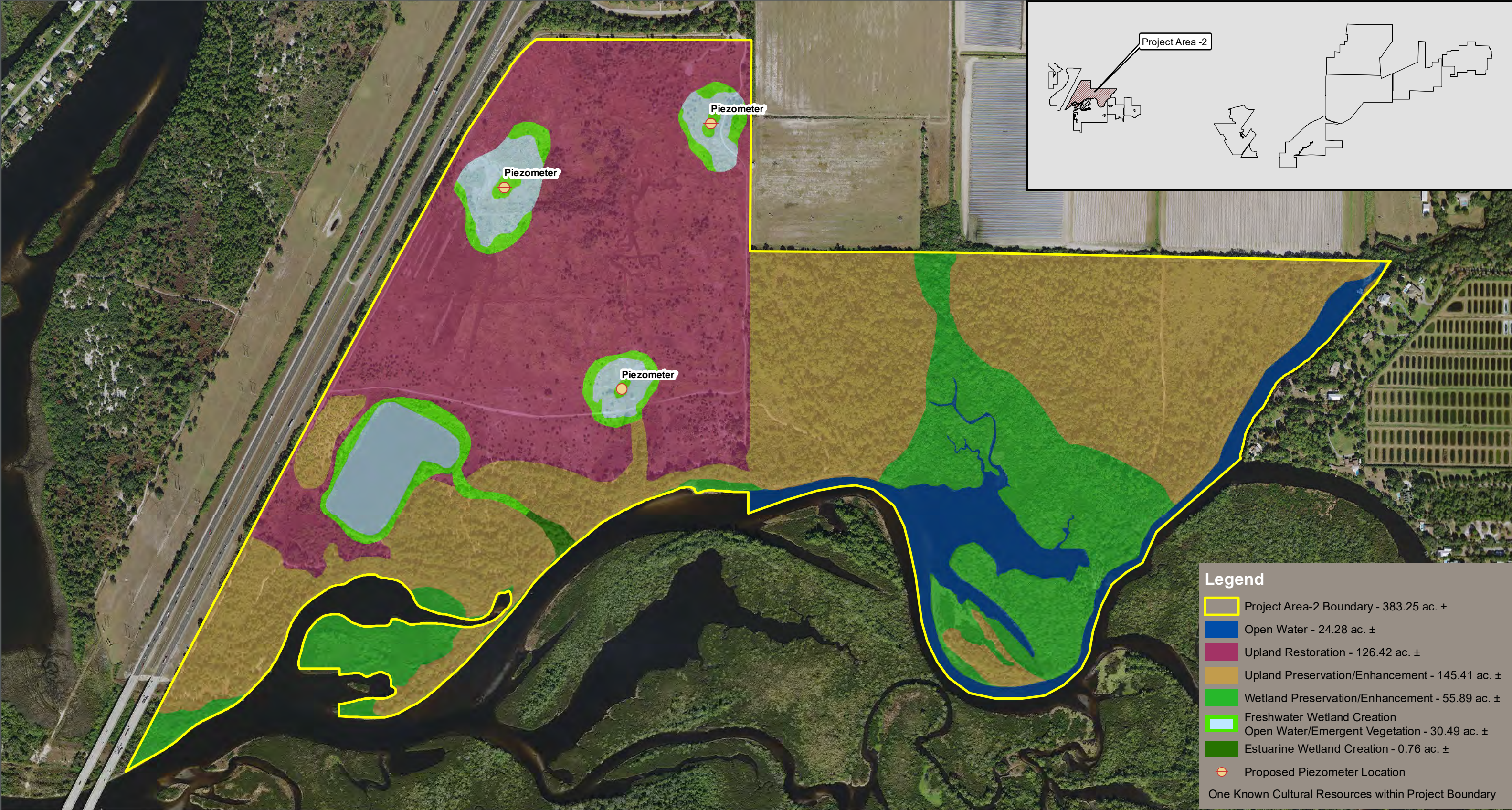


Image:2017
Data Source:

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Sec 20, 28-29
Twp 32 S
Rng 19 E

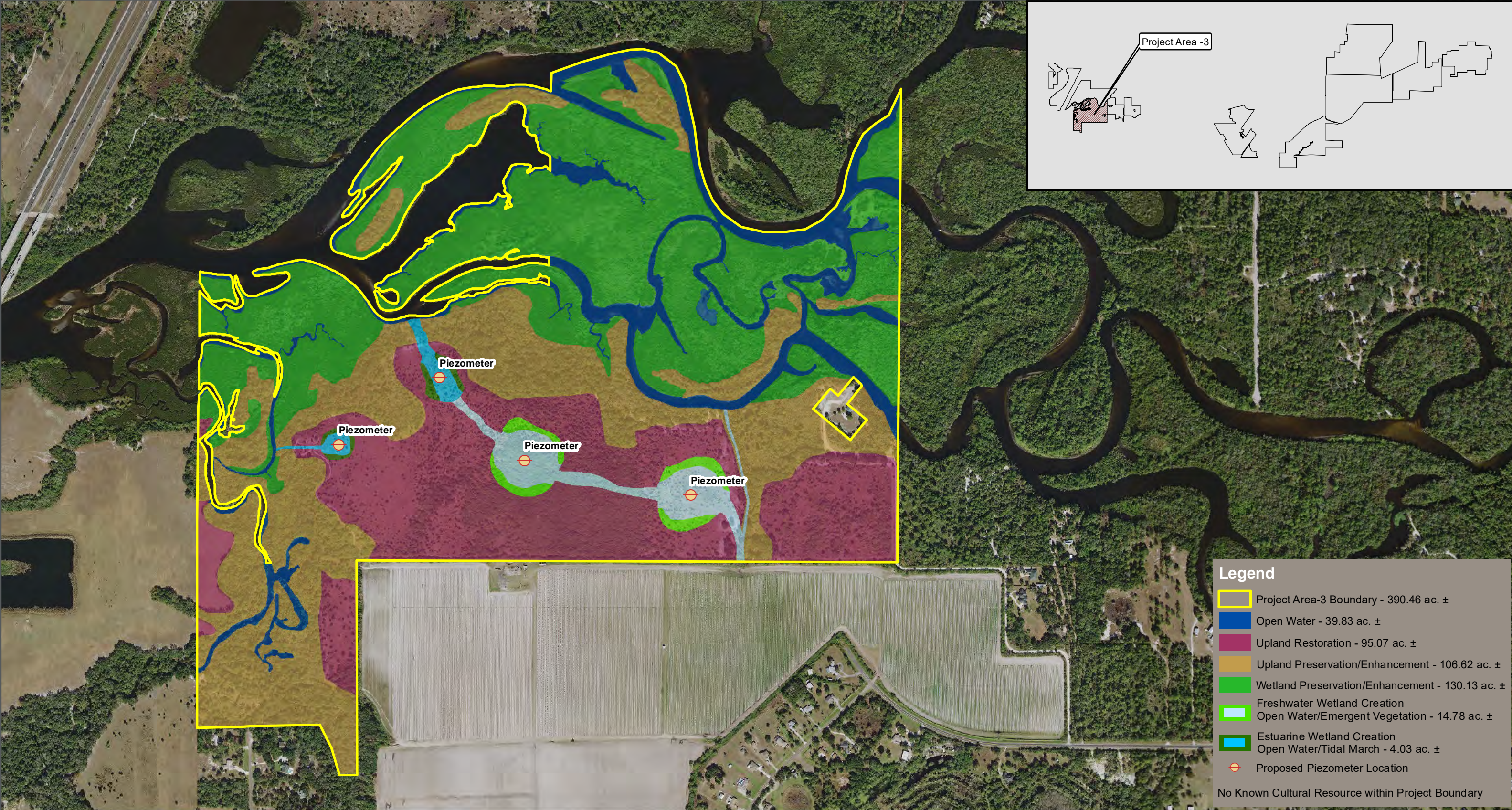
0 600 1,200 Feet
0 183 366 Meters

Conceptual Restoration Plan - Area 2

Little Manatee River Preserve
Hillsborough County, Florida



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Legend

- Project Area-3 Boundary - 390.46 ac. ±
- Open Water - 39.83 ac. ±
- Upland Restoration - 95.07 ac. ±
- Upland Preservation/Enhancement - 106.62 ac. ±
- Wetland Preservation/Enhancement - 130.13 ac. ±
- Freshwater Wetland Creation
- Open Water/Emergent Vegetation - 14.78 ac. ±
- Estuarine Wetland Creation
- Open Water/Tidal March - 4.03 ac. ±
- Proposed Piezometer Location

No Known Cultural Resource within Project Boundary




Image:2017
Data Source:

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Sec 28-29, 32
Twp 32 S
Rng 19 E

0 700 1,400 Feet
0 213 426 Meters

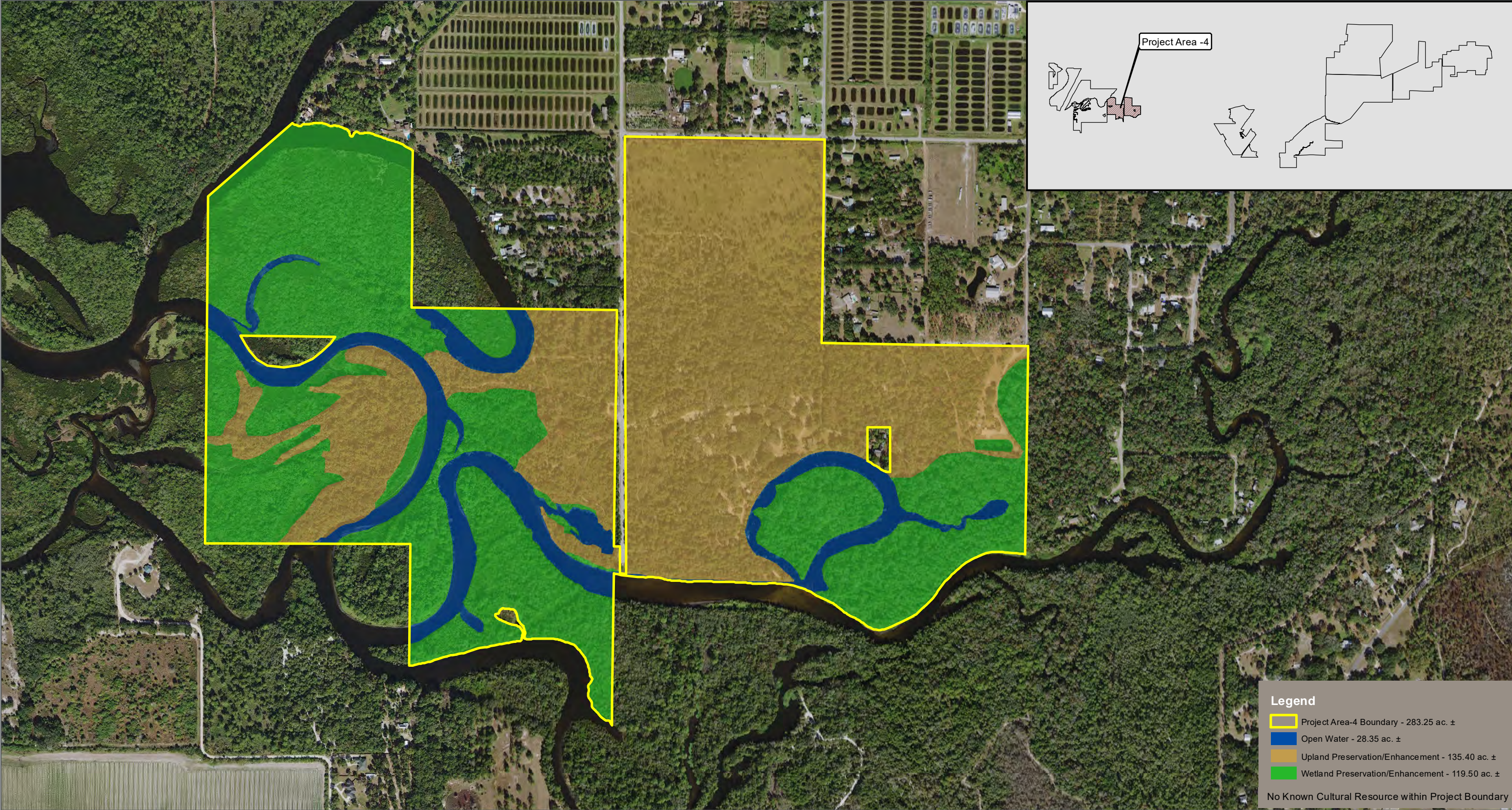
Conceptual Restoration Plan - Area 3

Little Manatee River Preserve
Hillsborough County, Florida



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Image:2017

Data Source:

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0 600 1,200 Feet

0 183 366 Meters

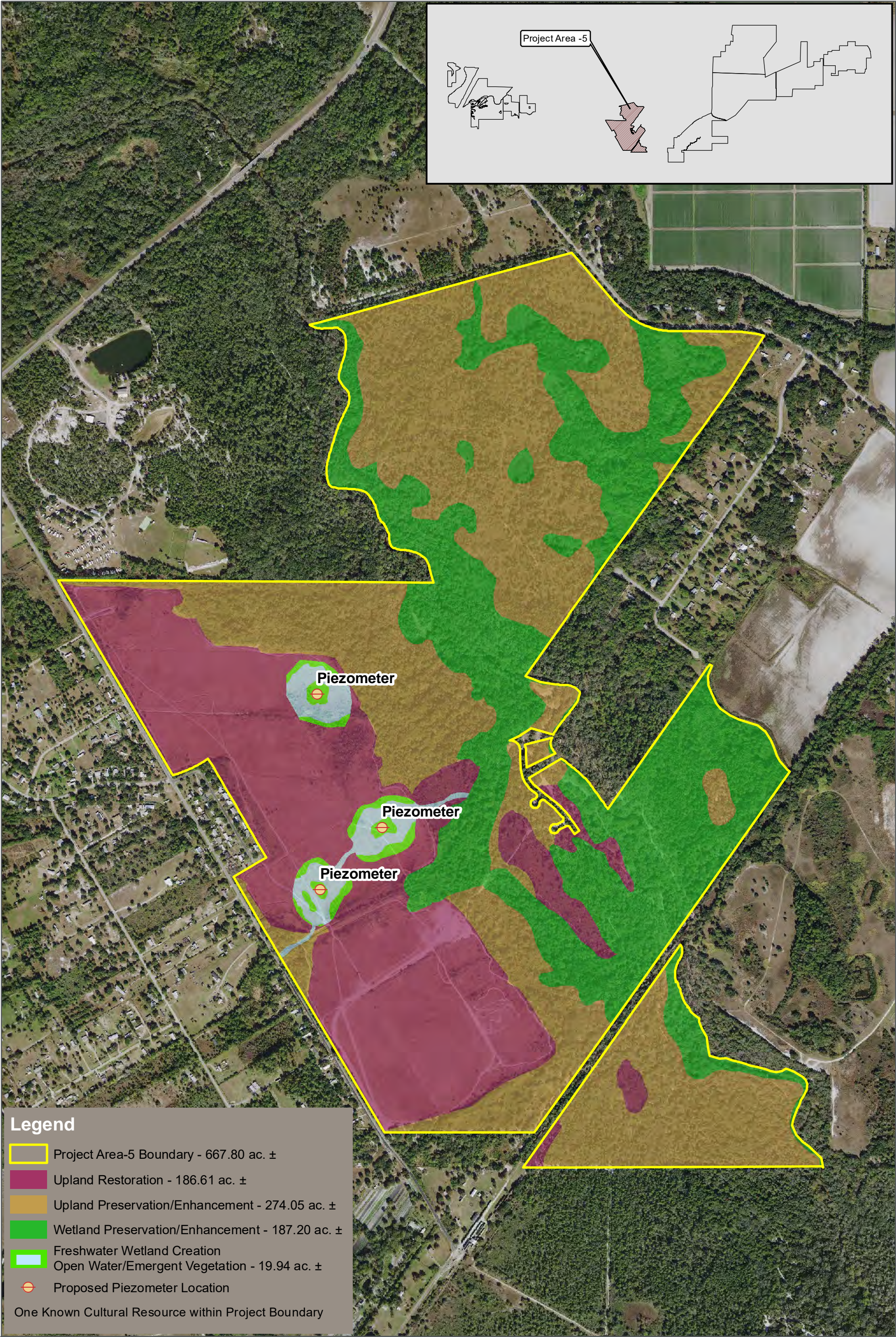
Sec 27-28
Twp 32 S
Rng 19 E

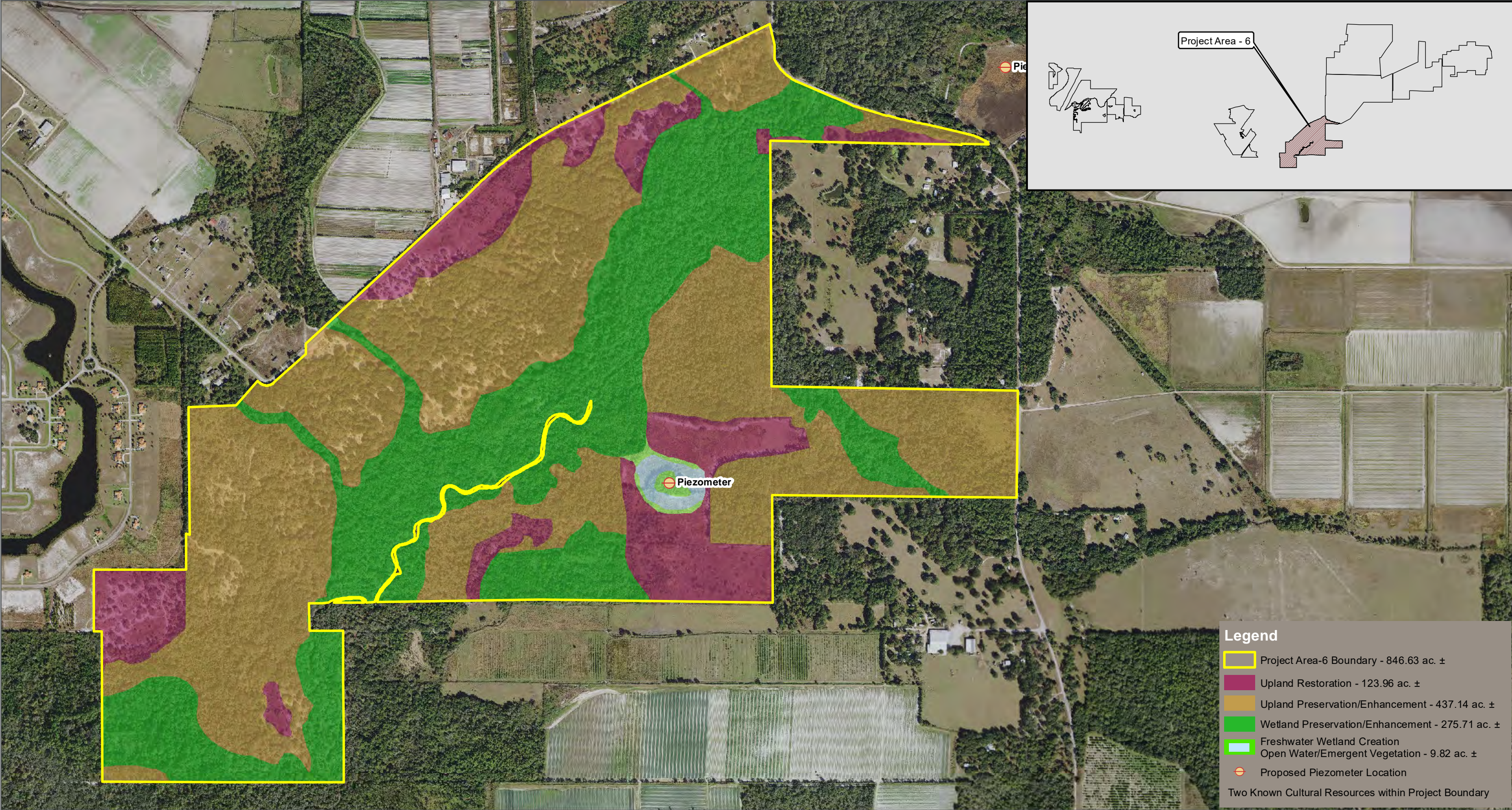
Conceptual Restoration Plan - Area 4

Little Manatee River Preserve
Hillsborough County, Florida



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Legend

- Project Area-6 Boundary - 846.63 ac. ±
- Upland Restoration - 123.96 ac. ±
- Upland Preservation/Enhancement - 437.14 ac. ±
- Wetland Preservation/Enhancement - 275.71 ac. ±
- Freshwater Wetland Creation
Open Water/Emergent Vegetation - 9.82 ac. ±
- Proposed Piezometer Location

Two Known Cultural Resources within Project Boundary

Image:2017
Data Source:

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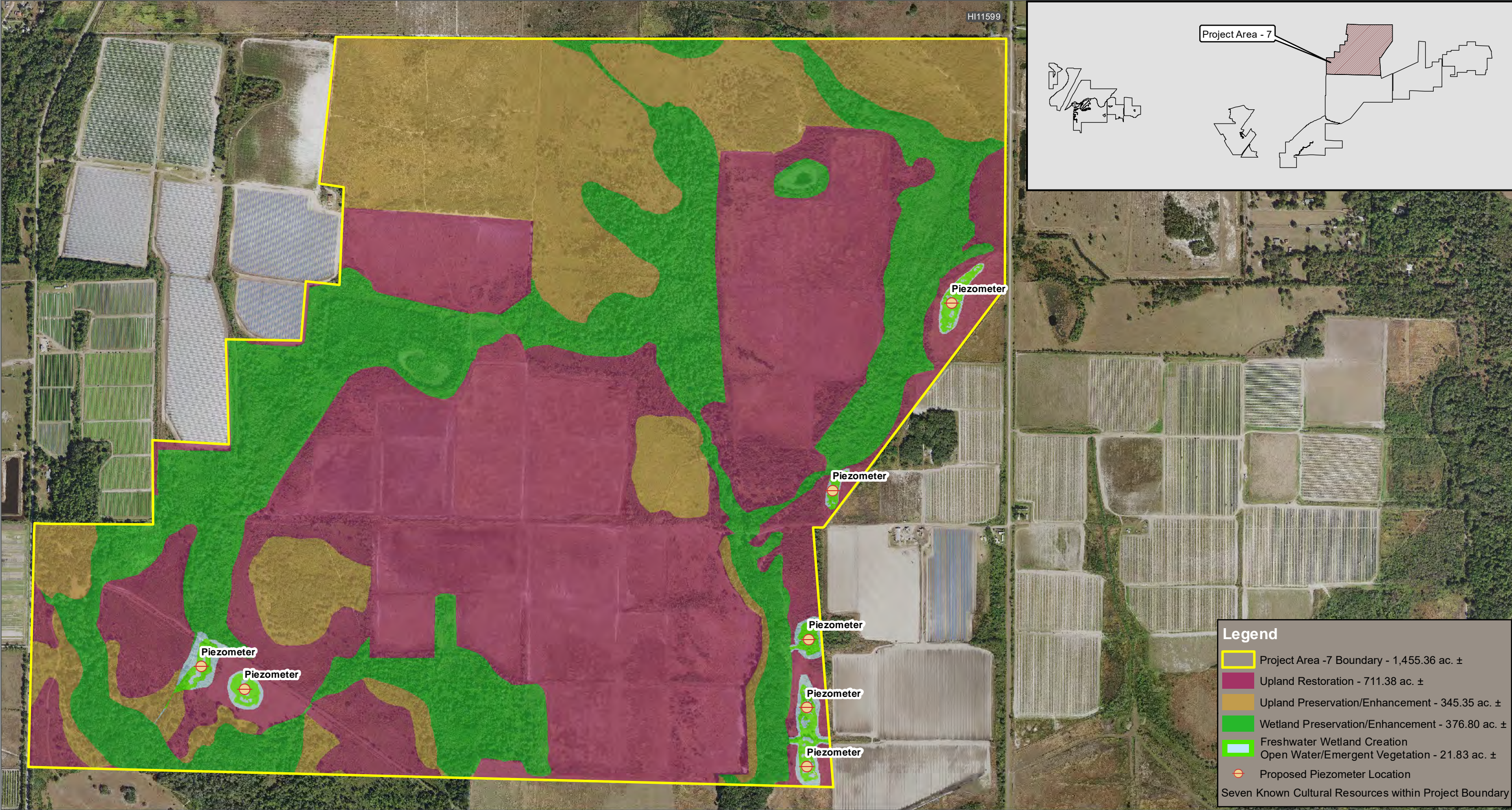
0 1,000 2,000 Feet
0 305 610 Meters

Conceptual Restoration Plan - Area 6

Little Manatee River Preserve
Hillsborough and Manatee County, Florida


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Image:2017
Data Source:

Sec 14-15, 22-23
Twp 32 S
Rng 20 E

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0 1,000 2,000 Feet
0 305 610 Meters

Conceptual Restoration Plan - Area 7

Little Manatee River Preserve
Hillsborough County, Florida



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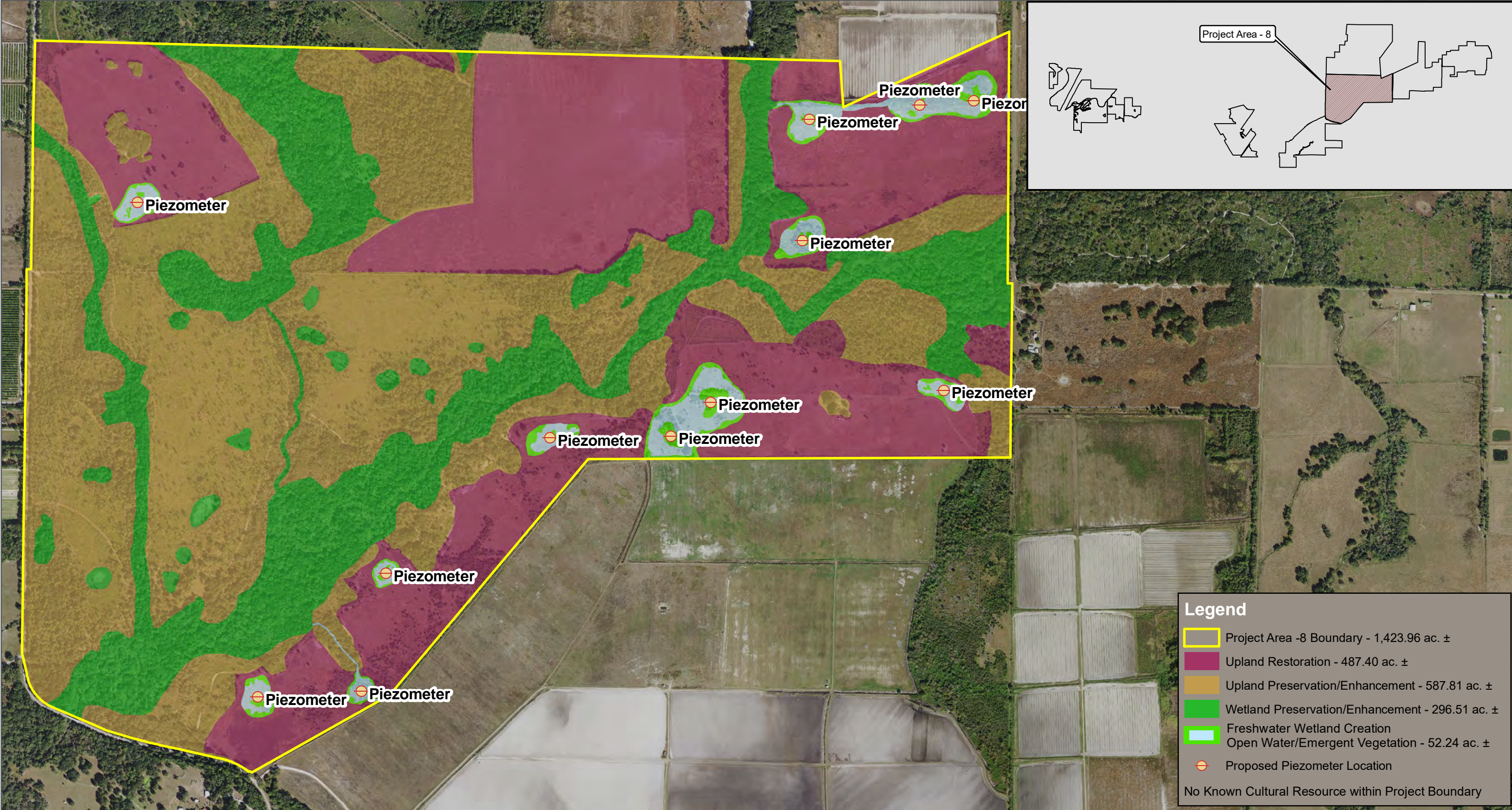


Image:2017

Data Source:

Sec 22-23, 26-27
Twp 32 S
Rng 20 E

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Conceptual Restoration Plan - Area 8

Little Manatee River Preserve
Hillsborough County, Florida

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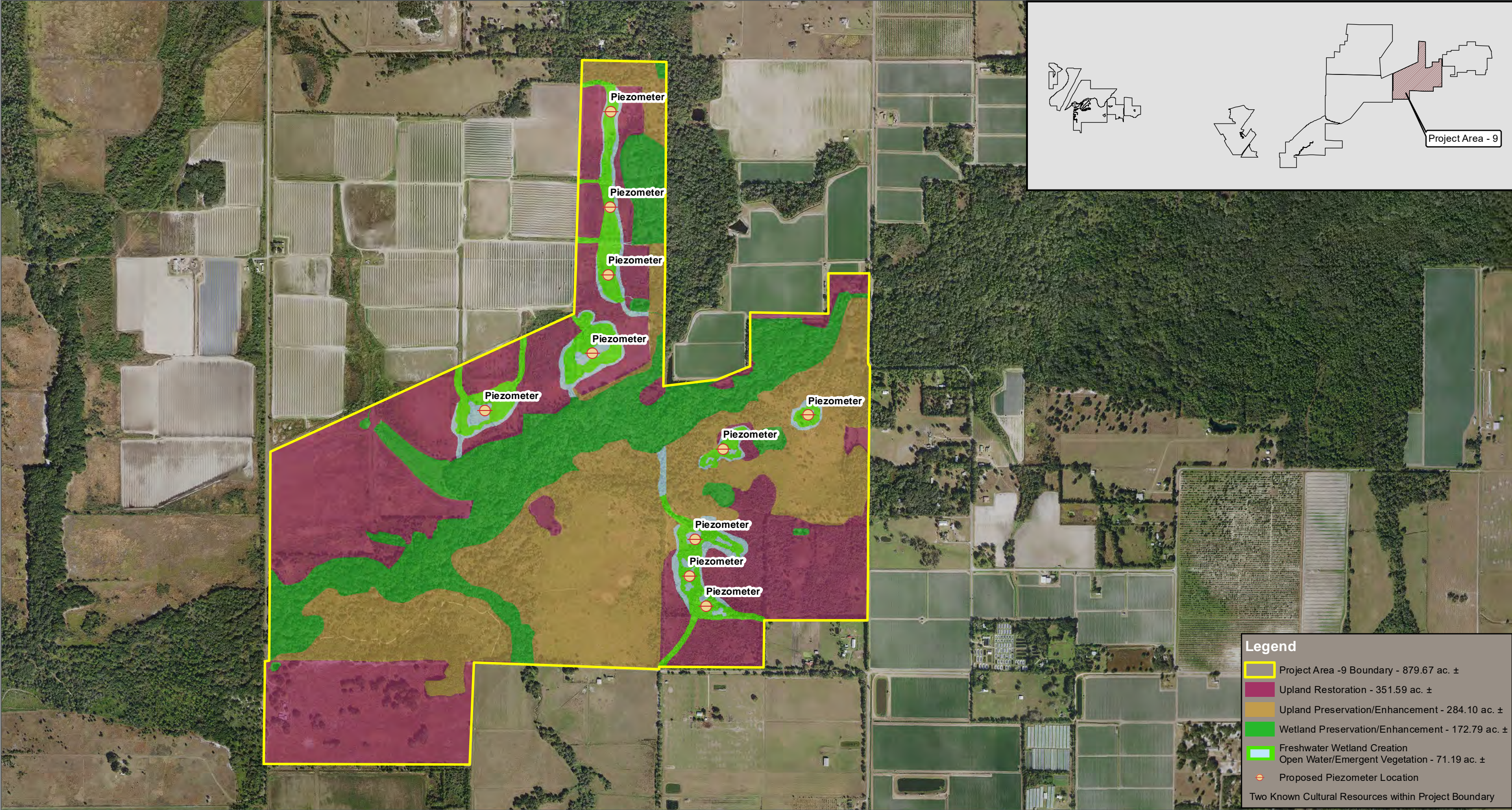


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Data Source:

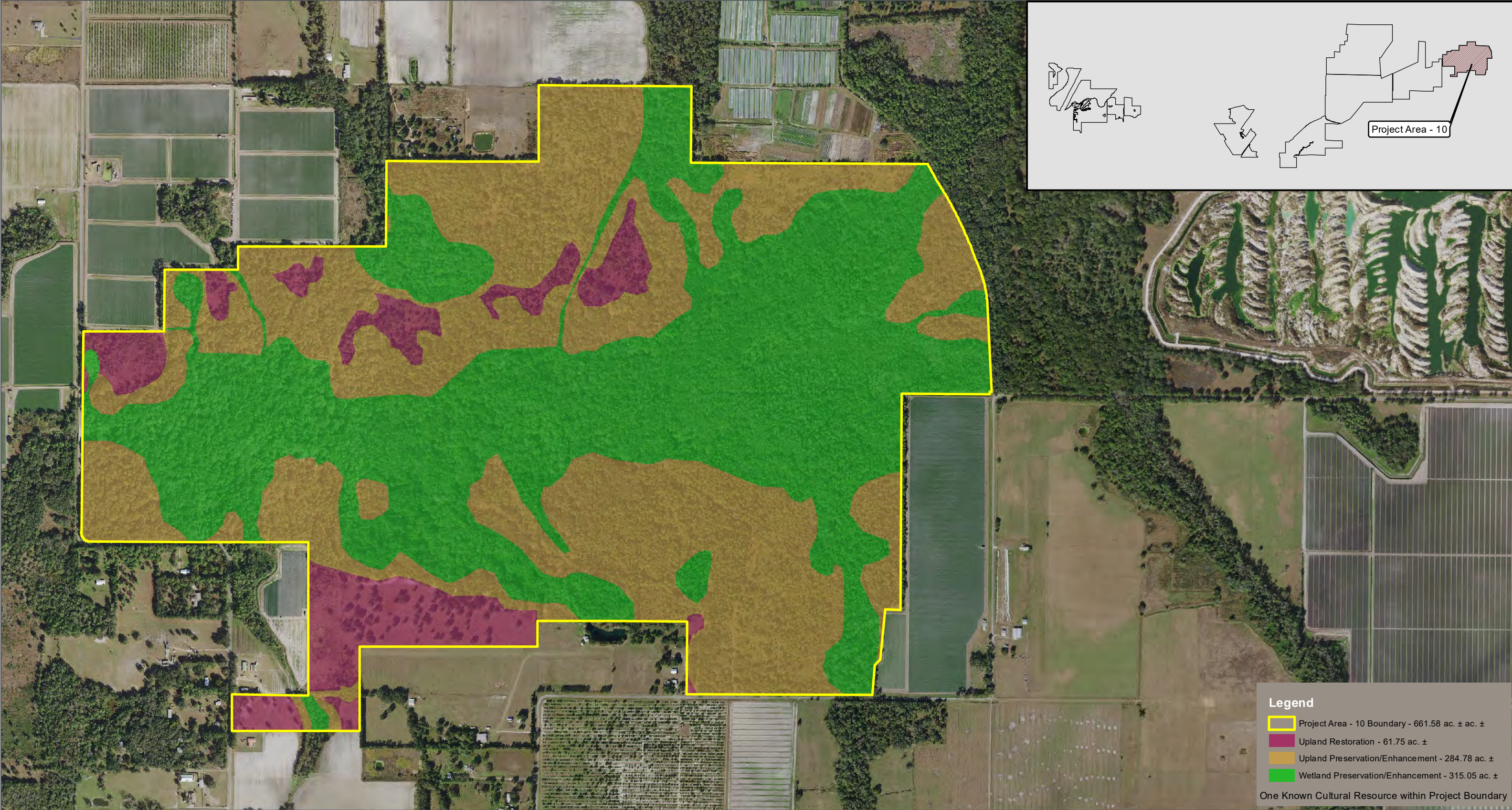
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Conceptual Restoration Plan - Area 9

Little Manatee River Preserve
Hillsborough County, Florida



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Image:2017
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Sec 17-20
Twp 32 S
Rng 21 E

0 800 1,600 Feet
0 244 488 Meters

Conceptual Restoration Plan - Area 10

Little Manatee River Preserve
Hillsborough County, Florida



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About Cardno

Cardno is an ASX-200 professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage, and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

Cardno Zero Harm

Cardno
ZERO
HARM
EVERY JOB. EVERY DAY.

At Cardno, our primary concern is to develop and maintain safe and healthy conditions for anyone involved at our project worksites. We require full compliance with our Health and Safety Policy Manual and established work procedures and expect the same protocol from our subcontractors. We are committed to achieving our Zero Harm goal by continually improving our safety systems, education, and vigilance at the workplace and in the field. Safety is a Cardno core value and through strong leadership and active employee participation, we seek to implement and reinforce these leading actions on every job, every day.