Town of Lake Hamilton

Town Council Special Meeting Agenda – March 20, 2024

Time: 5:00 pm
Location: Town Council Chambers
100 Smith Avenue

MAYOR MICHAEL KEHOE – VICE MAYOR CORA ROBERSON
COUNCIL MEMBERS, PATRICK SLAVENS, LARRY TOMLINSON, MARLENE WAGNER

1. **CALL TO ORDER**
2. **INVOCATION**
3. **PLEDGE OF ALLEGIANCE**
4. **ROLL CALL**
5. **SPECIAL MEETING BUSINESS**

   A. *Public Hearing and Resolution R-2024-2 Waste Water Treatment Facility Improvements (pages 2-142)*

ADJOURNMENT

Any opening invocation that is offered before the official start of the Town Council meeting shall be the voluntary offering of a private person, to and for the benefit of the Town Council. The views or beliefs expressed by the invocation speaker have not been previously reviewed or approved by the Town Council or the town staff, and the Town is not allowed by law to endorse the religious or non-religious beliefs or views of such speaker. Persons in attendance at the Town Council meeting are invited to stand during the opening ceremony. However, such invitation shall not be construed as a demand, order, or any other type of command. No person in attendance at the meeting shall be required to participate in any opening invocation that is offered or to participate in the Pledge of Allegiance. You may remain seated within the Town Council Chambers or exit the Town Council Chambers and return upon completion of the opening invocation and/or Pledge of Allegiance if you do not wish to participate in or witness the opening invocation and/or the recitation of the Pledge of Allegiance.

Any person desiring to appeal any decision made by the Town Council, with respect to any matter considered at such meeting or hearing, will need a record of the proceedings, and for such purposes, must ensure that a verbatim record and transcript of the proceeding is made in a form acceptable for official court proceedings, which record includes the testimony and evidence upon which the appeal is to be based. It shall be the responsibility of the person desiring to appeal any decision to prepare a verbatim record and transcript at his/her own expense, as the Town does not provide one. (F.S. 286.26.105)

ATTN: PERSONS WITH DISABILITIES. In accordance with the American with Disabilities Act and Section 286.26, Florida Statutes, persons needing special accommodations to participate in this proceeding, please contact the Town Clerks Office at 863-439-1910, at least forty-eight (48) hours prior to the meeting, provide a written request to the Office of the Town Clerk. If you are hearing or speech impaired, please contact the Florida Relay Service by dialing 7-1-1 or 1-800-955-8771 (TTY) / 1-800-955-8770 (Voice).

WASTEWATER FACILITIES PLAN
FOR
PHASE 2 WWTF AND TRANSMISSION SYSTEM IMPROVEMENTS

PREPARED FOR:

TOWN OF LAKE HAMILTON

PO BOX 126
LAKE HAMILTON, FL 33851

PREPARED BY:

PENNONI

401 THIRD STREET SW
WINTER HAVEN, FL 33880
863-324-1112

Ethan Geiger

Steven Elias, PE

LAKHA22008
December 23, 2023

401 Third Street SW
Winter Haven, FL 33880
T: 863-324-1112
F: 863-294-6185

www.pennoni.com

Project No. LAKHA22008

Mr. Steven Hunnicutt, Town Administer
Town of Lake Hamilton
Post Office Box 126
Lake Hamilton, Florida 33851

RE: PRELIMINARY ENGINEERING REPORT – PHASE 2 WASTEWATER TREATMENT FACILITY AND TRANSMISSION SYSTEM IMPROVEMENTS

Dear Mr. Hunnicutt:

We are pleased to submit the enclosed Preliminary Engineering Report (PER) for the referenced Project. The purpose of this Report is to evaluate wastewater improvements, provide recommendations, and associated costs.

Upon adoption by the Town Council, this PER will be the basis of a grant/loan funding application request to the Florida Department of Environmental Protection (FDEP) via their State Revolving Fund (SRF) Program

Please contact our office if you have any questions related to our findings. We sincerely appreciate the opportunity to assist the Town of Lake Hamilton with this important Project.

Sincerely
Pennoni

Steven L. Elias, P.E.
Associate Vice President

Ethan Geiger
Project Engineer

Table of Contents

LIST OF TABLES

LIST OF FIGURES

APPENDICES

EXECUTIVE SUMMARY

Project Background

The Town of Lake Hamilton (Town) is located in central Florida along the eastern shore of Lake Hamilton and serves approximately 1,600 residents with potable water and 150 residents with central wastewater treatment services.

In 2021, the Town was awarded Clean Water State Revolving Fund (CWSRF) funding to design and construct a Phase 1 Wastewater Treatment Facility (WWTF). This WWTF project was constructed in 2023 in conjunction with a septic to sewer replacement project to create an initial gravity sewer system and provide seeding flows to the WWTF. Several planned Phase 1 treatment plant components had to be removed and/or omitted from the scope due to elevated bid prices and lack of funding (surge tank, headworks, back-up treatment train, operations building, paved driveway, and other treatment system components to meet the stringent local BMAP discharge water quality requirements, etc.).

Now that the Phase 1 WWTF has been completed, the Town desires to construct the remaining planned improvements as part of the Phase 2 Project to ensure the Town has adequate and durable facilities to reliably handle flow surges and meet the stringent local effluent discharge requirements to provide service for existing and future users.

In parallel with the Phase 2 WWTF improvements, the Town desires to redirect collection system flows from customers along US 27 to the Town's new WWTF. In 2018, the Town constructed a wastewater pumping collection system and master pumping station located on US-27 that collects wastewater from the residents and businesses on the US-27 corridor and transmits the flows south to the Town of Dundee for treatment. Due to Dundee treatment capacity limitations and contractual obstacles, the Town must now redirect wastewater flows from the US 27 corridor to its new WWTF.

Project Purpose

To evaluate the benefits of additional treatment processes, meet FDEP regulations for WWTF and effluent quality, and provide backup reliability to an expanding wastewater system, the Town has tasked Pennoni to prepare this Facilities Plan and position the Town to apply for construction funding via the FDEP CWSRF program. Following the substantial completion of the Phase 1 WWTF in 2023, the Town is pursuing the construction of a Phase 2 facility expansion on the existing Water Tank Road WWTF site and the redirecting flows from the existing pump station wastewater collection system on US-27. These Phase 2 improvements will extend the life of existing treatment equipment, provide treatment redundancy with an additional treatment train and extensive influent screening treatment, allow the Town an operations center for emergency preparedness and coordination, and provide additional avenues of septic tank conversion through force main or conventional gravity wastewater collection.

The Environmental Protection Agency (EPA) and the Florida Department of Environmental Protection (FDEP) created a partnership to provide communities with low-cost financing for a variety of water quality infrastructure projects. The CWSRF is part of that program and has certain documentation requirements as set forth in Chapter 62-503.700(2) of the Florida Administrative Code (FAC). The Town of Lake Hamilton (Town) intends to utilize this program to help fund the second phase of their wastewater treatment facility.

Project Recommendations

The project presented here for consideration in this Wastewater Facilities Plan consists of the construction of additional WWTF improvements on an existing WWTF site located on the east side of Town, east of Detour Road and south of Water Tank Road. Based on the existing Phase 1 treatment equipment and increasingly stringent effluent standards, the Town desires to proceed with building WWTF improvements with a total treatment capacity of 0.5 MGD and additional screening capabilities. The proposed improvements to the wastewater system include but are not limited to:

- Additional Treatment Train with Anoxic and Aerobic Chambers
- Elevated Headworks with fine screening and grit removal
- Influent Flow Meter
- Influent Surge Tank
- Onsite Operations Building
- Pump Station Rehabilitation
- Offsite Force Main

The proposed projects have a total opinion of probable construction cost of $9,057,633. The project is proposed to be funded via the CWSRF Program with potentially principal forgiveness on the loan. The Town charges residents a wastewater use charge for all connections to the WWTF, which will be used to repay this FDEP SRF loan.

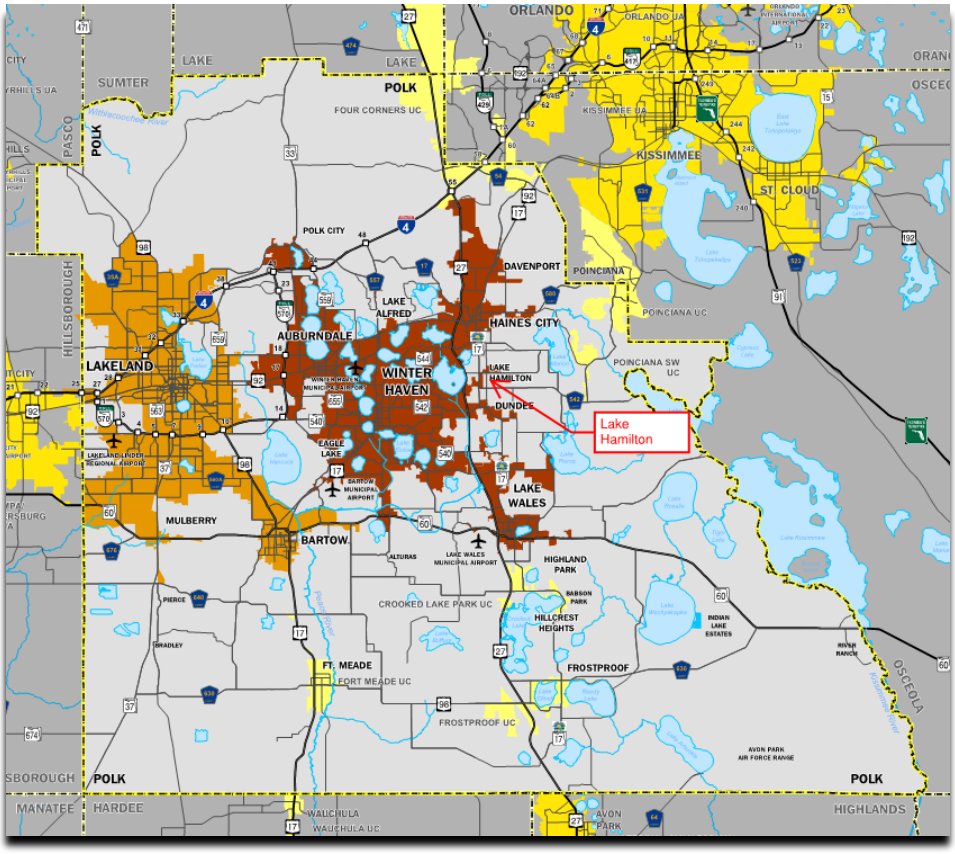
A. INTRODUCTION

1. Project Background

The Town of Lake Hamilton is located in central Florida along the eastern shore of Lake Hamilton and serves approximately 1,600 residents with potable and central wastewater treatment services. The Town provides wastewater treatment via their recently constructed Phase 1 WWTF with disposal of effluent via rapid infiltration basin (RIBS) groundwater discharge. The initial Phase 1 WWTF construction consisted of a dual train packaged concrete plant with clarification, sludge digestion, chlorination chambers, and tie in points for a Phase 2 along the outer post-tensioned walls of the structure.

Prior to the construction of the WWTF, residents and businesses of the Town of Lake Hamilton relied solely on septic tanks for wastewater treatment. To retain capacity redundancy, extend life expectancy of WWTF equipment, and improve effluent wastewater quality as flows continue to accumulate at the WWTF, the Town proposes to construct improvements on the existing 0.250 MGD plant. A concurrent pump station rehabilitation and force main installation project will occur

Figure 1: Town of Lake Hamilton Location Map



with the Phase 2 WWTF improvements to convey an existing pressurized wastewater system to the Town's plant for treatment. The proposed force main system will replace an existing force main that transports wastewater to a non-Town owned facility which provides treatment for Lake Hamilton wastewater prior to Town WWTF construction. This existing conveyance system is completely reliant on the available unused capacity of the offsite facility.

The Town commissioned a Technical Memorandum dated Decemeber 1, 2023 to evaluate the feasibility of constructing Phase 2 WWTF improvements on the existing Town-owned WWTF along Water Tank Road. Phase 2 improvements to include an influent headworks to increase treatment plant effectiveness and prevent damage to WWTF equipment (ie. Pumps, scrapper arms, etc.) as fine grit and debris will be filtered out prior to further treatment processes, an influent surge tank to protect treatment equipment from wastewater surge flows, an additional treatment train for capacity redundancy, and an onsite WWTF operations building that can double as an emergency operations building during storm events.

2. Project Purpose

The purpose of this Facilities Plan is to illustrate the need for the Town's existing WWTF to receive Phase 2 improvements and implement additional centralized wastewater treatment capacity and redundancy measures, reduce aquifer nutrient introduction via RIB disposal, and prevent the proliferation of septic tanks within the region.

The proposed project plans to use funding provided by the CWSRF program. The CWSRF is part of that program and has certain documentation requirements as set forth in Chapter 62-503.700(2) of the Florida Administrative Code (FAC). This plan was developed to comply with the program requirements and assess the benefits and costs of the proposed project.

3. Project Location & Study Area

The Town of Lake Hamilton is one of seventeen municipalities in Polk County located in central Florida (Figure 1). The project area is the existing WWTF site along the south side of Water Tank Road in the northeastern portion of the Town of Lake Hamilton.

The Town's WWTF has been constructed on a 19.74 acre site on the east side of the Town limits. The existing site has previously been evaluated and improved upon during Phase 1 design. Phase 2 construction will take place on the south side of the existing WWTF site adjacent to the existing treatment tankage, and a concurrent force main project will take place approximately two miles west of the WWTF site (Figure 2). Prior to additional improvements, the Town tasked Pennoni with performing a preliminary site evaluation and conceptual WWTF planning effort to help identify potential development challenges and develop the initial implementation schedule.

The WWTF site is adjacent to the Lake Okeechobee River Basin, and while no improvements will be made within the area, the Town will be required to construct additional treatment processes and improve their effluent treatment standards if they choose to discharge within the basin.

The existing Pump Station is located along the west side of US-27 highway on a 1.28 acre parcel owned by the Town with an existing force main pipeline within Florida Department of Transportation (FDOT) right-of-way.

The rerouted pipeline will remain in FDOT right-of-way, will use of an easement along an undeveloped orange grove, and will remain in Town right-of-way once through the provided easement.

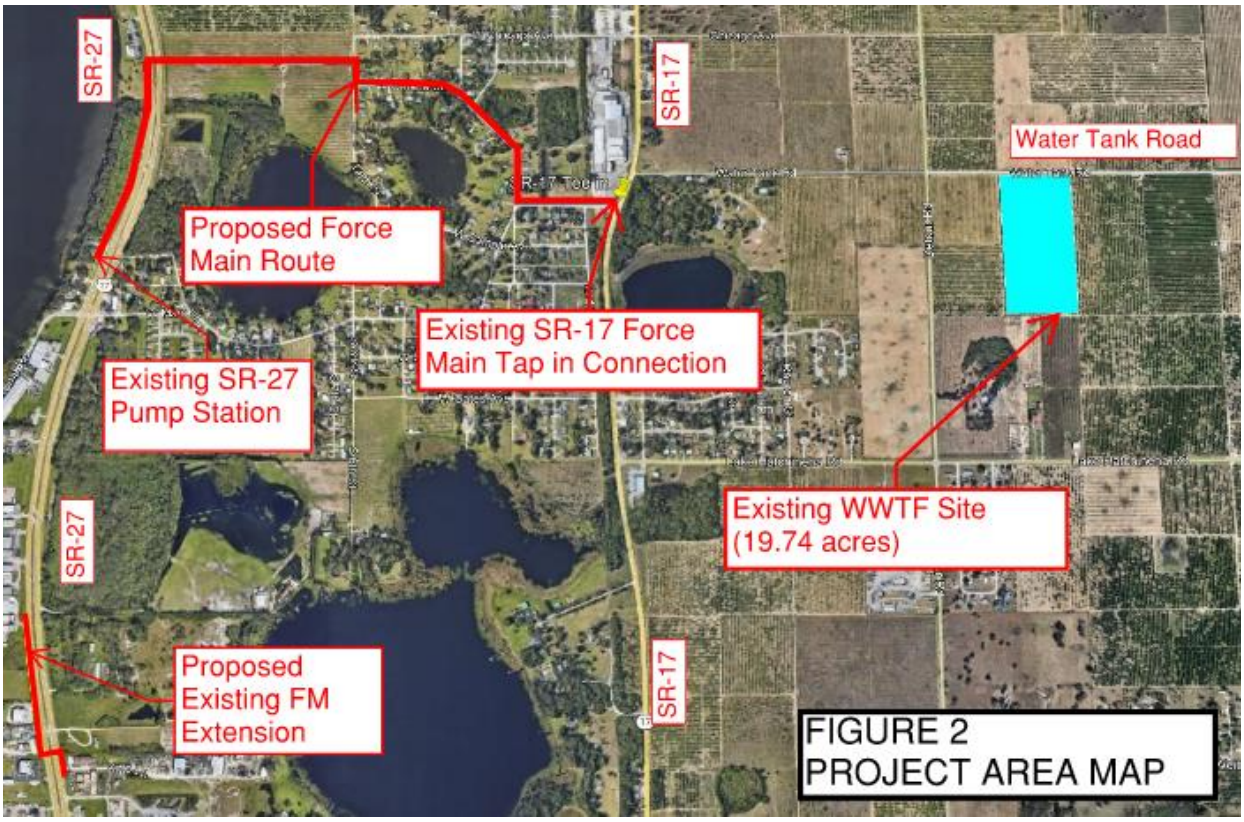


Figure 2: Project Area Map

4. Project Scope and Approach

The scope of the Wastewater Facilities Plan is described below:

- Identify the project(s) with water quality and/or public health risk components which the Town desires to construct.
- Establish design goals for the project.
- Identify and evaluate various alternatives to satisfy the needs of the project.
- Recommend the most cost-effective and environmentally sound facilities to meet the goals of the project.
- Describe in detail the recommended facilities improvements and their costs.
- Present a schedule of implementation of the recommended facilities.
- Identify any adverse environmental impacts and propose mitigating measures.

5. Need and Justification for Project

Prior to 2023, all residents, businesses, and municipal buildings of the Town of Lake Hamilton relied on septic systems and drain fields for treatment and disposal of wastewater. Despite central sewer installation and septic conversion projects, septic failures, and infiltration of the aquifer by biologic materials continue to be a potential public health hazard and water quality issue in areas where no sewer collection system is available.

As of 2023, the Town has completed construction of their Phase 1 wastewater treatment facility with an initial 0.25 MGD capacity to provide an alternative wastewater treatment method to existing septic systems. The original Phase 1 design was a standard prepackaged plant with anoxic, aerobic, clarifier, sludge digestion, and basic chlorination processes to meet basic wastewater treatment and effluent standards. While this approach provided a strong foundation to the Town's wastewater collection and treatment system, it will not continue to meet capacity or treatment requirements as the plant ages and the equipment is worn down by usage due to lack of screening and headworks. Another factor accentuating the plant's need for improvement is due to budgetary restrictions, some components of the Phase 1 design were removed, with prior FDEP notification and acceptance, on conditional acceptance that these removed items would be constructed as part of a future Phase 2 design. These include necessary components such as an influent surge tank, flow meter, and chlorine tank level indicator, which are included in the Phase 2 expansion discussed in this report. The influent surge tank will be used to control and prevent rapid surges of wastewater from overwhelming the treatment processes and equipment via a holding tank and pumping equipment to mimic a constant design flow reaching the treatment equipment. With no means to handle surging flows, the treatment equipment will be at the mercy of common residential diurnal flows, leading to inefficient and quickly worn-down treatment equipment.

The second portion of this SRF project is the redesign of an existing pump station to redirect wastewater from the US 27 corridor to the Town's WWTF rather than a City of Dundee owned WWTF. Lake Hamilton currently pays per gallon of wastewater sent to the Dundee plant via a Lake Hamilton US-27 pump station, force main, and flow meter. The ability for Lake Hamilton to convey wastewater for treatment is contingent on the continued situation that the Dundee plant has the open capacity to receive wastewater. Should the Dundee plant reach a flow near its permitted capacity, the Town will be forced to pause transmittal of its US-27 collected wastewater, leaving many residents without wastewater disposal. Removing Lake Hamilton's reliance on the Dundee plant capacity and providing an alternate force main to the Town owned WWTF will ensure no potential failures in the event that Dundee no longer has any capacity and provide the Town with an avenue for additional septic conversions and central sewer installation along the proposed force main path.

To continue moving forward with eliminating the risks associated with continued reliance on septic systems and meet FDEP WWTF treatment and monitoring requirements, additional treatment and storage capacity of the existing plant are necessary. The Town desires to continue its septic to sewer conversion projects and provide wastewater treatment for new residents, but the existing basic treatment approach will not be able to reliably provide wastewater treatment without significant upgrades and infrastructure.

B. PROJECT PLANNING

1. Planning Area

The existing WWTF project is located in Section 15, Township 28 South, Range 27 East. More specifically, the East ½ of the Northwest ¼ of the Southwest ¼ Less Road right-of-way, of Sec. 17, Twn 27 S., Rng 28 E. The

wastewater improvements evaluated in this report will be constructed on property owned by the Town of Lake Hamilton and already disturbed by Phase 1 WWTF construction.

Land use on the Town's 19.7 acre parcel is fully cleared of previous orange groves and the site is dedicated as wastewater treatment facility area.

The pump station site is located in Section 17 Township 28 South, Range 27 East and the force main path will go through Section 16 Township 28 South, Range 27 East.

Land use on the existing Pump Station site is dedicated to use as a park and surrounded by commercial property. The proposed force main path will be installed along FDOT and Town right-of-way with previously built-out parcels and through an existing orange grove via an easement provided by the current parcel owners.

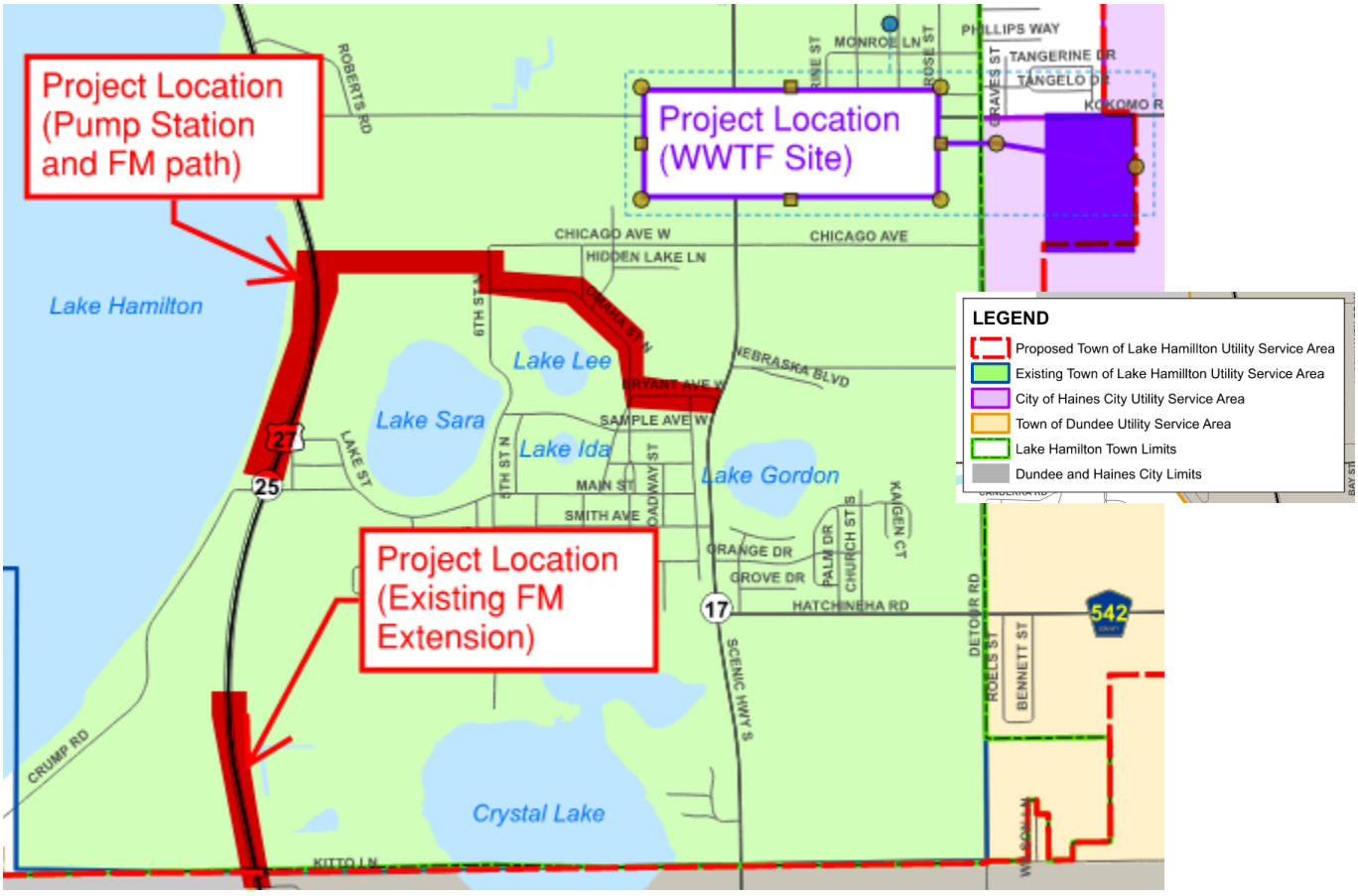


Figure 3: Project Service Area Map (WWTF and PUMP STATION SITE)

2. Planning Year

This Wastewater Facilities Plan describes the proposed Phase 2 WWTF Expansion and US-27 Force Main Projects. The project service area (Figure 3) is expected to have some growth as the Town expands and needs additional treatment capacity throughout the Town's service area. Accordingly, this Wastewater Facilities Plan addresses reasonable projection of growth for a specified planning period within the project area.

Additional flows will also be added by the simultaneous US-27 Pump Station project discussed within this Facilities Plan. The area of which the proposed force main will be placed is planned as a single-family residency area, with a tentative master pump station and gravity system to connect to the US-27 station for final conveyance to the WWTF.

The alternative cost analysis for the Project is based on a standard design life of 20 years, which results in a planning year of 2043.

3. Existing Wastewater Utility System

The Town has previously constructed a wastewater treatment facility (Phase 1 WWTF) and central sewer system (SR-17 Sewer Installation) with FDEP CWSRF funding as well as owns a pressurized collection system (US-27) that conveys collected wastewater to a separate non-Town owned treatment facility. Approximately ninety homes and businesses were connected to the central sewer system and WWTF during the Phase 1 construction to provide initial flows, with an additional seventy to be connected to the in use gravity sewer.

The US-27 pump station collects wastewater from thirty-one local commercial connections, all of which is currently sent to the city of Dundee for treatment via a force main tie in point into the Dundee's collection system. A portion of the customers are directly connected to the effluent 8" FM via a grinder station tie in, which will be capped, abandoned in place, and replumbed to the connect to a proposed 3" FM during construction.

C. DEVELOPMENT OF ALTERNATIVES

Three potential project alternatives were considered to provide wastewater treatment for the proposed residences as described below.

1. Cost Analysis Methodology

Present worth has been used to compare the various wastewater treatment alternatives developed in this Facilities Plan document. The present worth analysis performed incorporates the following considerations:

- Planning period of 20 years;
- Discount rate from the latest revision of OMB Circular A-94 Appendix C (currently 0.4%)
- Capital costs including contingency, engineering, and administrative costs;
- Salvage value;
- Operation and maintenance costs;
- Opinions of probable construction costs are based on similar past project; and
- Loan requirements for compliance with Davis-Bacon wage rates and American Iron and Steel requirements.

2. Alternatives Analysis

Alternative 1: No Action

The no action alternative would consist of no expansion to the existing WWTF or force main and allowing existing residences to continue to utilize their onsite treatment and disposal systems (septic tanks) and require future residential developments to also utilize septic tanks. The No Action alternative is not considered viable. Both public health and water quality risks exists due to potential future additional septic system overflows and backups, along with nutrient discharges to surface waters/groundwater within and adjacent to the Lake Okeechobee Basin Management Action Plan (BMAP) area is not feasible due to State of FL water quality goals.

Alternative 2: Resiliency and expansion improvements of existing 0.25 MGD WWTF (to 0.5 MGD)

This alternative consists of a number of resiliency improvements which will expand the capacity of the existing 0.25 MGD WWTF to a 0.5 MGD system and a rehabilitated pump station and force main network. The Phase 2 expansion includes an elevated headworks, equalization tanks, a second treatment train for treatment, and an onsite operations building which may also function as an extreme storm emergency operations center. The elevated headworks will consist of a mechanical fine screen, a bypass static screen, and a grit tank. This alternative will supply the Town with treatment capacity redundancy while also protecting the existing equipment with increased screening and filtration. The Town's initial Phase 1 WWTF construction was designed to facilitate expansion to a 0.5 MGD plant with an additional treatment train via post-tensioning caps on the concrete tankage. The force main and pump station is proposed for an already developed area, with only previously disturbed area in the project route. Some existing customers will require additional piping to connect to the force main feeding the pump station wetwell but the in-use grinder stations will be used to provide flow pressure to reach the wetwell.

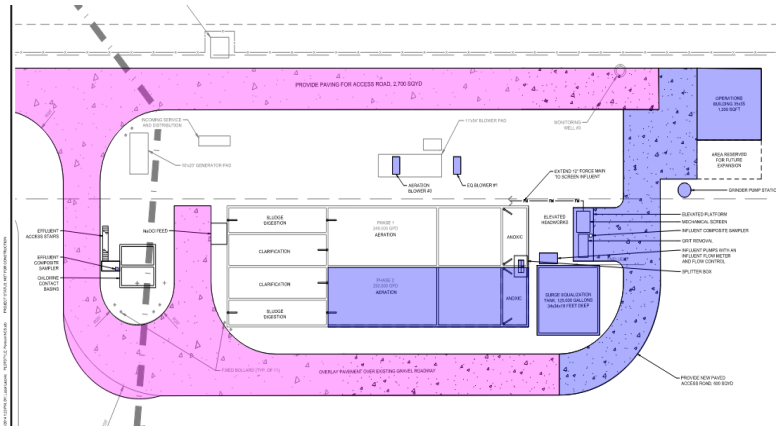


Figure 4: Project Layout – Alternative 2

This alternative consists of the following wastewater collection system improvements:

- Elevated headworks with screening and grit removal;
- Grit tank system;
- Influent surge equalization tanks;
- Anoxic treatment tank;
- Aerobic treatment tank;
- WWTF Site grinder pump station and drain line;
- WWTF Operations Building
- Paving, parking, and other site improvements;
- Other resiliency improvements;
- Existing pump station rehabilitation (mechanical and electrical);
- Approximately 1,550' of 6" force main;

- Approximately 3,700' of 8" force main;
- Approximately 1,470' of 3" force main;
- Six existing grinder station to FM abandonments;
- Six grinder station connections to 3" FM;

The estimated design and construction cost of this alternative is $9,057,633 (see **Table 1**). This alternative will require the use an easement along the proposed force main route which is currently privately owned. The immediate need for increased treatment capacity and allowance for redundancy make this an attractive alternative.

TABLE 1: Cost Analysis – Expansion to 0.5 MGD WWTF and Pump Station Rehabilitation (Alt. 2)

Capital Cost

Item	Description	Quantity	Unit	Cost	Total
1	Civil and General Work	1	LS	$209,850	$209,850
2	Elevated Headworks (Screening and Grit)	1	LS	$744,000	$744,000
3	Surge Tank and Influent Pump and Piping	1	LS	$525,060	$525,060
4	Additional Treatment Train	1	LS	$2,400,000	$2,400,000
5	Yard Piping			$6,000	$6,000
6	Operations Building	1	LS	$450,000	$450,000
7	Electrical Power, and Controls	1	LS	$520,189	$520,189
8	Existing Site Equipment Improvements (Lighting cells, davit cranes, etc.)	1	LS	$41,500	$41,500
9	WWTF Grinder Pump Station	1	LS	$62,501	$62,501
10	Chlorine Access Stairs	1	LS	$39,400	$39,400
11	Paved Access Road	1	LS	$186,400	$186,400
12	Access Sidewalks	1	LS	$18,000	$18,000
13	Potable Water Well Fence and Gate	1	LS	$7,200	$7,200
14	Influent Flow Meter	1	LS	$13,000	$13,000
15	Composite Samplers	1	LS	$16,000	$16,000
16	US-27 Pump Station Rehabilitation	1	LS	$335,000	$335,000
17	US-27 8" HDPE Bore	105	LF	$271	$28,449
18	US-27 6" HDPE Bore	230	LF	$203	$42,674
19	US-27 3" HDPE Bore	105	LF	$101.61	$10,669
19	8" PVC Force Main	3,700	LF	$96	$355,200
20	6" PVC Force Main	1,550	LF	$85	$131,595
21	3" PVC Force Main	1,717	LF	$71	$103,856

22	Existing Grinder Station to 3" FM Connection	6	EA	$2,500	$15,000
23	2" Existing Force Main Abandonment	6	EA	$1,920	$11,520
24	Misc. valves, fittings, tap in connection, etc.	1	LS	$144,523	$144,523
				Subtotal	$6,417,585
				Contingency (10%)	$641,759
				Bonds, Taxes, and Contractor Markup	$717,970
				Technical Services During Construction	$692,678
				Mobilization	$587,640
				Capital Cost Total	**$9,057,633**

Salvage Value

Useful Life for Salvage Value: Assumes 50 years on all items except for duplex and grinder pump station and controls, WWTF site improvements, flow meter, composite sampler, and electrical power, and controls (15 years). Assumes 20-year planning period. N = 0.4% real discount rate.

Salvage value at year 20:	$3,388,317
PW Salvage Value = $F(1 + i)^{-N}$	**$3,669,935**

Annual Operation and Maintenance

WWTF Infrastructure and Pump Station	Repl. Cost	Useful Life	Quantity	Annual Repl. Cost
Electrical Power and Controls	$50,000	15	1	$3,333
Existing Site Equipment Improvements	$15,000	20	1	$750
Grinder Pump Station	$20,000	20	1	$1,000
Potable Water Well Fence and Gate	$2,500	20	1	$83
Influent Flow Meter	$15,000	20	1	$750
Composite Sampler	$8,000	20	1	$400
			Subtotal Equipment Replacement Cost	$6,717

Piping	Unit Price	Length of Pipe	Annual Pipe O&M Cost
Annual cost per LF of pipe	$2.00 / ft every 5 yrs	7,140	$2,856

Power Cost	Power Cost	Quantity	Annual Power Cost
Flat Rate	$ 12.00 / month	12	$144
Energy Charge	$0.0914 / kWh	322.09 kWh/day	$128,944
Demand Charge	$6.93 / kW	325.38 kW	$27,059
		Subtotal Power Cost	$156,146

$PW_{O\&M} = \{A[(1+i)^N - 1]\}/[i(1+i)^N]$	Total Annual O&M Cost	$165,719
A = annual O&M value (assumed constant)	**PW O&M Cost**	**$3,245,787**
i = discount rate OMB Circular A-94, App C = 0.2%		
N = number of years in evaluation period		

Alternative 2 Present Worth Analysis Summary

Capital Cost	$9,057,633
PW Salvage Value	($3,669,935)
PW O&M Costs	$3,245,787
Grand Total	**$8,633,486**

Alternative 3: Expansion of existing 0.25 MGD WWTF (to 0.5 MGD; including public access reuse)

An alternative to a capacity and screening improvements via 0.5 MGD WWTF expansion as described in Alternative 2, is an expansion of the plant to 0.5 MGD and include treatment and storage equipment for public access reuse water. Currently, the Town requires all future developments to install piping infrastructure for public access reuse but does not have treatment or storage capability for reuse water. The alternative will consist of an additional anoxic and aerobic treatment train, plant operation building, two 25'x25' chlorine contact chambers, two 40' diameter clarifiers, a new 1.0 MG reuse storage tank, additional RAS/WAS and reclaim pumps and piping, and cloth disk filters. The additional treatment equipment will be constructed on the existing WWTF site with no additional land purchase required.

This alternative consists of the following wastewater collection system improvements:

- One anoxic treatment tank;
- One aerobic treatment tank;
- Plant operations building;
- Two 25'x25' chlorine contact chambers;
- Two 40' secondary clarifiers;
- One 1.0 MG reuse water storage tank;
- Additional RAS/WAS pumping system;
- Cloth disk filters;
- Existing pump station rehabilitation (mechanical and electrical);
- Approximately 1,550' of 6" force main;
- Approximately 3,700' of 8" force main;
- Approximately 1,470' of 3" force main;
- Six existing grinder station to FM abandonments;
- Six grinder station connections to 3" FM;

The estimated construction cost of this alternative is $16,224,755 (see Table 2). Design costs are excluded as they are being paid separately by the Town and others. This alternative positions the Town to begin treatment improvements up to public access reuse standards, and provides an alternative water source (AWS) that are currently being heavily encourage by potable water regulations (Central Florida Water Initiative (CFWI), Water Use Permit (WUP), etc.). As part of the Town's recent WUP approval, the Town will be given a gap quantity of Upper Floridan Aquifer (UFA) well water past 2025 to meet any demands at that time. This gap quantity will last only until the Town is able to provide an AWS to meet the demand of its utility customers, which will only require more retrofitting and infrastructure cost as the Town expands to 2025. While the regulations do not require these AWS improvements within the next two years, heading off the improvement with the Town's current situation would be beneficial to planning and economic growth.

TABLE 2: Cost Analysis – Increase to 0.5 MGD with Public Access Reuse (Alternative 3)

Capital Cost

Item	Description	Quantity	Unit	Cost	Total
1	Civil and General Work	1	LS	$227,925	$227,925
2	Elevated Headworks	1	LS	$1,102,000	$1,102,000
3	Treatment Equipment – Modular Treatment Train with EQ Tanks	1	LS	$2,500,000	$2,500,000
4	Yard Piping	1	LS	$70,000	$70,000
5	Operations Building	1	LS	$550,000	$550,000
6	Electrical Power and Controls	1	LS	$555,000	$555,000
7	High Level Disinfection (25'x25' CCL)	2	EA	$200,000	$400,000
8	Clarifiers (40' Diameter)	2	EA	$600,000	$1,200,000
9	Storage Tank (1.0 MG Tank)	1	LS	$1,250,000	$1,250,000
10	VFD Pumps and Piping	4	EA	$112,500	$450,000
11	RAS/WAS Pumping System	1	LS	$200,000	$200,000
12	Cloth Disk and Elevated Platform	1	LS	$1,000,000	$1,000,000
13	Reuse Transmission Line	1	LS	$1,250,000	$1,250,000
14	SCADA and Wiring	1	LS	$180,000	$180,000
15	Electrical Power for Reuse Components	1	LS	$164,000	$164,000
16	Pump Station Rehabilitation	1	LS	$335,000.00	$335,000
17	Northern SR-27 8" HDPE Bore Casing	105	LF	$270.94	$28,449
18	Northern SR-27 6" HDPE Bore Carrier	210	LF	$203.21	$42,674
18	Southern SR-27 3" HDPE Bore Carrier	105	LF	$101.61	$10,669
19	6" PVC Force Main	1550	LF	$84.90	$131,595
20	8" PVC Force Main	3700	LF	$96	$355,200

21	3" PVC Force Main	1470	LF	$71	$103,856
23	Existing Grinder Station to 3" Force Main Connection	6	EA	$2,500	$15,000
24	2" Existing Force Main Abandonment	6	EA	$1,920	$11,520
25	Misc. valves, fittings, tap in connection, etc.	1	LS	$144,523	$144,523
				Subtotal	$11,672,485
				Contingency (10%)	$1,167,249
				Design	$1,400,698
				Mobilization	$1,050,524
				Technical Services During Construction	$933,799
				Capital Cost Total	**$16,224,755**

Salvage Value

Useful Life for Salvage Value: Assumes 50 years on all items except for Electrical Power and Controls, Process Pumps, and SCADA and wiring (15 years). Assumes 20-year planning period. N = 0.2% real discount rate.

Salvage value at year 20:	$5,774,091
PW Salvage Value = F $(1 + i)^{-N}$	**$6,254,000**

Annual Operation and Maintenance

WWTF Infrastructure	Repl. Cost	Useful Life	Quantity	Annual Repl. Cost
Electrical Power and Controls	$75,000	15	1	$5,000
Pumps and Piping	$50,000	20	1	$2,500
RAS/WAS Pumping System	$30,000	20	1	$1,500
SCADA and Wiring	$40,000	15	1	$2,667
Electrical Power for Reuse Process	$17,500	15	1	$1,167
			Subtotal Equipment Replacement Cost	$12,833
Piping	**Unit Price**		**Length of Pipe**	**Annual Pipe O&M Cost**
Annual cost per LF of pipe	$2.00 / ft every 5 yrs		7,140	$2,856
Power Cost	**Power Cost**		**Quantity**	**Annual Power Cost**
Flat Rate	$ 12.00/ month		12	$144
Energy Charge	$0.0914/ kWh		383.83 kWh/day	$153,658
Demand Charge	$6.93/ kW		387.74 kW	$32,245
			Subtotal Power Cost	$186,047
$PW_{O\&M} = \{A[(1+i)^N - 1]\}/[i(1+i)^N]$			Total Annual O&M Cost	$198,736
A = annual O&M value (assumed constant)			**PW O&M Cost**	**$3,892,463**
i = discount rate OMB Circular A-94, App C = 0.2%				
N = number of years in evaluation period				

Alternative 3 Present Worth Analysis Summary				
			Capital Cost	$16,224,755
			PW Salvage Value	($6,254,000)
			PW O&M Costs	$3,892,463
			Grand Total	$13,863,218

3. Cost to Construct Alternatives

The cost details for the proposed alternatives are presented on Tables 1 and 2. The following summary tabulation presents the total project cost inclusive of the non-construction items.

3.1. Alternative 1: No Action

No capital, engineering or Operation and Maintenance cost.

3.2. Alternative 2: Cost Analysis – Sewer/Force Main to Haines City

Capital Cost	$	9,057,633
Present Worth Salvage Value	$	(3,669,935)
Present Worth O&M Costs	$	3,245,787
20-YEAR PRESENT WORTH COST	$	8,633,486

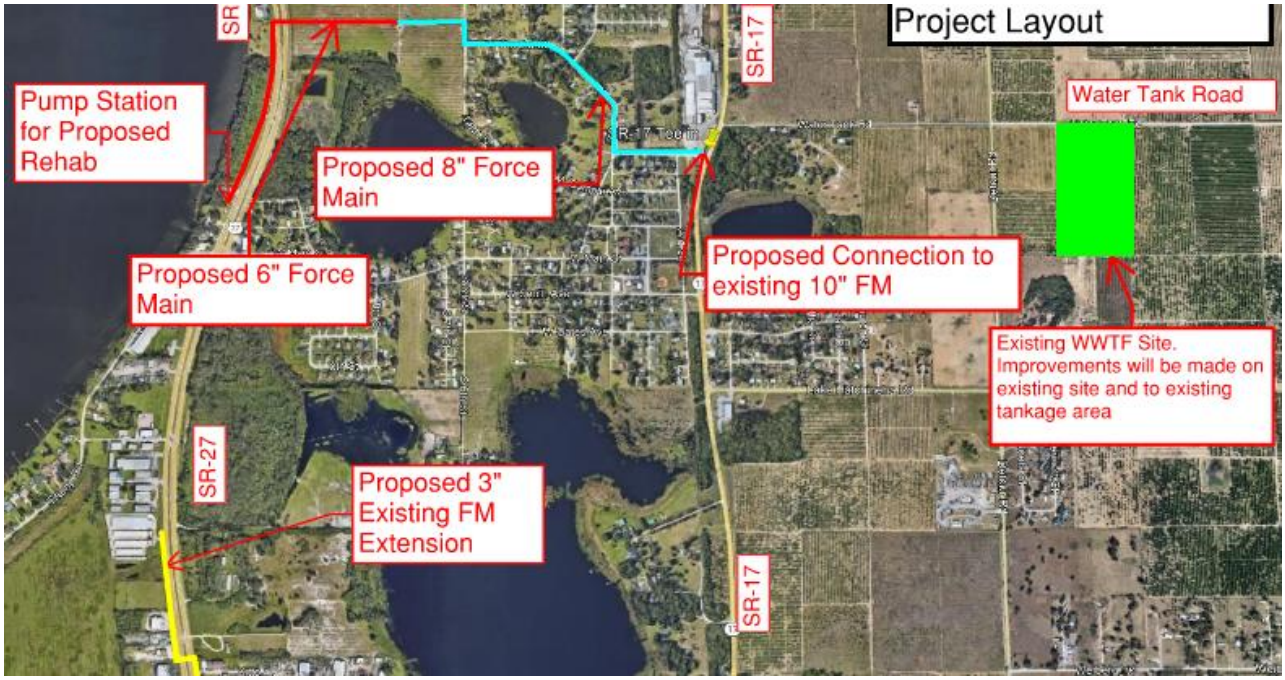
3.3. Alternative 3: Sewer/Force Main to New Town WWTF

Capital Cost	$	16,224,755
Present Worth Salvage Value	$	(6,254,000)
Present Worth O&M Costs	$	3,892,463
20-YEAR PRESENT WORTH COST	$	123,863,218

D. SELECTED ALTERNATIVE

The preferred Project alternative is Alternative 2, described as the construction of existing WWTF improvements with 0.5 MGD capacity and the concurrent rehabilitation of an existing pump station and pressurized force main conveyance system. The project would construct an additional treatment train of anoxic and aerobic tanks and tie into the existing post-tensioned concrete tank structure, an elevated headworks for screening and grit removal, an onsite operations building, and an influent surge tank and influent pumping system. The cost to improve the WWTF system to utilize public access reuse water was deemed too expensive and unneeded for the current wastewater system that will require more residential connections to provide enough consistent wastewater flow to adequately use and generate reuse water. An expansion to utilize public access reuse would be beneficial to the Town as an alternative water source a

Figure 5: Conceptual Project Design



more stringent water source regulations arise (CFWI, effluent regulations, etc.), but this focus is better put to improve the base level treatment ability at the existing plant. **Figure 5** illustrates the layout of the proposed Project.

The Project will be permitted through the FDEP's Tampa district office. Plans and specifications will be submitted to the FDEP Bureau of Water Facilities Funding. A copy of the FDEP Construction Permit approvals will be provided to the FDEP upon receipt. Additionally, the Florida Department of Transportation (FDOT) will be contacted to acquire a right-of-way use permit as the proposed force main will use US-17 right-of-way.

E. ENVIRONMENTAL REVIEW

The project alternative chosen in this Facilities Plan takes place in areas of both prior improvement and unimproved orange groves. The WWTF, pump station improvement, and force main will be constructed on

significantly disturbed areas of residential neighborhoods, WWTF site, and FDOT road right-of-way. A portion of the force main will be installed in an existing orange grove, which while not developed to the same standards as a WWTF site or neighborhood, has still been disturbed by intensive agricultural operations involved with the management of citrus groves.

Short-term impacts during construction of the proposed project would include increased noise levels, increased airborne particulates, surface run-off during rainfall on the site, temporary pausing of both potable and wastewater services, and surface run-off during rainfall. Control measures will be implemented to minimize these temporary effects.

The proposed project will be constructed within previously disturbed areas and will not have significant adverse impacts on wild and scenic rivers, flora, fauna, threated or endangered plant or animal species, prime agricultural lands, wetlands, undisturbed natural areas, or the socio-economic character of the project areas. These factors were evaluated via a field and desktop evaluation (Appendix A) and is documented and discussed herein.

1. Climate

The Lake Hamilton area is warm and temperate with mild winters and long summers. According to 2022 Climate Data, the average annual daily temperature is 72.3° F with a high average of 80.8° F in August and a low average of 60.4° in January. Rare extreme temperatures reach highs in the low 100s to lows in the low 50s.

The average annual rainfall is approximately 42.6 inches. Rainfall is seasonally distributed. Approximately 57 percent of the average annual precipitation falls during the months of June through September. Most rainfall in summer comes as thundershowers of short duration during the afternoon and early evening hours.

2. Topography and Drainage

According to information obtained from the United States Geological Survey (USGS) Dundee, Florida quadrangle map, the native ground surface elevation across the site area ranges from approximately +200 to +215 feet National Geodetic Vertical Datum (NGVD). The site is located approximately 0.5 mile east of Lake Gordon. Based on the USGS map, the normal high-water elevation in Lake Gordon is about +120 feet NGVA. The soil on the property (Candler fine sand) is sandy, excessively well drained with no stormwater runoff features.

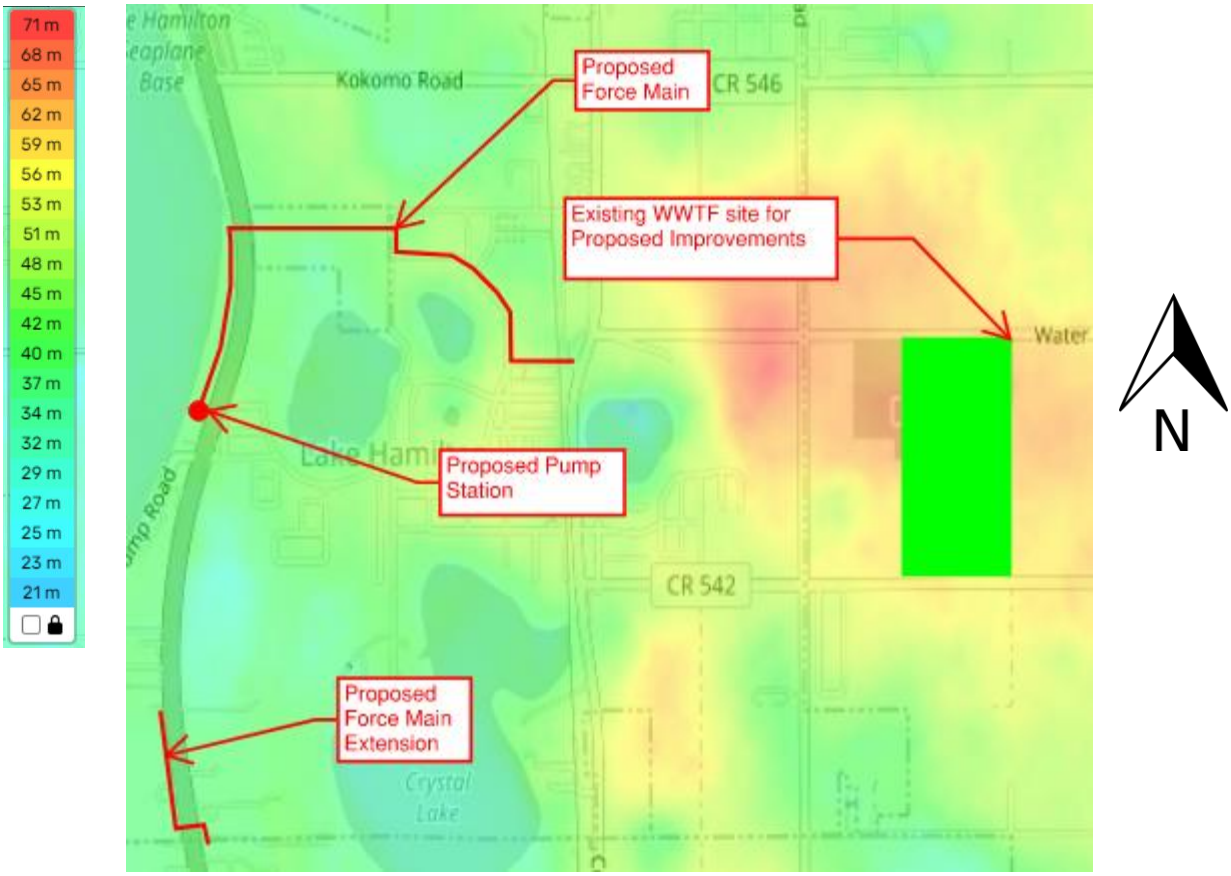


Figure 6: Town of Lake Hamilton Topography

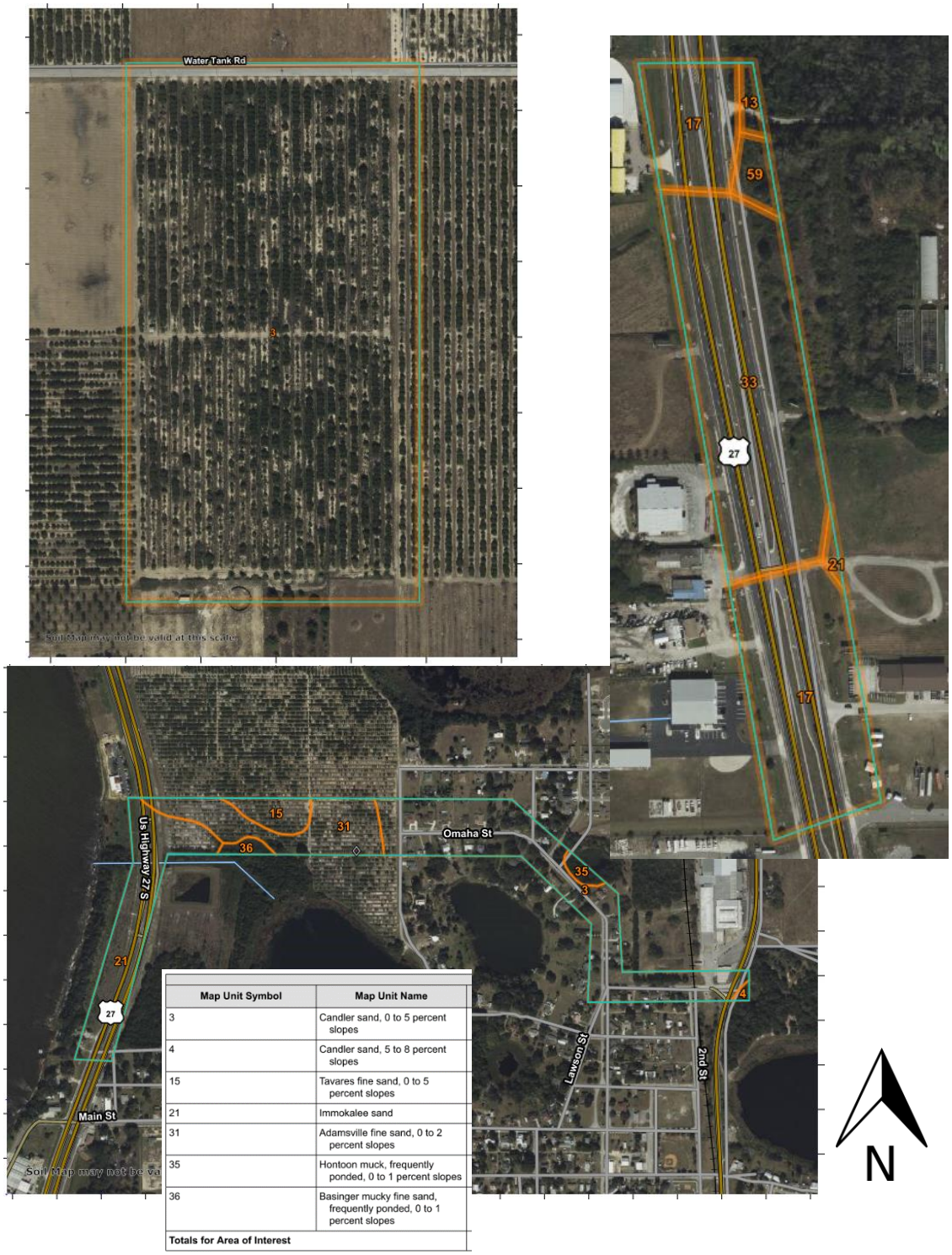
3. Geology, Soils, and Physiography

Geographically the WWTF and force main are located within the Lake Hamilton Ridge (upland) physiographic area of Polk County (USDA, 1990). Most of Polk County lies within in the Polk and Lake Uplands area designation. The project area lies within the Lake Hamilton Ridge watershed and the Peace River Drainage Basin.

A USDA Natural Resource Conservation Service (NRCS) Polk County Soil Survey was conducted and summarized in this Facilities Plan for both project areas (Appendix B). The survey indicates the native underlying project area contains multiple soil mapping units. The WWTF only indicated one native soil type mapped within the project boundary according to the USDA NRCS Soil Survey of Polk County, Florida is Candler fine sand, 0 to 5 percent slopes. This soil type is classified in hydrologic group "A" and has excessively well drained drainage characteristics. The depth of published seasonal high water is greater than 6-feet.

The proposed force main route survey indicated seven total soil types mapped within the project boundary. The majority of the soils are Candler sand, 0 to 5 percent slope, Immokalee sand, and Adamsville fine sand, 0 to 2 percent slopes. The majority of other soil types are below 10% and can be avoided during force main installation. The Immokalee sand is defined as having poor drainage qualities with only six to eighteen inches to the water table. The final majority soil type within the area is Adamsville fine sand, 0 to 2 percent slope. This is defined as somewhat poorly draining capabilities with depth to water table of about eighteen to fourty-

two inches. These soils are not believed to negatively impact the project due to the backfilling nature of the pipeline project.



Map Unit Symbol	Map Unit Name
3	Candler sand, 0 to 5 percent slopes
4	Candler sand, 5 to 8 percent slopes
15	Tavares fine sand, 0 to 5 percent slopes
21	Immokalee sand
31	Adamsville fine sand, 0 to 2 percent slopes
35	Hontoon muck, frequently ponded, 0 to 1 percent slopes
36	Basinger mucky fine sand, frequently ponded, 0 to 1 percent slopes
Totals for Area of Interest	

4. Surface water Hydrology, Water Quality, and Water Uses

4.1. Surface Water Hydrology

The Town does not contain and is not located near Outstanding Florida Waters, Rivers, or Lakes as defined in Chapter 62-302-700 F.A.C. The proposed force main will be installed near Lake Hamilton, Lake Sara, and Lake Lee, but no discharge will be made into the lakes, nor will any piping be required to be under or over the water bodies.

Water quality regulations developed by the Florida Department of Environmental Protection (FDEP) provide use standards for water bodies (Chapter 62.302.400 F.A.C.) as defined in the following five classes:

- Class I waters are for potable water supplies;
- Class II waters are for shellfish propagation or harvesting;
- Class III waters are for recreation and propagation and maintenance of a healthy, well-balanced population of fish and wildlife;
- Class IV waters are for agricultural water supplies; and
- Class V waters are for navigation, utility and industrial use.

As specified in Chapter 62.302.400(14) F.A.C., surface waters within the Town of Lake Hamilton area are classified as Class III Waters.

The planning area is located within the Peace River Drainage Basin. The nearest significant surface water bodies are Lake Hamilton, Lake Sara, Lake Lee, and Lake Gordon. These water bodies are all located within a mile of the proposed WWTF and force main site.

4.2. Groundwater

Aquifer systems in the Lake Hamilton area include a shallow surficial aquifer, an intermediate aquifer system, and the Floridan aquifer. The upper Floridan consists of several hundred feet of limestone and dolomite and is the principal source of groundwater for public supply in the planning area, including the Town of Lake Hamilton's public supply wells.

A portion of the project area, including the WWTF site and force main route, lie within a Florida Department of Environmental Protection (FDEP) groundwater contamination zone for ethylene dibromide (EDB). The Town may be required to conduct sampling and enhanced treatment if EDB is discovered within the UFA.

4.3. Water Uses

Potable water and landscape irrigation in the area are provided by the Town of Lake Hamilton Monroe St. Water Treatment Plant (WTP).

Surface water bodies in the area are used for recreation and some irrigation. The surficial aquifer is used for some agricultural irrigation, and the upper Floridan aquifer is used as the drinking water source and agricultural irrigation.

5. Environmentally Sensitive Areas or Features

The proposed WWTF is located on a previously disturbed property parcel as described in the introduction to Section E above. The property is currently owned by the Town and impacts to environmentally sensitive areas or features are not reasonably expected to occur. An existing sand skink buffer on the south side of the property is currently in place.

The proposed force main will be on Polk County right-of-way, Town owned public right-of-way, and land that is currently used for citrus growing purposes. The improvements are anticipated to have little impacts due to location inside previously disturbed areas.

The conclusions of a "Preliminary Ecological Site Assessment" (Appendix B) for the proposed route are summarized as follows:

- The majority of vegetation community consisted of herbaceous plants, Bahia and Saint Augustine grass inside road right-of-way, and citrus groves with orange trees and minor groundcover.
- A 100% gopher tortoise survey was conducted on November 16th and no gopher tortoises were observed within 25 feet of the proposed pipeline route. If any gopher tortoise burrows are discovered that the potential to be impacted (cannot be avoided by 25 feet), they will be excavated/trapped and relocated offsite. A Florida Fish and Wildlife Conservation Commission (FWC) permit will be gathered if necessary.
- The sand skink and bluetail mole skink are listed as Threatened by the US Fish and Wildlife Services (USFWS) and FWC. Much of the assessment area does not contain suitable habitat outside of the citrus grove. However impacts to sand skinks are not expected as the project is a temporary activity and soils to be replaced after project completion will be loosened, thus creating more suitable habitat conditions for sand skinks than what currently exists.
- The bald eagle was delisted by USFWS and FWS in August 2007, but are still protected through the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. A database of bald eagle nests revealed one (1) documented nest (opposite side of road than the Town's pipeline project) within less than 300 feet of the assessed area to the at the southwest boundary. A consultation with the US Fish and Wildlife Service (FWS) will be conducted to reduce the protection zone due to the project being significantly close to an active roadway.
- No sign of wood stork, Audubon's crested caracara, Florida Scrub-Jay, Everglade snail kite, Florida grasshopper sparrow, southeastern American kestrel, sandhill crane, Florida burrowing owl, or any other listed species was observed in the project area.

5.1. Wetlands

The proposed improvements will occur within a previously disturbed residential, public institution, and agricultural use areas. There are jurisdictional wetlands near the proposed project area, but not within the project areas, therefore no impacts are anticipated (Figure 8). If any wetlands would be discovered during design (not anticipated), wetland impact will be minimized by directional drilling under or avoiding construction near the wetland as well as use of best management practices.

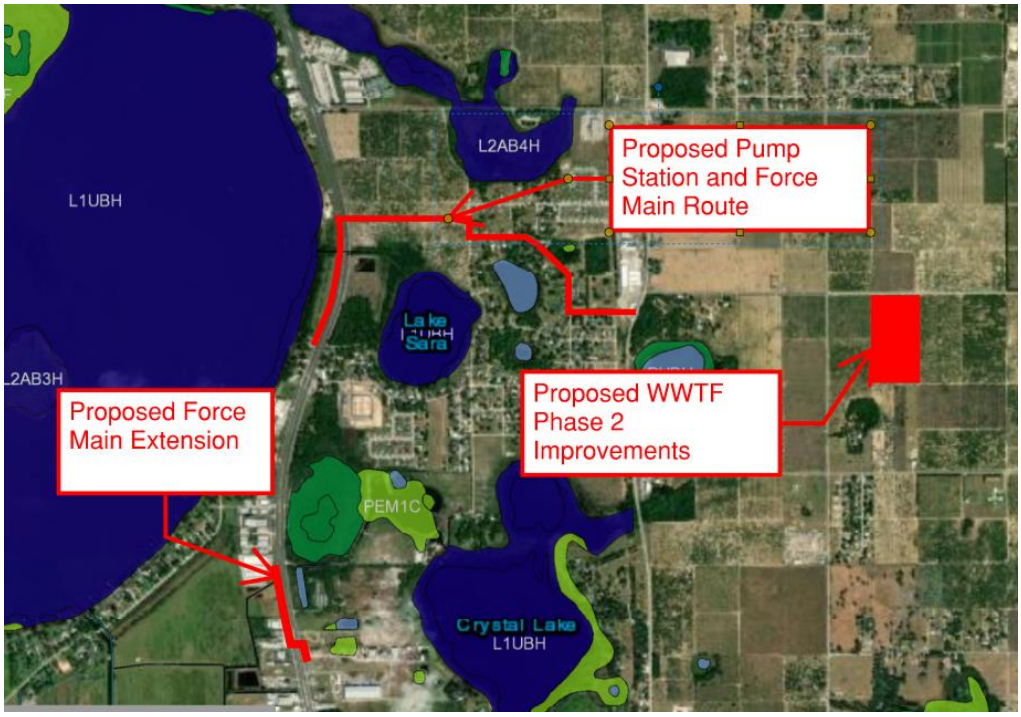


Figure 8: WWTF Site Wetlands

5.2. Archeological and Historical Sites

The National Park Service's National Historic Landmarks Program internet database was searched for national or natural landmarks in the planning area (Appendix C). No such sites are found for the WWTF site or surrounding property.

The project will be constructed on existing previously disturbed Town-owned property. No archeological and/or historical sites will be disturbed.

Historic structures will not be encroached upon.

5.3. Flood Plain

Flood zones for the Town are designated based on the Flood Insurance Rate Map (FIRM). The proposed WWTF will be constructed on upland property that has been previously disturbed and will not be impacted by 100-year flood events. The proposed pipeline will not be affected by flood events due to the nature of the improvement, as the pump station rehabilitation is not in a flood zone, only a portion of the force main route and extension will be within flood areas.

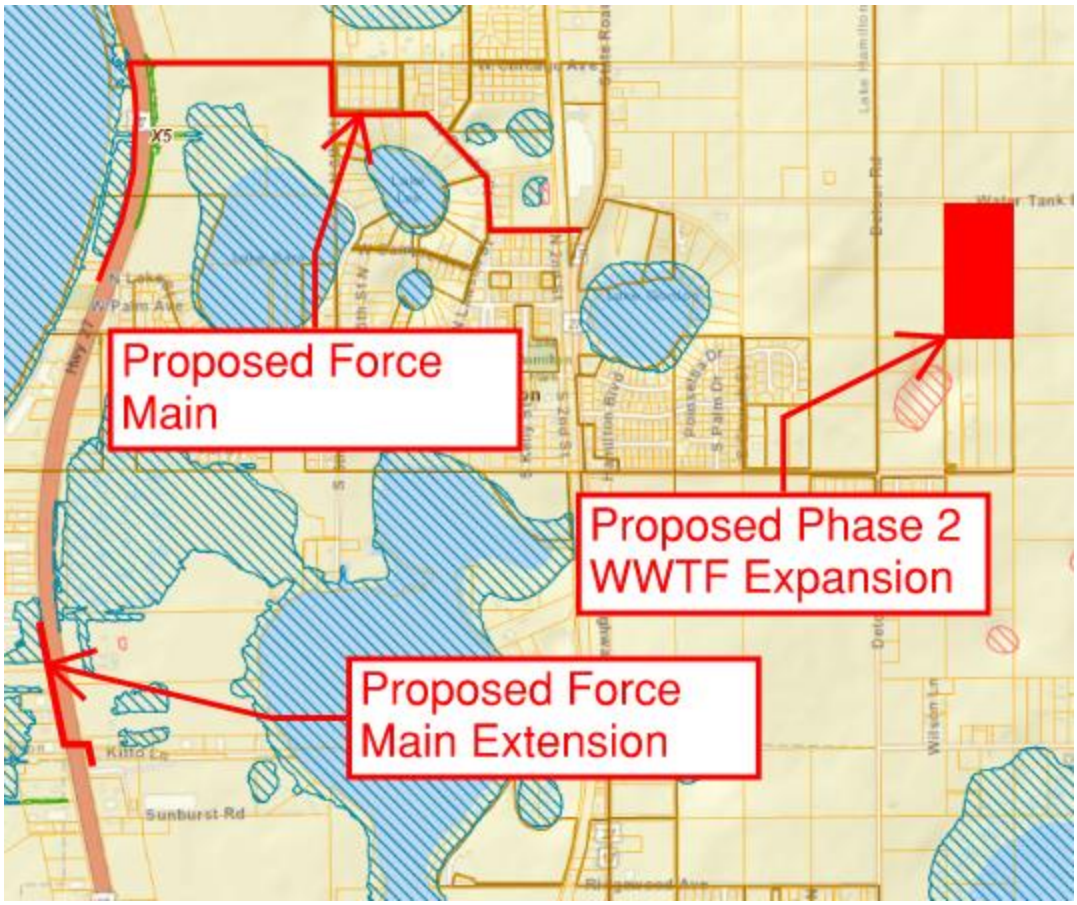


Figure 9: FEMA Flood Map, Town of Lake Hamilton and Project Site

5.4. Air Quality

The air quality in Polk County is generally good and according to F.A.C. Chapter 62-204.340 is classified as an area of attainment with respect to the National Ambient Air Quality Standards. An extended aeration activated sludge process is proposed with equipment located in the interior of the site. In addition, a minimum of a 100' buffer for all process equipment from property boundaries was designed into the Phase 1 construction. As such, the Project is not anticipated to have a significant adverse impact on the existing ambient air quality.

6. Socio-Economic Conditions

6.1. Population

The population that is provided water service by the Town is the current population within the Town of Lake Hamilton corporate limits, which was 1,537 persons as determined from 2020 U.S. Census data. This is an increase of 306 persons from the 2010 U.S. Census count of 1,231 persons. This project will serve approximately thirty wastewater customers who currently have wastewater treated via the US-27 pump station. Increasing the capacity of the WWTF will prepare the plant to receive additional flows as additional septic-to-sewer conversion is completed.

The 2020 Census indicates that the average age of the Lake Hamilton population is 39.1, which is lower than the state average age of 42.4 years old. The median household income is $40,658, which is lower than the state median household income of $57,703. Approximately 20.1% of the Town's residents live at or below the poverty level, which is higher than the percentage of people in the State living at or below the poverty level. The homeownership rate in the Town is 85.4% which is significantly higher than the state's 66.2% home ownership.

6.2. Land Use and Development

The 19.74-acre project site has previously been used for agriculture as a citrus grove (FLUCFCS 2210 – Citrus groves) prior to Phase 1 construction. The proposed force main route will include areas of commercial highway, agricultural, and single-family residential zoning. The agricultural areas are planned to be converted to single and multi-family residential within the next five years. As of 2021 (prior to acquisition of the Town's 19.7 acre WWTF site), an updated breakdown of Lake Hamilton's mixture of land uses including agriculture, open land/recreation, residential, commercial, industrial, and institutional uses is summarized in Table 3.

Table 3: Town of Lake Hamilton – Existing Land Use (2021)

Existing Land Use	Florida Land Use Cover Classification System (FLUCCS)	Acreage	Percent of total acreage
Open Land (Vacant)	1900	163.73	5.7%
Single family residential	1200	260.55	9.1%
Muti-family (<10 units/acre)	1330	3.57	0.12%
Commercial/office	1400	38.24	1.33%
Industrial	1500	112.87	3.92%
Institutional	1700	44.09	1.53%
Agriculture	2000	1,163.50	40.4%
Transportation (Right-of-way)	8140	146.53	5.1%
Open water (Lakes)	5200	593.0	20.6%
Wetlands/floodplains	6000	350.29	12.2%
TOTAL		2,876.37	100%

Source: Town of Lake Hamilton 2030 Comprehensive Plan, Adopted September 2011
Polk County Property Appraiser data base, Polk GIS Mapping, 2020 aerial photography.

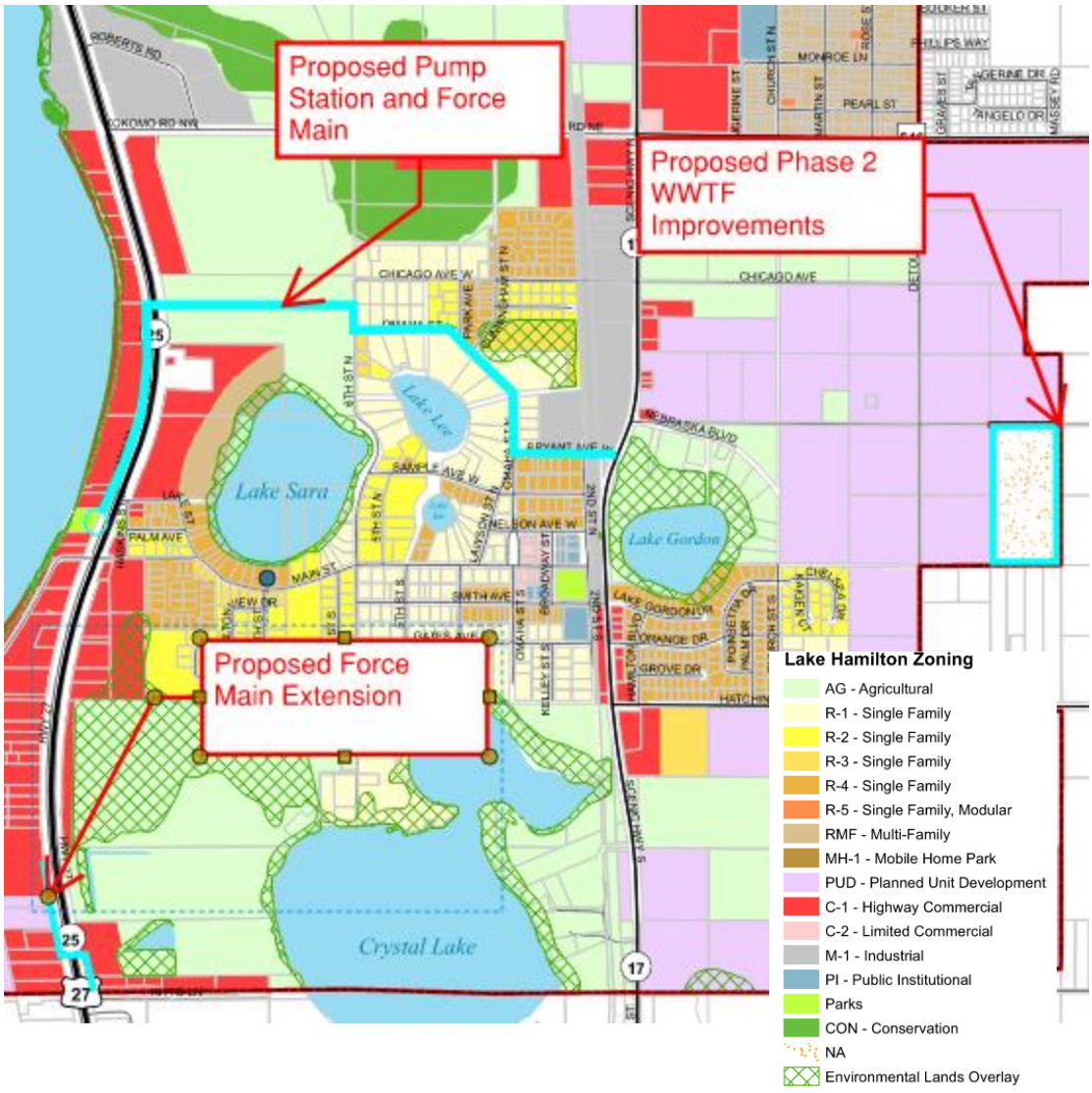


Figure 10: Town of Lake Hamilton Zoning

F. IMPLEMENTATION AND COMPLIANCE

1. Financial Sustainability

It is anticipated that loan funding from the FDEP Clean Water State Revolving Fund will be used to finance the proposed project. A Capital financing Plan has been prepared by Town staff to explain to the public and to the FDEP what the financial impacts on the users of the Lake Hamilton utility systems will be (Appendix D)

2. Regulatory Agency Review

To qualify for a subsidized loan from the SRF, various governmental agencies must be satisfied with the way the Town of Lake Hamilton's wastewater system issues are to be solved. Prior to submitting this revised Facilities Plan, the Town provided a copy of the Town's WWTF Preliminary Engineering and Environmental Assessment Reports to FDEP Clean Water SRF staff to advertise and seek review comments from the following governmental agencies:

- USDA Natural Resources Conservation Service;
- U.S. Fish and Wildlife Service; and
- Florida State Clearinghouse

3. Permits Required

The permits required to implement the proposed project are an FDEP General Permit for Wastewater Collection/Transmission Systems, an FDOT right-of-way permit, and a FDEP Wastewater Treatment Facility Construction Permit. Application for the permits are currently being made to acquire the necessary permits prior to bidding.

4. Public Participation Process

A public meeting to present this revised Wastewater Facilities Plan and the Capital Financing Plan is scheduled to be held at Town Hall in January 2024. The meeting will be advertised in accordance with Town noticing requirements. The public will be given the opportunity to offer comments concerning the Facilities Plan and Capital Financing Plan. The Affidavit of Advertisement for the public hearing and copies of the Town Commission Meeting Agenda and Meeting Minutes for the January 2024 public hearing will be submitted following the meeting (Appendix E). It is anticipated that the Town Council will adopt this revised Wastewater Facilities Plan inclusive of the Capital Financing Plan.

5. Implementation

The Town of Lake Hamilton has responsibility and authority to implement the recommended facilities. The Town will bid the pump station and force main project separately from the WWTF construction project, as that will require two different specialty contractors. The Town will have adequate capacity at its new WWTF to serve the 30 existing pressurized sewer connections proposed by this Project (approximately 9000 gpd of capacity). The Town of Lake Hamilton's WWTF is currently accepting flows from the previously completed septic to sewer conversion project.

6. Implementation Schedule

- January 2024 – Hold public hearing on Facilities Plan and Capital Financing Plan.
- December 2023 – Submit final revised Facilities Plan to FDEP.
- December 2023 – Design plans, specifications, and permits submitted to FDEP.
- January 2024 – FDEP approves Wastewater Facilities Plan.
- January 2024 – SRF design grant/loan agreement is executed.
- January 2024 – FDEP approves plans and specifications.
- February 2024 – Project added to priority list for construction funding.
- March 2024 – Grant/loan application submitted to FDEP for construction funding.
- June 2024 – SRF construction grant/loan agreement is executed.
- August 2024 – Advertise for bids.
- September 204 – Open construction bids.
- October 2024 – Award construction contract.
- December 2024 – Start project construction.
- January 2026 – Complete Project construction.
- February 2026 – Close out project.
- August 2026 – Begin SRF loan repayments to the FDEP.

7. Compliance

The wastewater system improvements and lift station will be designed in compliance with regulatory requirements set forth in Chapter 62-604 F.A.C.

The environmental aspects of the proposed facilities are satisfactory.

The recommended facilities are consistent with the Town's Comprehensive Plan and with Polk County's Comprehensive Plan.

G. REFERENCES

Environmental Site Review, R. Bruce Williams, Environmental Consultant, Austin Environmental Consultants, Inc., December 6, 2023.

Florida Department of Environmental Protection, Chapter 62-604 Florida Administrative Code.

Phase 2: Lake Hamilton Wastewater Treatment Facility, Lake Hamilton, Florida, Preliminary Engineering Report, prepared by Pennoni, December 1, 2023.

Polk County, Florida Property Appraiser data [Home Page (polkpa.org)]

Recommended Standards for Wastewater Facilities, 2014 Edition, Great Lakes - Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers.

U.S. Census Bureau Data for Lake Hamilton, Florida, 2010, 2020.

U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Highlands County, Florida, 1989.

Florida Aquifer Vulnerability Assessment (FAVA): Contamination potential of Florida's principal aquifer systems; Arthur, Baker, Cichon, Wood, and Rudin; 2005 FAVA final dep report

FIGURES

LARGER FORMAT

SMALLER VERSIONS

INCLUDED IN REPORT TEXT

Polk County 2010 Urbanized Area Boundaries

Urbanized Area (UA) and Urban Cluster (UC) Boundaries

UA/UC

- Lakeland
- Winter Haven
- Other Urbanized Areas
- Urban Clusters

Note: The TPO Study Area includes the Lakeland and Winter Haven TMAs, as well as all of Polk County.

Urbanized Area (UA) and Urban Cluster (UC) Population

UA	2010
Lakeland	262,596
Winter Haven	201,289
Avon Park - Sebring [1] [2]	61,625
Kissimmee [2]	314,071
Orlando [2]	1,510,516
Tampa/St. Pete [2]	2,441,770
Zephyrhills [2]	66,609

UC	2010
Poinciana [2]	41,922
Four Corners [2]	35,549
Frostproof	7,626
Fort Meade	6,234
Poinciana SW	5,501
Crooked Lake Park	4,335
Wauchula [2]	14,621

1. New Urbanized Area 2. All or a portion of the UA/UC is outside of Polk County.

N

0 2.5 5 10 15 Miles

Polk Transportation Planning Organization

September 12, 2014

FIGURE 1
TOWN LOCATION MAP

035

SR-27

SR-17

Water Tank Road

Proposed Force Main Route

SR-17 Tee in

Existing SR-17 Force Main Tap in Connection

Existing SR-27 Pump Station

Existing WWTF Site (19.74 acres)

Proposed Existing FM Extension

SR-27

SR-17

W Chicago Ave

Chicago Ave

Water Tank Rd

W Sample Ave

W Main St

W Gates Ave

Detour Rd

Lake Hatchineha Rd

Crump Rd

S 6th St

Kitto Ln

Google Earth

Image Landsat / Copernicus

FIGURE 2
PROJECT AREA MAP

EXHIBIT "A"
LAKE HAMILTON UTILITY SERVICE AREA
Ordinance O-20-11

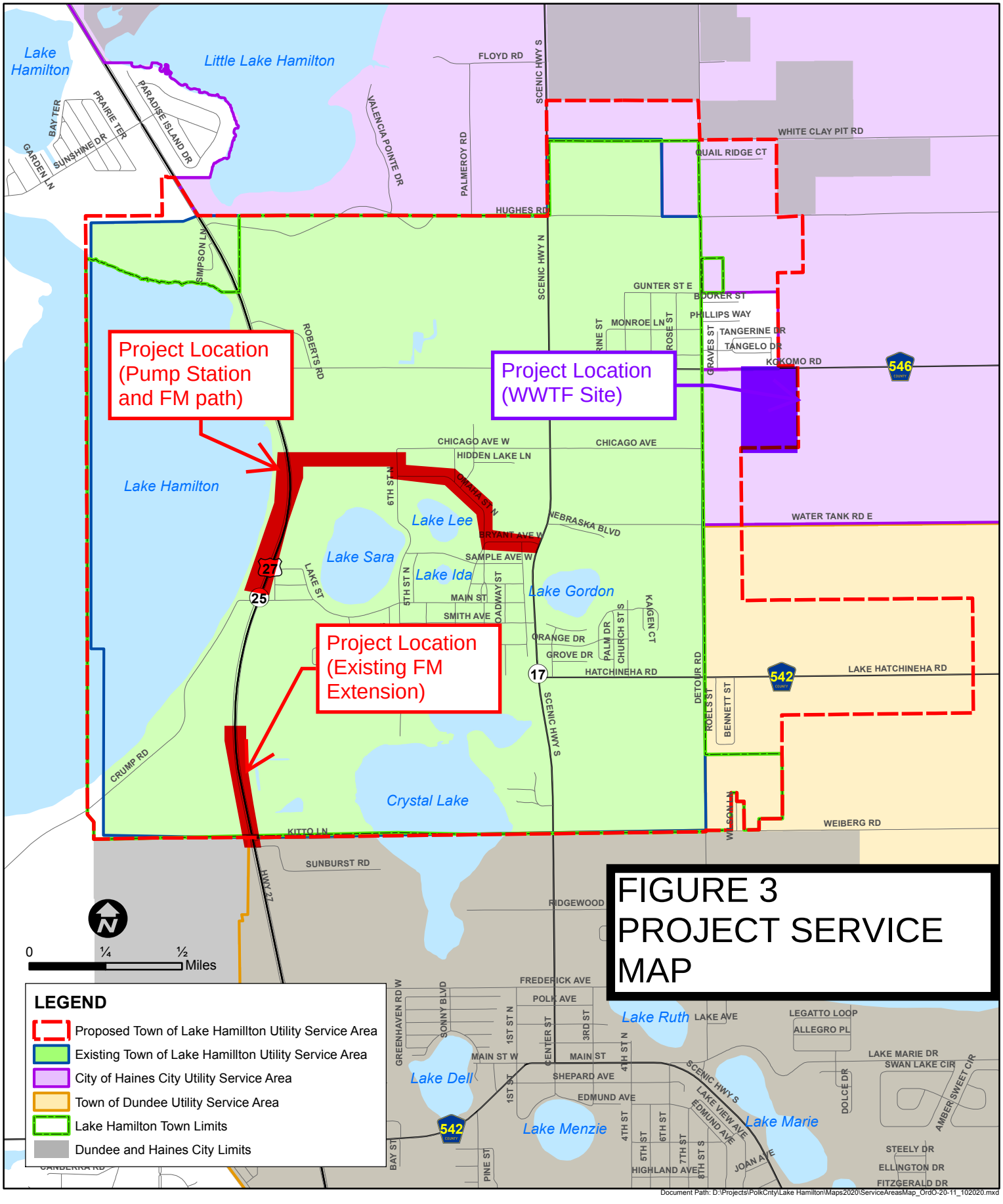
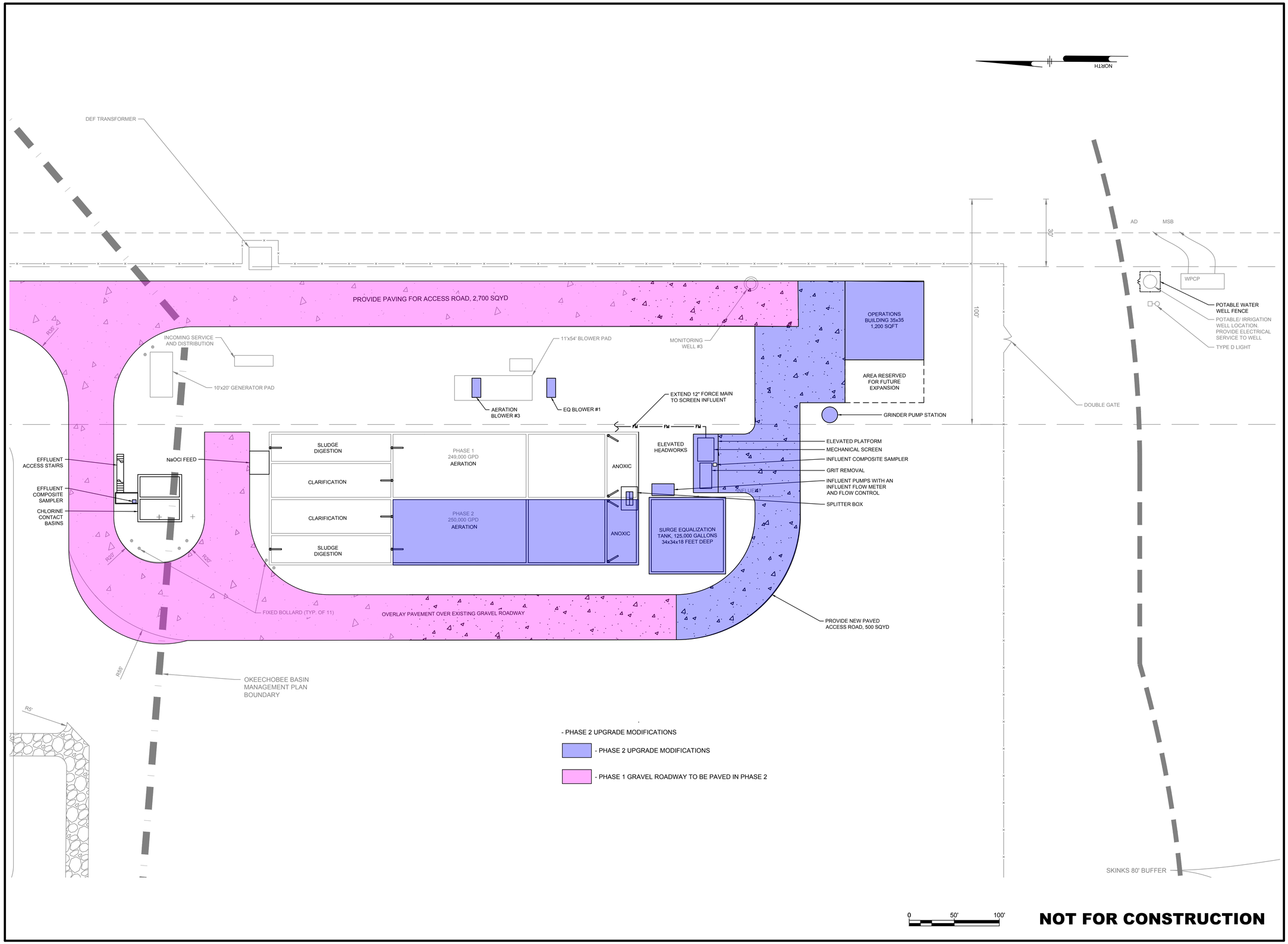


FIGURE 3
PROJECT SERVICE MAP

Document Path: D:\Projects\PolkCnty\Lake Hamilton\Maps2020\ServiceAreasMap_OrdO-20-11_102020.mxd



NOT FOR CONSTRUCTION

PENNONI ASSOCIATES INC.
401 Third Street SW
Winter Haven, FL 33880
T 863.324.1112 F 863.294.6185
COA #00007819

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

PHASE 2 - CAPACITY EXPANSION
WATER TANK ROAD
LAKE HAMILTON, FLORIDA 33851

TREATMENT SYSTEM MODIFICATIONS CONCEPTUAL LAYOUT
TOWN OF LAKE HAMILTON
100 SMITH AVENUE
LAKE HAMILTON, FLORIDA 33851

NO.	DATE	REVISIONS	BY

PROJECT	LAKHA22005
DATE	2022-11-13
DRAWING SCALE	1"=20'
DRAWN BY	LL
APPROVED BY	TD

CM-1001

SHEET 1 OF 1

'\\pennoni.com\Data\Accounts\LAKHA\LAKHA22005 - Phase 2 WWTF Preliminary Design Report\DESIGN_SHEETS\CM-1001.dwg PLOTTED: 4/20/2014 1:23 PM, BY: Lazar Lazovic PLOTSTYLE: Pennoni NCS.stb PROJECT STATUS: NOT FOR CONSTRUCTION

FIGURE 5 - Conceptual Project Layout

Pump Station for Proposed Rehab

Proposed 8" Force Main

Proposed 6" Force Main

Proposed Connection to existing 10" FM

Water Tank Road

Existing WWTF Site. Improvements will be made on existing site and to existing tankage area

Proposed 3" Existing FM Extension

SR-27

SR-17

SR-17 Tee in

W Chicago Ave

Chicago Ave

Water Tank Rd

Detour Rd

W Main St

W Smith Ave

W Gates Ave

8th St

S 6th St

Lake Hatchineha Rd

Weiberg Rd

Crump Rd

Kitto Ln

Google Earth

Image Landsat / Copernicus

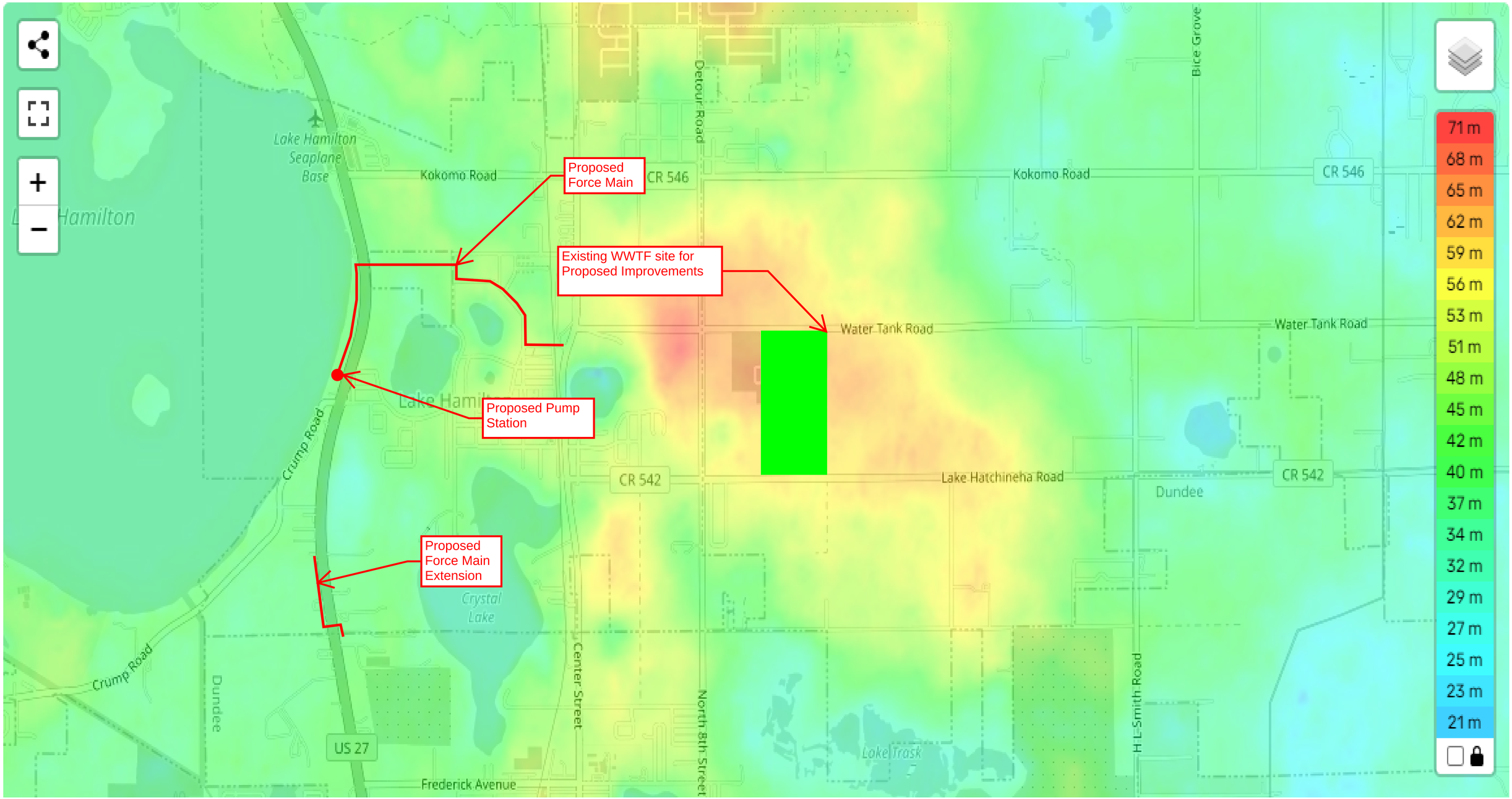


FIGURE 6 - PROJECT TOPOGRAPHY

Custom Soil Resource Report
Soil Map

Map Scale: 1:2,510 if printed on A portrait (8.5" x 11") sheet.

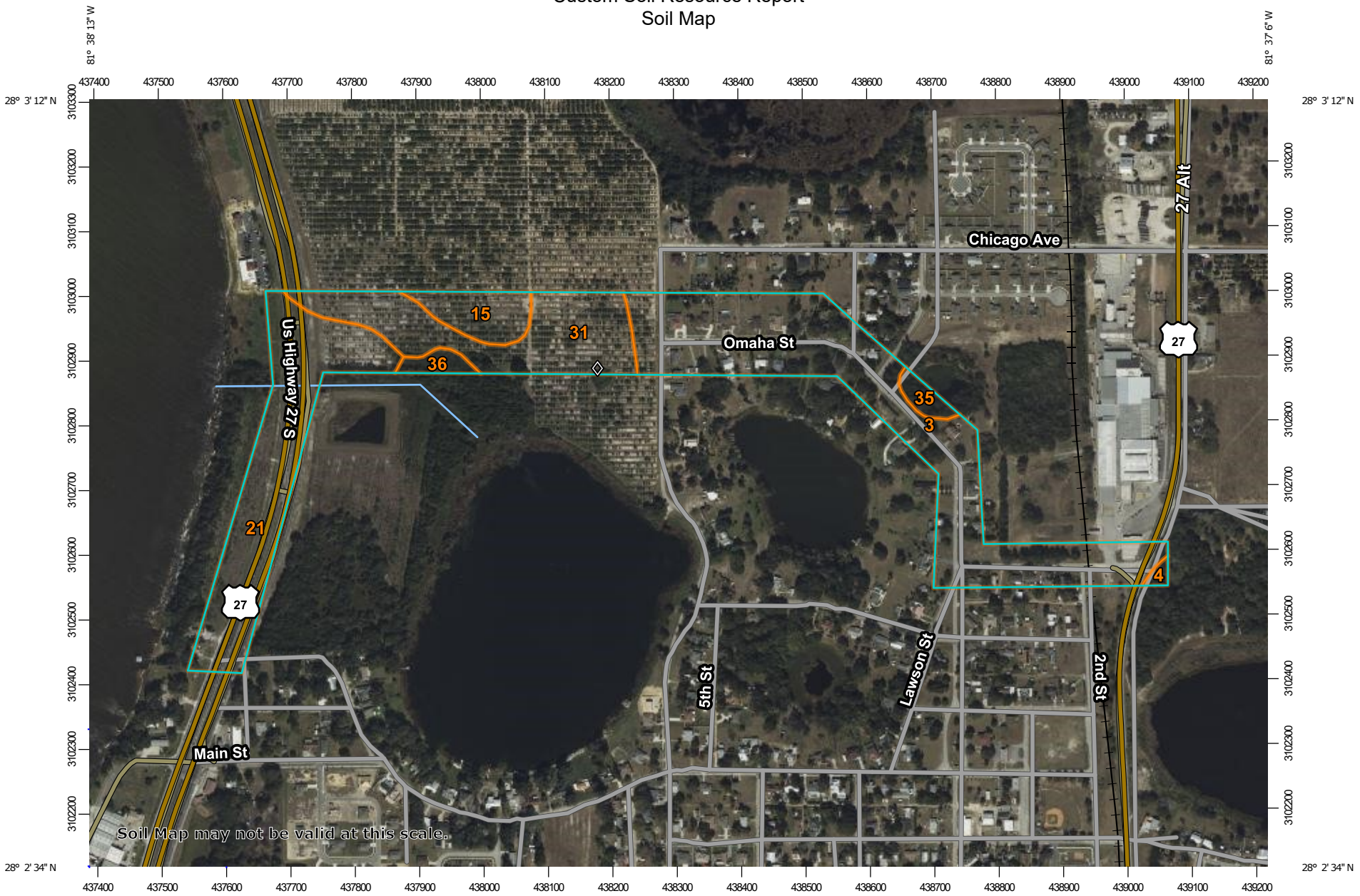
N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

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

Custom Soil Resource Report
Soil Map



Map Scale: 1:8,370 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 400 800 1600 2400

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

Custom Soil Resource Report
Soil Map

Map Scale: 1:3,190 if printed on A portrait (8.5" x 11") sheet.

N

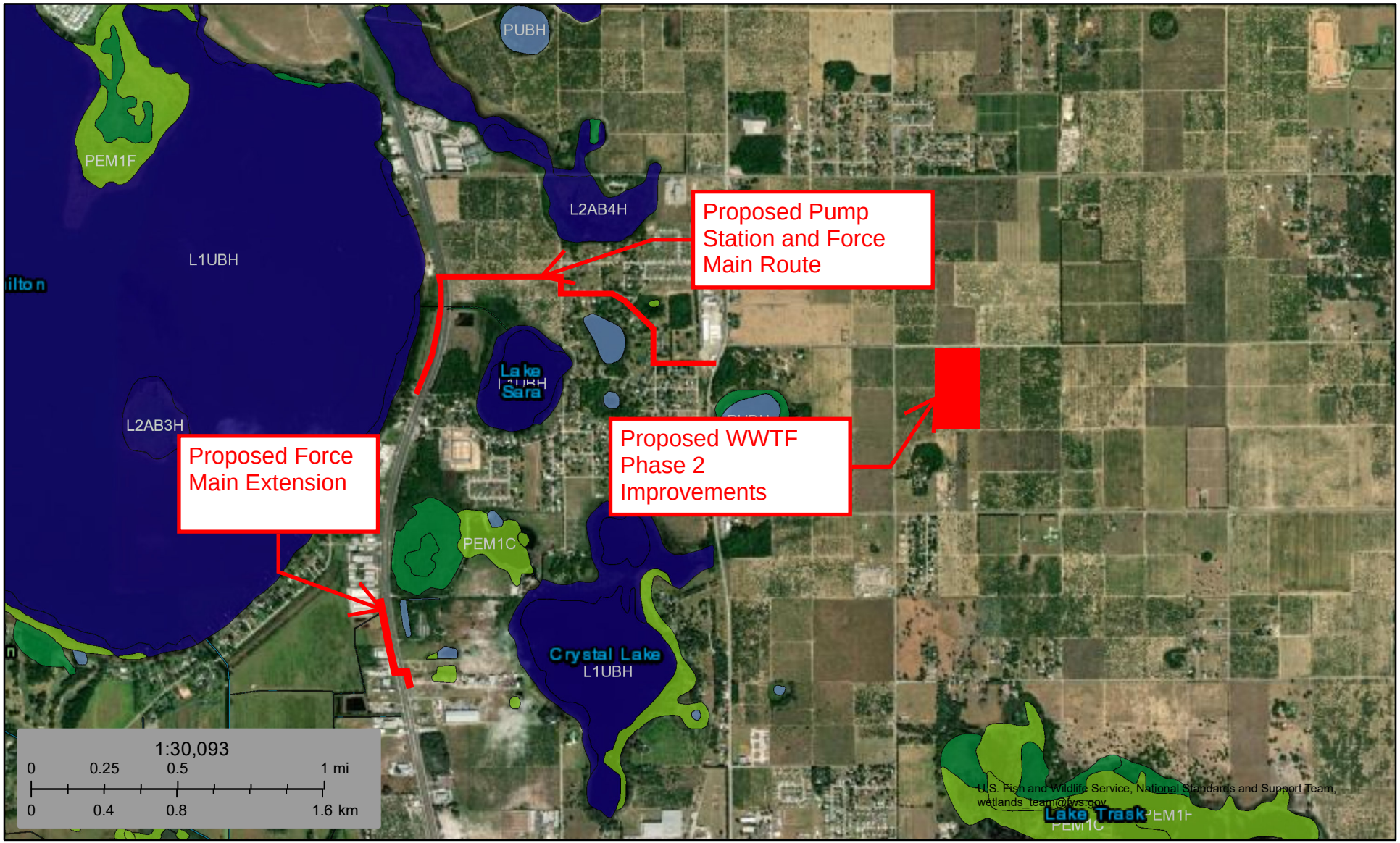
Meters: 0 45 90 180 270

Feet: 0 150 300 600 900

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

U.S. Fish and Wildlife Service
National Wetlands Inventory

Figure 8 - Wetlands V2

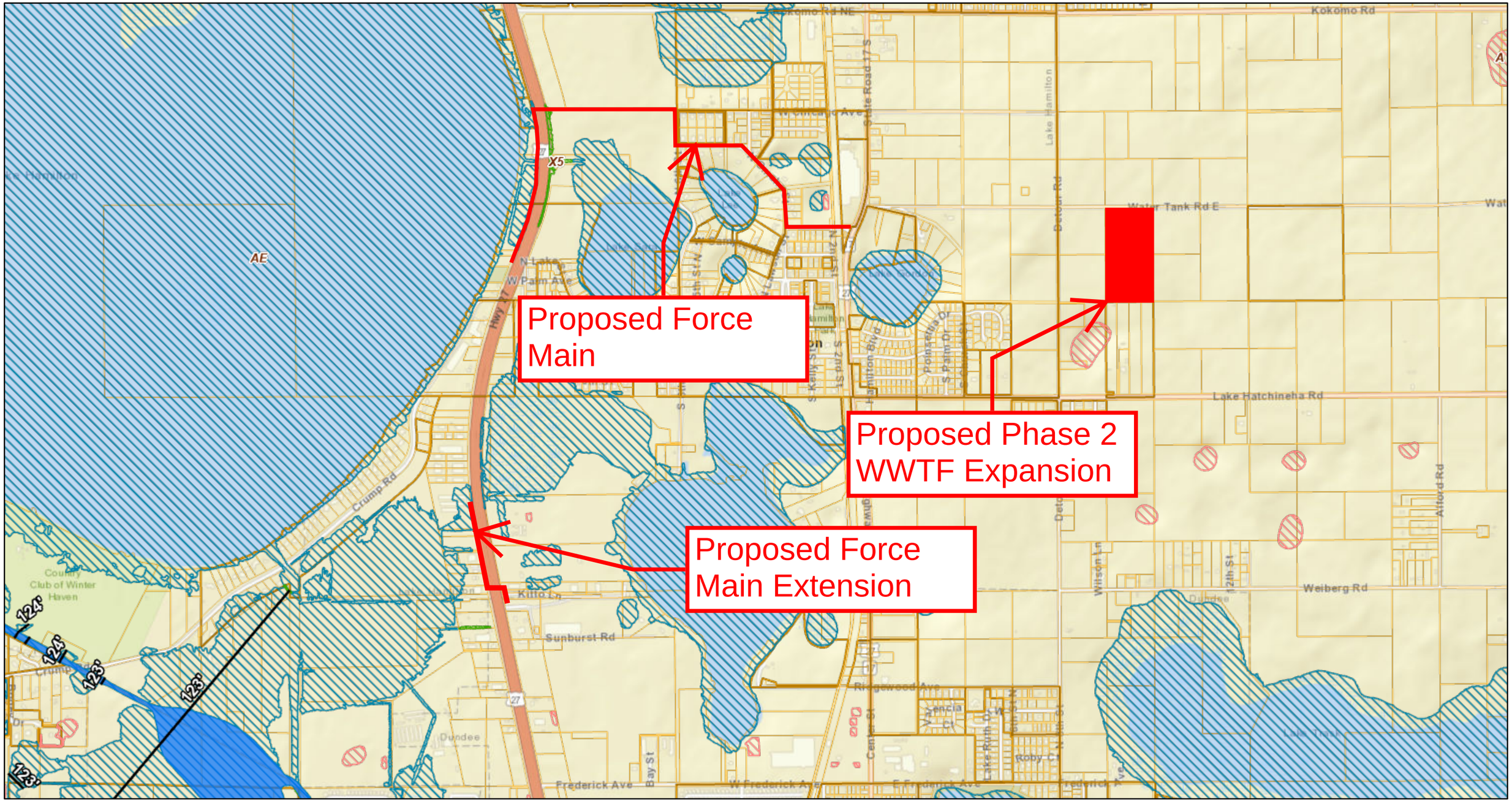


December 13, 2023

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

Figure 9 - Floodplain Map



12/13/2023, 4:38:38 PM

FEMA Flood Zones 2016 (visible at 1:18,056)

- Flood Zone A
- Flood Zone AE
- Flood Zone X5
- FEMA Floodways
- Base Flood Elevations (visible at 1:18,490)
- Subdivision
- Parcels

1:18,056

0 0.2 0.4 0.8 mi

0 0.3 0.6 1.2 km

University of South Florida, Esri, HERE, Garmin, INCREMENT P, NGA, USGS

Web AppBuilder for ArcGIS

University of South Florida, Esri, HERE, Garmin, INCREMENT P, NGA, USGS |

TOWN OF LAKE HAMILTON - ZONING MAP

FIGURE 10 - Zoning Map

Legend

- Lake Hamilton Town Boundary
- Parcels
- US Highways
- State Roads
- County Roads
- Local Roads
- Water Bodies

Lake Hamilton Zoning

- AG - Agricultural
- R-1 - Single Family
- R-2 - Single Family
- R-3 - Single Family
- R-4 - Single Family
- R-5 - Single Family, Modular
- RMF - Multi-Family
- MH-1 - Mobile Home Park
- PUD - Planned Unit Development
- C-1 - Highway Commercial
- C-2 - Neighborhood Commercial
- M-1 - Industrial
- PI - Public Institutional
- Parks
- CON - Conservation
- NA
- Environmental Lands Overlay

Town of Lake Hamilton
100 Smith Avenue, P.O. Box 126
Lake Hamilton, FL 33851
Phone: (863) 439-1910
www.townoflakehamilton.com

CENTRAL FLORIDA REGIONAL PLANNING COUNCIL
555 East Church Street, Bartow, FL 33830-3931
P.O. Box 2089, Bartow, FL 33831-2089
(863) 534-7130 - Fax (863) 534-7138
www.cfrpc.org

Town Boundary Updated per
Ordinance no. O-22-02
April 5, 2022

Zoning Updated per
Ordinance no. O-22-08
March 1, 2022

I hereby certify that this is the Official Zoning Map of the Town of Lake Hamilton, Florida.

Michael Kehoe, Mayor

N W E S

0 ¼ ½

Miles

DISCLAIMER:
The information on this map should be considered conceptual and subject to change. This map is not a survey.

Data Sources:
Central Florida Regional Planning Council
Florida Department of Transportation
Polk County Property Appraiser
Town of Lake Hamilton

Proposed Pump Station and Force Main

Proposed Phase 2 WWTF Improvements

Proposed Force Main Extension

ORD NO	DESCRIPTION	ORD DATE
2004-06	5.73 AC FROM AG TO C-1, E SIDE OF US 27, N	11/2/2005
2006-(		)06
2007-(		)06
2007-1		08
2007-1		08
2008-02	0.34 AC FROM C-2 TO C-1, NE COR OF SMITH AV & OMAHA ST, MAPPED 12/9/11	2/5/2008
2008-04	22.65 AC FROM AG TO R-1, E SIDE OF LK GORDON, MAPPED 12/9/11	3/4/2008
2008-07	38.88 AC FROM AG TO R-3, SE COR OF SR 17 & HUGHES RD, MAPPED 12/9/11	4/1/2008
2008-08	19.48 AC TO R-3, BTWN HUGHES RD & WHITE CLAY PIT RD, MAPPED 12/9/11	4/1/2008
2008-10	12.73 AC FROM C-2 & AG TO C-1 & R-3, SE OF SR 17 & HATCHINEHA RD, MAPPED 12/9/11	4/1/2008
2008-12	0.11 AC FROM RMF TO C-2, NW COR OF MARTIN ST & MONROE LN, MAPPED 12/9/11	10/7/2008
2012-01	35.57 AC FROM A-1 TO C-1 AND RMF, BOTH SIDES OF US-27, N OF LAKE ST	3/6/2012
2013-03	ADOPTION OF UPDATED ZONING MAP	4/2/2013
2013-15	22.635 AC FROM R-1 AND R-3 TO AG, EAST SIDE OF LAKE GORDON, S OF WATER TANK RD	11/5/2013
2013-16	4.73 AC FROM AG TO M-1, NE CORNER OF INT OF KOKOMO RD AND ROBERTS RD	1/7/2014
2016-03	1.85 AC REZONED FROM R-3 TO C-1, SE CRNR SR-17 AND HATCHINEHA RD	3/1/2016
2016-04	77.87 AC REZONED FROM R-3 TO M-1	8/2/2016
2017-02	AMENDED LDC; ADDING A NEW ZONING DISTRICT; R-5 (SINGLE FAMILY, MODULAR)	3/7/2017
2017-06	8 AC REZONED FROM R-2 TO R-5	5/2/2017
2017-12	.82 AC FROM AG TO M-1, N OF KOKOMO RD NE, W OF SCENIC HWY N	9/1/2017
2017-13	1.03 AC FROM RMF TO R-5, CHURCH ST & PEARL ST AND ROSE ST & MONROE LN	9/1/2017
2017-14	11.28 AC FROM R-1 TO R-4; N OF CHICAGO AVE, ADJACENT TO DUKE ENERGY PLANT	2/6/2018
O-19-07	9.3 AC FROM R-3 TO R-4, S SIDE OF MAIN ST, W OF LAKE ST, IN S21-TWN28S-RNG27E	11/5/2019
O-20-01	10.24 AC FROM AG TO PUD, 660 FT E OF SR 17, S SIDE OF TOWN	2/4/2020
O-20-02	77.61 AC FROM IND & AG TO PUD, SCENIC HWY, HUGHS RD, DETOUR RD AREA	2/4/2020
O-20-10	8.196 AC FROM AG TO C-1, E OF US 27, S OF KOKOMO RD	12/8/2020
O-21-29	1.14 AC FROM R-1 TO R-4, NE CRNR INT OF MAIN ST & FIFTH ST	2/1/2021
O-21-11	191.72 AC ADOPTING PUD (SCENIC TEREACE SOUTH), N & S HUGHES RD, SR 17	6/1/2021
O-21-16	242.3 AC PUD, HAMILTON BLUFF, BTWN HATCHINEHA RD, S OF KOKOMO, N SR 17	10/5/2021
O-21-24	10.17 AC FROM AG TO M-1, W DETOUR RD, 552 FT S DETOUR RD & HATCHINEHA RD	11/2/2021
O-21-25	0.34 AC FROM C-1 TO C-2, NE CRNR OMAHA ST & SMITH AVE	11/2/2021
O-22-08	66.31+ AC PUD (WEIBERG WEST), S21-T28-R27 & S22-T28-R27 (OLD OLSON PUD)	3/1/2022

APPENDIX A

PRELIMINARY ECOLOGICAL SITE ASSESSMENT

Austin Ecological Consultants

316 Church Street • Kissimmee, Florida • 34741 • Phone: 407.935.0535

December 6th, 2023

Pennoni
Steven Elias, P.E.
401 Third Street SW
Winter Haven, FL 33880

RE: Environmental Site Review

Submitted via email: Steven Elias, SElias@Pennoni.com

RE: Preliminary Environmental Site Assessment
LAKHA23001 WTF Pipeline Project

Mr. Elias:

The approximate 9-acre linear water treatment and pipeline improvements project is located in the Lake Hamilton area of Polk County, Florida. The assessment area includes parcels 272817000000012010, 272816000000041020, 272816823500003010, 272816000000031020, 272817000000011030 and the Right-of Ways (ROW) of 6th Street North, Omaha Street, Bryant Avenue West, and approximately 0.5 mile within the western ROW of US-27 (See attached **Location/Aerial Map**).

Qualified scientists with Austin Ecological Consultants, LLC. (AEC) reviewed the referenced project site to evaluate general site conditions and ecological constraints that may influence site development relative to wetlands and listed wildlife species. AEC conducted a site inspection on November 16, 2023, and also reviewed available online databases and published information.

METHODOLOGY

Land use and vegetative community types located within the project site were identified through aerial photographic interpretation, and verified in the field through site investigation. On-site land use forms were classified using the Florida Land Use, Cover, and Forms Classification System (FLUCCS) as defined by the Florida Department of Transportation (FDOT, 1999), and are described below (see attached **FLUCCS Map**).

The site was evaluated for the potential presence of wildlife species listed as threatened (T), endangered (E), or species of special concern (SSC) as defined by the United States Fish and Wildlife Service (USFWS) and/or the Florida Fish and Wildlife Conservation Commission (FWC) and their habitat. AEC scientists conducted a review of available published information from federal and state online databases, and reviewed literature from existing sources useful in identifying the occurrence or potential occurrence of wildlife species listed as T, E, or SSC (collectively recognized as listed species), as defined by USFWS and/or the FWC. In addition, the presence of designated consultation areas, critical habitat, and/or vegetative communities and land uses with the potential to support listed species was evaluated. During the site assessment conducted by AEC,

pedestrian transects were performed by staff environmental scientists throughout the project site. Pedestrian transects were appropriately spaced so as to accurately determine the presence/absence of protected wildlife species within the project site.

SOILS

The onsite soil types were classified according to the Soil Survey for Polk County, Florida and available USDA Natural Resource Conservation Service (NRCS) GIS layers (see attached **Soils Map**).

The onsite soils are limited to four (4) soil types, (see **Table 1)**.

Table 1 – On-site Soil Types

ID#	Soil Name	Hydric Rating
3	Candler Sand	No
15	Tavares fine sand	No
21	Immokalee sand	No
31	Adamsville fine sand	No

WETLANDS AND OTHER SURFACE WATERS

No wetlands or surface waters were observed on-site.

UPLANDS

Open Land (FLUCCS 190)

This community type represents an overgrown area with vegetation consisting mainly of herbaceous plants with a groundcover of beggar tick (*Bidens alba*), sandbur (*Cenchrus spinifex*), guinea grass (*Megathyrsus maximus*), ragweed (*Ambrosia spp.*), Hairy indigo (*Indigofera hirsutus*), Bermuda grass (*Cynodon dactylon*) and Balsam apple (*Momordica charantia*).

Citrus Groves (FLUCCS 221)

This citrus grove consists of orange trees (Citrus spp.), beggar tick, sandbur, and Bahia grass.

Transportation, Communication, and Utilities (FLUCCS 800)

These areas consist of the ROW for 6th Street North, Omaha Street, Bryant Avenue West, and US-27. Vegetation within the ROW consisted of maintained grass which was dominated by Bahia grass (*Paspalum notatum*), and Saint Augustine grass (*Stenotaphrum secundatum*).

Pump Station (FLUCCS 8172)

This land use consists of a pump station, and vegetation within this land-use consists mainly of maintained Bahia grass along the boundary.

LISTED SPECIES ASSESSMENT

The project site was evaluated for the potential presence of wildlife species listed as T, E, or SSC as defined by the USFWS and/or the FWC and their habitat. For listed species

which could potentially be affected by development of the project site, and therefore could potentially affect development, further detailed analysis is provided below. Due to the location and soils, special emphasis was given to the potential presence of sand skinks (*Neoseps reynoldsi*) and gopher tortoises (*Gopherus polyphemus*).

Gopher Tortoise (*Gopherus polyphemus*)
The gopher tortoise is listed as Threatened by FWC. The gopher tortoise inhabits subterranean burrows in a wide variety of upland habitats, both native and altered. The site contains upland habitats which are suitable for gopher tortoises. A 100% gopher tortoise survey was conducted on November 16th, and no gopher burrowrs were were observed within 25 feet of the proposed pipeline route. Gopher tortoise surveys are only good for 90 days from the time of the initial survey. After 90 days, an updated 100% survey of all potentially suitable gopher tortoise habitat should be performed if construction acitvities have not started. If any tortoise burrows are discovered that have the potential to be impacted (cannot be avoided by 25 feet) by site manipulation, they must be excavated/trapped, and any resident tortoise relocated offsite. Accordingly, a permit from the FWC will be required to capture and relocate any resident tortoises discovered at a future date.

If the future project follows the FWC Gopher Tortoise Permitting Guidelines, the gopher tortoise is unlikely to be adversely affected by future development of the project site. In addition, the presence of this species is not anticipated to significantly affect future development of the project site.

Eastern Indigo Snake (*Drymarchon corais couperi*)
The Eastern indigo snake is listed as Threatened by both the USFWS and FWC. The Eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. Although they have a preference for uplands, they also utilize some wetlands and agricultural areas. Indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. If the future development project complies with the *USFWS Standard Protection Measures For The Eastern Indigo Snake*, and relocates any onsite gopher tortoises, then using the 2017 Indigo Snake Key the project keys out to A<B<C<D< NLAA (not likely to adversely affect). Therefore, the Easern indigo snake is not anticipated to significantly affect future development of the project site.

Sand Skink (*Neoseps reynoldsi*) and Bluetail Mole Skink (*Eumeces egregious lividus*)
The sand skink and bluetail mole skink are listed as Threatened by the USFWS and FWC. The project is located within the USFWS Sand and Bluetail Mole Skink Consultation Area. Per review of the NRCS Soil Survey (see attached **Soils Map**) and available topographic data, the assessment area contains suitable sand skink soils (Tavares, Candler, Immokalee, and Adamsville sands) located 82 feet above sea level. These suitable soils are found throughout the assessment area.

While much of the assessment area does not contain suitable habitat, within the the citrus grove there are open sandy areas that offer suitable habitat. However, impacts

to sand skinks are not expected as the project (pipeline installatin) is a temporary activity and soils to be replaced after project completion will be loosened, thus creating more suitable habitat conditions (loose swimmable soils clear of vegetation/citrus) for sands skinks than what currently exists within the project area.

The USFWS may request a coverboard survey within areas of open sand to verify the presence or absence of sand skinks. Formal surveys to document the absence of skinks can only be conducted between March 1 and May 15, and involve placing 2' x 2' plywood "coverboards" within all areas of suitable habitat at a density of forty (40) coverboards per-acre. Coverboards are checked once per week for four consecutive weeks for signs of sand skinks.

Bald Eagle (*Haliaeetus leucocephalus*)
The bald eagle was delisted by USFWS and FWC in August 2007 as a result of positive recovery of the species. Although the bald eagle was delisted, it continues to be protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Federal and state guidelines for the bald eagle require that certain activities be conducted outside a 660-foot radius distance outward from a nest tree. FWC's database of documented bald eagle nest sites, and Adudon's Egle Nest Locator database were queried. The database review revealed one (1) documented bald eagle nest (PO1316) within less than 300 feet of the assessment area at the southwest boundary (See attached **Wildlife Map**).

The protections for bald eagle nests are now outlined in the National Bald Eagle Protection Guidelines. The following is an excerpt from those guidelines, and provides a good summary of the standard protections provided to an active bald eagle nest in the absence of consultation and/or permitting.

Category A:
Building construction, 1 or 2 story, with project footprint of ½ acre or less. Construction of roads, trails, canals, power lines, and other linear utilities. Agriculture and aquaculture – new or expanded operations.
Alteration of shorelines or wetlands. Installation of docks or moorings.
Water impoundment.

Category B:
Building construction, 3 or more stories.
Building construction, 1 or 2 story, with project footprint of more than ½ acre.
Installation or expansion of marinas with a capacity of 6 or more boats.
Mining and associated activities.
Oil and natural gas drilling and refining and associated activities.

	If there is no similar activity within 1 mile of the nest	***If there is similar activity closer than 1 mile from the nest***

If the activity will be visible from the nest	660 feet. Landscape buffers are recommended.	660 feet, or as close as existing tolerated activity of similar scope. Landscape buffers are recommended.
If the activity will not be visible from the nest	Category A: 330 feet. Clearing, external construction, and landscaping between 330 feet and 660 feet should be done outside breeding season. Category B: 660 feet.	330 feet, or as close as existing tolerated activity of similar scope. Clearing, external construction and landscaping within 660 feet should be done outside breeding season.

As outlined above, the standard protection zone for a bald eagle nest is 660-feet, however, it is not as rigid as it once was. The protection zone can be reduced to 330-feet if site work is not visible from the nest, and for other reasons. With the proposed activtiy being close to an active roadway, the protection zone can probably be reduced significantly through a simple consultation with the US Fish and Wildlife Service (FWS).

The US Fish and Wildlife Service (FWS) does issue Incidental Take permits for bald eagle nest sites. This permit does not allow destruction of the nest, but provides legal protection if site activities cause the eagles to abandon the nest site. It is recommended that site-specific coordination occur with the FWS during the site planning and design process.

Wood Stork (*Mycteria americana*)
The project is located within the USFWS designated Core Foraging Area (CFA) of several wood stork colonies. No wood storks were observed during the onsite inspection performed by AEC and there is no suitable habitat within the site. Accordingly, the project will have “no effect” on the wood stork.

Audubon’s Crested Caracara (*Polyborus plancus*)
The project site falls within the USFWS CA for this federally threatened raptor species. Caracara utilize open grasslands, including pastures, palmetto prairies, wet prairies, and freshwater marshes for foraging. The species prefers to nest in cabbage palms, although they have been documented to nest in other tree species. No caracara were observed onsite, or have been documented in available USFWS and FWC locality records. No suitable nesting habitat was identified on or immediately adjacent to the project site, although minimal suitable forage habitat (i.e., open land) does occur onsite. Based on the location of the project site within the surrounding urbanized landscape, it is not anticipated that this species would be encountered onsite or affected by development.

Florida Scrub-Jay(*Aphelocoma coerulescens*)

The project site is located within the USFWS CA for the Florida scrub-jay. This federally-listed, threatened species is native to Florida's xeric scrub communities, although it is known to utilize altered habitats including citrus groves and even residential areas. The USFWS considers the presence of scrub oaks to be the key indicator of suitable habitat. No Florida scrub-jays are known to occur within or immediately adjacent to the project site based on FWC and the USFWS locality records, and no suitable foraging habitat occurs onsite. Therefore, it is not anticipated that this species would be encountered onsite or affected by development.

Everglade Snail Kite (*Rostrhamus sociabilis plumbeus*)

The project site occurs within the USFWS CA for this federally-listed, endangered species. This small raptor's diet consists almost exclusively of apple snails (Pomacea paludosa). Snail kites require shallow freshwater marsh habitats that are capable of supporting healthy apple snail populations. They are found along the shorelines of freshwater lakes and marshes within the upper St. Johns River, and Kissimmee River basins. No snail kites were observed onsite, nor have they been documented to occur in the immediate vicinity of the project site. There is no suitable snail kite habitat onsite. The project is anticipated to have "no effect" on the snail kite.

Florida Grasshopper Sparrow (*Ammodramus savannarum floridanus*)

The project site is within the USFWS Consultation Area for the Florida grasshopper sparrow. The Florida grasshopper sparrow is federally listed as an Endangered species. The range of the grasshopper sparrow has been greatly reduced due to conversion of dry prairies to incompatible land uses such as pastures, sod farms, citrus groves, or pine plantations. As the majority of the groundcover within the project site is associated with disturbed sites, there is no suitable on-site habitat. The project is expected to have "no effect" on the Florida grasshopper sparrow.

Southeastern American Kestrel (*Falco sparverius paulus*)

The Southeastern American kestrel is a non-migratory subspecies of kestrel found in open pine savannahs, sandhills, prairies, and pastures. It has protections under the U.S. Migratory Bird Treaty Act and as a State-designated Threatened species by Florida's Endangered and Threatened Species Rule. The site is outside the boundary of the southeastern kestrel management units (KMUs), there is no nesting habitat (tree snags) and no southeastern American kestrels were observed on site during the site assessment. The project is expected to have "no effect" on the Southeastern American kestrel.

Sandhill crane (Grus canadensis)

The Florida sandhill crane is protected by the U.S. Migratory Bird Treaty Act and as a State-designated Threatened species by Florida's Endangered and Threatened Species Rule. This non-migratory species prefers to nest in freshwater ponds and marshes. Foraging habit includes open pastures and prairies. The breeding season for Florida sandhill cranes is December to August with nesting occurring primarily from February to April. There is no suitable nesting habitat onsite and due to the overgrown state of the site foraging habitat is minimal. The project is anticipated to have no effect on the sandhill crane.

Florida Burrowing Owl (*Athene cunicularia floridana*)

The Florida burrowing owl is listed as "threatened" by the State of Florida. Burrowing owls inhabit open prairies in Florida that have very little understory vegetation. These areas include golf courses, airports, pastures, agriculture fields, and vacant lots. The pedestrian survey identified no Florida burrowing owl burrows within the project site and no burrowing owls were observed at the time of the site assessment. Due to the urbanized surroundings, the burrowing owl is not anticipated to utilized the site.

Other Listed Species

No other listed species nor sign of their utilization of the project site was observed during the site inspection performed on October 4, 2023. Not considering species individually addressed above, no other listed species are anticipated to be affected by development of the project site.

SUMMARY OF FINDINGS

A 100% gopher tortoise survey was conducted on November 16th, and no gopher burrows were observed within 25 feet of the proposed pipeline route. Gopher tortoise surveys are only good for 90 days from the time of the initial survey. If at a future date any tortoise burrows are discovered that have the potential to be impacted by site manipulation they must be excavated/trapped, and any resident tortoise relocated offsite. Accordingly, a permit from the FFWCC will be required to capture and relocate any resident tortoises.

The project is located within the USFWS Sand and Bluetail Mole Skink Consultation Area. Per review of the NRCS Soil Survey (see attached **Soils Map**) and available topographic data, the assessment area contains suitable sand skink soils (Tavares, Candler, Immokalee, and Adamsville sands) located 82 feet above sea level.

While much of the assessment area does not contain suitable habitat, within the the citrus grove there are open sandy areas that offer suitable habitat. However, impacts to sand skinks are not expected as the project (pipeline installation) is a temporary activity and soil to be replaced after project completion will be loosened, thus creating more suitable habitat conditions (loose swimmable soils clear of vegetation/citrus) for sands kinks than what currently exists within the project area.

The USFWS may request a coverboard survey within areas of open sand to verify the presence or absence of sand skinks.

Federal and state guidelines for the bald eagle require that certain activities be conducted outside a 660-foot radius distance outward from a nest tree. FWC's database of documented bald eagle nest sites, and Adudon's Egle Nest Locator database were queried. The database review revealed one (1) documented bald eagle nest within less than 300 feet of the assessment area at the southwest boundary (See attached wildlife Map).

The protection zone can be reduced to 330-feet if site work is not visible from the nest, and for other reasons. With the proposed activtiy being close to an active roadway, the

protection zone can probably be reduced significantly through a simple consultation with the US Fish and Wildlife Service (FWS).

If you have any questions about the information contained in this report, please contact me.

Sincerely,

R. Bruce Williams, Environmental Consultant
Austin Ecological Consultants, LLC.

PHOTOGRAPHS

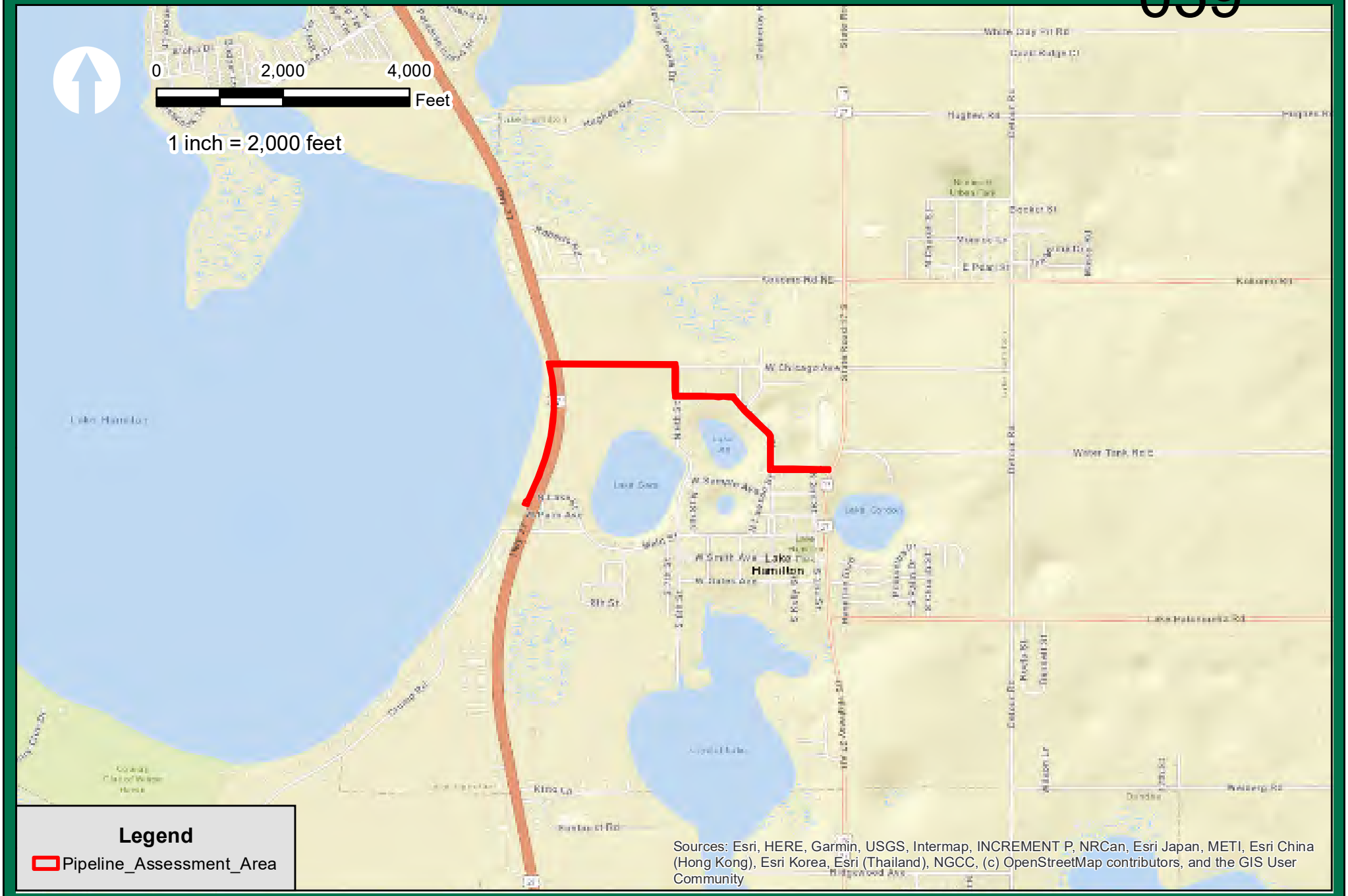
FLUCCS 190 : Open Land

FLUCCS 221 : Citrus Groves

FLUCCS 800 : Transportation, Communication, and Utilities

FLUCCS 8172 : Water Pump

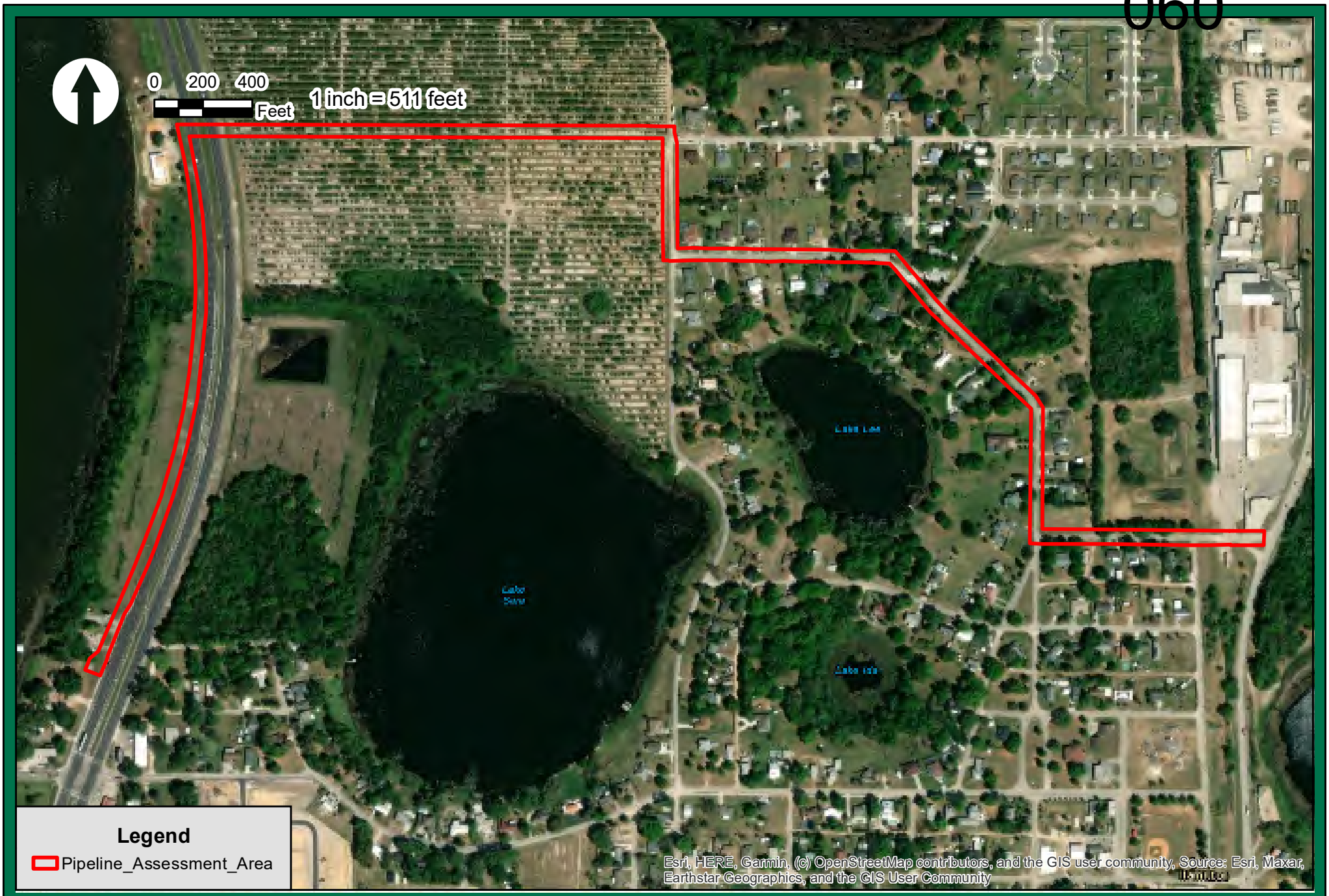
ATTACHMENTS



Austin Ecological Consultants, LLC.
316 Church Street
Kissimmee, Florida 34741
407.935.0535

LOCATION MAP

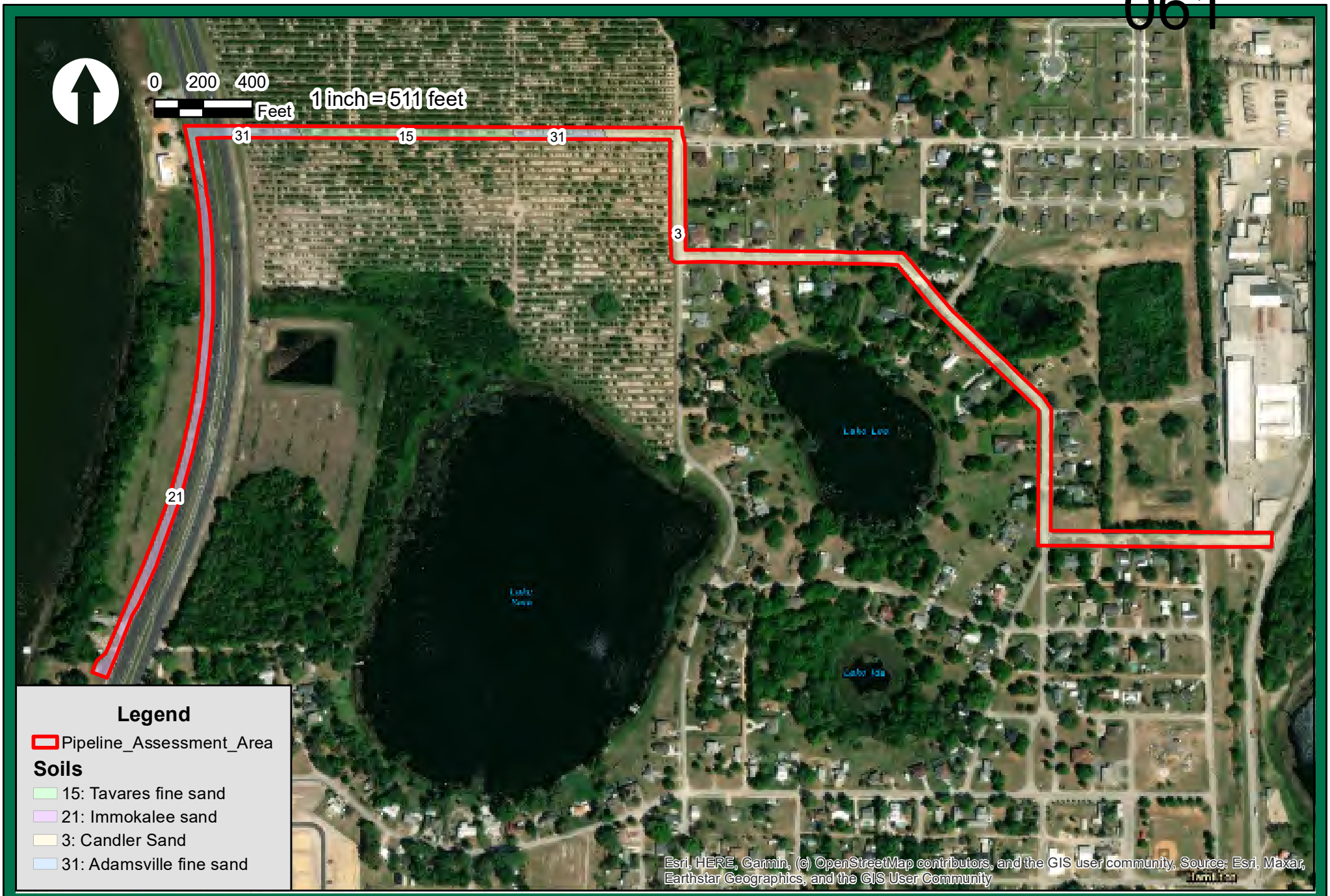
LAKHA23001
Polk County, FL



Austin Ecological Consultants, LLC.
316 Church Street
Kissimmee, Florida 34741
407.935.0535

AERIAL MAP

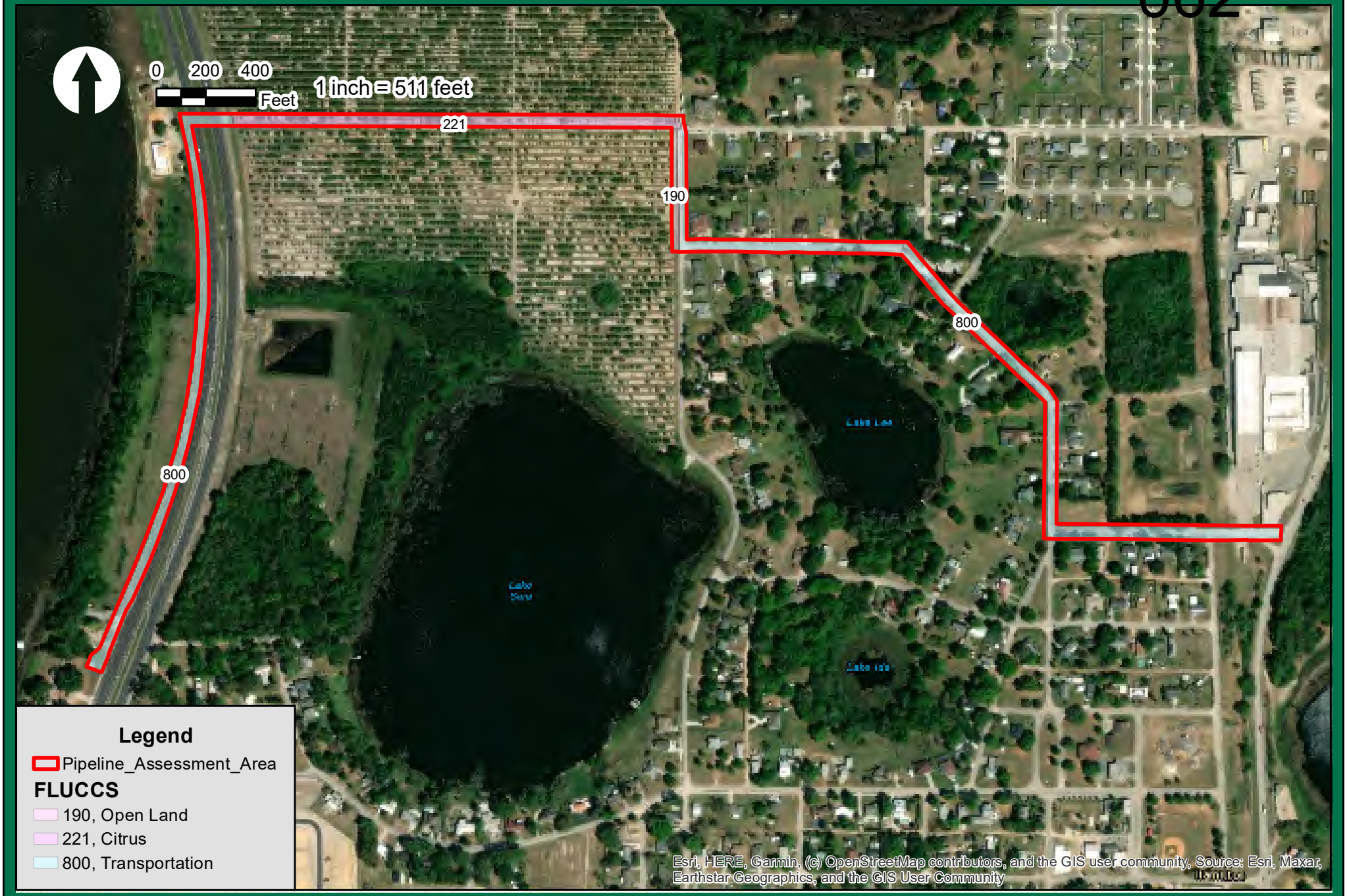
LAKHA23001
Polk County, FL



Austin Ecological Consultants, LLC.
316 Church Street
Kissimmee, Florida 34741
407.935.0535

SOILS MAP

LAKHA23001
Polk County, FL



Austin Ecological Consultants, LLC.
316 Church Street
Kissimmee, Florida 34741
407.935.0535

FLUCCS MAP

LAKHA23001
Polk County, FL

Austin Ecological Consultants, LLC.
316 Church Street
Kissimmee, Florida 34741
407.935.0535

WILDLIFE MAP

LAKHA23001
Polk County, FL

APPENDIX B

SOILS REPORT

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Polk County, Florida

December 12, 2023

Preface

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

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

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

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

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

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

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

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

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

Soil Map

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

Custom Soil Resource Report
Soil Map

Map Scale: 1:2,510 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Polk County, Florida
Survey Area Data: Version 21, Sep 6, 2023

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

Date(s) aerial images were photographed: Jan 6, 2022—Mar 21, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3	Candler sand, 0 to 5 percent slopes	24.8	100.0%
Totals for Area of Interest		**24.8**	**100.0%**

Map Unit Descriptions

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

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

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

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

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

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

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

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

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

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

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

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

Polk County, Florida

3—Candler sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t3z1
Elevation: 10 to 260 feet
Mean annual precipitation: 47 to 56 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 280 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Candler and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Candler

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 6 inches: sand
E - 6 to 63 inches: sand
E and Bt - 63 to 80 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on ridges and dunes of xeric uplands (G154XB111FL), Sandy soils on ridges and dunes of xeric uplands (G155XB111FL)
Other vegetative classification: Sandy soils on ridges and dunes of xeric uplands (G154XB111FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL), Longleaf

Pine-Turkey Oak Hills (R155XY002FL), Sandy soils on ridges and dunes of xeric uplands (G155XB111FL)

Hydric soil rating: No

Minor Components

Tavares

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave, convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Millhopper

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

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

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

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

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

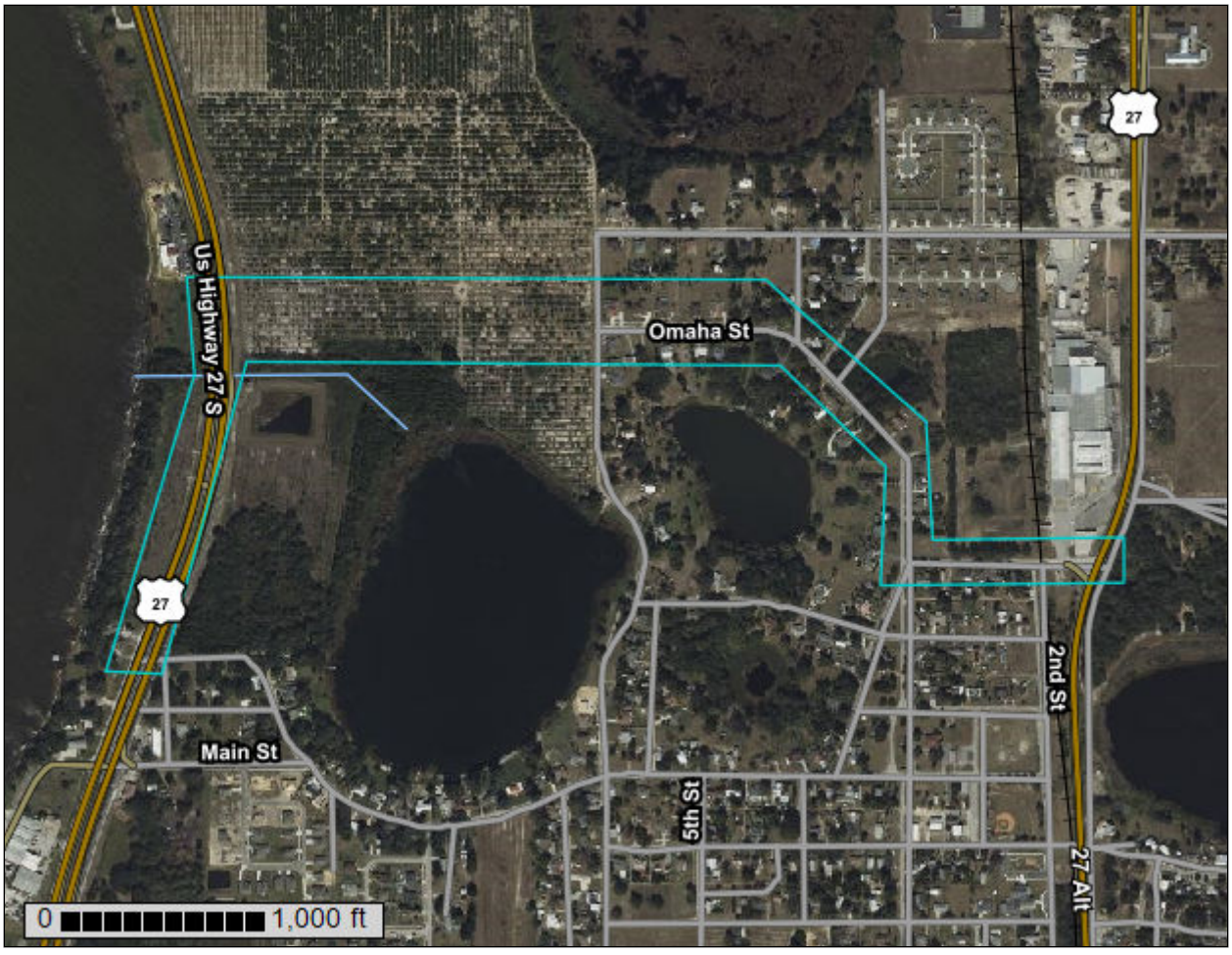
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Polk County, Florida



December 12, 2023

Preface

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

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

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

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

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

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

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

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

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

Soil Map

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

Custom Soil Resource Report
Soil Map

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Polk County, Florida
Survey Area Data: Version 21, Sep 6, 2023

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

Date(s) aerial images were photographed: Jan 6, 2022—Mar 21, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3	Candler sand, 0 to 5 percent slopes	22.7	45.0%
4	Candler sand, 5 to 8 percent slopes	0.3	0.5%
15	Tavares fine sand, 0 to 5 percent slopes	2.8	5.5%
21	Immokalee sand	13.3	26.3%
31	Adamsville fine sand, 0 to 2 percent slopes	9.8	19.3%
35	Hontoon muck, frequently ponded, 0 to 1 percent slopes	0.8	1.7%
36	Basinger mucky fine sand, frequently ponded, 0 to 1 percent slopes	0.8	1.7%
Totals for Area of Interest		**50.5**	**100.0%**

Map Unit Descriptions

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

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

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit

descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

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

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

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

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

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

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

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

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

Polk County, Florida

3—Candler sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t3z1
Elevation: 10 to 260 feet
Mean annual precipitation: 47 to 56 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 280 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Candler and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Candler

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 6 inches: sand
E - 6 to 63 inches: sand
E and Bt - 63 to 80 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on ridges and dunes of xeric uplands (G154XB111FL), Sandy soils on ridges and dunes of xeric uplands (G155XB111FL)
Other vegetative classification: Sandy soils on ridges and dunes of xeric uplands (G154XB111FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL), Longleaf

Pine-Turkey Oak Hills (R155XY002FL), Sandy soils on ridges and dunes of xeric uplands (G155XB111FL)
Hydric soil rating: No

Minor Components

Tavares
Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave, convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Millhopper
Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

4—Candler sand, 5 to 8 percent slopes

Map Unit Setting
National map unit symbol: 1jttm
Elevation: 20 to 150 feet
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Farmland of unique importance

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

Description of Candler

Setting
Landform: Knolls on marine terraces, hillslopes on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex

Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 7 inches: sand
E - 7 to 63 inches: sand
E and Bt - 63 to 80 inches: sand

Properties and qualities

Slope: 5 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on ridges and dunes of xeric uplands (G154XB111FL)
Other vegetative classification: Sandy soils on ridges and dunes of xeric uplands (G154XB111FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Astatula

Percent of map unit: 4 percent
Landform: Hills on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Sandy soils on ridges and dunes of xeric uplands (G154XB111FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Millhopper

Percent of map unit: 4 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL), Upland Hardwood Hammock (R154XY008FL)
Hydric soil rating: No

Apopka

Percent of map unit: 4 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve, side slope

Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on ridges and dunes of xeric uplands (G154XB111FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Tavares

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

15—Tavares fine sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2w0pz
Elevation: 30 to 160 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 290 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Tavares

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve, side slope, tread, rise
Down-slope shape: Convex, linear
Across-slope shape: Linear
Parent material: Eolian or sandy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
C - 5 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 42 to 60 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 2.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL)
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL)
Hydric soil rating: No

Minor Components

Candler

Percent of map unit: 5 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, tread
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex, concave
Other vegetative classification: Sandy soils on ridges and dunes of xeric uplands (G154XB111FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Apopka

Percent of map unit: 4 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (two-dimensional): Summit, shoulder, footslope
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on ridges and dunes of xeric uplands (G154XB111FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Zolfo

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex, linear
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises and knolls of mesic uplands (G155XB131FL), North Florida Flatwoods (R154XY004FL)
Hydric soil rating: No

Narcoossee

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

Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises and knolls of mesic uplands (G155XB131FL), Upland Hardwood Hammock (R154XY008FL)
Hydric soil rating: No

21—Immokalee sand

Map Unit Setting

National map unit symbol: 1jtv4
Elevation: 50 to 260 feet
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Immokalee, Non-hydric

Setting

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

Typical profile

A - 0 to 7 inches: sand
E - 7 to 39 inches: sand
Bh - 39 to 58 inches: sand
E' - 58 to 66 inches: sand
B'h - 66 to 80 inches: sand

Properties and qualities

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

Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Ecological site: F155XY120FL - Sandy Flatwoods and Hammocks
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL), South Florida Flatwoods (R154XY003FL)
Hydric soil rating: No

Description of Immokalee, Hydric

Setting

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

Typical profile

A - 0 to 7 inches: sand
E - 7 to 39 inches: sand
Bh - 39 to 58 inches: sand
E' - 58 to 66 inches: sand
B'h - 66 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Ecological site: F155XY120FL - Sandy Flatwoods and Hammocks
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL), South Florida Flatwoods (R154XY003FL)
Hydric soil rating: Yes

Minor Components

Basinger

Percent of map unit: 5 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R155XY070FL - Sandy Freshwater Isolated Marshes and Swamps
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL), Slough (R154XY011FL)
Hydric soil rating: Yes

Smyrna, non-hydric

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F155XY120FL - Sandy Flatwoods and Hammocks
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL), South Florida Flatwoods (R154XY003FL)
Hydric soil rating: No

Myakka

Percent of map unit: 5 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F155XY120FL - Sandy Flatwoods and Hammocks
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL), South Florida Flatwoods (R154XY003FL)
Hydric soil rating: No

31—Adamsville fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2r8h8
Elevation: 10 to 100 feet
Mean annual precipitation: 47 to 56 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 290 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Adamsville and similar soils: 95 percent
Minor components: 5 percent

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

Description of Adamsville

Setting

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

Typical profile

Ap - 0 to 7 inches: fine sand
C1 - 7 to 20 inches: fine sand
C2 - 20 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on rises and knolls of mesic uplands (G154XB131FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Other vegetative classification: Sandy soils on rises and knolls of mesic uplands (G154XB131FL), South Florida Flatwoods (R154XY003FL), Upland Hardwood Hammock (R155XY008FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Minor Components

Myakka

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

Basinger

Percent of map unit: 2 percent
Landform: Drainageways
Landform position (three-dimensional): Dip, talf
Down-slope shape: Concave, linear
Across-slope shape: Concave, convex
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL), Slough (R155XY011FL)
Hydric soil rating: Yes

35—Hontoon muck, frequently ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2vbpg
Elevation: 0 to 250 feet
Mean annual precipitation: 43 to 63 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 300 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Hontoon

Setting

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

Typical profile

Oa - 0 to 75 inches: muck
AC - 75 to 80 inches: sandy loam

Properties and qualities

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

Available water supply, 0 to 60 inches: Very high (about 23.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Forage suitability group: Organic soils in depressions and on flood plains (G154XB645FL)
Other vegetative classification: Organic soils in depressions and on flood plains (G154XB645FL), Freshwater Marshes and Ponds (R154XY010FL)
Hydric soil rating: Yes

Minor Components

Samsula

Percent of map unit: 5 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL), Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

Hontoon, drained

Percent of map unit: 5 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Organic soils in depressions and on flood plains (G154XB645FL), Freshwater Marshes and Ponds (R154XY010FL)
Hydric soil rating: Yes

Placid

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

Basinger

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

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

Map Unit Setting

National map unit symbol: 2y9hl
Elevation: 50 to 230 feet
Mean annual precipitation: 45 to 55 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Basinger

Setting

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

Typical profile

A - 0 to 7 inches: mucky fine sand
E - 7 to 19 inches: fine sand
E/Bh - 19 to 39 inches: fine sand
C - 39 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G154XB145FL)

Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G154XB145FL), Freshwater Marshes and Ponds (R154XY010FL)
Hydric soil rating: Yes

Minor Components

Placid

Percent of map unit: 4 percent
Landform: Depressions on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL), Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

Pompano

Percent of map unit: 4 percent
Landform: Drainageways on marine terraces, flats on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Concave, linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL), Slough (R155XY011FL)
Hydric soil rating: Yes

Samsula

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL), Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

St. johns

Percent of map unit: 3 percent
Landform: Depressions on marine terraces, flats on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL), South Florida Flatwoods (R155XY003FL)
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

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

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

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

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

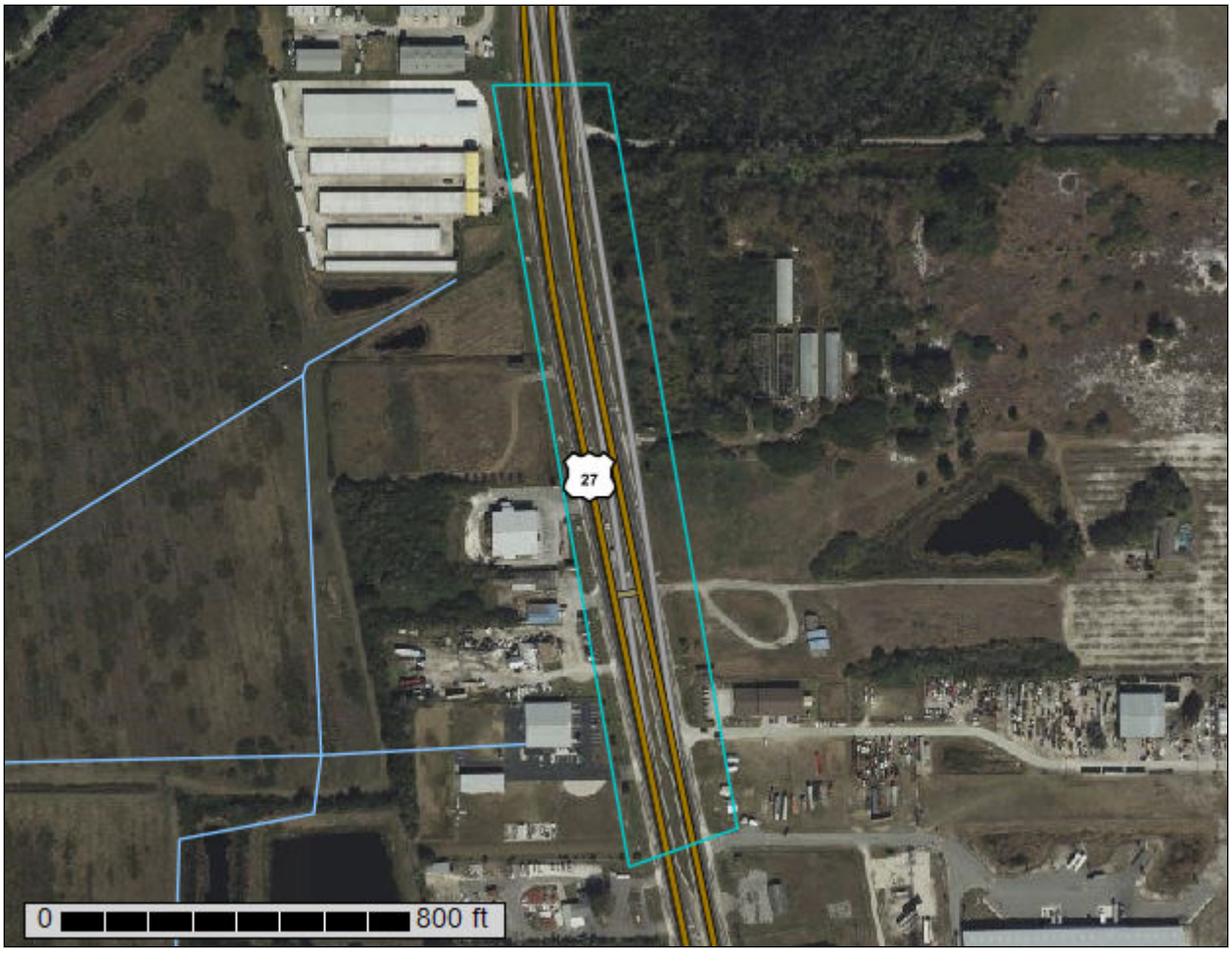
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Polk County, Florida



December 13, 2023

Preface

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

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

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

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

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

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

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

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

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

Soil Map

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

Custom Soil Resource Report
Soil Map

Map Scale: 1:3,190 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 150 300 600 900

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Polk County, Florida
Survey Area Data: Version 21, Sep 6, 2023

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

Date(s) aerial images were photographed: Jan 6, 2022—Mar 21, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
13	Samsula muck, frequently ponded, 0 to 1 percent slopes	0.2	1.6%
17	Smyrna and Myakka fine sands	4.8	45.7%
21	Immokalee sand	0.1	0.8%
33	Holopaw fine sand, frequently ponded, 0 to 1 percent slopes	5.2	48.9%
59	Arents-Urban land complex, 0 to 5 percent slopes	0.3	3.0%
Totals for Area of Interest		**10.6**	**100.0%**

Map Unit Descriptions

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

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

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

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

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

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

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

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

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

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

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

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

Polk County, Florida

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

Map Unit Setting

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

Map Unit Composition

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

Description of Samsula

Setting

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

Typical profile

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

Properties and qualities

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

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Ecological site: R155XY100FL - Organic Freshwater Isolated Marshes and Swamps
Forage suitability group: Organic soils in depressions and on flood plains (G155XB645FL)

Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL), Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

Minor Components

Myakka

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Ecological site: R155XY070FL - Sandy Freshwater Isolated Marshes and Swamps
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL), Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

Kaliga

Percent of map unit: 3 percent
Landform: Depressions on flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Ecological site: R155XY100FL - Organic Freshwater Isolated Marshes and Swamps
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL), Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

Basinger

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Ecological site: R155XY070FL - Sandy Freshwater Isolated Marshes and Swamps
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Anclote

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Convex, concave
Across-slope shape: Linear, concave
Ecological site: R155XY070FL - Sandy Freshwater Isolated Marshes and Swamps
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Floridana

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear

Across-slope shape: Concave, linear
Ecological site: R155XY080FL - Sandy over Loamy Freshwater Isolated Marshes and Swamps
Other vegetative classification: Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL), Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

Sanibel

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear, concave
Across-slope shape: Concave
Ecological site: R155XY100FL - Organic Freshwater Isolated Marshes and Swamps
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

17—Smyrna and Myakka fine sands

Map Unit Setting

National map unit symbol: 1jtv1
Elevation: 20 to 260 feet
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Smyrna, non-hydric, and similar soils: 41 percent
Myakka and similar soils: 39 percent
Smyrna, hydric, and similar soils: 15 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Smyrna, Non-hydric

Setting

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

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 12 inches: fine sand
Bh - 12 to 25 inches: fine sand

E' - 25 to 42 inches: fine sand
B'h - 42 to 48 inches: fine sand
C - 48 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Ecological site: F155XY120FL - Sandy Flatwoods and Hammocks
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL), South Florida Flatwoods (R154XY003FL)
Hydric soil rating: No

Description of Myakka

Setting

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

Typical profile

A - 0 to 7 inches: fine sand
E - 7 to 25 inches: fine sand
Bh - 25 to 36 inches: fine sand
C - 36 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Ecological site: F155XY120FL - Sandy Flatwoods and Hammocks
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL), South Florida Flatwoods (R154XY003FL)
Hydric soil rating: No

Description of Smyrna, Hydric

Setting

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

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 12 inches: fine sand
Bh - 12 to 25 inches: fine sand
E' - 25 to 42 inches: fine sand
B'h - 42 to 48 inches: fine sand
C - 48 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Ecological site: F155XY120FL - Sandy Flatwoods and Hammocks
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL), South Florida Flatwoods (R154XY003FL)
Hydric soil rating: Yes

Minor Components

Basinger

Percent of map unit: 2 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R155XY070FL - Sandy Freshwater Isolated Marshes and Swamps
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL), Slough (R154XY011FL)
Hydric soil rating: Yes

Pomona, non-hydric

Percent of map unit: 1 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F155XY120FL - Sandy Flatwoods and Hammocks
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL), South Florida Flatwoods (R154XY003FL)
Hydric soil rating: No

Ona, non-hydric

Percent of map unit: 1 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F155XY120FL - Sandy Flatwoods and Hammocks
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL), South Florida Flatwoods (R154XY003FL)
Hydric soil rating: No

Immokalee, non-hydric

Percent of map unit: 1 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F155XY120FL - Sandy Flatwoods and Hammocks
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL), South Florida Flatwoods (R154XY003FL)
Hydric soil rating: No

21—Immokalee sand

Map Unit Setting

National map unit symbol: 1jtv4
Elevation: 50 to 260 feet
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Immokalee, Non-hydric

Setting

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

Typical profile

A - 0 to 7 inches: sand
E - 7 to 39 inches: sand
Bh - 39 to 58 inches: sand
E' - 58 to 66 inches: sand
B'h - 66 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Ecological site: F155XY120FL - Sandy Flatwoods and Hammocks
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL), South Florida Flatwoods (R154XY003FL)
Hydric soil rating: No

Description of Immokalee, Hydric

Setting

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

Typical profile

A - 0 to 7 inches: sand
E - 7 to 39 inches: sand
Bh - 39 to 58 inches: sand
E' - 58 to 66 inches: sand
B'h - 66 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Ecological site: F155XY120FL - Sandy Flatwoods and Hammocks
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL), South Florida Flatwoods (R154XY003FL)
Hydric soil rating: Yes

Minor Components

Basinger

Percent of map unit: 5 percent

Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R155XY070FL - Sandy Freshwater Isolated Marshes and Swamps
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL), Slough (R154XY011FL)
Hydric soil rating: Yes

Smyrna, non-hydric
Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F155XY120FL - Sandy Flatwoods and Hammocks
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL), South Florida Flatwoods (R154XY003FL)
Hydric soil rating: No

Myakka
Percent of map unit: 5 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F155XY120FL - Sandy Flatwoods and Hammocks
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL), South Florida Flatwoods (R154XY003FL)
Hydric soil rating: No

33—Holopaw fine sand, frequently ponded, 0 to 1 percent slopes

Map Unit Setting
National map unit symbol: 2x9g8
Elevation: 0 to 190 feet
Mean annual precipitation: 46 to 63 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

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

Description of Holopaw

Setting

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

Typical profile

A - 0 to 4 inches: fine sand
Eg - 4 to 50 inches: fine sand
Btg - 50 to 66 inches: fine sandy loam
Cg - 66 to 80 inches: loamy fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 4 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Ecological site: R155XY070FL - Sandy Freshwater Isolated Marshes and Swamps
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Minor Components

Basinger

Percent of map unit: 6 percent
Landform: Drainageways on marine terraces, flats on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Concave, convex
Across-slope shape: Linear, concave
Ecological site: R155XY070FL - Sandy Freshwater Isolated Marshes and Swamps
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL), Slough (R155XY011FL)
Hydric soil rating: Yes

Riviera

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R155XY080FL - Sandy over Loamy Freshwater Isolated Marshes and Swamps
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

Floridana

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear, concave
Ecological site: R155XY080FL - Sandy over Loamy Freshwater Isolated Marshes and Swamps
Other vegetative classification: Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL), Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

Manatee

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear, concave
Ecological site: R155XY090FL - Loamy and Clayey Freshwater Isolated Marshes and Swamps
Other vegetative classification: Loamy and clayey soils on stream terraces, flood plains, or in depressions (G155XB345FL), Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

59—Arents-Urban land complex, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 1jtw7
Elevation: 50 to 210 feet
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Arents and similar soils: 55 percent
Urban land: 45 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arents

Setting

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

Typical profile

C - 0 to 80 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Forage suitability group: Forage suitability group not assigned (G154XB999FL)
Other vegetative classification: Forage suitability group not assigned (G154XB999FL)
Hydric soil rating: No

Description of Urban Land

Setting

Landform: Marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: No parent material

Interpretive groups

Land capability classification (irrigated): None specified
Forage suitability group: Forage suitability group not assigned (G154XB999FL)
Other vegetative classification: Forage suitability group not assigned (G154XB999FL)
Hydric soil rating: Unranked

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

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

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

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

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

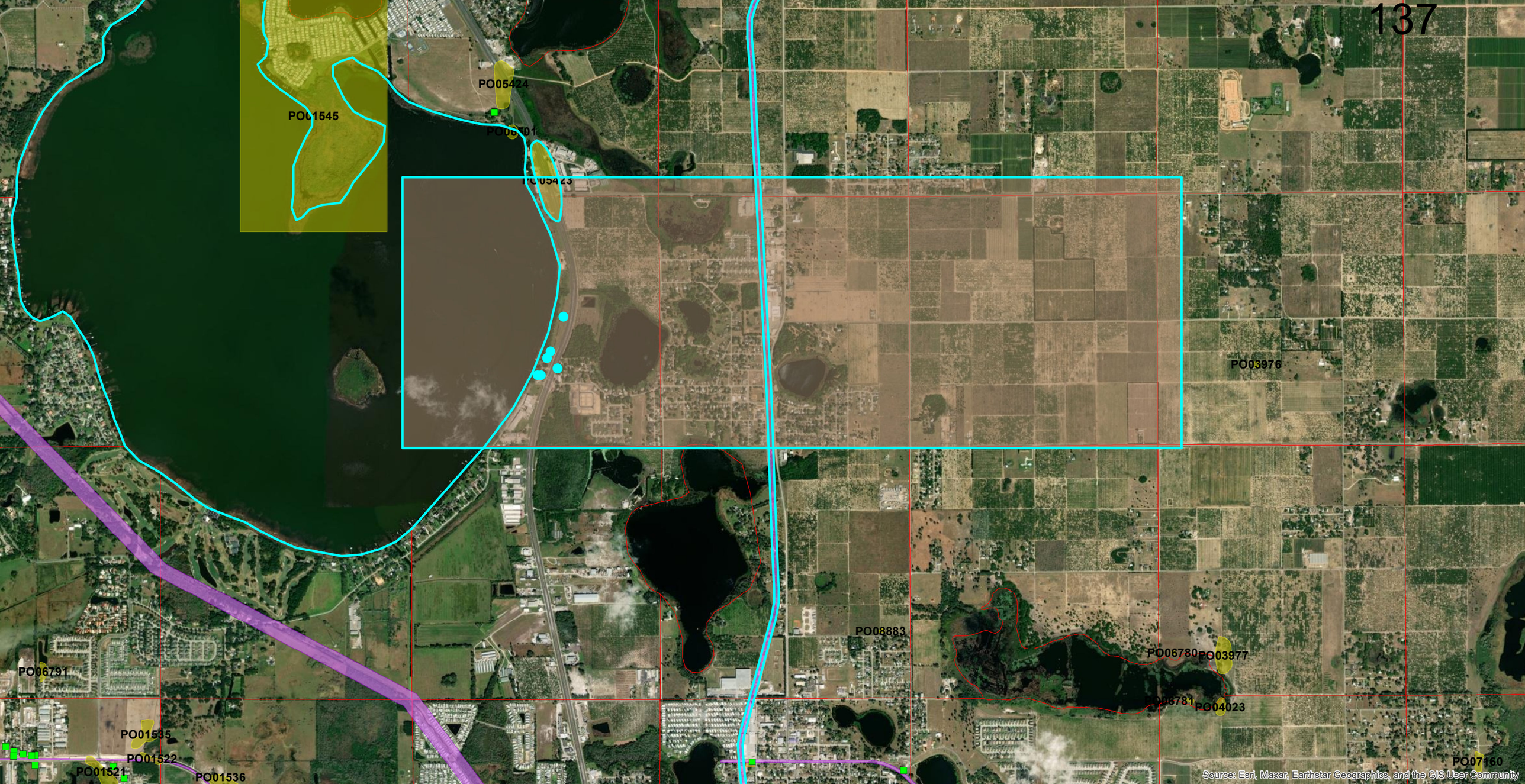
APPENDIX C

HISTORICAL AND ARCHEOLOGICAL SURVEY

AR=1
SS=6
CM=0
RG=1
BR=0
Total=8

Cultural Resource Roster

SiteID	Type	Site Name	Address	Additional Info	SHPO Eval	NR Status
PO05392	SS	JOHN WARD'S CUSTOM PAINTING (A)	72 US 27, LAKE HAMILTON	c1945 Frame Vernacular	Not Eligible	
PO05393	SS	JOHN WARD'S CUSTOM PAINTING (B)	72 US 27, LAKE HAMILTON	c1945 Frame Vernacular	Not Eligible	
PO05394	SS	36 W PALM AVENUE	36 W PALM AVE, LAKE HAMILTON	c1935 Frame Vernacular	Not Eligible	
PO05395	SS	AQUA MANIA RESIDENTIAL BUILDING	104 US 27, LAKE HAMILTON	c1930 Frame Vernacular	Not Eligible	
PO05396	SS	AQUA MANIA COMMERCIAL BUILDING	104 US 27, LAKE HAMILTON	c1945 Frame Vernacular	Not Eligible	
PO05397	SS	GROVE STORE	NONE US 27, LAKE HAMILTON	c1930 Frame Vernacular	Not Eligible	
PO05423	AR	LAKE HAMILTON 1	HAINES CITY		Not Eligible	
PO06512	RG	RAILROAD BED	Haines City	Linear Resource	Not Eligible	


PO05424
PO01545
PO05423
PO03976
PO08883
PO06780
PO03977
PO06781
PO04023
PO06791
PO01535
PO01522
PO01521
PO01536
PO07160
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

APPENDIX E

PUBLIC NOTICE RECORD AND PUBLIC HEARING SUMMARY

RESOLUTION NUMBER R-2023-____

A RESOLUTION OF THE TOWN COUNCIL OF THE TOWN OF LAKE HAMILTON, FLORIDA, RELATING TO THE FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION (FDEP) STATE REVOLVING FUND (SRF), ADOPTION OF THE WASTEWATER FACILITY PLAN FOR THE IMPLEMENTATION OF PHASE 2 WWTF AND PUMP STATION IMPROVEMENTS, EFFECTIVE THIS DATE

WHEREAS, Florida Statutes provide for loans to local government agencies to finance the construction of wastewater facilities; and Florida Administrative Code requires the formal authorization by Town Council to formally adopt a facility plan outlining necessary Phase 2 WWTF and Pump Station facility improvements to comply with State of Florida funding requirements;

WHEREAS, formal adoption of the proposed Facility Plan is required for the Town of Lake Hamilton to participate in the State Revolving Loan Fund Program;

WHEREAS, the Town Council of the Town of Lake Hamilton, Florida agrees with the findings and summary of necessary improvements as outlined in the Facility Plan for the purpose of Phase 2 WWTF and Pump Station Construction funding;

NOW THEREFORE BE IT RESOLVED by the Town Council of the Town of Lake Hamilton, Florida formally approves and adopts the Town of Lake Hamilton Facility Plan as written and presented to the Town Council on this date;

SECTION 1. FINDINGS

The foregoing findings are incorporated herein by reference and made a part hereof.

The Town of Lake Hamilton Florida, is authorized to approve the proposed Facility Plan.

The Town Manager is hereby designated as the authorized representative to provide the assurances and commitments that will be required by the Facility Plan.

The Mayor is hereby designated as the authorized representative to execute the Facility Plan which will become the foundation of all activities related to the wastewater facility improvements. The Mayor is authorized to represent the Town in carrying out the Town's responsibilities under the Facility Plan. The Mayor is authorized to delegate responsibility to appropriate Town Staff to carry out technical, financial, and administrative activities associated with the Facility Plan.

The legal authority for adoption of this facility plan is pursuant to the Town Charter, Town Code of Ordinances, and the Laws of the State of Florida.

All Resolutions or part of Resolutions in conflict with any of the provisions of this Resolution are hereby repealed.

If any section or portion of a section of this Resolution proves to be invalid, unlawful, or unconstitutional, it shall not be held to invalidated or impair the validity, force, or effect or any other section or part of this Resolution.

SECTION 2. EFFECTIVE DATE

This Resolution shall take effect upon its approval and adoption by the Town Council.

APPROVED AND ADOPTION THIS ____TH DAY OF DECEMBER, 2023.

TOWN COUNCIL
TOWN OF LAKE HAMILTON, FLORIDA

_____
MAYOR **(SEAL)**

ATTEST:

_____

APPROVED AS TO FORM AND CORRECTNESS:

_____

RESOLUTION *R-2023-____*

"A RESOLUTION OF TOWN OF *Lake Hamilton*, FLORIDA, RELATING TO THE STATE REVOLVING FUND LOAN PROGRAM; MAKING FINDINGS; AUTHORIZING THE LOAN APPLICATION; AUTHORIZING THE LOAN AGREEMENT; ESTABLISHING PLEDGED REVENUES; DESIGNATING AUTHORIZED REPRESENTATIVES; PROVIDING ASSURANCES; PROVIDING FOR CONFLICTS, SEVERABILITY, AND EFFECTIVE DATE."

WHEREAS, Florida Statutes provide for loans to local government agencies to finance the construction of wastewater treatment facilities; and

WHEREAS, Florida Administrative Code rules require authorization to apply for loans, to establish pledged revenues, to designate an authorized representative; to provide assurances of compliance with loan program requirements; and to enter into a loan agreement; and

WHEREAS, the State Revolving Fund loan priority list designates Project No. CW53168 as eligible for available funding; and

WHEREAS; the Town of *Lake Hamilton*, Florida, intends to enter into a loan agreement with the Department of Environmental Protection under the State Revolving Fund for project financing.

NOW, THEREFORE, BE IT RESOLVED BY THE TOWN COMMISSION OF THE TOWN OF *Lake Hamilton*, FLORIDA, AS FOLLOWS:

SECTION I. The foregoing findings are incorporated herein by reference and made a part hereof.

SECTION II. The Town of *Lake Hamilton*, Florida, is authorized to apply for a loan to finance the Project.

SECTION III. The revenues pledged for the repayment of the loan are *net water and sewer system revenues.*

SECTION IV. The *Town Manager* is hereby designated as the authorized representative to provide the assurances and commitments required by the loan application.

SECTIOIN V. The *Mayor* is hereby designated as the authorized representative to execute the loan agreement which will become a binding obligation in accordance with its terms when signed by both parties. The *Mayor* is authorized to represent the Town in carrying out the Town's responsibilities under the loan agreement. The *Mayor* is authorized to delegate responsibility to appropriate Town staff to carry out technical, financial, and administrative activities associated with the loan agreement.

SECTION VI. The legal authority for borrowing moneys to construct this Project is _____, Florida Statutes.

SECTION VII. All resolutions or part of Resolutions in conflict with any of the provisions of this Resolution are hereby repealed.

SECTION VIII. If any section or portion of a section of this Resolution proves to be invalid, unlawful, or unconstitutional, it shall not be held to invalidate or impair the validity, force, or effect of any other section or part of this Resolution.

SECTION IX. This Resolution shall become effective immediately upon its passage and adoption.

PASSED and ADOPTED this _____ Day of December, 2023.

ATTEST

Town Clerk

APPROVED AS TO FORM AND LEGALITY

Town Attorney

Mayor