POND SITING REPORT

Florida Department of Transportation

District One

State Road (SR) 70 PD&E Study

Limits of Project: County Road (CR) 29 to Lonesome Island Road

Highlands County, Florida

Financial Management Number: 414506-5-22-01

ETDM Number: 14364

Date: April 2023

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

FINAL
POND SITING REPORT

SR 70

FROM CR 29 TO LONESOME ISLAND ROAD
PROJECT DEVELOPMENT AND ENVIRONMENT STUDY
FINANCIAL PROJECT NUMBER: 414506-5-22-01

HIGHLANDS COUNTY

PREPARED FOR:

FLORIDA DEPARTMENT OF TRANSPORTATION
DISTRICT 1

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APRIL 2023

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EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT) is developing a Pond Siting Report (PSR) for State Road (SR) 70 from County Road (CR) 29 to Lonesome Island Road Project Development and Environment (PD&E) Study in Highlands County, a distance of 4.3 miles. This project includes the widening of SR 70 from a two-lane to a four-lane divided highway with a shared use path on the south side. Right-of-way varies with a minimum width of 218 feet. The project is located within the South Florida Water Management District (SFWMD) within "open" basins. The proposed shared use path and roadway widening will impact the Federal Emergency Management Agency (FEMA) 100-year floodplain. Floodplain compensation (FPC) sites were sized using the Final Floodplain Modeling Report and were shown to keep the 100-year floodplain elevation at or below the stages determined in the Existing Conditions Model. The latest FEMA maps, panel numbers 12055C0533C, 12055C0535C, and 12055C0555C are dated November 18, 2015. There are no regulated FEMA floodways within the project limits.

This PSR is preliminary and is used as an engineering tool to verify that the proposed stormwater treatment ponds can accommodate the addition of a shared use path and the widening of SR 70 from two-lanes to four-lanes. The proposed pond sites are based on the best available information and are sized to provide the required stormwater management for the four-lane typical section. The calculations presented in this report are preliminary and help in estimating the preliminary size of the stormwater and floodplain ponds for each basin. The pond sizes and other supporting documentation are subject to change throughout the preliminary engineering and project design phases.

The preferred FPC sites are FPC 1A and FPC 2A. The preferred stormwater management facilities (SMF) will be linear dry retention ponds along the north and south sides of the SR 70 roadway within the proposed right-of-way.

1 INTRODUCTION

The Florida Department of Transportation (FDOT) proposes to widen 4.3 miles of State Road (SR) 70 from County Road (CR) 29 (Mile Post (MP) 17.255) to Lonesome Island Road (MP 21.573) in Highlands County, Florida (**Figure 1**). This PSR is preliminary and is used as an engineering tool to verify that the proposed stormwater treatment ponds can accommodate the widening and the addition of a shared use path. The proposed locations of the ponds are based on the best available information and are sized to provide the required stormwater management for the four-lane typical section. The calculations presented in this report are preliminary and help in estimating the preliminary size of the stormwater ponds for each basin. The pond sizes and other supporting documentation are subject to change throughout the preliminary engineering and project design phases.

The project is located within the South Florida Water Management District (SFWMD). The preferred stormwater management for water quality (treatment) and water quantity (attenuation) will be provided within linear ponds in the proposed right-of-way. SR 70 from CR 29 to Lonesome Island Road will be constructed under a future project, FPID 414506-5-52-01, and includes a 12-foot-wide shared use path on the south side of the roadway within the proposed right-of-way. The design of the drainage and stormwater facilities will comply with the standards set forth by the FDOT *Drainage Manual* and the SFWMD *Environmental Resource Permit (ERP) Applicant's Handbook Volume I (General and Environmental)* and the SFWMD *ERP Applicant's Handbook Volume II.*

Figure 1: Project Location Map

2 PROJECT DESCRIPTION

This project includes widening of SR 70 from a two-lane to a four-lane divided highway. The roadway is a rural principal arterial, a Strategic Intermodal System (SIS) highway corridor, and a hurricane evacuation route. There is one four-lane rural typical section along SR 70 as seen below in **Figure 2**. The proposed SR 70 typical section from east of CR 29 to west of Lonesome Island Road includes four 12-foot travel lanes, a 40-foot median, ditches, and a 12-foot shared use path on the south side. The northbound roadway includes 10-foot inside and outside shoulders (5' paved). The southbound roadway includes a 10-foot outside shoulder (5' paved) and an 8-foot inside shoulder (4' paved).

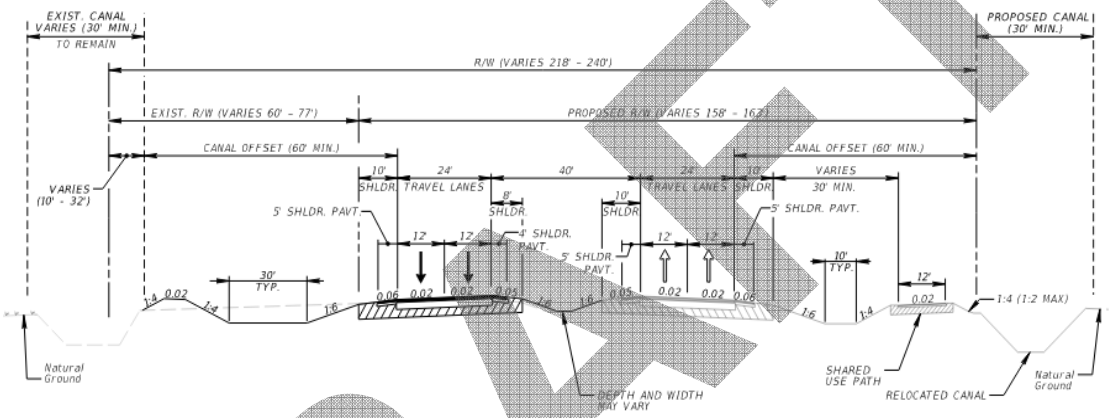

Figure 2: Typical Section

This PSR determines which pond and floodplain alternative will best meet the needs of the project. The project is located in Section 1 of Township 38S and Range 30E; Section 31, 32, 33, 34 of Township 37S and Range 31 E; Section 3, 4, 5, 6 of Township 38S and Range 31 E; Section 36 of Township 37S and Range 30E.

A project meeting was held with the FDOT Drainage office on January 10, 2019 to discuss the stormwater and floodplain alternatives. Refer to Appendix B for the meeting minutes.

3 PROJECT DATUM

All referenced elevations correspond to the North American Vertical Datum of 1988 (NAVD88) unless stated otherwise. The conversion from NAVD88 to the National Geodetic Vertical Datum of 1929 (NGVD29) is as follows:
EL NAVD88 = EL NGVD29 – 1.20'

4 DESIGN CRITERIA

Water quality and quantity requirements will comply with the guidelines as defined in Chapter 62-330 Florida Administrative Code (FAC) as well as the SFWMD *ERP*

Applicant's Handbook Volume I & II. A SFWMD pre-application meeting was held on January 10, 2019 (Appendix B).

4.1 IMPAIRED WATERBODY CRITERIA

The SR 70 project includes one basin, waterbody identification number (WBID) 3204 (**Table 1**), within Fisheating Creek, a part of Group 4 (Appendix A, Figure 10).

Table 1: Impaired Waterbodies

WBID	Name	Comments
3204	Harney Pond Canal	Nutrients

Harney Pond Canal (3204) is verified impaired for the following nutrients: chlorophyll-a, macrophytes, nitrogen, and phosphorus; therefore, nutrient loading calculations shows a net reduction in all treatment alternatives (Appendix C).

4.2 WATER QUALITY CRITERIA

The three water quality treatment alternatives presented in Section 8 of this report will provide treatment for the four-lane roadway widening. The shared use path is exempt from water quality treatment under F.A.C. 62-330.051 (10), if there is no reduction in capacity of the existing swales, ditches or other stormsewer systems. For this PSR, the shared use path was included as impervious in the pond calculations.

Water quality treatment for the linear pond alternative, Alternative A, will operate under dry retention conditions and will thus provide treatment for 50% of 1" over the contributing basin, or 50% of 2.5" over the impervious area, whichever is greater. The 2.5" (or 50% for dry retention) will be applied to the greater of the new impervious area or the directly connected impervious area (DCIA) (Appendix C). The alternative including individual ponds for each basin as well as the regional pond alternative, Alternative B and C respectively, will operate under wet detention conditions and will provide the greater of 1" over the contributing basin, or 2.5" over the impervious area. SFWMD requested that the FDOT provide and additional 50% treatment volume since the project discharges to an impaired waterbody. However, correspondence with the SFWMD clarified that the FDOT will provide the presumptive water quality treatment plus nutrient loading calculations demonstrating a net improvement (Appendix B).

Net Improvement Volume

Pollutant loading calculations are required for this project and shows a net improvement (Appendix C).

4.3 WATER QUANTITY CRITERIA

The proposed discharge rate for the 25-year/72-Hour storm is limited to the existing rate and the discharge is also limited to 35.4 CSM (cubic feet per second per square mile) for the 10-year/72-hour storm per the C-41 Basin Requirement. This project includes only "open basins".

4.4 CRITICAL DURATION

The FDOT requires the SMF to be designed to comply with FDOT Rule Chapter 14-86 for "closed" basins.

5 DATA COLLECTION

The following sources were used to determine the pond sites:

- FDOT *Drainage Manual* (2023)
- FDOT *Drainage Design Guide* (2023)
- SFWMD *ERP Applicant's Handbook, Volume I* (12/22/2020)
- SFWMD *ERP Applicant's Handbook, Volume II* (5/22/2016)
- Final Floodplain Modeling Report (March 2023)
- Natural Resources Conservation Service (NRCS) Maps
- United States Geological Survey (USGS) Quadrangle Maps (Childs and Brighton NW)
- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), 12055C0533C, 12055C0535C, and 12055C0555C (November 18, 2015)

6 EXISTING SITE CONDITIONS

6.1 EXISTING DRAINAGE CONDITIONS

This project includes all open basins. There are three existing crossdrains (CD) located along SR 70 (**Table 2**). The project is located within the Harney Pond Canal (C-41) Watershed, located within the SFWMD jurisdiction. The existing drainage patterns were determined using the Existing Conditions Interconnected Channel and Pond Routing (ICPR) models, USGS quadrangle maps, and LiDAR contours.

Table 2: Existing Crossdrain Summary

Number	MP	Station	Description	Outfall
CD-1	17.900	10037+65	36" CMP	Harney Pond Canal
CD-2	19.251	10109+00	2-53"x83" CMP	Harney Pond Canal
CD-3	21.017	10202+36	2-82"x128" CMP	Harney Pond Canal

6.2 EXISTING SMF

There are no existing SMF servicing the SR 70 project corridor. The roadway drainage is currently conveyed to flanking canals to the north and south of the project. These canals then discharge into Harney Pond Canal (C-41).

6.3 SOILS DATA

Soil information was taken from the NRCS Web Soil Survey of Highlands County. See Figure 5 in Appendix A for the Soils Map. **Table 3** summarizes the hydrologic soil group (HSG) and depth to water table of the main soil types located within the project limits. Refer to Appendix H for the NRCS Soils Report.

Table 3: Soil Descriptions

Map Symbol	Soil Name	HSG	Depth to Water Table (in)
8	Immokalee sand, 0 to 2% Slopes	B/D	6 – 18
12	Basinger fine sand, 0 to 2% Slopes	A/D	0 – 12
13	Felda fine sand, 0 to 2% Slopes	A/D	3 – 18
18	Kaliga Muck, frequently ponded, 0 to 1% Slopes	C/D	About 0
26	Tequesta muck, frequently ponded, 0 to 1% Slopes	A/D	About 0
35	Sanibel muck, frequently ponded, 0 to 2% Slopes	A/D	About 0

6.4 LAND USE

Existing land use located adjacent to the SR 70 right-of-way is characterized as:

- Residential, Low Density (110)
- Improved Pastures (211)
- Unimproved Pastures (212)
- Citrus Groves (221)
- Sod Farms (242)
- Temperate Hardwood (425)
- Live Oak (427)
- Streams and Waterways (510)
- Reservoirs (530)
- Mixed Wetland Hardwoods (617)
- Freshwater Marshes/Graminoid Prairie – Marsh (641)
- Roads and Highways (814)

See Figures 2A-2G in Appendix A for the Land Use Map.

7 FLOODPLAIN

The project site is located on the FEMA FIRM Community-Panel Numbers 12055C0533C, 12055C0535C, and 12055C0555C (November 18, 2015) in Highlands County. The FEMA maps are included in Appendix A. The FEMA FIRM maps shows floodplain shapes along SR 70 along the entire project corridor on both the north and south sides which were listed as Zone A, no base flood elevations determined. KCA updated the floodplain modeling to account for the additional shoulder pavement (Appendix D) to determine the 100-year floodplain elevations within the project limits using ICPR4. The 100-year floodplain elevations obtained from the Existing Conditions ICPR4 Model provides the best available information on the floodplain elevations within the project area. The 100-year/24-hour storm was selected as the best match to the known stages and flows within the watershed. Refer to **Table 4** for the 100-year/24-hour elevations from the Existing Conditions ICPR4 model. There are no FEMA floodways within the project limits.

The Existing Conditions ICPR4 Model established and refined the 100-year floodplain elevations and locations within the project right-of-way as well as throughout the basin of interest. No fill of the floodplain is proposed along the north side of the project, but due to the widening and construction of a 12' shared use path to the south of the existing roadway, there will be a considerable amount of encroachment into the Zone A areas. Therefore, FPC sites were included in the Proposed Conditions ICPR4 model and sized until the 100-year floodplain elevations were less than or equal to the 100-year elevations generated from the Existing Conditions ICRP4 model. Refer to Table 4 to view the 100-year flood elevations generated from the Existing Conditions ICPR4 Model along the project alignment. The final Floodplain Modeling Report is included in Appendix D along with GIS maps indicating node name and 100-year floodplain elevations.

Table 4: Existing Floodplain Summary

Begin Station	End Station	Road	Side	Node Name	100 Yr. Elevation	Zone
10002+35	10008+61	SR 70	LT	N-0450	40.64	A
10008+61	10015+61	SR 70	LT	N-0400	40.84	A
10015+61	10021+63	SR 70	LT	N-0410	40.58	A
10021+63	10029+22	SR 70	LT	N-0360	40.55	A
10029+06	10035+91	SR 70	LT	N-0370	36.09	A
10035+91	10038+15	SR 70	LT	N-0330	35.71	A
10038+15	10054+63	SR 70	LT	N-0210	34.60	A
10054+63	10065+49	SR 70	LT	N-0220	31.60	A
10065+49	10079+45	SR 70	LT	N-0190	31.30	A
10065+49	10108+10	SR 70	LT	N-0200	30.85	A
10108+10	10112+39	SR 70	LT	N-0180	30.81	A
10112+39	10117+96	SR 70	LT	N-0580	30.78	A
10117+96	10125+50	SR 70	LT	N-0590	29.53	A
10125+50	10136+99	SR 70	LT	N-0640	29.50	A
10136+99	10150+41	SR 70	LT	N-0650	29.48	A
10150+41	10163+10	SR 70	LT	N-0720	29.47	A
10163+10	10175+49	SR 70	LT	N-0730	29.41	A
10175+49	10190+00	SR 70	LT	N-0740	29.39	A
10190+00	10201+41	SR 70	LT	N-0750	29.22	A
10201+41	10203+06	SR 70	LT	N-0760	29.20	A
10203+06	10230+21	SR 70	LT	N-0820	29.09	A
10230+21	10233+67	SR 70	LT	N-0830	27.40	A
10018+66	10037+93	SR 70	RT	N-0350	39.34	A
10037+93	10041+43	SR 70	RT	N-0290	38.95	A
10041+43	10045+90	SR 70	RT	N-0300	37.56	A
10044+16	10051+46	SR 70	RT	N-0270	35.49	A
10048+58	10059+27	SR 70	RT	N-0250	35.37	A
10059+27	10069+05	SR 70	RT	N-0050	33.78	A
10069+05	10095+17	SR 70	RT	N-0070	31.15	A
10095+08	10136+99	SR 70	RT	N-0060	29.71	A
10136+85	10175+09	SR 70	RT	N-0710	29.53	A
10174+96	10175+87	SR 70	RT	N-0630	29.39	A

10175+67	10202+79	SR 70	RT	N-0770	29.29	A
10201+77	10215+42	SR 70	RT	N-0780	29.94	A
10215+03	10215+86	SR 70	RT	N-0800	31.44	A
10215+56	10233+67	SR 70	RT	N-0810	31.46	A

FPC can be achieved within offsite ponds in basins one and three. Two alternatives were evaluated:

1) Alternative A
2) Alternative B

Locations of the FPC sites, SMF, and the Regional Pond along with parcels are shown on the maps in Figures 6, 7 and 8 located in Appendix A. The amount of wetland impacts were estimated based on aerial photographs and review of the soils. The preliminary analysis for these FPC sites is based on best available information. The seasonal high-water (SHW) within the FPC sites is based on the NRCS Web Soil Survey. The right-of-way cost was estimated based on the conceptual estimates. Each of the sites is located within the 100-year floodplain. Alternative floodplain sites were not located on the north side of SR 70 due to the presence of wetland reclamation sites.

7.1 ALTERNATIVE A (PREFERRED)

Alternative A consists of constructing a 19.0-acre site adjacent to the relocated canal along the south side of SR 70 at the west end of the project (FPC 1A) and a 31.5-acre site located offsite on the south side of SR 70 at the east end of the project (FPC 2A) to minimize impacts to the 100-year floodplain. The Proposed Conditions ICPR4 Model shows that impacts to the floodplain are mitigated, Appendix D.

The location of FPC 1A near the relocated canal reduces the need for extra pipe. FPC 1A is located within parcel C-01-38-30-A00-0030-0000 and a partial take is proposed. Soil at the site includes Felda fine sand (13), Immokalee sand (8), and a small portion of Sanibel muck (35). Felda fine sand is a Type A/D Hydrologic Soil Group (HSG) with an estimated SHW of 3 to 18 inches below the existing ground. Immokalee fine sand is a Type B/D HSG with an estimated SHW of 6 to 18 inches below the existing ground. Sanibel muck is a Type A/D HSG with an estimated SHW of 0 inches below the existing ground. LiDAR contours show that the site varies from elevation 43 feet on the east side to 44 feet on the west side. Notably, the existing land use for FPC 1A includes 0.16 acres of Mixed Wetland Hardwoods, 0.39 acres of Streams and Waterways, and 0.60 acres of Freshwater Marshes (Table 3-4, Appendix F). FPC 1A has a high potential wetland involvement indicating greater than 1.0 acres of wetlands are expected to be impacted (Table 3-5, Appendix F). Additionally, FPC 1A has a moderate potential for protected species involvement indicating that the site location has conditions that are favorable for protected species (Table 3-5, Appendix F). FPC 1A has been determined to be at low probability for all archeological and historic impacts (Table 1, Appendix E). FPC 1A has also been determined to be at a low contamination risk rating (Appendix G).

FPC 2A is located within parcel C-03-38-31-A00-0010-0000. Soil at the site includes Immokalee sand (8) and is a Type B/D Hydrologic Soil Group (HSG). LiDAR contours

show that the site varies from elevation 34 feet on the south side to 33 feet on the north side. Node 1000 lies directly to the east of FPC 2A and has an estimated 100-year floodplain elevation of approximately 34.05 feet. Due to the topography of the site and the size of the parcel, it is proposed to provide only a 5-foot maintenance berm on the west side of the FPC site. The proposed floodplain site will be cut to elevation 33.0 feet to provide 30 ac-ft of FPC. The existing land use for FPC 2A consists of 0.26 acres of Streams and Waterways (Table 3-4, Appendix F) resulting in a wetland mitigation cost of approximately $31,200. FPC 2A has a low potential wetland involvement indicating less than 0.5 acres of wetlands are expected to be impacted at a cost of $31,200 (Table 3-5, Appendix F). Additionally, FPC 2A has a high potential for protected species involvement indicating that protected species are confirmed or highly likely at this site (Table 3-5, Appendix F). FPC 2A has been determined to be at low-moderate probability for Prehistoric Archaeological impacts and low probability for Historic Archaeological and Historical impacts (Table 1, Appendix E). FPC 2A has also been determined to be at a medium contamination risk rating (Appendix G). There are several regulatory sites within 500 feet of the proposed FPC site including TANKs 8519808 and 9101697. The primary concern at this site is two-fold: 1) pesticides and herbicides at the decontamination station and 2) a history of discharges associated with this facility.

Refer to **Table 5** for the Floodplain Alternative Matrix comparing the costs for the two FPC alternatives and Appendix J to view the preliminary cost estimates. The total estimated cost for this alternative is $2,913,708.

7.2 ALTERNATIVE B

Alternative B consists of two FPC sites, 1B and 2B, of similar size to those in Alternative A. FPC 1B is located within parcel C-01-38-30-A00-0010-0000 and a partial take is proposed. Soil at the site includes Basinger fine sand (12) and Immokalee fine sand (8). Basinger fine sand is a Type A/D Hydrologic Soil Group (HSG) with an estimated SHW of 0 to 12 inches below the existing ground. Immokalee fine sand is a Type B/D HSG with an estimated SHW of 6 to 18 inches below the existing ground. LiDAR contours show that the site varies from elevation 36 feet on the east side to 40 feet on the west side. The existing land use on the FPC 1B site consists of 0.43 acres of Streams and Waterways (Table 3-4, Appendix F) resulting in a wetland mitigation, approximately $51,600. FPC 1B has a low potential wetland involvement indicating less than 0.5 acres of wetlands are expected to be impacted (Table 3-5, Appendix F). Additionally, FPC 1B has a high potential for protected species involvement indicating that protected species are confirmed or highly likely at this site (Table 3-5, Appendix F). FPC 1B has been determined to be at low probability for all archeological and historic impacts (Table 1, Appendix E). FPC 1B has also been determined to be at a low contamination risk rating (Appendix G).

FPC 2B is located within parcel C-04-38-31-A00-0040-0000. Soil at the site includes Immokalee sand (8) and is a Type B/D Hydrologic Soil Group (HSG). The SHW is estimated to be 6 to 18 inches below the existing ground. LiDAR contours show that the site varies from elevation 35 feet on the east side to 34 feet on the west side. Node 0910

and the agricultural ditches connected to it adjacent to FPC 2B, have an estimated floodplain elevation of approximately 34.04 feet. Due to the topography of the site and the size of the parcel, it is proposed to provide only a 5-foot maintenance berm on the west side of the FPC site. The proposed floodplain site will be cut to elevation 33.0 feet to provide 30 ac-ft of FPC. The existing land use on the FPC 2B site consists of 1.01 acres of Streams and Waterways (Table 3-4, Appendix F) resulting in approximately $121,200 worth of wetland mitigation costs. FPC 2B has a high potential wetland involvement indicating greater than 1.0 acres of wetlands are expected to be impacted (Table 3-5, Appendix F). Additionally, FPC 2B has a moderate potential for protected species involvement indicating that conditions for protected species are favorable at this site (Table 3-5, Appendix F). FPC 2B has been determined to be at low-moderate probability for Prehistoric Archaeological impacts and low probability for all other archeological impacts (Table 1, Appendix E). FPC 2B has also been determined to be at a medium contamination risk rating due to the presence of nearby tanks including Facility ID 8944575 (Appendix G). Furthermore, the primary contamination concerns include the following: 1) Petroleum and/or agrichemical ASTs located at the irrigation well located near the west boundary of FPC 2B, 2) Petroleum and/or agrichemical ASTs located at the irrigation well near the south boundary of FPC 2B, and 3) Petroleum ASTs at the fuel point located within the access easement.

Refer to Table 5 for the Floodplain Alternative Matrix comparing the costs for the two FPC alternatives and Appendix J to view the preliminary construction cost estimates. Right-of-way costs were estimated at $35,365.64 per acre.

Table 5: Floodplain Alternative Matrix

Alternative	Name	Side	Area (Ac)	Estimated Right-of-Way Cost	Constr. Cost	Wetland Mitigation Cost	Total Cost
A	FPC 1A	RT	19.0	$ 671,947	$ 361,180	$ 138,000	$ 2,913,708
	FPC 2A	RT	31.5	$ 1,114,017	$ 597,364	$ 31,200	
B	FPC 1B	RT	18.8	$ 664,874	$ 504,358	$ 51,600	$ 3,126,905
	FPC 2B	RT	31.5	$ 1,114,017	$ 670,856	$ 121,200	

Based on this preliminary floodplain analysis, the preferred alternative is Alternative A which consists of constructing FPC sites closer to the roadway and thus reducing construction costs. The information used in this preliminary analysis is based on best available information and is subject to change. See Table 1, Appendix E for the cultural impacts at each site. See Table 3-5, Appendix F for the wetland and protected species involvement at each site. See Appendix G for the contamination rankings.

8 PROPOSED DRAINAGE CONDITIONS

Stormwater management for water quality (treatment) and water quantity (attenuation) will be provided in ponds. The design of the drainage and SMF will comply with the standards set forth by the FDOT *Drainage Manual*, and the SFWMD *ERP Applicant's*

Handbook. Three alternatives have been proposed: Alternative A: Linear Ponds, Alternative B: Offsite Ponds, and Alternative C: Regional Pond. Each treatment option will include a control structure as a Best Management Practices (BMP) except for the regional pond site with the land change. The treatment alternatives have comparable depths to SHW as estimated by the NRCS Web Soil Survey. **Table 6** includes a description of each basin, total area and impervious area.

Table 6: Basins

Basin	Begin Sta.	End Sta.	Basin Length (ft)	Right-of-Way Width (ft)	Impervious width (ft)*	Basin Area (ac)	Basin Impervious Area (ac)
1	10000+00	10056+90	5400	218	79	27.02	9.79
2	10056+90	10163+45	10650	218	79	53.30	19.31
3	10163+45	10233+67	6450	218	79	32.28	11.70

*Includes 12’ wide shared use path

8.1 ALTERNATIVE A: LINEAR PONDS (PREFERRED)

This alternative involved incorporating control structures within the proposed FDOT right-of-way to create linear ponds along the length of the project. These linear ponds will operate as dry retention ponds. The typical section (Figure 2) show ditches flanking either side of the roadway. The ditches along the south side will have the following typical dimensions: 10’ bottom widths, 1:4 back slopes, 1:6 front slopes, and 2.5’ of depth, 0.5’ for freeboard, and 2.0’ depth for both treatment and attenuation. This results in a 40 square foot cross-sectional area. The ditches along the north side of SR 70 will have the following typical dimensions: 30’ bottom width, 1:4 back slopes, 1:6 front slopes, and 2.5’ of depth, 0.5’ for freeboard, and 2.0’ depth for both treatment and attenuation. This results in an 80 square foot cross-sectional area. Approximately six control structures would be required divided into one per side per basin. This alternative drastically reduces the treatment costs compared to either Alternative B or Alternative C by not requiring the purchase of additional right-of-way. Refer to **Table 7** for a cost breakdown. The linear ponds would outfall into the adjacent canals prior to the ultimate discharge within Harney Pond Canal.

Basin 1 is approximately 27.02 acres with 9.79 acres of contributing impervious area resulting in a required treatment volume of 1.13 acre-ft. This treatment volume is the greater of 50% of 1.0” over the total basin area (1.13 acre-feet) or 50% of 2.5” over the impervious area (1.02 acre-feet). This pond provides 2.2 acre-feet of treatment. The attenuation required for Basin 1, 12.57 acre-feet, was determined using ICPR4 under the 35.4 CSM SFWMD limitation for the C-41 Basin. The linear pond accepting discharge from Basin 1 will provide approximately 12.80 acre-feet of volume between the required treatment volume and the required DHW elevation.

Basin 2 is approximately 53.30 acres with 19.31 acres of contributing impervious area resulting in a required treatment volume of 2.22 acre-feet. The treatment volume is the

greater of 50% of 1.0" over the total basin area (2.22 acre-feet) or 50% of 2.5" over the impervious area (2.01 acre-feet). This pond provides 3.97 acre-feet of treatment. The attenuation required for Basin 2, 24.79 acre-feet, was determined using ICPR4 under the 35.4 CSM SFWMD limitation for the C-41 Basin. The linear pond accepting discharge from Basin 2 will provide approximately 25.38 acre-feet of volume between the required treatment volume and the DHW elevation.

Basin 3 is approximately 32.28 acres with 11.70 acres of contributing impervious area resulting in a required treatment volume of 1.34 acre-ft. The treatment volume is the greater of 50% of 1.0" over the total basin area (1.34 acre-feet) or 50% of 2.5% over the impervious area (1.22 acre-feet). This pond provides 2.41 acre-feet of treatment. The attenuation required for Basin 3, 15.02 acre-feet, was determined using ICPR4 under the 35.4 CSM SFWMD limitation for the C-41 Basin. The linear pond accepting discharge from Basin 3 will provide approximately 15.36 acre-feet of volume between the required treatment volume and the DHW elevation.

The SHW table for Basin 1 was estimated from the NRCS Web Soil Survey. The primary soils in this basin include Immokalee sand (8) and Felda fine sand (13), each with an estimated depth to SHW of approximately one foot below the existing ground. The SHW table for Basin 2 was estimated from the NRCS Web Soil Survey. The primary soils in this basin include Tequesta muck (26) and Kaliga Muck (18), each with an estimated depth to SHW of approximately zero feet below the existing ground. The SHW table for Basin 3 was estimated from the NRCS Web Soil Survey. The primary soils in this basin include Kaliga muck (18), Felda fine sand (13) and Tequesta muck (26), each with an estimated depth to SHW of approximately zero, one, and zero feet below the existing ground respectively. Due to the proximity of these linear ponds to the existing and proposed canals on the left and right respectively, the depth to seasonal high-water table (SHWT) will likely be greater than the approximation given by the NRCS Web Soil Survey. Therefore, this alternative will likely have no expected impacts on the roadway elevation. Additionally, the preferred BMP for this alternative is dry retention due, in part, to the adjacent canals lowering the estimated SHWT in the roadside swales.

Table 7: Stormwater Management Alternative Matrix

Alternative	Name	Area (Ac)	Estimated Right-of-Way Cost	Construction Cost	Wetland Mitigation Cost[c]	Total Cost
Alternative A	Linear Ponds	46.58	$ 0[a]	$ 203,663[b]	$ 0	$ 203,663
Alternative B	SMF 1	5.0	$ 176,828	$ 240,388	$ 0	$ 3,401,264
	SMF 2	13.7	$ 484,509	$ 382,834	$ 1,622,400	
	SMF 3	6.0	$ 212,194	$ 261,711	$ 20,400	
Alternative C	Regional Pond Option 2: Land Swap	105.0 (124.0)	$ 4,385,339	$ 0[d]	$ 0[e]	$ 4,385,339

	Regional Pond Option 1: Wet Detention	20.5 (124.0)	$ 4,385,339	$ 1,277,433	$ 376,800	$ 6,039,572

[a] Estimated Right-of-Way cost for Alternative A: Linear Ponds included in estimate for project right-of-way. All other alternatives require additional right-of-way at $35,365.64 per acre.
[b] the estimated construction cost for Alternative A does not include the excavation or mitered end section costs for the linear ponds as they would be constructed as part of the typical section regardless of treatment using control structures.
[c] Wetland mitigation costs were estimated at $120,000 per acre impacted.
[d] This alternative requires no excavation, only the removal of existing crops.
[e] This site would result in no wetland impacts.

8.2 ALTERNATIVE B: OFFSITE PONDS

In this alternative, Basins 1, 2, and 3 will have their own stormwater management ponds named SMF 1, SMF 2, and SMF 3 respectively. Refer to Appendix I to view the Drainage Exhibits. All offsite ponds will be wet detention. One complication of this alternative is the necessary rerouting of the canals around the SMF's to keep reasonable and effective pipe inverts in the roadside swales. See Table 7 for cost comparisons.

SMF 1 will require a treatment volume of 2.53 acre-ft and an attenuation volume of 14.70 acre-feet as determined using the 35.4 CSM SFWMD limitation in ICPR4. The larger attenuation volume required compared to the linear option is a result of including the offsite pond area. Approximately 10.0 acre-feet of the attenuation volume required for Basin 1 will be accounted for within the SR 70 right-of-way. The 2.53 acre-ft of required treatment will occur between the orifice elevation (EL. 34.5') and the weir elevation (EL. 35.5') yielding a provided treatment volume of 3.18 acre-feet. The remaining 4.70 acre-feet of attenuation volume required will be accounted for between the weir (El. 35.5') and the estimated DHW (EL. 37.0'). This site will be constructed on parcel C-01-38-30-A00-0010-0000 as a partial take. The existing land use of SMF 1 consists of 5.01 acres of Improved Pastures and 0.02 acres of Temperate Hardwoods (Table 3-1, Appendix F). This site is expected to have no wetland impacts (Table 3-4, Appendix F). SMF 1 has been listed as having a moderate potential protected species involvement (Table 3-5, Appendix F). SMF 1 (SMF 1B in Appendix G) has been listed as having no contamination risk. This site is listed as low in terms of zones of archaeological and historical probability (Table 1, Appendix E).

SMF 2 will require a treatment volume of 5.32 acre-ft and an attenuation volume of 31.84 acre-feet as determined using the 35.4 CSM SFWMD limitation in ICPR4. The required treatment volume will be achieved through a treatment depth of 0.7' between the orifice (EL. 26.0') and the weir elevation (EL. 26.7') for 8.37 ac-ft. The 31.84 acre-feet of required attenuation will be accounted for between the weir elevation (EL. 26.7') and the estimated DHW (EL. 29.30'). The required treatment and attenuation will be achieved through a total pond area of 13.7 acres. This site will be constructed on parcel C-32-37-31-A00-0020-0000 as a partial take. This parcel is on the north side of the project in Basin 2. Notably, the existing land use on the SMF 2 proposed site consists of 13.15 acres of Freshwater Marshes and 0.37 acres of streams and waterways (Table 3-4,

Appendix F) which would impose approximately $ 1,622,400 in wetland mitigation costs. Therefore, SMF 2 has been listed as having a high potential of wetland involvement. Additionally, SMF 2 has been listed as having a high potential protected species involvement (Table 3-5, Appendix F). SMF 2 (SMF 2B in Appendix G) has been listed as having no contamination risk. SMF 2 has a low ranking for pre-historic archaeologic and historic resources (Table 1, Appendix E).

SMF 3 will require a treatment volume of 3.19 acre-ft and an attenuation volume of 18.28 acre-feet as determined using the 35.4 CSM SFWMD limitation in ICPR4. Approximately 5.41 acre-feet of attenuation volume will be accounted for within the SR 70 right-of-way. The treatment will occur between the orifice at elevation 25.0' and the weir, 26.0'. The remaining 12.87 acre-feet of required attenuation volume will be accounted for between the weir elevation (EL. 26.0') and the estimated DHW (EL. 30.0'). This site will be constructed on parcel C-04-38-31-A00-0030-0000 as a partial take. The existing land use of SMF 3 consists of 6.96 acres of Unimproved pastures and 0.17 acres of Streams and Waterways that operate as man-made agricultural ditches (Table 3-1, Appendix F). The 0.17 acres of Streams and Waterways would necessitate an additional $20,400 worth of wetland mitigation costs. Therefore, SMF 3 has been listed as having a low potential of wetland involvement. Additionally, it has been listed as having a low potential protected species involvement (Table 3-5, Appendix F). SMF 3 has a low ranking for pre-historic archaeologic and historic resources (Table 1, Appendix E). SMF 3 (SMF 3B in Appendix G) has also been determined to be at a low contamination risk rating. Refer to Table 7 for comparisons.

The SHWT for SMF 1 was estimated based on the NRCS Web Soil Survey. The primary soils for this site include Basinger fine sand (12) and Felda fine sand (13) each with a depth to SHWT of approximately six inches and one foot respectively. The SHWT for SMF 2 was estimated based on the NRCS Web Soil Survey. The primary soil for this site is Kaliga muck (18) which has an estimated depth to SHW of zero feet. The SHWT for SMF 3 was estimated based on the NRCS Web Soil Survey. The primary soils for this site include Kaliga muck (18) and Tequesta muck (26), each with an approximated depth to SHW of zero feet. The relatively shallow SHWT results in wet detention systems as the preferred BMP alternative. A berm will be required to provide both the necessary treatment and attenuation in these ponds. The maximum elevation of such a berm would be approximately 38', 30.3', and 31' in basins 1, 2, and 3 respectively due to estimated roadway elevations. Should the ponds require a higher berm elevation, the proposed roadway elevation will likely need to increase. A portion of the attenuation will be secured within the SR 70 right-of-way.

8.3 ALTERNATIVE C: REGIONAL POND

The regional pond alternative would treat the runoff at a single location prior to discharging into Harney Pond Canal. This alternative would involve purchasing 124.0 acres on parcel C-04-38-31-A00-0010-0000 as a partial take. The existing land use for the Regional Pond site includes 0.33 acres of Improved Pastures, 122.18 acres of Sod Farms, and 3.14 acres of Streams and Waterways (Table 3-1, Appendix F). The 3.14

acres of Streams and Waterways would necessitate an additional $376,800 worth of wetland mitigation costs due to construction of a wet detention pond. The 124.0-acre regional pond site has been listed as having both a high potential wetland involvement and a high potential protected species involvement (Table 3-5, Appendix F). The Regional Pond alternative has been determined to be at a low contamination risk rating (Appendix G). Furthermore, the Regional Pond has been given a low rating for zones of archaeological and historical probability (Table 1, Appendix E).

The SHWT for the regional pond site was estimated based on the NRCS Web Soil Survey. The primary soils for this site include Kaliga muck (18) and Tequesta muck (26), each with an approximate depth to SHWT of zero feet.

Two options exist for Alternative C on this site including a 20.5-acre wet detention within a 124-acre site or a conversion of land use (land swap) for 105 acres. The land swap option will involve the purchase of 124 acres of farmland to allow for a 19-acre portion allotted to re-route existing agricultural canals. The remaining 105 acres will undergo alternation from cropland to unimproved/natural land. The nutrient credits obtained from this process will be used to offset the additional impervious area added under the 4-lane widening. Both options meet nutrient loading requirements (Appendix C). The wet detention option would result in a 20.5-acre plot of land located adjacent to the access road at the northwest corner of the 124-acre area shown in Figure 9. Option 1 would result in approximately $6,039,572 in total costs while Option 2 would have $4,385,339. This difference stems from a combination of right-of-way costs, construction costs and wetland mitigation costs (Table 7). Both alternatives will require the retention volume to be accounted for within the SR 70 right-of-way using attenuation in the roadside ditches.

9 CONCLUSIONS

Two FPC alternatives were evaluated for the floodplain impacts along the project corridor. Alternative A and Alternative B have the same required right-of-way. However, in Alternative A the configurations of FPC 1A and FPC 2A are closer to the SR 70 right-of-way which reduces the cost of construction and are thus the preferred alternative. The preferred water quality treatment method is to construct linear ponds (Alternative A) along the north and south sides of SR 70 within the proposed FDOT right-of-way. This water quality treatment alternative drastically reduces the total cost compared to Alternatives B or C since there is no need to purchase additional right-of-way.

Users of this report are cautioned that the included recommendations were based on pond sizes and locations determined from preliminary data and calculations and reasonable engineering judgment and assumptions. Pond sizes and configurations may change during final design as more detailed geotechnical or survey information becomes available.

APPENDIX A

FIGURES

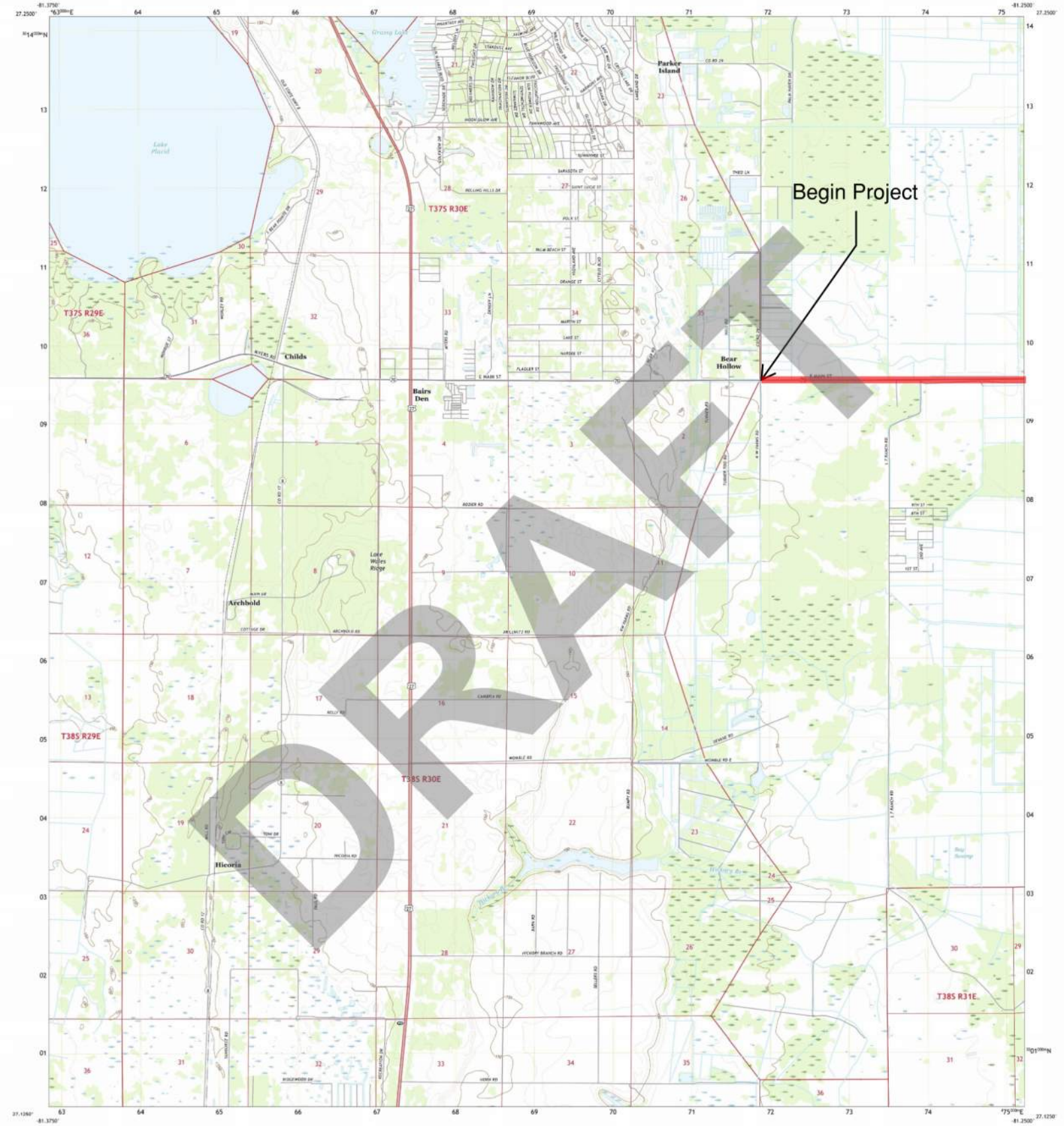

Figure 1A: USGS Childs Quadrangle Map

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 17R
This map is not a legal document. Boundaries may be
generalized for this map scale. Private lands within government
reservations may not be shown. Obtain permission before
entering private lands.

Imagery.....NAIP, November 2015 - February 2016
Roads.....U.S. Census Bureau, 2016
Names.....GNIS, 1979 - 2016
Hydrography.....National Hydrography Dataset, 2003 - 2017
Contours.....National Elevation Dataset, 2012
Boundaries.....multiple sources; see metadata file 2014 - 2016
Public Land Survey System.....BLM, 2017
Wetlands.....FWS National Wetlands Inventory 2010

UTM GRID AND 2017 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000
1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
0.5 0 1
HALF
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the
National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.18

ADJOINING QUADRANGLES
1 Lake June In Winter
2 Lake Placid
3 Basinger SW
4 Venus NW
5 Brighton NW
6 Venus SW
7 Venus
8 Brighton SW

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

CHILDS, FL
2018

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map US Topo

BRIGHTON NW QUADRANGLE
FLORIDA
7.5-MINUTE SERIES

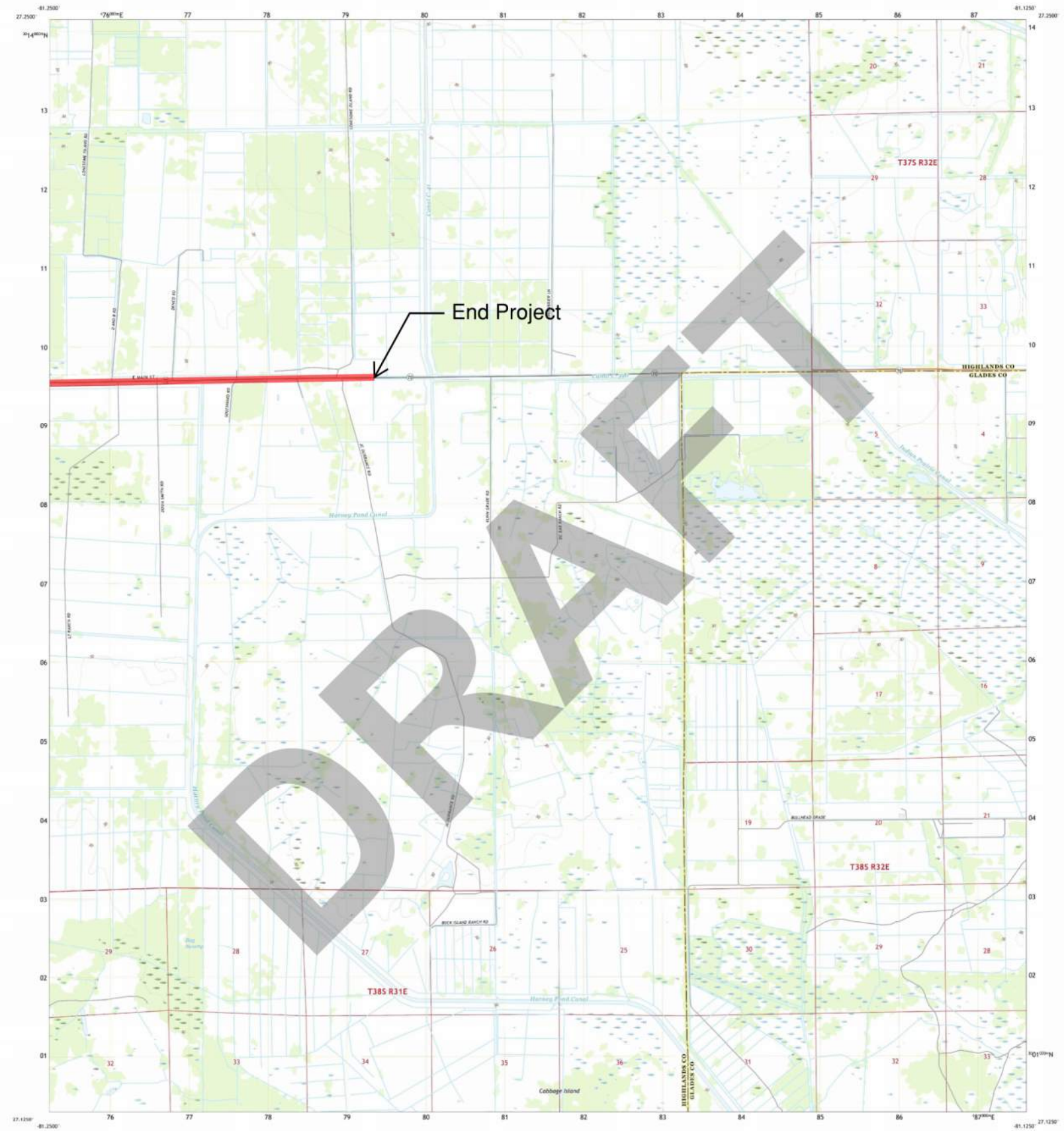

Figure 1B: USGS Brighton NW Quadrangle Map

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 17R
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generalized for this map scale. Private lands within government
reservations may not be shown. Obtain permission before
entering private lands.

Imagery.....NAIP, August 2015 - February 2016
Roads.....U.S. Census Bureau, 2016
Names.....GNIS, Not Available
Hydrography.....National Hydrography Dataset, 2001 - 2017
Contours.....National Elevation Dataset, 2010 - 2016
Boundaries.....Multiple sources; see metadata file 2014 - 2016
Public Land Survey System.....BLM, 2017
Wetlands.....FWS National Wetlands Inventory 2010

UTM GRID AND 2017 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

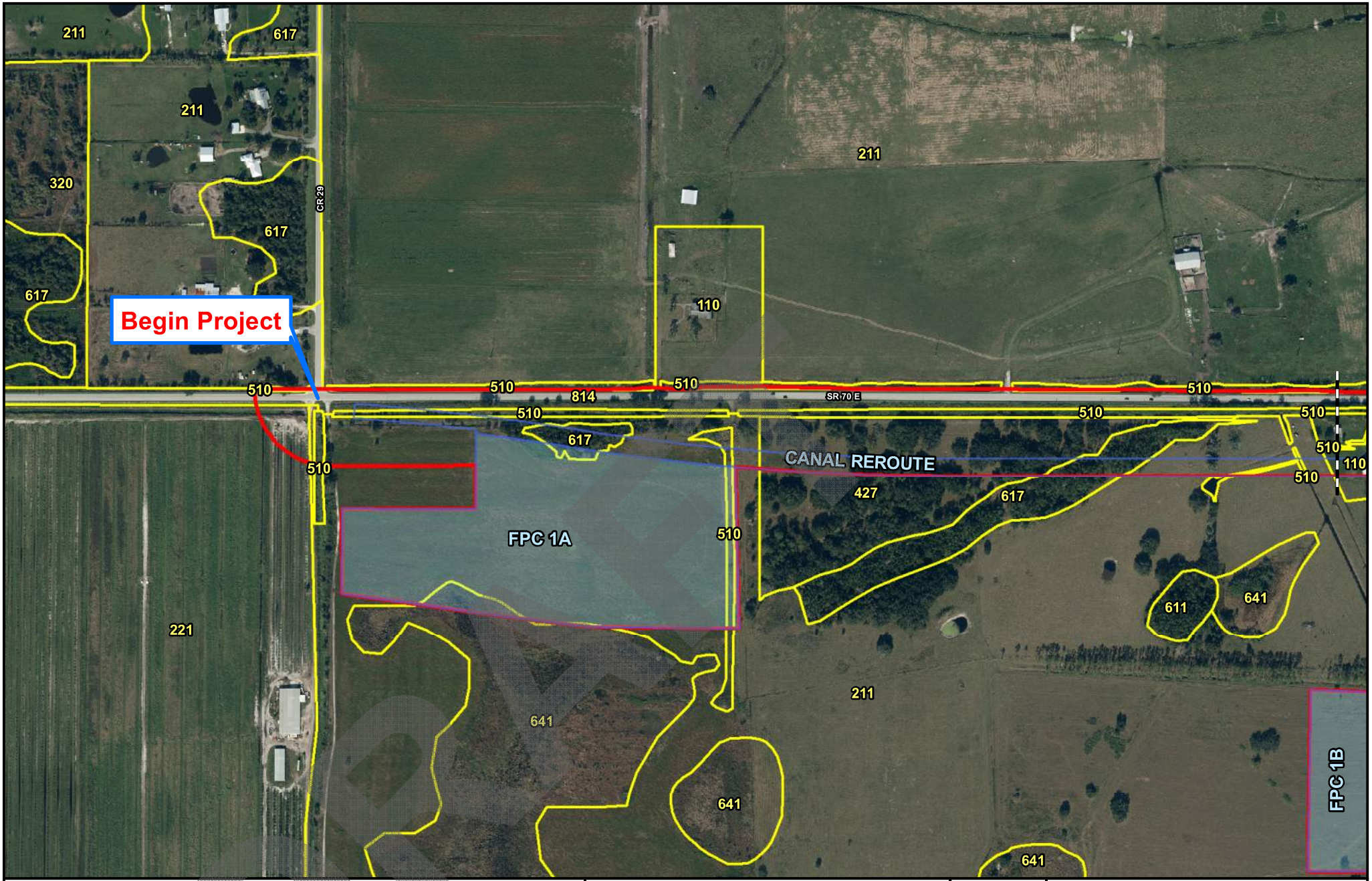
CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the
National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.18

ADJOINING QUADRANGLES
1 Lake Placid
2 Basinger SW
3 Fort Basinger
4 Childs
5 Brighton
6 Venus
7 Brighton SW
8 Brighton SE

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

BRIGHTON NW, FL
2018



Land Use Map

SR 70 from CR 29 to Lonesome Island Road
Project Development & Environment Study

FPID No. 414506-5-22-01
Highlands County, FL

Figure 2A

Page 1 of 7

Kisinger Campo & Associates, Corp.
201 N. Franklin Street, Suite 400
Tampa, FL 33602
Phone: 813/871-5331

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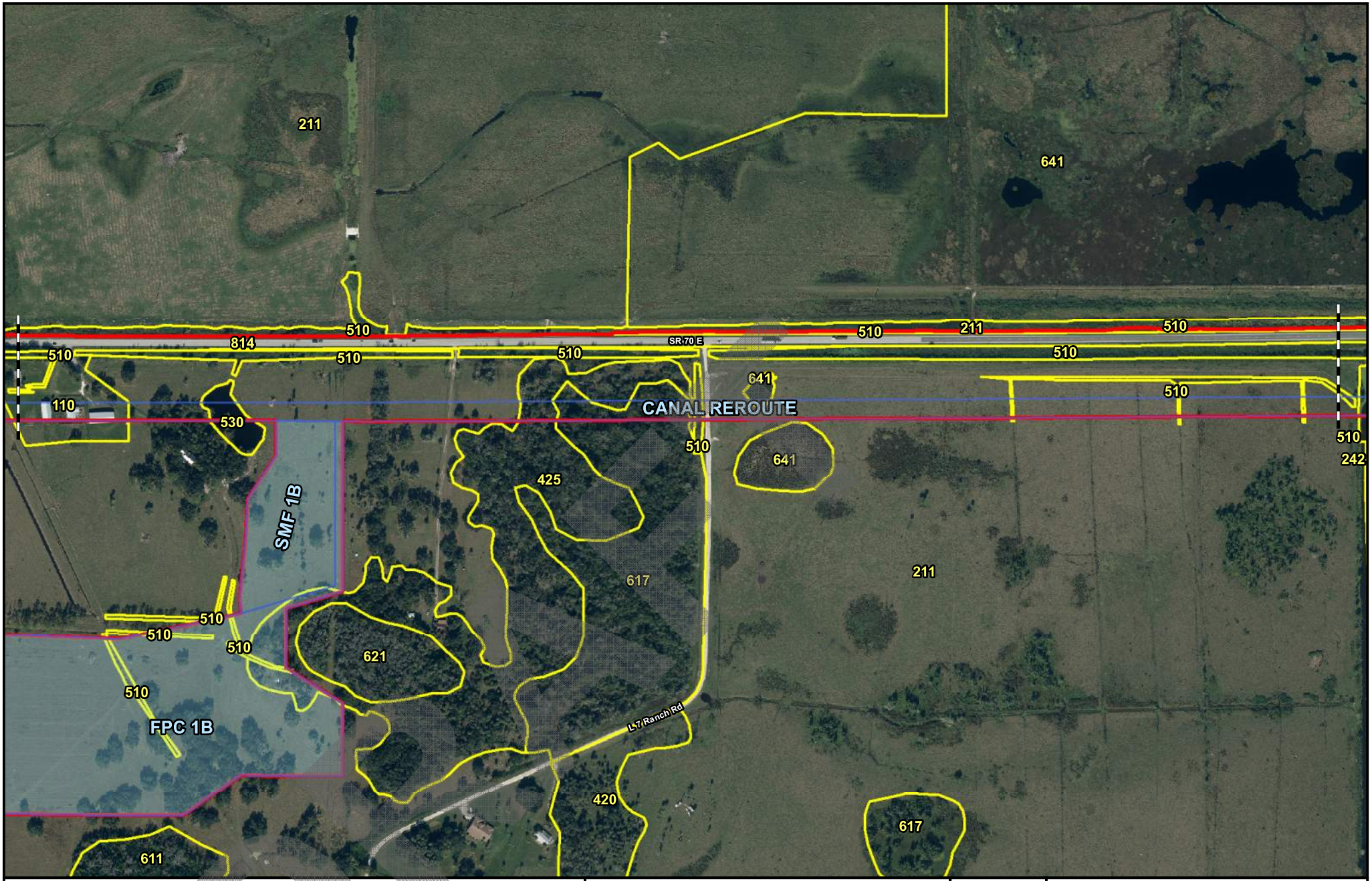

Project Study Area

Proposed Pond

110: Residential, Low Density

211: Improved Pastures

242: Sod Farms

420: Upland Hardwood Forests

425: Temperate Hardwood

510: Streams and Waterways

530: Reservoirs

611: Bay Swamps

617: Mixed Wetland Hardwoods

621: Cypress - Mixed Hardwoods

641: Freshwater Marshes / Graminoid Prairie - Marsh

814: Roads and Highways

Land Use Map

SR 70 from CR 29 to Lonesome Island Road
Project Development & Environment Study

FPID No. 414506-5-22-01
Highlands County, FL

Figure 2B

N W E S

500 250 0 500

Feet

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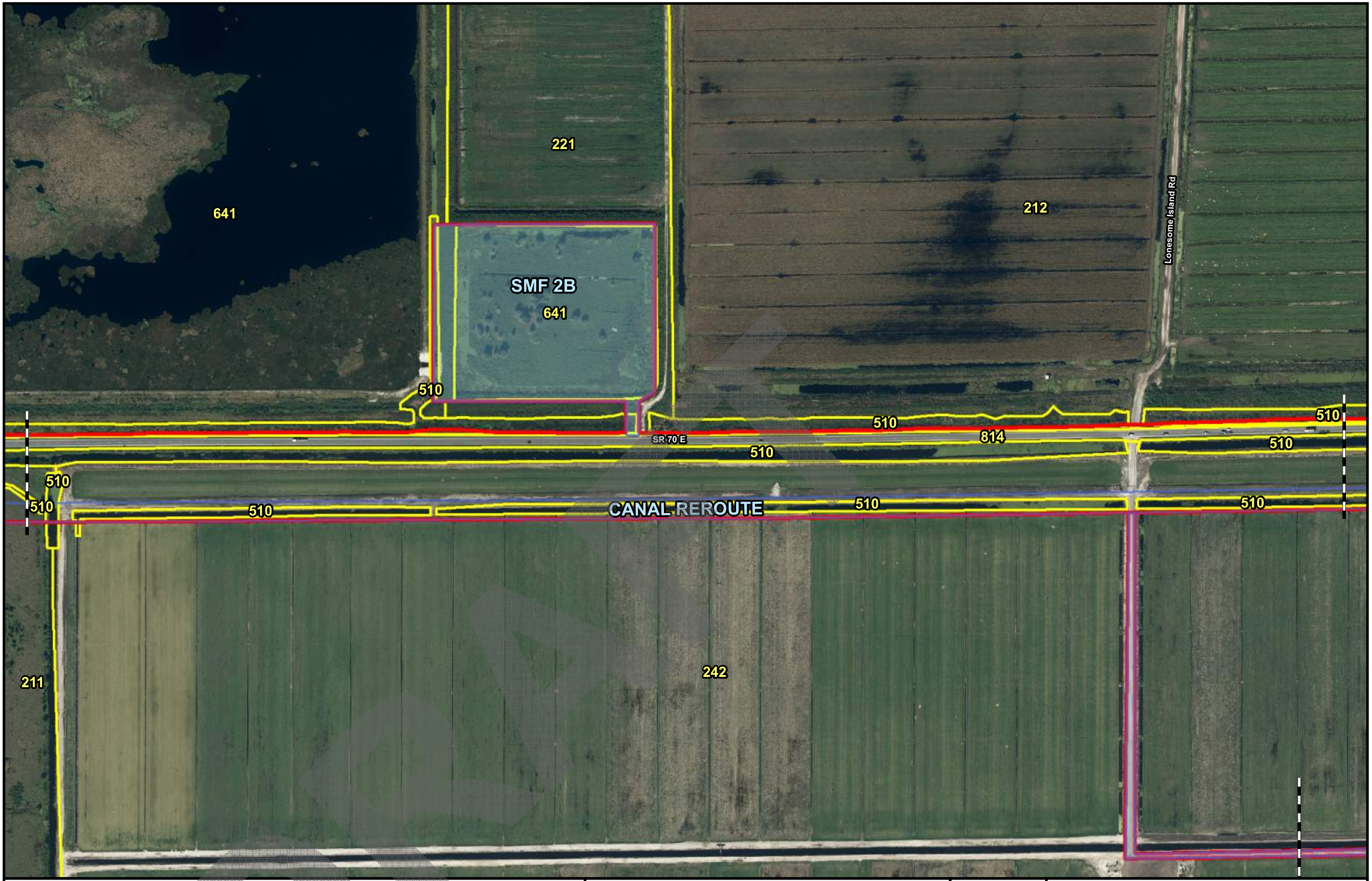

Project Study Area

Proposed Pond

211: Improved Pastures

212: Unimproved Pastures

221: Citrus Groves

242: Sod Farms

510: Streams and Waterways

641: Freshwater Marshes / Graminoid Prairie - Marsh

814: Roads and Highways

Land Use Map

SR 70 from CR 29 to Lonesome Island Road
Project Development & Environment Study

FPID No. 414506-5-22-01
Highlands County, FL

N W E S

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Feet

Figure 2C

Page 3 of 7

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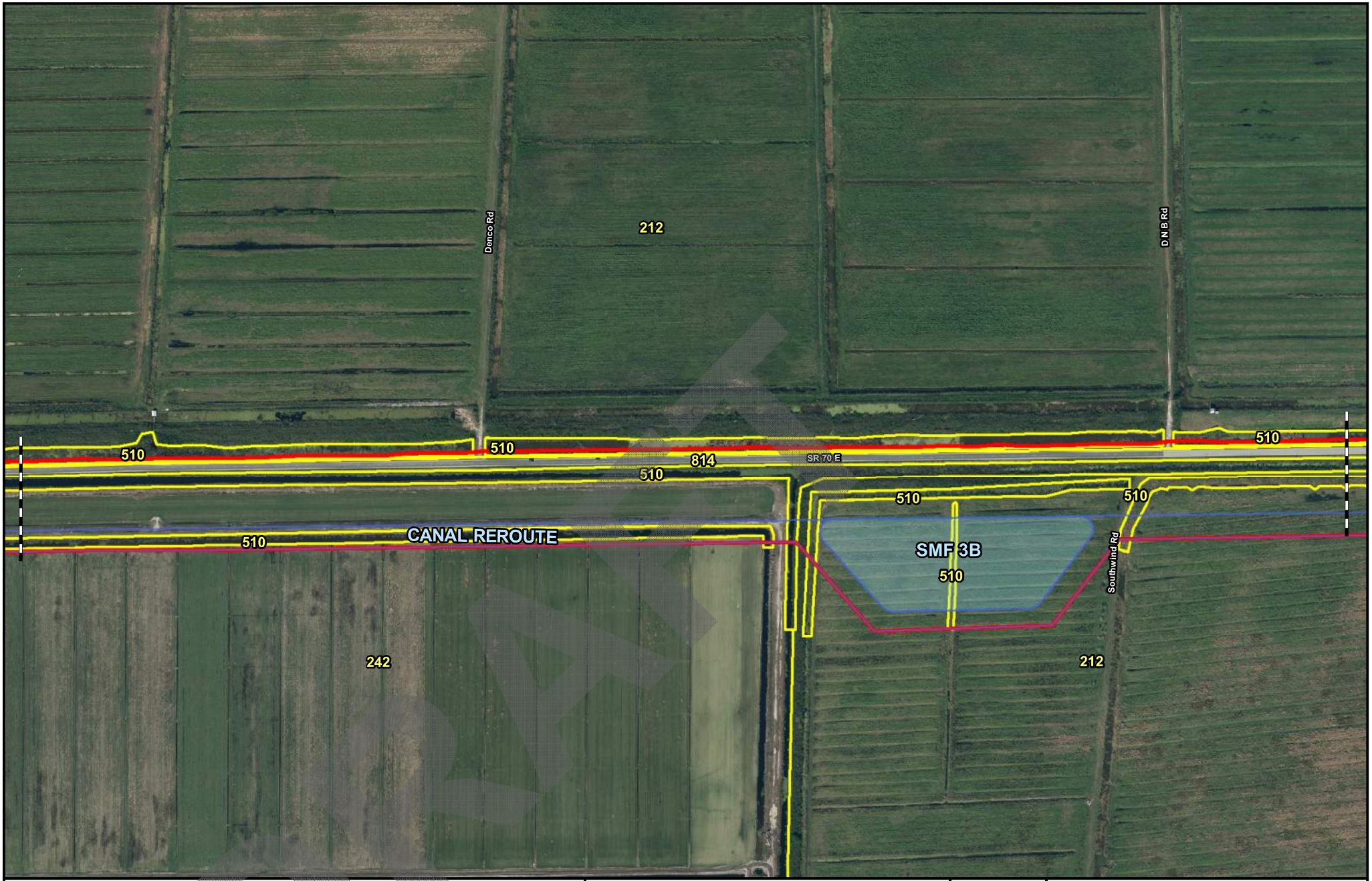

Project Study Area

Proposed Pond

212: Unimproved Pastures

242: Sod Farms

510: Streams and Waterways

814: Roads and Highways

Land Use Map

SR 70 from CR 29 to Lonesome Island Road
Project Development & Environment Study

FPID No. 414506-5-22-01
Highlands County, FL

N W E S

500 250 0 500

Feet

Figure 2D

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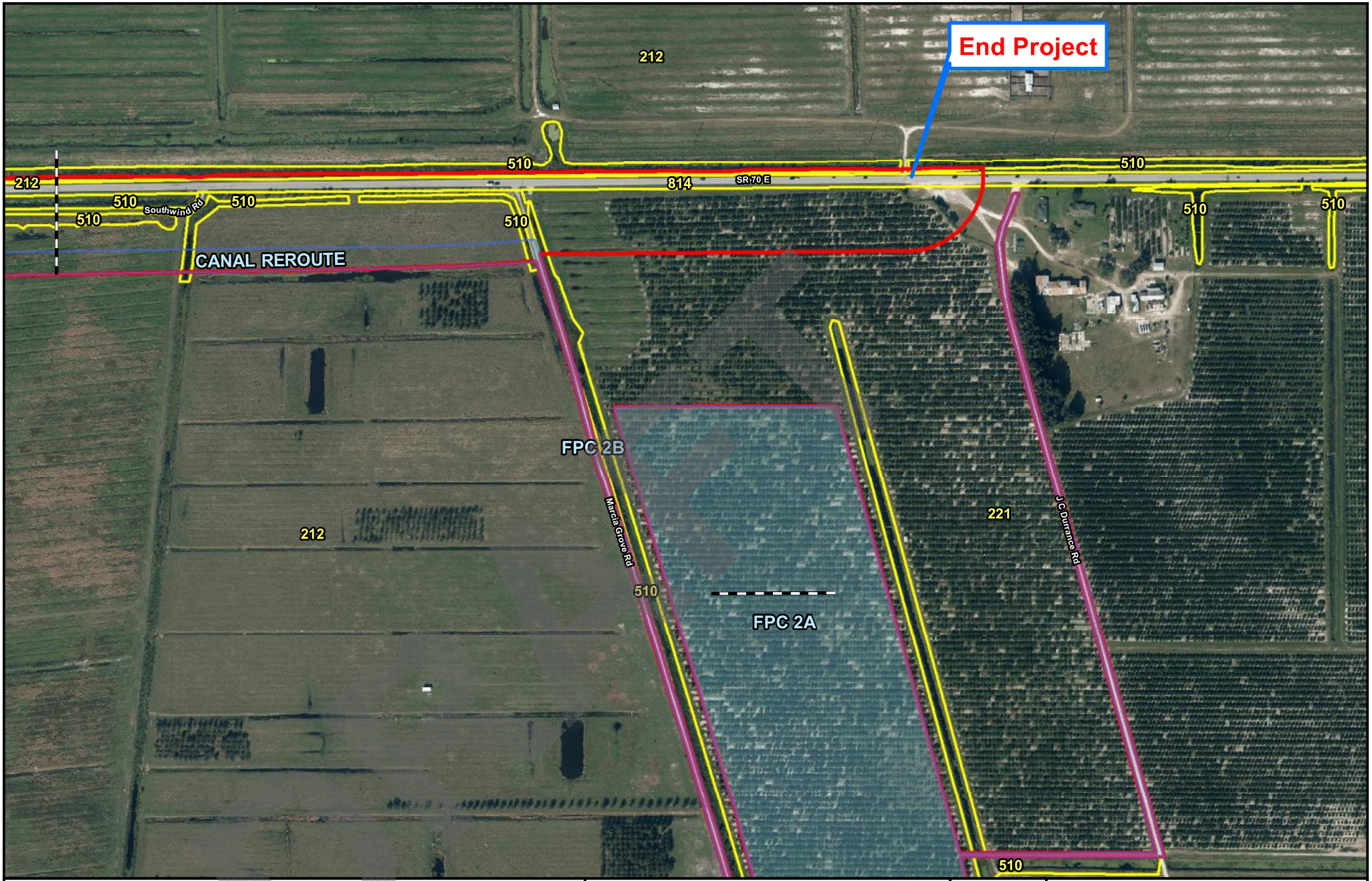

Project Study Area

Proposed Pond

212: Unimproved Pastures

221: Citrus Groves

510: Streams and Waterways

814: Roads and Highways

Land Use Map

SR 70 from CR 29 to Lonesome Island Road
Project Development & Environment Study

FPID No. 414506-5-22-01
Highlands County, FL

Figure 2E

Page 5 of 7

N W E S

500 250 0 500

Feet

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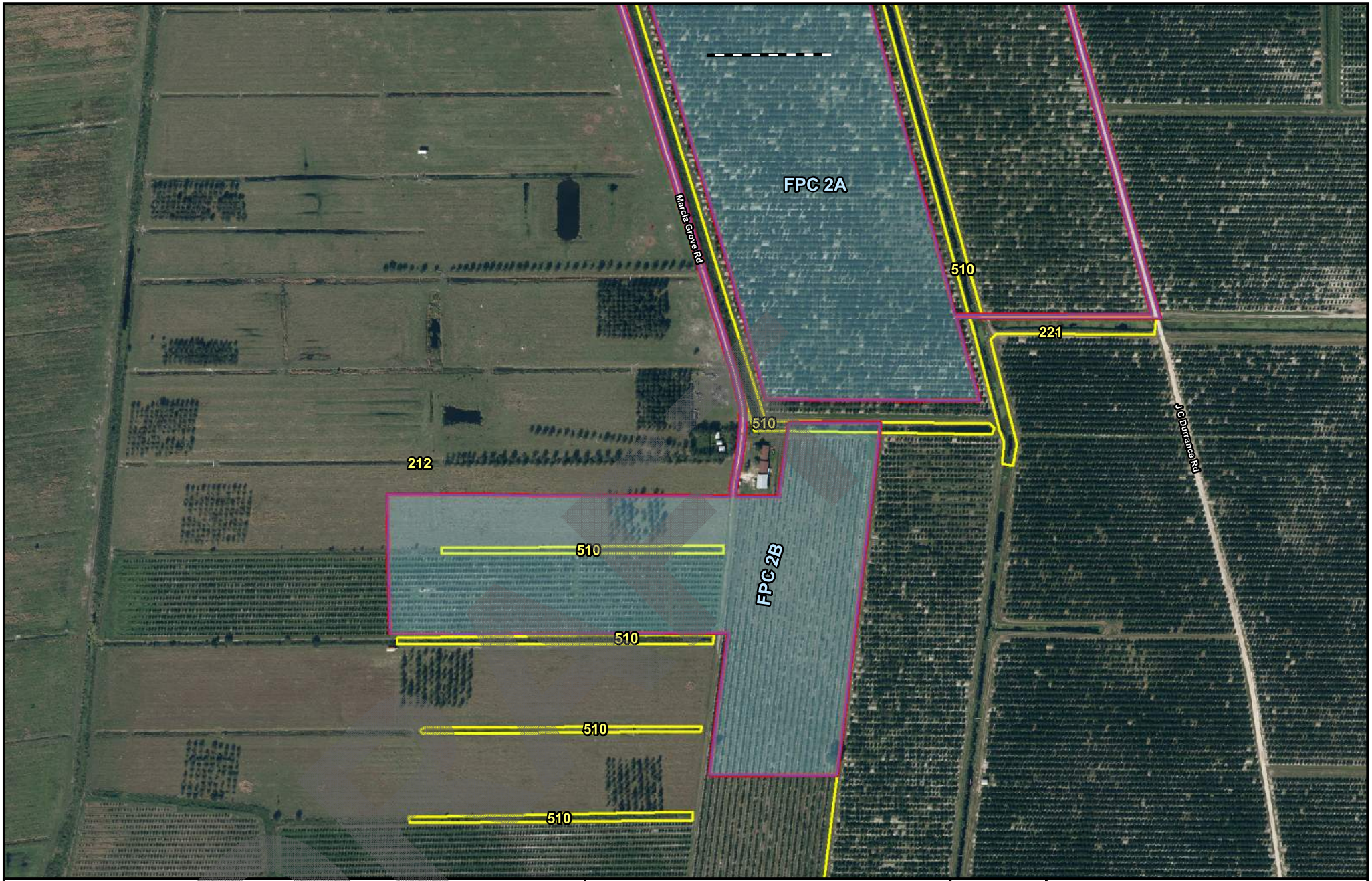

Project Study Area

Proposed Pond

212: Unimproved Pastures

221: Citrus Groves

510: Streams and Waterways

Land Use Map

SR 70 from CR 29 to Lonesome Island Road
Project Development & Environment Study

FPID No. 414506-5-22-01
Highlands County, FL

N W E S

500 250 0 500

Feet

Figure 2F

Page 6 of 7

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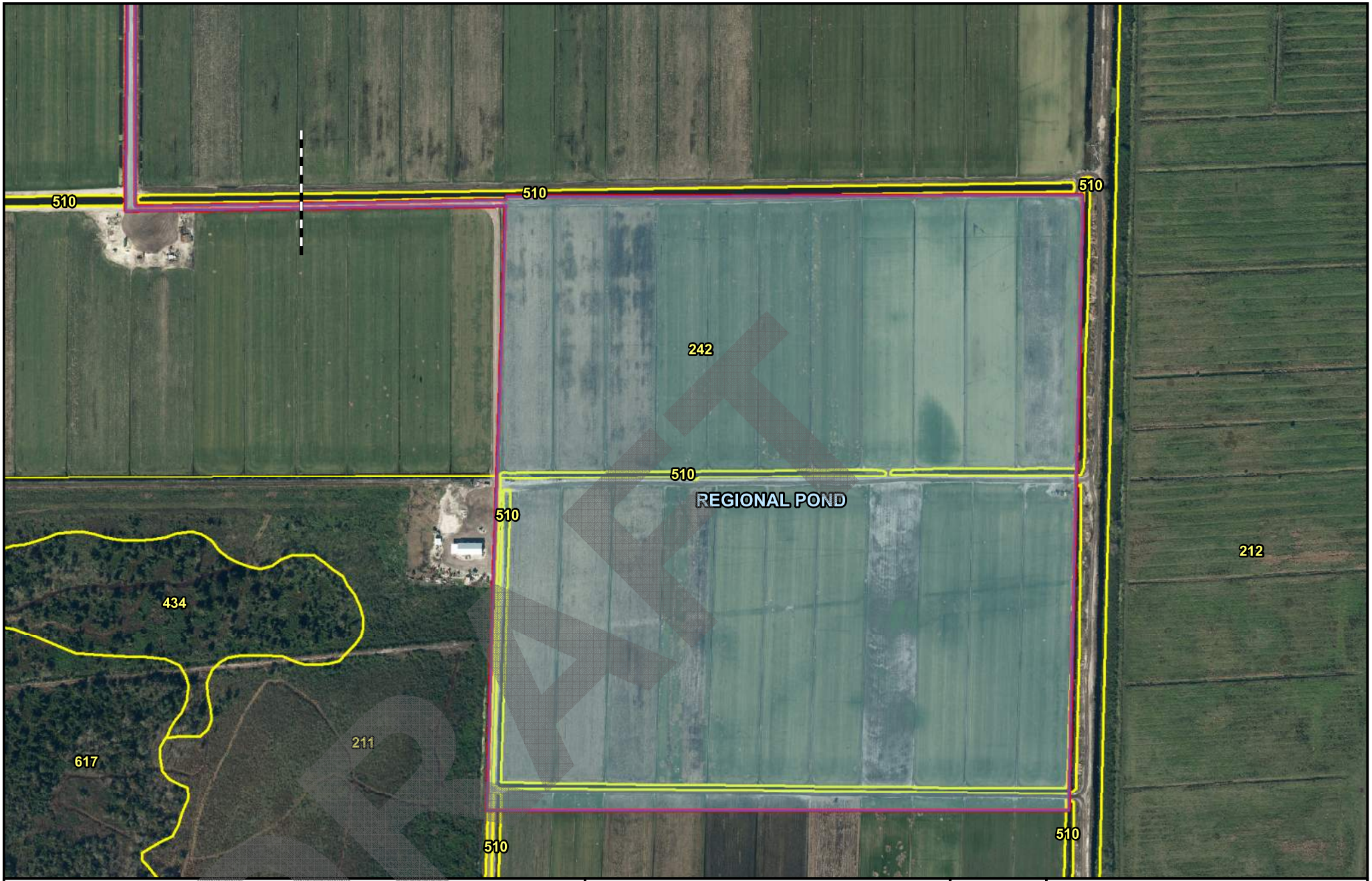

Project Study Area

Proposed Pond

211: Improved Pastures

212: Unimproved Pastures

242: Sod Farms

434: Upland Mixed Coniferous / Hardwood

510: Streams and Waterways

617: Mixed Wetland Hardwoods

Land Use Map

SR 70 from CR 29 to Lonesome Island Road
Project Development & Environment Study

FPID No. 414506-5-22-01
Highlands County, FL

N W E S

500 250 0 500

Feet

Figure 2G

Page 7 of 7

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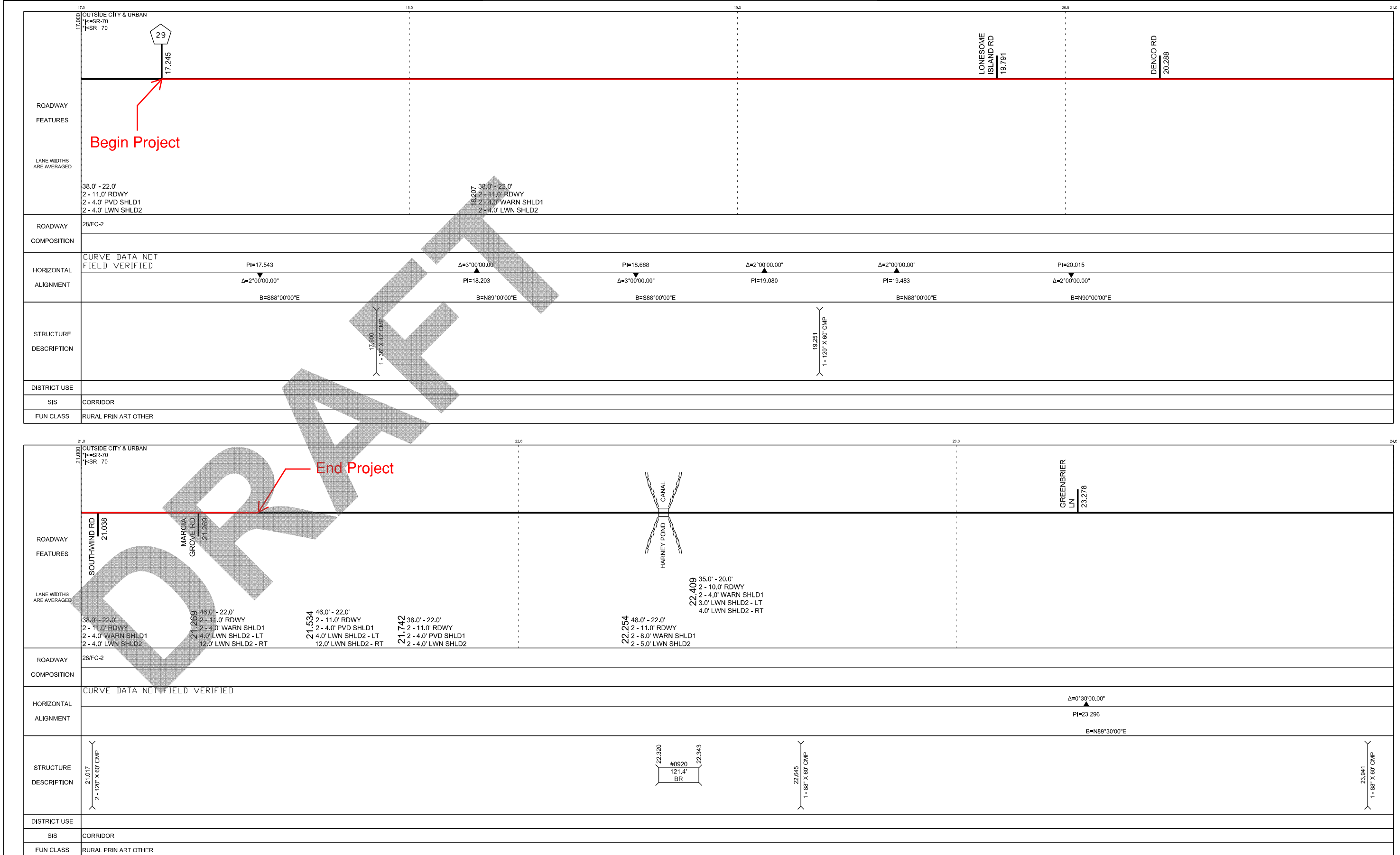
Figure 3

	5 YR INV	SLD REV	BMP	EMP	INV	SLD REV
DATE	07/11/2019	08/13/2019	17.245	21.639	01/06/2022	1/12/22-414506-6
BY	FTE	FTE	0.000	36.334		1/12/22(F241)

FLORIDA DEPARTMENT OF TRANSPORTATION

STRAIGHT LINE DIAGRAM OF ROAD INVENTORY

SECTION STATUS	INT. or US ROUTE NO.	STATE ROAD NO.	COUNTY	DISTRICT	ROADWAY ID	SHEET NO:
02		SR 70	HIGHLANDS	01	09060000	4 OF 7



Version: 1.4.2.27 08/13/2019

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation information presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations (BFEs) shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

Base map information shown on this FIRM was provided in digitial format by the Southwest Florida Water Management District. The original orthophotographic base imagery was provided in color with a on-foot pixel resolution at a scale of 1" = 200' from photography flown January - February 2008.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

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DATUM INFORMATION

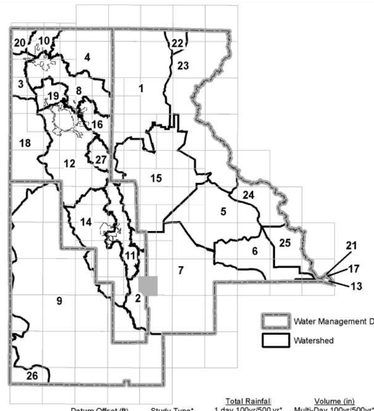
The **projection** used in the preparation of this map was State Plane Florida East. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane Zone used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Base Flood Elevations (BFEs)on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3242

Example Datum Offset Calculation
using datum offset table below
NAVD88 = NGVD29 + (datum offset value)

To obtain current elevation, description, and/or location information for **benchmarks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242** or visit its website at http://www.ngs.noaa.gov/



ID	Watershed	Datum Offset (ft)	Study Type*	Total Rainfall 1-day 100yr/500yr**	Volume (ac) Multi-Day 100yr/500yr*	Date of Model*
1	Arbuckle Creek	-1.13				
2	Bay Swamp	-1.13				
3	Bay Branch	-1.13				
4	Bonnet Creek	-1.13				
5	C-41 AN	-1.13				
6	C-41 AS	-1.13				
7	C-41 N	-1.13				
8	Carter Creek	-1.13				
9	Fisheating Creek	-1.13				
10	Grassy Creek (north)	-1.13				
11	Grassy Creek (central)	-1.13				
12	Josephine Creek	-1.13				
13	L-59E	-1.13				
14	Lake Francis Outlet	-1.13				
15	Lake Istokpoga	-1.13				
16	Lake Lucas	-1.13				
17	Lake Okeechobee	-1.13				
18	Little Charley Bowlegs	-1.13				
19	Little Red Water Lake	-1.13				
20	Old Town Creek	-1.13				
21	S-154C	-1.13				
22	S-65A	-1.13				
23	S-65BC	-1.13				
24	S-65D	-1.13				
25	S-65E	-1.13				
26	Shell Creek	-1.13				
27	Yellow Bluff Creek	-1.13				

* Multiple study types, rainfall volumes, and/or model dates found within specific watersheds; refer to the Flood Insurance Study (FIS) for details.

This digital Flood Insurance Rate Map (FIRM) was produced through a cooperative partnership between the Southwest Florida Water Management District (SWFWMD), South Florida Water Management District (SFWMD), Highlands County, Federal Emergency Management Agency (FEMA) and the associated communities within Highlands County.

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot; and areas protected by levees from 1% annual chance flood. See additional note in Watershed Table on left collar[1]

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 — 23	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
$^{4}275^{000m}$E	1000-meter Universal Transverse Mercator grid ticks, Zone 17 W
6000000 FT	5000-foot grid values: Florida State Plane coordinate system, East zone (FIPSZONE 0901), Transverse Mercator projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile
222218	Section - Township - Range
7NX1000 ♦	Junction - Points defining locations of flow accumulation or hydraulic connectivity. The first two characters of the Junction name represents the specific watershed (as shown in the map collar locator map) in which the Junction is located (note that boundary Junctions, without an associated floodplain, are also shown).
	Watershed Boundaries

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
November 18, 2015

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0533C

FIRM
FLOOD INSURANCE RATE MAP
HIGHLANDS COUNTY, FLORIDA AND INCORPORATED AREAS

PANEL 533 OF 710
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HIGHLANDS COUNTY	120111	0533	C

Figure 4A: FEMA Map

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
12055C0533C
EFFECTIVE DATE
NOVEMBER 18, 2015

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation information presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations (BFEs) shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

Base map information shown on this **FIRM** was provided in digital format by the Southwest Florida Water Management District. The original orthophotographic base imagery was provided in color with a on-foot pixel resolution at a scale of 1" = 200' from photography flown January - February 2008.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to those new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

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DATUM INFORMATION

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Base Flood Elevations (BFEs)on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

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Silver Spring, Maryland 20910
(301) 713-3242

Example Datum Offset Calculation
using datum offset table below
NAVD88 = NGVD29 + (datum offset value)

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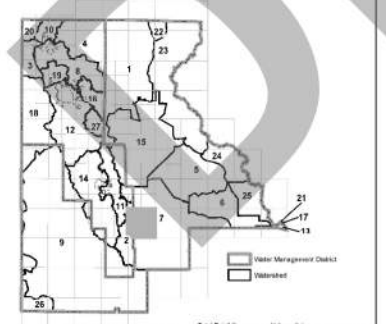

ID	Watershed	Datum Offset (ft)	Study Type*	Total Rainfall 1-day, 100yr/600 in*	Volume (cf) Multi-Day, 100yr/600yr*	Date of Model*
1	Arbuckle Creek	-1.13				
2	Bay Swamp	-1.13				
3	Bee Branch	-1.13				
4	Bills Branch	-1.13				
5	C-41 AS	-1.13				
6	C-41 AS	-1.13				
7	C-41 N	-1.13				
8	Carlton Creek	-1.13				
9	Fahkahatchee Creek	-1.13				
10	Grassy Creek (North)	-1.13				
11	Grassy Creek (Southeast)	-1.13				
12	Josephine Creek	-1.13				
13	L-28E	-1.13				
14	Lake Francis Outlet	-1.13				
15	Lake Istokpoga	-1.13				
16	Lake Lucie	-1.13				
17	Little Charley Bowlegs Inflow	-1.13				
18	Little Charley Bowlegs	-1.13				
19	Little Red Water Lake	-1.13				
20	Old Town Creek	-1.13				
21	S-154C	-1.13				
22	S-154D	-1.13				
23	S-65AS	-1.13				
24	S-65D	-1.13				
25	S-65E	-1.13				
26	Shell Creek	-1.13				
27	Yellow Bluff Creek	-1.13				

* Multiple study types, rainfall volumes, and/or model dates found within specific watersheds; refer to the Flood Insurance Study (FIS) for details.

This digital Flood Insurance Rate Map (FIRM) was produced through a cooperative partnership between the Southwest Florida Water Management District (SWFWMD), South Florida Water Management District (SFWMD), Highlands County, Federal Emergency Management Agency (FEMA) and the associated communities within Highlands County.

THIS AREA SHOWN AT A
SCALE OF 1" = 500'
ON MAP NUMBER
12055C0531

THIS AREA SHOWN AT A
SCALE OF 1" = 500'
ON MAP NUMBER
12055C0533

555000 FT 560000 FT 565000 FT 570000 FT
81° 18' 45" 81° 15' 00"
27° 16' 00"
1060000 FT
1055000 FT
1050000 FT
1045000 FT
1040000 FT
27° 11' 15"
JOINS PANEL 0393
JOINS PANEL 0394
JOINS PANEL 0527
JOINS PANEL 0529
JOINS PANEL 0545
JOINS PANEL 0555
Highlands County
Unincorporated Areas
120111
C-41N
Watershed
ZONE A
203731
293731
323731
053831
083831
$^{32}14^{000}$mN
$^{31}13^{000}$mN
$^{30}12^{000}$mN
$^{30}11^{000}$mN
$^{30}10^{000}$mN
$^{30}09^{000}$mN
$^{30}08^{000}$mN
$^{470}000$mE
$^{471}000$mE
$^{472}000$mE
$^{473}000$mE
$^{474}000$mE
$^{475}000$mE

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot; and areas protected by levees from 1% annual chance flood. See additional note in Watershed Table on left side*

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
513 — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*
* Referenced to the North American Vertical Datum of 1988
(A)—(A) Cross section line
(23)—(23) Transect line
97°07'30", 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
^{4}76^{000}mE 1000-meter Universal Transverse Mercator grid ticks, Zone 17 W
6000000 FT 5000-foot grid values: Florida State Plane coordinate system, East zone (FIPSZONE 0901), Transverse Mercator projection
DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 River Mile
222218 Section - Township - Range
7NX1000 Junction - Points defining locations of flow accumulation or hydraulic connectivity. The first two characters of the Junction name represents the specific watershed (as shown in the map collar locator map) in which the Junction is located (note that boundary Junctions, without an associated floodplain, are also shown).
Watershed Boundaries

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
November 18, 2015

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0535C

FIRM

FLOOD INSURANCE RATE MAP
HIGHLANDS COUNTY, FLORIDA
AND INCORPORATED AREAS

PANEL 535 OF 710
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HIGHLANDS COUNTY	120111	0535	C

Figure 4B: FEMA Map

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MAP NUMBER
12055C0535C
EFFECTIVE DATE
NOVEMBER 18, 2015

Federal Emergency Management Agency

NOTES TO USERS

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DATUM INFORMATION

The **projection** used in the preparation of this map was State Plane Florida East. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane Zone used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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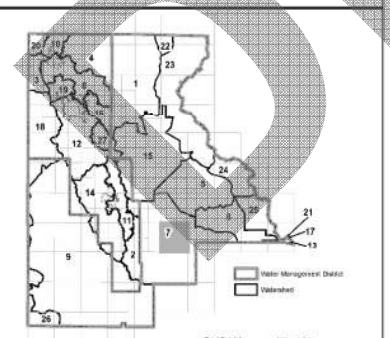
National Geodetic Survey, NOAA
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3242

Example Datum Offset Calculation
using datum offset table below
NAVD88 = NGVD29 + (datum offset value)

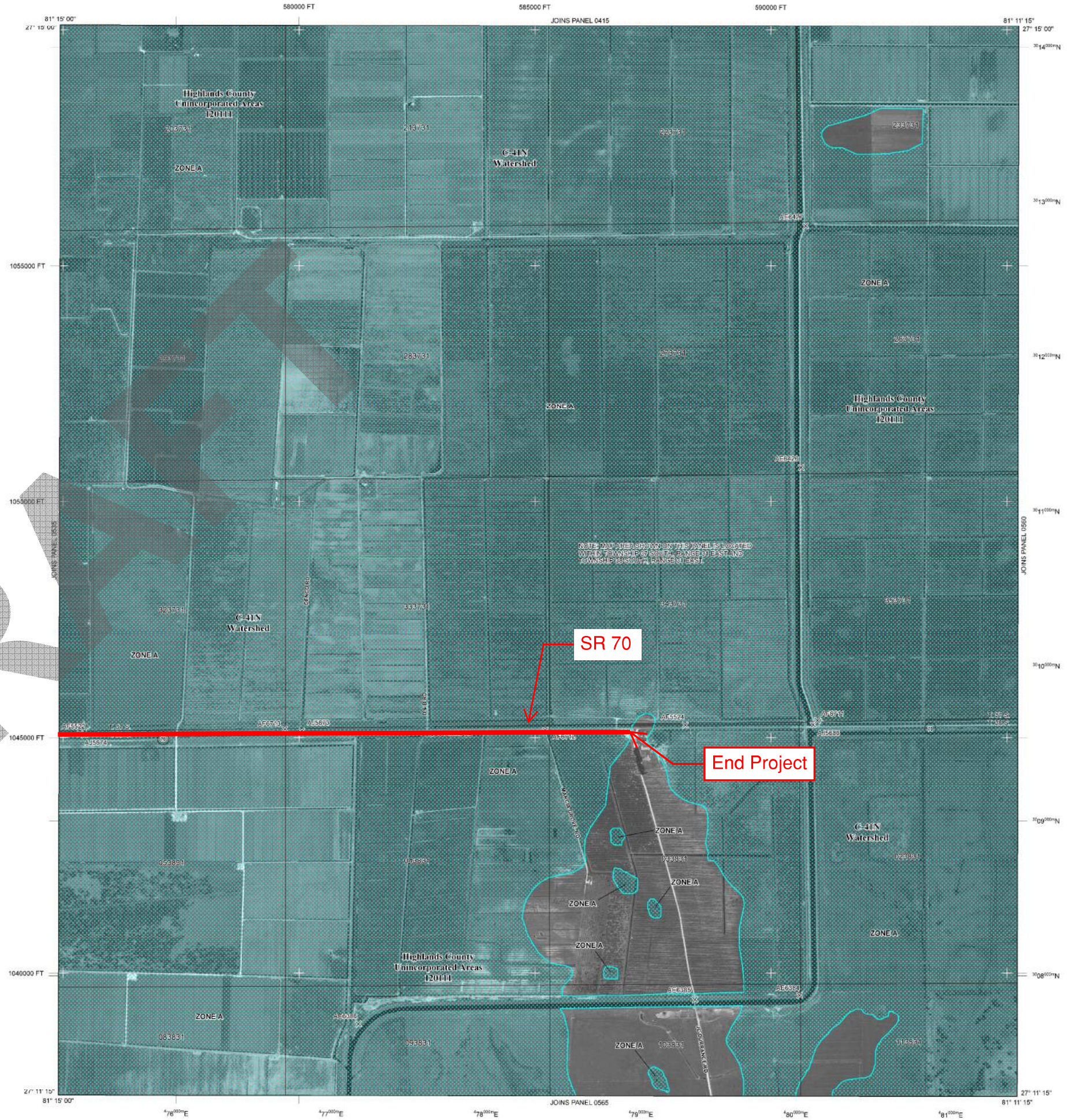
To obtain current elevation, description, and/or location information for **benchmarks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242** or visit its website at http://www.ngs.noaa.gov/.



ID	Watershed	Datum Offset (ft)	Study Type*	Total Rainfall 1-day 100yr/500 yr*	Volume (cy) Multi-Day 100yr/500yr*	Date of Model*
1	Arbuckle Creek	-1.13				
2	Bay Swamp	-1.13				
3	Bee Branch	-1.13				
4	C-41 Canal	-1.13				
5	C-41 Alt.	-1.13				
6	C-41 NS	-1.13				
7	C-41 N	-1.13				
8	Cartel Creek	-1.13				
9	Fisheating Creek	-1.13				
10	Grassy Creek (north)	-1.13				
11	Grassy Creek (central)	-1.13				
12	Josephine Creek	-1.13				
13	L-56D	-1.13				
14	Lake Francis Outlet	-1.13				
15	Lake Istokpoga	-1.13				
16	Lake Lucien	-1.13				
17	Lake Okeechobee	-1.13				
18	Little Red Water Bodega	-1.13				
19	Little Red Water Lake	-1.13				
20	Old Town Creek	-1.13				
21	S-154C	-1.13				
22	S-65A	-1.13				
23	S-65AC	-1.13				
24	S-65E	-1.13				
25	S-65EC	-1.13				
26	Shell Creek	-1.13				
27	Yellow Bluff Creek	-1.13				

*Multiple study types, rainfall volumes, and/or model dates found within specific watersheds; refer to the Flood Insurance Study (FIS) for details.

This digital Flood Insurance Rate Map (FIRM) was produced through a cooperative partnership between the Southwest Florida Water Management District (SWFWMD), South Florida Water Management District (SFWMD), Highlands County, Federal Emergency Management Agency (FEMA) and the associated communities within Highlands County.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot; and areas protected by levees from 1% annual chance flood. See additional note in Watershed Table on left collar[1]

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- (A)–(A) — Cross section line
- (23)–(23) — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 4775000mE — 1000-meter Universal Transverse Mercator grid ticks, Zone 17 W
- 6000000 FT — 5000-foot grid values: Florida State Plane coordinate system, East zone (FIPSZONE 0901), Transverse Mercator projection
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile
- 222218 — Section - Township - Range
- 7NX1000 — Junction - Points defining locations of flow accumulation or hydraulic connectivity. The first two characters of the Junction name represents the specific watershed (as shown in the map collar locator map) in which the Junction is located (note that boundary Junctions, without an associated floodplain, are also shown).
- Watershed Boundaries

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
November 18, 2015

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0555C

FIRM

FLOOD INSURANCE RATE MAP
HIGHLANDS COUNTY, FLORIDA
AND INCORPORATED AREAS

PANEL 555 OF 710
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HIGHLANDS COUNTY	120111	0555	C

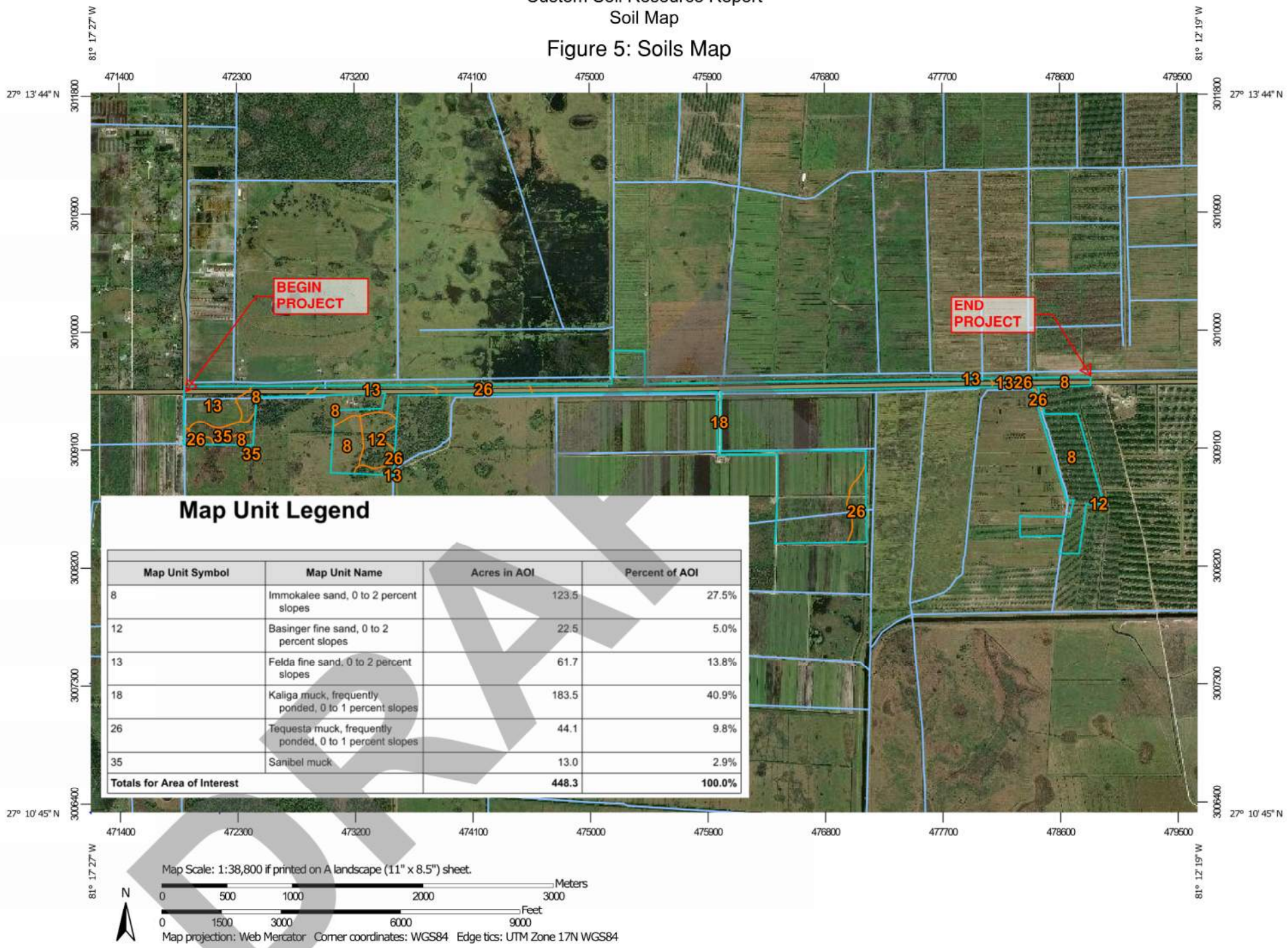
Figure 4C:
FEMA Map

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
12055C0555C
EFFECTIVE DATE
NOVEMBER 18, 2015

Federal Emergency Management Agency

Figure 5: Soils Map



Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Immokalee sand, 0 to 2 percent slopes	123.5	27.5%
12	Basinger fine sand, 0 to 2 percent slopes	22.5	5.0%
13	Felda fine sand, 0 to 2 percent slopes	61.7	13.8%
18	Kaliga muck, frequently ponded, 0 to 1 percent slopes	183.5	40.9%
26	Tequesta muck, frequently ponded, 0 to 1 percent slopes	44.1	9.8%
35	Sanibel muck	13.0	2.9%
Totals for Area of Interest		**448.3**	**100.0%**

Map Scale: 1:38,800 if printed on A landscape (11" x 8.5") sheet.

N

0 500 1000 2000 3000 Meters

0 1500 3000 6000 9000 Feet

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

Figure 6: Pond Sites & Parcels

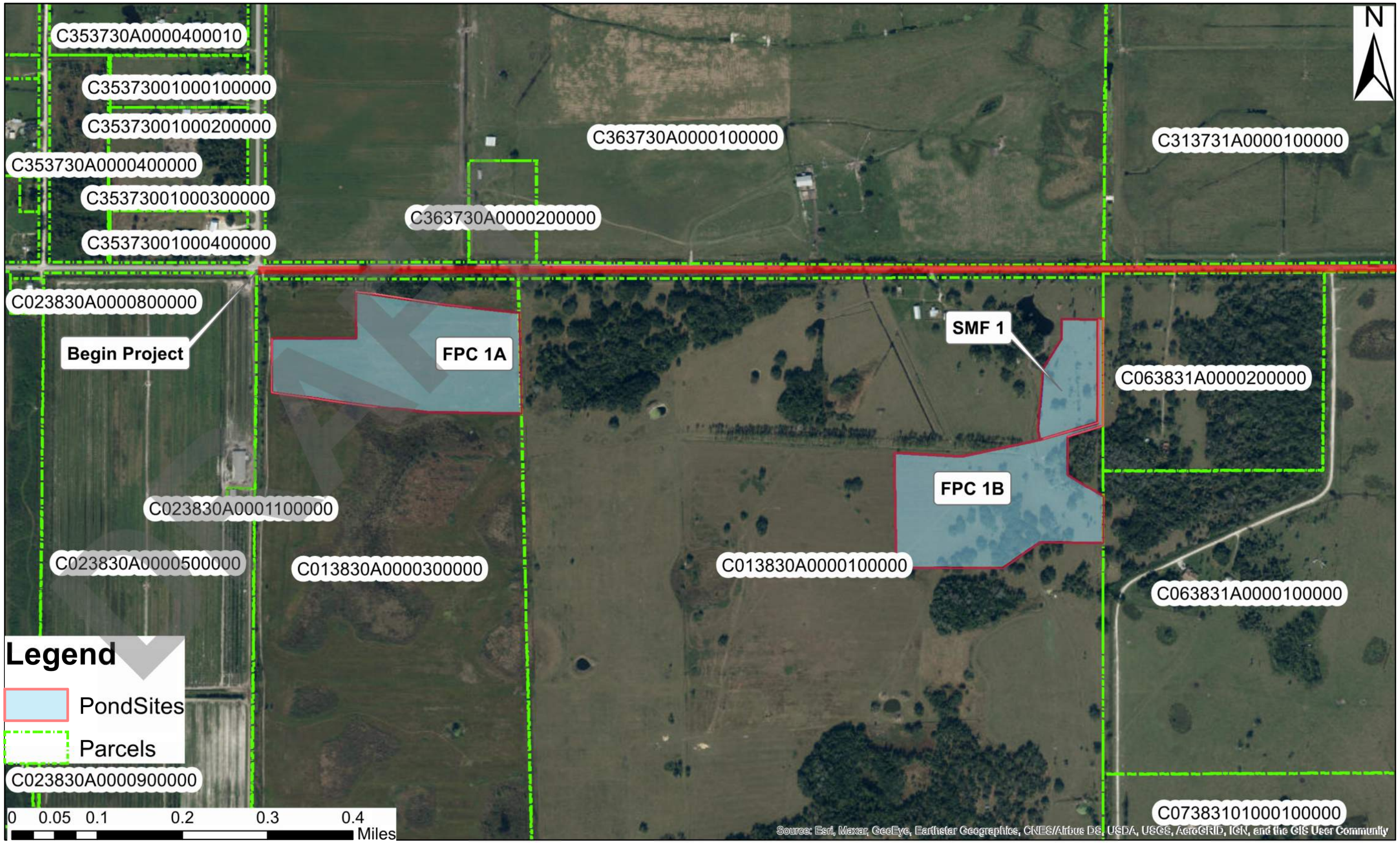


Figure 7: Pond Sites & Parcels

Figure 8: Pond Sites & Parcels

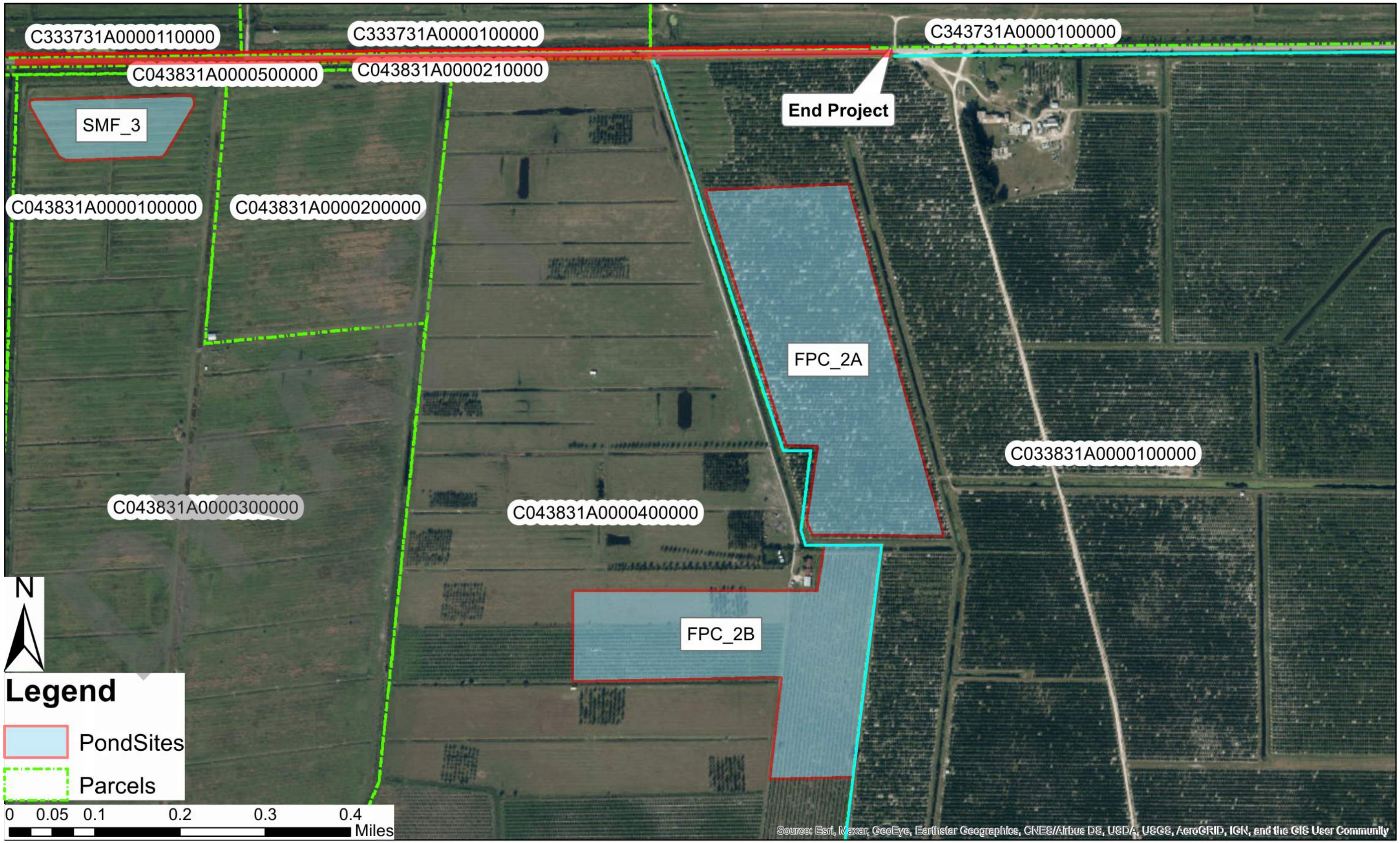
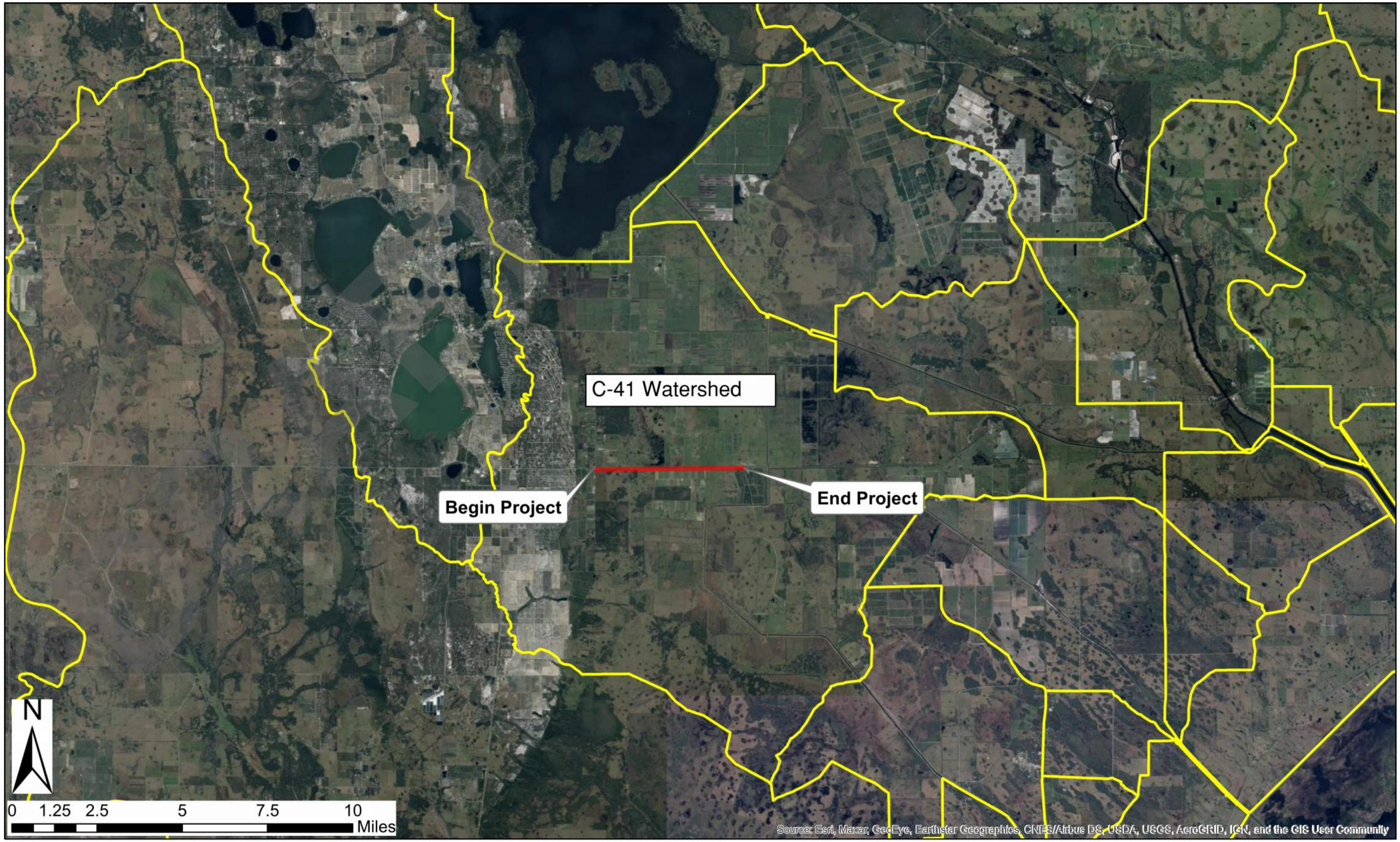
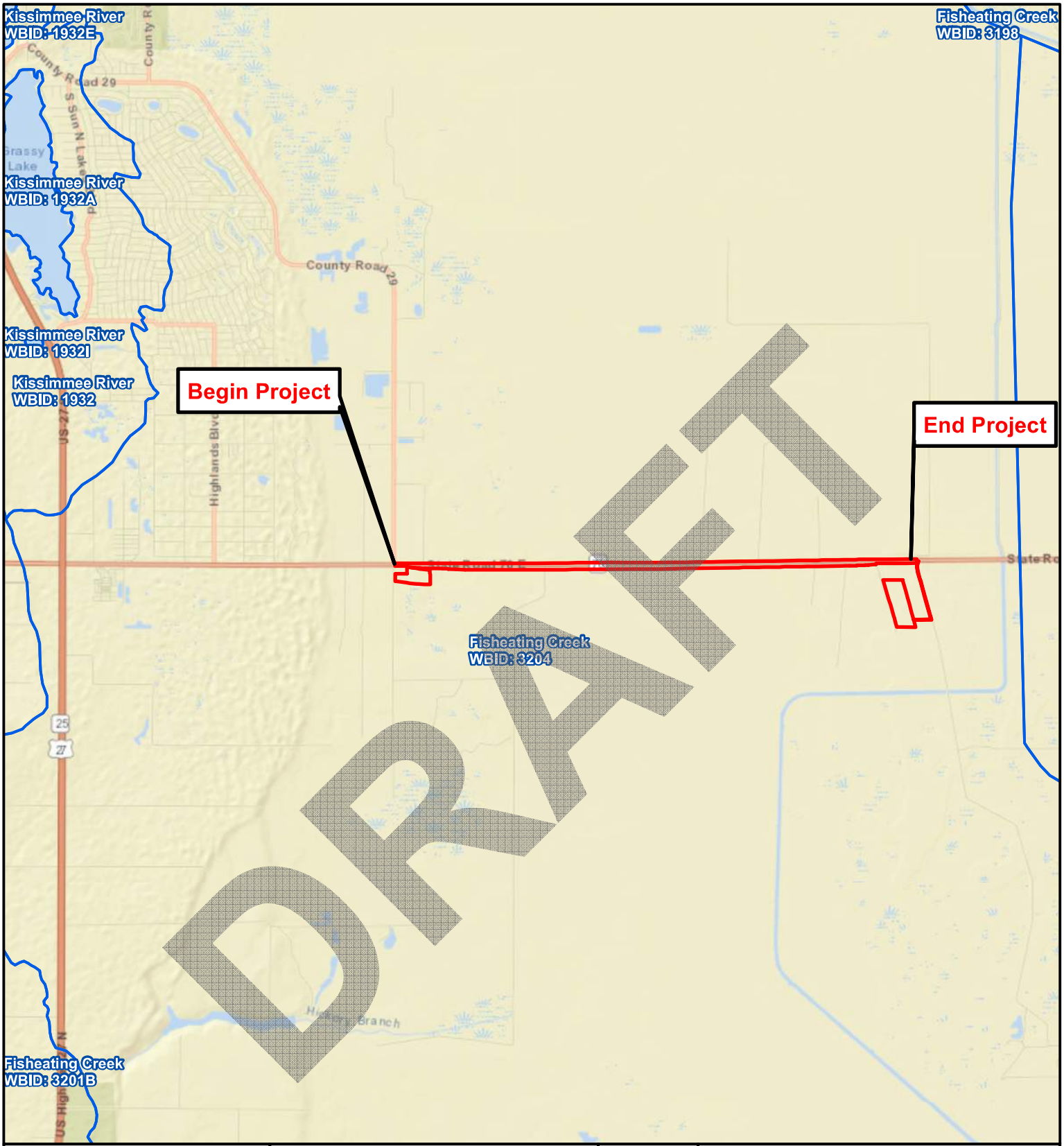


Figure 9: C-41 Watershed





Highlands County

Legend

- Project Study Area
- WBID Boundary

N W E S

6,000 3,000 0 6,000

Feet

WBID Map

SR 70 from CR 29 to Lonesome Island Road
Project Development and Environment Study
Highlands County, Florida
FPID No. 414506-5-22-01

Kisinger Campo & Associates, Corp.
201 N. Franklin Street, Suite 400
Tampa, FL 33602
Phone: 813/871-5331

Figure 10

Path: C:\Users\abesenerchia\GIS Projects - W\414506522201 SR70 - CR29 to Lonesome\NonSubmittal Design\GIS\Maps\Figures\SR 70 - 29 to Lonesome - Figure 1 WBID Map.mxd 1/9/2023

APPENDIX B

CORRESPONDENCE

SFWMD Pre-Application Meeting Notes (1/10/2019)

Florida Department of Transportation

RON DESANTIS
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

KEVIN J. THIBAULT
SECRETARY

FDOT 414506-6 SR70 From CR29 to Lonesome Island Rd Meeting (Highlands County)
Go-To Meeting
January 10, 2019
1:00 pm – 1:30 pm

Meeting Minutes

Attendees:

Carolyn McCreedy, SFWMD
Nicole Monies, FDOT
Randy Lachler, FDOT
Patrick Bateman, FDOT
Brent Setchell, FDOT
Sergio Figueroa, FDOT
Manny Monreal, FDOT

44506-6 SR70 Realignment

Nicole opened the meeting with introductions and then she described the project. Brent added the history of the project and Sergio mentioned that this project is a FDOT SWAT job.

FDOT is evaluating options for realigning SR 70 within the project limits by reconstructing the two existing travel lanes on a new alignment south of the existing SR 70, with the option to expand to a 4-lane ultimate typical in the future. The total length of the proposed project is approximately 4.3 miles.

Discussion:

1. SFWMD stated north side of SR70 is a wetland restoration site
2. SFWMD stated south side of SR70 are permitted grove facilities
   a) Verify permitted conditions and maintain control elevations
   b) Verify locations of agricultural wells
3. SFWMD emphasized the importance of establishing an accurate SHW elevation
4. SFWMD emphasized the need for a reciprocal outfall if discharging to agricultural canal
   a) Agricultural canal located adjacent to SR 70 on the south side will be relocated south
   b) Agricultural canal will be owned and maintained by others
   c) Agricultural canal may serve as an outfall for FDOT

Discussion Cont.:

5. SFWMD offered that it might be best to apply for a 20-year conceptual permit if FDOT only plans to construct the interim 2-lanes, but permit the ultimate 4-lanes.
6. FDOT indicated it will maintain/replace the 3 existing cross drains. Currently, these cross drains act as equalizers rather than moving water from one side to the other. FDOT will ensure they are sized appropriately.
7. Proposed Treatment Method Criteria:
   a) Wet Detention: greater of 1" over basin or 2.5" over net new impervious
   b) Dry Retention: 50% reduction (for dry retention, ensure facilities recover)
   c) Nutrient Loading Calcs for discharges to impaired WBID (Harney Pond Canal, C-41)
   d) SFWMD to verify the 50% more treatment criteria due to discharges to impaired WBID
8. Proposed Attenuation Criteria:
   a) Design Storm Events: 25 year 72 hour, 100 year 72 hour
   b) C-41 Basin Requirement: 35.4 CSM (cfs per Sq. Mile), 10 year 72 hour
9. Proposed Floodplain Compensation:
   a) SFWMD emphasized no offsite impacts
   b) SFWMD will allow Cup for Cup Method or Modeling Methodology
   c) Hydrologic/Hydraulic Modeling (ICPR4): SFWMD emphasized no pre/post stage increases, and requested that model information represent construction documents and that a schematic be provided

21-2-3 SR70-CR29 to Lonesome

Progress Meeting 9 Notes and Agenda

MEETING NOTES
Progress Meeting #9
SR 70 from CR 29 to Lonesome Island Road
Project Development & Environment Study
Financial Project No.: 414506-5-22-01
FDOT Contract: C9Z95
KCA Project No. 6201708.00

February 3, 2021 – 3:00 to 3:30 pm via Microsoft Teams

Attendees:

Jennifer Marshall – FDOT
OJ Oujevolk – FDOT
Gwen G. Pipkin – FDOT
Lauren Peters – FDOT
Martin Horwitz - KCA
Michael Campo – KCA
Alejandro Mendez – KCA
John Sutton – KCA

Engineering Tasks

- Discussed the Typical Section and Design Criteria Table.
  - KCA will finalize design criteria table and submit with alignment KMZ (can include potential pond sites in KMZ file)
- KCA is revising floodplain model report and plans to submit to FDOT by Feb. 10, 2021.
- KCA working on PSR for submittal March 1, 2021 and PHD completing draft LHR for submittal on 4/6/2021.

Environmental Tasks

- Discussed draft responses to USFWS comments on NRE.
  - Need to complete engineering to support Pond sites and select preferred pond sites in order to finalize habitat impact tables for NRE responses and mitigation totals.
  - Lauren will review draft responses and when finalized submit to OEM for approval prior to responding to USFWS.
  - Following OEM approval of responses, KCA to prepare a NRE Addendum to document revisions.

Schedule and Public Involvement

- Discussed the remaining project tasks starting up again in June 2021 and a tentative public hearing in Oct. 2021.
- Due to planning consistency, KCA to wait for update from Jennifer Marshall on planning consistency to determine if the tentative public hearing date needs to be at a later date than Oct. 2021 along with restarting rest of tasks in June 2021.
  - Will also have to factor in other D1 project public hearings when determining date.

Action Items

- Martin to forward email regarding Floodplain Model Rpt. ERC responses being accepted by FDOT Drainage – Completed 2/3/2021

- Martin to send FDOT Drainage email with revised Regional Pond and FPC sites to obtain approval of changes. – Completed 2/4/2021
- KCA to complete Design Criteria Table and submit with alignment KMZ file.
- KCA to complete draft PSR and PHD to complete draft LHR.
- Complete engineering support to identify preferred pond sites to then calculate Indigo Snake and FBB habitat impacts.
- DEMO to review draft NRE responses to USFWS and submit to OEM. – Completed 2/4/2021, Lauren Peters submitted to OEM
- OEM Coordination/Approval on NRE responses to USFWS.
- FDOT to coordinate with KCA on planning consistency and project schedule for public hearing.

Attachments: Meeting Agenda

AGENDA

SR 70 FROM CR 29 TO LONESOME ISLAND ROAD
HIGHLANDS COUNTY
PROJECT DEVELOPMENT & ENVIRONMENT STUDY
FINANCIAL PROJECT NO.: 414506-5-22-01
FDOT CONTRACT: C9Z95
KCA PROJECT NO. 6201708.00

PROGRESS MEETING #09
FEBRUARY 3, 2021
VIA MICROSOFT TEAMS

---

1. **Updates / Ongoing Tasks**
    a. Engineering Tasks
        i. PD&E Roadway:
            1. Typical Section Package:
                a. Draft typical section submitted 10/8/2020 addressing comments received from DEMO.
                b. Drafted Design Criteria Table for project.
                c. Additional on comments Typical Section?

                Note: Typical section and alignment include an interim alternative for two (2) lanes and ultimate four (4) lanes to the south of existing roadway.
            2. No other ongoing Roadway tasks.

        ii. PD&E Drainage:
            1. Revisions to Regional Pond and FPC 2A & FPC 2B as a result of meeting with DEMO on 12/21/2020 and floodplain model results.
            2. Floodplain Model Report:
                a. KCA continues to revise Floodplain Model Report to address ERC comments.
                b. Anticipate resubmitting Floodplain Model Report on Feb. 10, 2021.

3. Pond Siting Report (PSR):
    a. Working on draft PSR for submittal by 3/1/2021.
    b. Cultural Resources and Contamination preliminary pond site analysis to be complete by 2/12/2021.
4. Location and Hydraulics Report: Pevida Highway Designers (PHD) working on LHR for submittal by 4/6/2021.

b. Environmental Tasks
    i. NRE Report & Formal Consultation:
        1. OEM Submitted NRE to USFWS on 10/22/2020 with request to initiate Formal Section 7 Consultation for Eastern Indigo Snake and Florida Bonneted Bat (FBB).
            a. On Dec. 3rd, 8th , and 9th, 2020, USFWS sent comments to FDOT.
            b. KCA prepared draft responses.
                i. Need to verify acreages and identify preferred pond sites.
            c. Future Estimated Mitigation for Eastern Indigo Snake via FDOT's Platt Branch Mitigation Bank = **3.00 credits**
            d. Future mitigation for FBB via monetary contribution of **$25,000**?
                i. Similar to Caracara Fund. $25,000 - $100,000
        2. All other environmental tasks are on hold until **June 2021**.

c. Project Schedule
    i. Updated project schedule submitted on 1/7/2021.
        1. Comments?
    ii. Remaining Project Tasks Restart in **June 2021**.

1. Public Hearing tentatively scheduled for **10/14/2021**.

d. Public Involvement

i. Newsletter #2 – start preparing newsletter in June 2021

ii. Discuss Public Hearing date associated with schedule.

(Note: Project does not include an Alternatives Public Information Meeting)

2. Future Tasks

a. KCA Finalize Typical Section(s) & Alternative Alignment(s) and obtain FDOT approvals

b. KCA to Finalize Floodplain Model.

c. KCA to Complete Draft Pond Siting Report

d. PHD to Complete LHR

e. KCA to Complete response to USFWS comments

f. FDOT to complete project planning consistency

3. Action Items

a.

b.

c.

Email Correspondence

John Sutton

From: John Sutton
Sent: Thursday, January 28, 2021 8:15 AM
To: Curt Sprunger
Subject: RE: 414506-6, SR 70 from CR 29 to Lonesome Island Road - Water Quality Treatment Requirements

Sure thing.

John Sutton
Stormwater Engineer
Email: JSutton@kcaeng.com
201 N Franklin St., Suite 400, Tampa, FL 33602

From: Curt Sprunger <CSprunger@kcaeng.com>
Sent: Thursday, January 28, 2021 8:14 AM
To: John Sutton <JSutton@kcaeng.com>
Subject: FW: 414506-6, SR 70 from CR 29 to Lonesome Island Road - Water Quality Treatment Requirements

Can you make sure this email makes it into our correspondence appendix for the Lonesome PSR?
Thanks

Curt Sprunger, PE
Stormwater Department Manager
Email: CSprunger@kcaeng.com
Work: 813.871.5331
Cell: 727.424.1667
201 N. Franklin St., Suite 400, Tampa, FL 33602

From: Priest, Gary <gpriest@sfwmd.gov>
Sent: Friday, November 20, 2020 8:43 AM
To: Setchell, Brent <Brent.Setchell@dot.state.fl.us>; McCreedy, Carolyn <cmccreed@sfwmd.gov>
Cc: Monies, Nicole <nicole.monies@dot.state.fl.us>; Figueroa, Sergio <Sergio.Figueroa2@dot.state.fl.us>; Brett French <BFrench@kcaeng.com>; Martin Horwitz <MHorwitz@kcaeng.com>; Curt Sprunger <CSprunger@kcaeng.com>
Subject: Re: 414506-6, SR 70 from CR 29 to Lonesome Island Road - Water Quality Treatment Requirements

Brent,

It is confirmed that FDOT is to provide the presumptive criteria, plus nutrient loading calculations demonstrating net improvement and the additional 50% of the required treatment volume is not needed for the subject project.

As to the regional treatment alternative, more discussions on this topic are warranted with additional information necessary for the District to understand the alternative.

Sincerely,
Gary R. Priest, P.E.
Section Leader
Okeechobee Regulatory Office
South Florida Water Management District
(863) 462-5260, Ext. 3016
Email: gpriest@sfwmd.gov

From: Setchell, Brent <Brent.Setchell@dot.state.fl.us>
Sent: Thursday, November 5, 2020 12:41 PM
To: Priest, Gary; McCreedy, Carolyn
Cc: Monies, Nicole; Figueroa, Sergio; Brett French; Martin Horwitz; Curt Sprunger
Subject: RE: 414506-6, SR 70 from CR 29 to Lonesome Island Road - Water Quality Treatment Requirements

[Please remember, this is an external email]

Gary and Carolyn,
I wanted to follow up on the inquiry below. I don't believe we received a response.

Thanks,

Brent Setchell, P.E.
District Drainage Design Engineer
Florida Department of Transportation
801 N. Broadway Avenue
Bartow, Florida 33830
863-519-2557

From: Setchell, Brent
Sent: Tuesday, February 25, 2020 9:12 AM
To: Priest, Gary <gpriest@sfwmd.gov>; McCreedy, Carolyn <cmccreed@sfwmd.gov>
Cc: Monies, Nicole <Nicole.Monies@dot.state.fl.us>; Figueroa, Sergio <Sergio.Figueroa2@dot.state.fl.us>; Brett French <BFrench@kcaeng.com>; Martin Horwitz <MHorwitz@kcaeng.com>; Curt Sprunger <CSprunger@kcaeng.com>
Subject: 414506-6, SR 70 from CR 29 to Lonesome Island Road - Water Quality Treatment Requirements

Gary and Carolyn,
I wanted to follow up on the stormwater quality treatment requirements for the subject project that we had a pre-application meeting back in January 2019. Please see attached minutes for reference. We are moving along with our pond siting report efforts and we need to narrow down the treatment volume requirements. At the meeting SFWMD requested that FDOT provide an additional 50% of the required treatment volume (TV) since the project discharges to a nutrient impaired water body. I believe this request stems from an old SFWMD "Bob Brown" 2009 memo which has subsequently move into Appendix E of SFWMD's Applicant's Handbook Volume II. Back in 2010 after the 2009 Bob

Brown memo, FDOT District 1 provided the attached "SFWMD Memorandum Final 2010-8-2" requesting clarification on several items, specifically the requirement to provide the additional 50% water quality treatment volume for projects with direct discharges to verified impaired waters. Attached is an email from SFWMD's Assistant Executive Director, Lennart Lindahl, on April 26, 2013 agreeing to not require the additional 50% of the water quality volume for discharges to nutrient impaired WBIDs.

The additional 50% requirement is an extraneous hardship on FDOT especially for road widening projects where we are limited by the existing roadway elevation and the SHWE to provide the required treatment volume. Our only alternative is to buy more ROW for stormwater ponds which can be extremely costly especially in urban areas, potentially impact additional wetlands/floodplains, remove property from County tax rolls, and increase maintenance costs all for very little calculated benefit.

For clarification, FDOT will provide nutrient loading calculations demonstrating net improvement which should easily provide SFWMD the evidence it needs that the project will meet antidegradation criteria and meet the public interest test. Additionally, we are considering a regional treatment alternative which will offer substantial nutrient reductions over the traditional postage ponds. Please confirm that SFWMD is agreeable to allow FDOT to provide the presumptive criteria, plus nutrient loading calculations demonstrating net improvement and the additional 50% of the required TV is not needed for the subject project.

Thanks,

Brent Setchell, P.E.
District Drainage Design Engineer
Florida Department of Transportation
801 N. Broadway Avenue
Bartow, Florida 33830
863-519-2557

APPENDIX C

POND CALCULATIONS

Pond Size Estimates

PROJECT NAME:	SR 70 (PD&E Highlands County)	**KISINGER CAMPO & ASSOCIATES**
BASIN / SMF DESIGNATION:	Basin 1 Linear (Dry Retention)	

PRE-DEVELOPED: BASIN 1 RUNOFF CURVE NUMBER WORKSHEET

LAND-USE DESCRIPTION	SOIL GROUP	CN	AREA (ac)	PRODUCT
Onsite Pervious (fair condition)	D, A/D, B/D	77	23.55	1813.72
Impervious (Asphalt)		98	3.47	340.06
		TOTALS	27.02	2153.78

COMPOSITE CN =	79.7

POST-DEVELOPED: BASIN 1 RUNOFF CURVE NUMBER WORKSHEET

LAND-USE DESCRIPTION	SOIL GROUP	CN	AREA (ac)	PRODUCT
Open space (fair condition)	D, A/D, B/D	77	17.23	1327.08
Impervious (Asphalt)		98	9.79	959.42
		TOTALS	27.02	2286.50

COMPOSITE CN =	84.6

ESTIMATE OF RUNOFF VOLUME - 10YR/72HR — BASIN 1: PRE-DEVELOPED

1)	**DETERMINE SOIL STORAGE - S**			
	S= (1000/CN) - 10	**SOIL STORAGE (inches)**	**S**	**2.55**
2)	**DETERMINE RUNOFF - R**			
	R= $(7.5-0.2*S)^2$ / (7.5+0.8*S)	**RUNOFF (inches)**	**R**	**5.12**
3)	**DETERMINE RUNOFF VOLUME- V(R)**			
	V(R)= R/12*AREA	**RUNOFF (Ac-ft.)**	**V(R)**	**11.54**

ESTIMATE OF RUNOFF VOLUME - 10YR/72HR — BASIN 1: POST-DEVELOPED

1)	**DETERMINE SOIL STORAGE - S**			
	S= (1000/CN) - 10	**SOIL STORAGE (inches)**	**S**	**1.82**
2)	**DETERMINE RUNOFF - R**			
	R= $(7.5-0.2*S)^2$ / (7.5+0.8*S)	**RUNOFF (inches)**	**R**	**5.69**
3)	**DETERMINE RUNOFF VOLUME- V(R)**			
	V(R)= R/12*AREA	**RUNOFF (Ac-ft.)**	**V(R)**	**12.80**

WATER QUALITY CALCULATIONS: BASIN 1

Total Basin Area =	27.02 ac		
DCIA =	9.79 ac		
Dry Retention the greater of			
Treatment Volume Required (Total Basin Area)=	0.5"	Runoff Over Total Basin =	**1.13 Ac-Ft**
Treatment Volume Required (Impervious Area)=	1.25"	Runoff Over DCIA =	**1.02 Ac-Ft**
		Required Treatment Volume =	**1.13 Ac-Ft**

PRE - POST VOLUME DIFFERENCE: BASIN 1

POST-VOLUME =	**12.80**	**AC-FT**	
35.4 CSM ALLOWED VOLUME	**0.23**	**AC-FT**	< From ICPR4
REQUIRED ATTENUATION VOLUME =	**12.57**	**AC-FT**	

STAGE STORAGE CALCULATIONS - BASIN 1 LINEAR POND RIGHT

	ELEV.	AREA (AC)	AVG AREA (AC)	DELTA (FT)	DELTA STORAGE (AC-FT)	SUM STORAGE (AC-FT)
INSIDE BERM	37.50	4.37				7.03
			4.06	0.50	2.03	
DHW	37.00	3.75				5.00
			2.75	1.60	4.40	
WEIR	35.40	1.75				0.60
			1.50	0.40	0.60	
BOTTOM	35.00	1.25				0.00

*Area assumes bottom width of 10', a front slope of 1:6, a back slope of 1:4, a freeboard of 0.5', and a basin length of 5400' (Basin 1 extends from STA. 1000+00.00 to STA. 1054+42.00).

STAGE STORAGE CALCULATIONS - BASIN 1 LINEAR POND LEFT

	ELEV.	AREA (AC)	AVG AREA (AC)	DELTA (FT)	DELTA STORAGE (AC-FT)	SUM STORAGE (AC-FT)
INSIDE BERM	37.50	6.87				13.28
			6.56	0.50	3.28	
DHW	37.00	6.25				10.00
			5.25	1.60	8.40	
WEIR	35.40	4.25				1.60
			4.00	0.40	1.60	
BOTTOM	35.00	3.75				0.00

*Area assumes bottom width of 30', a front slope of 1:6, a back slope of 1:4, a freeboard of 0.5', and a basin length of 5400' (Basin 1 extends from STA. 1000+00.00 to STA. 1054+42.00).

EOP EL.= 38.0

Soils: Tequesta muck (26) [Towards East end of basin], Felda Fine Sand (13), and Immokalee sand (8)
Estimated SHW depth: 1.0 ft

VOLUMETRIC CALCULATIONS

Treatment Volume Required=	1.13 Ac-Ft	
Attenuation Volume Required =	12.57 Ac-Ft	
Total Volume Provided	**15.00 Ac-Ft**	
Total Attenuation Provided	**12.80 Ac-Ft**	**OK**
Total Treatment Provided	**2.20 Ac-Ft**	**OK**

PROJECT NAME:	SR 70 (PD&E Highlands County)	**KISINGER CAMPO & ASSOCIATES**
BASIN / SMF DESIGNATION:	Basin 2 (Dry Retention)	

PRE-DEVELOPED: BASIN 2 RUNOFF CURVE NUMBER WORKSHEET

LAND-USE DESCRIPTION	SOIL GROUP	CN	AREA (ac)	PRODUCT
Onsite Pervious (fair condition)	D, A/D, B/D	77	46.46	3577.34
Impervious (Asphalt)		98	6.84	670.32
		TOTALS	53.30	4247.66

COMPOSITE CN =	79.7

POST-DEVELOPED: BASIN 2 RUNOFF CURVE NUMBER WORKSHEET

LAND-USE DESCRIPTION	SOIL GROUP	CN	AREA (ac)	PRODUCT
Open space (fair condition)	D, A/D, B/D	77	33.99	2617.15
Impervious (Asphalt)		98	19.31	1892.38
		TOTALS	53.30	4509.53

COMPOSITE CN =	84.6

ESTIMATE OF RUNOFF VOLUME - 10YR/72HR — BASIN 2 LINEAR POND: PRE-DEVELOPED

1)	**DETERMINE SOIL STORAGE - S**			
	S= (1000/CN) - 10	**SOIL STORAGE (inches)**	**S**	**2.55**
2)	**DETERMINE RUNOFF - R**			
	$R= (7.5-0.2*S)^2 / (7.5+0.8*S)$	**RUNOFF (inches)**	**R**	**5.12**
3)	**DETERMINE RUNOFF VOLUME- V(R)**			
	V(R)= R/12*AREA	**RUNOFF (Ac-ft.)**	**V(R)**	**22.76**

ESTIMATE OF RUNOFF VOLUME - 10YR/72HR — BASIN 2 LINEAR POND: POST-DEVELOPED

1)	**DETERMINE SOIL STORAGE - S**			
	S= (1000/CN) - 10	**SOIL STORAGE (inches)**	**S**	**1.82**
2)	**DETERMINE RUNOFF - R**			
	$R= (7.5-0.2*S)^2 / (7.5+0.8*S)$	**RUNOFF (inches)**	**R**	**5.69**
3)	**DETERMINE RUNOFF VOLUME- V(R)**			
	V(R)= R/12*AREA	**RUNOFF (Ac-ft.)**	**V(R)**	**25.25**

WATER QUALITY CALCULATIONS: BASIN 2 LINEAR POND

Total Basin Area =	53.30 ac		
DCIA =	19.31 ac		
Dry Retention the greater of			
Treatment Volume Required (Total Basin Area)=	0.5"	Runoff Over Total Basin =	**2.22 Ac-Ft**
Treatment Volume Required (Impervious Area)=	1.25"	Runoff Over DCIA =	**2.01 Ac-Ft**
		Required Treatment Volume =	**2.22 Ac-Ft**

PRE - POST VOLUME DIFFERENCE: BASIN 2 LINEAR POND

POST-VOLUME =	**25.25**	**AC-FT**	
35.4 CSM ALLOWED VOLUME	**0.46**	**AC-FT**	< From ICPR4
REQUIRED ATTENUATION VOLUME =	**24.79**	**AC-FT**	

STAGE STORAGE CALCULATIONS - BASIN 2 LINEAR POND RIGHT

	ELEV.	AREA (AC)	AVG AREA (AC)	DELTA (FT)	DELTA STORAGE (AC-FT)	SUM STORAGE (AC-FT)
INSIDE BERM	32.50	8.56				13.76
			7.95	0.50	3.98	
DHW	32.00	7.34				9.78
			5.26	1.70	8.94	
WEIR	30.30	3.18				0.84
			2.81	0.30	0.84	
BOTTOM	30.00	2.45				0.00

*Area assumes bottom width of 10', a front slope of 1:6, a back slope of 1:4, a freeboard of 0.5', and a basin length of 10650' (Basin 2 RT extends from STA. 1054+42.00 to STA. 1161+00.00).

STAGE STORAGE CALCULATIONS - BASIN 2 LINEAR POND LEFT

	ELEV.	AREA (AC)	AVG AREA (AC)	DELTA (FT)	DELTA STORAGE (AC-FT)	SUM STORAGE (AC-FT)
INSIDE BERM	32.50	13.46				25.99
			12.85	0.50	6.42	
DHW	32.00	12.23				19.57
			10.28	1.60	16.44	
WEIR	30.40	8.32				3.13
			7.83	0.40	3.13	
BOTTOM	30.00	7.34				0.00

*Area assumes bottom width of 30', a front slope of 1:6, a back slope of 1:4, a freeboard of 0.5', and a basin length of 10650' (Basin 2 LT extends from STA. 1054+42.00 to STA. 1161+00.00).

EOP EL.= 33.0

Soils: Tequesta muck (26) [Towards West end of basin], Felda Fine Sand (13)
Estimated SHW depth: 1.0 ft

VOLUMETRIC CALCULATIONS

Treatment Volume Required =	2.22 Ac-Ft	
Attenuation Volume Required =	24.79 Ac-Ft	
Total Volume Provided	**29.35 Ac-Ft**	
Total Attenuation Provided	**25.38 Ac-Ft**	**OK**
Total Treatment Provided	**3.97 Ac-Ft**	**OK**

PROJECT NAME:	SR 70 (PD&E Highlands County)	**KISINGER CAMPO & ASSOCIATES**
BASIN / SMF DESIGNATION:	Basin 3 (Dry Retention)	

PRE-DEVELOPED: BASIN RUNOFF CURVE NUMBER WORKSHEET

LAND-USE DESCRIPTION	SOIL GROUP	CN	AREA (ac)	PRODUCT
Onsite Pervious (fair condition)	D, A/D, B/D	77	28.13	2165.98
Impervious (Asphalt)		98	4.15	406.70
		TOTALS	32.28	2572.68

COMPOSITE CN =	79.7

POST-DEVELOPED: BASIN RUNOFF CURVE NUMBER WORKSHEET

LAND-USE DESCRIPTION	SOIL GROUP	CN	AREA (ac)	PRODUCT
Open space (fair condition)	D, A/D, B/D	77	20.58	1584.63
Impervious (Asphalt)		98	11.70	1146.60
		TOTALS	32.28	2731.23

COMPOSITE CN =	84.6

ESTIMATE OF RUNOFF VOLUME - 10YR/72HR	**PRE-DEVELOPED**

1)	**DETERMINE SOIL STORAGE - S**			
	S= (1000/CN) - 10	**SOIL STORAGE (inches)**	**S**	**2.55**
2)	**DETERMINE RUNOFF - R**			
	$R= (7.5-0.2*S)^2 / (7.5+0.8*S)$	**RUNOFF (inches)**	**R**	**5.12**
3)	**DETERMINE RUNOFF VOLUME- V(R)**			
	V(R)= R/12*AREA	**RUNOFF (Ac-ft.)**	**V(R)**	**13.78**

ESTIMATE OF RUNOFF VOLUME - 10YR/72HR	**POST-DEVELOPED**

1)	**DETERMINE SOIL STORAGE - S**			
	S= (1000/CN) - 10	**SOIL STORAGE (inches)**	**S**	**1.82**
2)	**DETERMINE RUNOFF - R**			
	$R= (7.5-0.2*S)^2 / (7.5+0.8*S)$	**RUNOFF (inches)**	**R**	**5.69**
3)	**DETERMINE RUNOFF VOLUME- V(R)**			
	V(R)= R/12*AREA	**RUNOFF (Ac-ft.)**	**V(R)**	**15.29**

WATER QUALITY CALCULATIONS

Total Basin Area =	32.28 ac		
DCIA =	11.70 ac		
Dry Retention the greater of			
Treatment Volume Required (Total Basin Area) =	0.5"	Runoff Over Total Basin =	**1.34 Ac-Ft**
Treatment Volume Required (Impervious Area)=	1.25"	Runoff Over DCIA =	**1.22 Ac-Ft**
		Required Treatment Volume =	**1.34 Ac-Ft**

PRE - POST VOLUME DIFFERENCE

POST-VOLUME =	**15.29**	**AC-FT**	
35.4 CSM ALLOWED VOLUME	**0.27**	**AC-FT**	< From ICPR4
REQUIRED ATTENUATION VOLUME =	**15.02**	**AC-FT**	

STAGE STORAGE CALCULATIONS - BASIN 3 LINEAR POND RIGHT

	ELEV.	AREA (AC)	AVG AREA (AC)	DELTA (FT)	DELTA STORAGE (AC-FT)	SUM STORAGE (AC-FT)
INSIDE BERM	32.50	5.18				8.33
			4.81	0.50	2.41	
DHW	32.00	4.44				5.92
			3.18	1.70	5.41	
WEIR	30.30	1.92				0.51
			1.70	0.30	0.51	
BOTTOM	30.00	1.48				0.00

*Area assumes bottom width of 10', a front slope of 1:6, a back slope of 1:4, a freeboard of 0.5', and a basin length of 6450' (Basin 3 RT extends from STA. 1161+00.00 to STA. 1225+50.00).

STAGE STORAGE CALCULATIONS - BASIN 3 LINEAR POND LEFT

	ELEV.	AREA (AC)	AVG AREA (AC)	DELTA (FT)	DELTA STORAGE (AC-FT)	SUM STORAGE (AC-FT)
INSIDE BERM	32.50	8.14				15.74
			7.77	0.50	3.89	
DHW	32.00	7.40				11.85
			6.22	1.60	9.95	
WEIR	30.40	5.03				1.90
			4.74	0.40	1.90	
BOTTOM	30.00	4.44				0.00

*Area assumes bottom width of 30', a front slope of 1:6, a back slope of 1:4, a freeboard of 0.5', and a basin length of 6450' (Basin 3 LT extends from STA. 1161+00.00 to STA. 1225+50.00).

EOP EL.= 33.0

Soils: Tequesta muck (26) [Towards West end of basin], Felda Fine Sand (13)
Estimated SHW depth: 1.0 ft

VOLUMETRIC CALCULATIONS

Treatment Volume Required =	1.34 Ac-Ft	
Attenuation Volume Required =	15.02 Ac-Ft	
Total Volume Provided	**17.77 Ac-Ft**	
Total Attenuation Provided	**15.36 Ac-Ft**	**OK**
Total Treatment Provided	**2.41 Ac-Ft**	**OK**

PROJECT NAME:	SR 70 (PD&E Highlands County)	**KISINGER CAMPO & ASSOCIATES**
BASIN / SMF DESIGNATION:	Basin 1	
BASIN ANALYSIS (PRE/POST)	SMF 1	

PRE-DEVELOPED: BASIN RUNOFF CURVE NUMBER WORKSHEET

LAND-USE DESCRIPTION	SOIL GROUP	CN	AREA (ac)	PRODUCT
Open space (fair condition)	D, A/D, B/D	77	26.94	2074.38
Impervious (Asphalt)		98	3.47	340.06
Water		100	0.00	0.00
		TOTALS	30.41	2414.44

COMPOSITE CN =	79.4

POST-DEVELOPED: BASIN RUNOFF CURVE NUMBER WORKSHEET

LAND-USE DESCRIPTION	SOIL GROUP	CN	AREA (ac)	PRODUCT
Open space (fair condition)	D, A/D, B/D	77	16.98	1307.46
Impervious (Asphalt)		98	9.79	959.42
Water		100	3.64	364.00
		TOTALS	30.41	2630.88

COMPOSITE CN =	86.5

ESTIMATE OF RUNOFF VOLUME - 10YR/72HR	**PRE-DEVELOPED**

1) **DETERMINE SOIL STORAGE - S**			
S= (1000/CN) - 10	**SOIL STORAGE (inches)**	**S**	**2.59**
2) **DETERMINE RUNOFF - R**			
$R= (7.5-0.2*S)^2 / (7.5+0.8*S)$	**RUNOFF (inches)**	**R**	**5.09**
3) **DETERMINE RUNOFF VOLUME- V(R)**			
V(R)= R/12*AREA	**RUNOFF (Ac-ft.)**	**V(R)**	**12.90**

ESTIMATE OF RUNOFF VOLUME - 10YR/72HR	**POST-DEVELOPED**

1) **DETERMINE SOIL STORAGE - S**			
S= (1000/CN) - 10	**SOIL STORAGE (inches)**	**S**	**1.56**
2) **DETERMINE RUNOFF - R**			
$R= (7.5-0.2*S)^2 / (7.5+0.8*S)$	**RUNOFF (inches)**	**R**	**5.91**
3) **DETERMINE RUNOFF VOLUME- V(R)**			
V(R)= R/12*AREA	**RUNOFF (Ac-ft.)**	**V(R)**	**14.97**

WATER QUALITY CALCULATIONS

Total Basin Area =	30.41 ac		
DCIA =	9.79 ac		
Wet Detention the greater of			
Treatment Volume Required (Total Basin Area) =	1.0"	Runoff Over Total Basin =	**2.53 Ac-Ft**
Treatment Volume Required (Impervious Area)=	2.50"	Runoff Over DCIA =	**2.04 Ac-Ft**
		Required Treatment Volume =	**2.53 Ac-Ft**

PRE - POST VOLUME DIFFERENCE

POST-VOLUME =	**14.97**	**AC-FT**	
35.4 CSM ALLOWED VOLUME	**0.27**	**AC-FT**	< From ICPR4
REQUIRED ATTENUATION VOLUME =	**14.70**	**AC-FT**	

STAGE STORAGE CALCULATIONS - SMF 1

	ELEV.	AREA (AC)	AVG AREA (AC)	DELTA (FT)	DELTA STORAGE (AC-FT)	SUM STORAGE (AC-FT)
INSIDE BERM	38.00	3.87				12.15
1' Freeboard from			3.76	1.00	3.76	
DHW	37.00	3.64				8.39
			3.47	1.50	5.21	
WEIR	35.50	3.30				3.18
			3.18	1.00	3.18	
ORIFICE	34.50	3.07				0.00
			2.99	2.50	7.48	
Bottom	32.00	2.91				0.00

SHW = 34.5
Source: (USDA Soil Survey)

Basinger fine sand (12)
Assumed
0.5 ft below
Felda fine sand (13)
Assumed
1.0 ft below

Avg. exst. Ground in SMF site = 35.5
Source: Lidar contours

Assumed Low EOP = 38.0

Water Quality Calculations

ATTENUATION REQUIRED =	**14.70 Ac-Ft**	
ATTENUATION PROVIDED (SMF 1)=	**5.21 Ac-Ft**	
ATTENUATION PROVIDED (SR 70) =	**10.00 Ac-Ft**	Additional volume from Basin 1 Linear Pond LT
ATTENUATION PROVIDED (TOTAL) =	**15.21 Ac-Ft**	
TREATMENT REQUIRED =	**2.53 Ac-Ft**	
TREATMENT PROVIDED =	**3.18 Ac-Ft**	
PERMANENT POOL VOLUME =	**7.48 Ac-Ft**	

PROJECT NAME:	SR 70 (PD&E Highlands County)	**KISINGER CAMPO & ASSOCIATES**
BASIN / SMF DESIGNATION:	Basin 2	
BASIN ANALYSIS (PRE/POST)	SMF 2	

PRE-DEVELOPED: BASIN RUNOFF CURVE NUMBER WORKSHEET

LAND-USE DESCRIPTION	SOIL GROUP	CN	AREA (ac)	PRODUCT
Open space (fair condition)	D, A/D, B/D	77	56.98	4387.46
Impervious (Asphalt)		98	6.84	670.32
Water		100	0.00	0.00
		TOTALS	63.82	5057.78

COMPOSITE CN =	79.3

POST-DEVELOPED: BASIN RUNOFF CURVE NUMBER WORKSHEET

LAND-USE DESCRIPTION	SOIL GROUP	CN	AREA (ac)	PRODUCT
Open space (fair condition)	D, A/D, B/D	77	31.25	2406.25
Impervious (Asphalt)		98	19.31	1892.38
Water		100	13.26	1326.00
		TOTALS	63.82	5624.63

COMPOSITE CN =	88.1

ESTIMATE OF RUNOFF VOLUME - 10YR/72HR	**PRE-DEVELOPED**

1) DETERMINE SOIL STORAGE - S

S= (1000/CN) - 10

SOIL STORAGE (inches)	**S**	**2.61**

2) DETERMINE RUNOFF - R

$R= (7.5-0.2*S)^2 / (7.5+0.8*S)$

RUNOFF (inches)	**R**	**5.08**

3) DETERMINE RUNOFF VOLUME- V(R)

V(R)= R/12*AREA

RUNOFF (Ac-ft.)	**V(R)**	**27.01**

ESTIMATE OF RUNOFF VOLUME - 10YR/72HR	**POST-DEVELOPED**

1) DETERMINE SOIL STORAGE - S

S= (1000/CN) - 10

SOIL STORAGE (inches)	**S**	**1.35**

2) DETERMINE RUNOFF - R

$R= (7.5-0.2*S)^2 / (7.5+0.8*S)$

RUNOFF (inches)	**R**	**6.09**

3) DETERMINE RUNOFF VOLUME- V(R)

V(R)= R/12*AREA

RUNOFF (Ac-ft.)	**V(R)**	**32.40**

WATER QUALITY CALCULATIONS

Total Basin Area =	63.82 ac		
DCIA =	19.31 ac		
Wet Detention the greater of			
Treatment Volume Required (Total Basin Area) =	1.0"	Runoff Over Total Basin =	**5.32 Ac-Ft**
Treatment Volume Required (Impervious Area)=	2.50"	Runoff Over DCIA =	**4.02 Ac-Ft**
		Required Treatment Volume =	**5.32 Ac-Ft**

PRE - POST VOLUME DIFFERENCE

POST-VOLUME =	**32.40**	**AC-FT**	
35.4 CSM ALLOWED VOLUME	**0.56**	**AC-FT**	< From ICPR4
REQUIRED ATTENUATION VOLUME =	**31.84**	**AC-FT**	

STAGE STORAGE CALCULATIONS - SMF 2

	ELEV.	AREA (AC)	AVG AREA (AC)	DELTA (FT)	DELTA STORAGE (AC-FT)	SUM STORAGE (AC-FT)
INSIDE BERM	30.30	13.70				54.84
1' Freeboard from			13.48	1.00	13.48	
DHW	29.30	13.26				41.36
			12.69	2.60	32.99	
WEIR	26.70	12.12				8.37
			11.96	0.70	8.37	
ORIFICE	26.00	11.81				0.00
			11.79	1.00	11.79	
Bottom	25.00	11.76				0.00

SHW = 26 Avg. exst. Ground in SMF site = 26.0
Source: (USDA Soil Survey) Source: Lidar contours

Kaliga Muck (18)
Assumed
0.0 ft below

Assumed Low EOP = 33.0

Water Quality Calculations

ATTENUATION REQUIRED =	**31.84 Ac-Ft**	
ATTENUATION PROVIDED (SMF 2)=	**32.99 Ac-Ft**	
ATTENUATION PROVIDED (SR 70) =	**0.00 Ac-Ft**	No attenuation volume required from SR 70.
ATTENUATION PROVIDED (TOTAL) =	**32.99 Ac-Ft**	
TREATMENT REQUIRED =	**5.32 Ac-Ft**	
TREATMENT PROVIDED =	**8.37 Ac-Ft**	
PERMANENT POOL =	**11.79 Ac-Ft**	

PROJECT NAME:	SR 70 (PD&E Highlands County)	**KISINGER CAMPO & ASSOCIATES**
BASIN / SMF DESIGNATION:	Basin 3	
BASIN ANALYSIS (PRE/POST)	SMF 3	

PRE-DEVELOPED: BASIN RUNOFF CURVE NUMBER WORKSHEET

LAND-USE DESCRIPTION	SOIL GROUP	CN	AREA (ac)	PRODUCT
Open space (fair condition)	D, A/D, B/D	77	34.17	2631.06
Impervious (Asphalt)		98	4.15	406.70
Water		100	0.00	0.00
		TOTALS	38.32	3037.76

COMPOSITE CN =	79.3

POST-DEVELOPED: BASIN RUNOFF CURVE NUMBER WORKSHEET

LAND-USE DESCRIPTION	SOIL GROUP	CN	AREA (ac)	PRODUCT
Open space (fair condition)	D, A/D, B/D	77	22.78	1754.06
Impervious (Asphalt)		98	11.70	1146.60
Water		100	3.84	384.00
		TOTALS	38.32	3284.66

COMPOSITE CN =	85.7

ESTIMATE OF RUNOFF VOLUME - 10YR/72HR	**PRE-DEVELOPED**

1) DETERMINE SOIL STORAGE - S			
S= (1000/CN) - 10	**SOIL STORAGE (inches)**	**S**	**2.61**
2) DETERMINE RUNOFF - R			
$R= (7.5-0.2*S)^2 / (7.5+0.8*S)$	**RUNOFF (inches)**	**R**	**5.08**
3) DETERMINE RUNOFF VOLUME- V(R)			
V(R)= R/12*AREA	**RUNOFF (Ac-ft.)**	**V(R)**	**16.22**

ESTIMATE OF RUNOFF VOLUME - 10YR/72HR	**POST-DEVELOPED**

1) DETERMINE SOIL STORAGE - S			
S= (1000/CN) - 10	**SOIL STORAGE (inches)**	**S**	**1.67**
2) DETERMINE RUNOFF - R			
$R= (7.5-0.2*S)^2 / (7.5+0.8*S)$	**RUNOFF (inches)**	**R**	**5.81**
3) DETERMINE RUNOFF VOLUME- V(R)			
V(R)= R/12*AREA	**RUNOFF (Ac-ft.)**	**V(R)**	**18.56**

WATER QUALITY CALCULATIONS

Total Basin Area =	38.32 ac		
DCIA =	11.70 ac		
Wet Detention the greater of			
Treatment Volume Required (Total Basin Area) =	1.0"	Runoff Over Total Basin =	**3.19 Ac-Ft**
Treatment Volume Required (Impervious Area)=	2.50"	Runoff Over DCIA =	**2.44 Ac-Ft**
		Required Treatment Volume =	**3.19 Ac-Ft**

PRE - POST VOLUME DIFFERENCE

POST-VOLUME =	**18.56**	**AC-FT**	
35.4 CSM ALLOWED VOLUME	**0.28**	**AC-FT**	< From ICPR4
REQUIRED ATTENUATION VOLUME =	**18.28**	**AC-FT**	

STAGE STORAGE CALCULATIONS - SMF 3

	ELEV.	AREA (AC)	AVG AREA (AC)	DELTA (FT)	DELTA STORAGE (AC-FT)	SUM STORAGE (AC-FT)
INSIDE BERM	31.00	3.94				21.53
1' Freeboard from			3.89	1.00	3.89	
DHW	30.00	3.83				17.64
			3.59	4.00	14.35	
WEIR	26.00	3.35				3.29
			3.29	1.00	3.29	
ORIFICE	25.00	3.23				0.00
			3.15	2.00	6.29	
Bottom	23.00	3.06				0.00

SHW = 25 — Avg. exst. Ground in SMF site = 25.0

Source: (USDA Soil Survey) — Source: Lidar contours

Kaliga much (18)
Assumed 0 — Assumed Low EOP = 33.0
ft below
Teuestra muck (26)
Assumed 0
ft below

Water Quality Calculations

ATTENUATION REQUIRED =	**18.28 Ac-Ft**	
ATTENUATION PROVIDED (SMF 3)=	**14.35 Ac-Ft**	
ATTENUATION PROVIDED (SR 70) =	**5.41 Ac-Ft**	Volume from attenuation provided by Basin 3 Linear Pond RT
ATTENUATION PROVIDED (TOTAL) =	**19.76 Ac-Ft**	
TREATMENT REQUIRED =	**3.19 Ac-Ft**	
TREATMENT PROVIDED =	**3.29 Ac-Ft**	
PERMANENT POOL =	**6.29 Ac-Ft**	

PROJECT NAME:	SR70 - CR29 to Lonesome	Kisinger Campo & Associates
BASIN DESIGNATION:	Basins 1-3	

Alternative C: Regional Pond Size Estimate

Basin Length (ft)	22500
Impervious Width (ft)	79
R/W Width (ft)	218

1)	**DETERMINE Contributing Basin Area**		
	Contributing Basin = (L*W/43560)	**acre**	**133.10**
	Contributing Imp. = (L*W/43560)	**acre**	**40.81**
2)	**DETERMINE REQUIRED TREATMENT VOLUME (WET DET.)**		
	1" Over Contributing Basin Area	**acre-ft**	**11.09**
	or 2.5" Over Impervious Area	**acre-ft**	**8.50**
3)	**TREATMENT DEPTH WITHIN POND**	**ft**	**1.00**
	BERMS/SLOPES/CURVALINEAR FACTOR		**2.00**
4)	**DETERMINE POND SIZE**		
	A = (Treatment Volume/Treatment Depth) * 2	**acres**	**22.18**
	15% CONTINGENCY	**acres**	**25.51**

PRE-DEVELOPED: BASIN RUNOFF CURVE NUMBER WORKSHEET

LAND-USE DESCRIPTION	SOIL GROUP	CN	AREA (ac)	PRODUCT
Open space (fair condition)	D, A/D, B/D	77	118.64	9135.53
Impervious (Asphalt)		98	14.46	1417.08
Water		100	0.00	0.00
		TOTALS	133.10	10552.61

COMPOSITE CN =	79.3

POST-DEVELOPED: BASIN RUNOFF CURVE NUMBER WORKSHEET

LAND-USE DESCRIPTION	SOIL GROUP	CN	AREA (ac)	PRODUCT
Open space (fair condition)	D, A/D, B/D	77	74.07	5703.39
Impervious (Asphalt)		98	40.80	3998.40
Water		100	18.23	1823.00
		TOTALS	133.10	11524.79

COMPOSITE CN =	86.6

ESTIMATE OF RUNOFF VOLUME - 10YR/72HR | PRE-DEVELOPED

1)	DETERMINE SOIL STORAGE - S			
	S= (1000/CN) - 10	SOIL STORAGE (inches)	S	2.61
2)	DETERMINE RUNOFF - R			
	$R= (7.5-0.2*S)^2 / (7.5+0.8*S)$	RUNOFF (inches)	R	5.08
3)	DETERMINE RUNOFF VOLUME- V(R)			
	V(R)= R/12*AREA	RUNOFF (Ac-ft.)	V(R)	56.33

ESTIMATE OF RUNOFF VOLUME - 10YR/72HR | POST-DEVELOPED

1)	DETERMINE SOIL STORAGE - S			
	S= (1000/CN) - 10	SOIL STORAGE (inches)	S	1.55
2)	DETERMINE RUNOFF - R			
	$R= (7.5-0.2*S)^2 / (7.5+0.8*S)$	RUNOFF (inches)	R	5.92
3)	DETERMINE RUNOFF VOLUME- V(R)			
	V(R)= R/12*AREA	RUNOFF (Ac-ft.)	V(R)	65.63

WATER QUALITY CALCULATIONS

Total Basin Area =	133.10 ac		
DCIA =	40.80 ac		
Wet Detention the greater of			
Treatment Volume Required (Total Basin Area) =	1.0"	Runoff Over Total Basin =	11.09 Ac-Ft
Treatment Volume Required (Impervious Area)=	2.50"	Runoff Over DCIA =	8.50 Ac-Ft
		Required Treatment Volume =	11.09 Ac-Ft

PRE - POST VOLUME DIFFERENCE

STAGE STORAGE CALCULATIONS - Regional Pond

	ELEV.	AREA (AC)	AVG AREA (AC)	DELTA (FT)	DELTA STORAGE (AC-FT)	SUM STORAGE (AC-FT)
INSIDE BERM	29.00	18.57				54.44
1' Freeboard from			18.43	1.00	18.43	
DHW	28.00	18.28				36.01
			18.21	0.50	9.11	
WEIR	27.50	18.14				26.90
			17.93	1.50	26.90	
CONTROL / ORIFICE	26.00	17.72				0.00
			17.55	1.00	17.55	
Bottom	25.00	17.38				0.00

SHW = 26 — Avg. exst. Ground in SMF site = 26.0

Source: (USDA Soil Survey) — Source: Lidar contours

Kaliga Muck (18)

Assumed — Assumed Low EOP = 33.0

0.0 ft below

Water Quality Calculations

TREATMENT REQUIRED =	11.09 Ac-Ft
TREATMENT PROVIDED =	26.90 Ac-Ft
PERMANENT POOL =	17.55 Ac-Ft

ICPR4 35.4 CSM

Simple Basin: Basin 1 - Actual

Scenario:	Linear Ponds
Node:	Dummy Node B1A
Hydrograph Method:	NRCS Unit Hydrograph
Infiltration Method:	Curve Number
Time of Concentration:	10.0000 min
Max Allowable Q:	0.00 cfs
Time Shift:	0.0000 hr
Unit Hydrograph:	UH256
Peaking Factor:	256.0
Area:	27.0200 ac
Curve Number:	84.6
% Impervious:	0.00
% DCIA:	0.00
% Direct:	0.00
Rainfall Name:	~SFWMD-72

Comment:

Simple Basin: Basin 1 -Reduced

Scenario:	Linear Ponds
Node:	Dummy Node - B1R
Hydrograph Method:	NRCS Unit Hydrograph
Infiltration Method:	Curve Number
Time of Concentration:	10.0000 min
Max Allowable Q:	0.00 cfs
Time Shift:	0.0000 hr
Unit Hydrograph:	UH256
Peaking Factor:	256.0
Area:	0.4900 ac
Curve Number:	84.6
% Impervious:	0.00
% DCIA:	0.00
% Direct:	0.00
Rainfall Name:	~SFWMD-72

Comment:

Simple Basin: Basin 2 - Actual

Scenario:	Linear Ponds
Node:	Dummy Node B2A
Hydrograph Method:	NRCS Unit Hydrograph
Infiltration Method:	Curve Number
Time of Concentration:	10.0000 min
Max Allowable Q:	0.00 cfs

Time Shift:	0.0000 hr
Unit Hydrograph:	UH256
Peaking Factor:	256.0
Area:	53.3000 ac
Curve Number:	84.6
% Impervious:	0.00
% DCIA:	0.00
% Direct:	0.00
Rainfall Name:	~SFWMD-72

Comment:

Simple Basin: Basin 2 - Reduced

Scenario:	Linear Ponds
Node:	Dummy Node - B2R
Hydrograph Method:	NRCS Unit Hydrograph
Infiltration Method:	Curve Number
Time of Concentration:	10.0000 min
Max Allowable Q:	0.00 cfs
Time Shift:	0.0000 hr
Unit Hydrograph:	UH256
Peaking Factor:	256.0
Area:	0.9700 ac
Curve Number:	84.6
% Impervious:	0.00
% DCIA:	0.00
% Direct:	0.00
Rainfall Name:	~SFWMD-72

Comment:

Simple Basin: Basin 3 - Actual

Scenario:	Linear Ponds
Node:	Dummy Node - B3A
Hydrograph Method:	NRCS Unit Hydrograph
Infiltration Method:	Curve Number
Time of Concentration:	10.0000 min
Max Allowable Q:	0.00 cfs
Time Shift:	0.0000 hr
Unit Hydrograph:	UH256
Peaking Factor:	256.0
Area:	32.2800 ac
Curve Number:	84.6
% Impervious:	0.00
% DCIA:	0.00

% Direct:	0.00
Rainfall Name:	~SFWMD-72

Comment:

Simple Basin: Basin 3 - Reduced

Scenario:	Linear Ponds
Node:	Dummy Node - B3R
Hydrograph Method:	NRCS Unit Hydrograph
Infiltration Method:	Curve Number
Time of Concentration:	10.0000 min
Max Allowable Q:	0.00 cfs
Time Shift:	0.0000 hr
Unit Hydrograph:	UH256
Peaking Factor:	256.0
Area:	0.5800 ac
Curve Number:	84.6
% Impervious:	0.00
% DCIA:	0.00
% Direct:	0.00
Rainfall Name:	~SFWMD-72

Comment:

Simple Basin: Basin 1 - Actual

Scenario:	SMF Sites
Node:	Dummy Node B1A
Hydrograph Method:	NRCS Unit Hydrograph
Infiltration Method:	Curve Number
Time of Concentration:	10.0000 min
Max Allowable Q:	0.00 cfs
Time Shift:	0.0000 hr
Unit Hydrograph:	UH256
Peaking Factor:	256.0
Area:	30.4100 ac
Curve Number:	86.5
% Impervious:	0.00
% DCIA:	0.00
% Direct:	0.00
Rainfall Name:	~SFWMD-72

Comment:

Simple Basin: Basin 1 -Reduced

Scenario:	SMF Sites
Node:	Dummy Node - B1R
Hydrograph Method:	NRCS Unit Hydrograph
Infiltration Method:	Curve Number
Time of Concentration:	10.0000 min
Max Allowable Q:	0.00 cfs
Time Shift:	0.0000 hr
Unit Hydrograph:	UH256
Peaking Factor:	256.0
Area:	0.5400 ac
Curve Number:	86.5
% Impervious:	0.00
% DCIA:	0.00
% Direct:	0.00
Rainfall Name:	~SFWMD-72

Comment:

Simple Basin: Basin 2 - Actual

Scenario:	SMF Sites
Node:	Dummy Node B2A
Hydrograph Method:	NRCS Unit Hydrograph
Infiltration Method:	Curve Number
Time of Concentration:	10.0000 min
Max Allowable Q:	0.00 cfs
Time Shift:	0.0000 hr
Unit Hydrograph:	UH256
Peaking Factor:	256.0
Area:	63.8200 ac
Curve Number:	88.1
% Impervious:	0.00
% DCIA:	0.00
% Direct:	0.00
Rainfall Name:	~SFWMD-72

Comment:

Simple Basin: Basin 2 - Reduced

Scenario:	SMF Sites
Node:	Dummy Node - B2R
Hydrograph Method:	NRCS Unit Hydrograph
Infiltration Method:	Curve Number
Time of Concentration:	10.0000 min
Max Allowable Q:	0.00 cfs

Time Shift:	0.0000 hr
Unit Hydrograph:	UH256
Peaking Factor:	256.0
Area:	1.1000 ac
Curve Number:	88.1
% Impervious:	0.00
% DCIA:	0.00
% Direct:	0.00
Rainfall Name:	~SFWMD-72

Comment:

Simple Basin: Basin 3 - Actual

Scenario:	SMF Sites
Node:	Dummy Node - B3A
Hydrograph Method:	NRCS Unit Hydrograph
Infiltration Method:	Curve Number
Time of Concentration:	10.0000 min
Max Allowable Q:	0.00 cfs
Time Shift:	0.0000 hr
Unit Hydrograph:	UH256
Peaking Factor:	256.0
Area:	38.3200 ac
Curve Number:	85.7
% Impervious:	0.00
% DCIA:	0.00
% Direct:	0.00
Rainfall Name:	~SFWMD-72

Comment:

Simple Basin: Basin 3 - Reduced

Scenario:	SMF Sites
Node:	Dummy Node - B3R
Hydrograph Method:	NRCS Unit Hydrograph
Infiltration Method:	Curve Number
Time of Concentration:	10.0000 min
Max Allowable Q:	0.00 cfs
Time Shift:	0.0000 hr
Unit Hydrograph:	UH256
Peaking Factor:	256.0
Area:	0.5800 ac
Curve Number:	85.7
% Impervious:	0.00
% DCIA:	0.00

% Direct: 0.00
Rainfall Name: ~SFWMD-72

Comment:

Node: Dummy Node - B1R

Scenario: Linear Ponds
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 0.00 ft
Warning Stage: 0.00 ft
Boundary Stage:

Comment:

Node: Dummy Node - B2R

Scenario: Linear Ponds
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 0.00 ft
Warning Stage: 0.00 ft
Boundary Stage:

Comment:

Node: Dummy Node - B3A

Scenario: Linear Ponds
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 0.00 ft
Warning Stage: 0.00 ft
Boundary Stage:

Comment:

Node: Dummy Node - B3R

Scenario: Linear Ponds

Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 0.00 ft
Warning Stage: 0.00 ft
Boundary Stage:

Comment:

Node: Dummy Node B1A

Scenario: Linear Ponds
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 0.00 ft
Warning Stage: 0.00 ft
Boundary Stage:

Comment:

Node: Dummy Node B2A

Scenario: Linear Ponds
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 0.00 ft
Warning Stage: 0.00 ft
Boundary Stage:

Comment:

Node: Dummy Node - B1R

Scenario: SMF Sites
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 0.00 ft
Warning Stage: 0.00 ft
Boundary Stage:

Comment:

Node: Dummy Node - B2R

Scenario: SMF Sites
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 0.00 ft
Warning Stage: 0.00 ft
Boundary Stage:

Comment:

Node: Dummy Node - B3A

Scenario: SMF Sites
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 0.00 ft
Warning Stage: 0.00 ft
Boundary Stage:

Comment:

Node: Dummy Node - B3R

Scenario: SMF Sites
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 0.00 ft
Warning Stage: 0.00 ft
Boundary Stage:

Comment:

Node: Dummy Node B1A

Scenario: SMF Sites
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 0.00 ft
Warning Stage: 0.00 ft
Boundary Stage:

Comment:

Node: Dummy Node B2A

Scenario: SMF Sites
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 0.00 ft
Warning Stage: 0.00 ft
Boundary Stage:

Comment:

Simulation: 10YR-72HR

Scenario: Linear Ponds
Run Date/Time: 1/6/2023 2:56:28 PM
Program Version: ICPR4 4.07.08

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	96.0000

	Hydrology [sec]	Surface Hydraulics [sec]	Groundwater [sec]
Min Calculation Time:	60.0000	0.1000	900.0000
Max Calculation Time:		30.0000	

Output Time Increments

Hydrology

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Groundwater

Year	Month	Day	Hour [hr]	Time Increment [min]

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	60.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:
Reference ET Folder:
Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set:
Extern Hydrograph Set:
Curve Number Set:
Green-Ampt Set:
Vertical Layers Set:
Impervious Set:
Roughness Set:
Crop Coef Set:
Fillable Porosity Set:
Conductivity Set:
Leakage Set:

Tolerances & Options

Time Marching:	SAOR	IA Recovery Time:	24.0000 hr
Max Iterations:	6	ET for Manual Basins:	False
Over-Relax Weight Fact:	0.5 dec		
dZ Tolerance:	0.0010 ft	Smp/Man Basin Rain Opt:	Global
Max dZ:	1.0000 ft	OF Region Rain Opt:	Global
Link Optimizer Tol:	0.0001 ft	Rainfall Name:	~SFWMD-72
		Rainfall Amount:	7.50 in
Edge Length Option:	Automatic	Storm Duration:	72.0000 hr
Dflt Damping (2D):	0.0050 ft	Dflt Damping (1D):	0.0050 ft
Min Node Srf Area (2D):	100 ft2	Min Node Srf Area (1D):	100 ft2
Energy Switch (2D):	Energy	Energy Switch (1D):	Energy

Comment:

Simulation: 10YR-72HR

Scenario: SMF Sites
Run Date/Time: 1/6/2023 2:56:36 PM
Program Version: ICPR4 4.07.08

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	96.0000

	Hydrology [sec]	Surface Hydraulics [sec]	Groundwater [sec]
Min Calculation Time:	60.0000	0.1000	900.0000
Max Calculation Time:		30.0000	

Output Time Increments

Hydrology

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Groundwater

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	60.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:
Reference ET Folder:
Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set:
Extern Hydrograph Set:
Curve Number Set:

Green-Ampt Set:
Vertical Layers Set:
Impervious Set:
Roughness Set:
Crop Coef Set:
Fillable Porosity Set:
Conductivity Set:
Leakage Set:

Tolerances & Options

Time Marching:	SAOR	IA Recovery Time:	24.0000 hr
Max Iterations:	6	ET for Manual Basins:	False
Over-Relax Weight Fact:	0.5 dec		
dZ Tolerance:	0.0010 ft	Smp/Man Basin Rain Opt:	Global
Max dZ:	1.0000 ft	OF Region Rain Opt:	Global
Link Optimizer Tol:	0.0001 ft	Rainfall Name:	~SFWMD-72
		Rainfall Amount:	7.50 in
Edge Length Option:	Automatic	Storm Duration:	72.0000 hr
Dflt Damping (2D):	0.0050 ft	Dflt Damping (1D):	0.0050 ft
Min Node Srf Area (2D):	100 ft2	Min Node Srf Area (1D):	100 ft2
Energy Switch (2D):	Energy	Energy Switch (1D):	Energy

Comment:

Node Max Conditions [Linear Ponds]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
Dummy Node - B1R	10YR-72HR	0.00	0.00	0.0000	1.49	0.00	0
Dummy Node - B2R	10YR-72HR	0.00	0.00	0.0000	2.94	0.00	0
Dummy Node - B3A	10YR-72HR	0.00	0.00	0.0000	98.00	0.00	0
Dummy Node - B3R	10YR-72HR	0.00	0.00	0.0000	1.76	0.00	0
Dummy Node B1A	10YR-72HR	0.00	0.00	0.0000	82.03	0.00	0
Dummy Node B2A	10YR-72HR	0.00	0.00	0.0000	161.81	0.00	0

Node Max Conditions [SMF Sites]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
Dummy Node - B1R	10YR-72HR	0.00	0.00	0.0000	1.67	0.00	0
Dummy Node - B2R	10YR-72HR	0.00	0.00	0.0000	3.45	0.00	0
Dummy Node - B3A	10YR-72HR	0.00	0.00	0.0000	117.68	0.00	0
Dummy Node - B3R	10YR-72HR	0.00	0.00	0.0000	1.78	0.00	0
Dummy Node B1A	10YR-72HR	0.00	0.00	0.0000	94.13	0.00	0
Dummy Node B2A	10YR-72HR	0.00	0.00	0.0000	200.45	0.00	0

Scenario	Simulation	Node Name	Basin Name	Relative Time (hrs)	Volume (ac-ft)
Linear Ponds	10YR-72HR	Dummy Node - B1R	Basin 1 - Reduced	96.0027	0.23
Linear Ponds	10YR-72HR	Dummy Node - B2R	Basin 2 - Reduced	96.0027	0.46
Linear Ponds	10YR-72HR	Dummy Node - B3R	Basin 3 - Reduced	96.0027	0.27
SMF Sites	10YR-72HR	Dummy Node - B1R	Basin 1 - Reduced	96.0027	0.27
SMF Sites	10YR-72HR	Dummy Node - B2R	Basin 2 - Reduced	96.0027	0.56
SMF Sites	10YR-72HR	Dummy Node - B3R	Basin 3 - Reduced	96.0027	0.28

CN Calculations

SR 70
BASIN 1
CURVE NUMBER CALCULATIONS
Dry Retention

Existing:

		Acres	CN
Basin 1	**Area =**	**27.02**	0
	Onsite Impervious =	3.47	98.0
	Onsite Pervious (HSG D) =	23.55	77.0
	Composite CN =		79.7
	Total Area (Acres) =	**27.0**	
	Total Composite CN =	**79.7**	
	Percent Impervious =	**12.8**	

Proposed:

		Acres	CN
Basin 1	**Area =**	**27.02**	
	Total Onsite Impervious (Roadway) =	9.79	98.0
	Onsite Pervious (HSG D) =	17.23	77.0
	Composite CN =		84.6
	Total Area (Acres) =	**27.0**	
	Total Composite CN =	**84.6**	
	Percent Impervious =	**36.2**	

BASIN 2
CURVE NUMBER CALCULATIONS
Dry Retention

Existing:

		Acres	CN
Basin 2	**Area =**	**53.30**	0
	Onsite Impervious =	6.84	98.0
	Onsite Pervious (HSG D) =	46.46	77.0
	Composite CN =		79.7
	Total Area (Acres) =	**53.3**	
	Total Composite CN =	**79.7**	
	Percent Impervious =	**12.8**	

Proposed:

		Acres	CN
Basin 2	**Area =**	**53.30**	
	Total Onsite Impervious (Roadway) =	19.31	98.0
	Onsite Pervious (HSG D) =	33.99	77.0
	Composite CN =		84.6
	Total Area (Acres) =	**53.3**	
	Total Composite CN =	**84.6**	
	Percent Impervious =	**36.2**	

BASIN 3
CURVE NUMBER CALCULATIONS
Dry Retention

Existing:

		Acres	CN
Basin 3	**Area =**	**32.28**	0
	Onsite Impervious =	4.15	98.0
	Onsite Pervious (HSG D) =	28.13	77.0
	Composite CN =		79.7
	Total Area (Acres) =	**32.3**	
	Total Composite CN =	**79.7**	
	Percent Impervious =	**12.9**	

Proposed:

		Acres	CN
Basin 3	**Area =**	**32.28**	
	Total Onsite Impervious (Roadway) =	11.70	98.0
	Onsite Pervious (HSG D) =	20.58	77.0
	Composite CN =		84.6
	Total Area (Acres) =	**32.3**	
	Total Composite CN =	**84.6**	
	Percent Impervious =	**36.2**	

SR 70
SMF 1
CURVE NUMBER CALCULATIONS
Wet Detention

Existing:

		Acres	CN
Basin 1 +SMF 1	Area =	30.41	
	Basin 1 Impervious =	3.47	98.0
	Basin 1 Pervious (HSG D) =	21.94	77.0
	SMF Impervious =	0.00	98.0
	SMF Pervious =	5.00	77.0
	Composite CN =		79.4
	Total Area (Acres) =	30.4	
	Total Composite CN =	79.4	
	Percent Impervious =	11.4	

Proposed:

		Acres	CN
Basin 1 +SMF 1	Area =	30.41	
	Basin 1 Impervious =	9.79	98.0
	Basin 1 Pervious (HSG D) =	15.62	77.0
	SMF Water =	3.64	100.0
	SMF Pervious =	1.36	77.0
	Composite CN =		86.5
	Total Area (Acres) =	30.4	
	Total Composite CN =	86.5	
	Percent Impervious =	32.2	

SMF 2
CURVE NUMBER CALCULATIONS
Wet Detention

Existing:

		Acres	CN
Basin 2 +SMF 2	Area =	63.82	
	Basin 2 Impervious =	6.84	98.0
	Basin 2 Pervious (HSG D) =	43.28	77.0
	SMF Impervious =	0	98.0
	SMF Pervious =	13.7	77.0
	Composite CN =		79.3
	Total Area (Acres) =	63.82	
	Total Composite CN =	79.3	
	Percent Impervious =	10.7	

Proposed:

		Acres	CN
Basin 2 +SMF 2	Area =	63.82	
	Basin 2 Impervious =	19.31	98.0
	Basin 2 Pervious (HSG D) =	30.81	77.0
	SMF Water =	13.26	100
	SMF Pervious =	0.44	77.0
	Composite CN =		88.1
	Total Area (Acres) =	63.82	
	Total Composite CN =	88.1	
	Percent Impervious =	30.3	

SMF 3
CURVE NUMBER CALCULATIONS
Wet Detention

Existing:

		Acres	CN
Basin 3 +SMF 3	**Area =**	**38.32**	
	Basin 3 Impervious =	4.15	98.0
	Basin 3 Pervious (HSG D) =	28.13	77.0
	SMF Impervious =	0	98
	SMF Pervious =	6.04	77
	Composite CN =		79.3
	Total Area (Acres) =	**38.3**	
	Total Composite CN =	**79.3**	
	Percent Impervious =	**10.8**	

Proposed:

		Acres	CN
Basin 3 +SMF 3	**Area =**	**38.32**	
	Basin 3 Impervious =	11.70	98.0
	Basin 3 Pervious (HSG D) =	20.58	77.0
	SMF Water =	3.84	100
	SMF Pervious =	2.2	77
	Composite CN =		85.7
	Total Area (Acres) =	**38.3**	
	Total Composite CN =	**85.7**	
	Percent Impervious =	**30.5**	

PROJECT AREA
CURVE NUMBER CALCULATIONS

Existing:

		Acres	CN
Proj. Area	Area =	112.60	
	Onsite Impervious =	14.46	98.0
	Onsite Pervious (HSG D) =	98.14	77.0
	Composite CN =		79.7
	Total Area (Acres) =	112.6	
	Total Composite CN =	79.7	
	Percent Impervious =	12.8	

Proposed:

		Acres	CN
Proj. Area	Area =	112.60	
	Total Onsite Impervious (Roadway) =	40.80	98.0
	Onsite Pervious (HSG D) =	71.80	77.0
	Composite CN =		84.6
	Total Area (Acres) =	112.6	
	Total Composite CN =	84.6	
	Percent Impervious =	36.2	

REGIONAL POND: LAND SWAP
CURVE NUMBER CALCULATIONS

Existing:

		Acres	CN
Regional	Area =	105.00	
	Onsite Impervious =	0.00	98.0
	Onsite Pervious (HSG D) =	105.00	77.0
	Composite CN =		77.0
	Total Area (Acres) =	105.0	
	Total Composite CN =	77.0	
	Percent Impervious =	0.0	

Proposed:

		Acres	CN
Regional	Area =	105.00	
	Onsite Impervious =	0.00	98.0
	Onsite Pervious (HSG D) =	105.00	77.0
	Composite CN =		77.0
	Total Area (Acres) =	105.0	
	Total Composite CN =	77.0	
	Percent Impervious =	0.0	

REGIONAL POND: WET DETENTION
CURVE NUMBER CALCULATIONS

Existing:

		Acres	CN	Class	EMC TN (mg/L)	EMC TP (mg/L)
Regional	**Area =**	**133.10**				
	Impervious =	14.46	98.0	Highway	1.190	0.155
	Pervious (HSG D) =	98.14	77.0	Highway	1.190	0.155
	Regional Water =	0	100	Agricultural	2.800	0.487
	Regional Pervious =	20.5	77	Agricultural	2.800	0.487
	Composite CN =		79.3			
	Total Area (Acres) =	**133.1**				
	Total Composite CN =	**79.3**				
	Percent Impervious =	**10.9**				
	Composite N (mg/L) =	**1.438**				
	Composite P (mg/L) =	**0.206**				

Proposed:

		Acres	CN	Class	EMC TN (mg/L)	EMC TP (mg/L)
Regional	**Area =**	**133.10**				
	Impervious =	40.80	98.0	Highway	1.190	0.155
	Pervious (HSG D) =	71.80	77.0	Highway	1.190	0.155
	Regional Water =	18.23	100	No Loading	0.000	0.000
	Regional Pervious =	2.27	77	Rangland	1.150	0.055
	Composite CN =		86.6			
	Total Area (Acres) =	**133.1**				
	Total Composite CN =	**86.6**				
	Percent Impervious =	**30.7**				
	Composite N (mg/L) =	**1.026**				
	Composite P (mg/L) =	**0.132**				

Nutrient Loading Calculations

Complete Report (not including cost) Ver 4.3.5

Project: Linear Ponds
Date: 12/22/2022 1:28:14 PM

Site and Catchment Information

Analysis: Net Improvement

Catchment Name	Linear Pond 1	Linear Pond 2	Linear Pond 3
Rainfall Zone	Florida Zone 2	Florida Zone 2	Florida Zone 2
Annual Mean Rainfall	50.00	50.00	50.00

Pre-Condition Landuse Information

Landuse	User Defined Values	User Defined Values	User Defined Values
Area (acres)	27.02	53.30	32.28
Rational Coefficient (0-1)	0.18	0.18	0.18
Non DCIA Curve Number	77.00	77.00	77.00
DCIA Percent (0-100)	12.80	12.80	12.90
Nitrogen EMC (mg/l)	1.190	1.190	1.190
Phosphorus EMC (mg/l)	0.155	0.155	0.155
Runoff Volume (ac-ft/yr)	20.701	40.835	24.828
Groundwater N (kg/yr)	0.000	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000	0.000
Nitrogen Loading (kg/yr)	30.374	59.916	36.430
Phosphorus Loading (kg/yr)	3.956	7.804	4.745

Post-Condition Landuse Information

Landuse	User Defined Values	User Defined Values	User Defined Values
Area (acres)	27.02	53.30	32.28
Rational Coefficient (0-1)	0.35	0.35	0.35
Non DCIA Curve Number	77.00	77.00	77.00
DCIA Percent (0-100)	36.20	36.20	36.20

Wet Pond Area (ac)	0.00	0.00	0.00
Nitrogen EMC (mg/l)	1.190	1.190	1.190
Phosphorus EMC (mg/l)	0.155	0.155	0.155
Runoff Volume (ac-ft/yr)	39.578	78.072	47.283
Groundwater N (kg/yr)	0.000	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000	0.000
Nitrogen Loading (kg/yr)	58.072	114.553	69.376
Phosphorus Loading (kg/yr)	7.564	14.921	9.036

Catchment Number: 1 Name: Linear Pond 1

Project: Linear Ponds
Date: 12/22/2022

Retention Design

Retention Depth (in)	0.889
Retention Volume (ac-ft)	2.002

Watershed Characteristics

Catchment Area (acres)	27.02
Contributing Area (acres)	27.020
Non-DCIA Curve Number	77.00
DCIA Percent	36.20
Rainfall Zone	Florida Zone 2
Rainfall (in)	50.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	48
Provided TN Treatment Efficiency (%)	81
Required TP Treatment Efficiency (%)	48
Provided TP Treatment Efficiency (%)	81

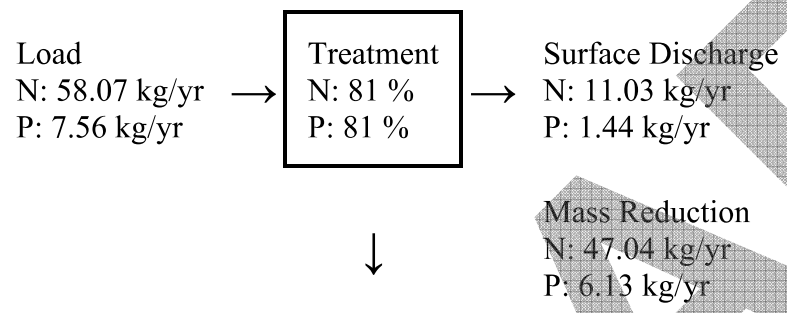
Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

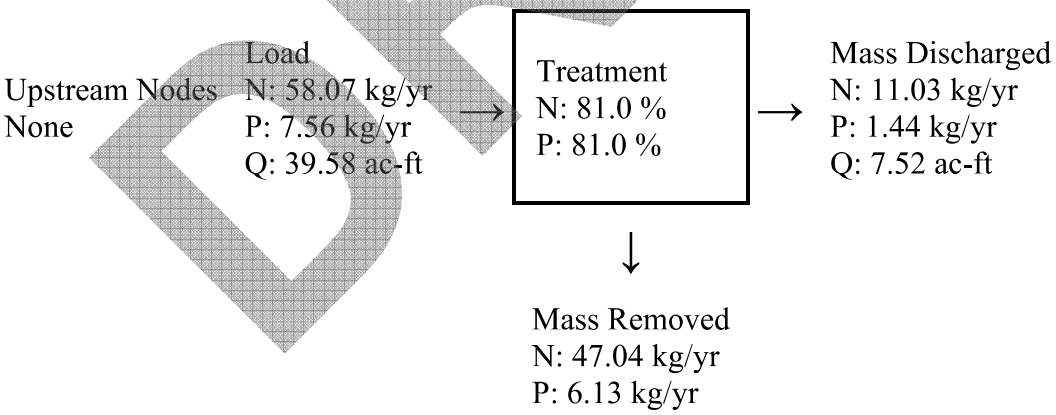
Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	47.041
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	6.127
TP Concentration (mg/L)	0.000

Load Diagram for Retention (stand-alone)



Load Diagram for Retention (As Used In Routing)



Catchment Number: 2 Name: Linear Pond 2

Project: Linear Ponds
Date: 12/22/2022

Retention Design

Retention Depth (in)	0.896
Retention Volume (ac-ft)	3.980

Watershed Characteristics

Catchment Area (acres)	53.30
Contributing Area (acres)	53.300
Non-DCIA Curve Number	77.00
DCIA Percent	36.20
Rainfall Zone	Florida Zone 2
Rainfall (in)	50.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	48
Provided TN Treatment Efficiency (%)	81
Required TP Treatment Efficiency (%)	48
Provided TP Treatment Efficiency (%)	81

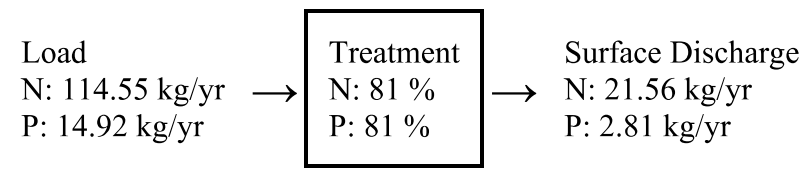
Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	92.991
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	12.112
TP Concentration (mg/L)	0.000

Load Diagram for Retention (stand-alone)



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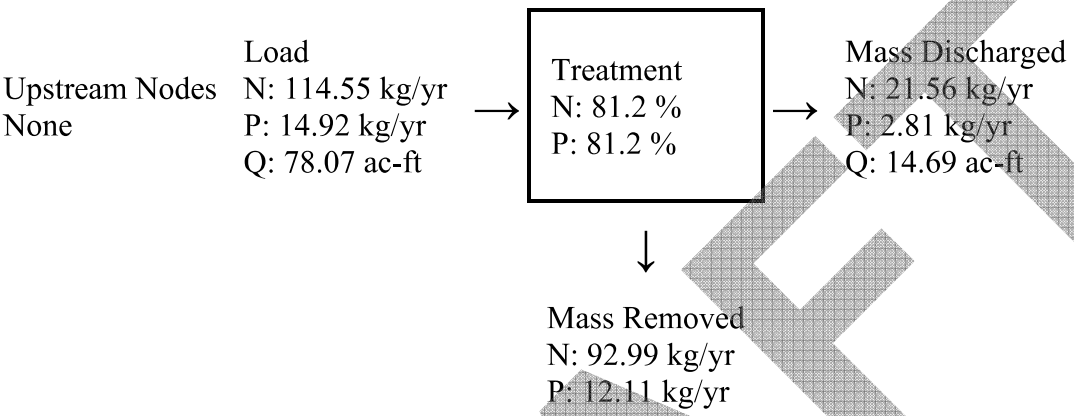
Mass Reduction
N: 92.99 kg/yr
P: 12.11 kg/yr

Load Diagram for Retention (As Used In Routing)



Catchment Number: 3 Name: Linear Pond 3

Project: Linear Ponds
Date: 12/22/2022

Retention Design

Retention Depth (in)	0.897
Retention Volume (ac-ft)	2.413

Watershed Characteristics

Catchment Area (acres)	32.28
Contributing Area (acres)	32.280
Non-DCIA Curve Number	77.00
DCIA Percent	36.20
Rainfall Zone	Florida Zone 2
Rainfall (in)	50.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	47
Provided TN Treatment Efficiency (%)	81

Required TP Treatment Efficiency (%) 47
Provided TP Treatment Efficiency (%) 81

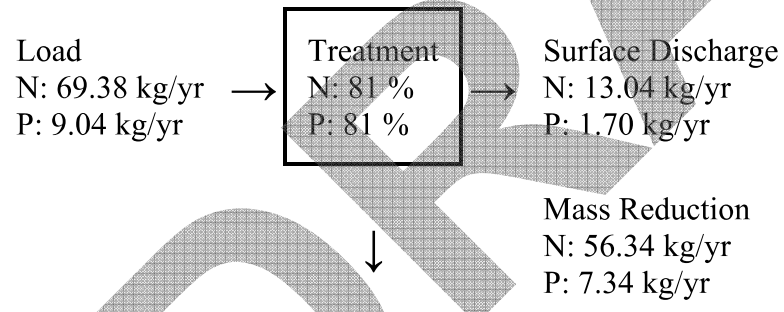
Media Mix Information

Type of Media Mix Not Specified
Media N Reduction (%)
Media P Reduction (%)

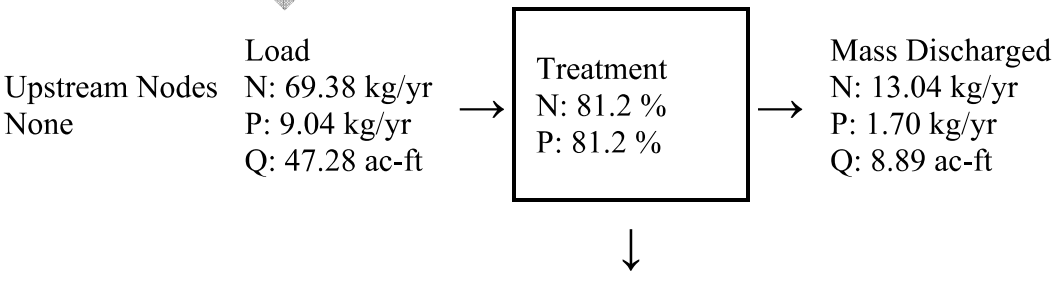
Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr) 0.000
TN Mass Load (kg/yr) 56.335
TN Concentration (mg/L) 0.000
TP Mass Load (kg/yr) 7.338
TP Concentration (mg/L) 0.000

Load Diagram for Retention (stand-alone)



Load Diagram for Retention (As Used In Routing)



Mass Removed
N: 56.34 kg/yr
P: 7.34 kg/yr

Summary Treatment Report Version: 4.3.5

Project: Linear Ponds

Analysis Type: Net Improvement
BMP Types:
Catchment 1 - (Linear Pond 1) Retention
Catchment 2 - (Linear Pond 2) Retention
Catchment 3 - (Linear Pond 3) Retention
Based on % removal values to the nearest percent

Date:12/22/2022

Routing Summary
Catchment 1 Routed to Outlet
Catchment 2 Routed to Outlet
Catchment 3 Routed to Outlet

Total nitrogen target removal met? **Yes**
Total phosphorus target removal met? **Yes**

Summary Report

Nitrogen

Surface Water Discharge

Total N pre load	126.72 kg/yr	
Total N post load	242 kg/yr	
Target N load reduction	48 %	
Target N discharge load	126.72 kg/yr	
Percent N load reduction	81 %	
Provided N discharge load	45.63 kg/yr	100.62 lb/yr
Provided N load removed	196.37 kg/yr	432.99 lb/yr

Phosphorus

Surface Water Discharge

Total P pre load	16.505 kg/yr

Total P post load	31.521 kg/yr	
Target P load reduction	48 %	
Target P discharge load	16.505 kg/yr	
Percent P load reduction	81 %	
Provided P discharge load	5.944 kg/yr	13.11 lb/yr
Provided P load removed	25.577 kg/yr	56.398 lb/yr

Complete Report (not including cost) Ver 4.3.5

Project: Offsite Ponds
Date: 12/22/2022 3:59:09 PM

Site and Catchment Information

Analysis: Net Improvement

Catchment Name	SMF 1	SMF 2	SMF 3
Rainfall Zone	Florida Zone 2	Florida Zone 2	Florida Zone 2
Annual Mean Rainfall	50.00	50.00	50.00

Pre-Condition Landuse Information

Landuse	User Defined Values	User Defined Values	User Defined Values
Area (acres)	30.41	63.82	38.32
Rational Coefficient (0-1)	0.17	0.17	0.17
Non DCIA Curve Number	77.00	77.00	77.00
DCIA Percent (0-100)	11.40	10.70	10.80
Nitrogen EMC (mg/l)	1.190	1.190	1.190
Phosphorus EMC (mg/l)	0.155	0.155	0.155
Runoff Volume (ac-ft/yr)	22.014	44.852	27.046
Groundwater N (kg/yr)	0.000	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000	0.000
Nitrogen Loading (kg/yr)	32.300	65.809	39.684
Phosphorus Loading (kg/yr)	4.207	8.572	5.169

Post-Condition Landuse Information

Landuse	User Defined Values	User Defined Values	User Defined Values
Area (acres)	30.41	63.82	38.32
Rational Coefficient (0-1)	0.32	0.31	0.31
Non DCIA Curve Number	77.00	77.00	77.00
DCIA Percent (0-100)	32.20	30.30	30.50

Wet Pond Area (ac)	3.64	13.26	3.84
Nitrogen EMC (mg/l)	1.190	1.190	1.190
Phosphorus EMC (mg/l)	0.155	0.155	0.155
Runoff Volume (ac-ft/yr)	35.998	65.090	44.597
Groundwater N (kg/yr)	0.000	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000	0.000
Nitrogen Loading (kg/yr)	52.818	95.505	65.436
Phosphorus Loading (kg/yr)	6.880	12.440	8.523

Catchment Number: 1 Name: SMF 1

Project: Offsite Ponds
Date: 12/22/2022

Wet Detention Design

Permanent Pool Volume (ac-ft)	7.480
Permanent Pool Volume (ac-ft) for 31 days residence	3.057
Annual Residence Time (days)	76
Littoral Zone Efficiency Credit	
Wetland Efficiency Credit	

Watershed Characteristics

Catchment Area (acres)	30.41
Contributing Area (acres)	26.770
Non-DCIA Curve Number	77.00
DCIA Percent	32.20
Rainfall Zone	Florida Zone 2
Rainfall (in)	50.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	39
Provided TN Treatment Efficiency (%)	41
Required TP Treatment Efficiency (%)	39
Provided TP Treatment Efficiency (%)	72

Media Mix Information

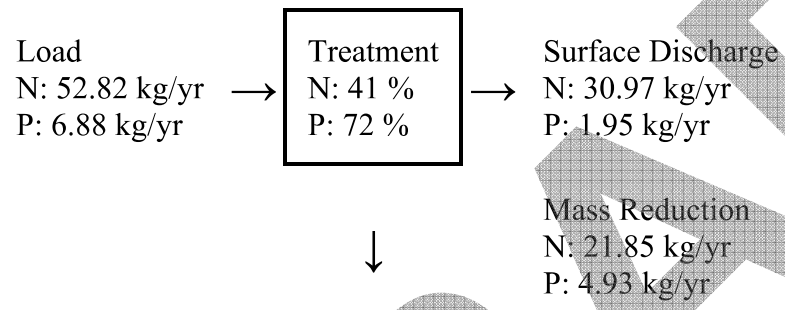
Type of Media Mix	Not Specified
Media N Reduction (%)	

Media P Reduction (%)

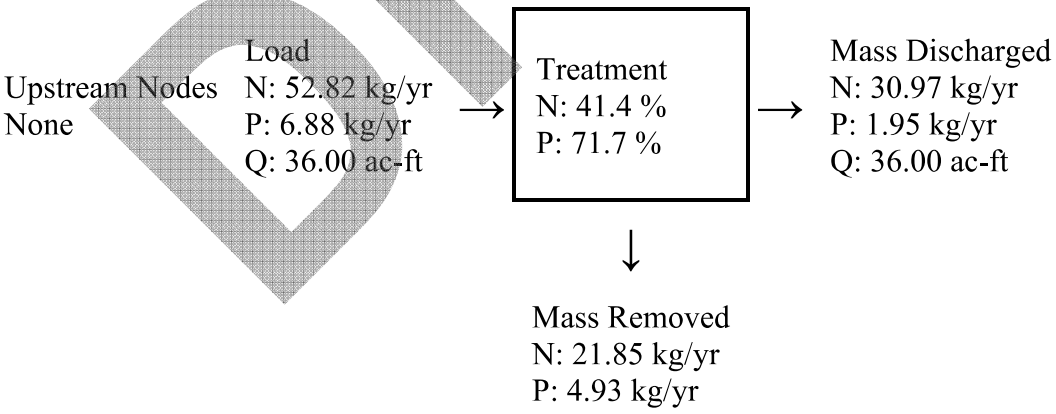
Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	0.000
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.000
TP Concentration (mg/L)	0.000

Load Diagram for Wet Detention (stand-alone)



Load Diagram for Wet Detention (As Used In Routing)



Catchment Number: 2 Name: SMF 2

Project: Offsite Ponds
Date: 12/22/2022

Wet Detention Design

Permanent Pool Volume (ac-ft)	11.790
Permanent Pool Volume (ac-ft) for 31 days residence	5.528
Annual Residence Time (days)	66
Littoral Zone Efficiency Credit	
Wetland Efficiency Credit	

Watershed Characteristics

Catchment Area (acres)	63.82
Contributing Area (acres)	50.560
Non-DCIA Curve Number	77.00
DCIA Percent	30.30
Rainfall Zone	Florida Zone 2
Rainfall (in)	50.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	31
Provided TN Treatment Efficiency (%)	41
Required TP Treatment Efficiency (%)	31
Provided TP Treatment Efficiency (%)	71

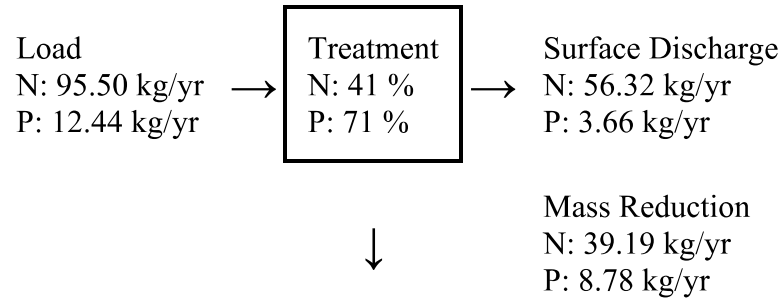
Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

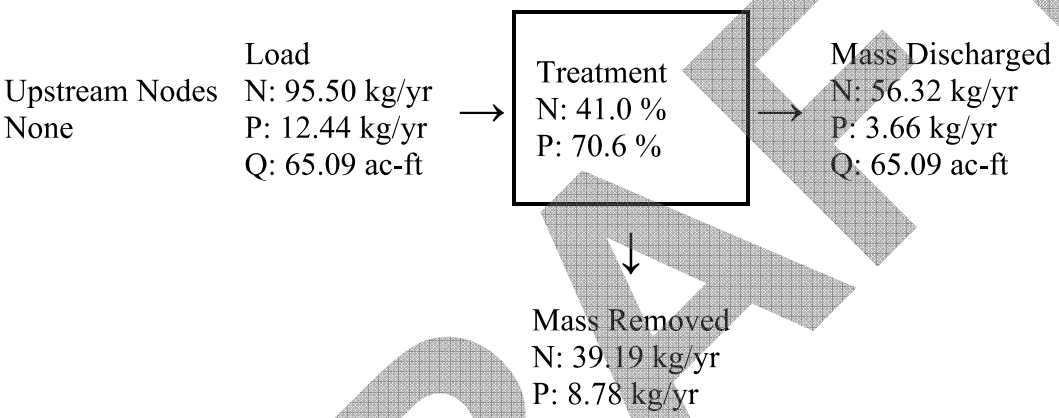
Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	0.000
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.000
TP Concentration (mg/L)	0.000

Load Diagram for Wet Detention (stand-alone)



Load Diagram for Wet Detention (As Used In Routing)



Catchment Number: 3 Name: SMF 3

Project: Offsite Ponds
Date: 12/22/2022

Wet Detention Design

Permanent Pool Volume (ac-ft)	4.720
Permanent Pool Volume (ac-ft) for 31 days residence	3.788
Annual Residence Time (days)	39
Littoral Zone Efficiency Credit	
Wetland Efficiency Credit	

Watershed Characteristics

Catchment Area (acres)	38.32
Contributing Area (acres)	34.480
Non-DCIA Curve Number	77.00

DCIA Percent	30.50
Rainfall Zone	Florida Zone 2
Rainfall (in)	50.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	39
Provided TN Treatment Efficiency (%)	39
Required TP Treatment Efficiency (%)	39
Provided TP Treatment Efficiency (%)	66

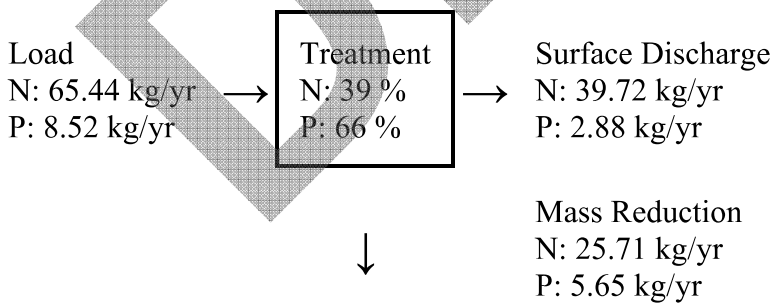
Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

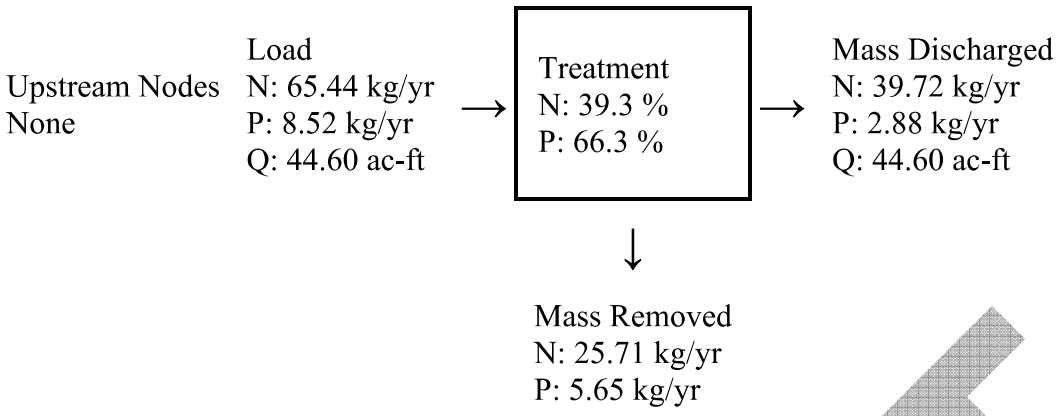
Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	0.000
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.000
TP Concentration (mg/L)	0.000

Load Diagram for Wet Detention (stand-alone)



Load Diagram for Wet Detention (As Used In Routing)



Summary Treatment Report Version: 4.3.5

Project: Offsite Ponds

Analysis Type: Net Improvement

BMP Types:

Catchment 1 - (SMF 1) Wet Detention

Catchment 2 - (SMF 2) Wet Detention

Catchment 3 - (SMF 3) Wet Detention

Based on % removal values to the nearest percent

Date:12/22/2022

Routing Summary

Catchment 1 Routed to Outlet
Catchment 2 Routed to Outlet
Catchment 3 Routed to Outlet

Total nitrogen target removal met? **Yes**

Total phosphorus target removal met? **Yes**

Summary Report

Nitrogen

Surface Water Discharge

Total N pre load	137.79 kg/yr	
Total N post load	213.76 kg/yr	
Target N load reduction	36 %	
Target N discharge load	137.79 kg/yr	
Percent N load reduction	41 %	
Provided N discharge load	127.01 kg/yr	280.06 lb/yr

Provided N load removed	86.75 kg/yr	191.28 lb/yr

Phosphorus

Surface Water Discharge

Total P pre load	17.948 kg/yr	
Total P post load	27.843 kg/yr	
Target P load reduction	36 %	
Target P discharge load	17.948 kg/yr	
Percent P load reduction	70 %	
Provided P discharge load	8.482 kg/yr	18.7 lb/yr
Provided P load removed	19.36 kg/yr	42.689 lb/yr

Complete Report (not including cost) Ver 4.3.5

Project: Regional Pond
Date: 1/9/2023 1:41:37 PM

Site and Catchment Information

Analysis: Net Improvement

Catchment Name	SR 70 Basins1-3	Regional Pond: Land Swap	Regional Pond: Wet Detention
Rainfall Zone	Florida Zone 2	Florida Zone 2	Florida Zone 2
Annual Mean Rainfall	50.00	50.00	50.00

Pre-Condition Landuse Information

Landuse	User Defined Values	Agricultural - General: TN=2.800 TP=0.487	User Defined Values
Area (acres)	112.60	105.00	133.10
Rational Coefficient (0-1)	0.18	0.09	0.17
Non DCIA Curve Number	77.00	77.00	77.00
DCIA Percent (0-100)	12.80	0.00	10.90
Nitrogen EMC (mg/l)	1.190	2.800	1.438
Phosphorus EMC (mg/l)	0.155	0.487	0.206
Runoff Volume (ac-ft/yr)	86.267	40.163	94.343
Groundwater N (kg/yr)	0.000	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000	0.000
Nitrogen Loading (kg/yr)	126.576	138.657	167.276
Phosphorus Loading (kg/yr)	16.487	24.116	23.963

Post-Condition Landuse Information

Landuse	User Defined Values	Rangeland/Parkland: TN=1.150 TP=0.055	User Defined Values
Area (acres)	112.60	105.00	133.10
Rational Coefficient (0-1)	0.35	0.09	0.31
Non DCIA Curve Number	77.00	77.00	77.00
DCIA Percent (0-100)	36.20	0.00	30.70
Wet Pond Area (ac)	0.00	0.00	18.23
Nitrogen EMC (mg/l)	1.190	1.150	1.026
Phosphorus EMC (mg/l)	0.155	0.055	0.132
Runoff Volume (ac-ft/yr)	164.933	40.163	149.268
Groundwater N (kg/yr)	0.000	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000	0.000
Nitrogen Loading (kg/yr)	242.001	56.948	188.832
Phosphorus Loading (kg/yr)	31.521	2.724	24.294

Catchment Number: 1 Name: SR 70 Basins1-3

Project: Regional Pond
Date: 1/9/2023

None Design

Watershed Characteristics

Catchment Area (acres)	112.60
Contributing Area (acres)	112.600
Non-DCIA Curve Number	77.00
DCIA Percent	36.20
Rainfall Zone	Florida Zone 2
Rainfall (in)	50.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	48
Provided TN Treatment Efficiency (%)	
Required TP Treatment Efficiency (%)	48
Provided TP Treatment Efficiency (%)	

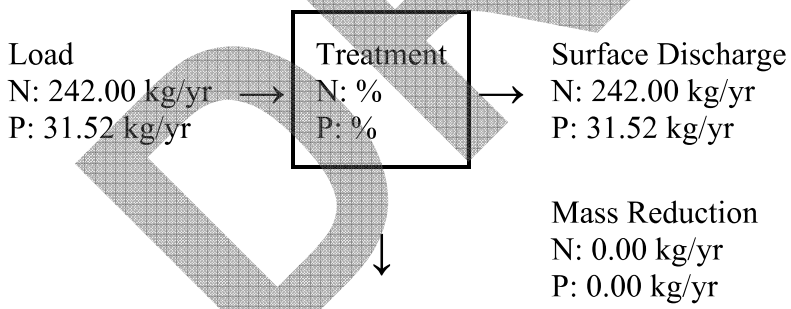
Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	0.000
Media P Reduction (%)	0.000

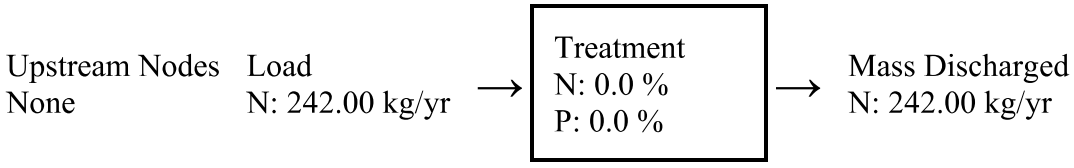
Groundwater Discharge (Stand-Alone)

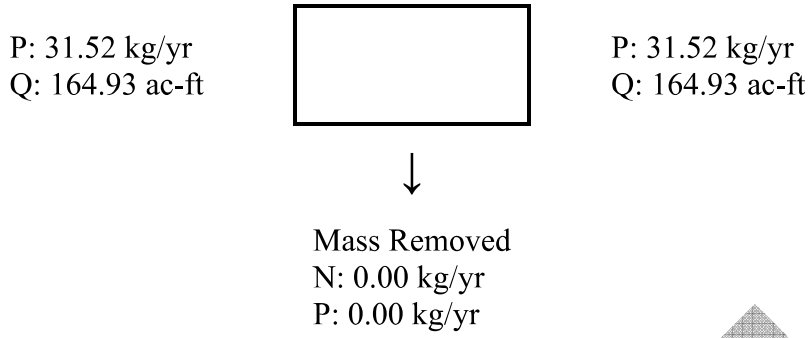
Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	0.000
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.000
TP Concentration (mg/L)	0.000

Load Diagram for None (stand-alone)



Load Diagram for None (As Used In Routing)





Catchment Number: 2 Name: Regional Pond: Land Swap

Project: Regional Pond
Date: 1/9/2023

None Design

Watershed Characteristics

Catchment Area (acres)	105.00
Contributing Area (acres)	105.000
Non-DCIA Curve Number	77.00
DCIA Percent	0.00
Rainfall Zone	Florida Zone 2
Rainfall (in)	50.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	
Provided TN Treatment Efficiency (%)	
Required TP Treatment Efficiency (%)	
Provided TP Treatment Efficiency (%)	

Media Mix Information

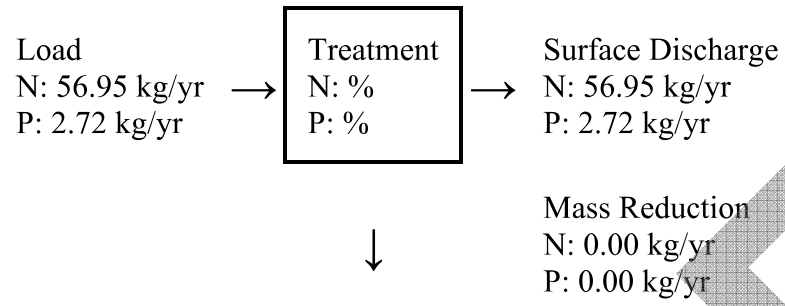
Type of Media Mix	Not Specified
Media N Reduction (%)	0.000
Media P Reduction (%)	0.000

Groundwater Discharge (Stand-Alone)

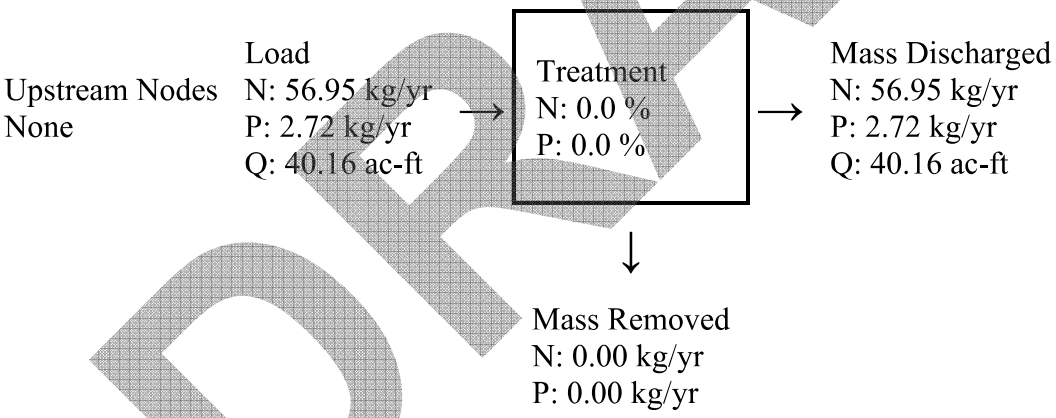
Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	0.000

TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.000
TP Concentration (mg/L)	0.000

Load Diagram for None (stand-alone)



Load Diagram for None (As Used In Routing)



Catchment Number: 3 Name: Regional Pond: Wet Detention

Project: Regional Pond
Date: 1/9/2023

Wet Detention Design

Permanent Pool Volume (ac-ft)	17.550
Permanent Pool Volume (ac-ft) for 31 days residence	12.678

Annual Residence Time (days)	43
Littoral Zone Efficiency Credit	
Wetland Efficiency Credit	

Watershed Characteristics

Catchment Area (acres)	133.10
Contributing Area (acres)	114.870
Non-DCIA Curve Number	77.00
DCIA Percent	30.70
Rainfall Zone	Florida Zone 2
Rainfall (in)	50.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	11
Provided TN Treatment Efficiency (%)	40
Required TP Treatment Efficiency (%)	1
Provided TP Treatment Efficiency (%)	67

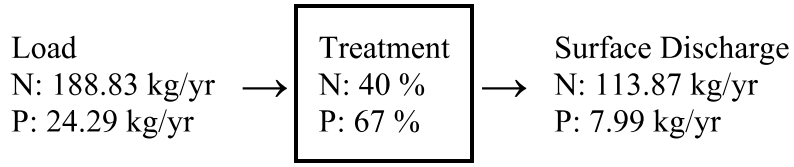
Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	0.000
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.000
TP Concentration (mg/L)	0.000

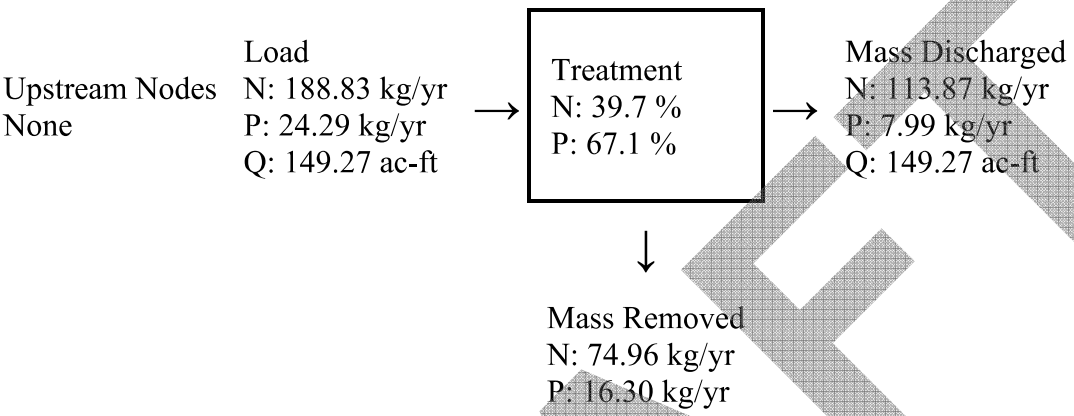
Load Diagram for Wet Detention (stand-alone)



↓

Mass Reduction
N: 74.96 kg/yr
P: 16.30 kg/yr

Load Diagram for Wet Detention (As Used In Routing)



Summary Treatment Report Version: 4.3.5

Project: Regional Pond

Analysis Type: Net Improvement
BMP Types:
Catchment 1 - (SR 70 Basins1-3) None
Catchment 2 - (Regional Pond: Land Swap) None
Catchment 3 - (Regional Pond: Wet Detention) Wet Detention
Based on % removal values to the nearest percent

Date:1/9/2023

Routing Summary
Catchment 1 Routed to Outlet
Catchment 2 Routed to Outlet
Catchment 3 Routed to Outlet

Total nitrogen target removal met? **Yes**
Total phosphorus target removal met? **Yes**

Summary Report

Nitrogen

Surface Water Discharge

Total N pre load	432.51 kg/yr	
Total N post load	487.78 kg/yr	
Target N load reduction	11 %	
Target N discharge load	432.51 kg/yr	
Percent N load reduction	15 %	
Provided N discharge load	412.82 kg/yr	910.26 lb/yr
Provided N load removed	74.96 kg/yr	165.29 lb/yr

Phosphorus

Surface Water Discharge

Total P pre load	64.566 kg/yr	
Total P post load	58.539 kg/yr	
Target P load reduction	%	
Target P discharge load	64.566 kg/yr	
Percent P load reduction	28 %	
Provided P discharge load	42.239 kg/yr	93.14 lb/yr
Provided P load removed	16.3 kg/yr	35.941 lb/yr

APPENDIX D

FLOODPLAIN MODELING

Final

Floodplain Modeling Report

SR 70
Project Development and Environment Study

from CR 29 to Lonesome Island Road
Highlands County, Florida

Financial Project ID: 414506 5 22 01
ETDM Number: 14364

Florida Department of Transportation
District One

Prepared By:
Kisinger Campo & Associates Corp.
201 N. Franklin Street, Suite 400
Tampa, Florida

March 2023

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EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) study to evaluate the proposed widening of SR 70 from CR 29 to Lonesome Road in Highlands County. The purpose of this PD&E study is to evaluate engineering and environmental data and document information that will aid FDOT, Highlands County, and the Federal Highway Administration (FHWA) in determining the type, preliminary design and location of proposed improvements. The study is being conducted to meet the requirements of the National Environmental Policy Act (NEPA) and other related federal and state laws. This report includes reducing the proposed floodplain compensation sites through modeling.

Existing Conditions

SR 70 is classified as a Rural Principal Arterial, is an evacuation route and is a two-lane undivided roadway with 12-foot lanes and 5-foot paved shoulders. Stormwater runoff is collected in roadside canals and discharges to Canal C-41. There is no stormwater treatment in the existing condition, all roadway runoff discharges directly into canals.

The corridor is approximately 4.3 miles in length with varying right-of-way (ROW). The existing ROW is generally 50-60 feet in in width. The existing pavement exhibits sever rutting and cracking as well as the presence of potholes. These symptoms are consistent with unsuitable soils beneath the roadway.

The posted speed limit is 60 miles per hour (mph) from CR 29 to Lonesome Island Road. There are no bus stops, sidewalks, or other pedestrian features located within the project limits.

Project Need

The FDOT proposes to widen SR 70 from a two-lane undivided roadway to a four-lane divided roadway to maintain important east-west mobility for people and freight in southern Highlands County and alleviate future traffic congestion on the corridor. The proposed improvements to SR 70 will also include a shared use path. The roadway currently operates at Level of Service (LOS) B with it deteriorating to a LOS of E in 2035 if no improvements are made. This will cause higher levels of congestion and longer delays since the roadway will have insufficient capacity to accommodate the future travel demand. However, the LOS rises to B for a four-lane divided roadway. SR 70 carries significant truck traffic (> 27%) and is part of the Strategic Intermodal System (SIS) highway network. SR 70 provides regional access to agricultural lands, industrial areas, commercial developments and freight distribution facilities across the state of Florida as well as functioning as an important hurricane evacuation route.

This project is identified in the Capital Improvements Element of the 2030 Comprehensive Plan for Highlands County. A large majority of the corridor will continue to be used for agricultural purposes according to the Highlands County Future Land Use Map. In addition, the Highlands County Comprehensive Plan (Policy 12.6.5) indicates that the project segment is part of the designated SR 70 Commercial-Industrial Corridor Area where industrial and commercial growth will be targeted along the corridor. The FDOT anticipates this project will improve connectivity

between the east and west sides of the state, enhance safety along the project corridor, and improve emergency evacuation.

The project is located along SR 70 between CR 29 (MP 17.255) and Lonesome Island Road (MP 21.573). This project lies in Section 1 of Township 38S and Range 30E; Section 31, 32, 33, 34 of Township 37S and Range 31E; Section 3, 4, 5, 6 of Township 38S and Range 31E; Section 36 of Township 37S and Range 30E (Appendix A, Figures 1A and 1B). Drainage basins along the project flow into the Harney Pond Canal (Appendix A, Figure 5). The project is located within the South Florida Water Management District (SFWMD).

The existing conditions floodplain model was used to establish 100-year floodplain elevations and flow rates for the Federal Emergency Management Agency (FEMA) Zone A areas. An initial proposed model was created by removing storage within the basins that were impacted due to the proposed roadway widening. Additionally, estimated stage/area data for the relocated canal was added to their respective nodes. Compensation sites (FPC 1 and FPC 2) were added to the proposed model and were sized appropriately until the proposed 100-year floodplain elevations were less than or equal to the existing 100-year floodplain elevations. The calculations presented in this report are preliminary and help in estimating the size of the floodplain ponds for the roadway widening project. Refer to **Table 1** below for a summary of the floodplain sites.

Table 1: Summary of Preferred Floodplain Sites

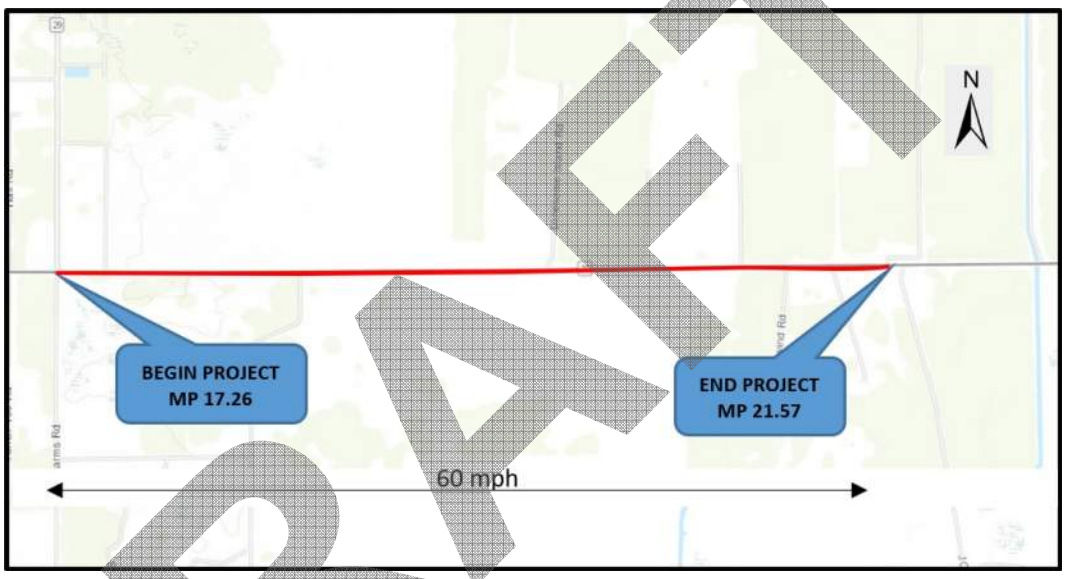
Pond Site	Location	ROW Area (Acres)
FPC 1	10003+32 to 10018+62 RT	19.0
FPC 2	10218+49 to 10232+18 RT	31.5

1.0 GENERAL PROJECT INFORMATION

1.1 INTRODUCTION

The Florida Department of Transportation (FDOT) is performing a Project Development and Environment (PD&E) study to evaluate the widening of approximately 4.3 miles of SR 70 from CR 29 to Lonesome Island Road in Highlands County. This report discusses the reduction of required floodplain compensation by modeling of the floodplain. Two floodplain compensation sites are required for the proposed floodplain impacts. The project limits are shown on **Figure 1**. This report includes reducing the proposed floodplain compensation sites through modeling.

Figure 1: Project Location Map



1.2 SITE LOCATION AND DESCRIPTION

The project will improve operational capacity along SR 70 from CR 29 to Lonesome Island Road in Highlands County. The existing two-lane undivided rural roadway (**Exhibit 1**) will be widened to a four-lane divided roadway with a shared use path. Widening along the existing roadway would involve relocating both the north and south canals. Additionally, the lands to the north of SR 70 between CR 29 and Lonesome Island Road consist of several Wetland Remediation Sites. Therefore, widening to the south and relocating the southern canal was chosen as the preferred alternative (**Figure 2**).

Figure 2: Typical Section

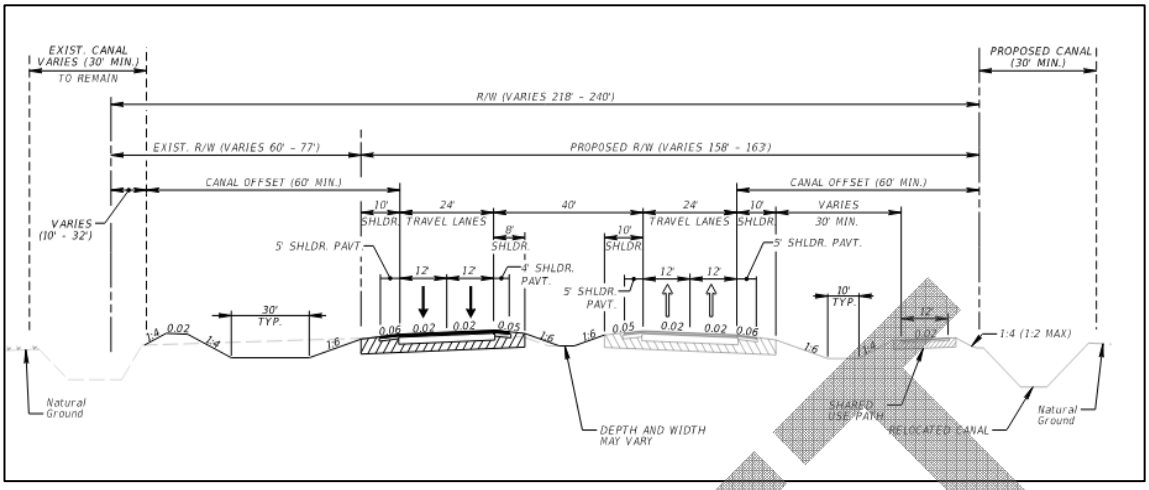


Exhibit 1: SR 70 – Looking East

1.3 SOIL CHARACTERISTICS

Soil information used in the Interconnected Channel and Pond Routing (ICPR) model was taken from the *Natural Resources Conservation Service* (*NRCS) Web Soil Survey* of Highlands County. For more information, please see Figure 2 Appendix A for the Soils Map. **Table 2** summarizes the Hydrologic Soil Group (HSG) and depth to water table of the main soil types located within the project limits. This soil data was imported into ArcGIS and classified into hydrologic soil groups under the NAME category. This was then imported into ICPR and rasterized.

The assumptions for the seasonal high water table (SHWT) determinations are critical for floodplain design. For each floodplain site, an average ground elevation was determined using data from a remote sensing method called Light Detection and Ranging (LiDAR). The *NRCS Web Soil Survey* was used to determine the depth to the SHWT. Using this information, the elevation of the SHWT was determined for each floodplain site.

Table 2: Soil Descriptions

Soil Name	Slope (Percentage)	Hydrologic Soil Group (Type)	Depth to Water (inches)
Paola sand (1)	0 to 8	A	+80
St. Lucie sand (2)	0 to 8	A	+80
Basinger fine sand (3)	0 to 1	A/D	0
Duette sand (4)	0 to 5	A	48 to 72
Daytona sand (5)	0 to 5	A	42 to 60
Placid fine sand (7)	0 to 1	A/D	0
Immokalee sand (8)	0 to 2	B/D	6 to18
Astatula sand (9)	0 to 5	A	+80
Myakka fine sand (10)	0 to 2	A/D	6 to 18
Orsino sand (11)	0 to 5	A	48 to 60
Basinger fine sand (12)	0 to 2	A/D	0 to 12
Felda fine sand (13)	0 to 2	A/D	3 to 18
Satellite sand (14)	0 to 2	A	18 to 42
Bradenton fine sand (15)	0 to 2	B/D	3 to 18
Valkaria fine sand (16)	0 to 2	A/D	3 to 18
Malabar fine sand (17)	0 to 2	A/D	3 to 18
Kaliga muck (18)	0 to 1	C/D	0
Hicoria mucky sand (19)	-	C/D	0
Samsula muck (20)	0 to 1	A/D	0
Hontoon muck (21)	0 to 1	A/D	0
Brighton muck (22)	-	A/D	0
Pineda sand (24)	0 to 2	C/D	3 to 18
Chobee fine sandy loam (25)	0 to 1	C/D	0
Tequesta muck (26)	0 to 1	A/D	0
Archbold sand (28)	0 to 5	A	42 to 72
Oldsmar fine sand (30)	0 to 2	A/D	6 to 18
Arents (32)	-	A	+80
Basinger, St. Johns, and Placid soils (33)	-	A/D	0 to 12
Sanibel muck (35)	-	A/D	0

Soil Name	Slope (Percentage)	Hydrologic Soil Group (Type)	Depth to Water (inches)
EauGallie fine sand (38)	0 to 2	A/D	6 to 18
Arents (40)	-	A	24 to 36
Paola-Basinger sands (45)	-	A	+80
Astatula sand (47)	5 to 12	A	+80
Astatula sand (48)	12 to 20	A	+80
Water (99)	-	-	-

1.4 FEMA FLOODPLAIN INFORMATION

The project site is located on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Community-Panel Numbers 12055C0533C, 12055C0535C and 12055C0555C (effective date November 18, 2015) in Highlands County. The project does not include any FEMA floodways. The proposed alignment impacts several areas designated as Zone A, which are areas of the 100-year floodplain where the base flood elevation has not been determined. For more information, please refer to Figure 4 – FEMA FIRM Map in Appendix A.

2.0 DRAINAGE REFERENCE AND RESOURCE INFORMATION

2.1 MEETINGS

A pre-application meeting with the South Florida Water Management District (SFWMD) was held on January 10, 2019 (Appendix C, C-35).

2.2 RAINFALL INTENSITY DATA

The project includes both open and closed basins. The following storms were modeled in the existing and proposed conditions:

- SFWMD 25-year/72-hour storm (8.52 inches)
- SFWMD 100-year/72-hour storm (11 inches)
- Florida Modified (FLMOD) 2.33-year/24-hour storm (4 inches)
- FLMOD 10-year/24-hour storm (7.44 inches)
- FLMOD 25-year/24-hour storm (7.68 inches)
- FLMOD 50-year/24-hour storm (8.03 inches)
- FLMOD 100-year/24-hour storm (9.14 inches)
- No Rainfall

Additionally, the SFWMD FLMOD 100-year/24-hour storm (9.14 inches) was modeled for closed basins in the existing and proposed conditions.

2.3 RESOURCE FOR ANALYSIS

The following sources were used to locate and size the floodplain compensation

sites:

- FDOT *Drainage Manual*
- FDOT *Drainage Design Guide*
- SFWMD *Environmental Resource Permit (ERP) Applicant's Handbook Volume II*
- Contours derived from LiDAR, SFWMD, 2007
- United States Department of Agriculture (USDA) Soil Conservation Service (SCS) Web Soil Survey
- United States Geological Survey (USGS) Quadrangle Maps (Childs, Brighton)
- FEMA FIRM, effective November 18, 2015 (12055C0533C, 12055C0535C and 12055C0555C)
- TR-55, *Urban Hydrology for Small Watersheds*
- *C-41 Watershed, Arc Hydro Enhanced Database (AHED) Watersheds*, SFWMD

The following SFWMD permits were used to obtain conveyance information outside of the ROW: 28-00097-S, 28-00140-S, 28-00211-S-03, 28-00285-S, 28-00286-S, 28-00408-S, and 28-00670-P. The Datum used in ICPR floodplain model is NAVD88 and requires a datum shift of approximately -0.365 meters (1.20 feet) from NGVD 29 to convert.

3.0 EXISTING DRAINAGE CHARACTERISTICS

3.1 WATERSHED DESCRIPTIONS

The existing drainage patterns were determined using USGS quadrangle maps and LiDAR contours. The off-site drainage basins are shown in the exhibits in Appendix A. The roadway drains through roadside ditches to the three existing crossdrains (CD) within the project limits (See **Table 3**).

Table 3: Crossdrain Summary

No.	Mile Post (MP)	Station	Existing Description	Proposed Description
CD-1	17.900	10037+65	36" CMP	34" X 53" ECP
CD-2	19.251	10109+00	2-53" X 83" CMP	3-53" X 83" CMP
CD-3	21.017	10202+36	2-82" X 128" CMP	2-82" X 128" CMP

4.0 PROPOSED DRAINAGE DESIGN

Stormwater runoff from SR 70 will be collected and conveyed to stormwater management facilities through roadside swales. These stormwater management facilities will provide water quality (treatment) and water quantity (attenuation). The design of the drainage and stormwater facilities will comply with the standards set forth by the FDOT *Drainage*

Manual, FDOT *Drainage Design Guide*, and the SFWMD *ERP Applicant's Handbook Volume II*.

The existing conditions floodplain model yielded initial 100-year floodplain elevations and flow rates for FEMA Zone A areas. This model was then modified into the proposed condition by first accounting for encroachment from the proposed roadway by removing the stage/area, and thus the storage capacity, from the ICPR nodes. Additionally, estimated stage/area data for the relocated canal was added to their respective nodes. This model was run as a preliminary proposed condition to determine if any further compensation was necessary. Floodplain compensation sites, FPC 1 and FPC 2, were added and sized appropriately to reduce the proposed 100-year floodplain elevations so that they were less than or equal to the existing 100-year floodplain elevations. Refer to the floodplain calculations in Appendix B.

5.0 ICPR MODEL

5.1 MODEL BOUNDARY AND BASIN DELINEATION

The boundary for this model was modified from the existing C-41 AHED Watershed boundary provided by the SFWMD to exclude areas that did not produce runoff that would flow across the project area (Appendix A, Figure 8). This reduced the initial effort required in constructing the hydrologic network and reduced the runtime required for each simulation. Only the portion draining through the project area and into C-41 was included in the model. This eliminates areas to the east of C-41 as well as the southernmost reaches. Additional modifications were made based on ArcHydro flow estimates. The eastern boundary was set at the C-41 canal. The northern boundary was set along CR 621 E and cuts through a parcel of farmland to the northeast until intersecting with the eastern boundary. The western boundary below SR 70 was altered to extend no further than the beginning of the ridge except for the southwestern-most portion, which extends to the US 27 Hicoria Road intersection. North of SR 70, the western boundary extends to Old SR 8. The southern boundary terminates in farmland. A map of the study area is included in Appendix A (Figure 5).

Basins were delineated using ArcHydro toolsets under the assumption that the terrain was deranged. This can be corroborated by the topography indicated in the raster dataset file utilized called HHD_NW_DEM (Herbert Hoover Dike Northwest Digital Elevation Model). Initially, the Southwest Florida Water Management District (SWFWMD) workflow was used, though this was later modified using the Environmental Systems Research Institute (ESRI) workflow for deranged systems. The methodology utilized the guidelines and recommendations put forth by the SWFWMD Standard Operating Procedure (SOP) for the selection of sinks. This process is shown below. Following this, basins were manually grouped to better represent the local hydrology and account for

man-made divides. This included pumps to drop structures that serve to connect or disconnect the boundaries generated in ArcGIS.

1. Perform Sink Evaluation
2. Selection of Sinks Process
3. Create Sink Structures
4. Fill Sinks
5. Flow Direction
6. Adjust Flow Direction in Sinks
7. Sink Watershed Delineation

5.2 HYDRAULIC CHARACTERISTICS

5.2.1 LAND USE

The land use required to calculate the curve numbers (CNs) within ICPR were obtained from the SWFWMD for the 2014-2016 years. This file was then modified to better represent the extensive network of agricultural canals which were initially miscategorized. Additionally, wetland areas were checked and amended against SFWMD information to provide the most accurate information for the model inputs.

5.2.2 SOILS

Soil data was obtained through the USDA NRCS Web Soil Survey (SSURGO) and was classified into hydrologic soil groups (HSG) within ArcGIS prior to import into the ICPR model. The HSG for the area of interest were A, A/D, B/D, C/D, and D. Additionally, an HSG of W was included as an override condition for areas that are permanently inundated.

5.2.3 CURVE NUMBER

The curve number lookup table used for both the Existing and Proposed Conditions Models was created based on classifications found in the 2020 FDOT *Drainage Manual*. Some classifications pertaining to agricultural lands were found in Table 2-2A, 2-2B, and 2-2C of the TR-55 manual (210-VI-TR- 55, Second Ed., June 1986) which includes classifications for Fallow, Brush, and Orchard or Tree Farms.

5.3 MODEL PARAMETERS

Time of concentration for the basins was determined using the methods outlined in the 2020 FDOT *Drainage Manual*. After 100’ of overland flow, the regime shifts to that of shallow concentrated flow. Time of concentration calculations are included in Appendix B.

Node storage was calculated by constructing a one foot increment stage/area node polygon based on the basin boundaries delineated in ArcGIS. The HHD_NW_DEM was used as the defining surface, where possible, the Digital

Elevation Model (DEM) generated from survey contours was utilized.

Boundary conditions for the C-41A canal were determined from Appendix A of the "Canals in South Florida: A Technical Support Document" as the upper boundary (EL. 40.0') and the HHD_NW_DEM as the lower boundary (EL. 30.9'). Boundary conditions for the C-41 canal outfall were taken from the USGS stream gage 02273230. Data used to construct the time/stage table were taken from September 9, 2017, to September 13, 2017 which coincides with Hurricane Irma. This represents the most conservative case and will accurately represent outfall conditions for this designated hurricane evacuation route. The data indicates the effects of regulation by spillways both upstream and downstream of the gage, resulting in a maximum recorded stage of 27.01 feet. The mean daily stage over 116 years is approximately 24.50 feet.

Existing pipes along the SR 70 corridor were determined using survey. Pipes outside of the existing SR 70 ROW were either obtained from existing permits and hydrologic models or were estimated using aerial imagery and DEM data.

In order to avoid glass wall conditions, irregular weirs were placed along the boundary of every basin. These weir links were defined by irregular cross sections generated using the HHD_NW_DEM and a simplification tolerance of 0.005. In cases where permit information existed, these irregular weirs were removed and replaced by the permit data.

Several offsite drop structures were observed on aerial imagery. Many of them appear to be simple CMP with a circular riser. The riser elevation for many of these structures could not be determined using aerial imagery and DEM approximation alone. Therefore, drop structures were approximated as pipes with the upstream control elevation reflecting the elevation from the HHD_NW_DEM.

Several pumps were found through SFWMD Consumptive Use Permits. Rating curves for these were conservatively estimated as full-flow with a 100% efficiency.

In the Proposed Condition Model, the storage capacity of the basins along the roadway were altered from the Existing Condition Model. Stage/area node polygons for the proposed roadway widening, canal relocation, and FPC sites were generated in ICPR and then tabulated using the HHD_NW_DEM. These were used to account for the storage removed. The storage encompassed by the roadway widening polygon was removed from the node entirely. The canal relocation polygon approximated the existing canal conditions. This was then moved adjacent to the roadway widening polygon and the existing storage conditions there were then replaced.

The FPC site polygons underwent a similar process; storage lost from the existing condition was generated and replaced with the proposed storage from the

floodplain site. FPC 1 added storage to node 0350 and FPC 2 added storage to node 0810.

Several crossdrains were altered to facilitate drainage conditions in the Proposed Condition Model. CD-1, formerly a 36" CMP, was replaced with a 34" X 53" ECP. A third pipe 53" X 83" was added to CD-2 in the Proposed Condition Model.

5.4 MODEL DEBUG AND STABILIZATION

The 100-year/24-hour storm, 2.33-year/24-hour storm, and the No Rainfall simulations were used to conduct debug and stabilization tests. Continuity Error was kept minimal as the time step was kept at no greater than 0.25 hours. Each storm, regardless of rainfall duration was given a 72-hour run-time in order to provide data observe trends beyond the 24-mark. This was primarily used to monitor hydrographs for flow reversals, sudden changes, instability, or unusual trends that required justification. Significant initial flows were observed and corrected using time series tables to search for outliers. No data pertaining to cross sections or nodes was extrapolated, information was strictly interpolated using provided data. Missing interconnections (glass walls) were largely eliminated by thorough examination of aerial imagery. Irrigation pipes were found using aerial imagery and then input as links between respective basins. Furthermore, irregular weir cross sections were placed along basin boundaries to define their weir links.

5.5 MODEL CALIBRATION AND VERIFICATION

Since the USGS stream gage was used as the outfall stage condition, and no other USGS stream gage was observed, calibration was indeterminant, largely due to the C-41 spillways to the north, south, and east (S-70, S-75, and S-82).

5.6 MODEL VALIDATION

The model was validated using the edge of pavement (EOP) elevations observed along weir cross sections along SR 70 and the stages of nodes immediately adjacent. The stages generated from the 100-year/24-hour storm did not exceed the EOP in any roadway-adjacent node.

The FEMA FIRM maps 12055C0533C, 12055C0535C, and 12055C0555C (November 18, 2015) describe the model area as Zone A, indicating that no base flood elevations have been determined. However, the flood hazard area presented in the FEMA maps was estimated to be approximately 33.8' based on matching contours and covers a larger area than the ICPR model. The ICPR model shows the floodplain in greater detail as shown on the flood maps (Appendix B). The model shows the flooding of the adjacent farmland based on the grading of the crop rows. The model also shows there are similarities between the two

floodplain approximations, namely the hazard area coverage towards the beginning of the project to the south of SR 70 and along the ridge towards the end of the project to the south of SR 70.

5.7 MODEL RESULTS

The 100-year floodplain elevations were initially established for FEMA Zone A areas using the existing floodplain model. The model shows that the 100-year/24-hour floodplain stages did not increase in any node in the proposed conditions model due to the sufficient storage provided by the floodplain compensation sites, revising CD-1 from 36" round to elliptical 34" X 53" pipe and the addition of a third equalizer pipe at CD-2. The results of each storm simulation appear in Appendix B.

6.0 FPC SITE INFORMATION

6.1 FLOODPLAIN COMPENSATION SITE LOCATIONS

Floodplain compensation sites will be required for the floodplain impacts located along the project corridor. Aerial photographs, field reconnaissance, and information from the Highlands County Property Appraiser were used to locate these potential sites. During the design phase of the project, the FPC configurations may vary from the assumptions in this report based on actual conditions. A determination will need to be done during the design phase of the project to determine any changes to the 100-year floodplain elevations. Refer to Appendix B for floodplain encroachment/compensation calculations for Alternative 2. Below is a discussion of the proposed floodplain compensation ponds.

6.2.1 FLOODPLAIN COMPENSATION SITE 1

FPC 1 is a 19-acre pond site located on the south side of SR 70 from Sta. 10003+32 to 10018+62 RT. FPC 1 is located adjacent to the proposed SR 70 ROW. This site will provide 18.5 acre-feet of floodplain compensation in 1.0 feet of depth of excavation. The existing ground elevation for FPC 1 was determine by creating a stage/area polygon in ICPR and generating tabular data using HHD_NW_DEM as the elevation surface. Soils within this site include Felda fine sand (13) with an HSG Type A/D, Immokalee sand (8) with an HSG Type B/D, and a small portion of Sanibel muck (35) with an HSG Type A/D. FPC 1 lies within node N-0350 which includes both offsite and onsite areas as well as the canal. The south side of the project area drains into a series of interconnected irrigation canals spanning the entire watershed. Therefore, with FPC 1 attached to the canal in N-0350, it will be directly hydraulically connected to the canals to the west and east. FPC 1 can connect directly to this canal using a swale. Though no borings have been taken in this area to determine the SHWT, an estimation was performed using the NRCS soil survey depth to water table using the 44.0' elevation determined from the DEM. The SHWT was estimated to be 43.0'

and the floodplain site will be excavated to this elevation. This site impacts approximately 0.14 acres of forested wetlands.

6.2.2 FLOODPLAIN COMPENSATION SITE 2

FPC 2 is a 31.5-acre pond site located on the south side of SR 70 from Sta. 10218+49 to 10232+18 RT. An easement is proposed from SR 70 to FPC 2 for access. This site will provide approximately 30 acre-feet of floodplain compensation in 1.0 feet of depth of excavation. Soils within this site are classified as Immokalee sand (8) with an HSG Type B/D. FPC 2 lies within N-0810 which includes both onsite and offsite areas that consist mostly of orchards/tree farms. The south side of the project area drains into a series of interconnected irrigation canals spanning the entire watershed prior to out falling into C-41 Harney Pond Canal. Therefore, with FPC 2 attached to an offsite agricultural canal within N-0810, it will be directly hydraulically connected to the canals on the East end of the project. FPC 2 can connect directly to this canal using a swale or an equalizer pipe. Though no borings have been taken in this area to determine the SHWT, an estimation was performed using the NRCS soil survey depth to water table using the 34' elevation determined from the DEM. The SHWT was estimated to be 33' and the floodplain site will be excavated to this elevation. This site impacts no wetlands.

7.0 CONCLUSIONS

The ICPR model of the floodplain determined that a 19-acre site (FPC 1) at Sta. 10003+32 to 10018+62 RT on the south side of SR 70 and a 31.5-acre site (FPC 2) at Sta. 10218+49 to 10232+18 RT on the south side of SR 70 will provide the required floodplain compensation for the proposed roadway improvements.

Users of this report are cautioned that the following floodplain compensation site sizes and locations were determined from preliminary data and calculations and reasonable engineering judgment and assumptions. Pond sizes and configurations may change during final design as more detailed information on seasonal high water elevations, property boundaries, etc. becomes available.

APPENDIX A
FIGURES

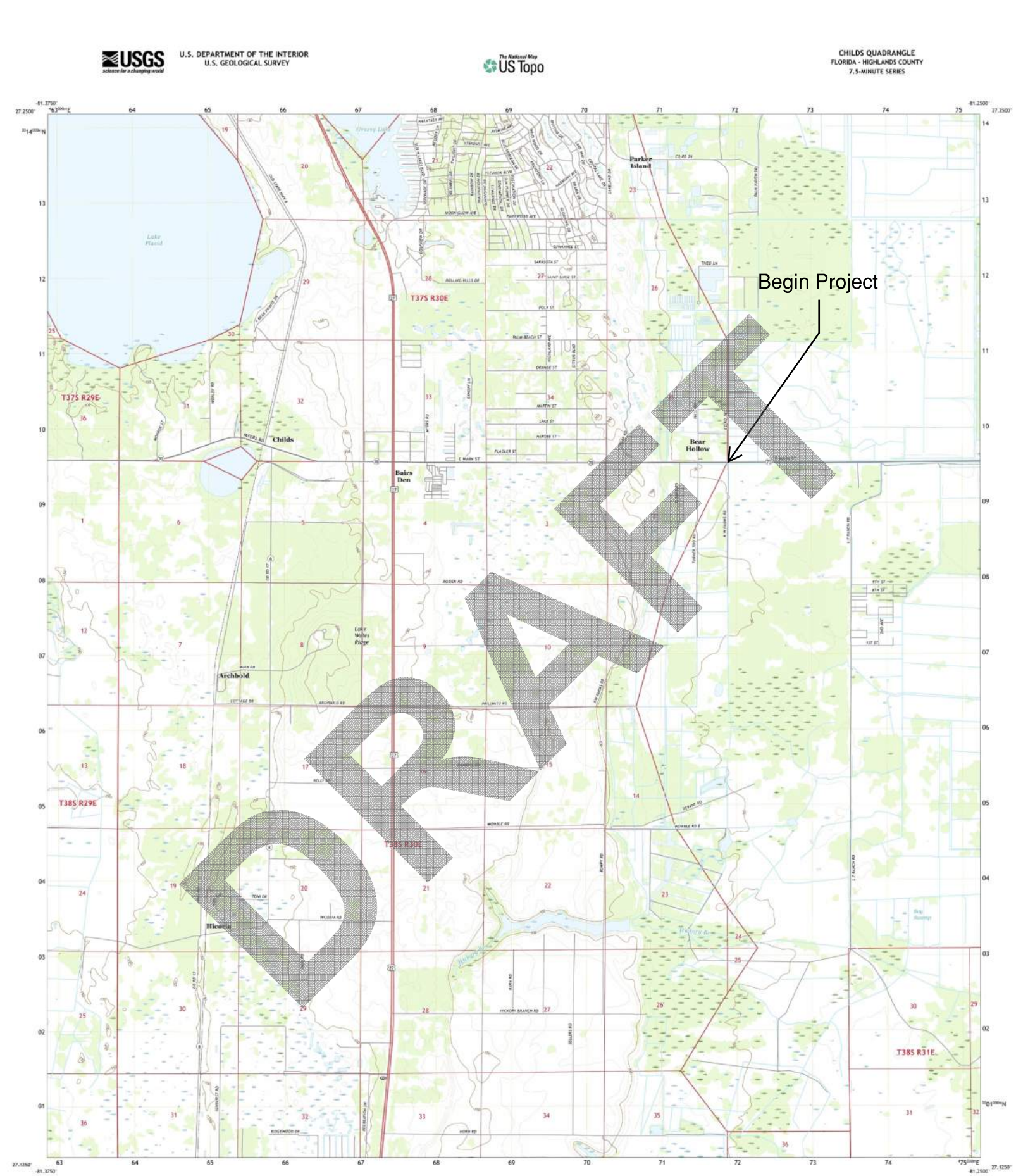


Figure 1A: USGS Childs Quadrangle Map

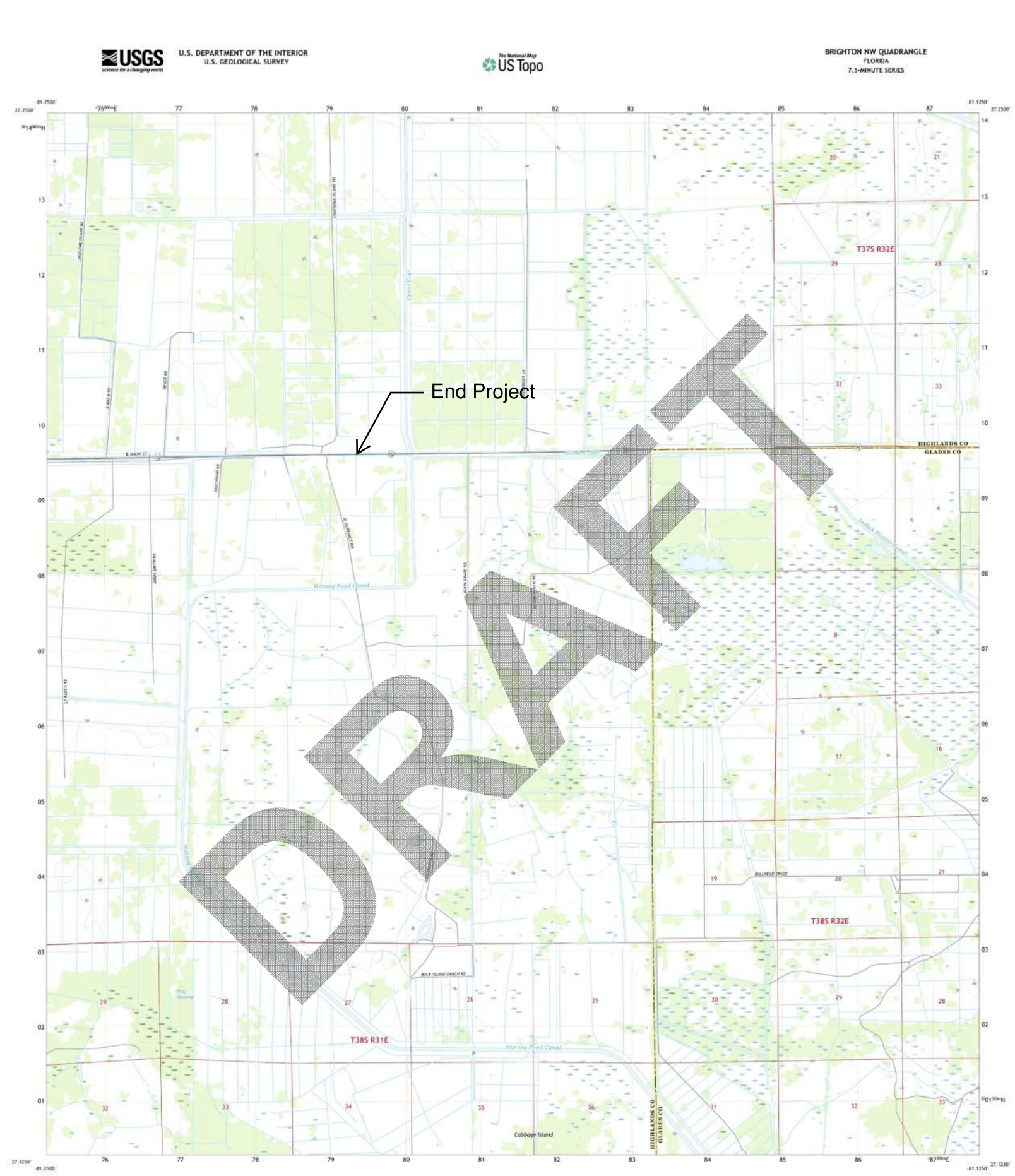
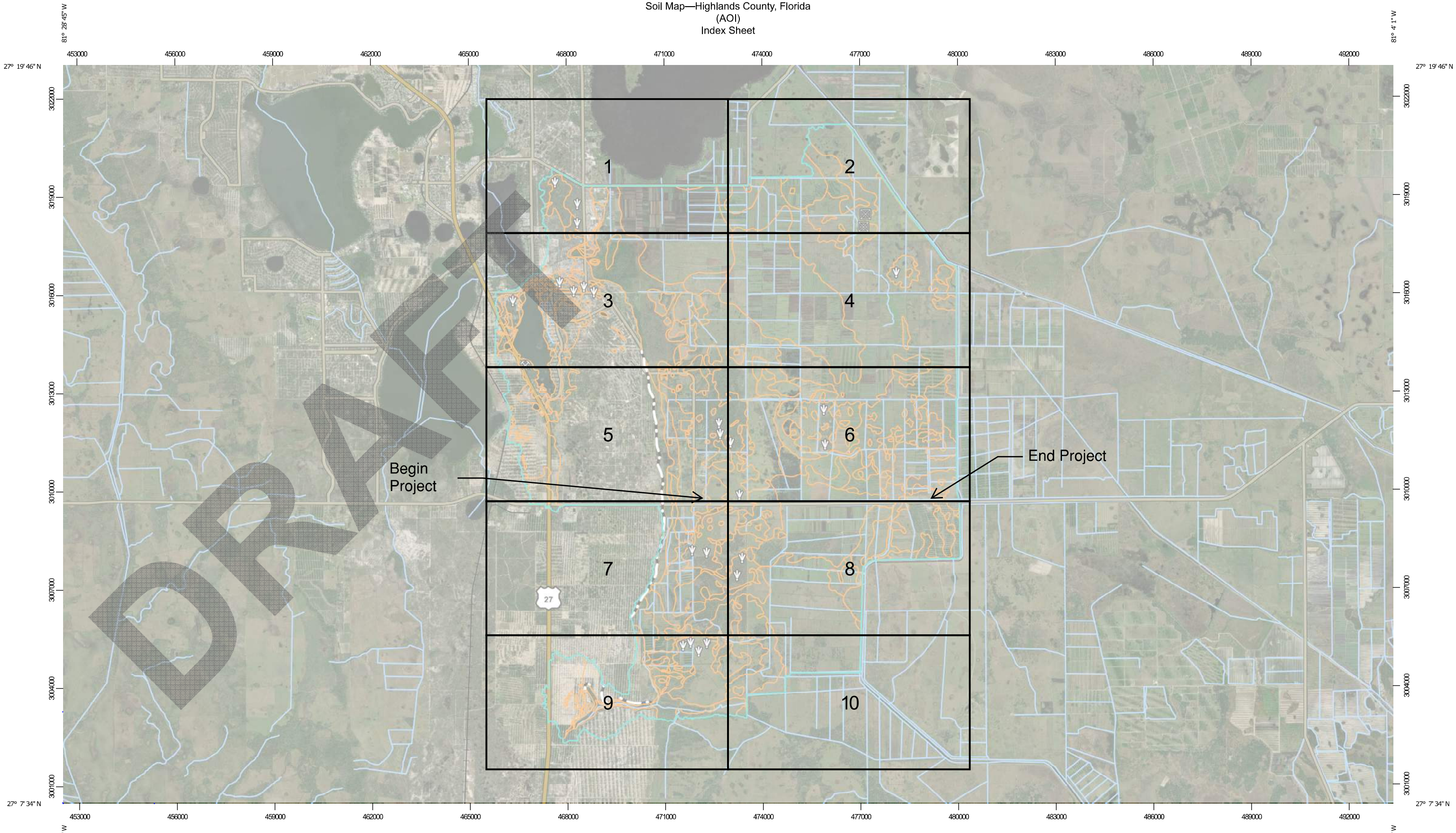


Figure 1B: USGS Brighton Quadrangle Map

Soil Map—Highlands County, Florida
(AOI)
Index Sheet



Map Scale: 1:110,000 if printed on B landscape (17" x 11") sheet.

N

Meters
0 1500 3000 6000 9000

Feet
0 5000 10000 20000 30000

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

Figure 2: Soils Map

81° 20' 53" W — 81° 16' 23" W
27° 19' 13" N — 27° 17' 0" N
465700 466300 466900 467500 468100 468700 469300 469900 470500 471100 471700 472300 472900
3021700 3021100 3020500 3019900 3019300 3018700 3018100

Oak Ave
Hallmark
Falcon St
Acalpha St
Highlands Lake
1st St
Orchid St
621
Orange St
Holmes
My Way Ln
Weeks Rd
County Road 621 E
621
Abell Rd

1 5 5 28 2 2 28 28 2 5 28 20 14 22 21 18 26

Joins sheet 2
Joins sheet 3
Joins sheet 4

Map Scale: 1:20,000 if printed on B landscape (17" x 11") sheet.
Meters: 0 250 500 1000 1500
Feet: 0 500 1000 2000 3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

Map Sheet Location: 1

Figure 2: Soils Map

81° 16' 23" W — 81° 11' 54" W
27° 19' 13" N — 27° 17' 0" N

473100 473700 474300 474900 475500 476100 476700 477300 477900 478500 479100 479700 480300

3021700 3021100 3020500 3019900 3019300 3018700 3018100

County Hwy 621

35 35 35 35 26 18 15 32 20 35 21 18 26 99 12 18 18 21 22 18

Joins sheet 1 — Joins sheet 3 — Joins sheet 4

Map Scale: 1:20,000 if printed on B landscape (17" x 11") sheet.

N

0 250 500 1000 1500 Meters

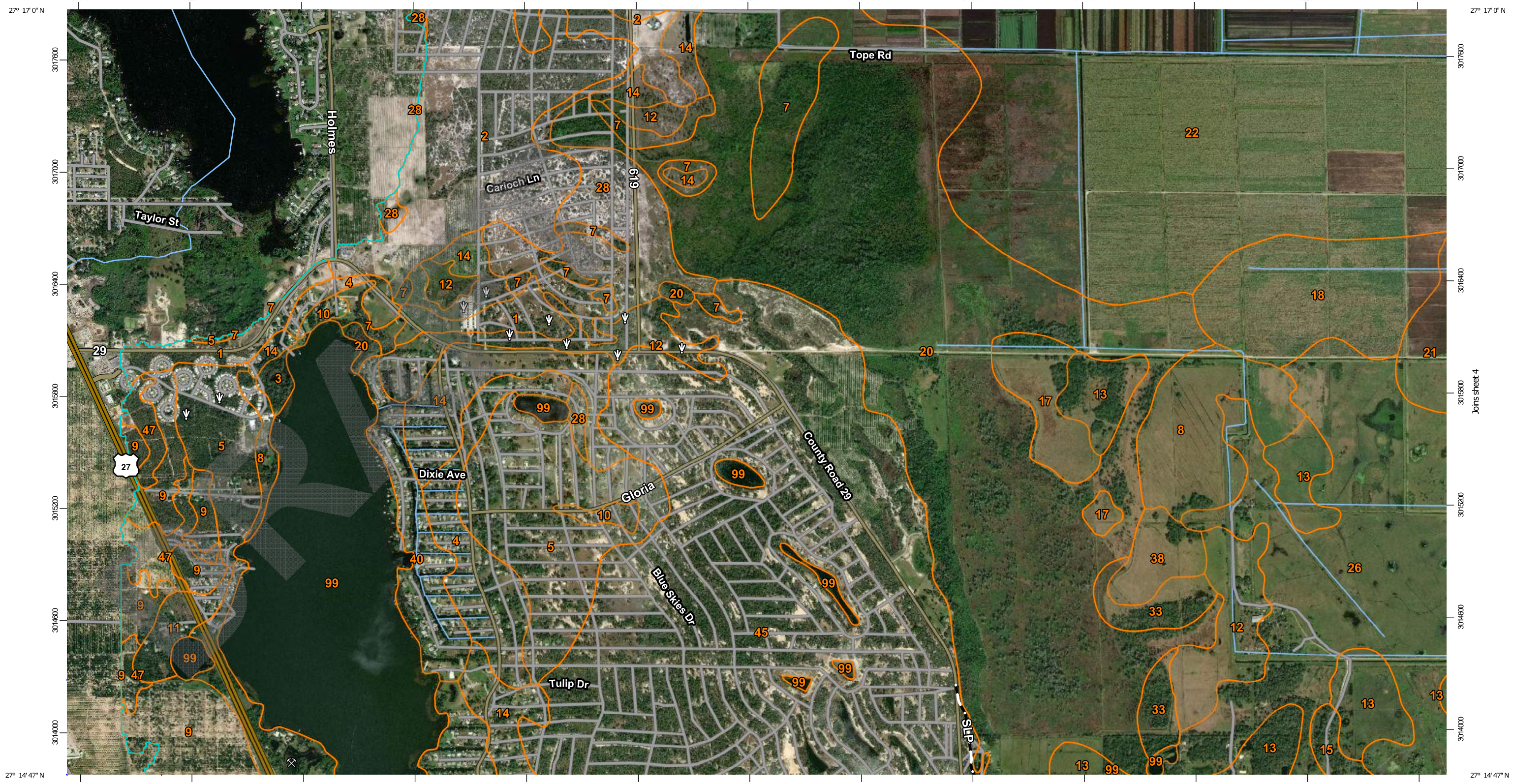
0 500 1000 2000 3000 Feet

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

Figure 2: Soils Map

	2

Map Sheet Location



Map Scale: 1:20,000 if printed on B landscape (17" x 11") sheet.

N

Meters
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Feet
0 500 1000 2000 3000

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

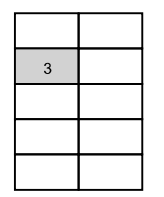


Figure 2: Soils Map

Joins sheet 1

81° 16' 23" W

81° 11' 54" W

27° 17' 0" N

473100 473700 474300 474900 475500 476100 476700 477300 477900 478500 479100 479700 480300

3017600 3017000 3016400 3015800 3015200 3014600 3014000

Joins sheet 3

27° 14' 47" N

Joins sheet 5

Joins sheet 6

Map Scale: 1:20,000 if printed on B landscape (17" x 11") sheet.

N

Meters
0 250 500 1000 1500

Feet
0 500 1000 2000 3000

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

Figure 2: Soils Map

4

Map Sheet Location

Soil Map—Highlands County, Florida
(AOI)
Map sheet 5 of 10
Joins sheet 3

81° 20' 53" W
81° 16' 23" W
Joins sheet 4
27° 14' 47" N
27° 12' 34" N
Joins sheet 7
Joins sheet 6
Joins sheet 8

465600 466200 466800 467400 468000 468600 469200 469800 470400 471000 471600 472200 472800

3013500 3012900 3012300 3011700 3011100 3010500 3009900

Paradise Ave
Sun N Lakes
Wildwood Dr
Fascination Dr
SLP
29
El Dorado Dr
Saint Lucie St
Polk St
Brevard Rd
Citrus Blvd
Old State Road 8
27
Penna Ave
Martin St
Hardee St
County Road 29
Coots Rd

Map Scale: 1:20,000 if printed on B landscape (17" x 11") sheet.
Meters 0 250 500 1000 1500
Feet 0 500 1000 2000 3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

Figure 2: Soils Map

Map Sheet Location

Soil Map—Highlands County, Florida
(AOI)
Map sheet 6 of 10
Joins sheet 4

Joins sheet 3

81° 16' 23" W

81° 11' 54" W

27° 14' 47" N

27° 12' 34" N

473100 473700 474300 474900 475500 476100 476700 477300 477900 478500 479100 479700 480300

3013500 3012900 3012300 3011700 3011100 3010500 3009900

Joins sheet 5

Joins sheet 7

Joins sheet 8

Map Scale: 1:20,000 if printed on B landscape (17" x 11") sheet.

N

Meters
0 250 500 1000 1500

Feet
0 500 1000 2000 3000

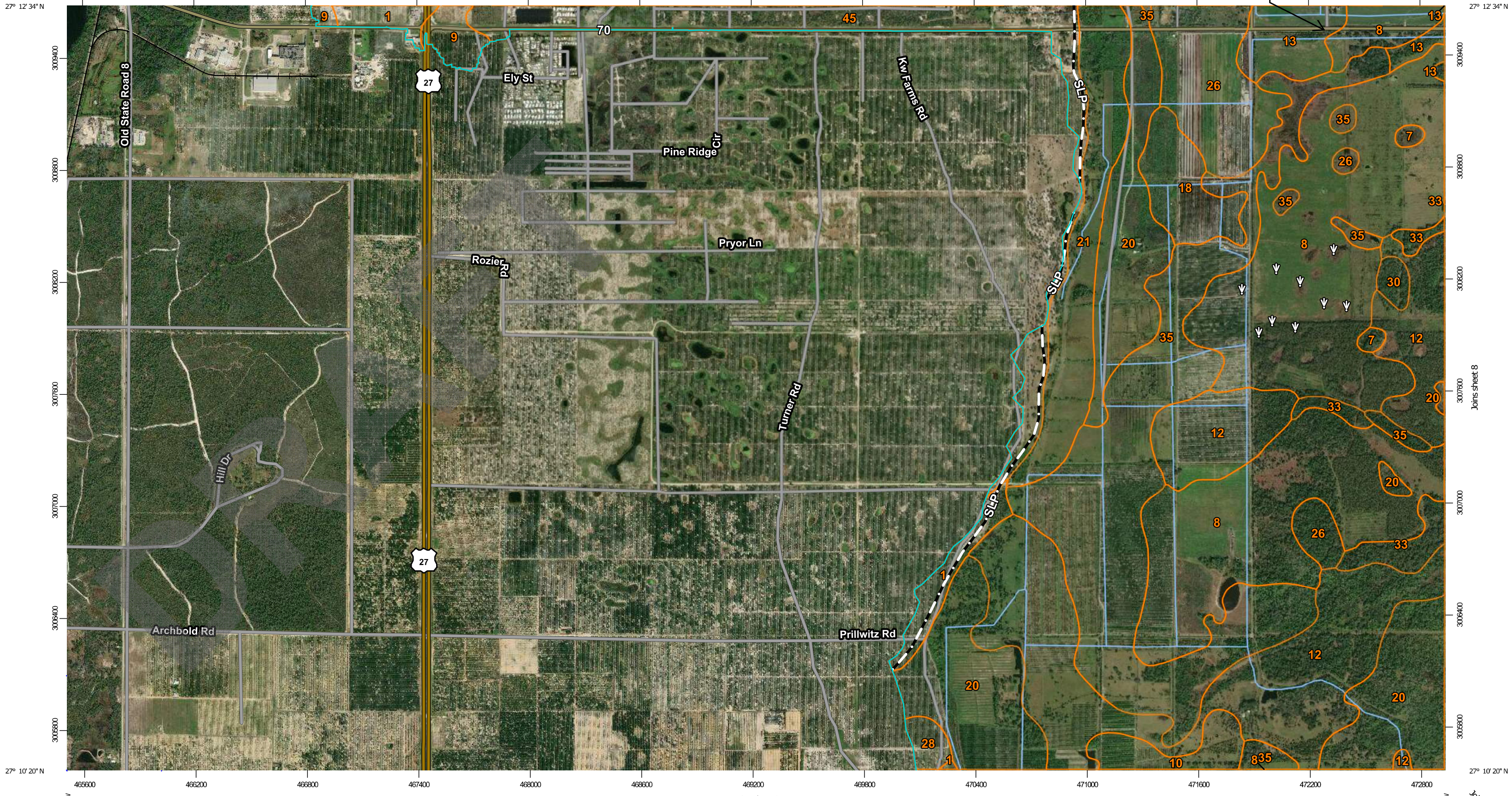
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

Figure 2: Soils Map

6

Map Sheet Location

Begin Project



Joins sheet 6
Joins sheet 8
Joins sheet 9
Joins sheet 10

81° 20' 53" W · 81° 16' 23" W · 27° 12' 34" N · 27° 10' 20" N

465600 · 466200 · 466800 · 467400 · 468000 · 468600 · 469200 · 469800 · 470400 · 471000 · 471600 · 472200 · 472800

3009400 · 3008800 · 3008200 · 3007600 · 3007000 · 3006400 · 3005800

Map Scale: 1:20,000 if printed on B landscape (17" x 11") sheet.

Meters: 0 · 250 · 500 · 1000 · 1500

Feet: 0 · 500 · 1000 · 2000 · 3000

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

N

Figure 2: Soils Map

Map Sheet Location

End Project

Joins sheet 5

81° 16' 23" W

81° 11' 54" W

27° 12' 34" N

27° 10' 20" N

473000 473600 474200 474800 475400 476000 476600 477200 477800 478400 479000 479600 480200

3008400 3008800 3009200 3009400 3007600 3007000 3006400 3005800

Dosia Smith Rd

Jc Durrance Rd

Joins sheet 7

Joins sheet 9

Joins sheet 10

Map Scale: 1:20,000 if printed on B landscape (17" x 11") sheet.

N

Meters
0 250 500 1000 1500

Feet
0 500 1000 2000 3000

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

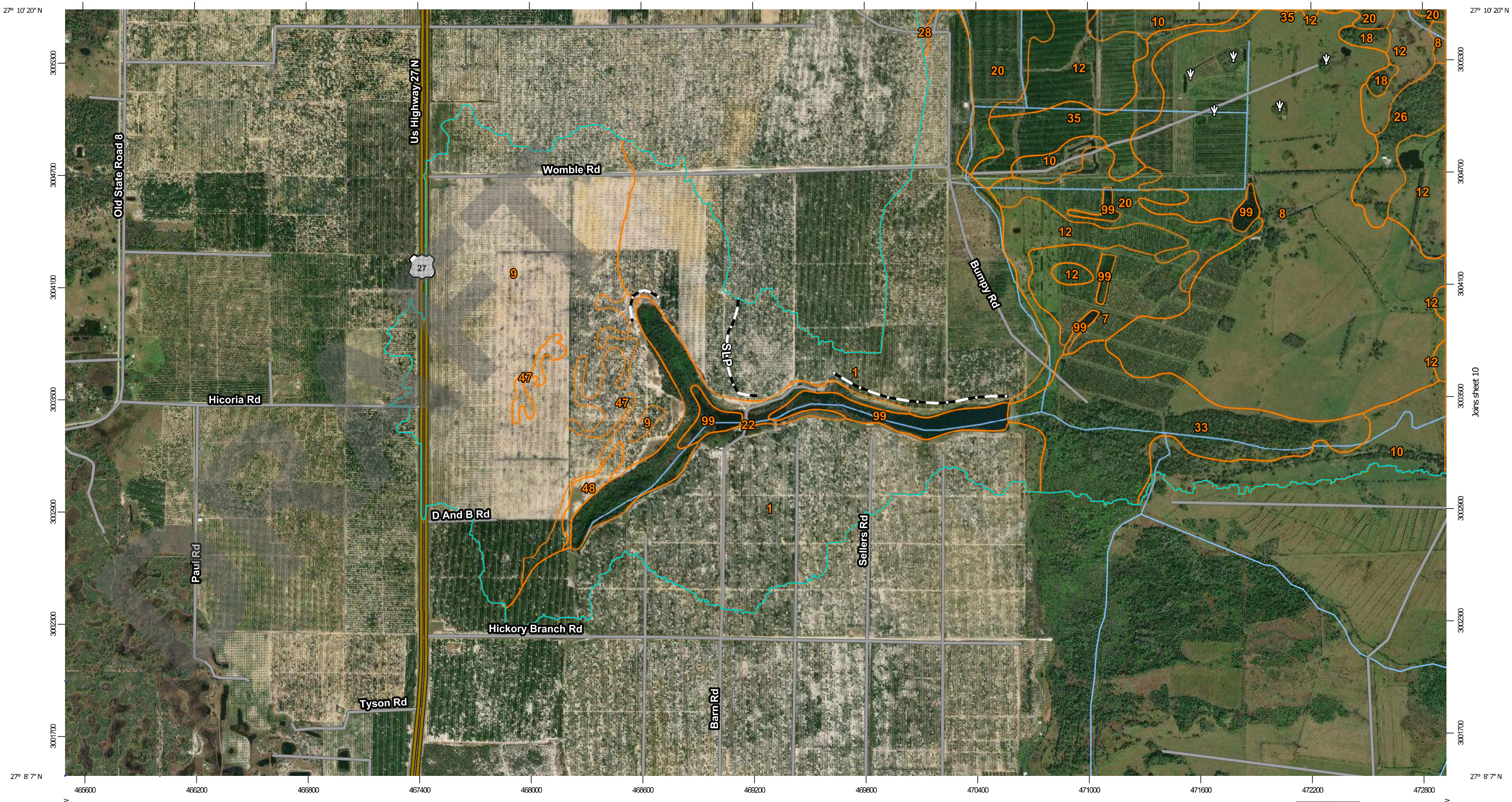
Figure 2: Soils Map

Map Sheet Location

Soil Map—Highlands County, Florida
(AOI)
Map sheet 9 of 10
Joins sheet 7

Joins sheet 8

Joins sheet 10



Map Scale: 1:20,000 if printed on B landscape (17" x 11") sheet.
Meters: 0 250 500 1000 1500
Feet: 0 500 1000 2000 3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

Figure 2: Soils Map

Map Sheet Location

Soil Map—Highlands County, Florida
(AOI)
Map sheet 10 of 10
Joins sheet 8

Joins sheet 7

81° 16' 23" W

81° 11' 54" W

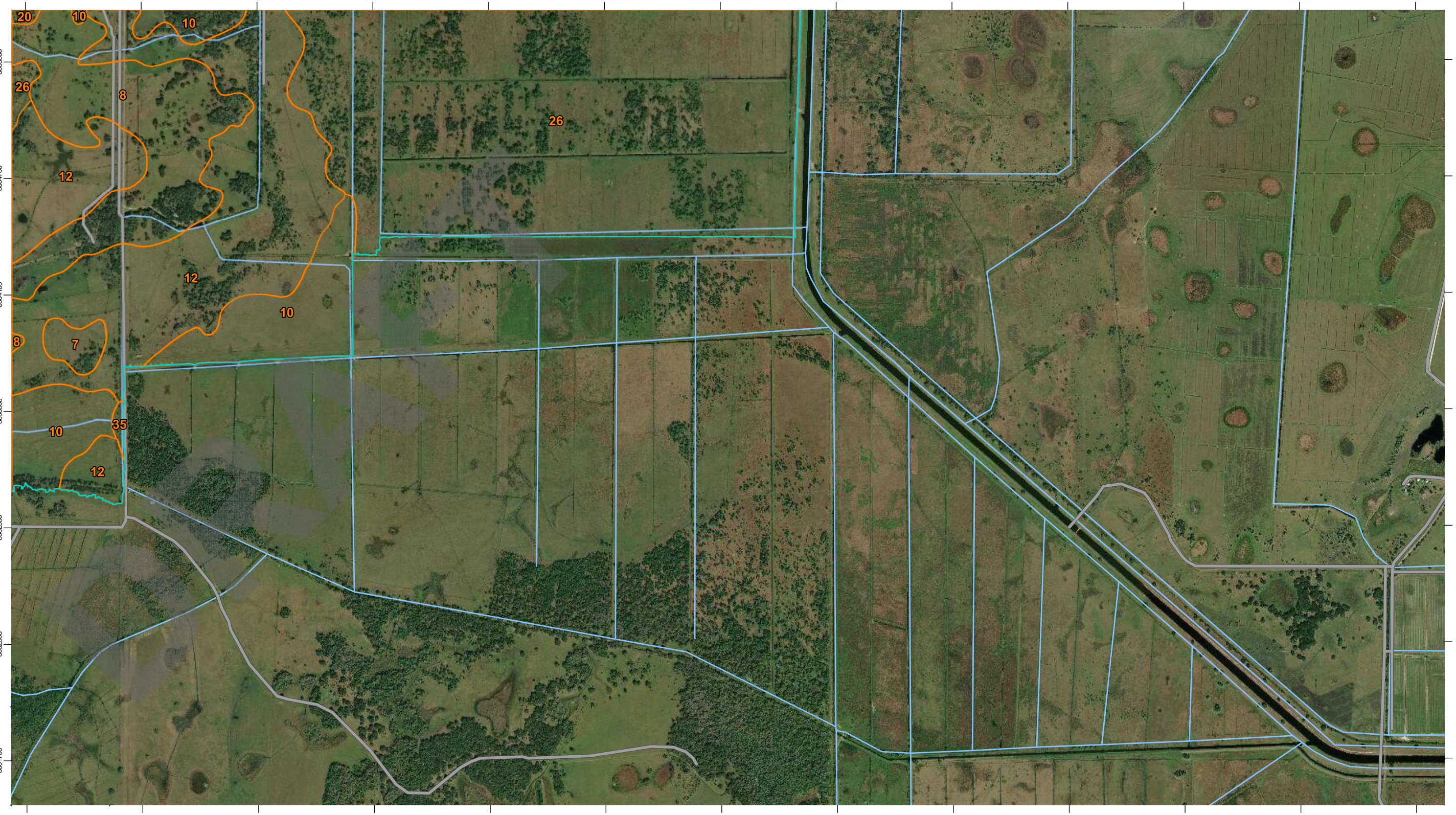
27° 10' 20" N

27° 8' 7" N

473000 473600 474200 474800 475400 476000 476600 477200 477800 478400 479000 479600 480200

3005300 3004700 3004100 3003500 3002900 3002300 3001700

Joins sheet 9



Map Scale: 1:20,000 if printed on B landscape (17" x 11") sheet.

N

Meters
0 250 500 1000 1500

Feet
0 500 1000 2000 3000

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

Figure 2: Soils Map

Map Sheet Location

	10

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

Soil Survey Area: Highlands County, Florida
Survey Area Data: Version 20, Jun 8, 2020

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

Date(s) aerial images were photographed: Oct 20, 2011—Dec 9, 2017

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Paola sand, 0 to 8 percent slopes	1,219.8	2.7%
2	St. Lucie sand, 0 to 8 percent slopes	638.6	1.4%
3	Basinger fine sand, frequently ponded, 0 to 1 percent slopes	11.2	0.0%
4	Duette sand, 0 to 5 percent slopes	117.1	0.3%
5	Daytona sand, 0 to 5 percent slopes	528.1	1.2%
7	Placid fine sand, frequently ponded, 0 to 1 percent slopes	248.0	0.6%
8	Immokalee sand, 0 to 2 percent slopes	2,737.9	6.1%
9	Astatula sand, 0 to 5 percent slopes	1,498.2	3.3%
10	Myakka fine sand, 0 to 2 percent slopes	606.3	1.3%
11	Orsino sand, 0 to 5 percent slopes	48.6	0.1%
12	Basinger fine sand, 0 to 2 percent slopes	2,824.2	6.3%
13	Felda fine sand, 0 to 2 percent slopes	3,973.9	8.8%
14	Satellite sand, 0 to 2 percent slopes	276.7	0.6%
15	Bradenton fine sand, 0 to 2 percent slopes	181.3	0.4%
16	Valkaria fine sand, 0 to 2 percent slopes	19.9	0.0%
17	Malabar fine sand, 0 to 2 percent slopes	136.1	0.3%
18	Kaliga muck, frequently ponded, 0 to 1 percent slopes	7,992.1	17.7%
19	Hicoria mucky sand, depressional	448.1	1.0%
20	Samsula muck, frequently ponded, 0 to 1 percent slopes	2,008.0	4.5%
21	Hontoon muck, frequently ponded, 0 to 1 percent slopes	3,069.7	6.8%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
22	Brighton muck	2,094.3	4.7%
24	Pineda sand, 0 to 2 percent slopes	131.7	0.3%
25	Chobee fine sandy loam, frequently ponded, 0 to 1 percent slopes	855.7	1.9%
26	Tequesta muck, frequently ponded, 0 to 1 percent slopes	6,423.2	14.3%
28	Archbold sand, 0 to 5 percent slopes	297.7	0.7%
30	Oldsmar fine sand, 0 to 2 percent slopes	117.8	0.3%
32	Arents, very steep	33.7	0.1%
33	Basinger, St. Johns, and Placid soils	304.7	0.7%
35	Sanibel muck	981.6	2.2%
38	EauGallie fine sand, 0 to 2 percent slopes	40.3	0.1%
40	Arents, organic substratum	82.5	0.2%
45	Paola-Basinger sands, rolling	4,210.3	9.4%
47	Astatula sand, 5 to 12 percent slopes	175.3	0.4%
48	Astatula sand, 12 to 20 percent slopes	10.7	0.0%
99	Water	683.2	1.5%
Totals for Area of Interest		**45,026.5**	**100.0%**

Figure 3: Existing Land Use Map

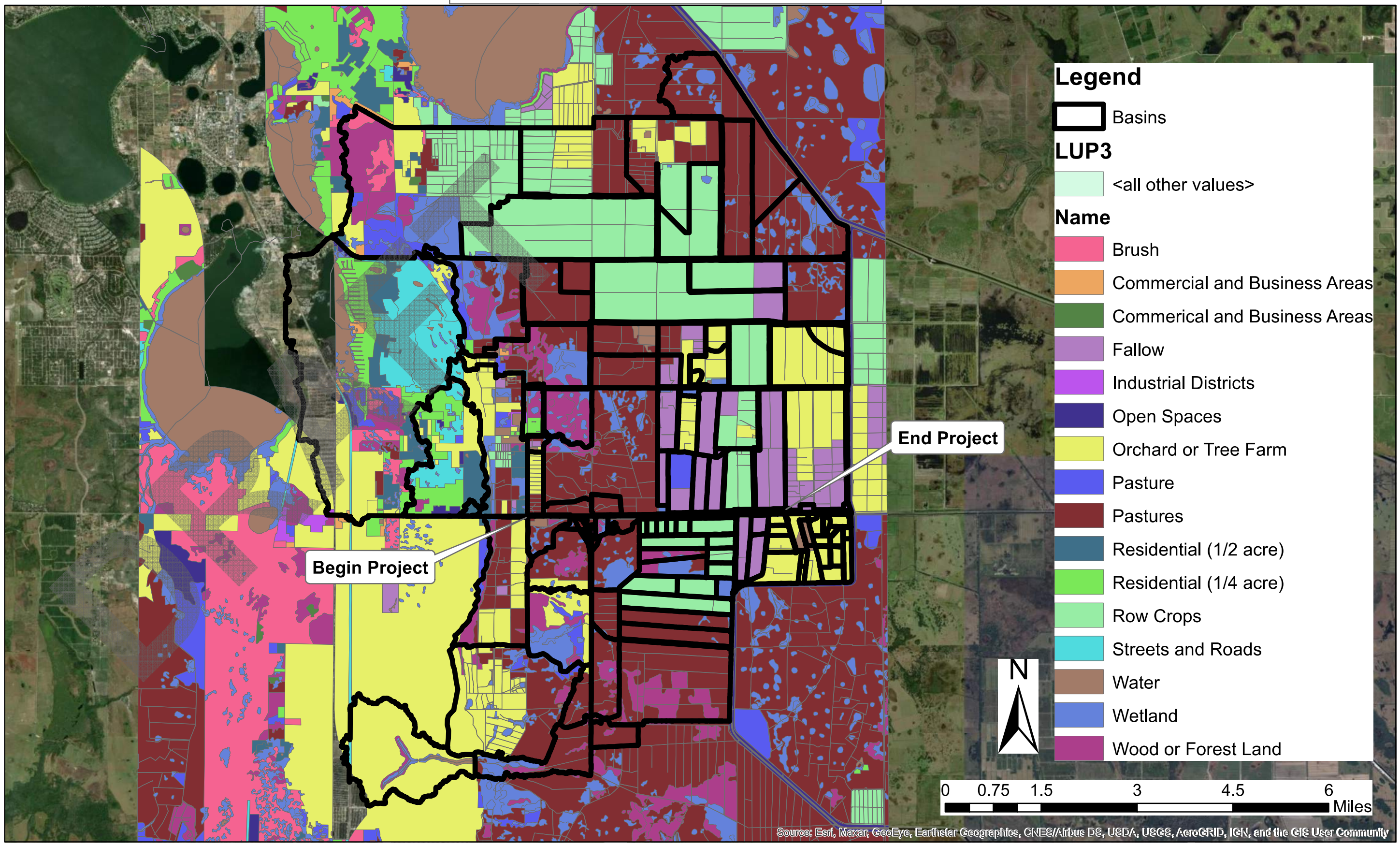


Figure 3: Land Use Map

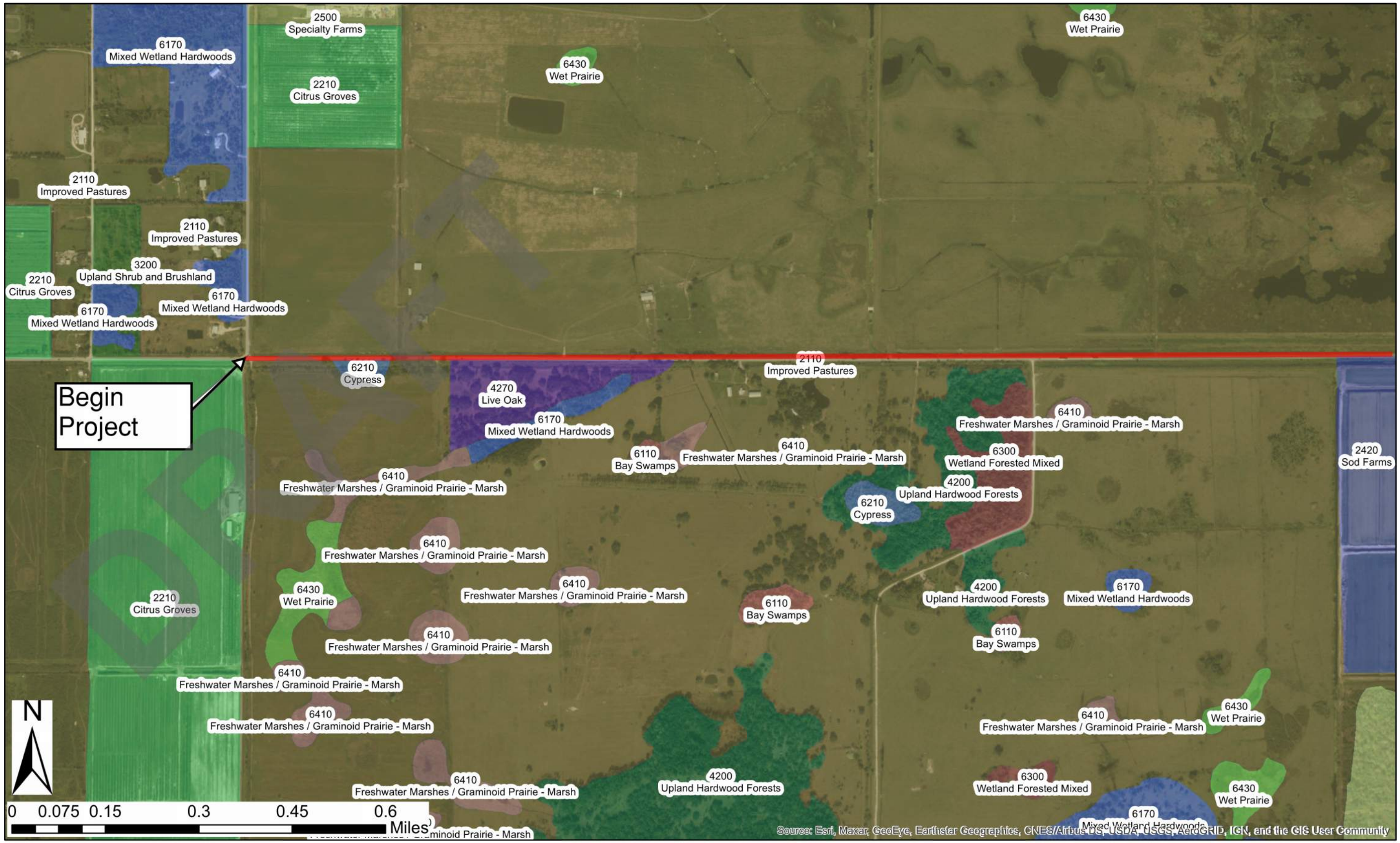
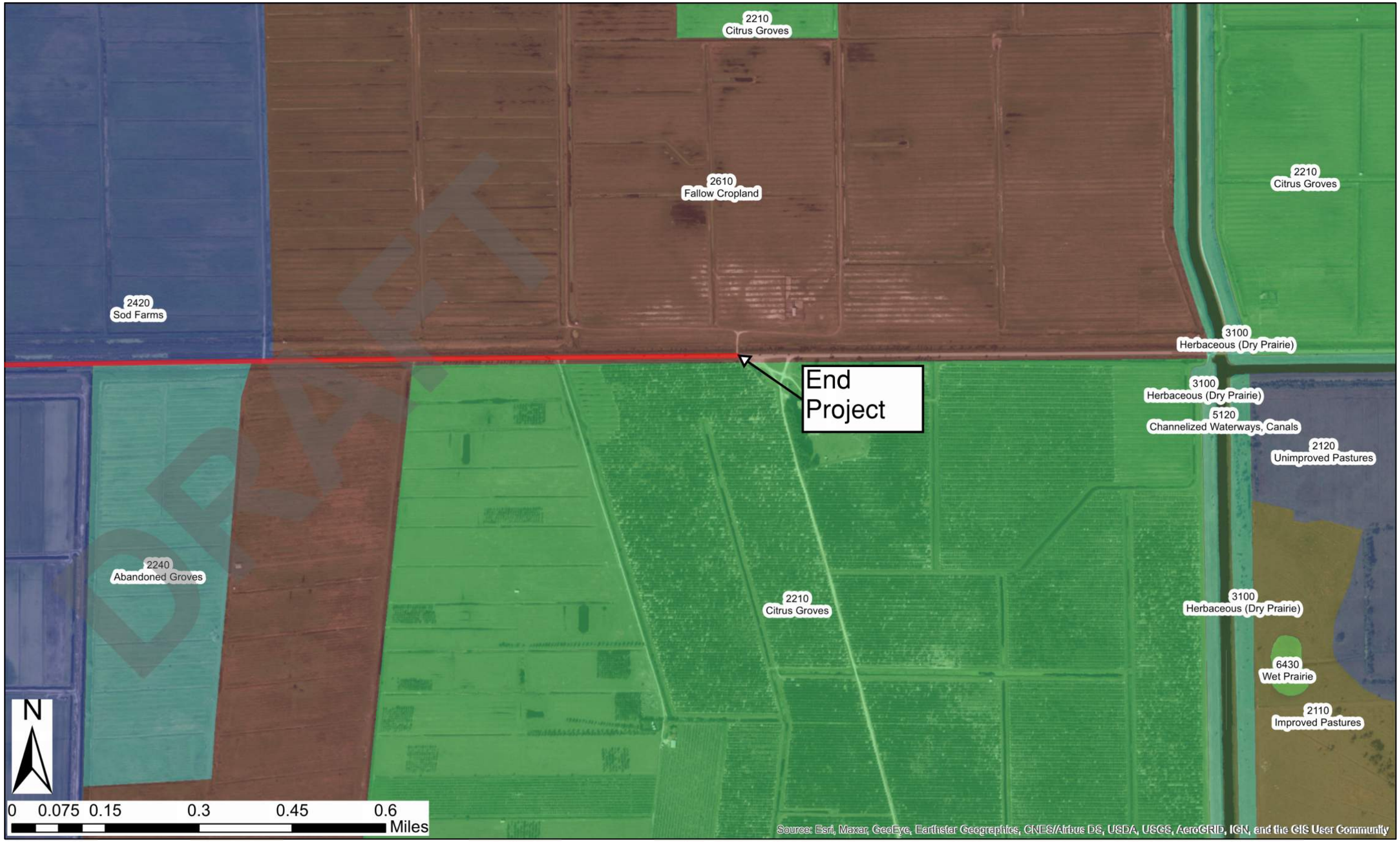


Figure 3: Land Use Map

Figure 3: Land Use Map



NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation information presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations (BFEs) shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

Base map information shown on this FIRM was provided in digitial format by the Southwest Florida Water Management District. The original orthophotographic base imagery was provided in color with a on-foot pixel resolution at a scale of 1" = 200' from photography flown January - February 2008.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map,** how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/national-flood-insurance-program.

DATUM INFORMATION

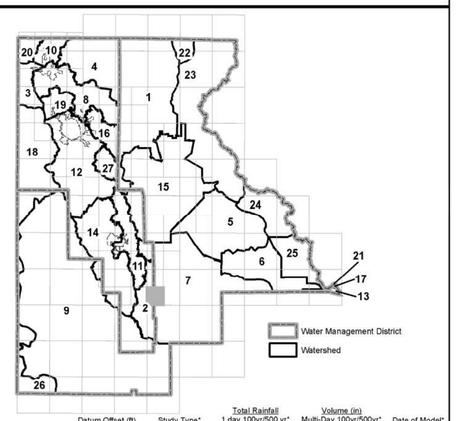
The **projection** used in the preparation of this map was State Plane Florida East. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane Zone used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Base Flood Elevations (BFEs)on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3242

Example Datum Offset Calculation
using datum offset table below
NAVD88 = NGVD29 + (datum offset value)

To obtain current elevation, description, and/or location information for **benchmarks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242** or visit its website at http://www.ngs.noaa.gov/



ID	Watershed	Datum Offset (ft)	Study Type*	Total Rainfall 1-day 100yr/500 yr*	Volume (ac) Multi-Day 100yr/500yr*	Date of Model*
1	Arbuckle Creek	-1.13				
2	Bay Swamp	-1.13				
3	Bee Branch	-1.13				
4	Bonnet Creek	-1.13				
5	C-41 AN	-1.13				
6	C-41 AS	-1.13				
7	C-41 N	-1.13				
8	Carter Creek	-1.13				
9	Fisheating Creek	-1.13				
10	Grassy Creek (north)	-1.13				
11	Grassy Creek (central)	-1.13				
12	Josephine Creek	-1.13				
13	Lake	-1.13				
14	Lake Francis Outlet	-1.13				
15	Lake Istokpoga	-1.13				
16	Lake Lucas	-1.13				
17	Lake Okeechobee	-1.13				
18	Little Charley Bowlegs	-1.13				
19	Little Red Water Lake	-1.13				
20	Old Town Creek	-1.13				
21	S-154C	-1.13				
22	S-65A	-1.13				
23	S-65BC	-1.13				
24	S-65D	-1.13				
25	S-65E	-1.13				
26	Shell Creek	-1.13				
27	Yellow Bluff Creek	-1.13				

* Multiple study types, rainfall volumes, and/or model dates found within specific watersheds; refer to the Flood Insurance Study (FIS) for details.

This digital Flood Insurance Rate Map (FIRM) was produced through a cooperative partnership between the Southwest Florida Water Management District (SWFWMD), South Florida Water Management District (SFWMD), Highlands County, Federal Emergency Management Agency (FEMA) and the associated communities within Highlands County.

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot; and areas protected by levees from 1% annual chance flood. See additional note in Watershed Table on left collar‡

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A A	Cross section line
23 23	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
$^{4}275^{000m}$E	1000-meter Universal Transverse Mercator grid ticks, Zone 17 W
6000000 FT	5000-foot grid values: Florida State Plane coordinate system, East zone (FIPSZONE 0901), Transverse Mercator projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile
222218	Section - Township - Range
7NX1000 ♦	Junction - Points defining locations of flow accumulation or hydraulic connectivity. The first two characters of the Junction name represents the specific watershed (as shown in the map collar locator map) in which the Junction is located (note that boundary Junctions, without an associated floodplain, are also shown).
	Watershed Boundaries

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
November 18, 2015

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0533C

FIRM

FLOOD INSURANCE RATE MAP

HIGHLANDS COUNTY, FLORIDA
AND INCORPORATED AREAS

PANEL 533 OF 710
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HIGHLANDS COUNTY	120111	0533	C

Figure 4: FEMA Map

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
12055C0533C
EFFECTIVE DATE
NOVEMBER 18, 2015

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation information presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations (BFEs) shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

Base map information shown on this FIRM was provided in digital format by the Southwest Florida Water Management District. The original orthophotographic base imagery was provided in color with a on-foot pixel resolution at a scale of 1" = 200' from photography flown January - February 2008.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

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Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/national-flood-insurance-program.

DATUM INFORMATION

The **projection** used in the preparation of this map was State Plane Florida East. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane Zone used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Base Flood Elevations (BFEs)on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3242

Example Datum Offset Calculation
using datum offset table below
NAVD88 = NGVD29 + (datum offset value)

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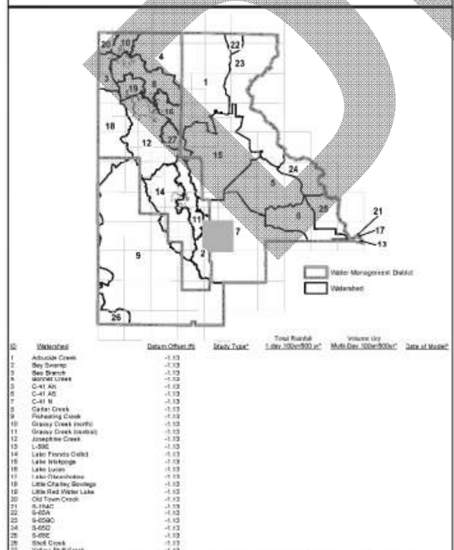

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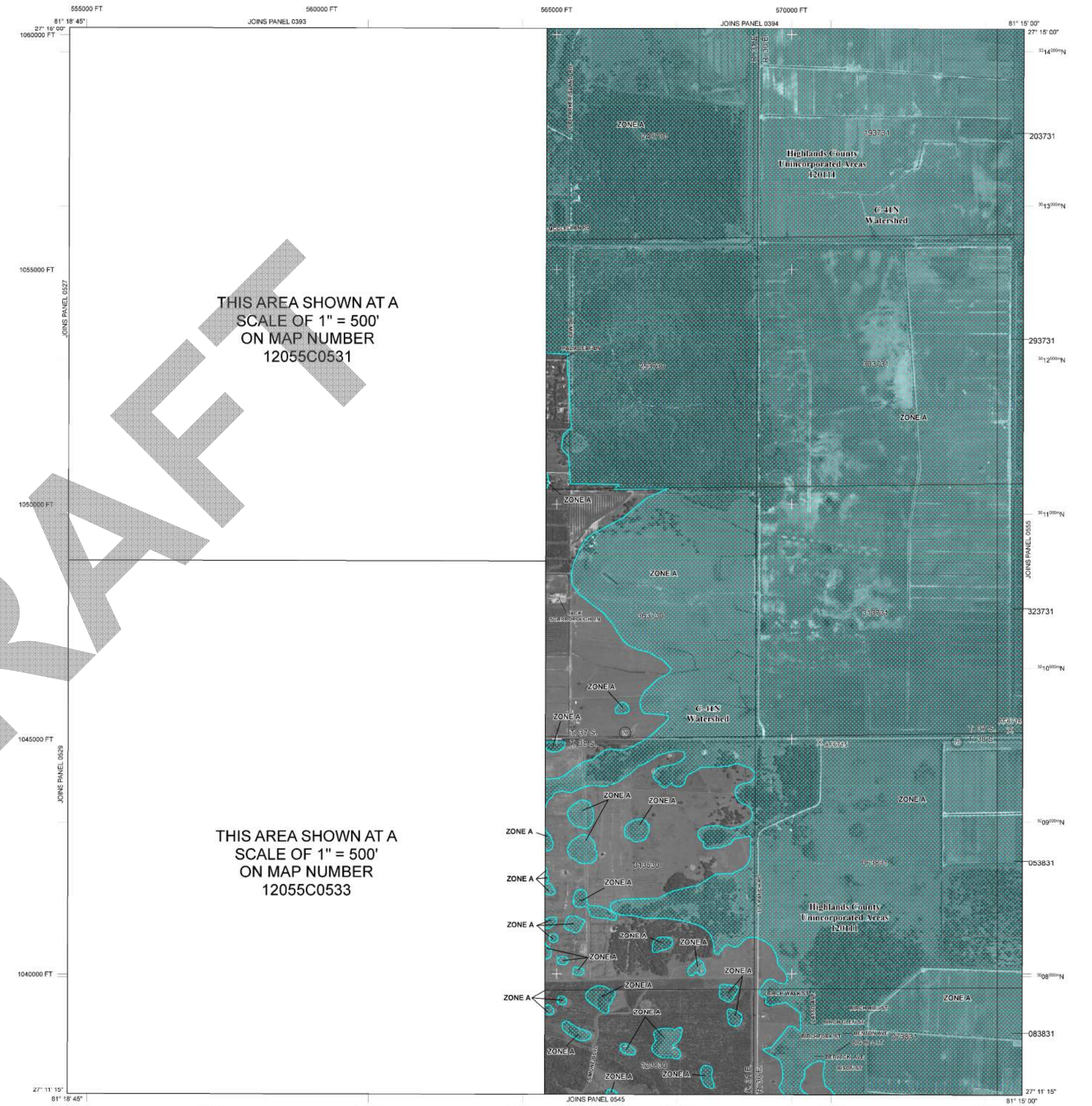

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A — No Base Flood Elevations determined.
ZONE AE — Base Flood Elevations determined.
ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
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ZONE A99 — Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot; and areas protected by levees from 1% annual chance flood. See additional note in Watershed Table on left collar.[1]

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
~ 513 ~ Base Flood Elevation line and value; elevation in feet*
(EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

(A)—(A) Cross section line
(23)- - -(23) Transect line
97°07'30", 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4275000mE 1000-meter Universal Transverse Mercator grid ticks, Zone 17 W
6000000 FT 5000-foot grid values: Florida State Plane coordinate system, East zone (FIPSZONE 0901), Transverse Mercator projection
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• M1.5 River Mile
222218 Section - Township - Range
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Watershed Boundaries

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
November 18, 2015

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP — NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0535C

FIRM
FLOOD INSURANCE RATE MAP
HIGHLANDS COUNTY, FLORIDA
AND INCORPORATED AREAS

PANEL 535 OF 710
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HIGHLANDS COUNTY	120111	0535	C

Figure 4:
FEMA Map

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MAP NUMBER
12055C0535C
EFFECTIVE DATE
NOVEMBER 18, 2015

Federal Emergency Management Agency

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DATUM INFORMATION

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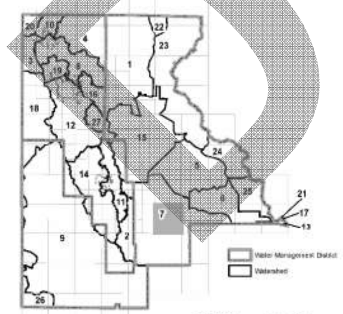

ID	Watershed	Datum Offset (ft)	Study Type*	Total Rainfall 1-day 100yr/500 yr*	Volume (in) Multi-Day 100yr/500yr*	Date of Model*
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6	C-41 AS	-1.13				
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8	Carter Creek	-1.13				
9	Fisheating Creek	-1.13				
10	Grassy Creek (north)	-1.13				
11	Grassy Creek (central)	-1.13				
12	Josephine Creek	-1.13				
13	L-59E	-1.13				
14	Lake Florida Outlet	-1.13				
15	Lake Istokpoga	-1.13				
16	Lake Lucas	-1.13				
17	Lake Okeechobee	-1.13				
18	Little Charley Bowlegs	-1.13				
19	Little Red Water Lake	-1.13				
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23	S-65BC	-1.13				
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* Multiple study types, rainfall volumes, and/or model dates found within specific watersheds; refer to the Flood Insurance Study (FIS) for details.

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LEGEND

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- **ZONE A** No Base Flood Elevations determined.
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- **ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
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FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- **ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot; and areas protected by levees from 1% annual chance flood. See additional note in Watershed Table on left collar[1]

OTHER AREAS

- **ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
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COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- (A)—(A) Cross section line
- (23)- - -(23) Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- $^{42}75^{000m}$E — 1000-meter Universal Transverse Mercator grid ticks, Zone 17 W
- 6000000 FT — 5000-foot grid values: Florida State Plane coordinate system, East zone (FIPSZONE 0901), Transverse Mercator projection
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- • M1.5 — River Mile
- 222218 — Section - Township - Range
- 7NX1000 ♦ — Junction - Points defining locations of flow accumulation or hydraulic connectivity. The first two characters of the Junction name represents the specific watershed (as shown in the map collar locator map) in which the Junction is located (note that boundary Junctions, without an associated floodplain, are also shown).
- Watershed Boundaries

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
November 18, 2015

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

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MAP SCALE 1" = 1000'

500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0555C

FIRM

FLOOD INSURANCE RATE MAP
HIGHLANDS COUNTY, FLORIDA
AND INCORPORATED AREAS

PANEL 555 OF 710
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HIGHLANDS COUNTY	120111	0555	C

Figure 4:
FEMA Map

Notice to User: The **Map Number** shown below should be used when placing map orders, the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
12055C0555C

EFFECTIVE DATE
NOVEMBER 18, 2015

Federal Emergency Management Agency

Figure 5: Basin Map

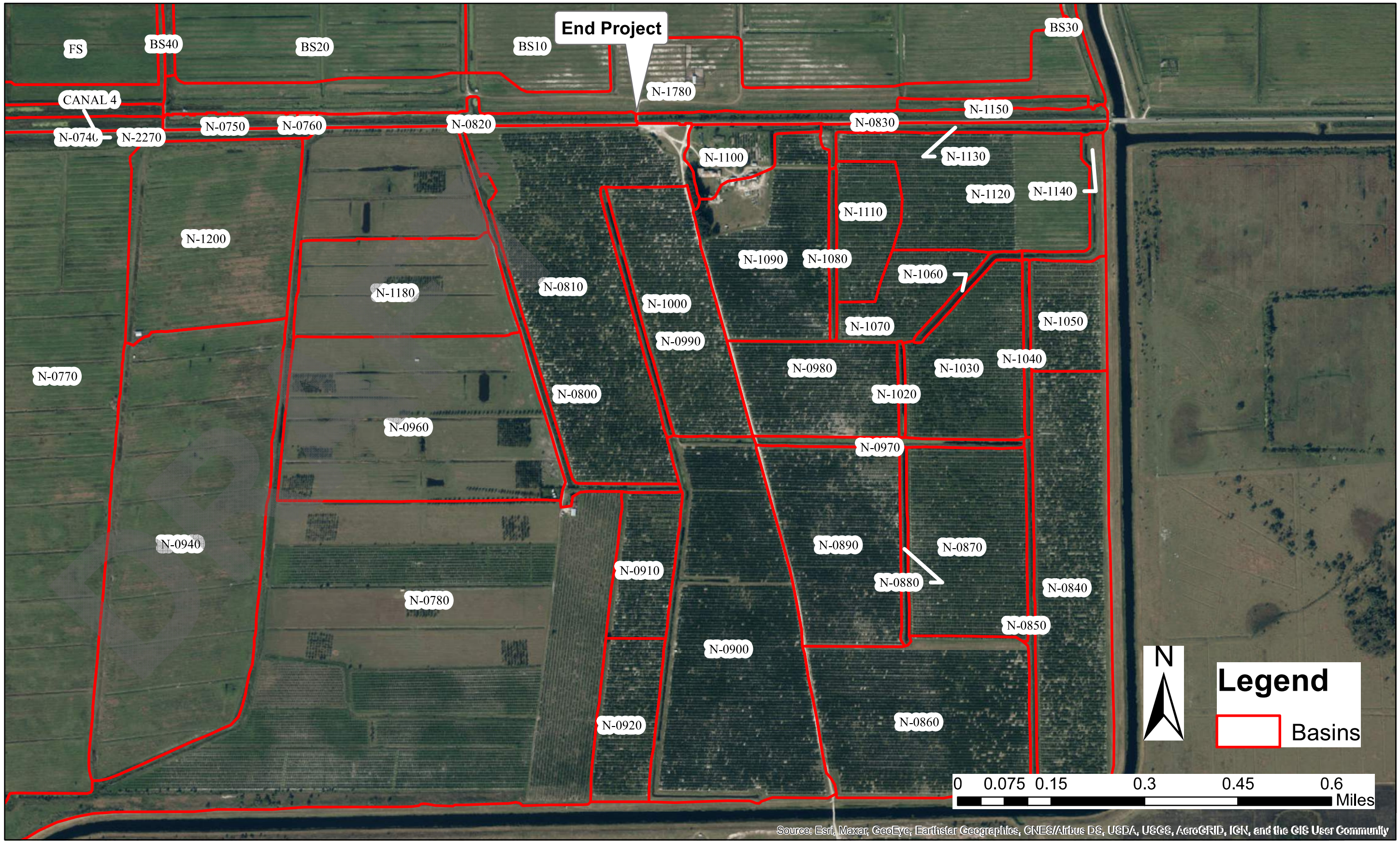


Figure 5: Basin Map

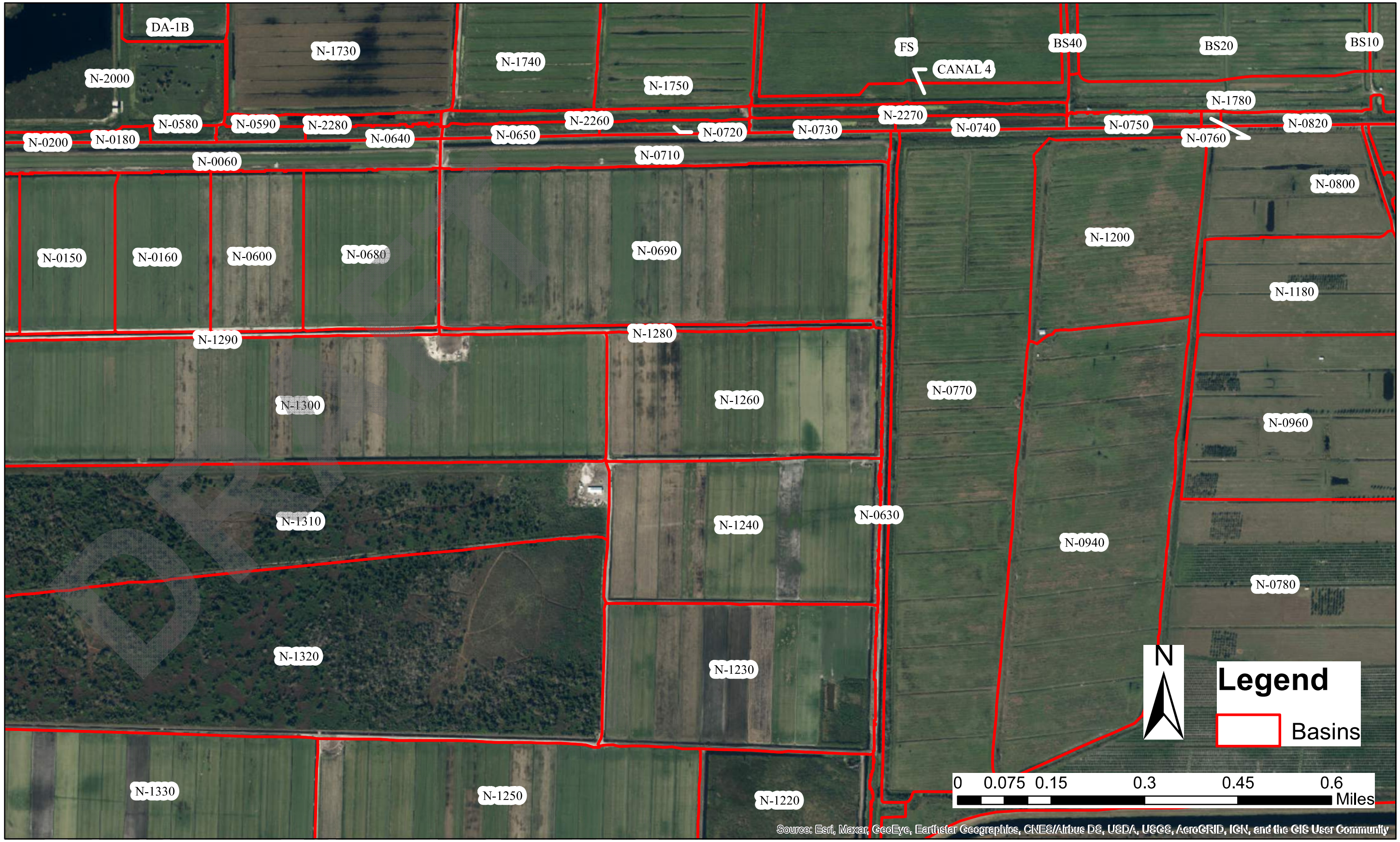


Figure 5: Basin Map

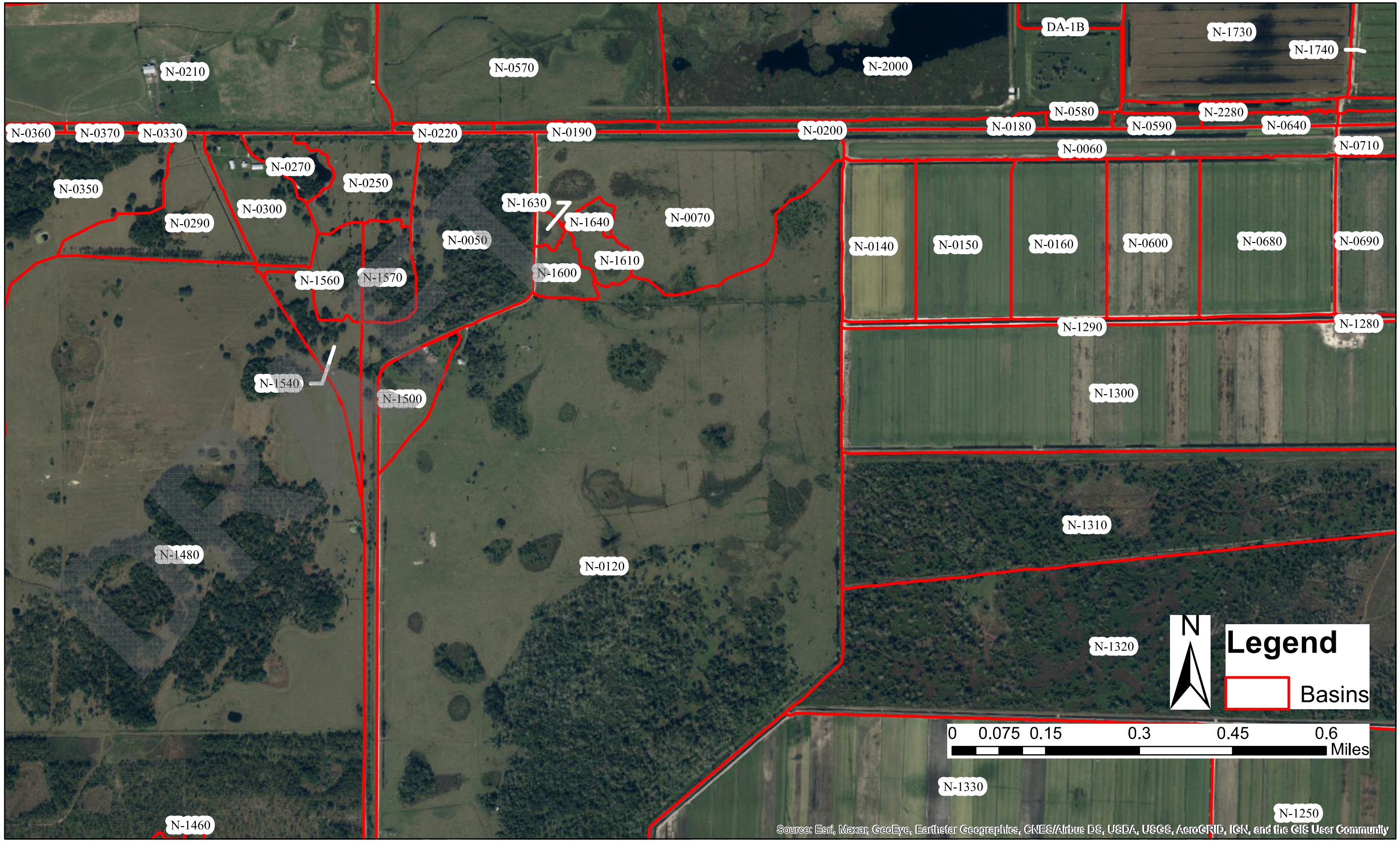


Figure 5: Basin Map

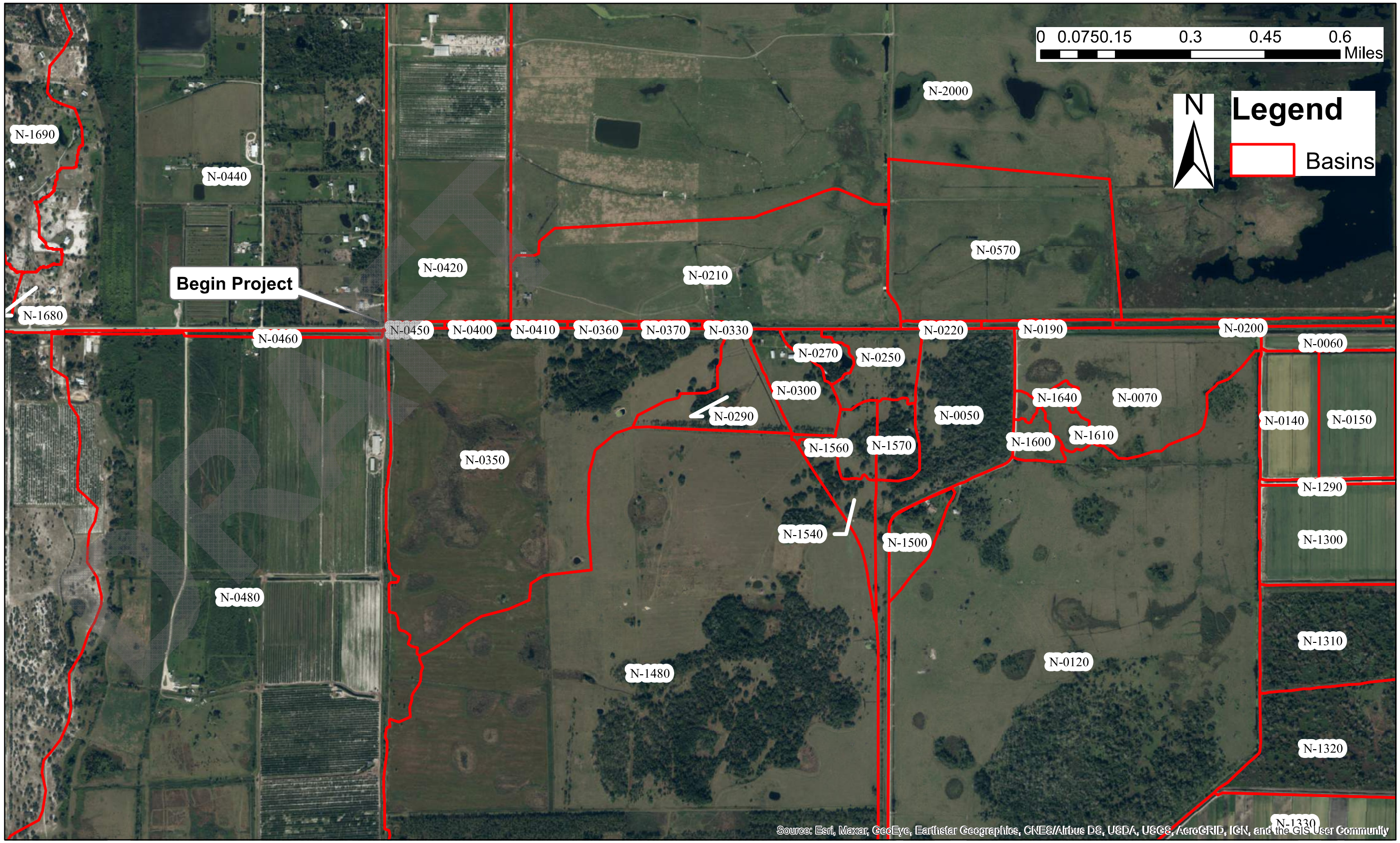


Figure 5: Basin Map

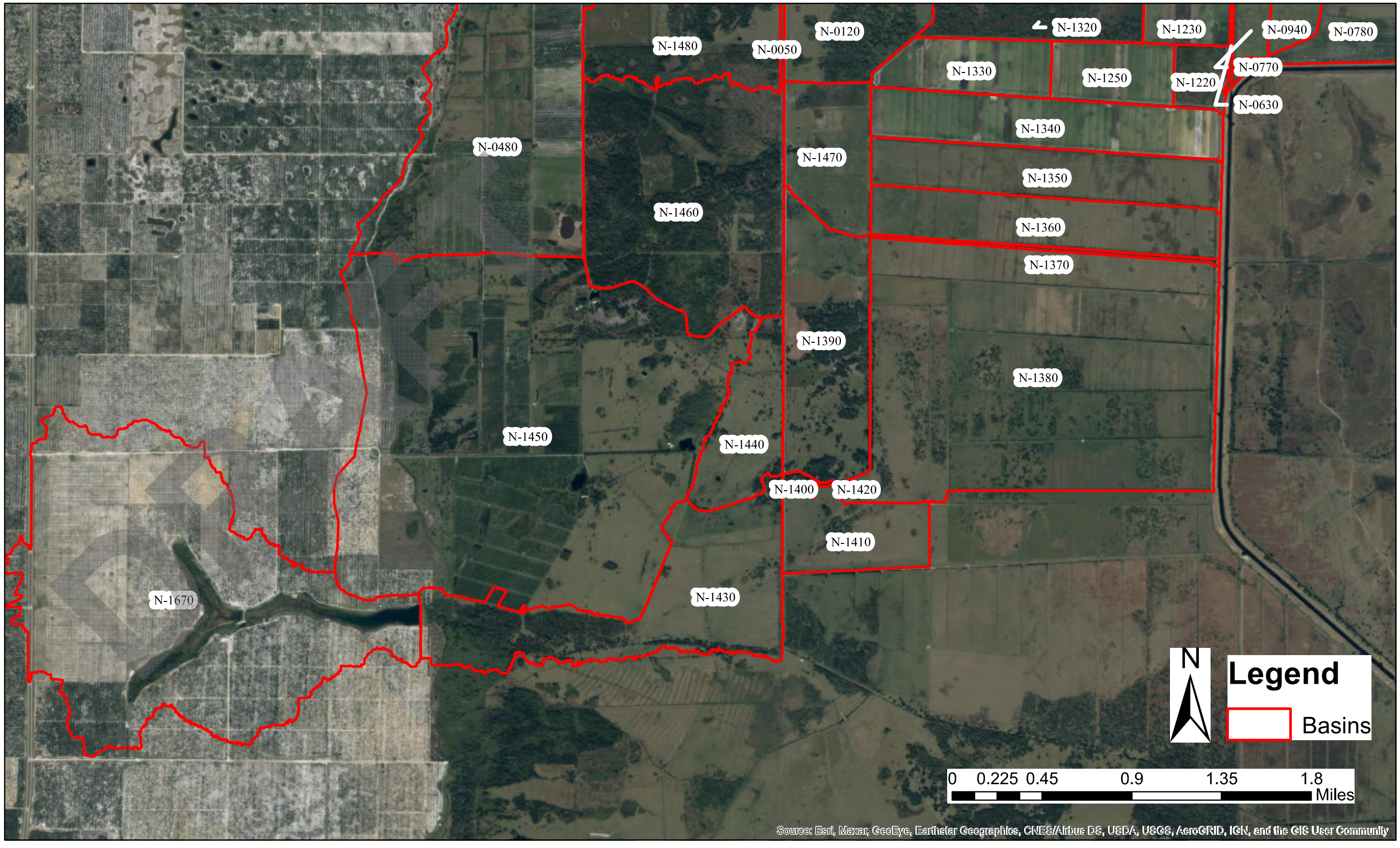


Figure 5: Basin Map

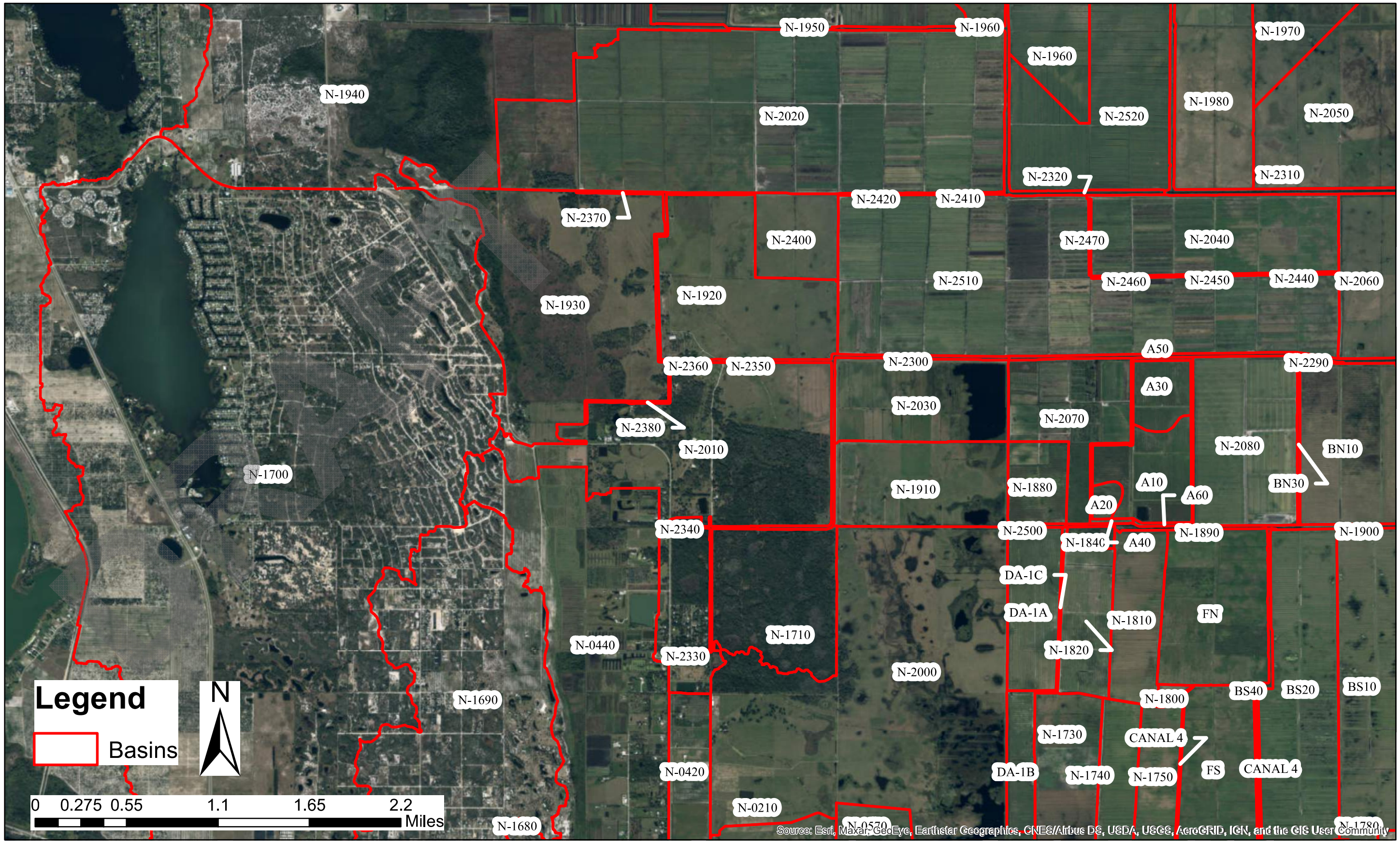


Figure 5: Basin Map

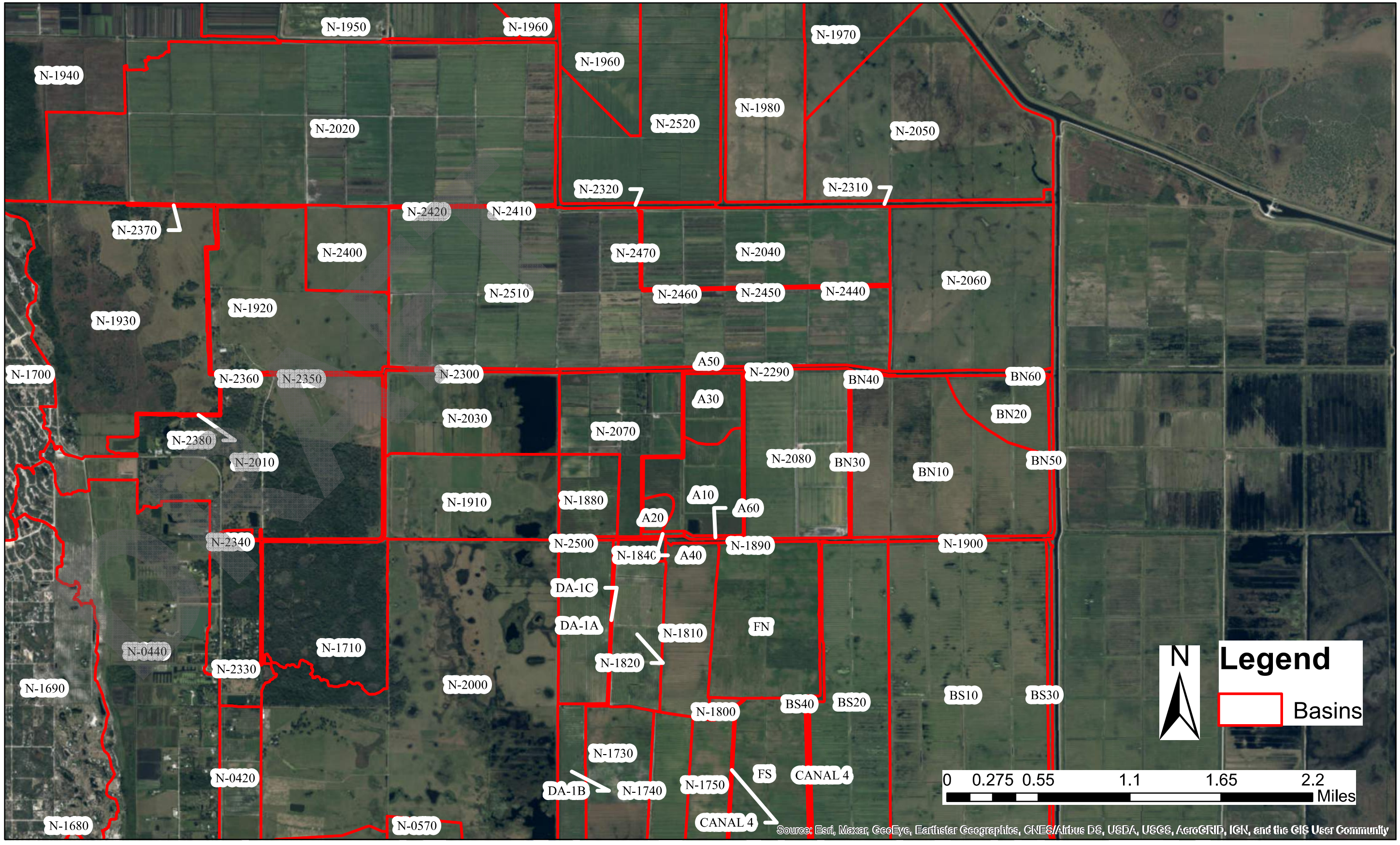


Figure 5: Basin Map

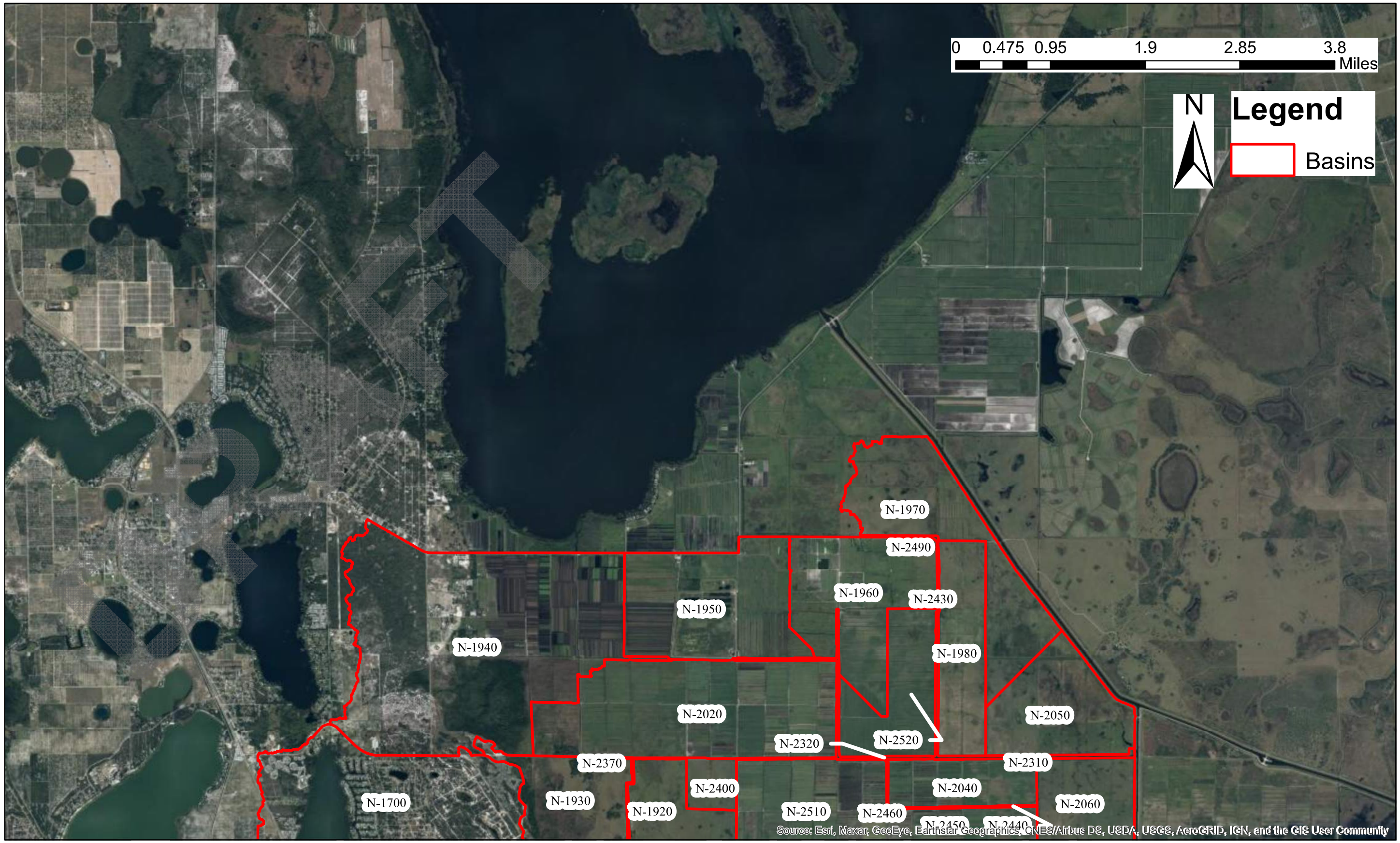


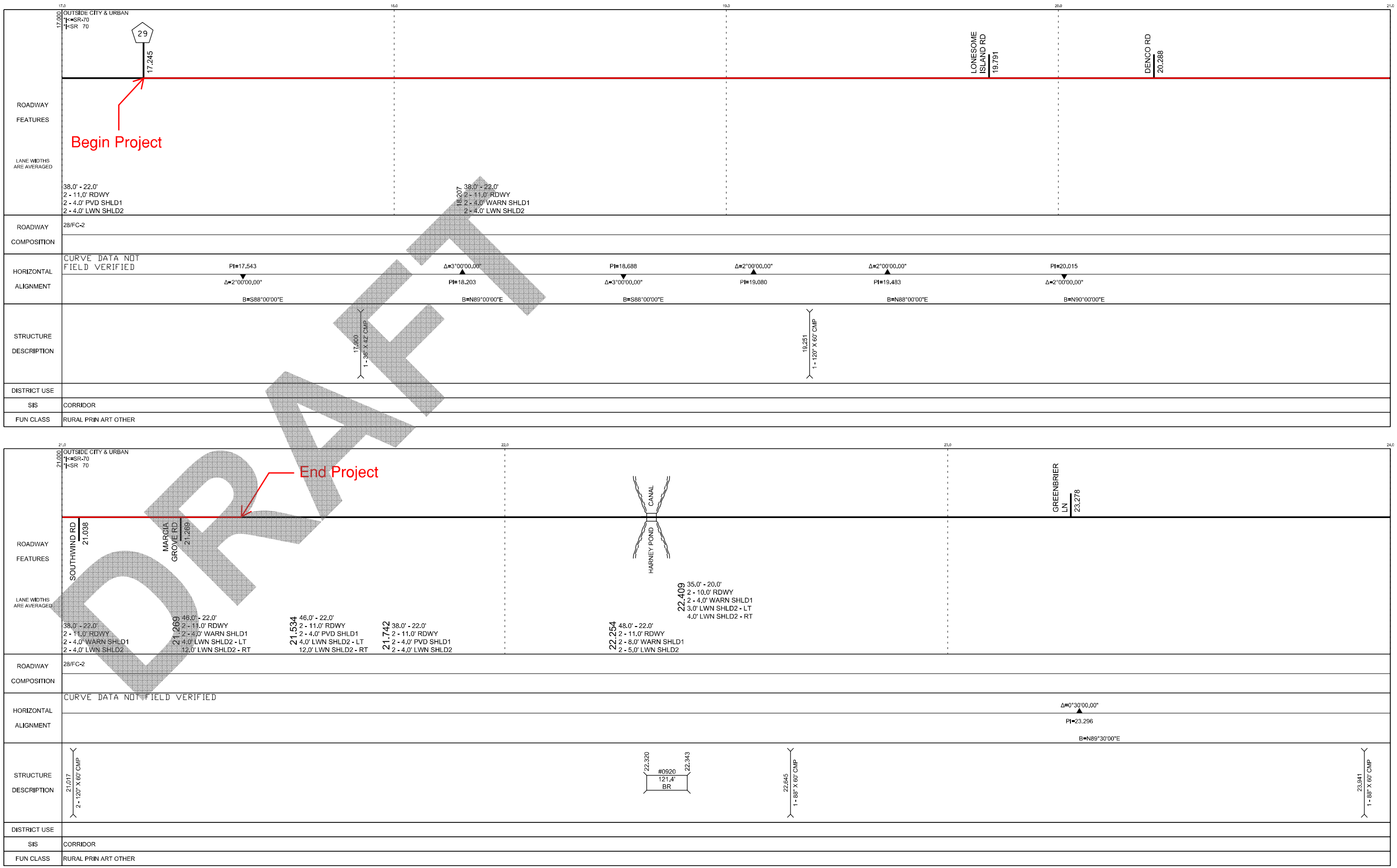
Figure 6

	5 YR INV	SLD REV	BMP	EMP	INV	SLD REV
DATE	07/11/2019	08/13/2019	17.245	21.639	01/06/2022	1/12/22-414506-6
BY	FTE	FTE	0.000	36.334		1/12/22(F241)

FLORIDA DEPARTMENT OF TRANSPORTATION

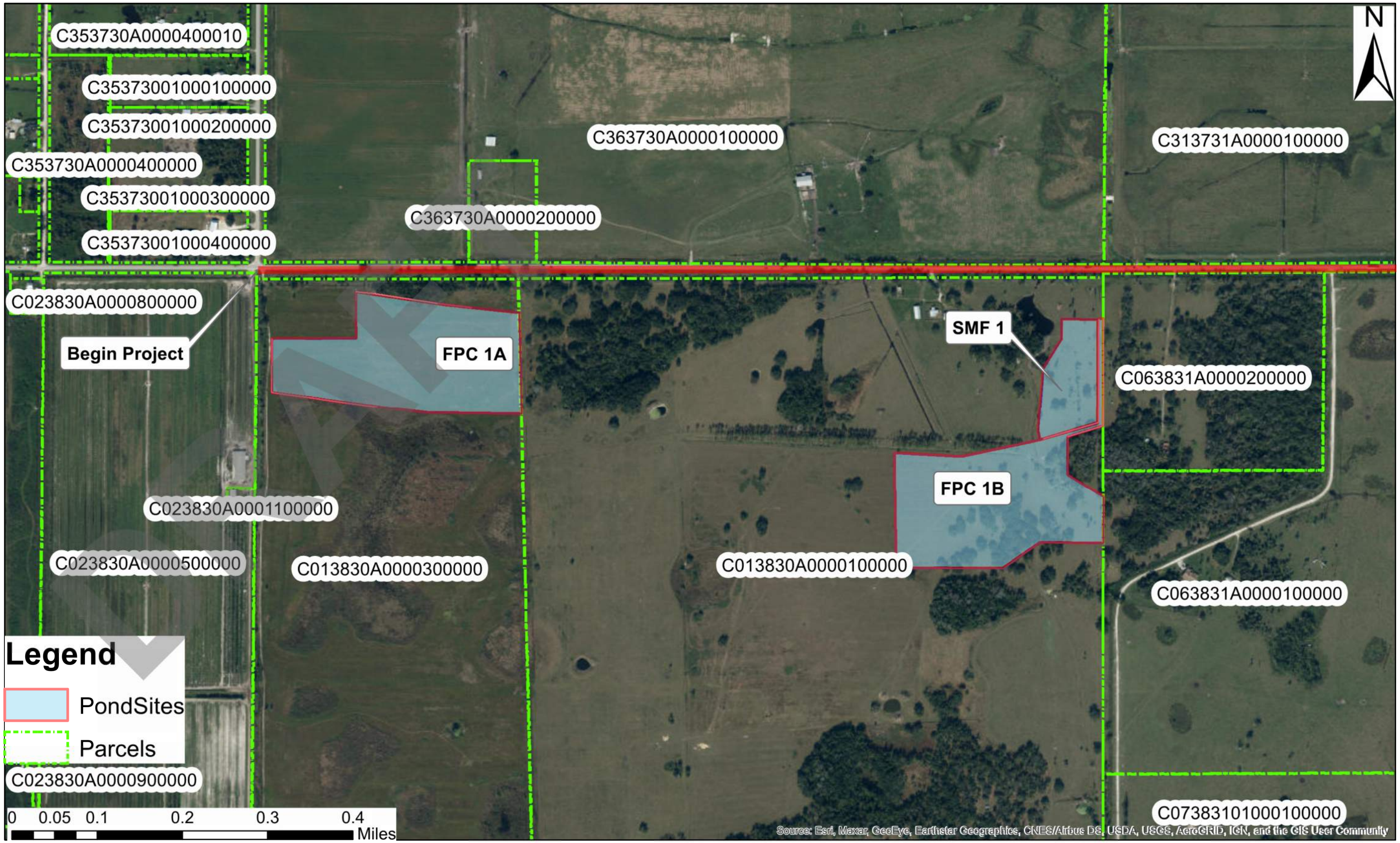
STRAIGHT LINE DIAGRAM OF ROAD INVENTORY

SECTION STATUS	INT. or US ROUTE NO.	STATE ROAD NO.	COUNTY	DISTRICT	ROADWAY ID	SHEET NO:
02		SR 70	HIGHLANDS	01	09060000	4 OF 7



Version: 1.4.2.27 08/13/2019

Figure 7: POND SITES



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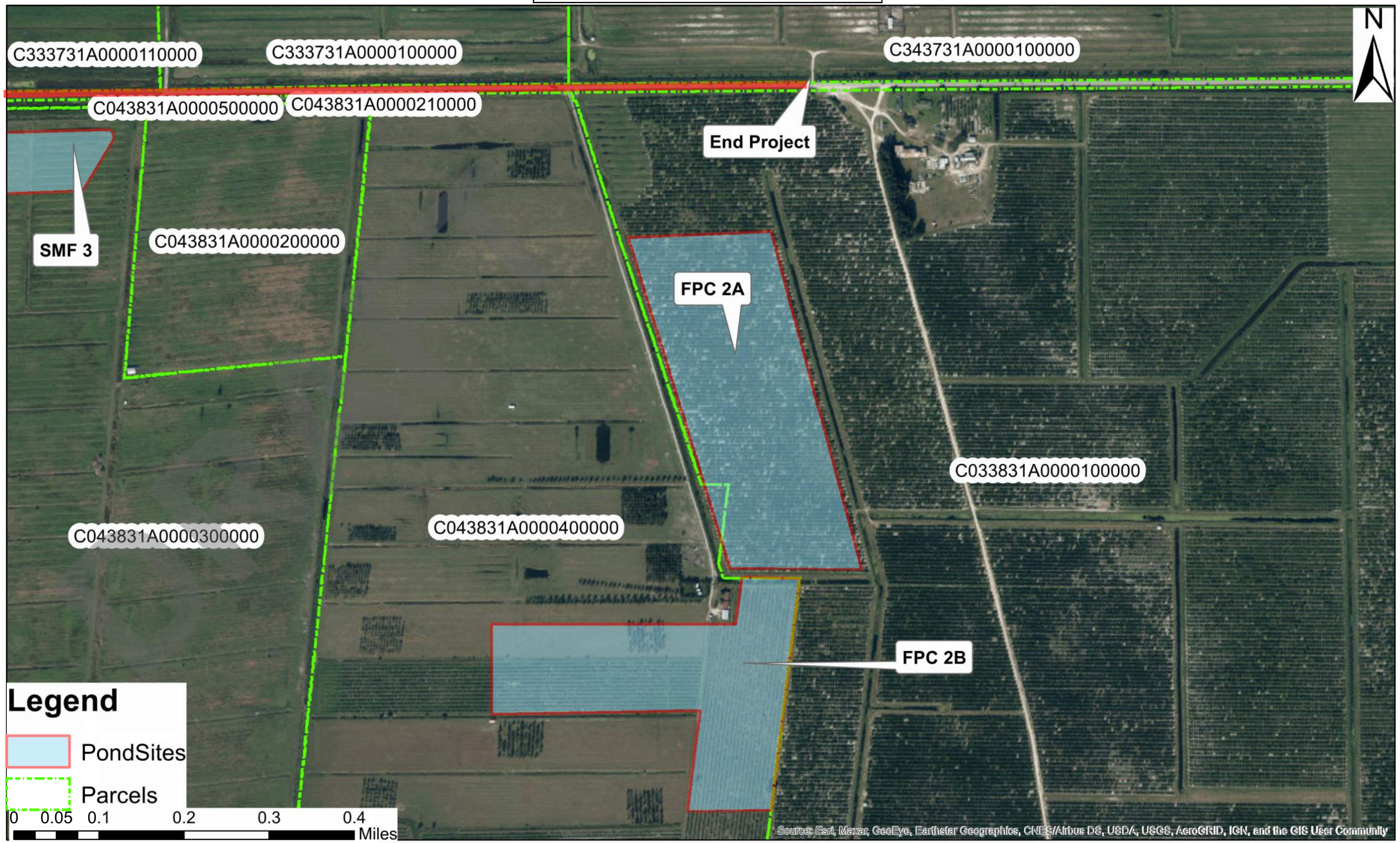

Figure 8: C-41 Watershed Map