US Army Corps of Engineers

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): July 12, 2018

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: CESAJ-RD-SP, John Manos, SAJ-2017-00229

C. PROJECT LOCATION AND BACKGROUND INFORMATION: The project site is located at 16300 133rd Drive North, Section 9, Township 41 South, Range 41 East, Jupiter Farms, Palm Beach County, Florida.

State: Florida County/parish/borough: Palm Beach County City: Jupiter Farms
Center coordinates of site (lat/long in degree decimal format): Lat. 26.971261° **N**, Long. -80.244674° **W**.
Universal Transverse Mercator: 17
Name of nearest waterbody: South Indian River Water Control District (SIRWCD), Canal 5, Secondary Drainage Canal
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: SIRWCD C-14 Canal to the Northwest Fork of the Loxahatchee River and C-18 Central and South Florida (C&SF) Canal
Name of watershed or Hydrologic Unit Code (HUC)12: 030302060603 for the Upper Loxahatchee River

- ☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
- ☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

- ☒ Office (Desk) Determination. Date: 10 March 2017; 15 May 2017; 16 October 2017;5 January 2018, 10 July 2018
- ☒ Field Determination. Date(s): 4 April 2017 and 27 April 2017

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

- ☐ Waters subject to the ebb and flow of the tide.
- ☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☐ TNWs, including territorial seas
   - ☐ Wetlands adjacent to TNWs
   - ☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☐ Non-RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☒ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☐ Impoundments of jurisdictional waters
   - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: linear feet: width (ft) and/or acres.
   Wetlands: 1.15 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **1987 Delineation Manual**
   Elevation of established OHWM (if known): .

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   - ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

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[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW
Identify TNW: .

Summarize rationale supporting determination: .

2. Wetland adjacent to TNW
Summarize rationale supporting conclusion that wetland is "adjacent": .

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:
Watershed size: 22.7**square miles** See Attachment 1, Figure 3 for the boundaries of the Watershed; HUC 12: 030902060603, 22.7 square miles/ 14,550 acres.
Drainage area: 22.8 **square miles** See Attachment 1, Figure 4 for the boundaries of the South Florida Water Management District (SFWMD) Wild and Scenic/Jupiter Farms Drainage Basin, total of 22.8 square miles/14,609 acres.
Average annual rainfall: 52.53-61.26 inches, as depicted by the WETS tables in Attachment 5 for Canal Point and West Palm Beach International Airport, respectively.
Average annual snowfall: 0 inches

(ii) Physical Characteristics:
(a) Relationship with TNW:
☐ Tributary flows directly into TNW.
☒ Tributary flows through **1** tributaries before entering TNW.

Project waters are **2-5** river miles from TNW.
Project waters are **1 (or less)** river miles from RPW.
Project waters are **2-5** aerial (straight) miles from TNW.
Project waters are **1 (or less)** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: .

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

Identify flow route to TNW[5]: See Attachment 1, Figure 2. Water from the east end of the project area will gravity flow west by overland sheetflow and subsurface flow into the swale located within parcel's boundaries, immediately east of 133rd Drive North. The section of the roadside swale located within the property boundaries is contiguous with the adjacent wetlands on site and considered part of the onsite wetlands. Water from the onsite swale will continue to flow south of the project area within the roadside swale and become the non-jurisdictional conveyance that discharges into Tributary A. Water flows within the non-jurisdictional conveyance 0.28 miles from the project site into Tributary A. Tributary A, a RPW, also known as SIRWCD Canal 5, flows east approximately 4.27 miles, to SIRWCD Canal 14, the TNW.
Tributary stream order, if known: unknown.

(b) General Tributary Characteristics (check all that apply):
Tributary is: ☐ Natural
☒ Artificial (man-made). Explain: Tributary A was created by the SIRWCD as a part of the second level of the drainage system, as explained in Attachment 4. Tributary A, also known as SIRWCD Canal 5 is an interior canal that was constructed within Jupiter Farms, by SIRWCD to move stormwater from the depressional wetlands, and swale system to the SIRWCD Canal 14, a primary drainage canal.
☒ Manipulated (man-altered). Explain: The water levels within Tributary A, SIRWCD Canal 5, secondary drainage canal are managed by the SIRWCD. Under normal conditions, water in Tributary A, Canal 5 will gravity flow to the east, into the SIRWCD Canal 14, primary drainage canal. Tributary A is maintained and treated for exotic/nuisance vegetation by the SIRWCD. Areas where riprap may be absent along the banks, will be mowed and maintained for vegetation.

Tributary properties with respect to top of bank (estimate):
Average width: 30 feet
Average depth: 2-10 feet
Average side slopes: **3:1**.

Primary tributary substrate composition (check all that apply):
☐ Silts ☐ Sands ☐ Concrete
☐ Cobbles ☐ Gravel ☐ Muck
☐ Bedrock ☒ Vegetation. Type/% cover: Varies
☒ Other. Explain: The side slopes of Tributary A, are covered in Riprap, as shown in Attachment 1, Figure 12. Vegetation is showing within the riprap and along the base of the riprap. Vegetation coverage varies between facultative, facultative wet, obligate, and aquatic depending of the time of year and level of water within Tributary A.

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: Tributary A is fairly stable as there is existing riprap along the edge of the banks, see attachment 1, Figure 12..
Presence of run/riffle/pool complexes. Explain: N/A.
Tributary geometry: **Relatively straight**
Tributary gradient (approximate average slope): 2 %

(c) Flow:
Tributary provides for: **Seasonal flow**
Estimate average number of flow events in review area/year: **20 (or greater)**
Describe flow regime: Tributary A flows continuously for at least 3 months.
Other information on duration and volume: .

Surface flow is: **Discrete and confined.** Characteristics: The flow in Tribuary A is limited to the footprint of SIRWCD Canal 5, linear feature, confined by levees/berms on north and south edges.

Subsurface flow: **Unknown**. Explain findings: Information in Attachment 4 confirms that SIRWCD Canal 5 flows by gravity when pumps are off to the east to the SIRWCD Canal 14. The extent of subsurface flow is unknown. No wells have been installed..
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☒ Bed and banks
☒ OHWM[6] (check all indicators that apply):
☐ clear, natural line impressed on the bank ☐ the presence of litter and debris
☐ changes in the character of soil ☐ destruction of terrestrial vegetation
☐ shelving ☐ the presence of wrack line
☒ vegetation matted down, bent, or absent ☐ sediment sorting
☐ leaf litter disturbed or washed away ☐ scour

[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.
[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.

☐ sediment deposition
☐ water staining
☐ other (list):
☐ multiple observed or predicted flow events
☐ abrupt change in plant community

☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:
- ☐ oil or scum line along shore objects
- ☐ fine shell or debris deposits (foreshore)
- ☐ physical markings/characteristics
- ☐ tidal gauges
- ☐ other (list):

☐ Mean High Water Mark indicated by:
- ☐ survey to available datum;
- ☐ physical markings;
- ☐ vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).

Explain: Tannin stained, clear, lawn runoff water. Water quality varies depending on the rate of flow, and quantity of water.

Identify specific pollutants, if known: Pollutants include nitrogen and phosporus from lawn fertalizers, as well as sediments from side slopes and pesticides.

(iv) Biological Characteristics. Channel supports (check all that apply):

☐ Riparian corridor. Characteristics (type, average width): .

☒ Wetland fringe. Characteristics: Along the banks of Tributary A, SIRWCD Canal 5, are littoral shelves containing obligate, facultative wet, and facultative vegetation emergent vegetation.

☒ Habitat for:

☒ Federally Listed species. Explain findings: Tributary A is located within the 18.6 mile buffer from the U.S. Fish and Wildlife Service's (FWS) 619220 Palm Beach County Solid Waste Authority Wood Stork Nesting Colony. The area also contains Indigo Snake habitat along the uplands adjacent to Tributary A, as gopher tortoise burrows may be present within the berms for SIRWCD Canal 5 and adjacet to the area. The presence of the Manatee with SIRWCD Canal 5 is limited based on water levels. The manatee can access the North Fork of Loxahatchee River and the SIRWCD Canal 14 because there are no barriers to flow. When water levels are high enough during extreme rain events, it is possible since there are no structures, for the manatee to access Tributary A, SIRWCD Canal 5. Additionally, Tributary A, is located within the consultation areas for the following species: Red cockcaded woodpecker, Florida Scrub Jay, Everglade Snail Kite, and Crested Caracara.

☐ Fish/spawn areas. Explain findings: .

☐ Other environmentally-sensitive species. Explain findings: .

☒ Aquatic/wildlife diversity. Explain findings: Tributary A supports an aquatic ecosystem that supports aquatic plants, fish, invertebrates, amphibians and reptiles such as snakes and alligators.

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size:1.15 acres

Wetland type. Explain: Palustrine emergent and forested.

Wetland quality. Explain:Wetland 1, paulustrine forested, 1.11 acres and wetland 2, 0.04 acres, paulustrine emegergent, are both dominated by Class I and II invasive/exotic species as listed by the Florida Exotic Pest Plant Council. A Wetland Rapid Assessment Procedure (WRAP) was completed for the project area. It received a WRAP score of 0.20.

Project wetlands cross or serve as state boundaries. Explain: None.

(b) General Flow Relationship with Non-TNW:

Flow is: **Ephemeral flow**. Explain: During periods of high water, when the onsite wetlands become saturated, water will overland and subsurface flow into the adjacent road side swale/non jurisdictional conveyance. .

Surface flow is**: Overland sheetflow**

Characteristics: Water from the east end of the project area will gravity flow west by overland sheetflow and subsurface flow into the swale located within parcel's boundaries, immediately east of 133rd Drive North. The section of the roadside swale located within the property boundaries is contiguous with the adjacent wetlands on site and considered part of the onsite wetlands. Water from the onsite swale will continue to flow south of the project area within the roadside swale and become the non-jurisdictional conveyance that discharges into Tributary A/ SIRWCD Canal 5. The swale is designed to collect stormwater from properties and discharge it into the adjacent canals (Attachment 4). The location of the swale, that is considered wetlands, and the adjacent road side swale/ non-jurisdictional conveyance is shown in Attachment 1, Figures 1 and 2.

[7] Ibid.

Subsurface flow: **Unknown**. Explain findings: No formal testing for subsurface flow has been completed. However, the SIRWCD website state that all water flows via swales into the secondary tier drainage canals east to the primary drainage canal. Subsurface flow is anticipated but not confirmed.

☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

☐ Directly abutting

☒ Not directly abutting

☒ Discrete wetland hydrologic connection. Explain: Wetlands 1 and 2 are contiguous with the non-jurisdictional swale which provides an overland and subsurface hydrologic connection to Tributary A.

☒ Ecological connection. Explain: The flora and fauna within the project area through the significant nexus conveyance provide foraging and habitat for a variety of listed and non-listed wildlife including raptors such as hawks, owls, and osprey, wading birds such as wood storks, and state listed species such as herons, white ibis, and sand hill cranes. Additionally indigo snake and gopher tortoise habitat is located within and adjacent to the project area and along the water's flow path to the TNW.

☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **2-5** river miles from TNW.

Project waters are **2-5** aerial (straight) miles from TNW.

Flow is from: **Wetland to navigable waters.**

Estimate approximate location of wetland as within the **50 - 100-year** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: The standing water within wetland 2 (herbacous wetland) had areas of low dissolved oxygen. There were visible algal mats along the substrate and surface of the water. Wetlands 1 and 2 provide pretreatment of water from neighboring parcels.

Identify specific pollutants, if known: Waters within the wetland may contain pesticides, fertilizers, fecal coliform from pet waste, oil, gasoline, or other pollutants commonly associated with suburban development asn associated infastructure.

(iii) Biological Characteristics. Wetland supports (check all that apply):

☐ Riparian buffer. Characteristics (type, average width): .

☒ Vegetation type/percent cover. Explain: The data sheets from site visits conducted on 4 April 2017 and 27 April 2017 are included in Attachment 2..

☒ Habitat for:

☒ Federally Listed species. Explain findings:Wood stork foraging habitat is located within the project site. Additionally the project area (wetlands 1 and 2) are located located within the 18.6 mile buffer from the FWS 619220 Palm Beach County Solid Waste Authority Wood Stork Nesting Colony. Use of The Corps of Engineers, Jacksonville District and the U.S. Fish and Wildlife's Indigo Snake Key dated 1 August 2017 describe eastern indigo snake habitat within Southern Florida include pine flatwoods, tropical hammocks, and the edges of freshwater marshes. Therefore there is Eastern Indigo Snake habitat within the project area and adjacent to the project area.

☐ Fish/spawn areas. Explain findings: .

☐ Other environmentally-sensitive species. Explain findings: .

☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **15-20**

Approximately (30.48) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following: The location of the similarly situated wetlands listed below can be found in Attachment 1, Figures 14 and 15.

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)
Wetland A- (Y)	1.11 ac	Wetland K (Y)	2.10 ac
Wetland B- (N)	0.04 ac	Wetland L- (Y)	0.38 ac
Wetland C- (Y)	1.30 ac	Wetland M- (Y)	0.64 ac
Wetland D - (Y)	0.15 ac	Wetland N- (Y)	1.26 ac
Wetland E- (Y)	5.50 ac	Wetland O-(Y)	2.11 ac
Wetland F- (Y)	1.10 ac	Wetland P- (Y)	1.83 ac
Wetland G- (N)	0.52 ac	Wetland Q-(Y)	3.26 ac
Wetland H- (Y)	0.61 ac	Wetland R- (Y)	6.89 ac
Wetland I- (Y)	2.62 ac	Wetland S- (Y)	3.31 ac
Wetland J- (Y)	1.00 ac	Wetland T- (Y)	2.23 ac

Summarize overall biological, chemical and physical functions being performed: The 38.48 acres of onsite and offsite wetlands adjacent to the non-jurisdictional conveyance and Tributary A serve as habitat for listed and non-listed species, it provides water quality treatment for stormwater runoff from adjacent properties, trapping of sediments and pollution control, detrital export, and groundwater filtration and recharged.

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

   Note: ***On 1 December 2008, the US Supreme Court declined to hear the McWane/Robison case. This case involved a federal appeals court (11th Circuit) ruling that had the effect of overturning a criminal conviction of an industrial pipe manufacturer found guilty of illegally dumping oil, lead, zinc, grease, and other pollutants into Avondale Creek in Alabama, a permanently flowing stream that eventually flows into the navigable Black Warrior River. The appeals court overturned the case because they interpreted the Rapanos decision as requiring a significant nexus determination on all waters except TNWs and wetlands adjacent to the TNWs, and in this case a significant nexus determination was not performed on Avondale Creek, an RPW.***

   The 2 December 2008 Rapanos guidance acknowledges (footnote 16, bottom of page 3) the Supreme Court's refusal to hear the McWane/Robison case. Therefore, in the 11th Circuit (Florida, Georgia, and Alabama) the McWane/Robison decision, which contradicted the June 2007 Rapanos Guidance concerning jurisdiction of RPWs and wetlands directing abutting RPWs, is final. Therefore, when performing an approved JD, the Corps must perform a significant nexus determination on ALL waters and wetlands except for TNWs and wetlands adjacent to TNWs.

   Physical:
   The SIRWCD website (Attachment 4) explains that the water control district maintains over 376 miles of canals and swales. Under normal flow conditions the canal and swale system is part of a gravity flow tertiary system to control stormwater. The initial drainage tertiary tier of the drainage system includes the water that flows from impervious systems, such as roofs, driveways, and roadways into ponds, natural depressions (wetlands), and adjacent roadside swales. Any stormwater that is not held by the swales and absorbed into the ground and moves eastward across the SIRWCD Service Area through a network of canals maintained and operated by the SIRWCD, as the secondary tier of the drainage system. The primary tier, consists of larger canals, such as the

SIRCWD Canal 14, the C&SF C-18 Canal, and Loxahatchee River. The SFWMD is responsible for primary drainage water control.

The Project Area shown in Attachment 1, Figures 1 and 2, a 1.15 acre delineated wetland, serves as a natural depression that collects stormwater runoff from adjacent parcels. Historically, the project area was a wetland as depicted in the 1953 and 1968 aerial imagery in Attachment 1, Figures 6 and 7. The project area is also located within the National Wetland Inventory, as depicted in Attachment 1, Figure 8. According to site visits conducted by the Corps on 4 April 2017 and 27 April 2017, Corps staff documented that the project area includes two wetlands: Wetland 1 is 1.11 acres of palustrine forested dominated by a canopy of melaleuca and slash pine, with an understory of cocoa plum; Wetland 2, 0.04 acres, is characterized by a canopy of melaleuca along the fringes and under story of *Cypreus papyrus* and *Bacopa moneri*. Wetland 1 is at a slightly higher elevation than Wetland 2, and Wetland 1 is at the same elevation as the adjacent roadside swale, which is also considered part of the project area. Data points and photos from the site visits and specifics about the wetlands are documented in Attachment 2.

The waters flow by either overland flow and/or subsurface flow from the project area wetlands into the road side swale located immediately south of the project site on the east side of 133rd Drive North. South of the project area, the roadside swale is maintained and mowed by individual property owners. It is considered a non-jurisdictional conveyance because the swale does not contain an ordinary high water line and is lacking hydrophytic vegetation. The non-jurisdictional conveyance is identified as part of the SIRWCD's tertiary layer of drainage. Water from the swale/ non-jurisdictional conveyance will gravity flow 0.28 miles south through a series of culverts under driveways without any obstructions to flow, to a culvert located south of Randolph Siding Road, which will discharge the water into the SIRWCD Canal 5. SIRWCD Canal 5, is part of the secondary tier of drainage and it is maintained and operated by the SIRWCD.

SIRWCD Canal 5 is a relatively permanent water that directly connects to the SIRWCD Canal 14, and primary drainage Canal, and TNW. Therefore SIRWCD Canal 5 is a Tributary to the TNW and is referred to as Tributary A throughout the determination. Under normal flow conditions, water from Tributary A will gravity flow east approximately 4.27 miles and directly discharges without any obstructions to flow, into the SIRWCD Canal 14, a primary drainage canal and TNW. There are approximately 38.5 acres of wetlands directly abutting Tributary A, along the 4.27 mile area between the non-jurisdictional conveyance discharge and the TNW, as shown in Attachment 1, Figure 14.

The SIRWCD Canal 14 was determined to be a navigable water, because it directly connects, without obstructions to flow, to the Northwest Fork of the Loxahatchee River, Wild and Scenic Section. Under normal flow conditions water will flow from the convergence of the SIRWCD Canal 5 and Canal 14, north in the SIRWCD Canal 14 into the Northwest Fork of the Loxahatchee Wild and Scenic River. During extreme rain events, water will flow south/ be pumped south from the Canal 5 and Canal 14 convergence through the G-92 structure into the C&SF C-18 Canal, also a TNW.

Chemical:
The project area wetlands in combination with the similarly situated wetlands that encompass the relevant reach drainage area provide water quality treatment for stormwater runoff from adjacent low-density single family residential properties by trapping of sediments and nutrients creating pollution control, detrital export, and groundwater filtration and groundwater recharge.

Biological:
The wetlands within the drainage area encompassed by the relevant reach tributary intercept runoff from the surrounding uplands. This water helps to concentrate and route detritus from the uplands, as well as that produced by the wetland vegetation itself, to the waters and TNW further down the landscape. Specifically, large quantities of decomposing biomass are conveyed to the RPW and TNW thereby providing important primary productivity toward the biological maintenance of the food web supported by the TNW. The residence time of water may be relatively short during periods of peak flow when water levels are highest, and therefore would favor rapid delivery of pollutants, including both dissolved and particulate chemicals typically found in moderately developed suburban to rural landscapes such as N, P, sediment, oil, tar, gasoline, fertilizers, pesticides, and pet waste. However, during much of the year flow volumes are much lower and residence times are substantially increased, allowing dissolved and suspended pollutants to interact with sediments and vegetation, thus likely ameliorating the poorer water quality conditions present during higher flow periods. Pollutants being contributed to these wetlands by surrounding uplands are reasonably concluded to include constituents typical of roadside runoff as well as those commonly associated with suburban development. Additional important chemical and physical water quality functions such as denitrification, carbon storage, and sediment and phosphorous retention are also provided by the similarly situated wetlands.

The wetland within the project area and the 37 similarly situated wetlands are of utmost importance biologically since the majority of other non-wetland areas in the watershed have been altered for agriculture, residential, or other purposes. These wetlands provide breeding grounds for species that cannot reproduce in faster-moving water and move between wetlands and uplands over their lifecycle. The wetlands, along with the tributary system, provides wildlife habitat (e.g. feeding, nesting, spawning, and rearing of young) for many aquatic species that live and forage in traditional navigable waters. The wetlands also maintain a more consistent water temperature in tributaries, which is important to many aquatic species. The close proximity of the wetlands, and occasional surface water connections, may affect the species distribution and diversity in these wetlands. Specifically, surface water connections to more permanent water bodies allow the introduction of fish species that would otherwise not be present in these wetlands. This will in turn have a direct effect on the species of amphibians and reptiles that can use the wetlands.

Specifically the wetlands within the project area, adjacent to the non-jurisdictional conveyance, Tributary A, and wetlands adjacent to Tributary A are located within the 18.6 mile buffer from the U.S. Fish and Wildlife Service's (FWS) 619220 Palm Beach County Solid Waste Authority Wood Stork Nesting Colony. Use of The Corps of Engineers, Jacksonville District and the U.S. Fish and Wildlife's Indigo Snake Key dated 1 August 2017 describe eastern indigo snake habitat within Southern Florida to include pine flatwoods, tropical hammocks, and the edges of freshwater marshes. Therefore there is Eastern Indigo Snake habitat within the project area, wetlands adjacent to the non-jurisdictional conveyance and adjacent to Tributary A, and along the upper banks of Tributary A. In addition to suitable types of habitat, they also contain area where gopher tortoise and/or their burrows may be present, which is also an indicator of eastern indigo snake habitat. The West Indian Manatee, may also be present within the eastern portions of Tributary A during the wettest summer months when water levels are the highest due to back to back daily rain and possible tropical cyclones. The manatee can access the North Fork of Loxahatchee River and the SIRWCD Canal 14 because there are no barriers to flow, therefore the species can also access SIRWCD Canal 5, Tributary A. Additionally, project area, adjacent to the non-jurisdictional conveyance, Tributary A, and wetlands adjacent to Tributary A are located within the consultation areas for the following species: Red cockaded woodpecker, Florida Scrub Jay, Everglade Snail Kite, and Crested Caracara.

Considering the high potential for development in the area and existing water quality issues within the watershed, specifically along the flow path from the project area to the TNW, the functions of the wetlands in the project area play an important role relating to downstream water quality. Based on the biological, chemical, and physical functions described above, this office has concluded that a Significant Nexus exists between this relevant reach, its similarly situated adjacent wetlands and the downstream TNW.

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   - ☐ TNWs: linear feet width (ft), Or, acres.
   - ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   - ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   - ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

   Provide estimates for jurisdictional waters in the review area (check all that apply):
   - ☐ Tributary waters: linear feet width (ft).
   - ☐ Other non-wetland waters: acres.
     Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
   - ☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

   Provide estimates for jurisdictional waters within the review area (check all that apply):
   - ☐ Tributary waters: linear feet width (ft).
   - ☐ Other non-wetland waters: acres.
     Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
   - ☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
     - ☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .
     - ☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

   Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**

---

[8]See Footnote # 3.

☒ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: **1.15** acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
   ☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

   Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.**[9]
   As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
   ☐ Demonstrate that impoundment was created from "waters of the U.S.," or
   ☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
   ☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]

☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
   Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):

☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
   ☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .

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[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

☐ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  ☐ Office concurs with data sheets/delineation report.
  ☐ Office does not concur with data sheets/delineation report.
☒ Data sheets prepared by the Corps: See Attachment 2.
☐ Corps navigable waters' study: .
☒ U.S. Geological Survey Hydrologic Atlas: Attachment 1, Figure 3 for HUC 12: for the Upper Loxahatchee River, 030902060603.
  ☐ USGS NHD data.
  ☒ USGS 8 and 12 digit HUC maps.
☐ U.S. Geological Survey map(s). Cite scale & quad name: .
☒ USDA Natural Resources Conservation Service Soil Survey. Citation: Web Soil Survey Data is located in Attachment 3.
☒ National wetlands inventory map(s). Cite name: Palustrine, Emergent Persistent, See Attachment 1, Figure 8.
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☒ Aerial (Name & Date): See Attachment 1.
  or ☒ Other (Name & Date): See Attachment 2.
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☒ Other information (please specify):Information from the South Indian River Water Control District website: www.sirwcd.org and Attachment 4; and Attachment 5: U.S. Department of Agriculture, NRCS, National Water and Climate Center Rainfall Data, WETS Tables and DAREM analysis.

B. ADDITIONAL COMMENTS TO SUPPORT JD:

The Project Area shown in Attachment 1, Figures 1 and 2, consists of a 1.15 acre delineated wetland. The project area was limited to the property boundaries owned by John Manos. The immediately adjacent undeveloped lot to the south appeared to also be wetlands and a continuance of the wetlands delineated on the Manos property. The wetlands on the parcel immediately south were included as one of the wetlands adjacent to the non-jurisdictional conveyance. Historically, the project area was a wetland as depicted in the 1953 and 1968 aerial imagery in Attachment 1, Figures 6 and 7. The project area is also located within the National Wetland Inventory, as depicted in Attachment 1, Figure 8. According to site visits conducted by the Corps on 4 April 2017 and 27 April 2017, Corps staff documented that the project area includes two wetlands: Wetland 1 is 1.11 acres of palustrine forested dominated by a canopy of melaleuca and slash pine, with an understory of cocoa plum; Wetland 2, 0.04 acres, is characterized by a canopy of melaleuca along the fringes and under story of *Cypreus papyrus* and *Bacopa moneri*. Wetland 1 is at a slightly higher elevation than Wetland 2, and Wetland 1 is at the same elevation as the adjacent roadside swale, which is also considered part of the project area. It should be noted that the northern portion of wetland 1 contained a higher percentage of Brazilian pepper and earleaf acacia in the canopy, as documented in data point 3. The western portion of the site, which did not include another data point contained similar vegetation coverage to data point 3 and did not warrant a 4th data point. Indicators of hydrology were fairly consistent through all of wetland 1, which consisted of visible water marks on the base of canopy strata trees, and both data points 1 and 3 documented oxidized rhizospheres on living roots within 12-inches of the soil surface. Data points and photos from the site visits and specifics about the wetlands are documented in Attachment 2.

Additionally U.S. Department of Agriculture, NRCS, National Water and Climate Center Rainfall Data, WETS Tables were downloaded for the Canal Point Station for the period of record (POR) from 1938-2018, and the West Palm Beach International Airport, POR from 1941-2018. Both sets of tables were used because the project area is located between both stations. The Canal Point Station is missing some rainfall data for January 2017-March 2017, however using the data as downloaded from the WETS tables for each station, two Direct Antecedent Rainfall Evaluation Method (DAREM) Analyses were conducted (one per station) for the April 2017 site visits to determine if the if the climatic conditions during the 4 April 2017 and 27 April 2017 site visits were completed during a period of normal, above normal or below normal rainfall. The DAREM analysis for the Canal Point station showed that rainfall was below normal (previously noted that some rainfall data was missing) and the analysis for the West Palm Beach International Airport Station showed that rainfall was normal. See Attachment 5 for the DAREM analyses and WETS tables.

Based on the biological, chemical, and physical functions described above, this office has concluded that a Significant Nexus exists between the relevant reach tributary and its adjacent wetlands, including the project area wetlands, to the downstream TNW and therefore the project area wetlands are subject to regulation under Section 404 of the Clean Water Act.

ATTACHMENT 1

Supporting Figures and Maps

Approved Jurisdictional Determination
Application: SAJ-2017-00229

Project: John Manos Single Family Home
SAJ-2017-00229

Review Area and Wetland Boundaries

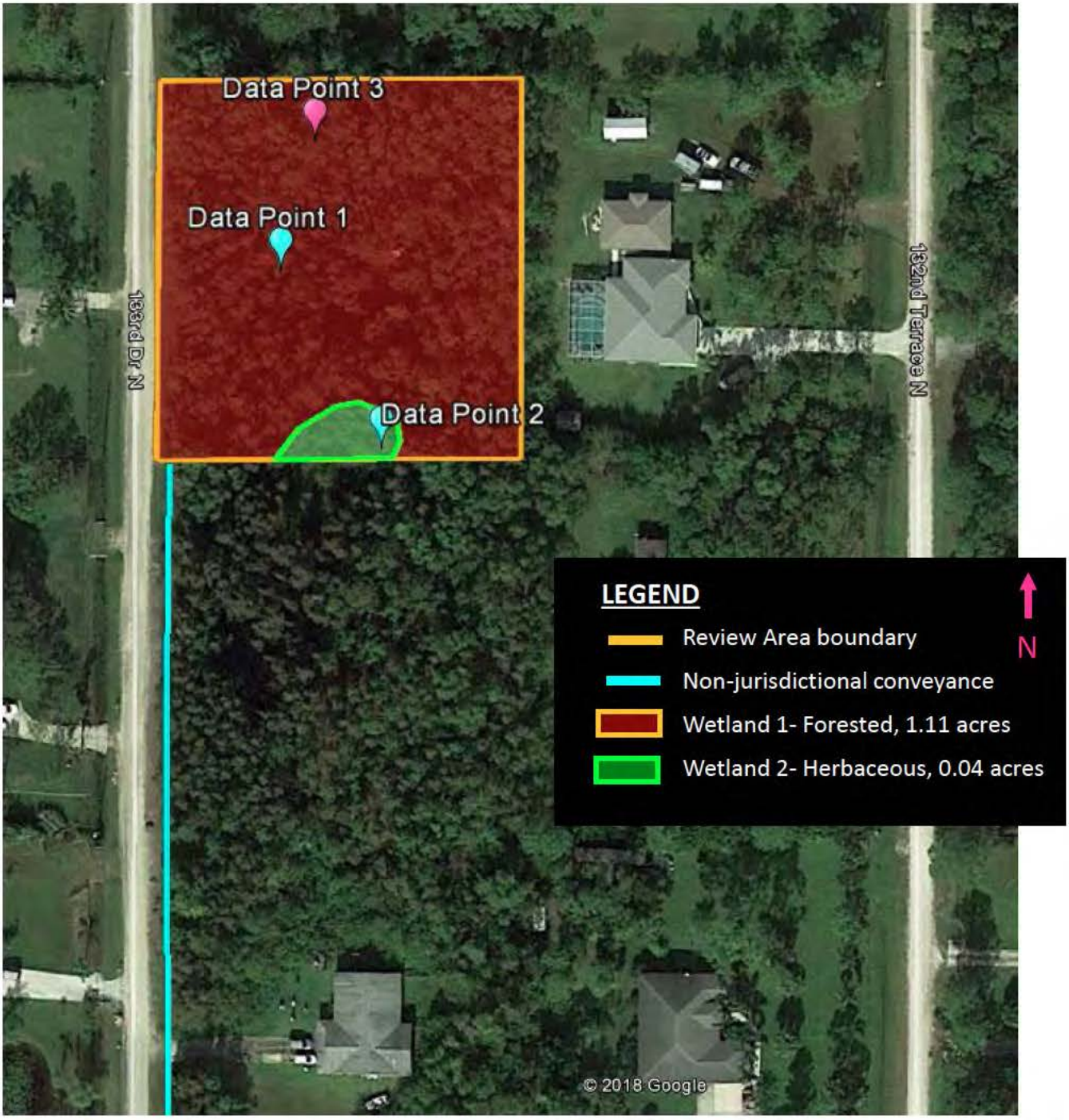

Figure 1. The Review Area, which includes the delineated wetland boundaries relation to the existing road side swale along 133rd Drive North (non-jurisdictional conveyance) that discharges water from the project area into Tributary A (South Indian River Water Control District (SIRWCD) Canal 5). See Attachment 2 for Wetland Delineation data forms and onsite photos at each data point.

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Review Area and Significant Nexus Component Locations

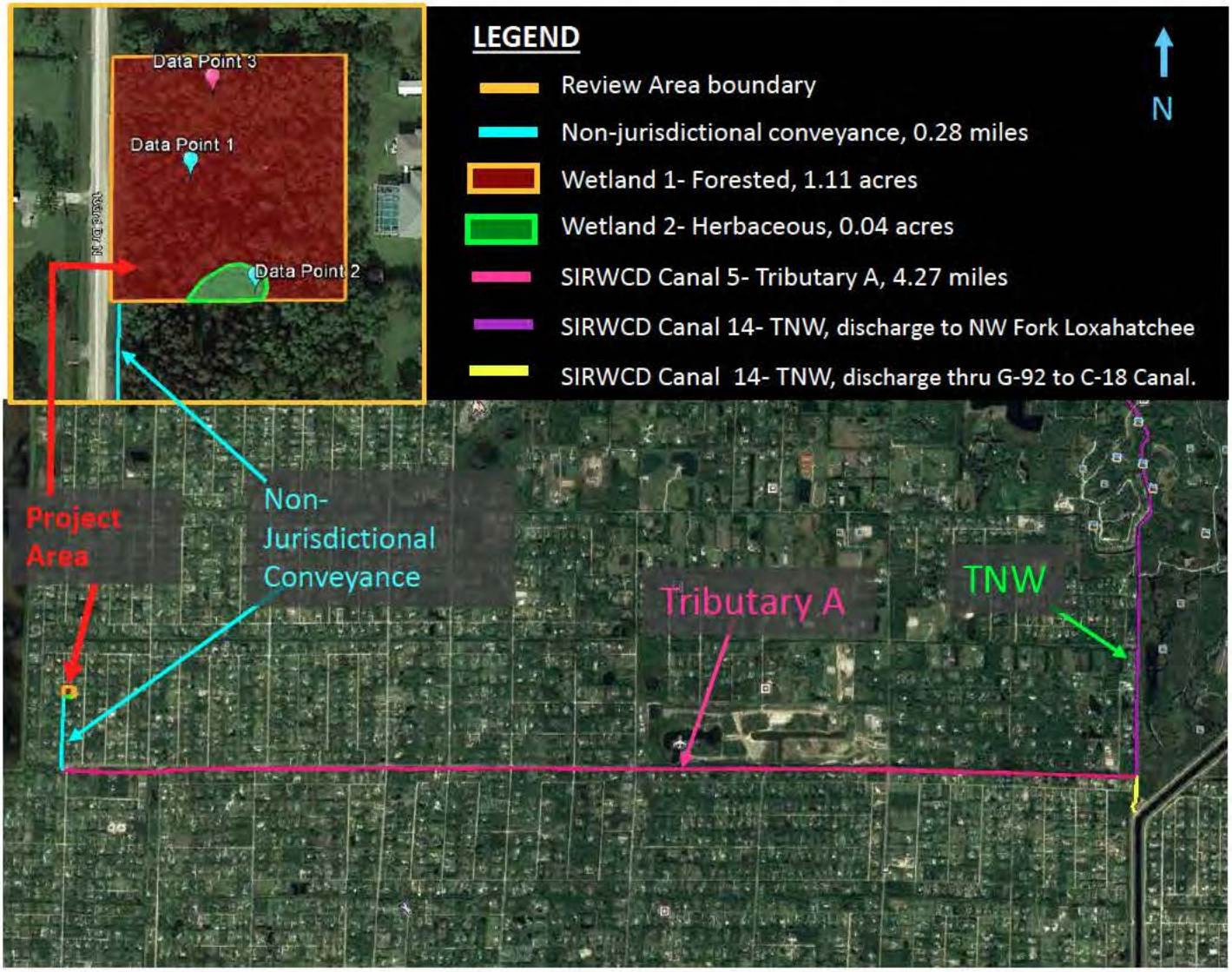

Figure 2. The Review Area and Significant Nexus Components. The delineated wetland boundaries flow into the existing east road side swale along 133rd Drive North (non-jurisdictional conveyance). Water from this conveyance will discharge into Tributary A (SIRWCD Canal 5, pink line). Tributary A, directly discharges to SIRWCD Canal 14, a Traditionally Navigable Water (TNW). Under normal flow conditions water will flow north from the SIRWCD C-14 Canal north into the Northwest Fork of the Loxahatchee River (purple flow). During extreme storm events, water from the SIRWCD may discharge South through the G-92 Structure (Yellow pathway).

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Watershed Boundaries and Size

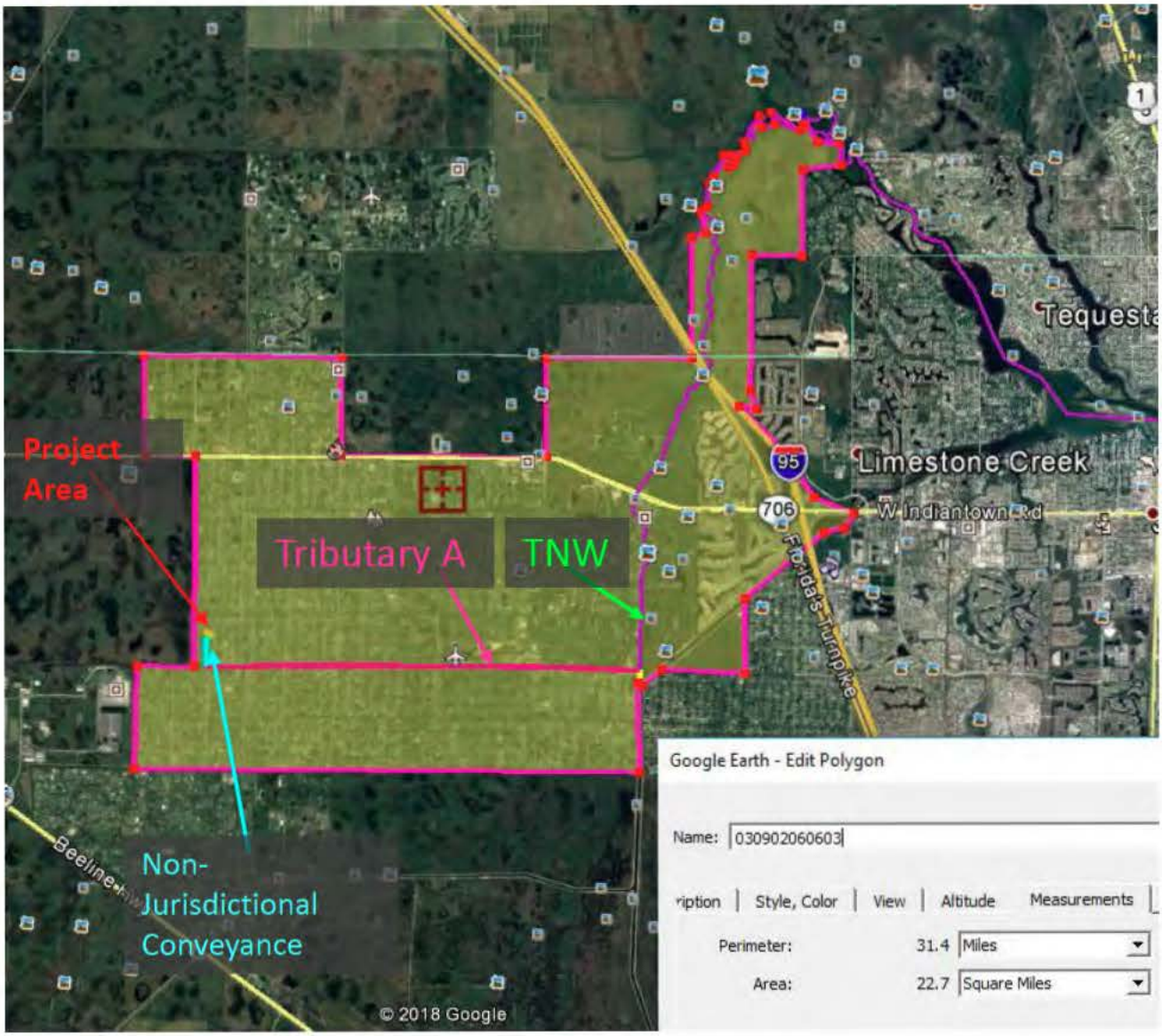

Figure 3: Watershed: Hydrologic Unit Code (HUC) 12 for the Upper Loxahatchee River, 030902060603. Watershed is 22.7 square miles, (14,550 acres).

Drainage Area and Size

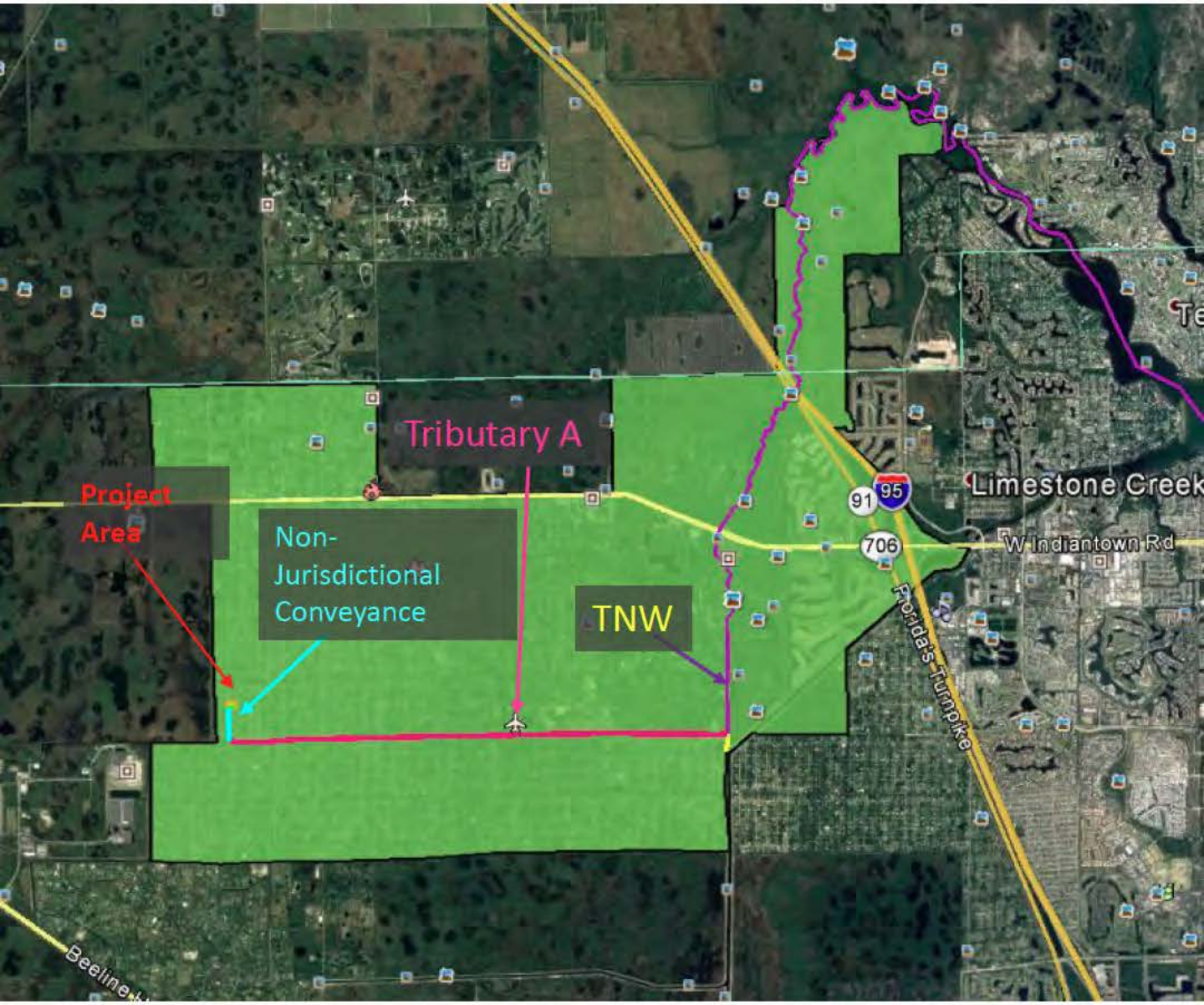

Figure 4: Drainage Area, South Florida Water Management District (SFWMD) Wild and Scenic/ Jupiter Farms Drainage Basin boundaries, total 22.8 square miles (14,609 acres).

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1999 Google Earth Aerial Image with plotted project boundary

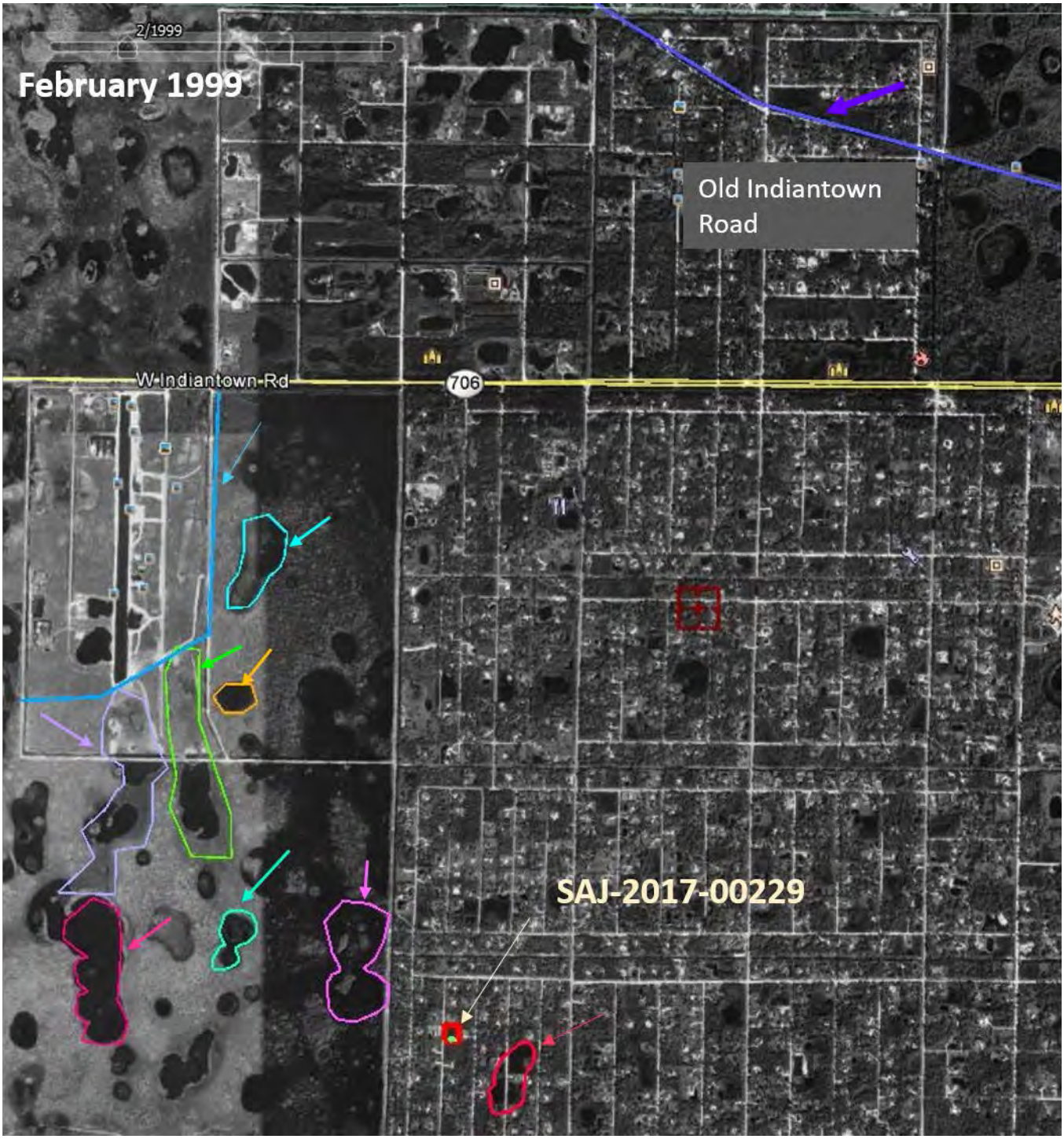

Figure 5. The wetlands outlined in the Google Earth 1999 Aerial Imagery were used to identify the location of parcel (SAJ-2017-00229), in the 1953 aerial imagery obtained from the University of Florida. The colored arrows in the photo above, correspond to the wetlands on the following page.

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1953 UF Aerial Imagery of the area.

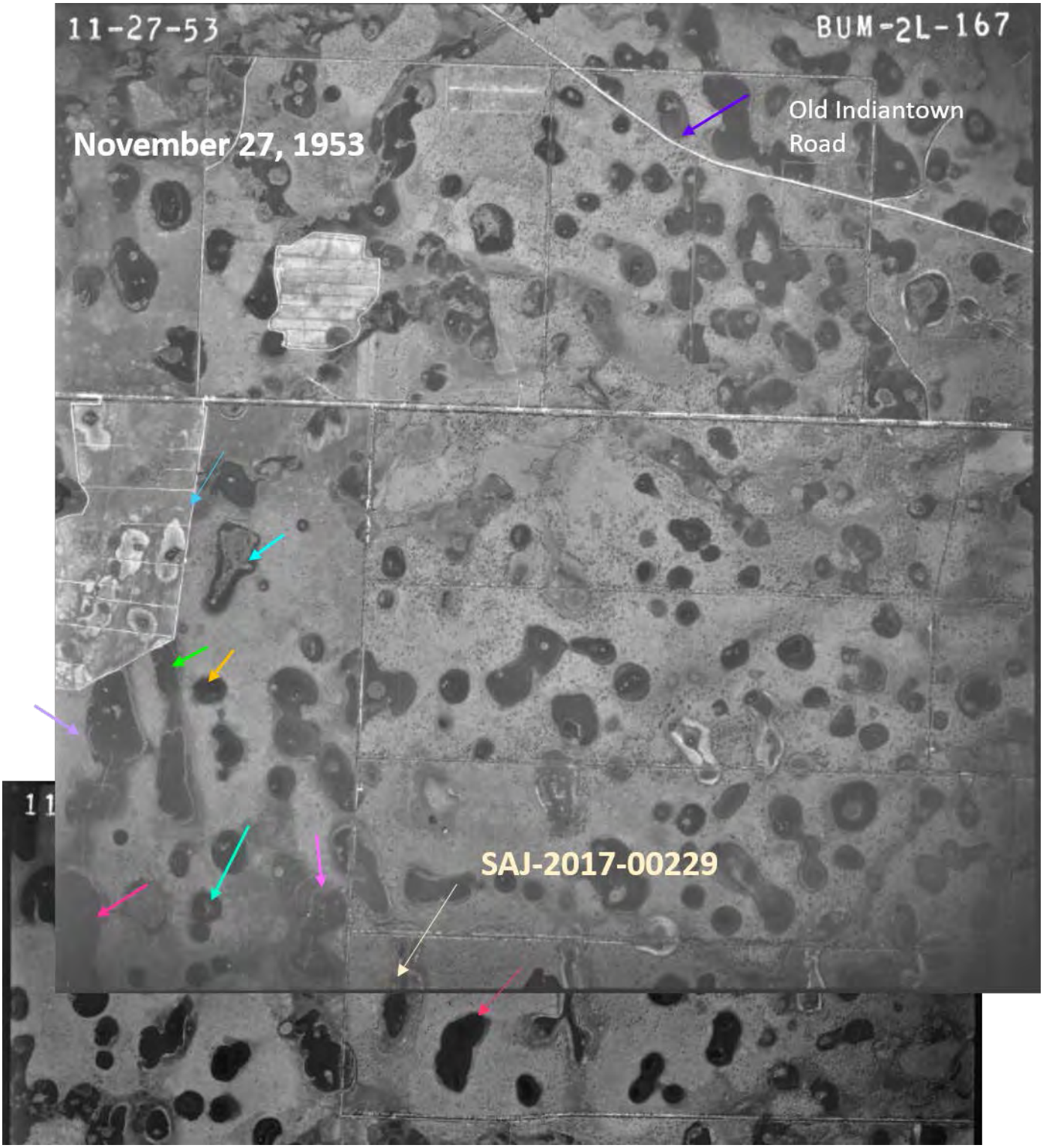

Figure 6. The aerial imagery from 1953 shows the location of parcel, SAJ-2017-00229, as an wetland area using surrounding signature wetlands and roadways from the 1999 Google Earth Aerial Image.

Project: John Manos Single Family Home SAJ-2017-00229

1953 UF Aerial Imagery of the area.

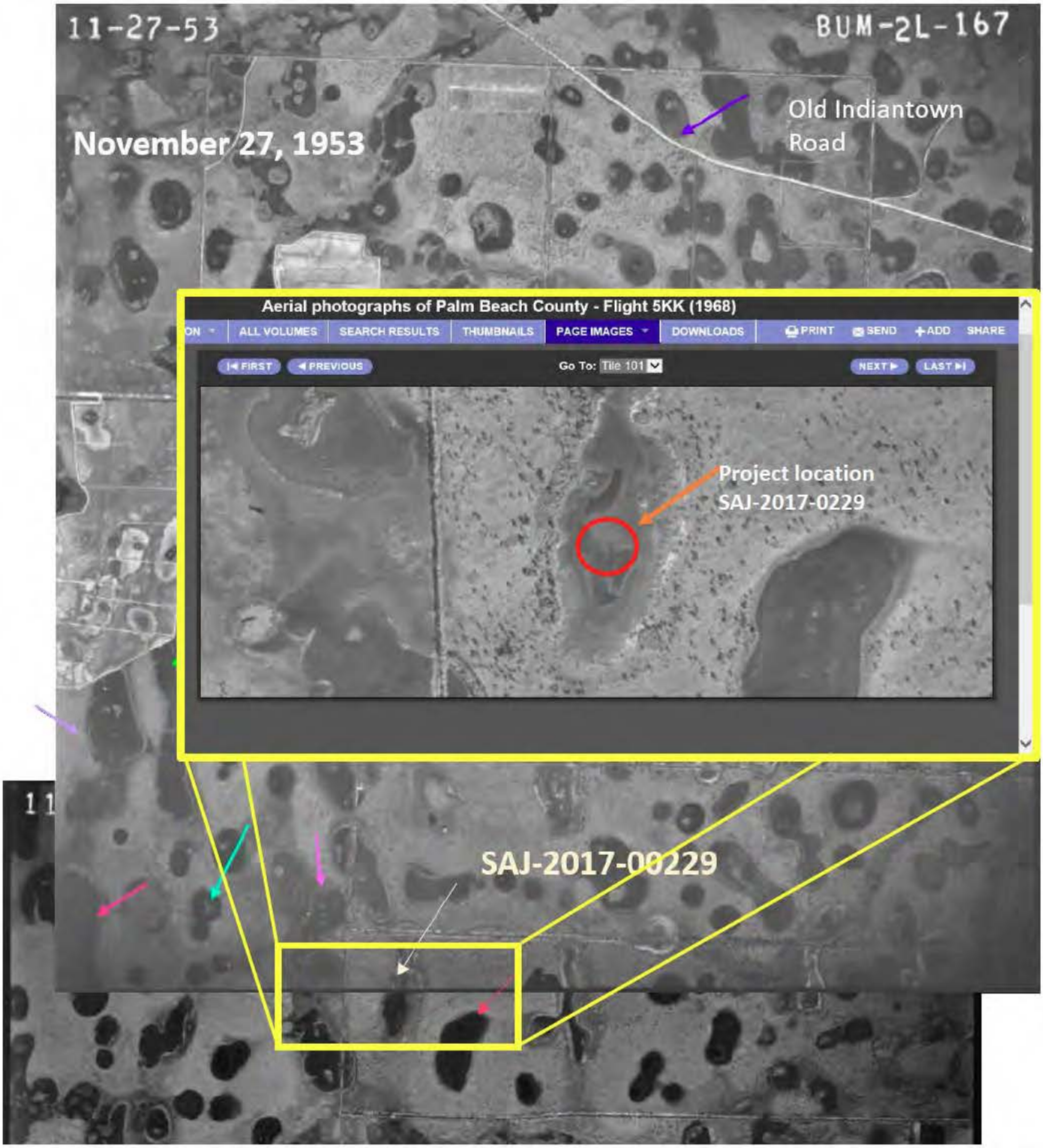

Figure 7: The 1968 aerial imagery inset from the 1953 background imagery shows the exact location of the project, as identified by the Regulatory Division Archaeologist, for the Section 106 Consultations. The exact project location is deemed to be in an historic wetland, with historic hydric soils, part of the larger mosaic wetland landscape.

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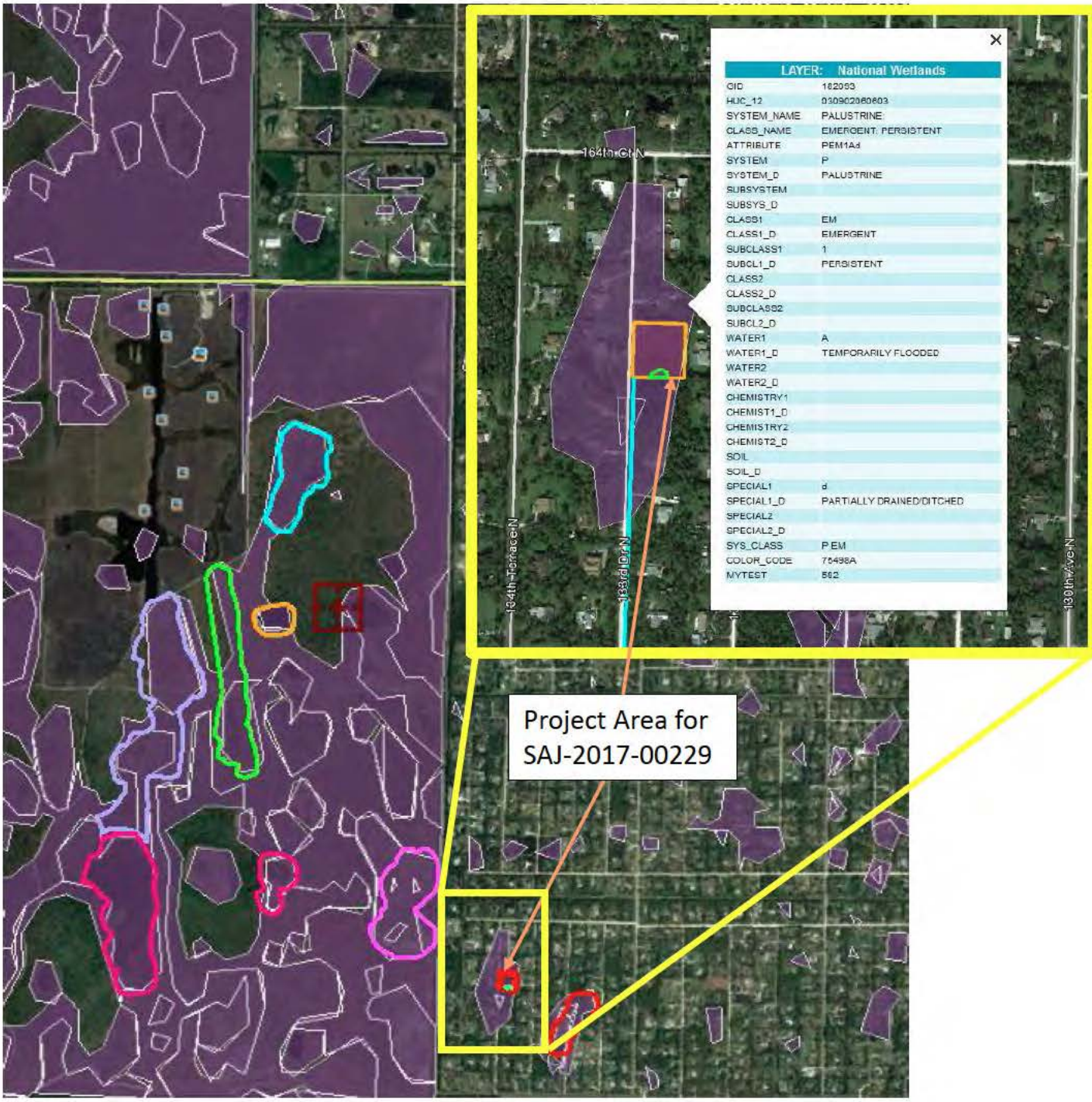
Figure 8: National Wetland Inventory RAR layer with historical wetlands outlined and SAJ-2017-00229 Parcel.



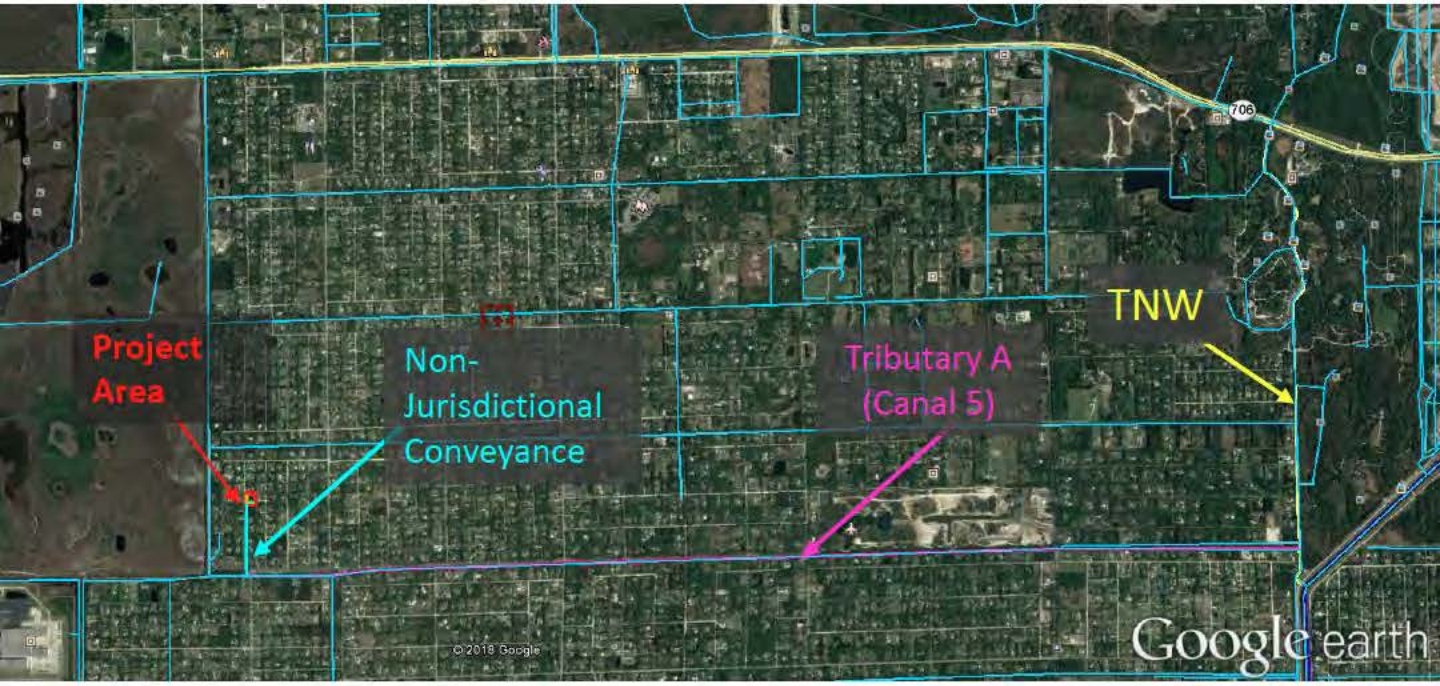
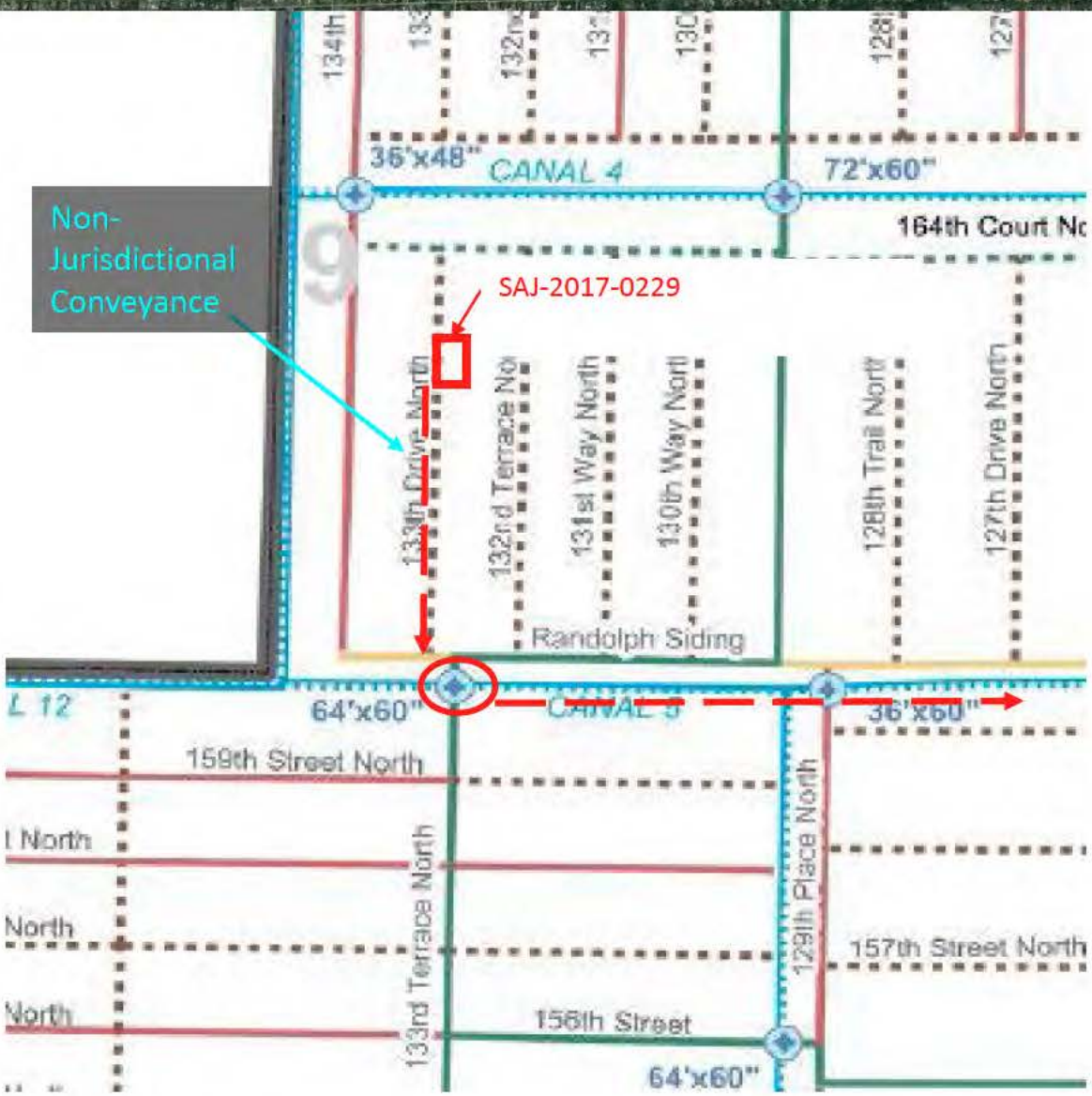


Figure 9: Flow Lines of all the canals within the project area, specifically showing the non-jurisdictional conveyance discharges into one of the flow lines, also labeled Tributary A (Canal 5). The above figure demonstrates that the flows from Tributary A and SIRWCD C-14 Canal (TNW) are also directly connected.

Project: John Manos Single Family Home SAJ-2017-00229

Figure 10 (below): Tributary Map from google Earth Compared to the structures map for the SIRWCD.



Zoomed in figure of the structures within the flow lines, from SIRWCD website

Project: John Manos Single Family Home SAJ-2017-00229

Figure 11: Map and photo graphs showing the zoomed view of Tributary A, where it connects to the John Manos Parcel, 1.15 acre wetland.

Photo above taken at the northwest corner of the property boundary, looking south within the existing swale adjacent to the road. Once past the property boundary, the swale is considered a non-jurisdictional conveyance of water. The section of swale (photos above) adjacent to the forested wetland contains herbaceous wetland obligate vegetation and continues to the toe of Melaleuca tree line, indicating no upland barrier and therefore the swale is included as part of Wetland 1.

Photo above shows a zoomed in photo from the photos to the left of the vegetation located in the Swale, within Wetland 1. Namely, *Sagittaria lancifolia*, wetland indicator status: obligate plant.

Project: John Manos Single Family Home SAJ-2017-00229

Figure 12: Map and photo graphs showing the zoomed view of the road side swales (non-jurisdictional conveyance), where it connects to Tributary A.

Photo (March 2018) above taken looking east along Tributary A. Culvert outfall from road side swales (non-jurisdictional conveyance), bottom right corner (not shown).

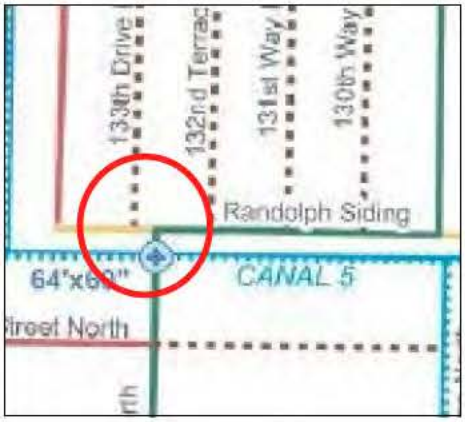


Photo taken looking West at Tributary A (April 2017). Culvert where water from the non-jurisdictional conveyance discharges to Tributary A (SIRWCD Canal 5) in Red circle.

Project: John Manos Single Family Home
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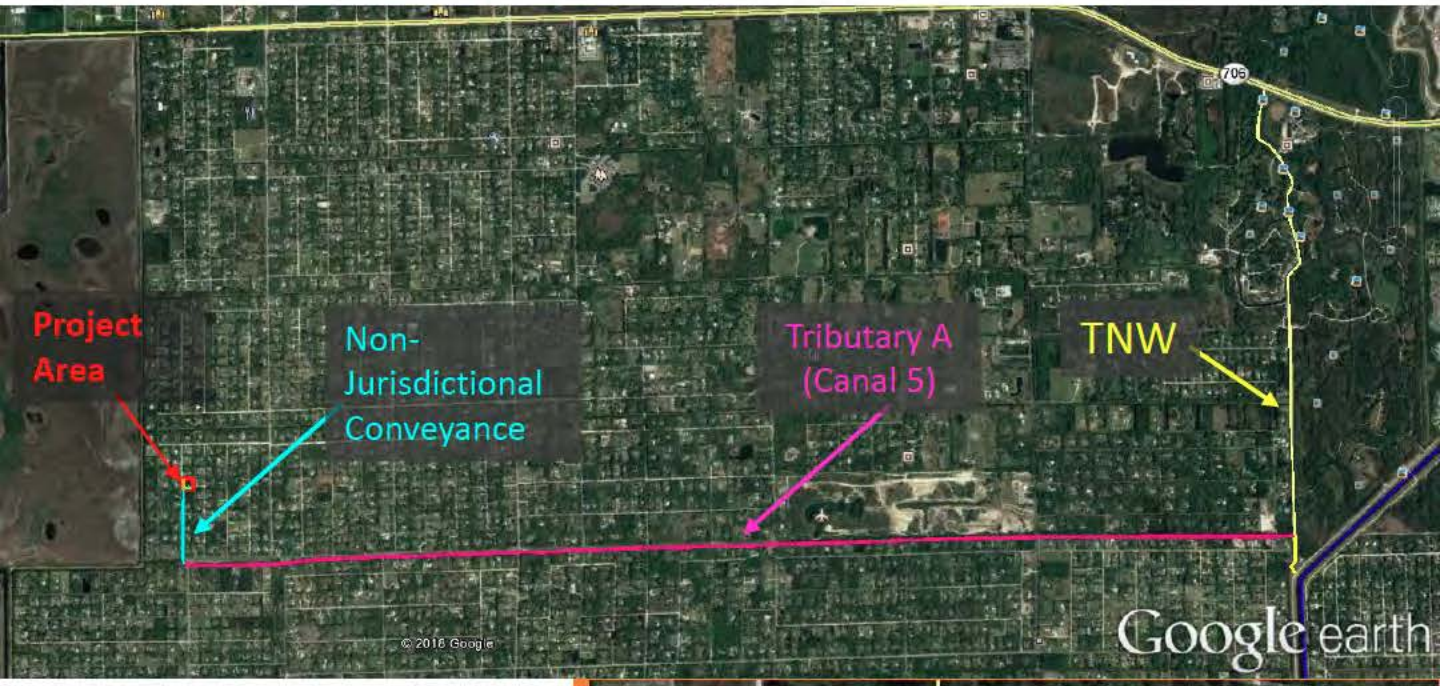
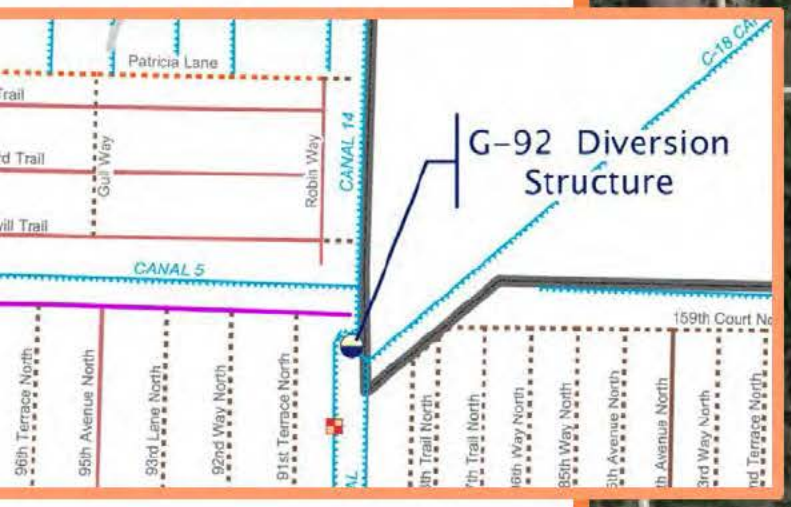
Figure 13. Shows the map and aerial imagery from google earth with the connection from Tributary A to the TNW, SIRWCD C-14 Canal.





Project: John Manos Single Family Home SAJ-2017-00229

Wetlands adjacent to non-jurisdictional conveyance, Tributary A, and the TNW.

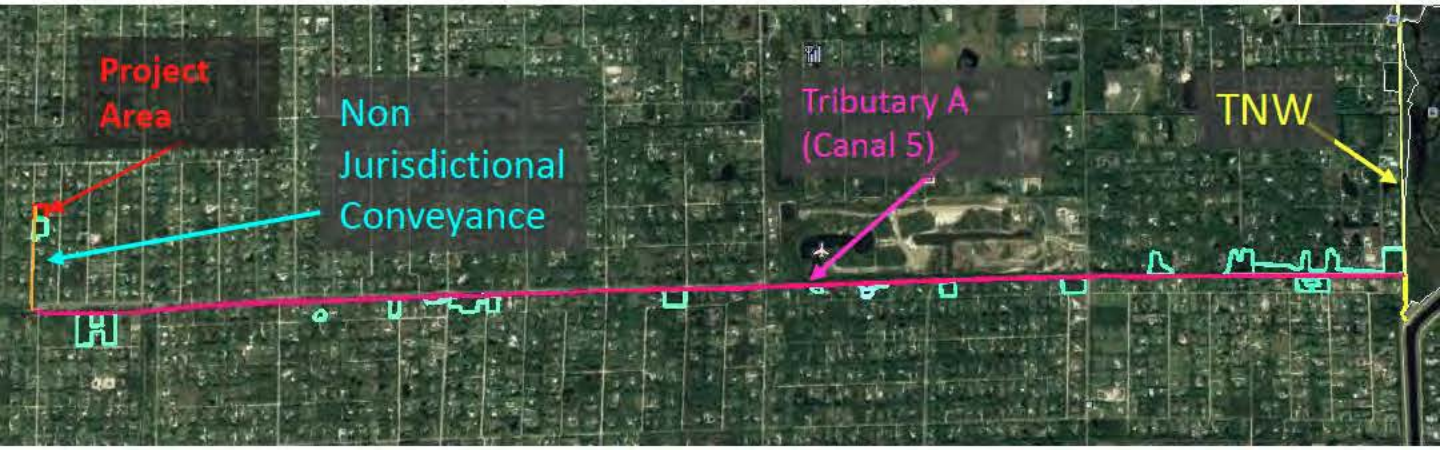


Figure 14. The cyan colored polygons show the location of the 20 wetlands (total 38.48 acres) adjacent to the roadside swale on 133rd street North (non-jurisdictional conveyance) and Tributary B.

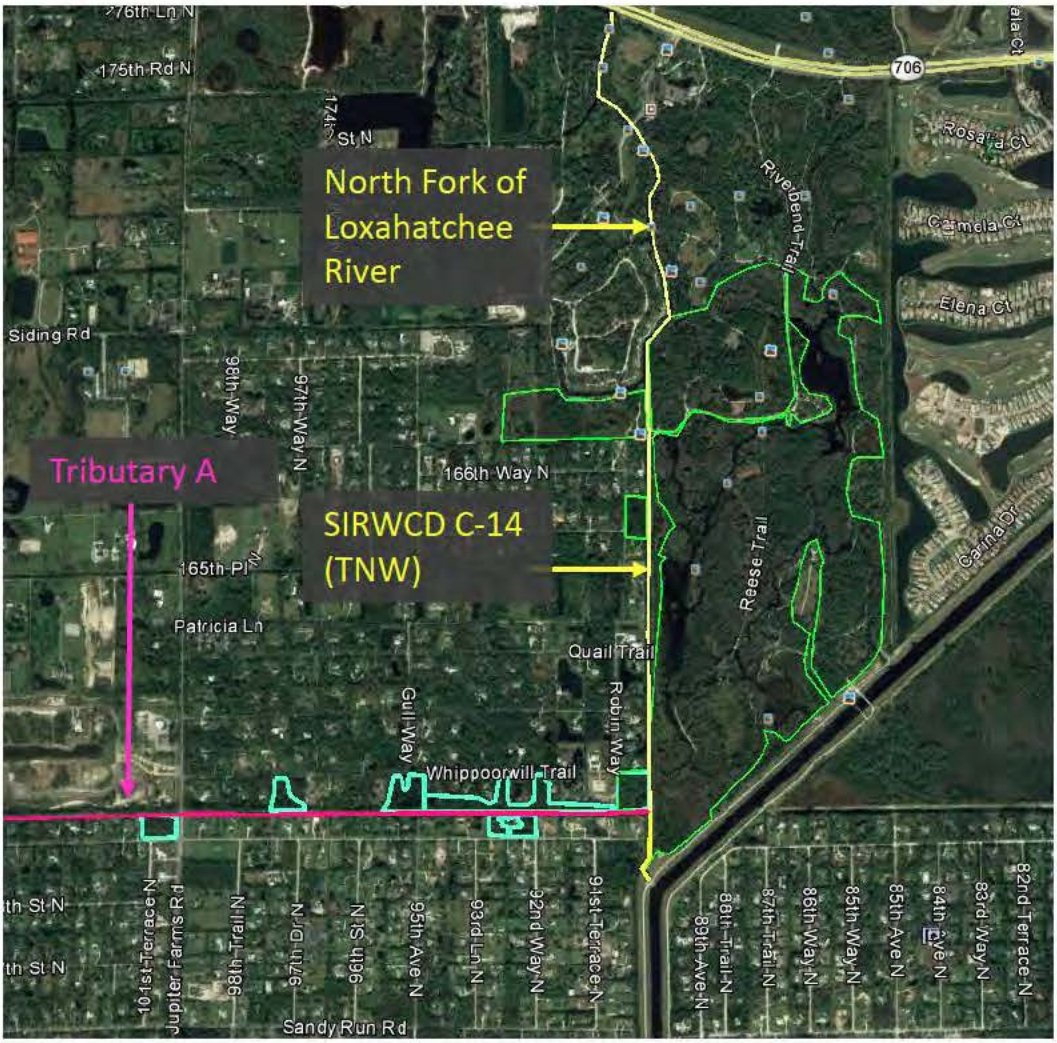


Figure 15 (left): The 300 acres of wetlands adjacent to the C-14 Canal (TNW), shown in the neon green polygons.

ATTACHMENT 2

Data Sheets and On Site Photos from Site Visits

Application: SAJ-2017-00229

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: SAJ-2017-00229 City/County: Jupiter Farms/Palm beach Sampling Date: 4/4/2017

Applicant/Owner: John Manos State: FL Sampling Point: 1

Investigator(s): USACE: Jerilyn Ashworth, C. Karvounis, T. Fraley Section, Township, Range: S 09/ T41 South / R41 East

Landform (hillside, terrace, etc.): Deperssion on marine terrace Local relief (concave, convex, none): Concave Slope (%): 0-1

Subregion (LRR or MLRA): LRR U Lat: 26.917293 Long: -80..244787 Datum: WGS 84

Soil Map Unit Name: Riveriera Fine Sand Depressional, 0-1% slope NWI classification: Palustrine Emergent

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
It has been extremely dry and hot for April in Florida. The wetland data point was taken within the "upland" portion of the site as described by the applicant. It was consistenly a canopy of Melaluca and slash pine with an understory of Cocoa Plum. There were some patches of Brazillian Pepper on the north side of the site. The data point area was chosen because it was a good respresnative of the majority of the habitat on site. The area contained all three parts of the wetland as defined under Section 404 of the Clean Water Act, hydrology, hydrophytic vegetation and hydric soils.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- X Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T,U)**

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** X **No** ____

Descr be Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
The soil plug recorded oxidated rhizopheres on living roots, which was photo documented. It started within the 2nd soil horizon at 2.5 inches and continued through to at least 6 inches. The base of the Melaleuca trees and slash pine showed buttressing from periods of inundation and water marks were visible on the trees. After conducting the hydrophytic vegetation indicators, it passed the dominance test and the Fac-Neutral test (secondary indicator) and the area also qualified for geomorphic position. The NRCS soils stated that it was concave surface, but in the field is appeared to be more of an extensive flat area at a slightly higher elevation from Wetland point 2. The bottom below the forested canopy was not vegetated and contained lots of fallen leaves and needles. If the area was concave from slight elevation differences around the perimeter from the adjacent road and house pad, it may have also qualified for the secondary indicator sparsely vegetated concave surface. But more than enough hydrologic indicators were observed to have wetland hydrology present.

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: 1

Tree Stratum (Plot size: 30-ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Melaleuca quinquenervia*	40	Yes	FAC
2. *Pinus elliottii*	25	Yes	FACW
3.			
4.			
5.			
6.			
	65	=Total Cover	
50% of total cover: 33		20% of total cover:	13

Sapling Stratum (Plot size: 30-Ft radius)			
1. *Melaleuca quinquenervia*	30	Yes	FAC
2. *Pinus elliottii*	5	No	FACW
3.			
4.			
5.			
6.			
	35	=Total Cover	
50% of total cover: 18		20% of total cover:	7

Shrub Stratum (Plot size: 30-ft radius)			
1. *Chrysobalanus icaco*	30	Yes	FACW
2.			
3.			
4.			
5.			
6.			
	30	=Total Cover	
50% of total cover: 15		20% of total cover:	6

Herb Stratum (Plot size: 30-ft radius)			
1. *Lygodium microphyllum*	5	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	5	=Total Cover	
50% of total cover: 3		20% of total cover:	1

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	65	x 2 =	130
FAC species	70	x 3 =	210
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	135 (A)		340 (B)

Prevalence Index = B/A = 2.52

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub - Woody Plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody Vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below.)

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2.5	10YR 5/1	93	10YR 7/1	5	D	M	Sandy	Faint Contrast/ Diffuse boundaries
			7.5YR 6/6	2	C	M		Prominent redox concentrations
2.5-6	10YR 6/2	81	10YR 7/2	15	D	M	Sandy	Faint Contrast/ Diffuse boundaries
			10YR 5/4	2	C	M		Distinct redox concentrations
			10YR 6/6	5	C	PL/M		Prominent redox concentrations
6-8.5	2.5Y 7/1	95	10YR 7/4	5	C	M	Sandy	Prominent redox concentrations
8.5-15	5Y 8/1	100					Sandy	100% uniform

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR, P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- X Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: sand refusal

Depth (inches): 15

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data form is revised from Atlantic and Gulf Coastal Plain Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx). Horizon 1 also contained substaintial amounts of root matter. Depletions were noted but only a few at 5% of the profile. Additionally Redox was observed but also only at 2% concntrations. See photos. Horizon 2 contained a larger percentage of delpleted areas, and two colors of redox were observed. This horizon also contained oxidized rhizopheres on living roots (Hydrologic indicator), see photos.. Horizon 3 had no roots pressent and teh redox was less than the 2nd horizon. Horizon 4 was entirely homogenous, a gray white sand.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: SAJ-2017-00229 City/County: Jupiter Farms/Palm beach Sampling Date: 4/4/2017

Applicant/Owner: John Manos State: FL Sampling Point: 2

Investigator(s): USACE: Jerilyn Ashworth, C. Karvounis, T. Fraley Section, Township, Range: S 09/ T41 South / R41 East

Landform (hillside, terrace, etc.): Deperssion on marine terrace Local relief (concave, convex, none): Concave Slope (%): 0-1

Subregion (LRR or MLRA): LRR U Lat: 26.917000 Long: -80.244411 Datum: WGS 84

Soil Map Unit Name: Riveriera Fine Sand Depressional, 0-1% slope NWI classification: Palustrine Emergent

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ___ No X (If no, explain in Remarks.)

Are Vegetation ___, Soil X, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X	No ___	
Wetland Hydrology Present?	Yes X	No ___	

Remarks:
It has been extremely dry and hot for April in Florida. Data point was taken within the area identified as a wetland by the applicant. The Corps agreed that this area was a wetland as it contained wetland hydrology, hyrophytic vegetation, and hydric soil. Soils however did appear to have disburbance even though hydric soil indicators were observed. Soil contained sharp and clear boundaries indicative or pior disturbance. Two plugs were taken and only one was analyzed, but both had similar appearance.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- X Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- X Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T,U)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? **Yes** X **No** ___

Descr be Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
The trees showed morphological adaptations such as butressing as signs of inundation. Additional toward the center of the concave area thin algal matting was oberved and water marks were observed on the base of the Melaluca trees. The area also passed the Fac-Neutral Test and was located in a concave area so it qualified for geomorphic position. Therefore there were many indicators of wetland hydrology.

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: 2

Tree Stratum (Plot size: 30-ft Radius*)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Melaleuca quinquenervia*	30	Yes	FAC
2.			
3.			
4.			
5.			
6.			
	30 =Total Cover		
50% of total cover: 15	20% of total cover: 6		

Sapling Stratum (Plot size: 30-ft radius *)			
1. *Melaleuca quinquenervia*	15	Yes	FAC
2.			
3.			
4.			
5.			
6.			
	15 =Total Cover		
50% of total cover: 8	20% of total cover: 3		

Shrub Stratum (Plot size: 30-ft Radius*)			
1. *Salix caroliniana*	10	Yes	OBL
2.			
3.			
4.			
5.			
6.			
	10 =Total Cover		
50% of total cover: 5	20% of total cover: 2		

Herb Stratum (Plot size: 30-ft Radius*)			
1. *Cyperus papyrus*	40	Yes	OBL
2. *Bacopa monnieri*	15	Yes	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	55 =Total Cover		
50% of total cover: 28	20% of total cover: 11		

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	65	x 1 =	65
FACW species	0	x 2 =	0
FAC species	45	x 3 =	135
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	110 (A)		200 (B)
Prevalence Index = B/A =			1.82

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub - Woody Plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody Vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below.)

* a 30-ft radius was completed North, South, and west fo the soil plug. However along the east boundary the radius was 10-feet because otherwise of a habitat/vegetation/elevation change.

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 2/1	100					Muck	OB present- see remarks
3-5	10YR 5/1	60	10YR 2/1	40	D	M	Sandy	Distrubance, clear boundaries
5-17	10YR 2/1	60	10YR 7/1	40	C	M	Mucky Loam/Clay	Distrubance, clear boundaries

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- X Organic Bodies (A6) **(LRR, P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- X Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ? Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ? Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ? Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Root refusal

Depth (inches): 17

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data form is revised from Atlantic and Gulf Coastal Plain Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx). Soil Horizon 1 (0-3 inches): Matrix was a 10YR 2/1 with an overall muck texture. It was comprised on roots with lots of organic bodies. Most of the horizon was organic bodies along living roots. The Matrix when analyzed as a whole contained 95% organic coating (Masked grains), with some visible sand grains. For the texture of the matrix, it passed the bounce test and after 5 rubs no sand grains were felt. It require to be moistened with the spray bottle. The organic Bodies (OB) had a mucky texture (after 5+ rubs no sand grains were felt. and soil was smooth and greasy), OB were > 95 % coated or masked. Size ranged from 0.5-0.75 inches in diameter, the OB had a 10YR 2/1 and were greater than 5% of the profile. Horizons 2 and 3 showed signs of distrubance. there were sharp and clear boundaries between the sand and dark loamy clay (MS at 70%). See photos for Organic Bodies, and all three horizons.

SAJ-2017-00229: Map

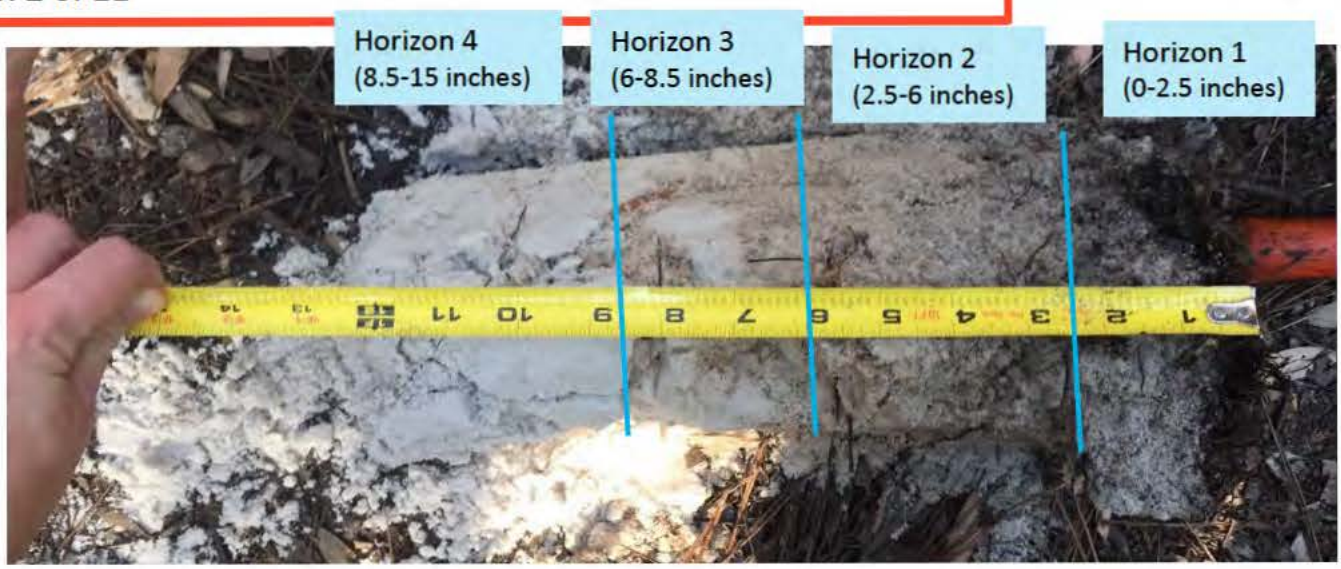
Applicant: John Manos
Sampling Date: 4/4/2017
USACE Investigators: Jerilyn Ashworth, C. Karvounis, and T. Fraley
Photo Report and Data sheets written by Jerilyn Ashworth

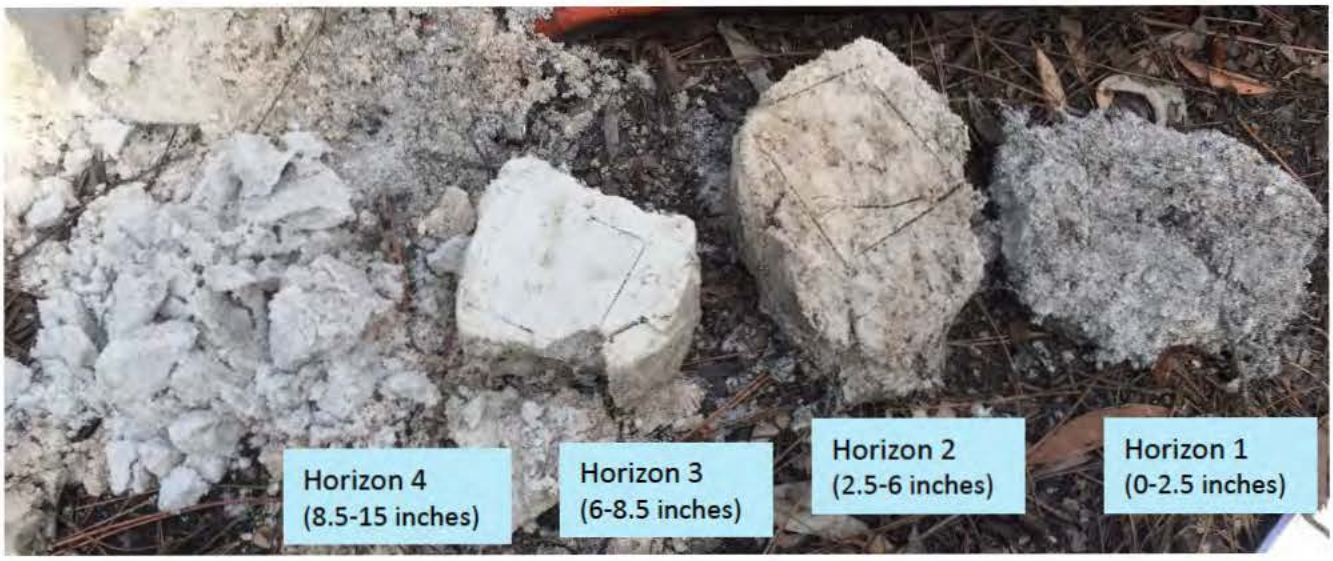
John Manos, a single family homeowner submitted an application requesting a jurisdictional determination and to construct a single family residence on his 1.15 acre property. The Corps conducted a wetland delineation on April 4, 2017 and found the entire 1.15 acres to be wetlands. There were two wetland community habitats on the property. Wetland 1, was dominated by a canopy of melaleuca and slash pine with a understory of cocoa plum and wetland 2 was a slightly lower elevation with a canopy of melaleuca and dominant understory of *Cyperus papyrus*. Wetland 2 appeared to be more herbaceous than wetland 1. See photos of delineation points.

SAJ-2017-00229: Wetland 1, Soil Plug Overview

Applicant: John Manos
Sampling Date: 4/4/2017
USACE Investigators: Jerilyn Ashworth, C. Karvounis, and T. Fraley
Photo Report and Data sheets written by Jerilyn Ashworth

This page shows an overview of the soil plug and each horizon's cross section.





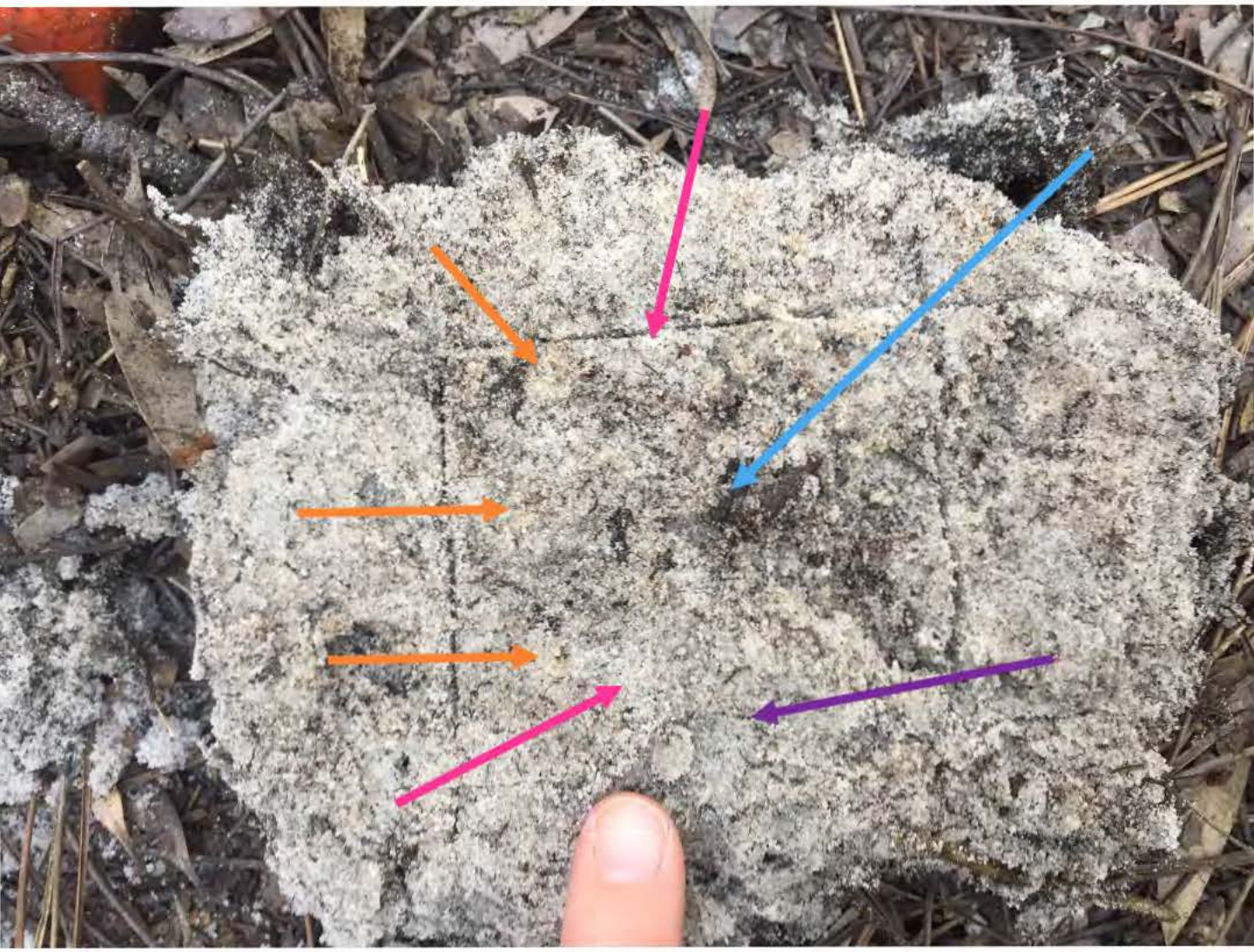
SAJ-2017-00229: Wetland 1 (Cross Section Horizon 1)

Applicant: John Manos

Sampling Date: 4/4/2017

USACE Investigators: Jerilyn Ashworth, C. Karvounis, and T. Fraley

Photo Report and Data sheets written by Jerilyn Ashworth



Redox Locations (2%)

Examples of Deleted areas (5%)

Root Matter

Matrix Color (10YR 5/1)

SAJ-2017-00229: Wetland 1 (Cross Section Horizon 2)

Applicant: John Manos
Sampling Date: 4/4/2017
USACE Investigators: Jerilyn Ashworth, C. Karvounis, and T. Fraley
Photo Report and Data sheets written by Jerilyn Ashworth

Redox in M/PL- 10YR 6/6, root matter visible (5%)

Redox in the matrix- 10YR 5/4 (2%)

Examples of Deleted areas (5%)

Root Matter

Matrix Color (10YR 5/1)

SAJ-2017-00229: Wetland 1 (Horizon 2-Oxidized rhizospheres on living roots)

Applicant: John Manos

Sampling Date: 4/4/2017

USACE Investigators: Jerilyn Ashworth, C. Karvounis, and T. Fraley

Photo Report and Data sheets written by Jerilyn Ashworth

Many examples of oxidized rhizospheres on living roots were observed within the 2nd Soil Horizon. Example 2 below, shows a living root, still partially attached (within the soil matrix), but with the linear signature of the orange iron within the soil.

Example 1: Living root is visible and the oxidation is found in a linear location around the root. Then when the root was pulled from the soil, the soil oxidized locations within the pore linings remained stuck to the ends of the root as seen in the photo below

SAJ-2017-00229: Wetland 1 (Cross Section Horizons 3 and 4)

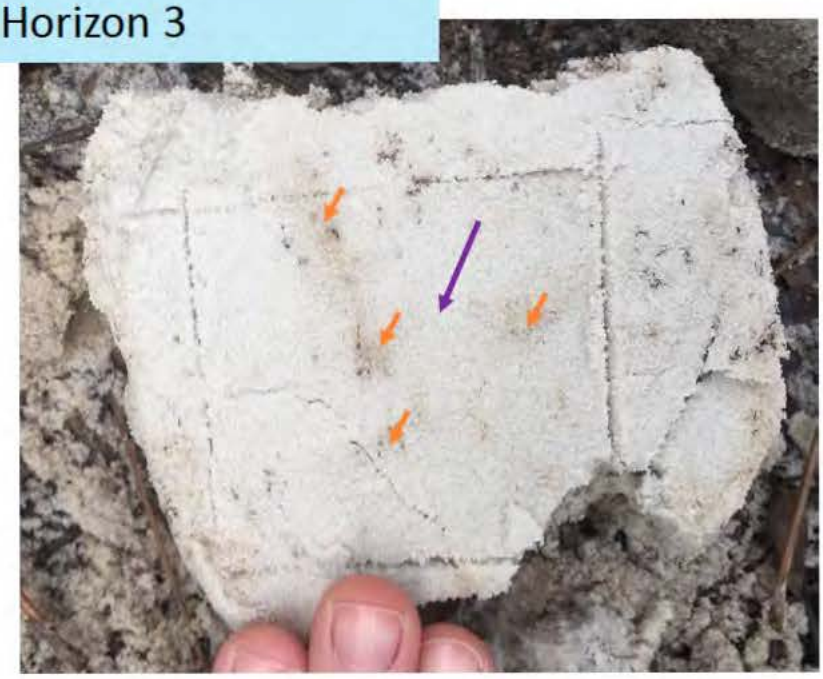
Applicant: John Manos

Sampling Date: 4/4/2017

USACE Investigators: Jerilyn Ashworth, C. Karvounis, and T. Fraley

Photo Report and Data sheets written by Jerilyn Ashworth

Horizon 3



Redox Locations- 10YR 7/4 (5%)

Matrix Color (2.5Y 7/1)

Horizon 4

Matrix color 5Y 8/1

SAJ-2017-00229: Wetland 1 (Hydrologic Indicators)

Applicant: John Manos
Sampling Date: 4/4/2017
USACE Investigators: Jerilyn Ashworth, C. Karvounis, and T. Fraley
Photo Report and Data sheets written by Jerilyn Ashworth

The base of the Melaleuca trees and slash pine showed buttressing from periods of inundation and water marks were visible on the trees.

SAJ-2017-00229: Wetland 2 (Soil Plug Overview and Horizon 1)

Applicant: John Manos
Sampling Date: 4/4/2017
USACE Investigators: Jerilyn Ashworth, C. Karvounis, and T. Fraley
Photo Report and Data sheets written by Jerilyn Ashworth

Wetland 2 appeared to be at a slightly lower elevation than the surrounding wetlands and it appeared to change community type. There were more herbaceous hydrophytic vegetation species that were observed and the canopy of trees was less dense. Slash pine (*Pinus elliotti)* and cocoa plum *(Chrysobalanus icaco)* were absent from this community as in comparison to the data point in Wetland 1. Another data point was recorded for the change in community. Two soil plugs were dug and the third one was fully analyzed as wetland point 2. Both soil plugs appeared to be highly disturbed as there was a mixing of lighter sand (10YR 5/1) and dark (10YR 2/1) loamy clay soils, with sharp boundaries below the first horizon. Additionally the majority of hydrophytic vegetation found in wetland data point 2, is considered invasive exotic, which would support the disturbed soils. See additional photos for horizon cross sections.

SAJ-2017-00229: Wetland 2 (Horizon 1)

Applicant: John Manos
Sampling Date: 4/4/2017
USACE Investigators: Jerilyn Ashworth, C. Karvounis, and T. Fraley
Photo Report and Data sheets written by Jerilyn Ashworth

Pea shaped items were organic bodies. Lots of root matter.

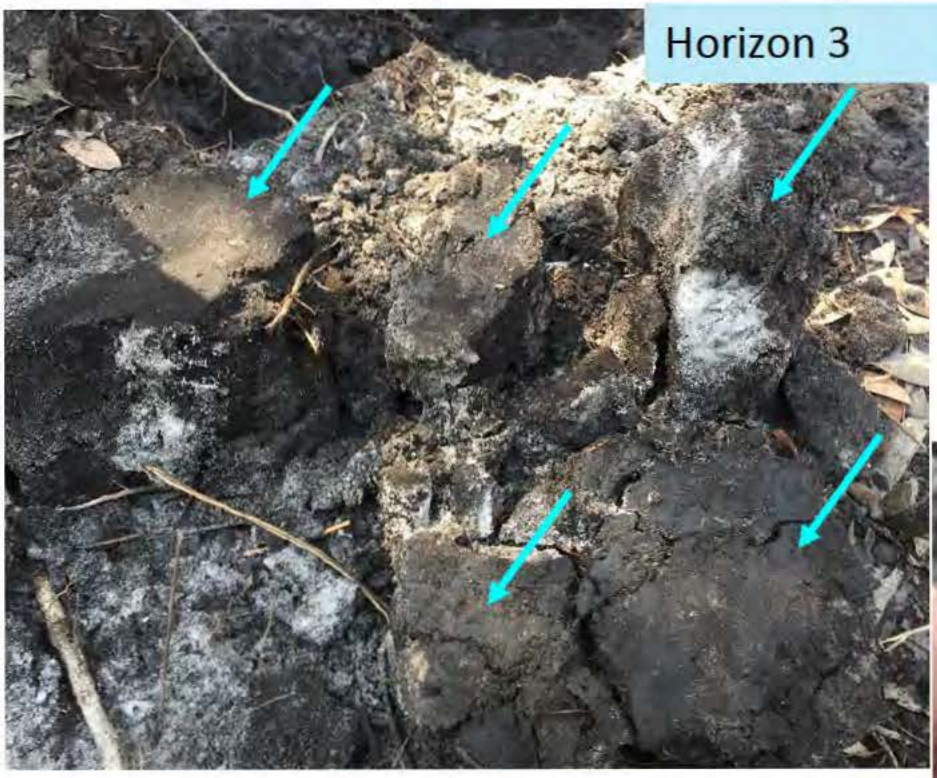
Soil Horizon 1 (0-3 inches): Matrix was a 10YR 2/1 with an overall muck texture. It was comprised on roots with lots of organic bodies. Most of the horizon was organic bodies along living roots. The Matrix when analyzed as a whole contained 95% organic coating (Masked grains), with some visible sand grains. For the texture of the matrix, it passed the bounce test and after 5 rubs no sand grains were felt. It require to be moistened with the spray bottle. The organic Bodies (OB) had a mucky texture (after 5+ rubs no sand grains were felt. and soil was smooth and greasy), OB were > 95 % coated or masked. Size ranged from 0.5-0.75 inches in diameter, the OB had a 10YR 2/1 and were greater than 5% of the profile.

SAJ-2017-00229: Wetland 2 (Horizons 2 and 3)

Applicant: John Manos
Sampling Date: 4/4/2017
USACE Investigators: Jerilyn Ashworth, C. Karvounis, and T. Fraley
Photo Report and Data sheets written by Jerilyn Ashworth

Horizon 2

Horizon 3



Multiple cross sections were taken of Horizon 3. They all showed the muck/loamy clay texture with mixed layers of sand with sharp to clear boundaries indicating disturbance. Soil separated in large uneven chunks like the one below.

SAJ-2017-00229: Wetland 2 (Hydrologic Indicators and Vegetation)

Applicant: John Manos
Sampling Date: 4/4/2017
USACE Investigators: Jerilyn Ashworth, C. Karvounis, and T. Fraley
Photo Report and Data sheets written by Jerilyn Ashworth

Buttressing and adventitious roots on the base of the Melaleuca

Dominant understory of the *Cyperus papyrus*

Water marks on the Melaleuca trees

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: SAJ-2017-00229 City/County: Jupiter Farms/Palm beach Sampling Date: 4/27/2017

Applicant/Owner: John Manos State: FL Sampling Point: 3

Investigator(s): USACE: Jerilyn Ashworth and Sam Rice and agent Section, Township, Range: S 09/ T41 South / R41 East

Landform (hillside, terrace, etc.): Deperssion on marine terrace Local relief (concave, convex, none): Concave Slope (%): 0-1

Subregion (LRR or MLRA): LRR U Lat: 26.9175 Long: -80.24472 Datum: WGS 84

Soil Map Unit Name: Riviera Fine Sand Depressional, 0-1% slope NWI classification: Palustrine Emergent

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
John Manos's hired consultatns Sheryl Carpenter and Merri Southwell were also on site and participated in every step of the delineation. Sheryl stepped away for part of the Soil, but Merri was present and an active participant the enitre time. Data point was taken in an area where there were visibly more Brazilian Pepper and Earleaf Acacia trees. Consultant thought this was representative of the uplands on site. Use of the Regional supplement delineation methodology shows the area still contained primary hydrologic indicators, hydrophytic vegetation under the dominance test, and hydric soil, qualifying the area as a wetland.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- X Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Vis ble on Aerial Imagery (B7)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15) **(LRR U)**
- ____ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ FAC-Neutral Test (D5)
- ____ Sphagnum Moss (D8) **(LRR T,U)**

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** X **No** ____

Descr be Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Water marks were visible at the base of the Melalueca and slash pine trees. Additionally, in the soil plug, oxidized rhizopheres on living roots were observed. The area also contained linear position, which qualified it for geomorphic position. According to the Regional supplement wetland hydrology is present if there is one primary hydrologic indicator or two secondary. Since the site contained two primary hydrologic indicators and one secondary indicator, there is more than adequate information to determine that wetland hydrology is present.

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: 3

Tree Stratum (Plot size: 30-ft Radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Melaleuca quinquenervia*	35	Yes	FAC
2. *Schinus terebinthifolia*	30	Yes	FAC
3. *Acacia auriculiformis*	15	No	UPL
4. *Pinus elliottii*	15	No	FACW
5.			
6.			
	95	=Total Cover	
50% of total cover: 48		20% of total cover:	19

Sapling Stratum (Plot size: 30-ft radius)			
1. *Melaleuca quinquenervia*	15	Yes	FAC
2. *Acacia auriculiformis*	5	Yes	UPL
3.			
4.			
5.			
6.			
	20	=Total Cover	
50% of total cover: 10		20% of total cover:	4

Shrub Stratum (Plot size: 30-ft Radius)			
1. *Acacia auriculiformis*	10	Yes	UPL
2. *Chrysobalanus icaco*	30	Yes	FACW
3. *Myrsine cubana*	5	No	FAC
4.			
5.			
6.			
	45	=Total Cover	
50% of total cover: 23		20% of total cover:	9

Herb Stratum (Plot size: 30 ft radius)			
1. *Lygodium microphyllum*	5	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	5	=Total Cover	
50% of total cover: 3		20% of total cover:	1

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 71.4% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub - Woody Plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody Vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below.)

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
1-0								Peat and roots
0-2	10YR 6/1	80	10YR 5/6	5	C	M	Sandy	Clear boundaries/ prominent contrast
			10YR 6/3	15	C	M		diffuse boundaries- oxidized soil
2-5	10YR 6/2	80	10YR 7/2	15	D	M	Sandy	diffuse boundaries/ faint contrast
			7.5YR 4/6	5	C	PL/M		Prominent redox concentrations
5-11	2.5Y 7/1	100					Sandy	Roots present

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR, P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- X Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Shovel refusal

Depth (inches): 11

Hydric Soil Present? **Yes** X **No** ___

Remarks:

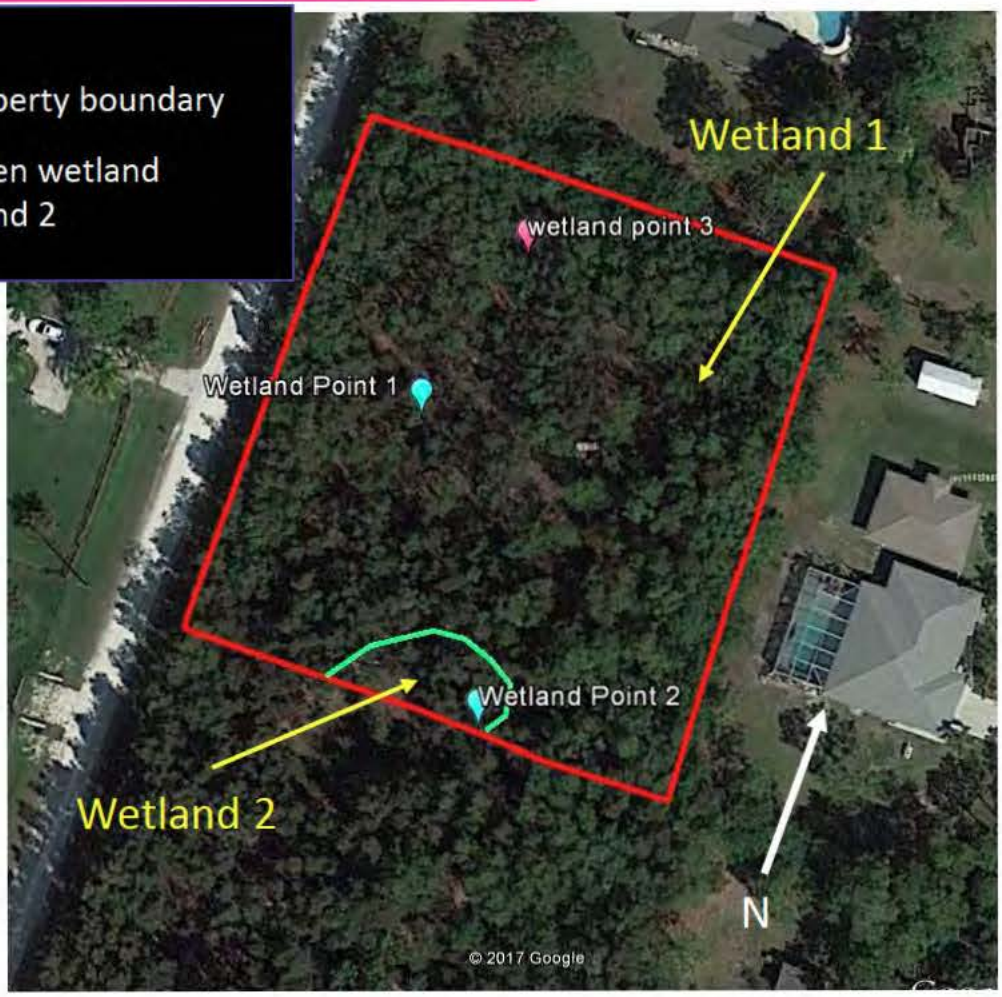
This data form is revised from Atlantic and Gulf Coastal Plain Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx). Soil horizon 2 from 0-2 inches had a corner of the profile that contained a matrix of 10YR 3/1 with 55% Masked grains. See photo. In soil horizon 3, oxidized rhizopheres on living roots were observed and photographed.

SAJ-2017-00229: Map

Applicant: John Manos
Sampling Date: 4/27/2017
USACE Investigators: Jerilyn Ashworth and Samantha Rice
Consultants: Sheryl Carpenter and Merri Southwell
Applicant: John Manos
Photo Report and Data sheets written by Jerilyn Ashworth

LEGEND

- Delineation/ Property boundary
- Boundary between wetland communities 1 and 2



At the request of the applicant, John Manos, a second site visit was conducted on April 27, 2017 to discuss the wetland limits on the site. The applicant requested that his two consultants Sheryl Carpenter and Merri Southwell also be present during the site visit. The Corps discussed the findings from the previous site visit with the applicant and his consultants, and agreed to complete a third data point in an area, where the consultants were claiming uplands. The third data point confirmed the presence of wetlands. The third data point contained a higher percentage of Brazilian pepper and earleaf Acacia, however vegetation still passed the dominance test and was deemed to be hydrophytic. The data point contained two primary indicators of hydrology and one secondary indicator, and also passed two hydric soil indicators. Vegetation along the east side of the parcel contained similar vegetation to the species documented at wetland point 3. Therefore the limits of the previous wetland delineation stand and the Corps is claiming that the entire 1.15 acre site are wetlands.

SAJ-2017-00229: Wetland Data Point 3

Applicant: John Manos
Sampling Date: 4/27/2017
USACE Investigators: Jerilyn Ashworth and Samantha Rice
Consultants: Sheryl Carpenter and Merri Southwell
Applicant: John Manos
Photo Report and Data sheets written by Jerilyn Ashworth

Photo below: Looking north from the center of the data point/ soil plug. An area with high density Brazilian pepper is located on the northern property boundary.

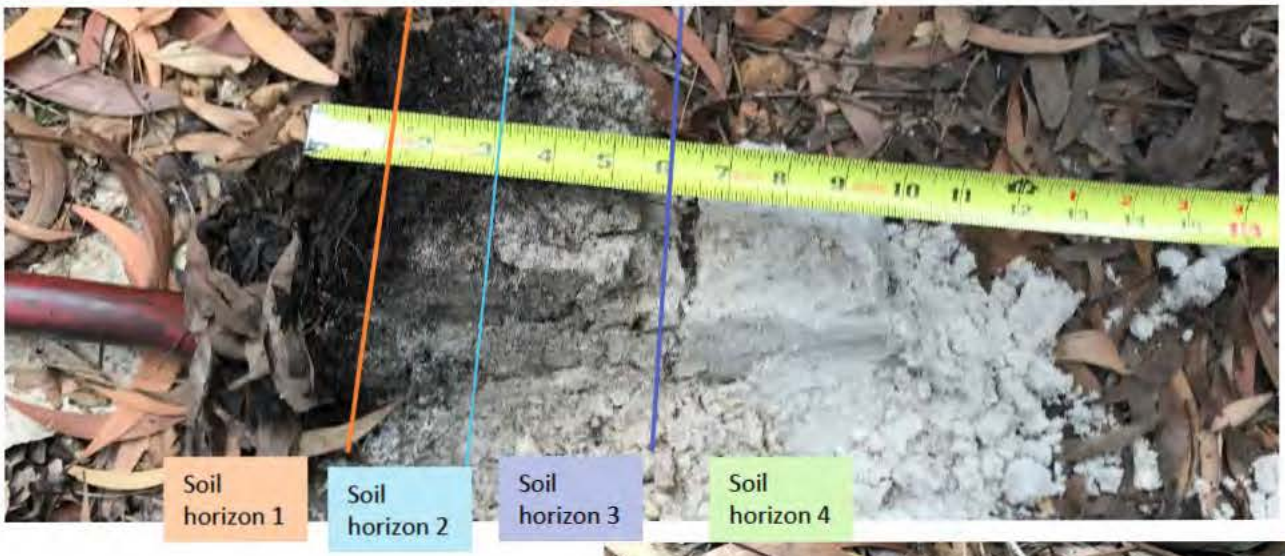
Photo below: Looking west from the center of the data point/ soil plug

All four photos document varying heights of the water lines on the Melaleuca trees, in each direction of the plug. Photos above shows a close up of the water lines.

Photo below: Looking south from the center of the data point/ soil plug

SAJ-2017-00229: Wetland Data Point 3

Applicant: John Manos
Sampling Date: 4/27/2017
USACE Investigators: Jerilyn Ashworth and Samantha Rice
Consultants: Sheryl Carpenter and Merri Southwell
Applicant: John Manos
Photo Report and Data sheets written by Jerilyn Ashworth



Soil Horizon 1: Peat Layer

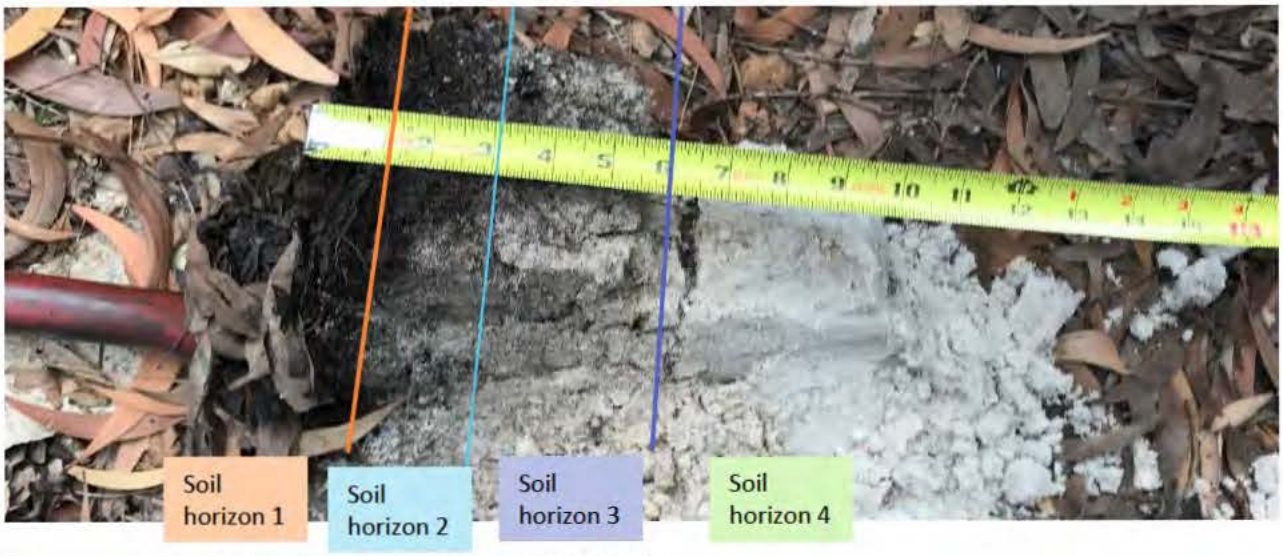
- 1-0 Inches above soil profile
- All root, detritus, and vegetative matter

Soil Horizon 2: 0-2 inches

- Matrix 10YR 6/1 (noted 10YR 3/1 darker portion of plug, with grains 55% masked with organics)
- 5% prominent redox concentrations
- Depleted areas 15 percent, 10YR 6/3 diffuse boundaries
- Red arrows pointing to redox

SAJ-2017-00229: Wetland Data Point 3

Applicant: John Manos
Sampling Date: 4/27/2017
USACE Investigators: Jerilyn Ashworth and Samantha Rice
Consultants: Sheryl Carpenter and Merri Southwell
Applicant: John Manos
Photo Report and Data sheets written by Jerilyn Ashworth



Soil Horizon 3: 2-5 inches

- Matrix: 10YR 6/2
- 5 % prominent redox concentrations
- 15% depleted areas, 10YR 7/2, diffuse boundaries

Soil Horizon 4: 6-11 inches

- 100% 2.5Y 7/1
- Visible Root Matter

SAJ-2017-00229:

Soil Horizon 3, Oxidized Rhizospheres on Living Roots

Applicant: John Manos
Sampling Date: 4/27/2017
USACE Investigators: Jerilyn Ashworth and Samantha Rice
Consultants: Sheryl Carpenter and Merri Southwell
Applicant: John Manos
Photo Report and Data sheets written by Jerilyn Ashworth

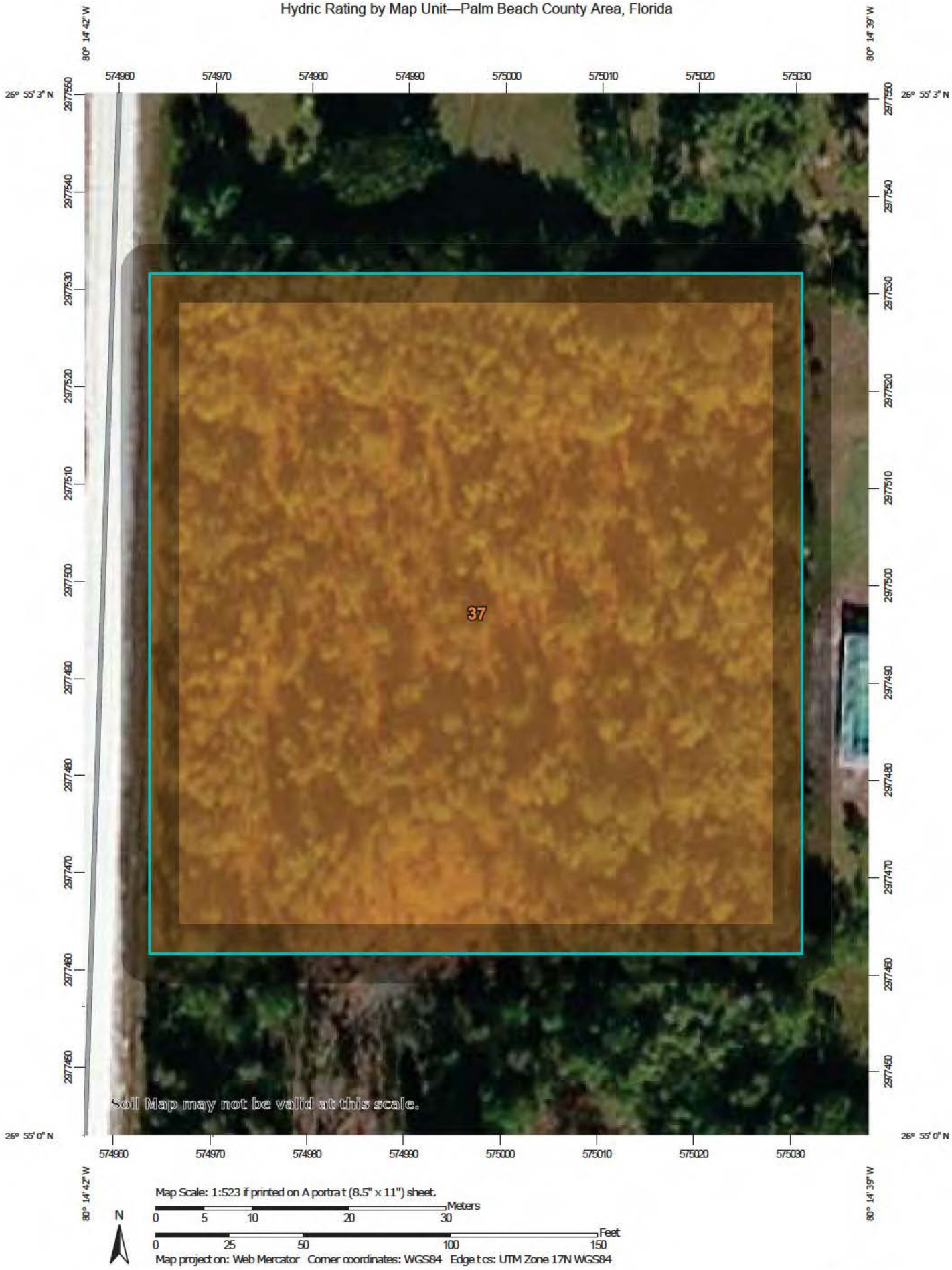
Photo above shows oxidized rhizospheres on living roots, a primary hydrologic indicator. This photo was taken within the 3rd soil horizon, which started at 2 inches and was three inches thick.

ATTACHMENT 3

NRCS Hydric Soil Rating and Soil Data

Application: SAJ-2017-00229

Hydric Rating by Map Unit—Palm Beach County Area, Florida



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

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

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

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

Soil Survey Area: Palm Beach County Area, Florida
Survey Area Data: Version 12, Sep 14, 2016

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

Date(s) aerial images were photographed: Dec 15, 2010—Mar 11, 2011

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

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Palm Beach County Area, Florida (FL611)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
37	Riviera fine sand, depressional, 0 to 1 percent slopes	96	1.2	100.0%
Totals for Area of Interest			**1.2**	**100.0%**

Description

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

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

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

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

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

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

References:

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

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

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

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

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

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

Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Palm Beach County Area, Florida

37—Riviera fine sand, depressional, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2tzwl
Elevation: 0 to 80 feet
Mean annual precipitation: 44 to 64 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 280 to 365 days
Farmland classification: Farmland of local importance

Map Unit Composition

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

Description of Riviera, Depressional

Setting

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

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 36 inches: fine sand
Bt/E - 36 to 42 inches: fine sandy loam
Cg1 - 42 to 56 inches: fine sand
Cg2 - 56 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w

Hydrologic Soil Group: A/D
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

Minor Components

Chobee, depressional
Percent of map unit: 7 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R156BY010FL), Loamy and clayey soils on stream terraces, flood plains, or in depressions (G156BC345FL)
Hydric soil rating: Yes

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

Tequesta, depressional
Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Organic soils in depressions and on flood plains (G156AC645FL)
Hydric soil rating: Yes

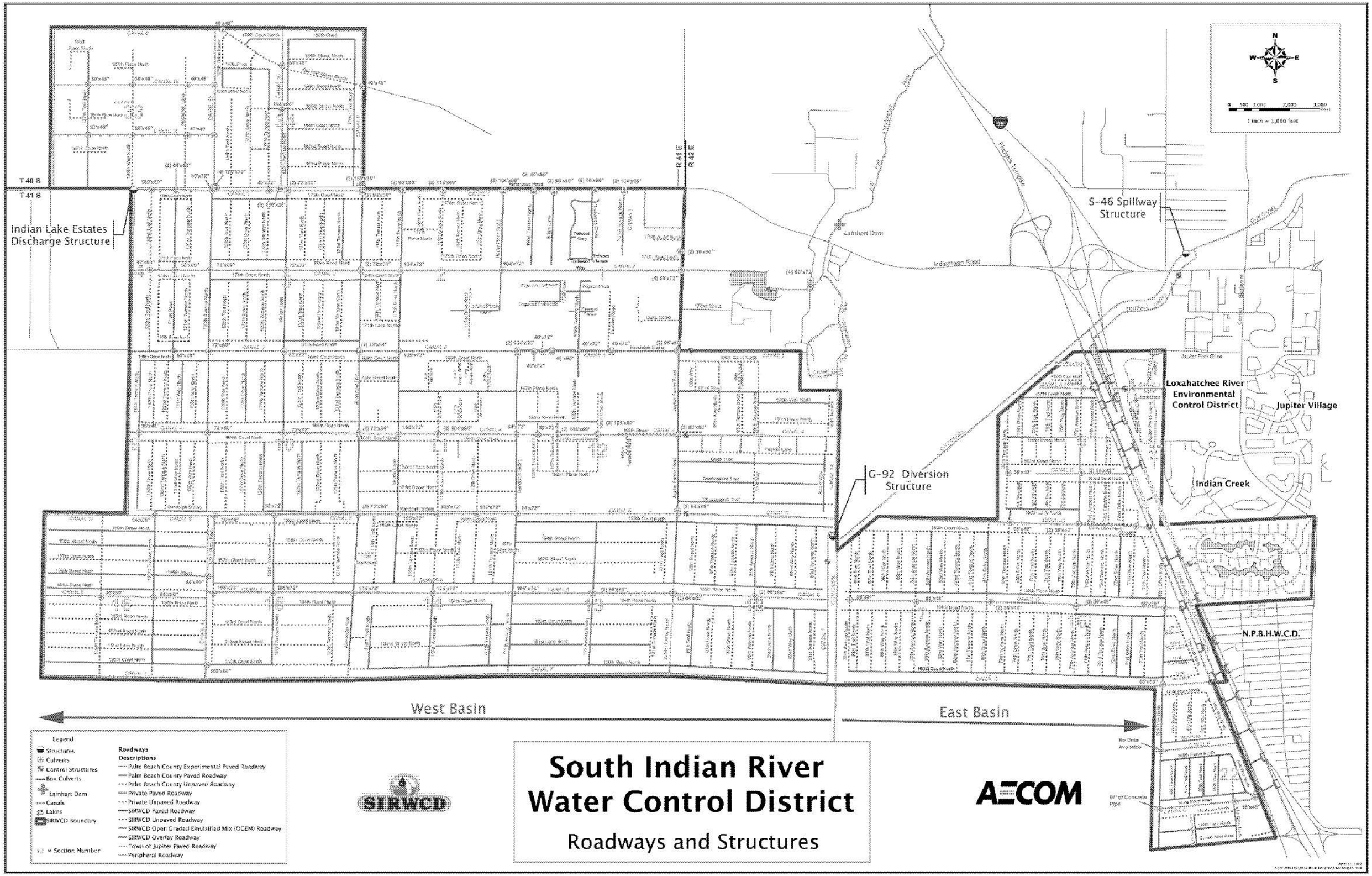
Data Source Information

Soil Survey Area: Palm Beach County Area, Florida
Survey Area Data: Version 12, Sep 14, 2016

ATTACHMENT 4

South Indian River Water Control District
(SIRWCD)
Drainage system information and associated map
of canals and structures

Approved Jurisdictional Determination
Application: SAJ-2017-00229



South Indian River Water Control District

Roadways and Structures

Stormwater Management

As you can see on our Statistics page, the District has a tremendous responsibility in the proper management of a large volume of stormwater runoff. Each year the District receives, on average, 60 inches of rain. It is important to manage the flow of this volume of water through the District's canals for maximum protection and benefit to property owners. The District's surface water management system is designed, operated and maintained for a mostly rural residential community with some commercial, industrial and urban residential areas.

SIRWCD is responsible for maintaining over 376 miles of swales and canals. Every effort is made to conserve the stormwater runoff generated from rainstorms by directing its flow into the natural holding areas in and around the District, such as the slough, water catchment areas and wetlands.

The drainage system, maintained by SIRWCD, operates by gravity flow.First the water flows from impervious surfaces such as roofs, driveways and roadways into ponds, natural depressions and swales. This initial drainage is referred to as the "tertiary" system. Any stormwater that is not held by the swales and absorbed into the ground, moves eastward across the District through a network of maintained canals and is known as the "secondary" drainage system. The final movement of the water is into the "primary" drainage system that consists of larger canals, such as the C-18, and the Loxahatchee River. The primary drainage system is the responsibility of the South Florida Water Management District.

It is important to understand that after heavy periods of rain it is normal for water to remain standing in the swales. This is the way the system is designed to function and allows for natural infiltration into the soils below to help filter pollutants and recharge groundwater. Standing water can occur when the ground becomes saturated and cannot absorb any more water. Continued development of low-lying areas of the District will result in commensurate consumption of storage within the District's watershed and thereby increases stormwater runoff.

Even with the heavy amounts of rain, such as the Thanksgiving week storm in 1995, Hurricanes Frances and Jeanne in 2004, and Hurricane Wilma in 2005, the system has functioned well. The 1995 storm produced a higher level of rainfall than is normally anticipated in a 100-year storm, which is what the system was designed to handle.

Maintaining the culverts is a major responsibility of SIRWCD. The district is engaged in a program of upgrading and replacing culverts in canals throughout the District. Maintenance of driveway culverts is the responsibility of the landowner. In addition, the District installs riprap to support and stabilize slopes on canals to minimize erosion.

The District also implements an aquatic weed control program in order to maintain the primary canals throughout the District. This is an ongoing program aimed at reducing and managing the amount of weeds in the canal network to allow unobstructed drainage following rain events and help prevent canals from being overgrown. The program controls emergent vegetation growth through the use of herbicides approved in permits obtained from the State of Florida, as well as through mechanical removal of dead or accumulated vegetation. In the future, greater emphasis may be needed for this program as a result of National Pollutant Discharge Elimination System (NPDES) water quality programs, the Florida Department of Environmental Protection and Environmental Protection Agency (EPA) proposed stormwater criteria, the Ecosystem Management Area Plan, and other governmental coordinating activities.

It is important that residents report any blockage in the canals and to refrain from dumping trash, agricultural waste, tires, old toys, recreational equipment, appliances and all toxic materials into the canals or on vacant lots. It is illegal and can result in heavy fines.

and improve water quality, the National Pollutant Discharge Elimination System, Environmental Protection Agency guidance and much more, click on the Resources tab above and select one of the Stormwater Information links.

District News Highlights

Board Meeting - May 17, 2018

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Proposed 19th Plan of Improvements Update

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Board of Supervisors Approves New Roadway Enhanced Stabilization/Paving Policy and Institutes a Petition Review Fee

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Permits and Culvert Installation

Permits Required

No one may use, construct, excavate or alter the works of the South Indian River Water Control District or install any structure or equipment to enable the discharge of water, water withdrawal or other water use by anyone without receiving a permit from the District. In the case of an emergency, authorization (written if practical) may be given by the Manager of Operations or District Engineer.

Unless expressly exempt by law or District rule or policy, a permit must be obtained for:

Construction, excavation, alteration, or abandonment of any drain, ditch, canal, or other system of drainage connecting to or to connect with, discharge into, withdraw from or otherwise make use of the works of the District; or,

Construction, alteration, or abandonment of any bridge, or other crossing over a work of the District; or,

Any other construction, excavation or alteration, including placement of utilities, on or within District rights-of-way.

SIRWCD Permit Criteria and Application

Florida Statutes 298.66 - Obstruction of public drainage canals, etc., prohibited; damages; penalties

(1) A person may not willfully, or otherwise, obstruct any public canal, drain, ditch or watercourse or damage or destroy any public drainage works constructed in or maintained by any district.
(2) Any person who willfully obstructs any public canal, drain, ditch, or watercourse or damages or destroys any public drainage works constructed in or maintained by any district shall be liable to any person injured thereby for the full amount of the injury occasioned to any land or crops or other property by reason of such misconduct and shall be liable to the district constructing the drainage work for double the cost of removing such obstruction or repairing such damage.
(3) Any person who willfully, or otherwise, obstructs any public canal, drain, ditch, or watercourse, impedes or obstructs the flow of water therein, or damages or destroys any public drainage works constructed in or maintained by any district commits a felony of the third degree, punishable as provided in s. 775.082, s. 775.083, or s. 775.084.

Florida Statue for Obstruction of Public Canals 298.66

Driveway Culverts for New Construction

Palm Beach County issues permits for driveway culvert installations for new construction. The District is responsible for preparing the area for the culvert to ensure proper elevations for drainage. Landowners should call the District office at 561-747-0550 to schedule this service. The homeowner is then responsible for the purchase and installation of the culvert. The District recommends installation of a concrete header for the ends of the culvert to protect it from being crushed. This can be accomplished with cast-in-place concrete or rip-rap bags. Sod should be installed around the culvert to prevent erosion and sediment build up in or around the culvert.

Please contact the District office for guidance.

After installation, the District will come out and inspect the site to ensure it was properly constructed and issue a final inspection sticker that can be provided to Palm Beach County.

Note: There are only two culverts per parcel allowed per Palm Beach County Ordinance 2007-013, "Lots located on local or residential access streets shall have a maximum of two access connections."

Replacement Driveway Culverts - SIRWCD Roadways

A Palm Beach County permit is not required for replacement of existing driveway culverts or the installation of an additional culvert on properties fronting SIRWCD roadways. Landowners must notify the District when their culvert has been crushed or has collapsed and is no longer functioning. This is important to ensure proper stormwater management. This applies to replacement culverts only or a second culvert on an existing home, not new home construction or temporary culvert installations (see above for new construction properties).

Basic Installation - The District will remove the old culvert and install a new replacement 18" x 20' culvert pipe (plastic or steel), rip rap headwall and sod where needed around the culvert at a cost of $300.00 for a single basic culvert or $600 for two basic culverts to the landowner. (A steel pipe is recommended if construction vehicles will drive over the new culvert within the first six months after installation.) **Fill dirt needed to cover the pipe must be supplied by the landowner and be on site at the time of culvert installation.** Any upgrades from ***Basic Installation*** are at the owner's expense.

A ***Limited Installation*** includes a 18" x 20' culvert pipe followed by sod placement where needed around the culvert**.** This installation is at a cost of $200 each. **Poured surface and concrete headwall is responsibility of landowner. Prior to pouring, landowner must schedule an inspection and show proof of County permit.**

To schedule an installation, visit the District Office to fill out a *SIRWCD Driveway Culvert Installation Agreement*, or download it here and take it to the District Office - please do not mail. A check made payable to SIRWCD is required.

Replacement Driveway Culverts - Palm Beach County Roadways

A permit is not required from Palm Beach County for replacement of driveway culverts on properties located on County roadways if SIRWCD will be doing the replacement. This applies to replacement culverts only, not new home construction or temporary culvert installations (see above for new construction properties).

Basic Installation - Palm Beach County requires a 24" diameter aluminum culvert with mitered ends and cast-in-place concrete headwalls, which results in higher installation costs. For these installations, the cost to the landowner is $750.00 for a single basic culvert or $1,500 for two basic culverts.**The site will be reviewed prior to installation and landowners will be notifed if additional fill will be needed to complete the installation. This must be supplied by the landowner and be on site at the time of culvert installation.** Any upgrades from ***Basic Installation*** are at the owner's expense.

A ***Limited Installation*** includes District installation of a 24" diameter mitered end pipe followed by sod placement. This installation is at a cost of $650.00. **Poured surface and concrete headwall is responsibility of landowner. Prior to pouring, landowner must schedule an inspection and show proof of County permit.**

To schedule an installation, visit the District Office to fill out a *County Driveway Culvert Installation Agreement*, or download it here and take it to the District Office - please do not mail. A check made payable to SIRWCD is required.

Hard Surface Covering Over Culverts

If landowners wish to install in the future, or have already installed, a hard surface covering such as concrete, asphalt, pavers or brick over their culvert as part of their driveway, please be aware that when replacement of the culvert becomes necessary, the District is not responsible for the cost of replacement or repair of the hard surfacing. This is a landowner expense. A permit is also required by Palm Beach County for this type of project – please contact them at 561-233-5000 to apply.

Temporary Culverts

When a landowner is building a new home or doing extensive remodeling or renovation of their property within South Indian River Water Control District, they must ensure that their contractor installs a temporary culvert to prevent blockages in the swales that could impact their ability to handle stormwater runoff and cause flooding in that area.

All construction entrances must have at least a 12" x 20' temporary culvert. We do not recommend installing a permanent culvert during construction due to risk of damage by heavy vehicles accessing the site.

Any construction entrances that do not have a temporary culvert in place will be dug out without notice to allow for proper drainage.

Driveway Culvert Maintenance

Landowners are responsible for the maintenance of their driveway culverts. When fully functional, driveway culverts help provide proper stormwater runoff management, not only for yourself, but also for your neighbors. They also aid in draining stormwater from the internal swales to the main canal system.

Culverts should be regularly inspected by the landowner to ensure it is functioning properly and is not blocked with debris or has been crushed or damaged. Here's a checklist of things you should look for during your inspection:

- Signs of erosion around the culvert ends
- Excessive rust build-up on metal culverts
- Cracks or areas that may have settled, leaving a gap between your concrete or asphalt driveway and the culvert
- Sink holes or depressions in a dirt driveway at the top of the culvert
- Sediment buildup in the culvert, particularly after a heavy rainfall

If you notice any of these issues, call the District office at 561-747-0550 to schedule an inspection.

Please note that while performing road and swale maintenance or during routine inspection of the water control system, District personnel may find driveway culverts that are inoperable, damaged or undersized. In order to maintain proper drainage, the culvert or culverts must be replaced. The landowner will be notified by a door-hanger and a certified letter instructing them to contact the District office to schedule a replacement installation. Under Florida Statutes 298.66 (see above), a person may not willfully, or otherwise, obstruct any public canal, drain, ditch or water-course or damage or destroy any public drainage works con-structed in or maintained by any district. **Under the statute, the Board of Supervisors has the authority to assess double the actual cost for culvert installation for landowners who fail to pay for the culvert replacements under these situations.**

Please call the District office if you have any questions regarding your driveway culvert.

District News Highlights

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ATTACHMENT 5

Direct Antecedent Rainfall Evaluation Method (DAREM) Analysis and WETS Tables:

- Canal Point, Period of Record: 1938-2018; and
- West Palm Beach International Airport, Period of Record: 1941-2018

Approved Jurisdictional Determination
Application: SAJ-2017-00229

Application Number: SAJ-2017-00229
Applicant: John Manos

Direct Antecedent Rainfall Evaluation Method (DAREM)

DAREM Analysis, based on WETS - From the Canal Point, POR 1941-2017

Site Visits completed April 4, 2017 and April 27, 2017

Prior Month	Names	WETS 30 % (inches)	WETS 70th% (inches)	Rainfall Amount (inches)	Condition	Value	Weight	Score	Result
3rd	January	0.88	2.67	1.76*	Normal	2	1	2	
2nd	February	0.81	2.58	0.9*	Normal	2	2	4	
Most Recent	March	1.38	3.9	0.57*	Dry	1	3	3	
Month Examined	April					Total		9	DRY

* WETS table indicated that there was missing rainfall data

	Rainfall Normality
	Result Range 6-9= Drier than Normal
	Result Range 10-14= Normal
	Result Range 15-18 = Wetter than Normal

DAREM Analysis, based on WETS - From the West Palm Beach, PBI, POR 1938-2017

Site Visits completed April 4, 2017 and April 27, 2017

Prior Month	Names	WETS 30 % (inches)	WETS 70th% (inches)	Rainfall Amount (inches)	Condition	Value	Weight	Score	Result
3rd	January	1.2	3.51	1	Dry	1	1	1	
2nd	February	1.25	3.08	2.54	Normal	2	2	4	
Most Recent	March	1.68	4.17	1.52	Normal	2	3	6	
Month Examined	April					Total		11	NORMAL

WETS Tab e

WETS Stat on CANAL PO NT USDA, FL								
Requested years 1941 2018								
Month	Avg Max Temp	Avg M n Temp	Avg Mean Temp	Avg Prec p	30% chance prec p ess than	30% chance prec p more than	Avg number days prec p 0 10 or more	Avg Snowfa
Jan	73 5	53 1	63 3	2 20	0 88	2 67	4	0 0
Feb	75 7	54 7	65 2	2 13	0 81	2 58	4	0 0
Mar	79 6	58 0	68 8	3 20	1 38	3 90	4	0 0
Apr	84 0	61 5	72 8	2 67	1 22	3 17	4	0 0
May	87 7	66 2	77 0	4 48	2 76	5 42	6	0 0
Jun	90 0	70 4	80 2	7 99	5 72	9 45	10	0 0
Ju	91 2	71 5	81 4	7 05	5 04	8 34	11	0 0
Aug	91 2	72 0	81 6	7 28	5 22	8 61	11	0 0
Sep	89 5	71 5	80 5	7 19	4 74	8 63	10	0 0
Oct	85 6	67 7	76 6	4 37	2 15	5 34	6	0 0
Nov	80 1	61 1	70 6	2 02	0 85	2 46	4	0 0
Dec	75 4	55 7	65 6	1 94	0 79	2 36	4	0 0
Annua					46 49	57 21		
Average	83 6	63 6	73 6					
Tota				52 53			77	0 0

GROW NG SEASON DATES			
Years w th m ss ng data	24 deg = 17	28 deg = 18	32 deg = 20
Years w th no occurrence	24 deg = 61	28 deg = 60	32 deg = 54
Data years used	24 deg = 61	28 deg = 60	32 deg = 58
Probab ty	24 F or h gher	28 F or h gher	32 F or h gher
50 percent *	No occurrence	No occurrence	No occurrence
70 percent *	No occurrence	No occurrence	No occurrence
* Percent chance of the grow ng season occurr ng between the Beg nn ng and End ng dates			

STATS TABLE tota prec p tat on (nches)													
Yr	Jan	Feb	Mar	Apr	May	Jun	Ju	Aug	Sep	Oct	Nov	Dec	Ann
1941				6 73	3 38	4 49	14 64	8 14	7 43	5 79	2 36	2 05	55 01
1942	1 53	2 63	6 26	2 46	4 81	14 16	3 71	4 42	4 93	2 06	2 15	2 47	51 59
1943	0 31	0 45	2 08	1 33	1 86	8 83	11 73	6 51	5 15	2 81	2 08	0 38	43 52
1944	0 98	0 04	4 17	2 71	3 98	3 35	5 69	M5 73			0 16	0 26	27 07
1945													
1946													
1947	0 24	2 28	7 87	5 11	4 15	9 49	10 56	M9 37	13 62	9 17	M1 57	0 97	74 40
1948													
1949													
1950													
1951													
1952													
1953	1 83	M1 77	2 69	4 20	0 84	7 85	14 00	M11 45	11 02	7 65	2 10	1 82	67 22

1954	0 35	1 96	2 71	7 57	M5 22	12 78	8 08	8 27	5 45	M2 66	0 56	1 60	57 21
1955	M0 15	2 20	2 08	M1 64	1 55	12 93	8 45	7 27	4 46	1 70	0 27	2 03	44 73
1956	0 72	1 11	0 03	1 92	M2 63	3 70	7 34	3 08	14 01	6 16	0 38	M0 50	41 58
1957	3 88	2 57	2 97	5 73	11 35	5 20	10 89	4 97	12 68	3 15	0 77	5 75	69 91
1958	8 73	0 61	5 10	4 35	6 33	4 86	7 79	6 60	6 26	6 07	0 62	6 35	63 67
1959	2 20	0 01	5 73	3 90	10 03	9 19	12 52	5 29	7 72	9 66	2 18	1 72	70 15
1960	0 05	4 59	0 99	4 33	3 20	6 80	7 83	6 16	12 89	4 00	2 01	0 70	53 55
1961	3 67	0 43	4 17	2 03	8 82	3 21	9 25	10 79	1 19	M3 67	M0 97	0 20	48 40
1962	1 22	0 57	3 05	4 08	M1 89	7 01	10 45	5 14	9 88	1 70	2 19	0 31	47 49
1963	0 99	4 18	0 71	0 09	6 41	7 68	1 60	5 54	3 61	2 58	1 62	6 09	41 10
1964	3 32	2 06	0 93	3 67	2 05	13 52	9 02	8 59	5 65	6 63	0 45	4 37	60 26
1965	0 97	4 54	2 20	2 04	4 50	10 25	8 10	7 22	7 32	13 24	0 32	1 13	61 83
1966	4 09	2 27	1 01	3 02	5 46	9 81	12 03	5 66	5 77	6 60	0 31	0 84	56 87
1967	0 66	2 55	1 00	0 00	1 36	6 33	7 73	3 48	4 37	3 45	0 13	1 40	32 46
1968	0 29	2 27	0 80	0 33	7 26	19 18	10 35	4 21	10 55	7 36	1 77	0 02	64 39
1969	1 66	1 76	4 74	1 87	7 17	9 93	3 36	8 09	5 82	8 44	2 09	2 14	57 07
1970	3 13	2 89	14 55	0 00	6 92	3 10	9 45	13 07	2 19	3 79	0 17	0 10	59 36
1971	0 40	1 12	0 40	0 16	6 74	8 43	5 07	5 40	6 47	8 09	1 80	1 97	46 05
1972	2 33	1 99	2 09	4 03		9 99		2 50	1 77	1 72	4 15	2 42	32 99
1973	2 66	1 99	2 00	0 84	5 03	4 62	6 03	4 30	5 74	3 38	0 98	1 77	39 34
1974	2 12	0 58	0 22	1 37	6 01	10 43	6 87	5 89	7 14	2 06	1 60	0 95	45 24
1975	0 46	4 15	1 00	1 09	10 13	7 34	7 72	4 52	8 95	4 36	0 82	0 21	50 75
1976	0 43	2 11	0 30	1 79	8 74	7 85	2 07	7 49	2 96	0 26	2 26	2 41	38 67
1977	3 62	0 46	0 55	1 11	3 01	5 83	2 06	6 84	13 28	1 39	6 17	6 59	50 91
1978	2 34	1 42	3 73	2 02	5 69	15 47	6 22	10 41	8 03	4 57	2 37	4 55	66 82
1979	5 89	0 16	2 72	0 78	4 65	2 34	2 85	4 09	11 96	3 52	2 52	2 10	43 58
1980	3 06	1 89	1 94	5 08	4 15	5 10	7 52	5 96	16 08	1 42	1 59	0 62	54 41
1981	0 54	1 62	2 27	0 16	3 18	7 16	4 05	13 50	5 12	0 35	1 97	0 27	40 19
1982	0 51	4 41	8 02	2 80	5 57	7 97	4 60	M6 80	7 88	4 96	1 17	0 72	55 41
1983	3 80	9 79	5 16	1 80	1 27	7 65	2 02	5 09	M5 77	14 16	1 22	3 65	61 38
1984	0 05	3 57	5 14	2 18	7 85	6 80	6 20	4 00	8 07	0 68	8 33	1 12	53 99
1985	1 20	0 19	3 48	3 43	M2 14	4 59	M7 82	4 96	8 70	3 67	0 83	3 08	44 09
1986	2 90	0 88	5 28	0 00	3 11	13 15	11 73	5 21	5 31	2 28	1 70	3 19	54 74
1987	3 51	1 10	7 09	0 11	3 21	6 99	5 73	1 75	6 63	6 25	8 84	0 29	51 50

1988	2 89	3 03	3 82	0 08	3 24	3 42	12 04	11 70	2 71	0 20	3 44	1 24	47 81
1989	1 03	0 01	4 21	2 86	2 26	2 91	3 50	11 00	6 95	3 94	1 25	2 64	42 56
1990	0 84	5 15	0 99	2 04	3 14	5 69	7 47	5 34	2 71	3 62	0 68	0 46	38 13
1991	6 37	2 09	4 00	9 04	2 89	5 66	10 56	9 18	5 51	2 76	1 83	0 68	60 57
1992	1 06	2 82	3 15	4 00	1 74	14 97	3 72	12 91	16 06	1 35	5 36	2 92	70 06
1993	9 06	3 32	5 22	2 68	11 71	5 18	3 36	6 91	5 49	4 86	2 81	0 71	61 31
1994	6 58	3 37	3 85	6 77	2 39	9 59	5 48	6 47	11 07	5 79	7 11	5 86	74 33
1995	2 75	1 40	6 33	2 36	5 70	6 62	13 91	9 54	3 70	14 28	1 64	0 70	68 93
1996	2 49	0 32	7 17	1 28	8 75	5 99	6 59	3 55	2 13	4 79	1 78	1 78	46 62
1997	2 98	1 47	3 28	3 45	3 74	10 17	6 73	6 19	5 08	1 39	2 59	6 80	53 87
1998	2 41	5 74	5 55	0 89	2 42	4 58	6 31	7 15	8 54	1 46	9 60	0 93	55 58
1999	2 93	1 07	1 44	1 17	2 82	14 36	4 30	8 18	M9 21	6 79	1 70	0 80	54 77
2000	0 83	0 97	M2 68	M7 11	1 26	8 34	8 19	M3 94	M9 47	3 06	0 45	0 69	46 99
2001	0 95	0 04	5 42	0 16	7 13	9 58	5 67	7 07	11 01	8 02	1 33	1 05	57 43
2002	M1 44	3 49	0 53	0 57	1 16	12 64	6 99	M12 02	5 59	3 77	M3 42	3 69	55 31
2003	1 98	1 19	3 81	3 33	4 91	6 43	8 42	14 52	7 71	0 82	2 82	2 14	58 08
2004	2 06	2 78	0 11	3 30	1 08	10 49	8 48	12 20	26 95	3 13	M0 85	1 03	72 46
2005	0 45	1 60	7 21	3 08	4 36	10 37	5 21	6 38	2 80	M9 00	M3 10	0 80	54 36
2006	0 28	M4 49	1 80	2 57	1 60	5 04	8 06	6 00	M4 08	0 51	1 11	2 43	37 97
2007	0 39	0 74	0 22	1 23	2 73	5 21	4 66	M2 38	5 41	4 48	1 05	3 42	31 92
2008	0 48	3 15	4 16	4 45	0 74	3 82	7 78	16 92	5 36	1 00	0 02	0 64	48 52
2009	0 22	0 16	0 55	1 21	7 17	7 72	4 04	12 46	2 51	1 64	1 24	2 68	41 60
2010	M1 52	M1 49	M1 08	M0 92	M0 62	11 96	M4 08	5 87	4 89	0 33	0 65	M0 64	34 05
2011	M2 50	0 38	6 44	M0 93	M1 05	2 08	M3 95	M7 01	4 18	5 76	0 84	M2 43	37 55
2012	M0 37	0 70	M1 60	M4 22	3 18	M5 82	M3 68	16 58	M3 74	M9 49	M0 17	M1 78	51 33
2013	1 78	4 19	M2 47	M0 94	5 99	12 29	M8 74	M2 70	M5 08	1 89	M1 20	M0 06	47 33
2014	2 89	M1 55	2 00	4 46	M3 07	M10 13	5 62	M2 71	M5 95	2 69	1 62	0 53	43 22
2015	0 60	M4 06	M1 54	M4 24	2 67	4 64	3 04	10 42	M9 91	1 76	1 82	3 31	48 01
2016	10 55	4 31	3 42	1 79	6 99	4 06	M5 68	M6 84	3 29	M2 75	M0 06	M1 47	51 21
2017	M1 76	M0 90	M0 57	M3 56	M4 40	M14 38	M2 08	8 49	M11 09	M7 96	M0 55	M0 87	56 61
2018	M2 79	0 84	0 35	M5 85	M2 41	M1 12							13 36

Notes Data m ss ng n any month have an "M" f ag A "T" nd cates a trace of prec p tat on

Data m ss ng for a days n a month or year s b ank

WETS Tab e

WETS Stat on WEST PALM BEACH NTERNAT ONAL AP, FL								
Requested years 1938 2018								
Month	Avg Max Temp	Avg M n Temp	Avg Mean Temp	Avg Prec p	30% chance prec p ess than	30% chance prec p more than	Avg number days prec p 0 10 or more	Avg Snowfa
Jan	75 1	57 1	66 1	2 89	1 20	3 51	4	0 0
Feb	76 5	58 3	67 4	2 52	1 25	3 08	4	0 0
Mar	79 3	61 7	70 5	3 41	1 68	4 17	5	0 0
Apr	82 5	66 1	74 3	3 58	1 49	4 35	5	0 0
May	85 9	70 4	78 1	5 39	2 81	6 59	7	0 0
Jun	88 7	73 6	81 2	8 04	5 27	9 66	10	0 0
Ju	90 3	75 1	82 7	6 13	4 19	7 32	10	0 0
Aug	90 6	75 4	83 0	7 21	5 04	8 57	11	0 0
Sep	88 7	74 8	81 8	8 93	6 32	10 58	12	0 0
Oct	85 0	71 1	78 0	6 59	3 68	8 03	8	0 0
Nov	80 2	64 8	72 5	3 68	1 75	4 50	5	0 0
Dec	76 6	59 9	68 3	2 88	1 34	3 52	5	0 0
Annua					54 29	67 13		
Average	83 3	67 4	75 3					
Tota				61 26			86	0 0

GROW NG SEASON DATES			
Years w th m ss ng data	24 deg = 4	28 deg = 4	32 deg = 4
Years w th no occurrence	24 deg = 77	28 deg = 77	32 deg = 68
Data years used	24 deg = 77	28 deg = 77	32 deg = 77
Probab ty	24 F or h gher	28 F or h gher	32 F or h gher
50 percent *	No occurrence	No occurrence	No occurrence
70 percent *	No occurrence	No occurrence	No occurrence
* Percent chance of the grow ng season occurr ng between the Beg nn ng and End ng dates			

STATS TABLE tota prec p tat on (nches)													
Yr	Jan	Feb	Mar	Apr	May	Jun	Ju	Aug	Sep	Oct	Nov	Dec	Ann
1938							M7 64	1 87	7 47	3 50		2 92	23 40
1939	0 33	0 49	0 90	1 84	6 51								10 07
1940										5 22	0 45	7 35	13 02
1941		3 93	3 59	4 68	3 50	4 38	17 74	4 78	14 82	4 05	3 38	1 38	66 23
1942	2 91	2 55	4 79	18 26	7 84	14 62	2 54	4 81	5 70	5 61	0 95	2 26	72 84
1943	1 90	1 17	7 18	1 17	3 39	6 32	5 54	7 94	5 74	8 44	4 35	1 65	54 79
1944	0 89	0 32	4 19	2 38	2 32	2 45	6 31	10 22	3 37	10 59	0 33	0 85	44 22
1945	1 64	2 58	1 04	0 12	0 48	11 31	9 95	11 02	14 89	8 42	1 75	4 09	67 29
1946	1 24	1 71	2 11	0 50	14 10	9 08	5 39	7 86	9 67	4 27	5 70	2 98	64 61
1947	4 01	3 77	9 11	4 33	9 45	16 48	M12 47	5 02	17 51	14 68	7 16	4 64	108 63

1948	5.81	0.29	4.02	5.37	3.82	3.98	8.44	5.31	15.41	10.40	1.31	1.18	65.34
1949	0.64	0.79	0.35	3.50	5.00	6.54	4.74	10.16	9.54	2.56	2.25	8.73	54.80
1950	0.99	2.42	0.70	2.01	4.23	2.55	4.04	13.47	8.63	10.12	1.81	0.95	51.92
1951	0.33	2.59	0.70	4.90	6.05	6.34	7.97	3.05	6.90	12.62	0.67	0.71	52.83
1952	1.30	4.55	1.56	1.86	3.26	1.07	5.87	6.34	10.77	13.09	0.43	0.77	50.87
1953	3.67	1.38	1.51	4.29	2.87	8.16	7.72	11.86	11.66	12.05	4.53	1.45	71.15
1954	1.59	2.68	3.32	10.80	7.87	13.57	11.78	3.62	11.00	2.82	3.21	0.95	73.21
1955	1.34	2.09	2.05	1.97	2.27	6.93	3.39	2.16	4.28	2.30	0.74	7.79	37.31
1956	0.89	0.51	0.33	1.26	3.39	1.94	2.98	8.90	11.22	4.74	0.89	1.35	38.40
1957	6.38	6.41	2.49	8.36	3.87	7.87	7.00	9.02	4.92	2.94	0.76	2.91	62.93
1958	7.92	0.51	7.20	2.51	14.00	3.20	4.84	4.41	6.85	6.94	1.83	4.97	65.18
1959	1.56	1.03	4.71	3.43	2.92	13.63	6.28	5.03	6.92	15.29	6.09	1.75	68.64
1960	0.22	4.54	1.59	5.99	2.09	6.37	5.97	4.76	24.86	7.43	2.67	0.28	66.77
1961	3.17	0.42	3.57	2.28	5.09	2.65	1.22	6.39	3.01	6.52	2.86	0.58	37.76
1962	1.23	1.19	4.43	1.90	3.70	6.94	8.09	7.64	8.96	2.16	1.11	1.21	48.56
1963	1.05	3.01	1.68	0.20	6.69	2.92	1.62	4.06	10.39	13.81	3.02	4.86	53.31
1964	0.98	4.36	1.82	7.45	5.74	10.23	5.29	7.33	11.72	15.23	5.76	3.39	79.30
1965	1.70	4.14	1.15	0.51	1.38	8.80	11.27	2.41	3.84	18.74	2.57	1.75	58.26
1966	6.23	6.88	2.38	2.73	3.75	17.91	8.19	9.76	10.00	8.90	2.00	1.02	79.75
1967	3.18	3.01	2.49	0.04	0.39	11.39	4.88	6.65	6.91	10.00	1.37	1.23	51.54
1968	0.56	4.44	1.48	0.72	13.82	16.78	4.66	8.14	14.01	10.24	2.51	0.06	77.42
1969	3.59	1.67	5.53	0.73	8.32	12.25	7.43	7.75	14.56	13.47	3.29	1.16	79.75
1970	4.57	2.98	11.95	1.00	5.83	8.23	3.17	5.47	7.61	4.13	0.23	0.11	55.28
1971	0.82	1.08	0.55	1.27	5.04	9.03	5.13	4.38	6.24	5.13	10.77	1.87	51.31
1972	2.47	2.55	3.99	12.62	11.19	12.34	13.25	2.76	3.72	1.20	6.98	2.08	75.15
1973	2.62	2.71	2.28	1.45	4.13	7.53	7.74	7.51	7.59	6.97	2.06	2.15	54.74
1974	8.30	0.42	2.44	1.18	2.93	4.87	11.00	5.85	5.62	9.30	3.99	2.56	58.46
1975	0.47	0.68	0.85	0.57	6.23	7.18	5.67	2.49	11.58	5.60	1.81	1.27	44.40
1976	1.09	4.59	1.84	1.26	15.22	4.52	1.67	7.29	7.74	3.75	3.29	3.06	55.32
1977	3.49	1.11	0.53	1.65	14.80	4.03	2.19	8.03	13.21	2.01	5.84	7.37	64.26
1978	3.40	2.49	2.73	0.88	4.55	10.36	5.91	2.27	6.36	6.98	10.98	5.30	62.21
1979	3.06	0.80	1.06	8.71	5.09	6.34	1.89	3.08	19.63	4.78	4.08	2.66	61.18
1980	4.11	3.85	2.53	3.90	8.06	4.26	7.61	5.02	6.76	4.02	5.28	1.27	56.67
1981	0.43	4.22	2.49	0.43	5.12	4.58	3.72	10.33	9.30	2.10	4.52	2.50	49.74

1982	1 29	2 31	16 78	7 67	6 90	10 37	2 57	5 72	6 03	4 83	14 63	1 52	80 62
1983	11 01	8 71	3 42	3 27	5 30	9 39	4 71	8 21	9 62	7 80	4 24	7 03	82 71
1984	1 36	4 49	5 06	5 99	8 44	5 84	7 34	6 39	8 69	1 67	14 39	0 13	69 79
1985	0 84	0 53	3 49	3 35	4 63	4 84	10 77	5 38	9 38	2 89	0 54	1 35	47 99
1986	6 34	1 58	5 48	0 33	1 59	9 82	10 20	4 88	4 08	8 11	6 80	10 10	69 31
1987	1 17	1 20	7 75	2 61	5 63	6 60	4 42	1 73	11 90	4 78	9 43	1 47	58 69
1988	3 38	3 04	5 51	3 65	6 94	10 95	9 01	11 38	1 77	3 54	3 86	1 88	64 91
1989	0 97	1 00	2 58	6 04	0 78	4 96	3 52	5 83	4 05	5 84	1 15	1 94	38 66
1990	1 19	1 39	1 91	2 82	6 74	6 67	10 17	6 60	11 70	3 45	1 23	1 94	55 81
1991	10 43	4 36	3 36	9 54	8 94	7 45	7 16	7 34	6 44	7 58	2 32	4 44	79 36
1992	1 69	3 26	2 61	2 64	1 59	16 08	2 90	6 12	6 99	2 82	12 56	1 85	61 11
1993	8 05	2 06	11 06	2 52	2 22	2 89	5 41	4 78	5 74	11 99	5 78	0 82	63 32
1994	5 85	3 22	2 62	7 57	4 50	10 89	5 22	10 33	11 41	4 42	8 17	11 69	85 89
1995	3 85	1 12	2 37	3 91	0 83	7 79	6 86	20 12	7 54	11 49	1 49	1 60	68 97
1996	1 54	0 67	5 06	0 78	6 52	7 56	2 77	4 24	7 53	6 54	2 06	1 55	46 82
1997	4 24	4 45	3 39	4 66	3 34	11 75	3 29	10 60	6 85	0 56	3 98	5 02	62 13
1998	11 18	6 23	4 10	1 12	1 94	1 68	8 81	5 73	13 36	1 36	7 64	3 90	67 05
1999	6 73	1 90	0 55	0 67	1 99	13 62	1 70	12 08	5 04	15 56	1 44	1 45	62 73
2000	1 15	0 59	2 00	4 09	0 40	3 06	6 43	3 03	7 23	6 68	5 28	2 33	42 27
2001	1 18	0 37	7 85	0 26	2 37	9 38	8 38	9 23	17 02	6 11	1 78	3 36	67 29
2002	0 48	8 08	1 71	6 88	0 51	20 09	5 97	5 46	2 73	2 52	3 15	2 59	60 17
2003	1 28	0 63	7 09	3 76	12 07	9 12	2 99	10 51	6 10	1 06	6 89	4 25	65 75
2004	2 00	2 70	1 54	2 76	2 89	2 89	5 13	12 35	29 40	1 58	1 12	0 76	65 12
2005	1 33	2 01	6 05	1 63	7 48	11 83	2 98	8 29	8 29	5 05	5 79	2 70	63 43
2006	1 62	2 79	1 78	4 69	3 13	4 27	4 91	7 14	6 07	1 95	4 75	11 06	54 16
2007	0 37	1 22	0 36	2 77	3 18	14 85	7 92	9 68	7 13	13 17	1 48	1 67	63 80
2008	0 81	5 95	7 40	4 59	2 42	4 94	8 97	11 91	5 32	4 25	0 89	1 76	59 21
2009	0 11	0 14	1 47	2 42	15 69	8 65	3 95	M6 22	7 48	1 91	3 65	7 38	59 07
2010	2 03	4 39	10 83	6 25	1 28	6 07	4 60	6 97	6 15	2 14	1 38	1 30	53 39
2011	1 76	0 89	1 49	0 30	1 19	3 19	6 75	11 98	8 22	9 89	1 33	0 90	47 89
2012	0 38	3 82	2 29	5 35	9 29	12 33	5 35	22 66	5 91	9 45	0 75	1 14	78 72
2013	0 79	2 40	0 97	5 12	15 67	12 73	5 84	4 10	9 10	1 14	2 78	4 34	64 98
2014	10 42	1 06	2 40	1 04	2 80	7 98	7 73	9 71	9 14	5 31	1 94	1 76	61 29
2015	1 05	2 05	1 04	8 05	1 56	4 02	6 04	7 08	8 42	0 91	3 06	7 34	50 62

2016	9 90	2 66	2 42	1 46	4 95	4 52	1 59	6 70	8 04	4 37	1 00	3 47	51 08
2017	1 00	2 54	1 52	3 74	2 61	10 32	7 44	5 72	5 78	15 02	2 69	0 75	59 13
2018	4 42	0 18	0 80	7 31	11 41	M6 86							30 98

Notes Data m ss ng n any month have an "M" f ag A "T" nd cates a trace of prec p tat on

Data m ss ng for a days n a month or year s b ank

Creat on date 2016 07 22