TECHNICAL MEMORANDUM: SURFACE WATER DISCHARGE ELIMINATION PLAN

HARBOR ROAD WRF
NPDES FACILITY ID FL0020915
CITY OF GREEN COVE SPRINGS, FLORIDA

Prepared by:

MITTAUER & ASSOCIATES, INC.
CONSULTING ENGINEERS
Orange Park, Florida

Project No. 8905-19-1
October 2021

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EXECUTIVE SUMMARY

In accordance with section 403.064(17), Florida Statutes (F. S.), the enclosed Surface Water Discharge Elimination Plan (Plan) was developed by the City of Green Cove Springs (City) to address the statutory requirements. As documented further herein, the Plan outlines and provides detailed support for the following approach:

- Maximizing reclaimed water supply and use within the City Limits and Utility Service Area including consideration of supplying neighboring utilities, such as Clay County Utility Authority (CCUA), with surplus reclaimed water.

  - The above approach provides the additional benefit of minimizing withdrawals from the Floridan Aquifer for non-essential water demands.

- Enhancing existing biological treatment systems to provide advanced wastewater treatment.

- Consolidating wastewater treatment to one regional facility to support: surface water elimination, increased reclaimed water supplies, and enhanced biological treatment.

- Retaining existing surface water outfalls for wet-weather discharges in accordance with the City's existing wastewater treatment operating permits.

In order to maximize the City's reclaimed water supply capabilities, diminish withdrawals from the Floridan Aquifer, and diminish surface water needs for wet-weather conditions, the City is considering the following projects:

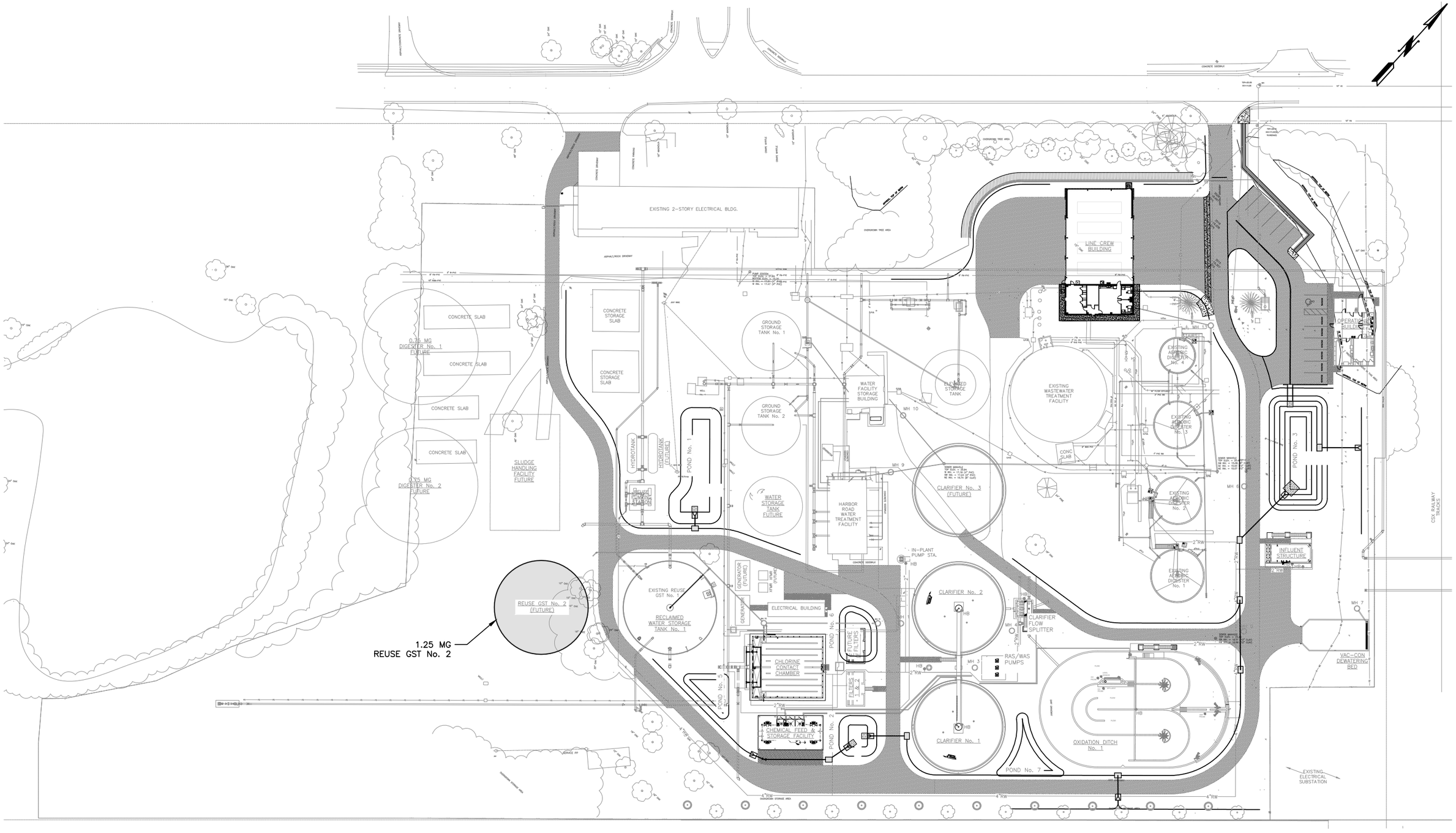
- Expand reclaimed water storage capacity by 1.24 million gallons (MG) via a second ground storage tank (GST No. 2). See **Exhibit ES-1** for conceptual site plan for this improvement.

- Extend reclaimed water distribution piping into the Magnolia Point development to replace existing residential potable water irrigation systems with reclaimed water. This improvement is anticipated to increase reclaimed water demands by approximately 0.50 million gallons per day (MGD) on an annual average daily flow (AADF) basis. See **Exhibit ES-2** for conceptual configuration and limits.

- Continue coordination with CCUA to determine reclaimed water interconnection possibilities, capacities, and locations.

- Evaluate enhancements to the City's reclaimed water operating protocol related to times when the system does not meet public-access reclaimed water quality requirements.

SCALE: 1" = 80'



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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
Reuse GST No. 2
Clay County, Florida

FIGURE
ES.1
October 2021
Project No.
8905-19-1

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 5.1-5.2 Site Plan.dwg, 10/8/2021 10:01:50 AM

SCALE: 1" = 800'

LEGEND
RECLAIMED WATER PIPING (CONCEPTUAL)
RWSA

PHASE 8 LIMITS
W/ EXISTING RECLAIMED
WATER SERVICE PIPING

EXISTING 10" RECLAIMED
WATER BULK DELIVERY MAIN

HRWRF

MAGNOLIA WEST
(CCUA SERVICE AREA)

GOLF COURSE FED BY
EXISTING BULK RECLAIMED
WATER DELIVERY SYSTEM

CONCEPTUAL RECLAIMED
WATER DISTRIBUTION SYSTEM

WEST RWSA

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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
West RWSA-Reclaimed Water Distribution System
Clay County, Florida

FIGURE
ES.2
October 2021
Project No.
8905-19-1

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 5.5 West RWSA Reclaimed Water Distribution System.dwg, 10/8/2021 10:20:59 AM

The City anticipates changes to their growth patterns with resulting modifications to their utility as a result of the First Coast Expressway that is currently under construction. Addressing water, sewer, and reclaimed water demands will be an ongoing process that will likely lead to modifications of the enclosed Plan. The City will continue to coordinate with FDEP as new growth characteristics are known, and submit any modifications to the Plan. Notwithstanding these potential modifications, the City intends to implement projects necessary to eliminate surface water disposal needs, except for wet-weather events in accordance with their operating permits, for operational completion on or before January 1, 2032.

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A Existing Reuse Water Consumption Data
B 2016 Reclaimed Water System Master Plan
C CCUA Reuse Water Demands
D 2015 Wastewater System Master Plan - Effluent Disposal
E Capital Estimates
F CCUA Distribution System Limits
G Class I Injection Well Criteria

1.0 BACKGROUND

The City of Green Cove Springs ("City") currently operates the Harbor Road Wastewater Treatment Facility ("HRWWTF"), NPDES Facility ID FL0020915, and the South Wastewater Treatment Facility ("SWWTF"), NPDES Facility ID FL0030210, with permitted surface water discharges to the St. Johns River (Class III Fresh Waters, WBID# 2213I). **Figure 1.1** shows the locations of permitted surface water discharges for the HRWWTF. **Figures 1.2, 1.3, and 1.4** illustrate the SWWTF outfall location.

The HRWWTF is currently undergoing expansion resulting in a 1.25 million gallon per day (MGD) advanced wastewater treatment (AWT) Water Reclamation Facility (WRF). Once the improvements are complete, the SWWTF may be deactivated and all flow directed to the Harbor Road Water Reclamation Facility ("HRWRF"). Pending future development needs, the SWWTF may be reactivated to serve currently unknown users.

This Technical Memorandum reviews the existing surface water discharge conditions and establishes a plan to reduce surface water discharges, except for anticipated wet-weather conditions, by January 1, 2032.

1.1 HRWRF Background

Surface Water Discharge Point D-001 (HRWRF) is located near the City's existing boat ramp at Governors Creek and US 17. The gravity pipeline extends approximately 140 feet in length from the shoreline and discharges at a depth of approximately four (4) feet (coordinates are approximately latitude 30°00'50"N, longitude 81°41'20"W).

The City operates a permitted public-access reclaimed water system ("reuse system"), R-001. Per the City's Reuse Operating Protocol, the reuse system is the primary means of effluent disposal, with the surface water discharge available for wet weather conditions or circumstances when the treatment system does not meet public-access requirements.

The current HRWRF permitted capacities are as follows:

- Treatment: 0.75 MGD on annual average daily flow (AADF) with current nutrient removal requirements that limit treatment capacity to 0.65 MGD (AADF). The 1.25 MGD (AADF) AWT WRF expansion project is currently under construction and is scheduled to be online by late 2022 to early 2023.

- Reuse (R-001): 0.955 MGD, AADF; 0.75 MGD limited until expansion.

SCALE: 1" = 400'

N

15" GRAVITY SEWER

15" GRAVITY SEWER

140'

16" GRAVITY SEWER

Enterprise Way

Virgils Way

HARBOR ROAD
WASTEWATER TREATMENT
PLANT

Magnolia
Layne

EXISTING 16" DUCTILE IRON
HRWWTP ST. JOHNS RIVER
OUTFALL (GRAVITY OUTFALL)
INV. EL. = (−)2.80'(±)
(SEE NOTE 2)

Governor's Creek

Magnolia Point
Golfside Villas U2

Magnolia Point
Golfside Villas U5

EXISTING 10"PVC
MAGNOLIA POINT
BULK RECLAIMED
WATER TRANSMISSION
MAIN (PRESSURE
OUTFALL)

Magnolia Point
Golfside Villas U1

SEE NOTE 1

Magnolia Pt Blvd

Gator Bay Rd.

Governors Creek Drive

Muirfield Dr.

Cove
Subdivision

Magnolia Point
Phase 1

EXISTING STORMWATER
MANAGEMENT SYSTEM

NOTES:
1. SUBDIVISION LAYOUT BASED ON CITY FILES.
2. INFORMATION BASED ON SMITH & GILLESPIE 1971 RECORD DRAWINGS.

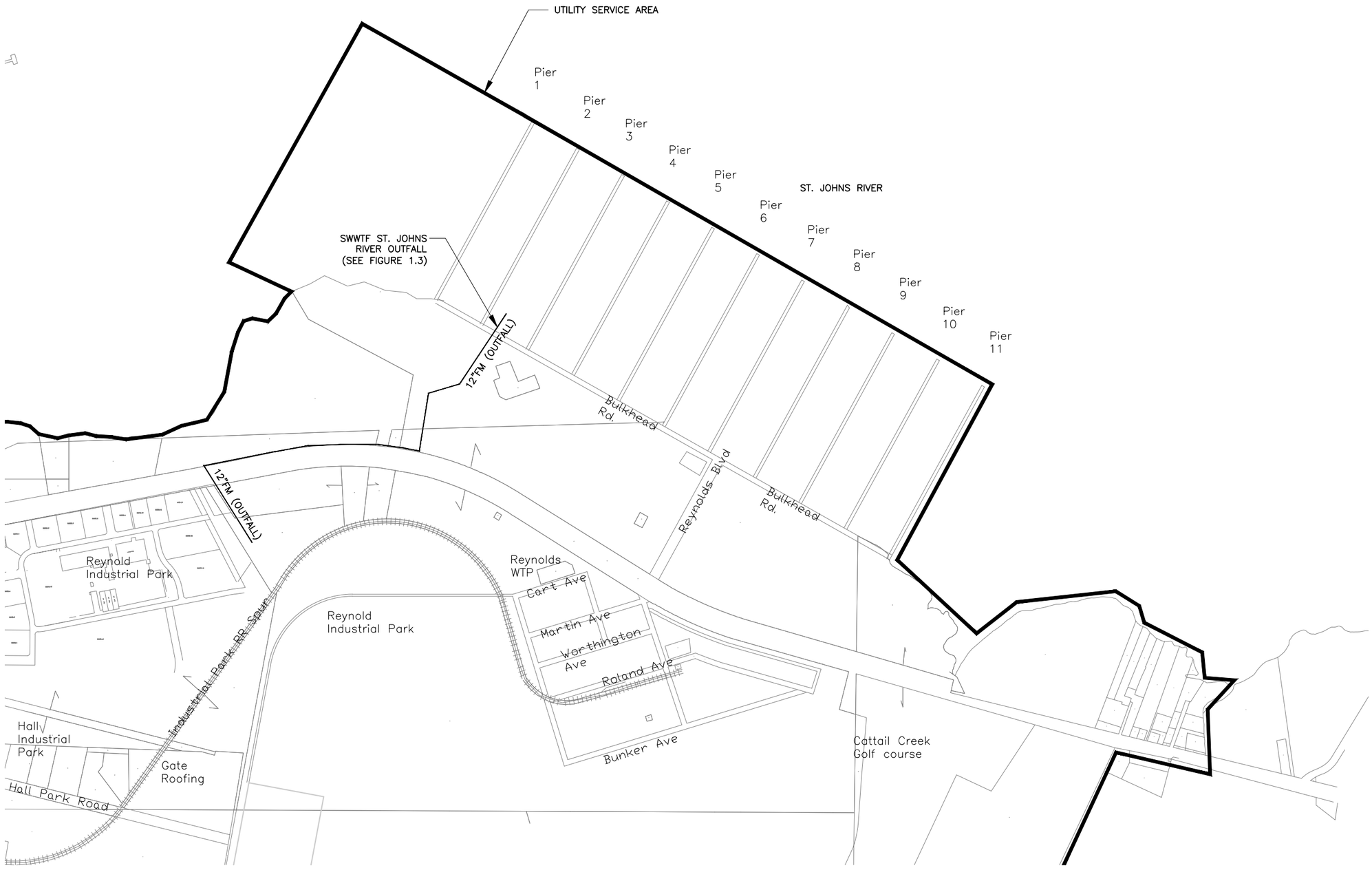
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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
HRWWTF Existing Outfall Locations
Clay County, Florida

FIGURE
1.1
October 2021
Project No.
8905-19-1

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 1.1 HRWWTF Existing Outfall Locations.dwg, 10/8/2021 10:01:12 AM

SCALE: 1" = 1000'

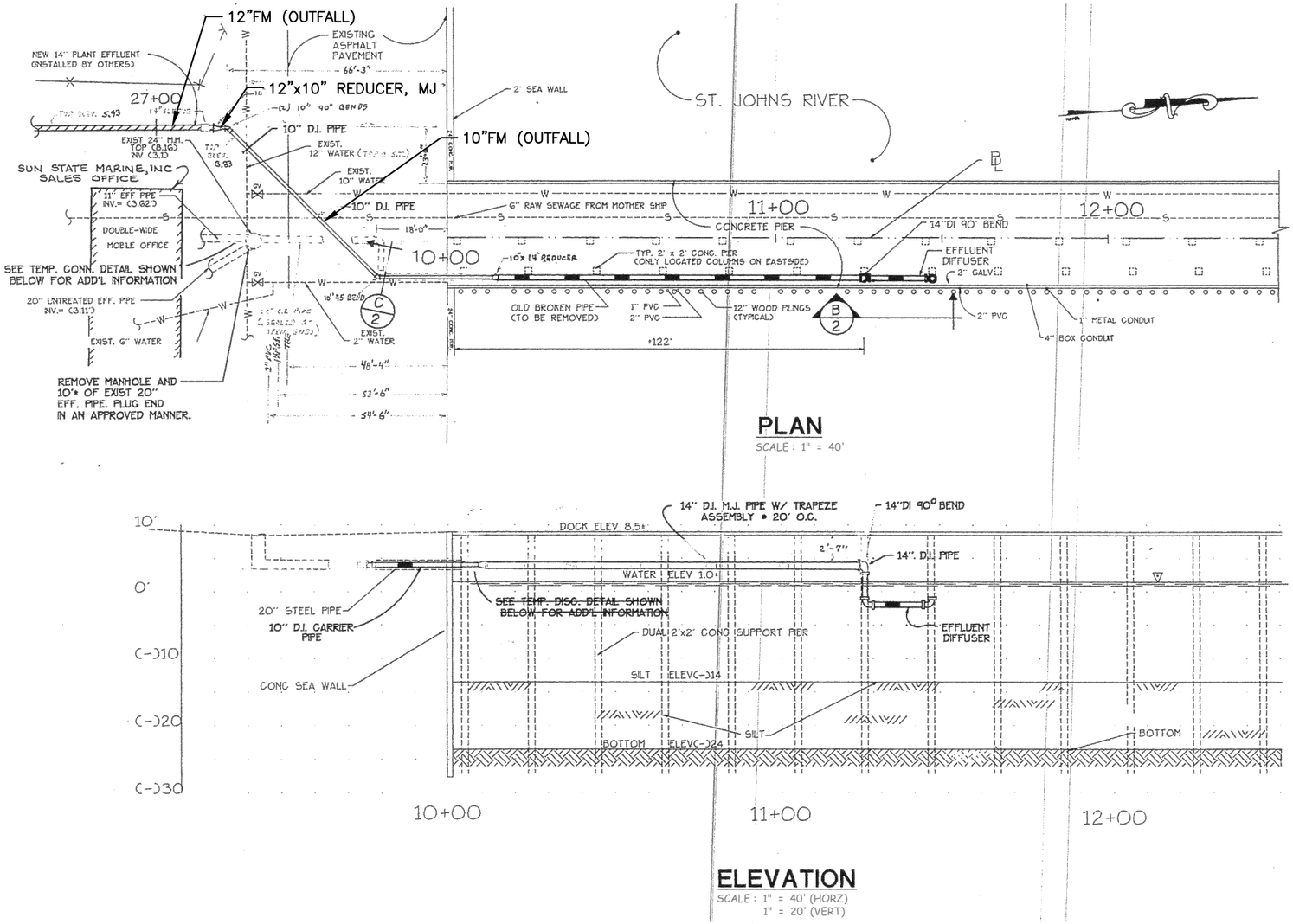


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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
SWWTF Existing Outfall Location
Clay County, Florida

FIGURE 1.2
October 2021
Project No. 8905-19-1

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 1.2 SWWTF Existing Outfall Location.dwg, 10/8/2021 10:01:16 AM



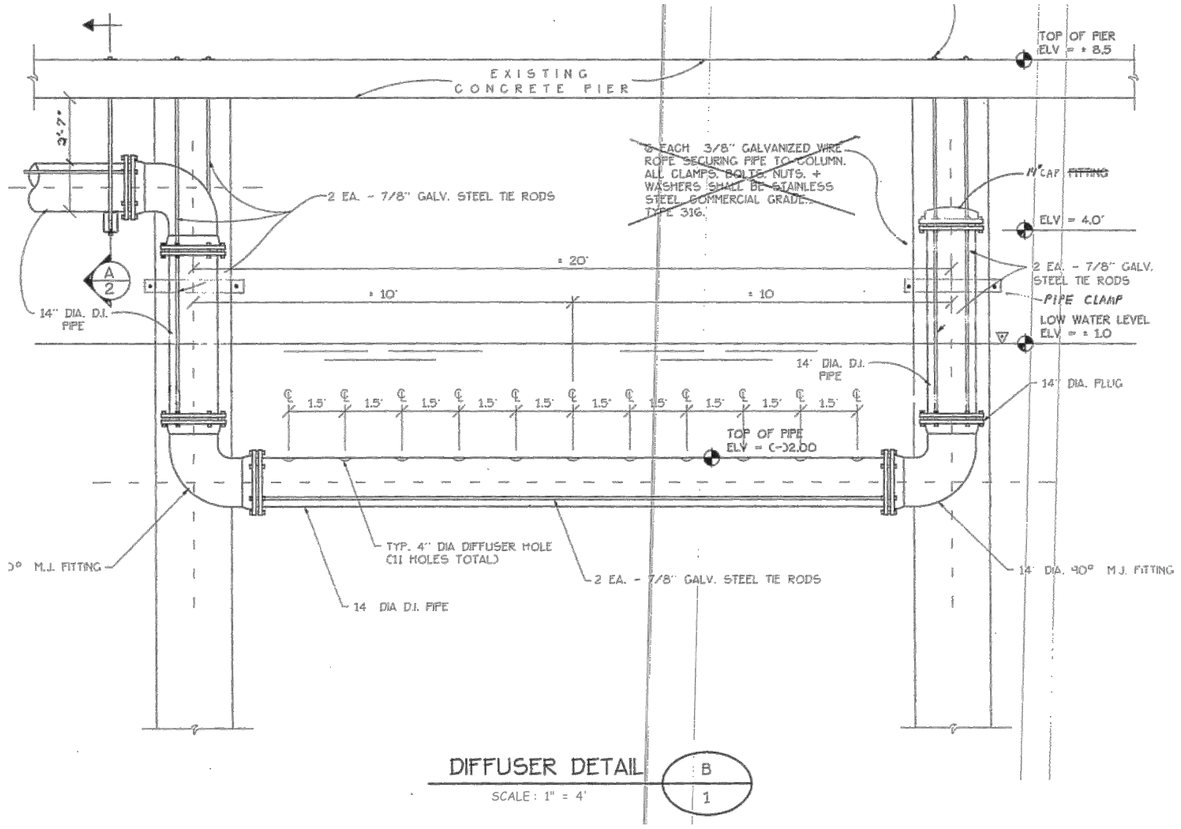
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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
SWWTF Effluent Pipe
Clay County, Florida

FIGURE 1.3
October 2021
Project No. 8905-19-1

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 1.3 SWWTF Effluent Pipe.dwg, 10/8/2021 10:08:48 AM

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 1.4 SWWTF Effluent Pipe Diffuser Detail.dwg, 10/8/2021 10:01:25 AM



DIFFUSER DETAIL B/1

SCALE: 1" = 4'

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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
SWWTF Effluent Pipe Diffuser Detail
Clay County, Florida

FIGURE 1.4
October 2021
Project No. 8905-19-1

- Surface Water Discharge (D-001): 0.65 MGD, AADF prior to expansion; 1.25 MGD after expansion.

The HRWRF improvements include expanding the reuse water storage and reclaimed water pumping capacity, which were completed under a separate construction project in 2020. The new reclaimed water delivery system includes:

- Four 75-hp split-case, pressure-controlled pumps (two in current phase and the additional two in future phases of work).
    - Each pump has a hydraulic capacity of 1,400 gallons per minute (gpm), which will provide a firm pumping capacity of 4,200 gpm (6.05 MGD) at build-out.
- A 10,000-gallon hydropneumatic tank with provisions for a second 10,000-gallon hydro tank.
- A 1.24 million gallon (MG) reclaimed water ground storage tank with provisions for additional storage capacity.

1.2 SWWTF Background

The SWWTF Surface Water Discharge Point (D-001) is located near Reynolds Park and is a pressurized force main. The force main extends approximately 122 feet in length from the shoreline and discharges at a depth of approximately three (3) feet (*coordinates are approximately latitude 29°59'27"N, longitude 81°39'34"W*). See **Figures 1.2, 1.3,** and **1.4** for details.

The current SWWTF permitted capacities are as follows:

- Treatment: 0.50 million gallons per day (MGD) AADF that is limited to 0.35 MGD (AADF) based on biological nutrient removal capabilities.
- Reuse (R-001): 0.5 MGD, AADF (no current end users, not in service).
- Surface Water Discharge (D-001): 0.35 MGD, AADF (interim permitted), 0.5 MGD (ultimate permitted).

1.3 Aggregate Total Maximum Daily Load (TMDL)

The HRWWTF and SWWTF interim capacities are limited to 0.65 MGD (AADF) and 0.35 MGD (AADF), respectively, to ensure compliance with the City of Green Cove

Springs Aggregate Permit (FL0635618) for Total Nitrogen (“TN”) and Total Phosphorus (“TP”). The limited capacities were the projected limitations to meet the City’s annual limits for TN and TP that are 17,055.5 and 4,244.2 pounds per year (ppy) respectively.

2.0 EXISTING SURFACE WATER DISCHARGES

Each of the City's WWTFs have surface water discharges. The HRWRF has a gravity discharge, while the SWWTF has a pressurized system. Each of the systems are summarized in the following subsections.

2.1 Harbor Road Existing Surface Water Hydraulic Capacity

The existing outfall piping is mostly 15" vitrified clay pipe (VCP), with gravity flow from the HRWRF to the St. Johns River. Following the HRWRF improvements, the effluent transfer pump station located at the end of the chlorine contact chamber will deliver treated effluent to the existing outfall only if the reuse GST is full or water does not meet public access reuse requirements. Each of the two effluent transfer pumps will have a hydraulic capacity of 2,600 gallons per minute at 55 feet total dynamic head (TDH). Valving will allow the effluent transfer pumps to convey water to the existing surface water discharge or to the reclaimed water ground storage tank.

The St. Johns River outfall was constructed with the 1971 WWTF, and the design was based on a 15" VCP from the treatment facility and transitioned to 16" ductile iron pipe (DIP)in the river with a final invert elevation (-) 2.80 feet (NGVD). The 16" outfall is located near Governors Creek as shown within Figure 1.1. The outfall remains submerged.

Treated effluent that does not meet reclaimed water standards is dechlorinated and discharged via the existing 16" outfall. Reclaimed water is also disposed of via this location when the Magnolia Point stormwater system does not have capacity for additional reclaimed water. In both scenarios, the treated effluent/reclaimed water gravity flows from the HRWRF beneath U.S. 17 to the outfall location within the banks of the St. Johns River. The gravity system's pipe slopes provide an estimated capacity of 1,590 gpm (2.29 MGD). If there is a 1-foot surcharge in one of the outfall manholes, the outfall capacity is then estimated at approximately 1,950 gpm or 2,776,000 gpd (2.78 MGD-PHF) on a peak hour flow ("PHF") basis.

Table 2.1 shows the HRWRF average daily flow (ADF) values to the river and reuse outfalls from August 2020 to July 2021.

TABLE 2.1 HRWRF REUSE AND SURFACE WATER DISCHARGE MONTHLY FLOWS				
Year	**Month**	**Surface Water Discharge - ADF (MGD)**	**Reuse Water - ADF (MGD)[1]**	**Total Effluent - ADF (MGD)**
2020	August	0.226	0.342	0.567
	September	0.226	0.248	0.474
	October	0.158	0.377	0.535
	November	0.100	0.411	0.510
	December	0.085	0.388	0.473
2021	January	0.110	0.356	0.465
	February	0.154	0.373	0.527
	March	0.073	0.421	0.494
	April	0.180	0.305	0.485
	May	0.092	0.379	0.471
	June	0.144	0.375	0.519
	July	0.194	0.344	0.538
AADF		**0.145**	**0.360**	**0.505**

*1 Note: All reuse water to Magnolia Point Golf Course (see **Section 3.1**).*

2.2 SWWTF River Outfall Hydraulic Capacity

The existing outfall piping is a 14" ductile iron pipe with that is connected to the SWWTF effluent pump station. The effluent pump station consists of two 15-HP, self-priming, end-suction, centrifugal pumps, each with a capacity of 835 gpm (1.2 MGD).

The St. Johns River outfall was constructed with the initial 1991/1992 SWWTF. The 14" outfall is located along a finger pier near Reynolds Park as shown within **Figure 1.2**. The outfall remains submerged.

Treated effluent is dechlorinated and discharged via the existing 14" outfall. Based on the effluent pump station capacity, the outfall's capacity is approximately 1,670 gpm, or 2,404,800 gpd (2.40 MGD-PHF) on a peak hour flow ("PHF") basis.

Table 2.2 shows the SWWTF surface water discharge over the past 12 months.

TABLE 2.2 SWWTF SURFACE WATER DISCHARGE MONTHLY FLOWS		
Year	**Month**	**Surface Water Discharge – ADF (MGD)**
2020	August	0.316
	September	0.406
	October	0.307
	November	0.300
	December	0.264
2021	January	0.247
	February	0.304
	March	0.263
	April	0.272
	May	0.250
	June	0.310
	July	0.346
AADF		**0.299**

3.0 REUSE WATER DEMANDS

The existing permitted reuse water customers are the Magnolia Point Golf Course, Edgewater Landing, and Black Creek Village. The following subsections will evaluate the existing reuse water demands, proposed reuse water demands, and potential future reuse water demands. At this time, the Harbor Road WRF is the only location that has public-access reclaimed water customers.

3.1 Existing Reuse Water Demands

Flows from the HRWRF to the public access reuse irrigation systems are maximized based on the City's Reuse Operating Protocol. Currently public-access reuse irrigation is limited to the Magnolia Point Golf Course due to its prioritized, high demand. The other two (2) existing permitted reuse customers are currently served via potable water, which will continue until the HRWRF AWT improvements are complete.

Table 3.1 shows a summary of existing reuse water or irrigation water consumption for permitted reuse customers. Complete existing reuse water consumption data is included as **Attachment A**.

TABLE 3.1
PERMITTED HRWRF REUSE WATER CUSTOMERS

Customer	User Type	Connections	Acreage (Acres)	Capacity (MGD)	Reuse Demand (MGD-AADF)
Magnolia Point Golf and Country Club	Golf Courses	N/A	151	0.75	0.36 MGD[1]
Edgewater Landing[2]	Residential	144	50	0.145	0.030 MGD[3]
Black Creek Village[2]	Residential	83	20	0.060	0.016 MGD[3]

1 Reuse demands are averaged over the past 12 months. See Table 3.2 for breakdown.
2 Permitted reuse customers currently served via potable water.
3 Irrigation demands are averaged over the past 36 months.

3.2 Proposed Reuse Water Demands

The Magnolia Point Residential Development Phase 8 ("Phase 8") was constructed with a reclaimed water distributions system, but is currently served via potable water since piping from the HRWRF to Phase 8 has not been constructed. Phase 8 has approximately 120 irrigation connections, and the average daily reuse demand is projected to be 0.06 MGD.

In order to serve Phase 8, reclaimed water piping from the HRWRF will be required. See **Section 5.0** for further discussion.

3.3 Other Potential Reuse Water Demands

3.3.1 **Inside Green Cove Springs Water & Sewer Service Area:** The existing Magnolia Point development, excluding Phase 8, is currently irrigated via the potable water system. The development could be retrofitted to supply reuse water instead of potable water.

The potential reuse water demands for Magnolia Point are summarized in **Table 3.2.** Complete calculations for potential reuse water demands can be found in **Attachment B**.

TABLE 3.2

MAGNOLIA POINT REUSE WATER DEMANDS

Location	Connections[1]	Reuse Demand[1] (MGD-AADF)
Magnolia Point - retrofit	715	0.42

1 Actual number of connections and demand are anticipated to be greater since many homes currently have one meter that provides domestic supply as well as irrigation supply.

3.3.2 **Reynolds Park Development:** Redevelopment of the Reynolds Park area is not currently known. Potential redevelopment alternatives were explored in separate master plans. Complete calculations for potential reuse water demands can be found in **Attachment B**.

TABLE 3.3

REYNOLDS PARK REUSE WATER DEMANDS

Location	Connections	Reuse Demand (MGD-AADF)
Reynolds Park – future development (Min)[1]	1,080	0.54
Reynolds Park – future development (Max)[1]	2,340	1.17

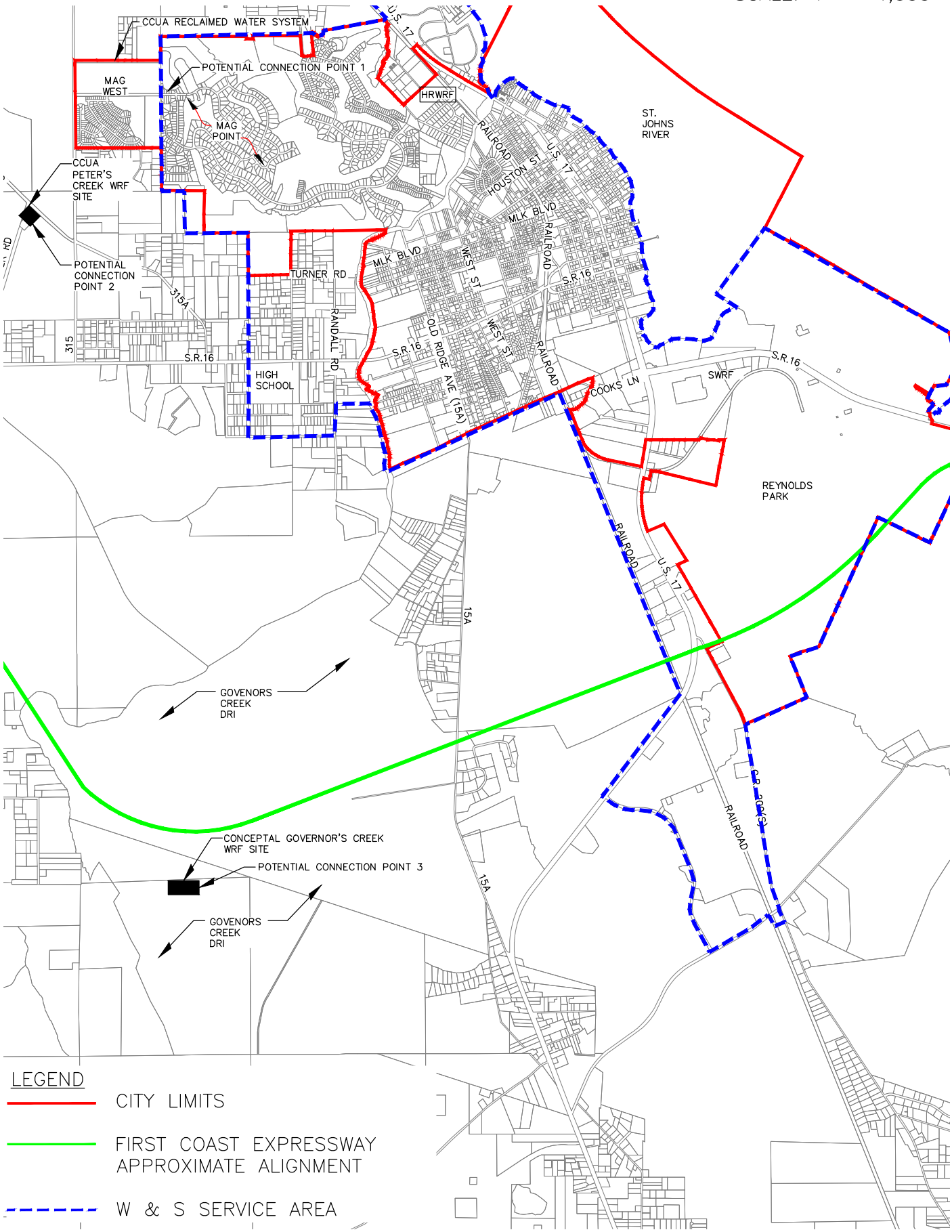
1 Note: Estimated minimum and maximum of future irrigation connections are based on total acreage. Actual future parcel use is unknown.

3.3.3 **<u>Outside Green Cove Springs Water & Sewer Service Area</u>:** Additionally, a reuse interconnect could be constructed between the HRWRF and the adjacent Clay County Utility Authority (CCUA) service area. The CCUA interconnect would allow HRWRF effluent flow that exceeds the reuse water demands of Green Cove Springs customers to flow to CCUA customers, in lieu of surface water locations.

Specific demands within the CCUA system that abuts Magnolia Point are not known, but a potential connection point is adjacent to Magnolia Point Phase 8 as shown in **Figure 3.1**. CCUA's overall reuse demands are summarized in **Attachment C**.

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 3.1 CCUA WRF Reclaimed Water Regional Interconnect Locations.dwg, 10/8/2021 10:31:0

SCALE: 1" = 4,000'



LEGEND

- CITY LIMITS
- FIRST COAST EXPRESSWAY APPROXIMATE ALIGNMENT
- W & S SERVICE AREA

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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
CCUA WRF Reclaimed Water Regional Interconnect Locations
Clay County, Florida

FIGURE 3.1
October 2021
Project No. 8905-19-1

4.0 INFLUENT FLOW PROJECTIONS TO HRWRF

In order to plan to eliminate surface water discharges, future influent flows must be projected to account for changes in service area population.

Table 4.1 shows the 2021 University of Florida Bureau of Economic and Business Research (BEBR) population projections for Clay County.

TABLE 4.1

CLAY COUNTY GROWTH PROJECTIONS

	Low Growth		Medium Growth		High Growth	
Year	**Population**	**5-yr % Δ**	**Population**	**5-yr % Δ**	**Population**	**5-yr % Δ**
2020	210,100		219,000		227,600	
2025	220,600	5.0%	236,800	8.1%	251,800	10.6%
2030	229,300	3.9%	252,500	6.6%	276,000	9.6%
2035	235,200	2.6%	265,000	5.0%	296,600	7.5%
2040	239,300	1.7%	275,600	4.0%	315,700	6.4%
2045	242,400	1.3%	285,100	3.4%	334,100	5.8%

Table 4.2 shows the HRWRF and SWWTF flow projections based on the population growth percentages shown in **Table 4.1**. After the year 2025, the SWWTF service area flows will be directed to the HRWRF as the SWWTF is phased out.

TABLE 4.2

HRWRF AND SWWTF FLOW PROJECTIONS

	Low Growth Flow (MGD)		Medium Growth Flow (MGD)		High Growth Flow (MGD)	
Year	**HRWRF**	**SWWTF**	**HRWRF**	**SWWTF**	**HRWRF**	**SWWTF**
2020	0.50	0.30	0.50	0.30	0.50	0.30
2025	0.53	0.31	0.55	0.32	0.56	0.33
2030	0.88	0	0.93	0	0.97	0
2035	0.90	0	0.97	0	1.05	0
2040	0.92	0	1.01	0	1.11	0
2045	0.93	0	1.05	0	1.18	0

Table 4.3 compares Green Cove Springs' available reuse water and reuse demands based on the 'High-Growth' projection shown in **Table 4.2** and assumes no action is taken to expand reuse water demand.

TABLE 4.3

PROJECTED REUSE AVAILABILITY AND DEMAND

	High Growth Flow (MGD)				
Year	HRWRF	SWWTF	Total	Existing Reuse Demand (MGD)	Potential Surface Water Disposal Projection (Influent Flow – Existing Demand) (MGD)
2020	0.50	0.30	0.80	0.41	0.40
2025	0.56	0.33	0.89	0.41	0.48
2030	0.97	0	0.97	0.41	0.57
2035	1.05	0	1.05	0.41	0.64
2040	1.11	0	1.11	0.41	0.71
2045	1.18	0	1.18	0.41	0.77

Alternatives to eliminate the projected average daily surface water outfall flows are provided in **Section 5.0**.

The above projections summarize average daily flow (ADF) values and do not consider times when reclaimed water demands will be depressed due to seasonal changes in weather (i.e., cooler months) and/or wet conditions. They also do not consider maximum month and/or peak daily flows that occur during seasonal extremes (i.e., spring months) or drought conditions. The City currently has supplemental groundwater capabilities to address drier conditions, but wet-weather scenarios will require additional storage, alternative disposal locations, or occasional use of the existing river outfall.

The intent of alternatives reviewed herein, is to balance average daily demands where influent wastewater flows are on par with reclaimed water demands.

5.0 SURFACE WATER DISCHARGE ELIMINATION ALTERNATIVES

Based on the reuse water demands and influent flow projections for the HRWRF, the following alternatives were evaluated to eliminate nonbeneficial surface water discharges by 2032.

5.1 Reject Water Storage Expansion

Current operating conditions include disposal of reject water via surface water discharge. The modifications to the HRWRF will allow for the existing package WWTF to be converted to a reject storage tank. The modified tank would provide up to 580,000 gallons of reject storage, which will address current influent flows but will not meet FDEP's rule requirement for one day's storage at the HRWRF permitted capacity.

This improvement would allow for near-term storage and subsequent recirculation of reject water to enhance elimination of surface water discharge.

The estimated conceptual capital cost for the improvements is $1,200,000. See **Attachment E** for capital estimates and **Figure 5.1** for concept.

The figure also depicts an alternative location for a separate 1.25 MG GST. The estimated capital needs for the alternative location is $2,900,000.

5.2 Reclaimed Water Storage Expansion

The HRWRF improvements include a 1.24-MG reclaimed water ground storage tank with provisions for additional storage capacity. Since the permitted capacity of the HRWRF following the expansion will be 1.25 MGD, the ground storage tank would provide one (1) day of storage. To eliminate surface water discharge, the reuse water storage capacity at the HRWRF could be increased.

An identical 1.24-MG reclaimed water ground storage tank would increase the reclaimed water storage to two (2) days. The estimated capital cost for the improvements is $2,300,000. See **Attachment E** for capital estimates and **Figure 5.2** for concept.

5.3 Reuse Water Distribution System Expansion

Increasing the availability of reuse water within the City's Water & Sewer Service Area will help eliminate surface water discharge. **Attachment B** groups the potential reuse service areas within the city into the following:

- North Reclaimed Water Service Area (RWSA);
- West RWSA; and
- South RWSA.

All reuse customers are listed in **Table 5.1** with further analysis herein.

SCALE: 1" = 80'

FUTURE REJECT STORAGE

BLOCK RETAINING WALL

NEW FENCE

PRE-ENGINEERED METAL BUILDING w/LINE CREW OFFICE

16" REJECT MAIN

CASCADE POST AERATOR

12" OVERFLOW

6" DRAIN

NEW FENCE

CONVERT PACKAGE WWTF TO REJECT GST

EFFLUENT PUMPS No. 1 THRU No. 4

16" REJECT MAIN

16" REJECT MAIN

EXISTING 2-STORY ELECTRICAL BLDG.

LINE CREW BUILDING

OPERATIONS BUILDING

CONCRETE SLAB

0.75 MG DIGESTER No. 1 FUTURE

CONCRETE SLAB

CONCRETE SLAB

CONCRETE SLAB

0.75 MG DIGESTER No. 2 FUTURE

CONCRETE STORAGE SLAB

CONCRETE STORAGE SLAB

GROUND STORAGE TANK No. 1

GROUND STORAGE TANK No. 2

ELEVATED STORAGE TANK

WATER FACILITY STORAGE BUILDING

EXISTING WASTEWATER TREATMENT FACILITY

EXISTING AEROBIC DIGESTER No. 4

EXISTING AEROBIC DIGESTER No. 3

EXISTING AEROBIC DIGESTER No. 2

EXISTING AEROBIC DIGESTER No. 1

SLUDGE HANDLING FACILITY FUTURE

HYDROTANK

HYDROTANK (FUTURE)

REUSE PUMPING STATION

POND No. 1

WATER STORAGE TANK FUTURE

HARBOR ROAD WATER TREATMENT FACILITY

CONC SLAB

CLARIFIER No. 3 (FUTURE)

IN-PLANT PUMP STA.

CLARIFIER No. 2

CLARIFIER FLOW SPLITTER

INFLUENT STRUCTURE

POND No. 3

CSX RAILWAY TRACKS

REUSE GST No. 2 (FUTURE)

EXISTING REUSE GST No. 1

RECLAIMED WATER STORAGE TANK No. 1

GENERATOR (FUTURE)

GENERATOR

ELECTRICAL BUILDING

FUTURE FILTERS

POND No. 6

CHLORINE CONTACT CHAMBER

FILTERS No. 1 & 2

POND No. 5

POND No. 4

CHEMICAL FEED & STORAGE FACILITY

POND No. 2

RAS/WAS PUMPS

CLARIFIER No. 1

OXIDATION DITCH No. 1

POND No. 7

VAC-CON DEWATERING BED

EXISTING ELECTRICAL SUBSTATION

MH 1

MH 2

MH 3

MH 4

MH 5

MH 6

MH 7

MH 8

MH 9

MH 10

MH 11

MH 12

MH 13

2"RW

4"RW

HB

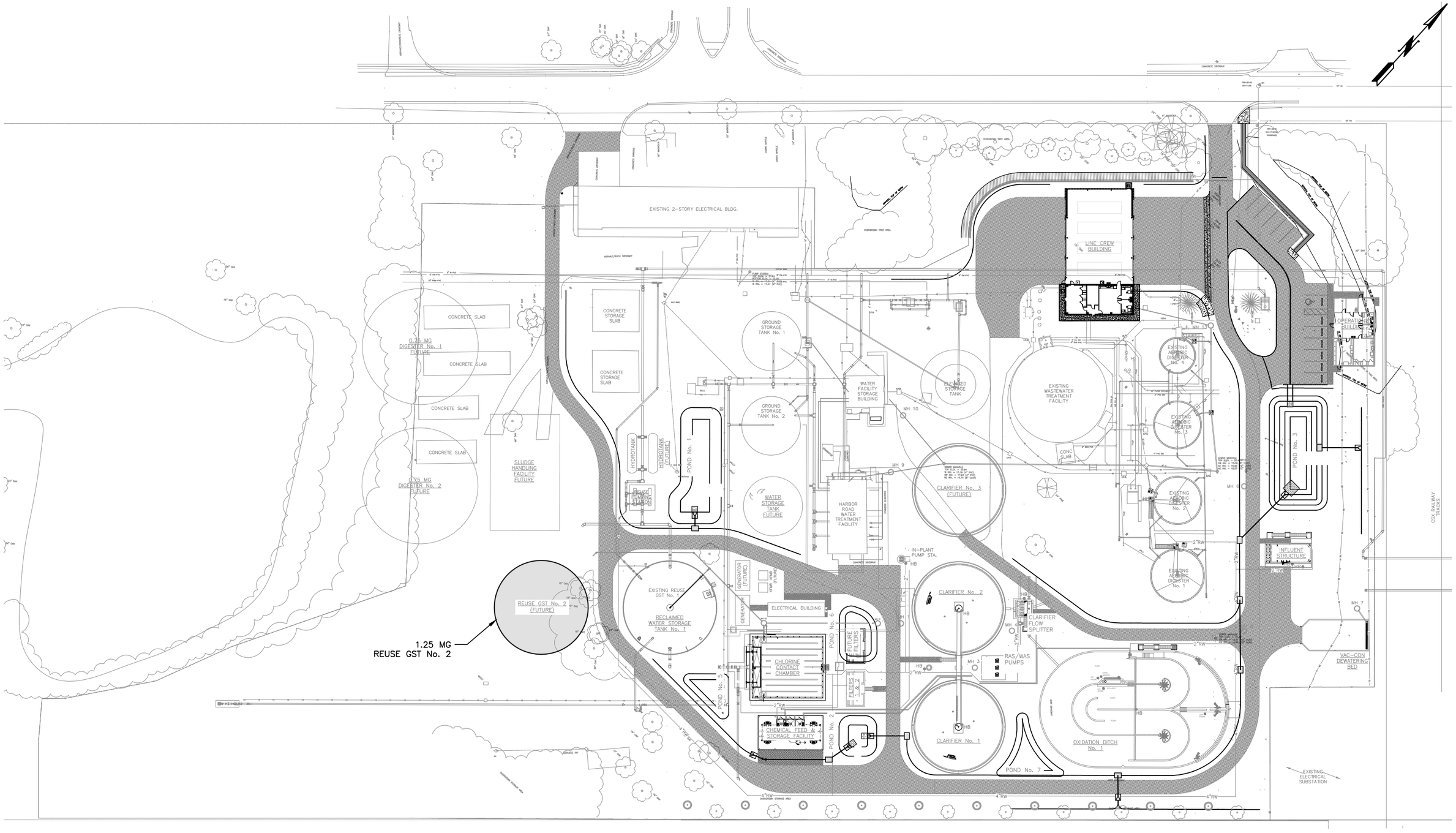
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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
Reject GST & Storage
Clay County, Florida

FIGURE 5.1
October 2021
Project No. 8905-19-1

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 5.1-5.2 Site Plan.dwg, 10/8/2021 10:01:38 AM

SCALE: 1" = 80'



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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
Reuse GST No. 2
Clay County, Florida

FIGURE 5.2
October 2021
Project No. 8905-19-1

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 5.1-5.2 Site Plan.dwg, 10/8/2021 10:01:50 AM

TABLE 5.1 ALL CURRENT AND POTENTIAL REUSE WATER CUSTOMERS						
Customer	**Connections**	**Reuse Demand (MGD-AADF)**	**Service Area**	**Existing Reuse Customer (Y/N)**	**Permitted (Y/N)**	**Developed (Y/N)**
Magnolia Point Golf Course	N/A	0.36	West	Y	Y	Y
Edgewater Landing	98	0.030	North	N	Y	Y
Black Creek Village	83	0.016	North	N	Y	Y
Magnolia Point Phase 8	121[2]	0.061[2]	West	N	N	N
Magnolia Point - retrofit	715[2]	0.43[2]	West	N	N	Y
Reynolds Park – future development (Min)[1]	1,080	0.54	South	N	N	N
Reynolds Park – future development (Max)[1]	2,340	1.17	South	N	N	N

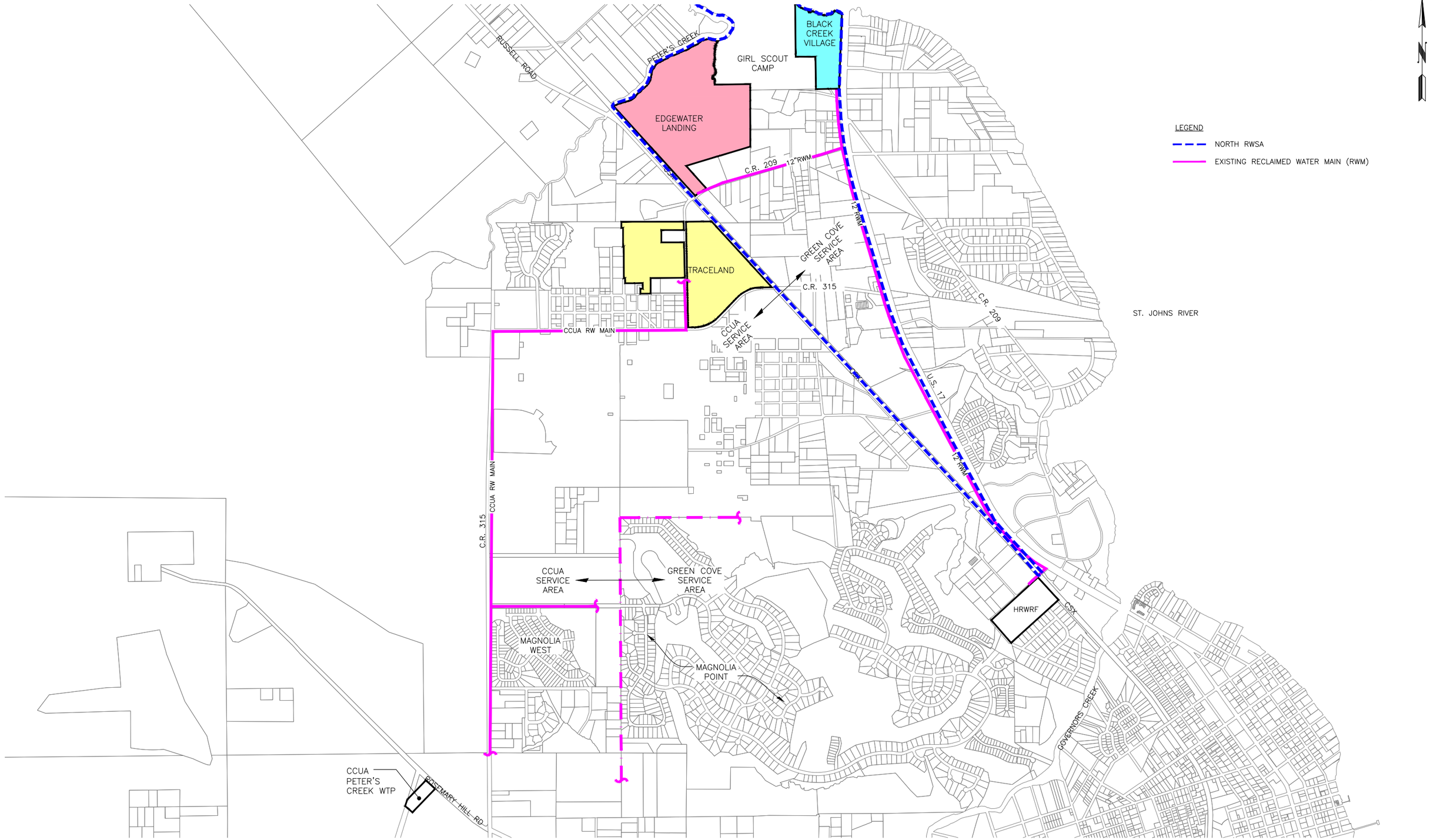
1 Estimated minimum and maximum of future irrigation connections are based on total acreage. Actual future parcel use is unknown.
2 Estimated demand, actual number of connections may be greater.

5.3.1 **Current Permitted Customers:** Reclaimed water service to current permitted customers is planned to begin when HRWRF AWT improvements are complete. The reuse water distribution systems within each development have already been designed, permitted, and constructed by the developers.

Edgewater Landing and Black Creek Village are currently developed with irrigation demands serviced via potable water. Both developments are part of the North RWSA and will be served by an existing 12-inch reclaimed water main, as outlined in **Attachment B** and shown in **Figure 5.3**.

5.3.2 **Magnolia Point Phase 8:** The Magnolia Point Phase 8 development includes a reuse water distribution system that is currently served via potable water. The City's reclaimed water distribution system would require extension to Phase 8. The proposed reclaimed water main is shown in **Figure 5.4**. The estimated capital cost for the reclaimed water main extension is $3,350,000.

SCALE: 1" = 1,800'



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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
North RWSA–Existing Reuse Developments
Clay County, Florida

FIGURE 5.3
October 2021
Project No. 8905-19-1

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 5.3 North RWSA Existing Reuse Developments.dwg, 10/8/2021 10:20:51 AM

SCALE: 1" = 800'

PHASE 8 LIMITS
W/ CENTRAL RECLAIMED WATER
DISTRIBUTION PIPING

CONNECT TO EXISTING
RECLAIMED WATER
DISTRIBUTION SYSTEM

12" RW

12" RW

12" RW

12" RW

HRWRF

MAGNOLIA WEST
(CCUA SERVICE AREA)

WEST RWSA

LEGEND

PROPOSED RESIDENTIAL RECLAIMED WATER TRANSMISSION MAIN

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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
West RWSA-Magnolia Point Phase 8 Alternative
Clay County, Florida

FIGURE
5.4
October 2021
Project No.
8905-19-1

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 5.4 West RWSA Magnolia Point Phase 8 Alternative.dwg, 10/8/2021 10:20:55 AM

5.3.3 **<u>Magnolia Point Retrofit</u>:** The Magnolia Point development irrigation demand is currently serviced via potable water. There is no existing reuse water distribution system. In order to service the existing Phases 1 through 8 developments areas, a reclaimed water distribution system with 16-inch reuse water main header from the HRWRF is proposed. **Figure 5.5** shows the proposed reclaimed water main and distribution system. The estimated capital cost for the reclaimed water main and distribution system retrofit is $9,100,000.

Options should also be considered to fill stormwater ponds that remain well below design water levels.

SCALE: 1" = 800'

LEGEND
RECLAIMED WATER PIPING (CONCEPTUAL)
RWSA

PHASE 8 LIMITS
W/ EXISTING RECLAIMED
WATER SERVICE PIPING

EXISTING 10" RECLAIMED
WATER BULK DELIVERY MAIN

HRWRF

MAGNOLIA WEST
(CCUA SERVICE AREA)

GOLF COURSE FED BY
EXISTING BULK RECLAIMED
WATER DELIVERY SYSTEM

CONCEPTUAL RECLAIMED
WATER DISTRIBUTION SYSTEM

WEST RWSA

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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
West RWSA-Reclaimed Water Distribution System
Clay County, Florida

FIGURE 5.5
October 2021
Project No. 8905-19-1

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 5.5 West RWSA Reclaimed Water Distribution System.dwg, 10/8/2021 10:20:59 AM

5.3.4 **<u>Future Reynolds Park Development</u>:** The Reynolds property is located on U.S. 17 and State Road 16 in the City of Green Cove Springs and contains five (5) City parcels within the larger boundary of the Reynolds property. The land use of each parcel is categorized as 'Reynolds Park Mixed Use Redevelopment District and Conservation'. The property is adjacent to the First Coast Expressway. The timing associated with redevelopment is unknown, so no demand projections can be provided at this time.

In order to serve the future Reynolds Park development with reuse water, the following infrastructure improvements were conceptualized in **Attachment B**:

- Construct a 16-inch reuse water main from the HRWRF to the SWWTF;
- Convert the existing 0.56 MG treatment tank at the SWWTF to a ground storage tank with aluminum cover;
- Convert the existing 0.16 MG redundant clarifier at the SWWTF to a ground storage tank with aluminum cover;
- Construction of a new 1.24 MG reuse water ground storage tank; and
- Modifications to existing reclaimed water delivery system to provide public-access reclaimed water delivery capabilities including, but not limited to: a) piping modifications; b) pump modifications; c) hydropneumatic tank improvements d) control enhancements; and e) other miscellaneous electrical improvements.

The proposed Reynolds Park reuse water infrastructure is shown in **Figure 5.6**. The estimated capital cost for the infrastructure is $6,034,000.

SCALE: 1" = 1,200'

N

EXISTING HRWRF

16" RWM EXTENSION

P.S. #12

P.S. #11

P.S. #4

P.S. #7

P.S. #2

P.S. #15

P.S. #5

P.S. #6

P.S. #8

P.S. #3

P.S. #1

P.S. #9

P.S. #10

Magnolia Point Golfside Villas U5

Magnolia Point Villas U1

Magnolia Point Phase 3

Governor's Creek

Gator Bay Rd.

Governors Creek Drive

Magnolia Pt. Blvd

Cove Subdivision

Houston St.

Bannerman School

Vera Francis Hall Park

Governors Springs Apartments

Mt. Pleasant Baptist

County PW Complex

Core City

Green Cove Junior High

Green Cove Heights

Clay Apts.

Highland Apts.

Cove Apts

Vencor

Public Works Complex

Reynold Industrial Park

Reynolds WTP

PORT P.S.

EXISTING SWRF

ST. JOHNS RIVER

Magnolia Ave. (US 17) Orange Ave.

Pine Ave.

Palmetto Ave.

Idlewilde Ave. (SR 16)

Dak St.

US 17

SR 16

16" RWM

Pier 1
Pier 2
Pier 3
Pier 4
Pier 5
Pier 6
Pier 7
Pier 8
Pier 9
Pier 10

Buckhead Rd.

Reynolds Blvd

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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
South RWSA–Bulk Service to SWRF
Clay County, Florida

FIGURE 5.6
October 2021
Project No. 8905-19-1

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 5.6 South RWSA Bilk Service to SWRF.dwg, 10/8/2021 10:21:05 AM

5.3.5 **<u>CCUA Distribution System Interconnect</u>:** A reuse water interconnect with the CCUA service area adjacent to Magnolia Point Phase 8 could be constructed. This connection point could receive up to 1.24 MGD from the HRWRF, so pipe sizes in the CCUA service area would need to be capable of handling large flows for this option to be feasible.

This alternative could be extended from either the Phase 8 or Magnolia Point reclaimed water distribution system extension alternatives. **Attachment F** illustrates the existing CCUA distribution system limits. **Figure 5.7** illustrates the extension limits.

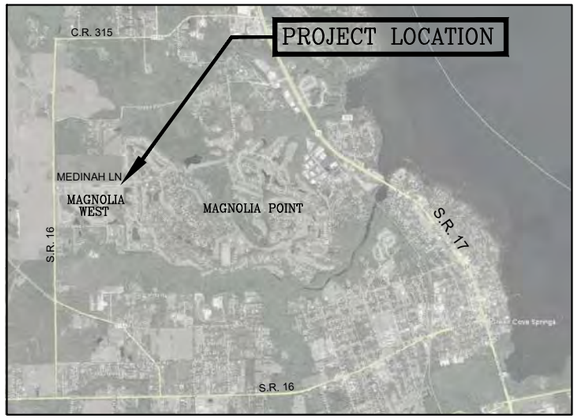
5.3.6 **<u>CCUA RWTP Interconnect</u>:** As another alternative, the City could extend bulk-reclaimed-water transmission mains to CCUA reclaimed water storage or treatment facilities. CCUA has several main potential connection points which are:

- Peter's Creek Reclaimed Water Treatment Plant (RWTP);
- Governor's Creek RWTP; or
- Mid-Clay RWTP.

The distance between HRWRF and the Mid-Clay RWTP is over nine (9) miles. The Peter's Creek RWTP and Governor's Creek RWTP are located closer to the HRWRF, but neither CCUA RWTP has been constructed at this time. Each of these locations are awaiting new development before they will move into design, permitting, and construction.

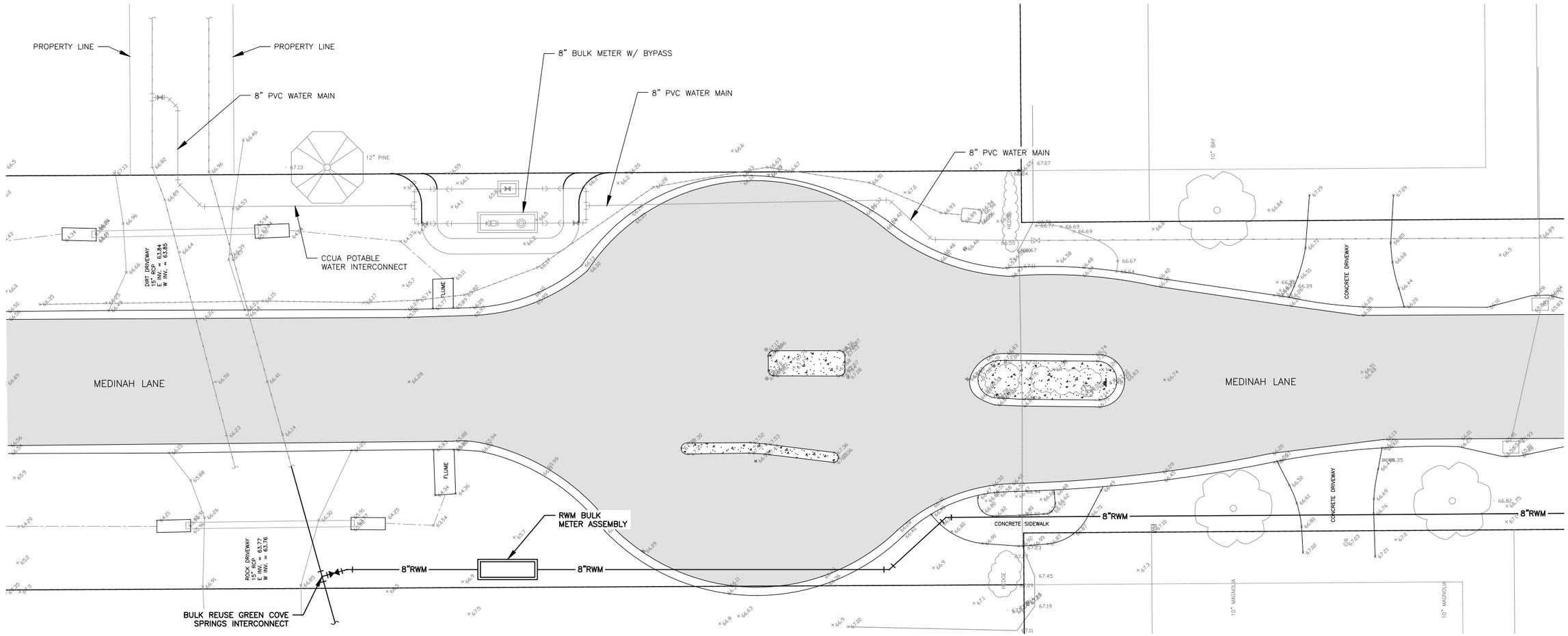
The Peter's Creek RWTP will be located approximately 9,000 lineal feet from the limits of the Phase 8 development. From the HRWRF, a 22,600 lineal foot reuse along CR 315 could be constructed to interconnect the City's and CCUA's reuse water infrastructure.

The anticipated locations for the Governor's Creek RWTP are approximately 25,000 to 30,000 feet away from the SWWTF. In order to interconnect the HRWRF with the Governor's Creek RWTP, a greater length of piping along with more pumping systems would need to be constructed with respect to the possible Peter's Creek RWTP interconnect.



LOCATION MAP
N.T.S.

SCALE: 1" = 20'



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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
Interconnect Plan
Clay County, Florida

FIGURE 5.7
October 2021
Project No. 8905-19-1

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 5.7 interconnect Plan.dwg, 10/8/2021 10:02:04 AM

Given CCUA's current demands (summarized in **Attachment C**) and available infrastructure, this option is not a near-term solution since CCUA does not have the demand for additional reclaimed water supplies. However, this option could prove viable in the future as both CCUA and the City grow their reuse infrastructure footprints.

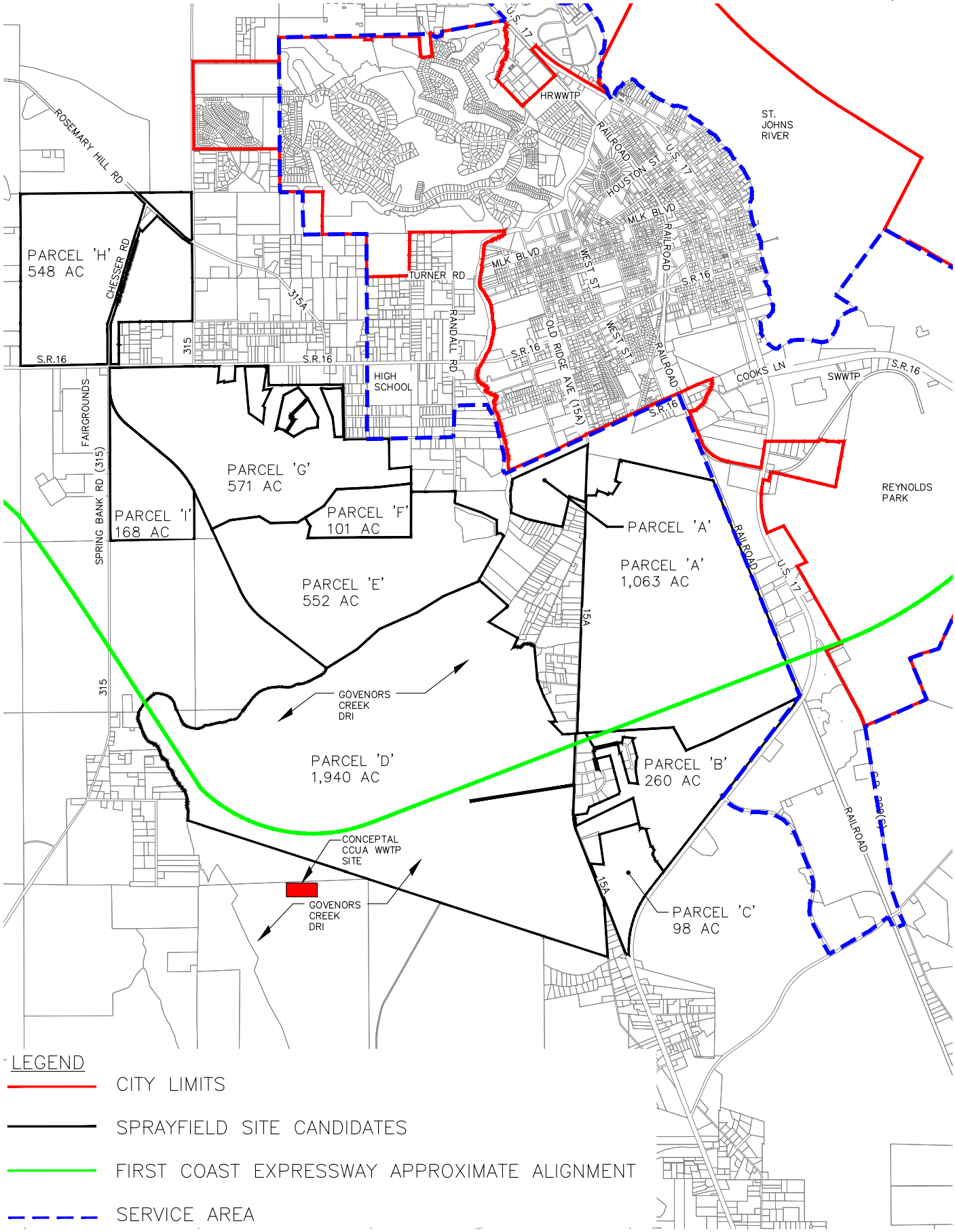
5.4 Effluent Disposal Alternatives

The City has also explored other effluent disposal options to eliminate surface water discharge.

5.4.1 <u>Sprayfields</u>: For this option, the treated effluent would be pumped to a location where a fixed-head or center-pivot style irrigation system is available to deliver the reclaimed water in accordance with FDEP requirements. The main driver related to this disposal option is the underlying hydraulic conductivity of the soils since it defines how much area is required to irrigate the effluent flows. FDEP typically defines an initial 'maximum' sprayfield capacity of two (2) inches per week. As discussed further herein, the soils within this region are not highly 'conductive' and could result in hydraulic capacity being limited to values less than two (2) inches per week. Confirmation of a 'reasonable' application rate via a geotechnical exploration would be prudent if a sprayfield system were selected as an effluent disposal solution.

As shown in **Attachment D**, the sprayfield land area requirements become excessive as effluent flow rates increase. The sprayfield option could be an interim step until enough public-access reclaimed water customers become available to eliminate surface water discharge.

Within **Attachment D**, the detailed screening analysis for sprayfield sites was completed, including a review of nine (9) large parcels inside and outside of the City's Service Area. A location map of the parcels is provided as **Figure 5.8**. As a result of the screening analysis, Parcel E or Parcel G were selected as the recommended locations to site sprayfields. See additional details within **Attachment D.** The 2015 estimated capital cost for the sprayfields was $6,976,000 and was based on a regional WRF located approximately 1.5 miles from the sprayfield site. The estimate did not include property acquisition costs, nor any environmental costs that could be encountered for land development. Based on the current market

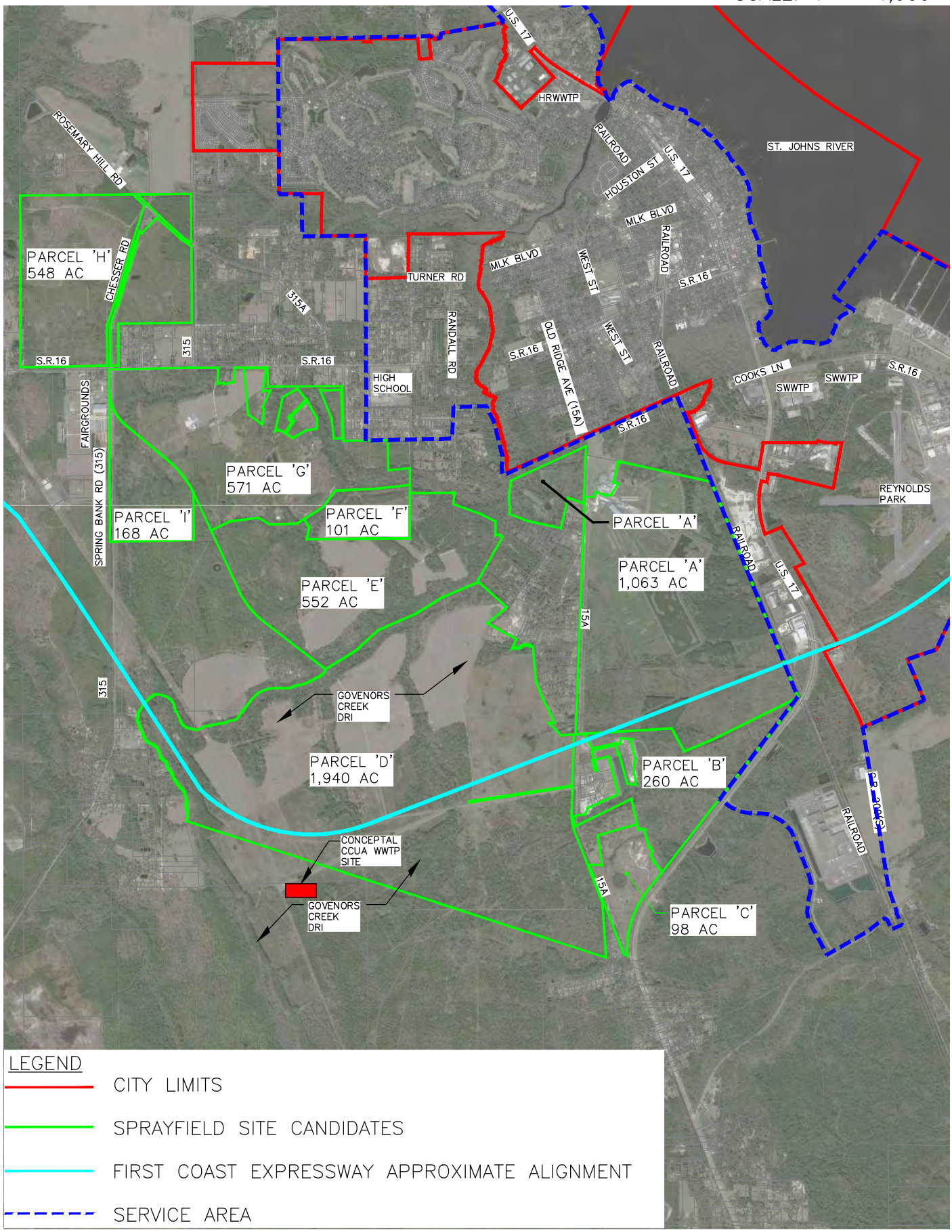


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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
Restricted Access Sprayfield Disposal Candidate Sites (Parcel Map)
Clay County, Florida

FIGURE 5.8(1)
October 2021
Project No. 8905-19-1

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 5.8(1) Restricted Access Sprayfield Disposal Candidate Sites (Parcel Map).dwg, 10/8/2021



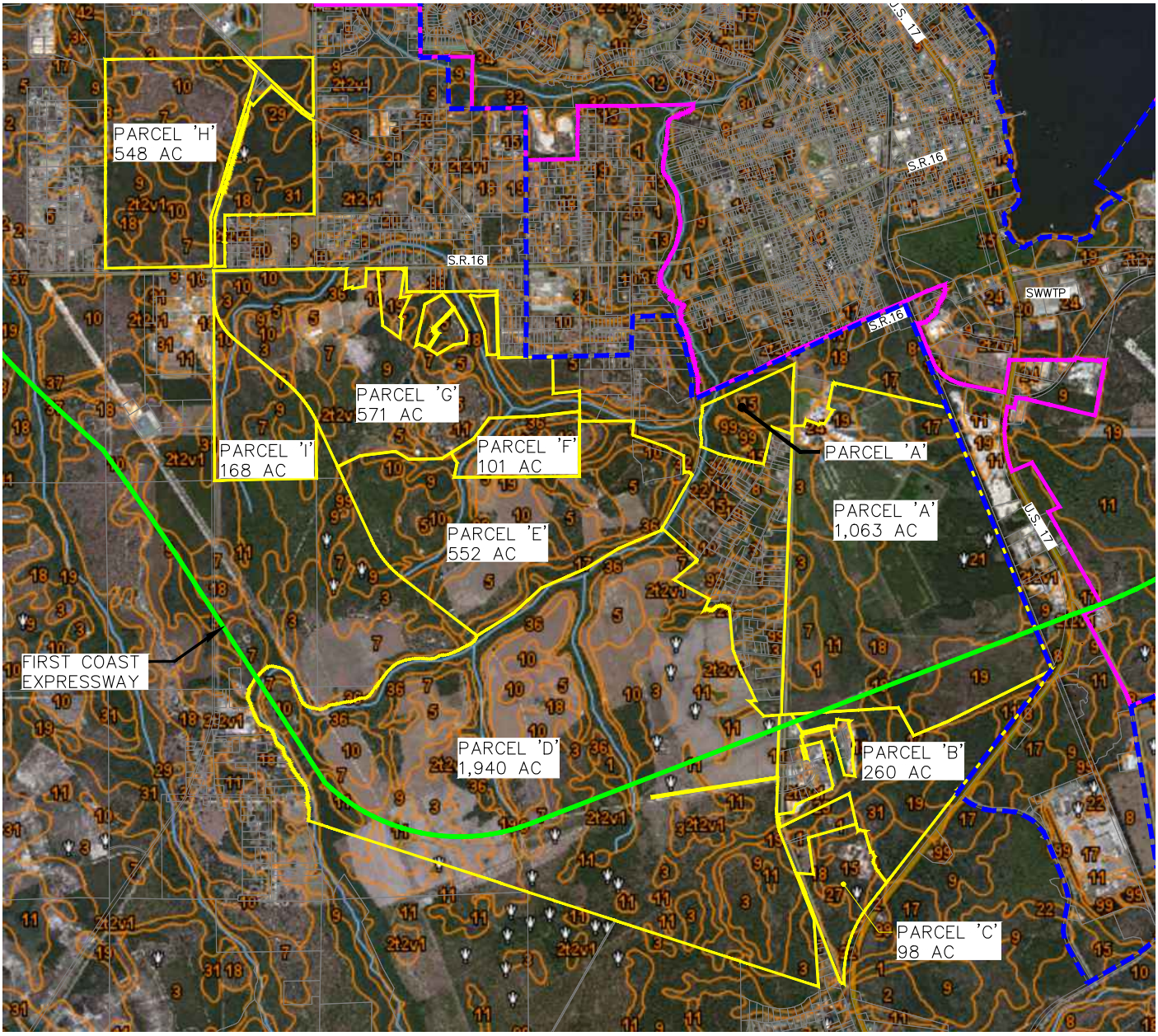
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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
Restricted Access Sprayfield Disposal Candidate Sites (Aerial Map)
Clay County, Florida

FIGURE 5.8(2)
October 2021
Project No. 8905-19-1

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 5.8(2) Restricted Access Sprayfield Disposal Candidate Sites (Aerial Map).dwg, 10/8/2021

SCALE: 1" = 4,000'



1	ALBANY FINE SAND, 0 TO 5 PERCENT SLOPES
2	BLANTON FINE SAND, 0 TO 5 PERCENT SLOPES
2t2v1	CASSIA FINE SAND
3	HURRICANE FINE SAND, 0 TO 5 PERCENT SLOPES
4	OCILLA LOAMY FINE SAND, 0 TO 5 PERCENT SLOPES
5	PENNEY FINE SAND, 0 TO 5 PERCENT SLOPES
7	CENTENARY FINE SAND, 0 TO 5 PERCENT SLOPES
8	SAPELO FINE SAND, 0 TO 5 PERCENT SLOPES
9	LEON FINE SAND
10	ORTEGA FINE SAND, 0 TO 5 PERCENT SLOPES
11	ALLANTON AND RUTLEGE MUCKY FINE SANDS, DEPRESSIONAL
12	SURRENCY FINE SAND, DEPRESSIONAL
13	MEGGETT FINE SAND LOAM
14	ORTEGA–URBAN LAND COMPLEX, 0 TO 5 PERCENT SLOPES
15	QUARTZIPSAMENTS, EXCAVATED
16	HURICAN–URBAN LAND COMPLEX, 0 TO 5 PERCENT SLOPES
17	PLUMMER FINE SAND
18	RIDGEWOOD FINE SAND, 0 TO 5 PERCENT SLOPES
19	OSIER FINE SAND
20	SCRANTON FINE SAND
21	GOLDHEAD FINE SAND
22	PELHAM FINE SAND
23	SAPELO–URBAN LAND COMPLEX
24	URBAN LAND
25	MAUREPAS MUCK, FREQUENTLY
27	PAMLICO MUCK
28	SANTEE FINE SANDY LOAM, FREQUENTLY FLOODED
29	RUTLEGE–OSIER COMPLEX, FREQUENTLY FLOODED
30	ARENTS, SANDY
31	POTTSBURG FINE SAND
32	BLANTON FINE SAND, 5 TO 8 PERCENT SLOPES
34	PENNEY FINE SAND, 5 TO 8 PERCENT SLOPES
36	ORTEGA FINE SAND, 5 TO 8 PERCENT SLOPES
37	RIDGEWOOD FINE SAND, 5 TO 8 PERCENT SLOPES
38	SURRENCY FINE SAND, FREQUENTLY FLOODED
42	OSIER FINE SAND, OCASSIONALLY FLOODED
43	PAMLICO MUCK, FREQUENTLY FLOODED
51	POTTSBURG FINE SAND, OCCASIONALLY FLOODED
62	NEILHURST FINE SAND, UNDULATING
63	SOLITE FINE SAND
65	MEADOWBROOK SAND
99	WATER

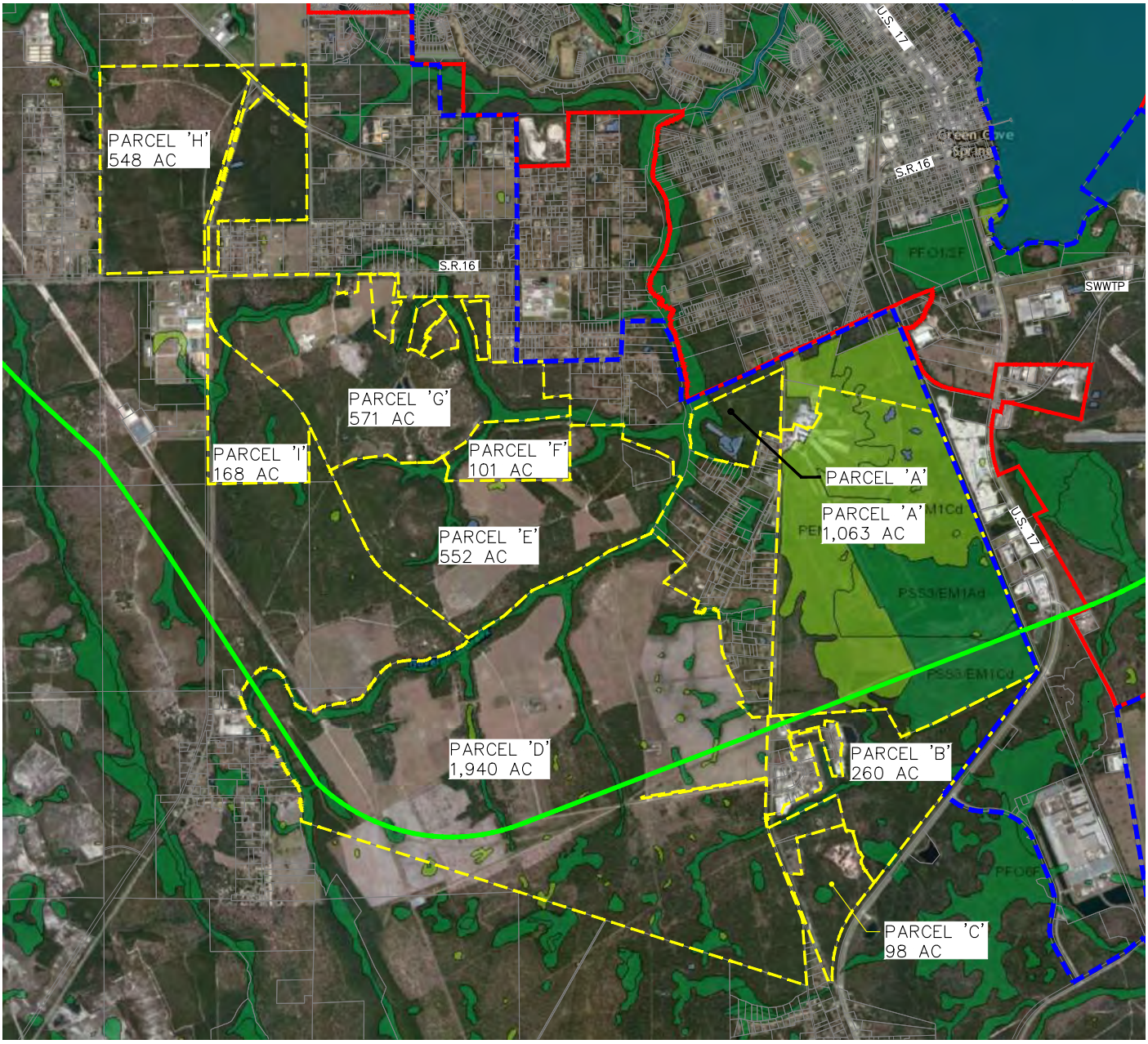
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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
Restricted Access Sprayfield Disposal Candidate Sites (Soils Map)
Clay County, Florida

FIGURE 5.8(3)
October 2021
Project No. 8905-19-1

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SCALE: 1" = 4,000'



LEGEND

- CITY LIMITS
- SPRAYFIELD SITE CANDIDATES
- FIRST COAST EXPRESSWAY APPROXIMATE ALIGNMENT
- SERVICE AREA

Wetlands

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

Scanned Wetlands Maps

- Scanned Wetlands Maps

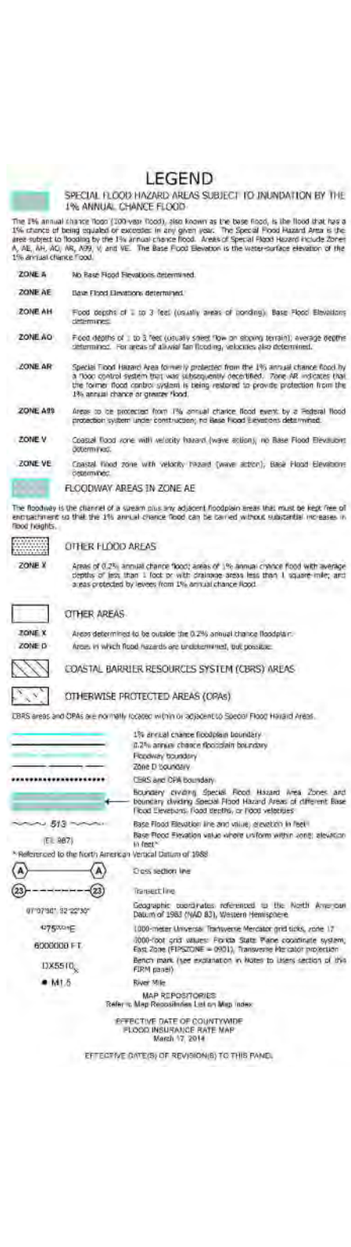
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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
Restricted Access Sprayfield Disposal Candidate Sites (FLUCCS Map)
Clay County, Florida

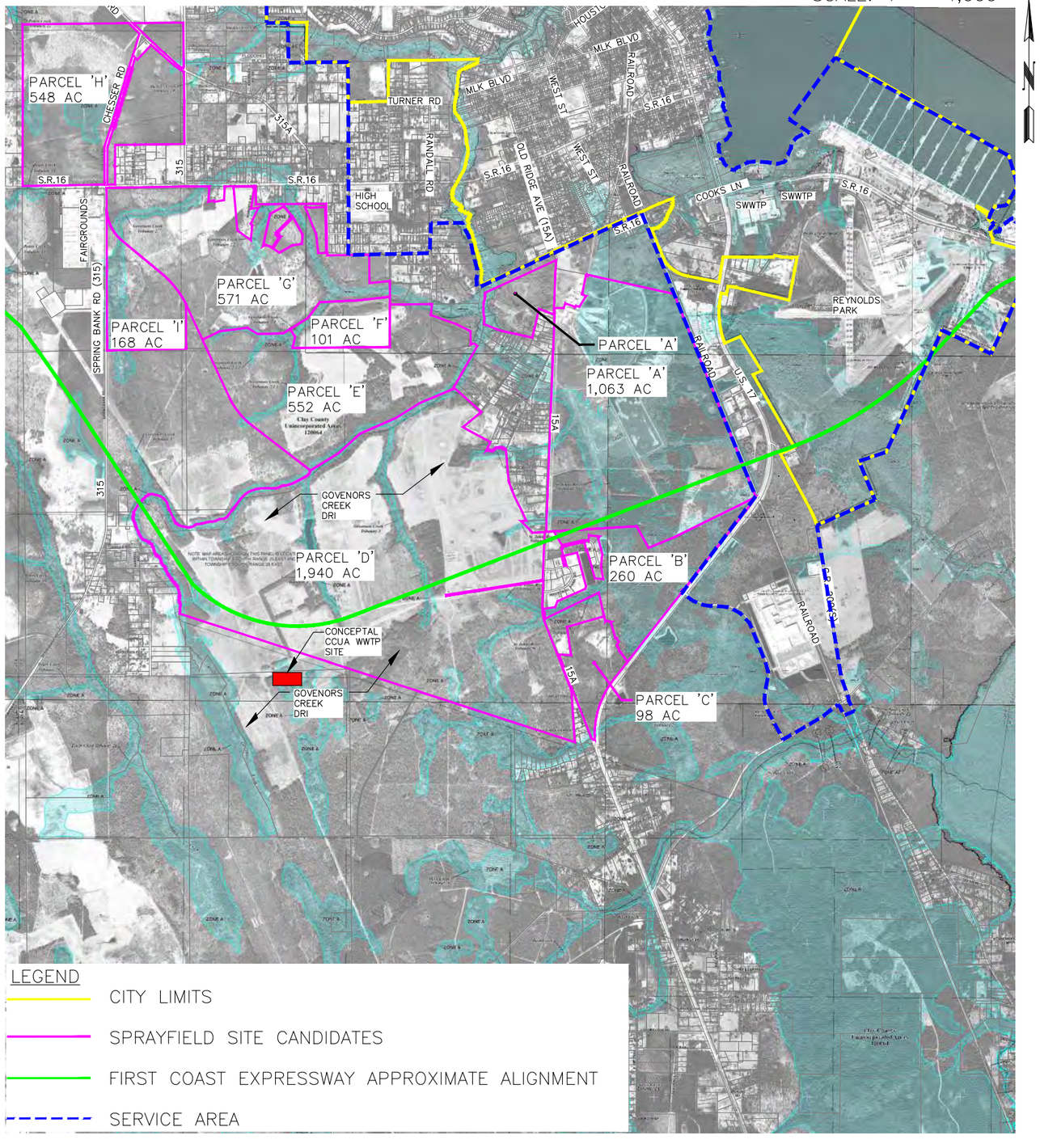
FIGURE 5.8(4)
October 2021
Project No. 8905-19-1

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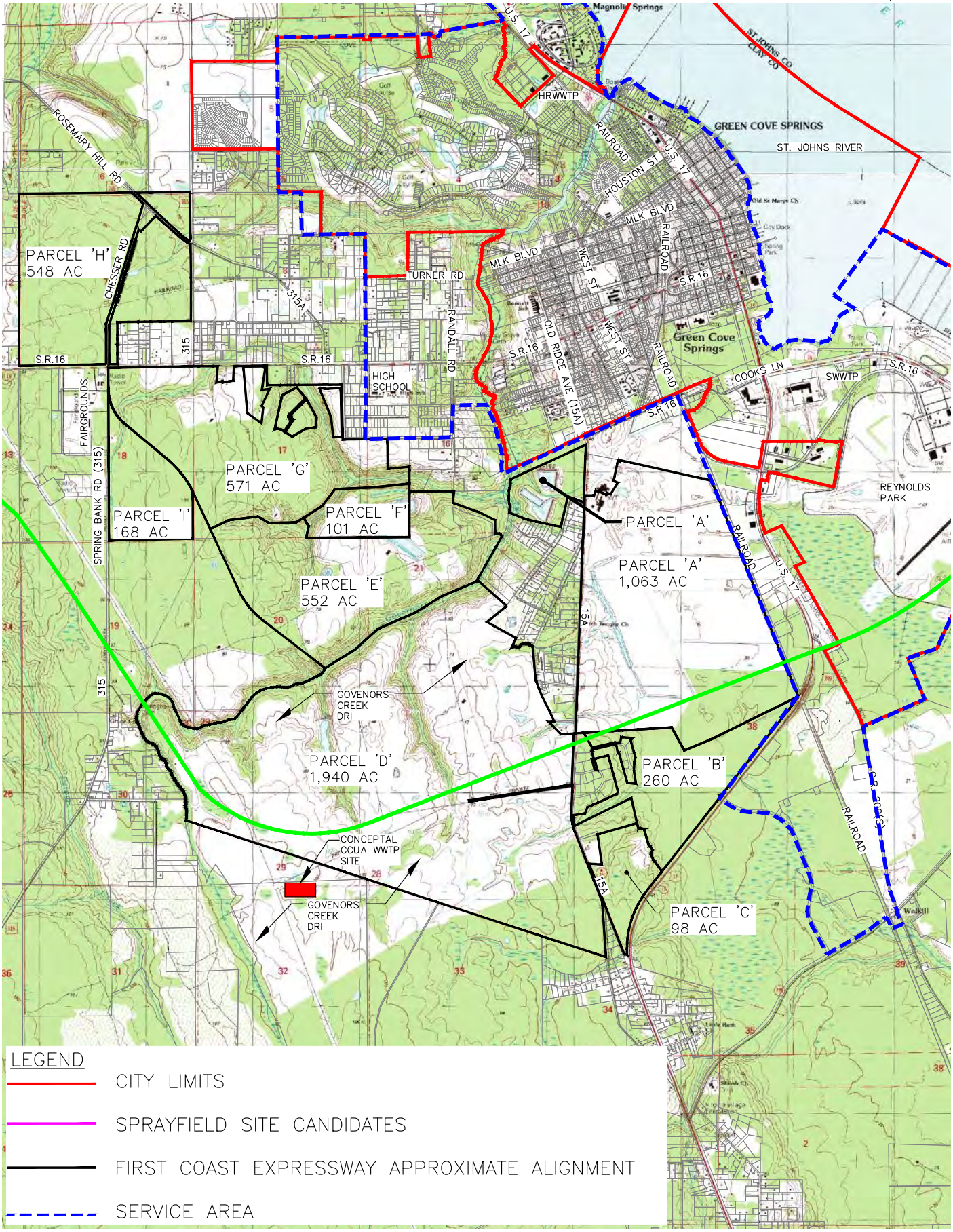
CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
Restricted Access Sprayfield Disposal Candidate Sites (FEMA Flood Map)
Clay County, Florida

FIGURE 5.8(5)
October 2021
Project No. 8905-19-1

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 5.8(5) Restricted Access Sprayfield Disposal Candidate Sites (Fema Flood Map).dwg, 10/8/2021 8:39:39 AM, Adobe PDF

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 5.8(6) Restricted Access Sprayfield Disposal Candidate Sites (USGS Map).dwg, 10/8/2021

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LEGEND

- CITY LIMITS
- SPRAYFIELD SITE CANDIDATES
- FIRST COAST EXPRESSWAY APPROXIMATE ALIGNMENT
- SERVICE AREA

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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
Restricted Access Sprayfield Disposal Candidate Sites (USGS Map)
Clay County, Florida

FIGURE 5.8(6)
October 2021
Project No. 8905-19-1

conditions, property acquisition costs, and location of the regional facility at the Harbor Road site, the conceptual costs to acquire, develop, and deliver effluent to an offsite sprayfield would likely exceed $22,000,000.

5.4.2 **Constructed Wetlands:** Many of the lands near the SWWTF are low lying areas that contain wetlands or are adjacent to wetland areas. While these areas are unsuitable for sprayfield development, they could be utilized for the option of constructing wetlands for effluent disposal. A detailed analysis of the land requirements is provided within **Attachment D** and includes a review of eight (8) potential parcels as shown within **Figure 5.9**.

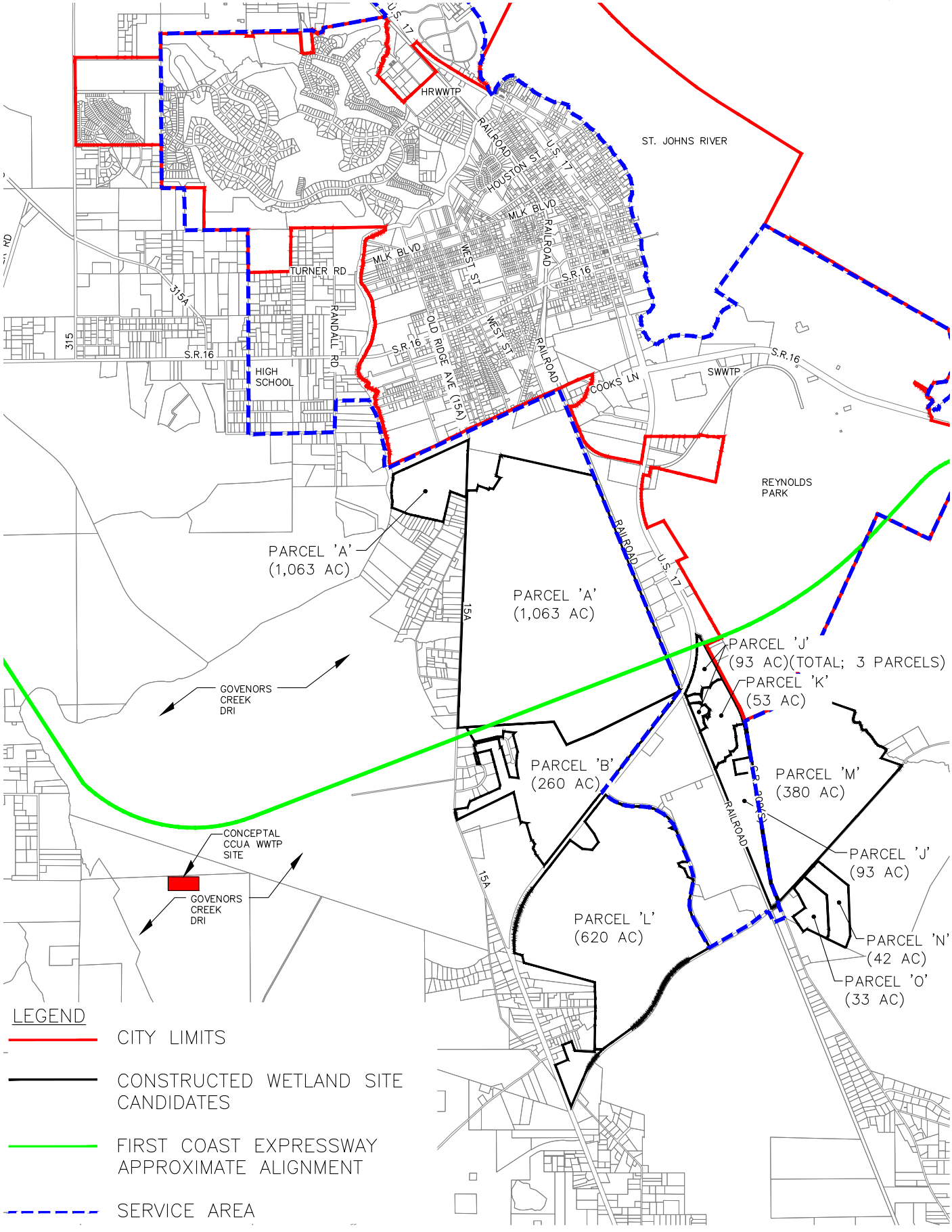
Through the analysis provided in **Attachment D**, it was determined that the required land area would be limited based on hydraulic loading and Total Nitrogen ("TN") loading (at a concentration of 3.0 mg/l). At 1.00 MGD AADF of permitted capacity, it is anticipated 50 acres of land would be needed just for effluent disposal needs without the WWTP site, buffers, construction tie-ins, etc. The wetland system would be developed with 40% of the land area as lined wetland cells and 60% as unlined. Additional site specific, water balance, nutrient loading, etc. analyses would need to be done to determine final treatment aspects, but the aforementioned review provides an overall land area basis. The 2015 estimated capital cost for the constructed wetlands is $7,039,000. Similar to sprayfield option outlined in Section 5.4.1, the conceptual costs to acquire, construct, and deliver effluent to an offsite constructed wetland would likely exceed $25,000,000.

In total, a land area of 100 to 150 acres was utilized to review the various parcel options.

5.4.3 **Rapid Infiltration Basins:** Due to the site limitations (i.e., general poor soils) determined during analysis of the sprayfield and wetland disposal options in **Attachment D**, rapid infiltration basins (RIBs) were assumed to have similar limitations. Compared to the aforementioned options, RIBs can reduce land area needs, since application rates can be permitted as high as three (3) inches per day (21 inches per week) or higher. However, RIBs also require site specific geotechnical testing and modeling/analysis. Given the parcel findings outlined in **Attachment D**, the RIB disposal option was not considered feasible at this time. The only parcels that may provide some capabilities for RIB disposal are located outside of the City's Service

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 5.9(1) Constructed Wetland Disposal Candidate Sites (Parcel Map).dwg, 10/8/2021 10:47:0

SCALE: 1" = 4,000'



LEGEND

- CITY LIMITS
- CONSTRUCTED WETLAND SITE CANDIDATES
- FIRST COAST EXPRESSWAY APPROXIMATE ALIGNMENT
- SERVICE AREA

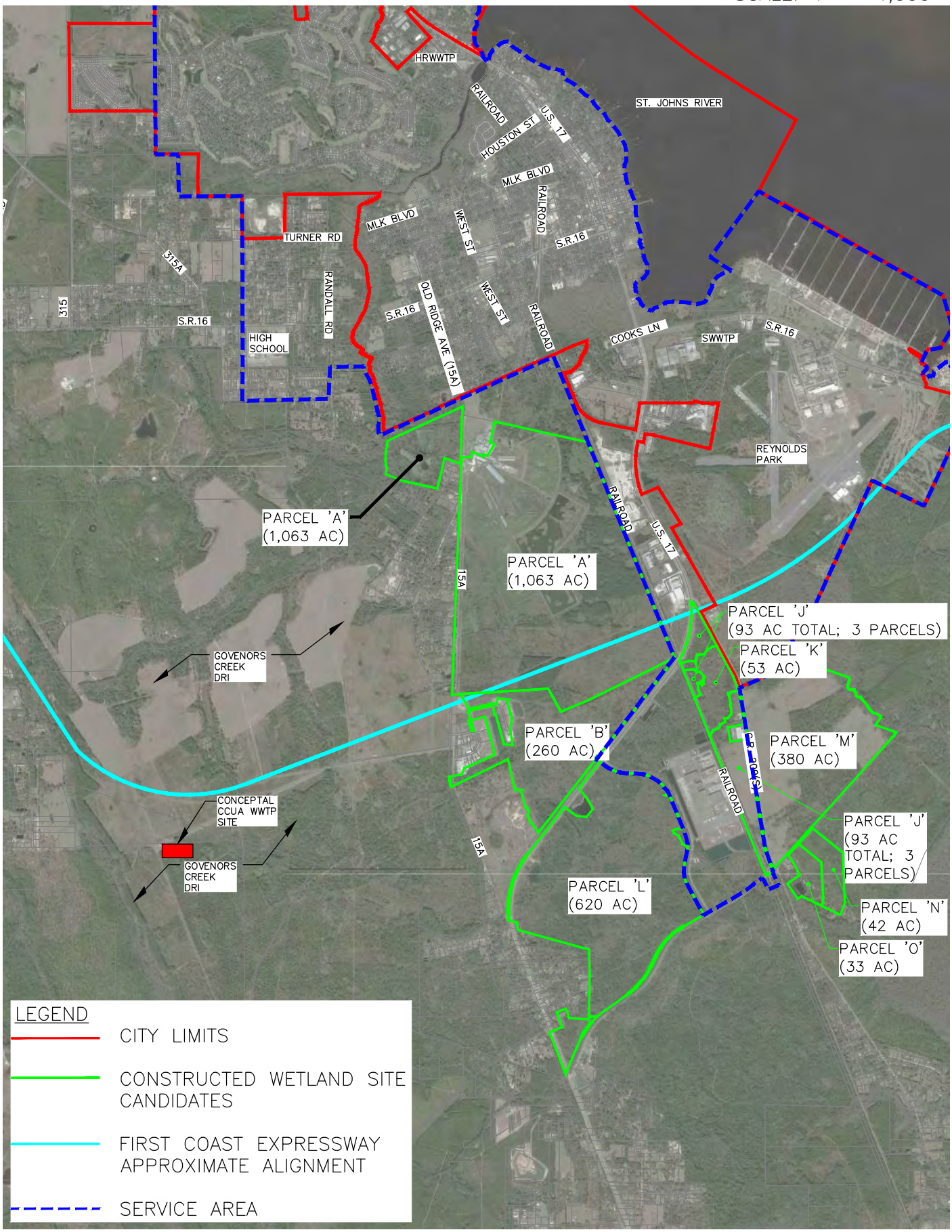
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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
Constructed Wetland Disposal Candidate Sites (Parcel Map)
Clay County, Florida

FIGURE 5.9(1)
October 2021
Project No. 8905-19-1

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 5.9(2) Constructed Wetland Disposal Candidate Sites (Aerial Map).dwg, 10/8/2021 10:55:5

SCALE: 1" = 4,000'



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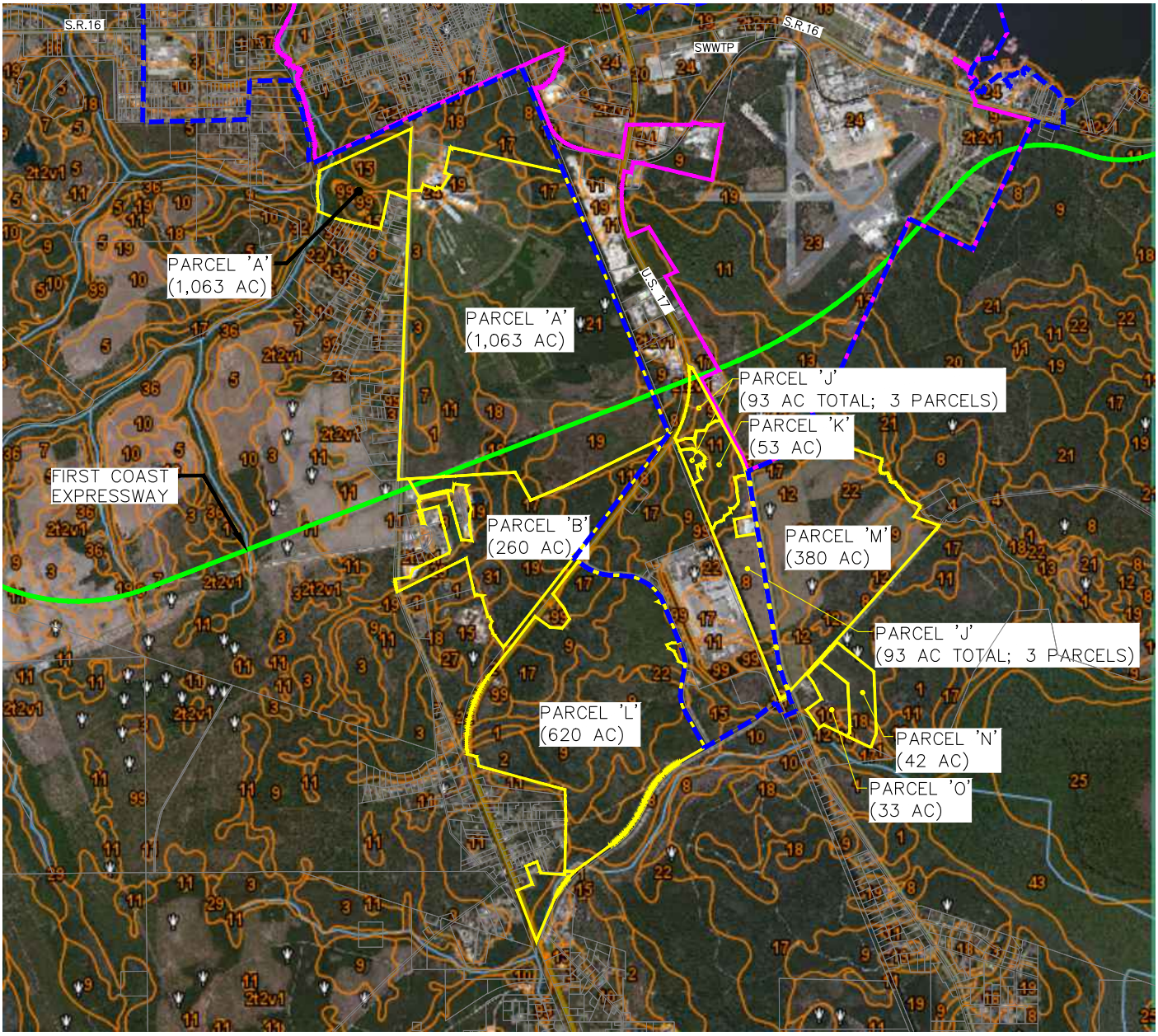
- CITY LIMITS
- CONSTRUCTED WETLAND SITE CANDIDATES
- FIRST COAST EXPRESSWAY APPROXIMATE ALIGNMENT
- SERVICE AREA

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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
Constructed Wetland Disposal Candidate Sites (Aerial Map)
Clay County, Florida

FIGURE 5.9(2)
October 2021
Project No. 8905-19-1

SCALE: 1" = 4,000'



1	ALBANY FINE SAND, 0 TO 5 PERCENT SLOPES	22	PELHAM FINE SAND
2	BLANTON FINE SAND, 0 TO 5 PERCENT SLOPES	23	SAPELO–URBAN LAND COMPLEX
2t2v1	CASSIA FINE SAND	24	URBAN LAND
3	HURRICANE FINE SAND, 0 TO 5 PERCENT SLOPES	25	MAUREPAS MUCK, FREQUENTLY
4	OCILLA LOAMY FINE SAND, 0 TO 5 PERCENT SLOPES	27	PAMLICO MUCK
5	PENNEY FINE SAND, 0 TO 5 PERCENT SLOPES	28	SANTEE FINE SANDY LOAM, FREQUENTLY FLOODED
7	CENTENARY FINE SAND, 0 TO 5 PERCENT SLOPES	29	RUTLEGE–OSIER COMPLEX, FREQUENTLY FLOODED
8	SAPELO FINE SAND, 0 TO 5 PERCENT SLOPES	30	ARENTS, SANDY
9	LEON FINE SAND	31	POTTSBURG FINE SAND
10	ORTEGA FINE SAND, 0 TO 5 PERCENT SLOPES	32	BLANTON FINE SAND, 5 TO 8 PERCENT SLOPES
11	ALLANTON AND RUTLEGE MUCKY FINE SANDS, DEPRESSIONAL	34	PENNEY FINE SAND, 5 TO 8 PERCENT SLOPES
12	SURRENCY FINE SAND, DEPRESSIONAL	36	ORTEGA FINE SAND, 5 TO 8 PERCENT SLOPES
13	MEGGETT FINE SAND LOAM	37	RIDGEWOOD FINE SAND, 5 TO 8 PERCENT SLOPES
14	ORTEGA–URBAN LAND COMPLEX, 0 TO 5 PERCENT SLOPES	38	SURRENCY FINE SAND, FREQUENTLY FLOODED
15	QUARTZIPSAMENTS, EXCAVATED	42	OSIER FINE SAND, OCASSIONALLY FLOODED
16	HURICAN–URBAN LAND COMPLEX, 0 TO 5 PERCENT SLOPES	43	PAMLICO MUCK, FREQUENTLY FLOODED
17	PLUMMER FINE SAND	51	POTTSBURG FINE SAND, OCCASIONALLY FLOODED
18	RIDGEWOOD FINE SAND, 0 TO 5 PERCENT SLOPES	62	NEILHURST FINE SAND, UNDULATING
19	OSIER FINE SAND	63	SOLITE FINE SAND
20	SCRANTON FINE SAND	65	MEADOWBROOK SAND
21	GOLDHEAD FINE SAND	99	WATER

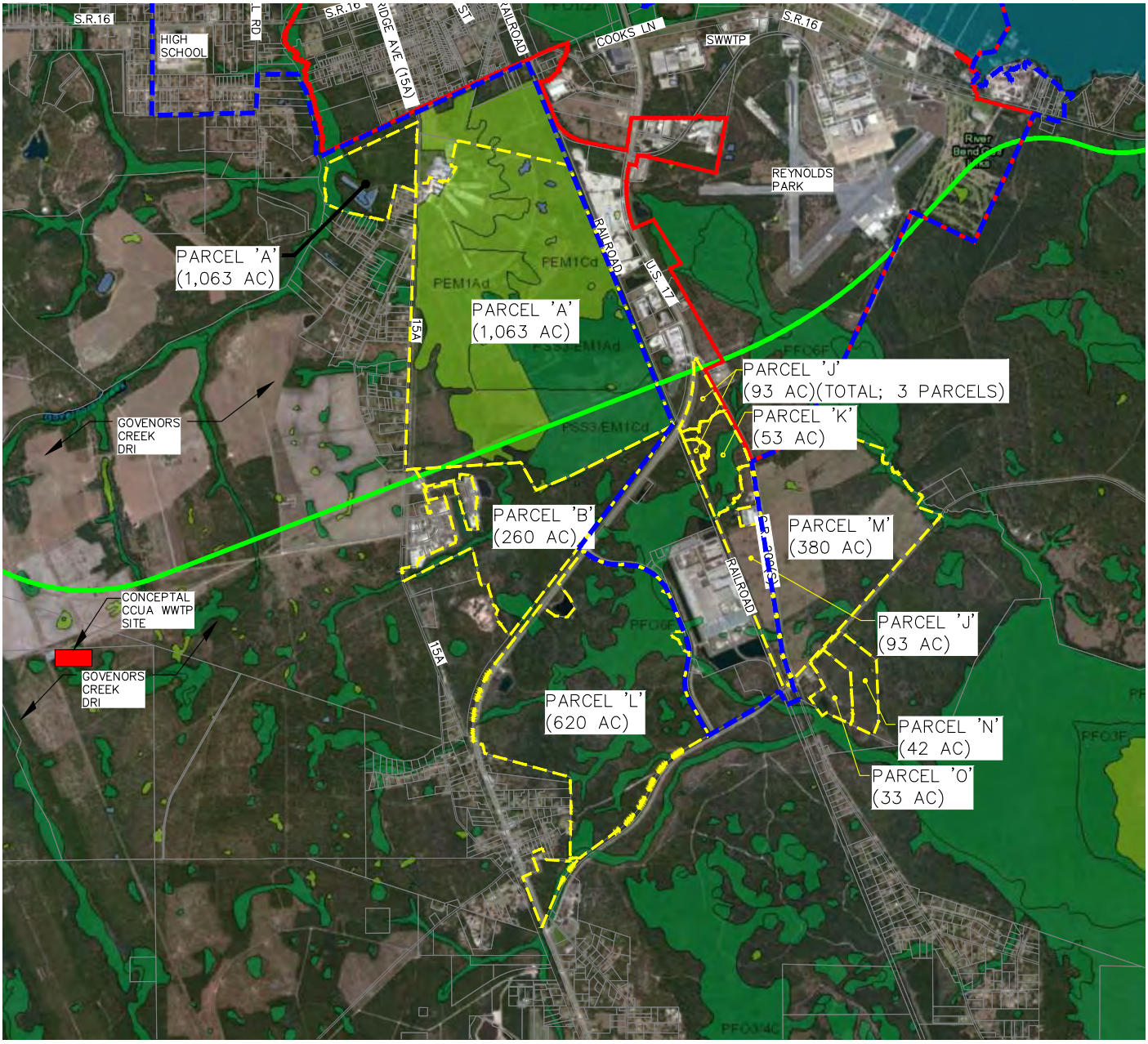
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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
Constructed Wetland Disposal Candidate Sites (Soils Map)
Clay County, Florida

FIGURE 5.9(3)
October 2021
Project No. 8905-19-1

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SCALE: 1" = 4,000'



LEGEND

- CITY LIMITS
- CONSTRUCTED WETLAND SITE CANDIDATES
- FIRST COAST EXPRESSWAY APPROXIMATE ALIGNMENT
- SERVICE AREA

Wetlands

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

Scanned Wetlands Maps

- Scanned Wetlands Maps

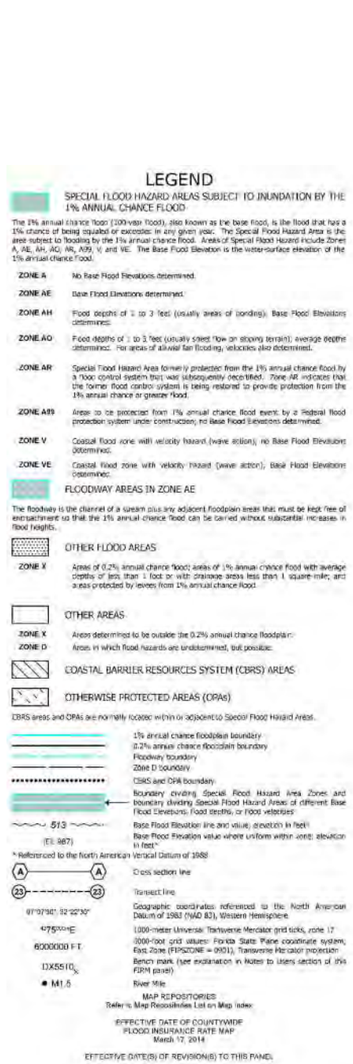
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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
Constructed Wetland Disposal Candidate Sites (FLUCCS Map)
Clay County, Florida

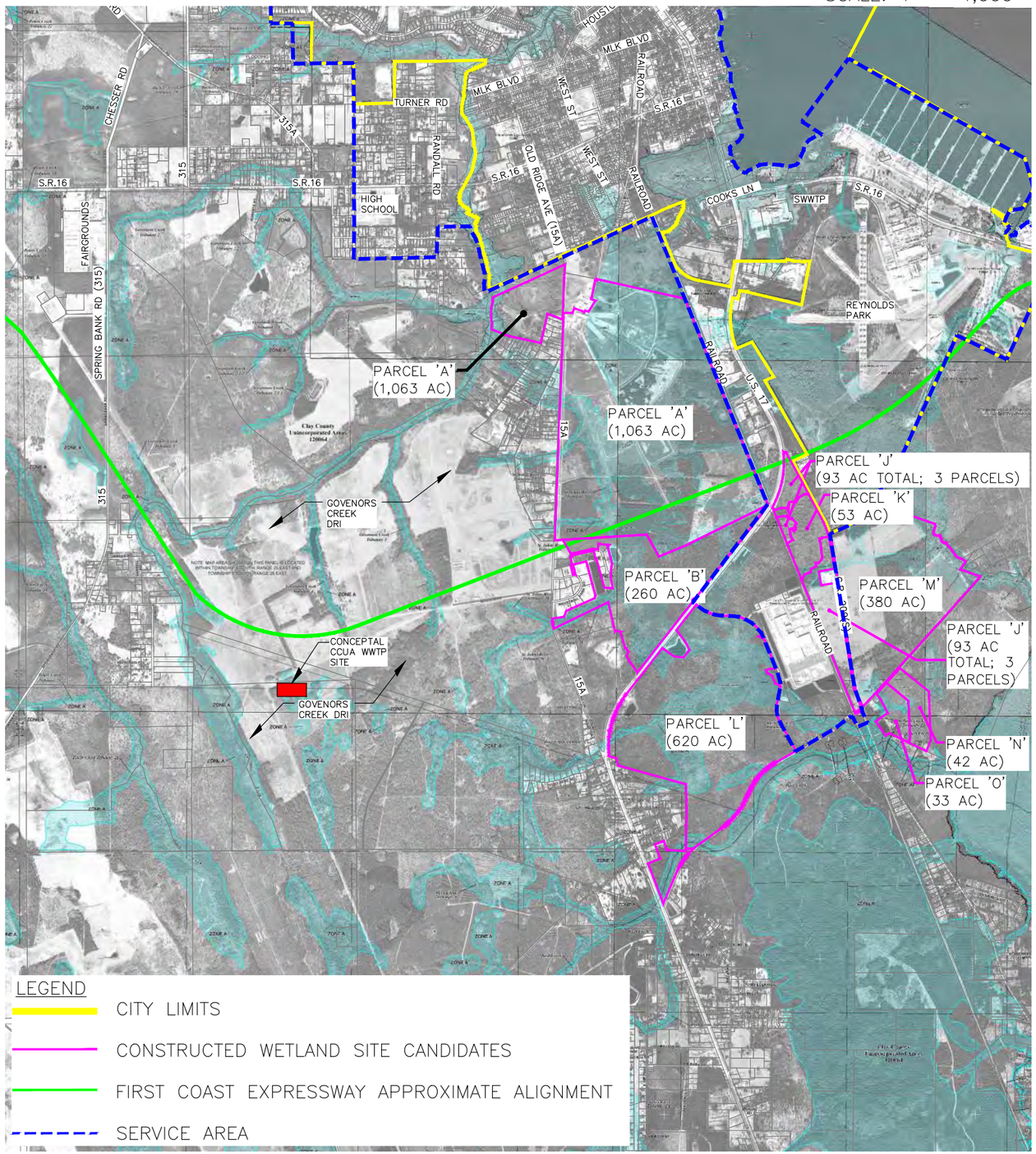
FIGURE 5.9(4)
October 2021
Project No. 8905-19-1

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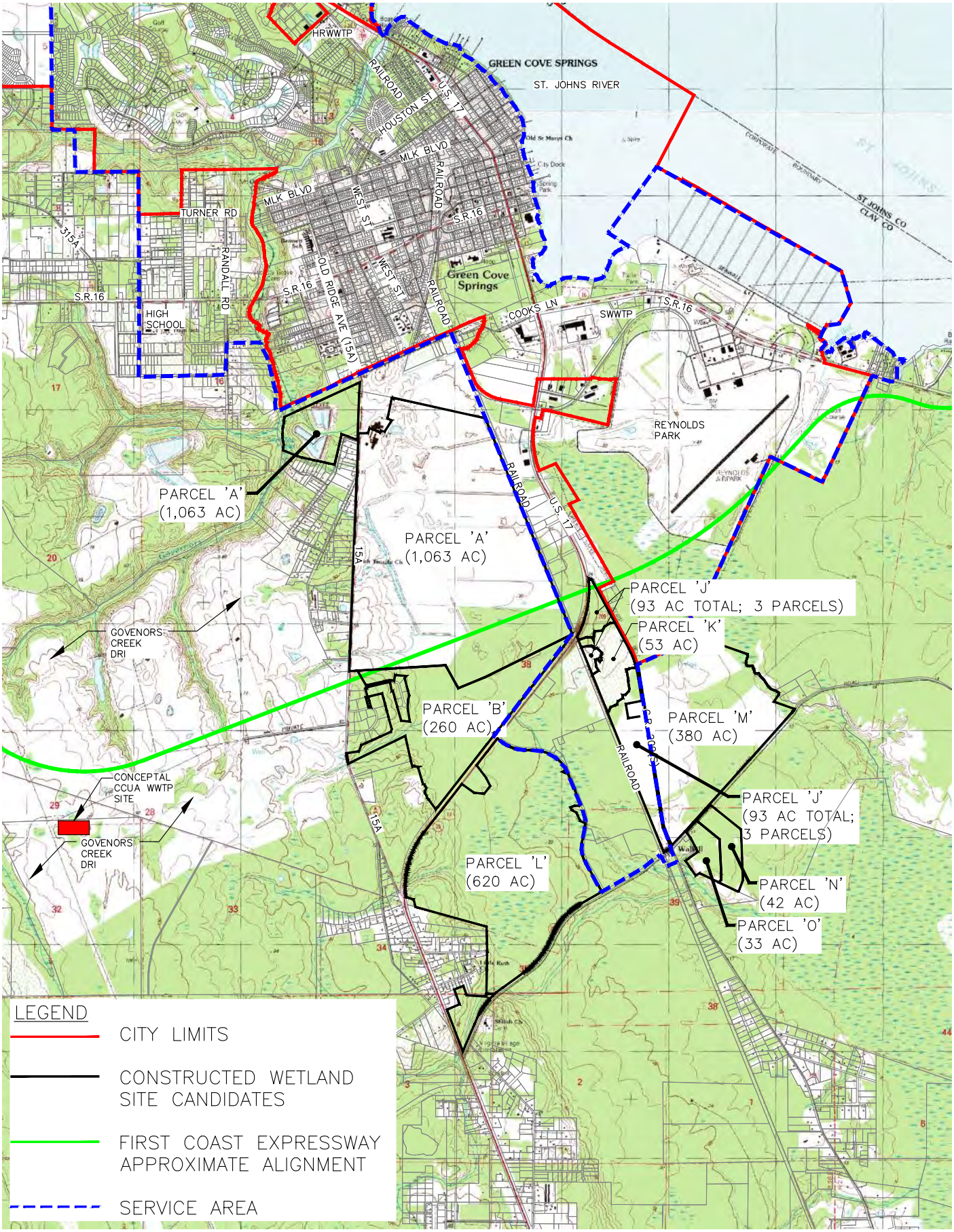
CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
Constructed Wetland Disposal Candidate Sites (FEMA Flood Map)
Clay County, Florida

FIGURE 5.9(5)
October 2021
Project No. 8905-19-1

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 5.9(5) Constructed Wetland Disposal Candidate Sites (Fema Flood Map).dwg, 10/8/2021 10

M:\CAD Files\Green Cove Springs\8905191 Misc. Small Projects\Surface Water Discharge Elimination Review\Figures\Figure 5.9(6) Constructed Wetland Disposal Candidate Sites (USGS Map).dwg, 10/8/2021 10:47:2

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CITY OF GREEN COVE SPRINGS
Surface Water Discharge Elimination Review
Constructed Wetland Disposal Candidate Sites (USGS Map)
Clay County, Florida

FIGURE 5.9(6)
October 2021
Project No. 8905-19-1

Area along SR 16 heading west toward Penney Farms. In this area, the topographic elevations climb and soils improve.

5.4.3 **Deep Well Injection:** Many neighboring utilities are considering deep well injection as an option to alleviate surface water outfalls. Deep well injection involves disposal of treated effluent underground without causing or allowing movement of fluid into an underground source of drinking water (USDW). The USDW for the City of Green Cove Springs is the Upper Floridan Aquifer (UFA), located approximately 400 feet below land surface (bls) and extends over 1,000 feet (bls).

Deep injection well would require construction of an FDEP Class I well. The following summary is from the FDEP website:

> "*There are more than 180 active Class I wells in Florida. The majority of the Class I injection facilities in Florida dispose of non-hazardous, secondary-treated effluent from domestic wastewater treatment plants. At locations where hydrogeologic conditions are suitable and where other disposal methods are not possible or may cause contamination, subsurface injection below all USDWs is considered a viable and lawful disposal method. There are favorable hydrogeologic conditions in Florida where the underground formations have the natural ability to accept and confine the waste. See an illustration of a Class I municipal well.*
>
> *The injection wells are required to be constructed, maintained and operated so that the injected fluid remains in the injection zone, and the unapproved interchange of water between aquifers is prohibited. Class I injection wells are monitored so that if migration of injection fluids were to occur it would be detected before reaching the USDW. Permitting for these wells is done in our Tallahassee office. Testing is conducted on all Class I injection wells at a minimum of every five years to determine that the well structure has integrity.*"

Figure 5.10 is provided to illustrate the Class I requirements and was copied from the January 2013 Joseph Haberfeld, P.G. (UIC Program, FDEP) presentation on *Florida's Class I Water Treatment Injection Wells*.

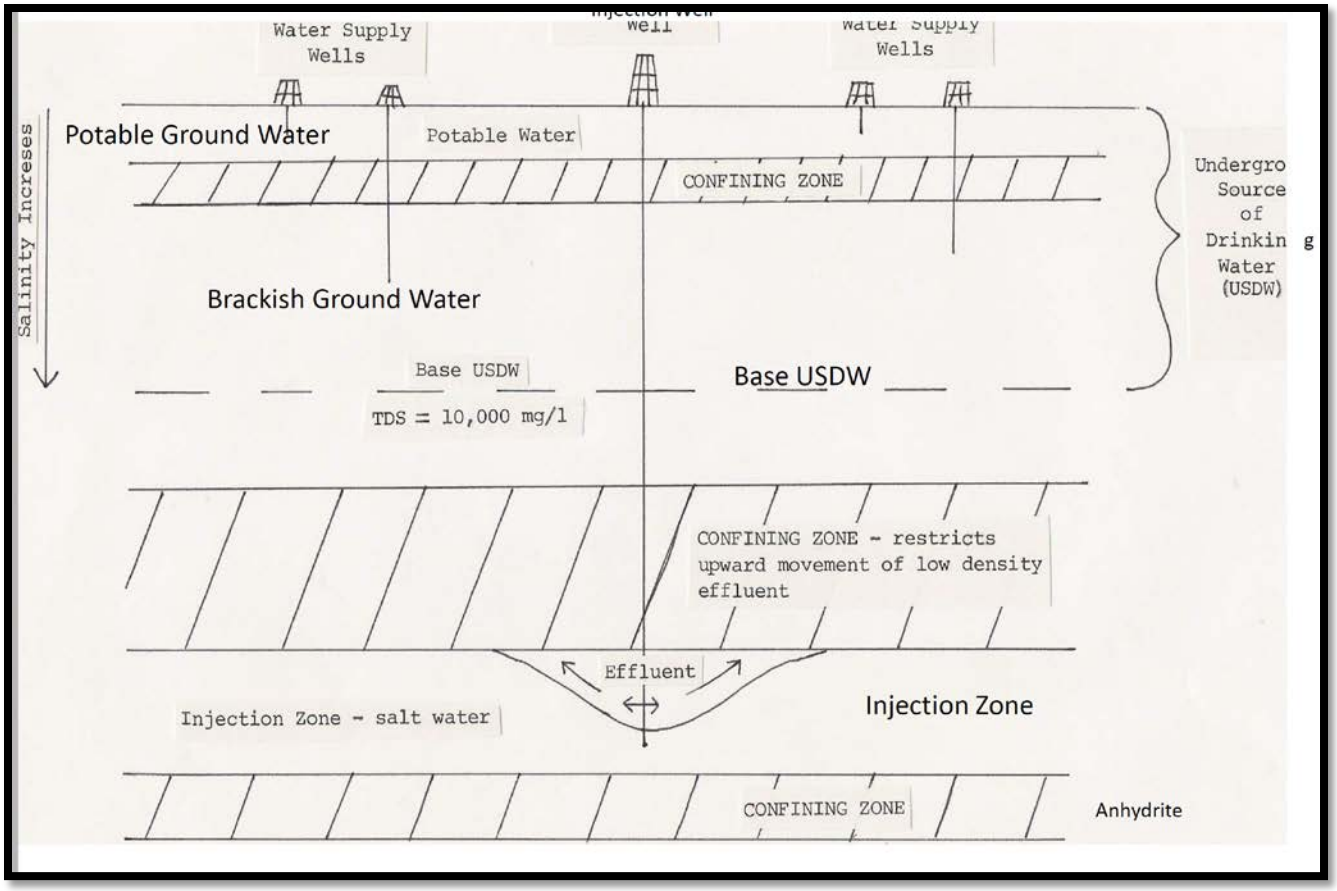


Figure 5.10 – Class I Injection Well Schematic (Haberfeld, 2013)

At this time, a permitted, operating Class I injection well for municipal wastewater does not exist in Northeast Florida. Various test wells and preliminary engineering is occurring, but a permitted system is not available for review at this time. Preliminary conversations with a professional geologist working in Clay, Nassau, Duval, and St. Johns Counties has indicated areas west of the St. Johns River have been difficult to locate a suitable injection zone. If the City were to consider this approach, conversations with FDEP and the SJRWMD along with a professional geologist will be required to develop a preliminary approach for review and approval by the regulatory agencies. Test wells would be required to determine if an injection zone could be found with the associated depth. A general summary of Class I Injection Well Criteria is provided as **Attachment G**.

Capital estimating could be provided once the above preliminary efforts were completed to define the work effort. However, it is anticipated the project would be in excess of $5,000,000.

6.0 SURFACE WATER DISCHARGE ELIMINATION PLAN

The following sections discuss the selected alternatives and implementation schedule for the elimination of surface water discharge by 2032. As summarized in **Table 4.3**, the City's effluent disposal alternatives need to address the following average daily capacity needs.

TABLE 6.1
ADF EFFLUENT DISPOSAL NEEDS

Year	Influent Wastewater Flow (MGD-ADF)	Existing Reuse Demand (MGD-ADF)	Alt. Disposal Needs (MGD-ADF)
2025	0.89	0.41	0.48
2030	0.97	0.41	0.57
2035	1.05	0.41	0.64
2040	1.11	0.41	0.71
2045	1.18	0.41	0.77

6.1 Alternatives Analysis

6.1.1 <u>Reuse Water Distribution</u>: The costs of each option are summarized in **Table 6.2**. Complete cost calculations are contained within **Attachment B.**

TABLE 6.2
REUSE WATER INFRASTRUCTURE EXPANSION COSTS

Service Area	Customer(s)	Capital Cost	Reuse Demand (MGD-ADF)[1]
North[2]	Edgewater Landing; Black Creek Village	Complete	0.046
West[3]	Magnolia Point – retrofit with Magnolia Point Phase 8	$9,120,000	0.42
CCUA Interconnect[1]	CCUA	N/A	N/A
		TOTAL	**0.47**

1 CCUA interconnect costs and capacity unknown at this time

As noted in **Table 6.1**, the above estimated demands would address near-term effluent disposal needs, but would require additional reuse demands to provide additional capacity. The CCUA interconnect would be an option and will be reviewed in tandem with CCUA to determine available capacities.

In general, the City intends to maximize reuse disposal options since they include revenue streams in comparison to the Treated Effluent Disposal options outlined in the next subsection.

6.1.2 **<u>Alternative Effluent Disposal Options</u>**: The costs of each option are summarized in **Table 6.3**. Excerpts from the 2015 planning documents can be found in **Attachment D.**

TABLE 6.3

EFFLUENT DISPOSAL EXPANSION ESTIMATED COSTS

Disposal Option	Capacity (MGD-ADF)	Capital Cost[1]	Notes
Sprayfields	1.25	> $22,000,000 (320 Ac)	Large parcel needs. Would increase O&M Costs. No offsetting revenue. Suitable locations are distant from the Harbor Road AWT WRF.
Constructed Wetlands	1.25	> $25,000,000 (75 Ac)	Wetland would require an outfall. Would increase O&M Costs. No offsetting revenue. Suitable locations are distant from the Harbor Road AWT WRF.
Rapid Infiltration Basins[2]	0	N/A	Not available option
Deep Well Injection	1.5	> $5,000,000	Test well required to determine feasibility and capital needs.

1 Capital estimates were reviewed during 2015 master planning efforts, but were based on a regional WRF located near the effluent disposal location. 2021 costs are listed based on current market conditions and use of the Harbor Road AWT WRF location.

2 Rapid infiltration basins are not recommended due to limiting soils within the region.

The deep well injection option should be further investigated pending available capacity from an interconnect with CCUA.

6.2 Selected Alternatives

The City will be considering the following improvements:

- Coordination with FDEP on reject water requirements and associated storage
- Retrofit the Magnolia Point development with a public-access reclaimed water distribution system for irrigation

    - Include review of options to fill wet-detention ponds that are operating well below the designed normal water levels.

    - Review alternatives to irrigate common spaces within US 17 right of way where the existing 12” reclaimed water is located.

- Connection of reclaimed water distribution system with CCUA

Pending the result of the CCUA coordination and available capacity, the City will review deep-well injection alternatives to determine feasibility.

It is anticipated additional growth within and around the City will require additional reclaimed water for irrigation needs. These locations are not known, but the City will continue to maximize this potential and coordinate with CCUA to ensure reclaimed water delivery is maximized between the neighboring utilities.

The extension of reclaimed water distribution systems into Magnolia Point and future developments provides the City with the following benefits:

- Reclaimed water is a commodity and provides a revenue stream in comparison to other effluent disposal options that have no revenue capabilities.

- Maximizing reclaimed water use decreasing use of the Floridan Aquifer, thus limiting withdrawals for non-essential water use.

- Extending reclaimed water infrastructure into Magnolia Point enhances opportunities to create interconnects with the CCUA reclaimed water infrastructure.

- Serving irrigation demands from the reclaimed water system will ‘offload’ large hydraulic peak demands from the potable water system allowing for more consistent service pressures.

6.3 Implementation Schedule

The implementation schedule is as follows:

- Evaluate Reject Storage Modification Requirements 2022
- Design and permit Retrofit of Magnolia Point 2022-2023
    - Include CCUA Interconnect
- Construct Reject Storage Modifications, if required 2023-2024
- Construct Retrofit of Magnolia Point 2025-2027
    - Include CCUA Interconnect
- Evaluate Deep Well Injection Options 2022-2023
- Update Effluent Disposal Options 2025
- Construct Additional Effluent Disposal Options TBD

Attachment A

Technical Memorandum – Surface Water Discharge Elimination Review
Harbor Road WWTF – NPDES ID FL0020915
City of Green Cove Springs, Florida
Mittauer & Associates, Inc. Project No. 8905-19-1

Existing Reuse Water Consumption Data

Harbor Road WRF								
Date	Surface Discharge AADF (MGD)	Reuse AADF (MGD)	Date	Surface Discharge AADF (MGD)	Reuse AADF (MGD)	Date	Surface Discharge AADF (MGD)	Reuse AADF (MGD)
8/31/2021	0.169	0.344	12/31/2019	0.179	0.298	4/30/2018	0.256	0.23
7/31/2021	0.146	0.372	11/30/2019	0.19	0.29	3/31/2018	0.249	0.236
6/30/2021	0.137	0.38	10/31/2019	0.199	0.28	2/28/2018	0.249	0.236
5/31/2021	0.141	0.377	9/30/2019	0.198	0.283	1/31/2018	0.258	0.229
4/30/2021	0.143	0.375	8/31/2019	0.21	0.283	12/31/2017	0.254	0.232
3/31/2021	0.144	0.374	7/31/2019	0.198	0.291	11/30/2017	0.245	0.242
2/28/2021	0.146	0.367	6/30/2019	0.199	0.289	10/31/2017	0.232	0.257
1/31/2021	0.147	0.361	5/31/2019	0.224	0.274	9/30/2017	0.215	0.274
12/31/2020	0.154	0.356	4/30/2019	0.237	0.261	8/31/2017	0.203	0.28
11/30/2020	0.161	0.347	3/31/2019	0.237	0.262	7/31/2017	0.189	0.295
10/31/2020	0.158	0.344	2/28/2019	0.229	0.268	6/30/2017	0.184	0.299
9/30/2020	0.154	0.341	1/31/2019	0.217	0.276	5/31/2017	0.162	0.319
8/31/2020	0.14	0.343	12/31/2018	0.21	0.28	4/30/2017	0.166	0.319
7/31/2020	0.139	0.341	11/30/2018	0.21	0.278	3/31/2017	0.173	0.313
6/30/2020	0.152	0.327	10/31/2018	0.217	0.271	2/28/2017	0.181	0.309
5/31/2020	0.147	0.324	9/30/2018	0.246	0.25	1/31/2017	0.194	0.299
4/30/2020	0.152	0.319	8/31/2018	0.27	0.234	12/31/2016	0.211	0.278
3/31/2020	0.153	0.317	7/31/2018	0.273	0.227	11/30/2016	0.225	0.261
2/29/2020	0.164	0.308	6/30/2018	0.273	0.222	10/31/2016	0.243	0.242
1/31/2020	0.167	0.307	5/31/2018	0.273	0.215	9/30/2016	0.247	0.237

CITY OF GREEN COVE SPRINGS
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Location Code	Service Address	#Services Billed	Actual Consumption	Est Consumption	Amount Billed	Fuel Adjustment	Taxes
01-52100	4169 Cr 15 A (potable Water)		21,470	0	199.43	0.00	0.00
05-00280	1342 N Orange Ave		0	0	809.40	0.00	0.00
05-16102	3119-2 Five Oaks Ln		519,110	0	2,196.52	0.00	0.00
06-34800	3373 Us Highway 17 Bldg 1 & 2		0	0	387.36	0.00	0.00
06-41300	3106 Highway 17		541,360	0	2,338.85	0.00	0.00
06-41500	3150 Hwy 17 N		650	0	392.58	0.00	0.00
06-72555	3266 Highway 17		0	0	574.98	0.00	0.00
06-72565	3254 Highway 17		10	0	577.59	0.00	0.00
06-74300	1495 County Road 315		26,150	0	491.56	0.00	0.00
06-79400	3529 Enterprise Way		450	0	577.67	0.00	0.00
06-79707	3516 Enterprise Way		1,072,120	0	4,424.35	0.00	0.00
06-79720	3525 Enterprise Way		170	0	1,156.81	0.00	0.00
27-33700	1493 Ball Rd (black Creek Sub Ir)		3,333,800	0	15,322.34	0.00	1,040.06
27-33768	Eagle Bluff Way(tract H) (btwn 3044 & 30		0	0	226.68	0.00	0.00
27-92480	3267 Cypress Walk Pl Edgewaterlandinghoa		181,940	0	1,072.29	0.00	94.33
27-92640	Pretty Cv Pocket Park		1,177,960	0	4,998.12	0.00	476.51
27-93490	3105 Southern Oaks Dr		3,814,600	0	17,779.13	0.00	1,485.45
27-93491	Southern Oaks Dr Common Areas		1,078,150	0	4,586.72	0.00	418.71
C/O COMMERCIAL/OUTSIDE BT: 2	IN DIST:	191	9,586,450	0	43,985.28	0.00	3,515.06
	OUT DIST:	318	2,181,490	0	14,127.10	0.00	0.00
	TOTAL:	509	11,767,940	0	58,112.38	0.00	3,515.06
C/O COMMERCIAL/OUTSIDE ==>	IN DIST:	191	9,586,450	0	43,985.28	0.00	3,515.06
	OUT DIST:	318	2,181,490	0	14,127.10	0.00	0.00
	TOTAL:	509	11,767,940	0	58,112.38	0.00	3,515.06
27-92000	1905 Rebecca Pt		722,500	0	2,242.03	0.00	224.18
27-92010	1906 Rebecca Pt		536,610	0	1,779.89	0.00	178.02
27-92090	1924 Rebecca Pt		1,068,770	0	3,640.03	0.00	364.04
27-93510	1913 Catlyn Ct		405,940	0	1,323.22	0.00	132.35
27-93530	1919 Catlyn Ct		427,516	0	1,448.12	0.00	144.84
27-93650	1950 Catlyn Ct		84,930	0	513.86	0.00	51.38
27-93960	3176 Southern Oaks Dr		437,210	0	1,369.89	0.00	136.98
27-93970	3182 Southern Oaks Dr		255,140	0	903.74	0.00	90.38
R/O RESIDENTIAL/OUTSIDE BT: 0	IN DIST:	235	3,938,616	0	13,220.78	0.00	1,322.17
	OUT DIST:	0	0	0	0.00	0.00	0.00
	TOTAL:	235	3,938,616	0	13,220.78	0.00	1,322.17
03-02500	1981 Hwy 16 W		12,240	0	288.70	0.00	0.00
05-16052	506 Chinkapin Ct		267,340	0	1,289.37	0.00	0.00
05-16060	538 Chinkapin Ct		262,780	0	1,272.63	0.00	0.00
05-16073	3012 Five Oaks Ln		220,580	0	1,152.10	0.00	0.00
05-16083	501 Chinkapin Ct		82,720	0	853.66	0.00	0.00
05-16085	3093 Five Oaks Ln		20	0	549.04	0.00	0.00
05-16087	3077 Five Oaks Ln		512,150	0	2,101.74	0.00	0.00
05-16095	561 Pin Oak Ct		298,090	0	1,406.93	0.00	0.00
05-16097	554 Pin Oak Ct		289,310	0	1,339.52	0.00	0.00
05-16098	558 Pin Oak Ct		436,560	0	1,146.10	0.00	98.96
05-16099	562 Pin Oak Ct		164,200	0	1,019.37	0.00	0.00
05-16100	568 Pin Oak Ct		133,400	0	975.73	0.00	0.00
05-16101	502 Chinkapin Ct		128,930	0	914.49	0.00	0.00
05-16117	3232 County Road 209		347,970	0	1,585.21	0.00	0.00
05-16118	3236 County Road 209		134,120	0	939.78	0.00	0.00
05-16119	3242 County Road 209		450,810	0	1,851.42	0.00	0.00
05-16120	3248 County Road 209		436,410	0	1,929.38	0.00	0.00
06-79982	3385 Gator Bay Rd		51,890	0	575.16	0.00	0.00

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Location Code	Service Address	#Services Billed	Actual Consumption	Est Consumption	Amount Billed	Fuel Adjustment	Taxes
06-80975	3694 Red Hawk Ct		303,910	0	1,292.33	0.00	129.25
27-33600	3004 Eagle Bluff Way		241,180	0	1,121.76	0.00	0.00
27-33610	3005 Eagle Bluff Way		275,180	0	1,340.88	0.00	0.00
27-33620	3008 Eagle Bluff Way		74,720	0	526.39	0.00	0.00
27-33630	3009 Eagle Bluff Way		280,110	0	1,289.67	0.00	0.00
27-33640	3013 Eagle Bluff Way		127,310	0	669.77	0.00	0.00
27-33650	3014 Eagle Bluff Way		119,080	0	699.23	0.00	0.00
27-33660	3017 Eagle Bluff Way		344,000	0	1,415.51	0.00	0.00
27-33670	3018 Eagle Bluff Way		259,930	0	1,187.08	0.00	0.00
27-33680	3021 Eagle Bluff Way		304,840	0	1,154.80	0.00	0.00
27-33690	3022 Eagle Bluff Way		252,950	0	1,168.49	0.00	0.00
27-33700	1493 Ball Rd (black Creek Sub Ir)		1,730	0	12.08	0.00	1.21
27-33710	3025 Eagle Bluff Way		126,030	0	691.32	0.00	0.00
27-33720	3026 Eagle Bluff Way		304,410	0	1,429.09	0.00	0.00
27-33730	3029 Eagle Bluff Way		187,410	0	859.44	0.00	0.00
27-33740	3030 Eagle Bluff Way		74,650	0	463.97	0.00	0.00
27-33750	3033 Eagle Bluff Way		186,020	0	777.96	0.00	0.00
27-33755	3036 Eagle Bluff Way		114,950	0	645.04	0.00	0.00
27-33760	3037 Eagle Bluff Way		125,400	0	587.34	0.00	0.00
27-33765	3041 Eagle Bluff Way		18,020	0	298.52	0.00	0.00
27-33770	3044 Eagle Bluff Way		49,920	0	367.73	0.00	0.00
27-33775	3045 Eagle Bluff Way		83,240	0	464.97	0.00	0.00
27-33780	3048 Eagle Bluff Way		112,580	0	655.35	0.00	0.00
27-33785	3049 Eagle Bluff Way		37,770	0	318.06	0.00	0.00
27-33790	3057 Eagle Bluff Way		63,530	0	412.26	0.00	0.00
27-33800	3089 Creek Village Ln		89,440	0	646.95	0.00	0.00
27-33802	3081 Creek Village Ln		171,940	0	853.48	0.00	0.00
27-33803	3077 Creek Village Ln		75,740	0	581.67	0.00	0.00
27-33804	3071 Creek Village Ln		247,500	0	1,143.63	0.00	0.00
27-33805	3067 Creek Village Ln		49,230	0	485.84	0.00	0.00
27-33806	3063 Creek Village Ln		197,270	0	946.82	0.00	0.00
27-33807	3059 Creek Village Ln		117,450	0	705.52	0.00	0.00
27-33809	3055 Creek Village Ln		40,810	0	462.50	0.00	0.00
27-33810	3051 Creek Village Ln		111,560	0	662.47	0.00	0.00
27-33811	3088 Creek Village Ln		343,600	0	1,384.72	0.00	0.00
27-33812	3084 Creek Village Ln		135,270	0	730.14	0.00	0.00
27-33813	3080 Creek Village Ln		235,060	0	1,105.27	0.00	0.00
27-33814	3076 Creek Village Ln		347,350	0	1,467.18	0.00	0.00
27-33815	3070 Creek Village Ln		201,710	0	986.59	0.00	0.00
27-33816	3066 Creek Village Ln		223,150	0	1,021.70	0.00	0.00
27-33817	3062 Creek Village Ln		172,880	0	914.64	0.00	0.00
27-33818	3058 Creek Village Ln		243,220	0	1,098.93	0.00	0.00
27-33819	3054 Creek Village Ln		394,230	0	1,659.07	0.00	0.00
27-33820	3046 Creek Village Ln		125,240	0	611.85	0.00	0.00
27-33821	3085 Creek Village Ln		270,340	0	1,217.76	0.00	0.00
27-33822	3041 Creek Village Ln		16,210	0	172.24	0.00	0.00
27-33823	3037 Creek Village Ln		307,910	0	1,280.29	0.00	0.00
27-33824	3047 Creek Village Ln		190,940	0	754.79	0.00	0.00
27-33834	3031 Creek Village Ln		356,470	0	1,504.82	0.00	0.00
27-33835	3025 Creek Village Ln		75,460	0	386.91	0.00	0.00
27-33836	3019 Creek Village Ln		39,450	0	318.60	0.00	0.00
27-33837	3015 Creek Village Ln		325,290	0	1,479.76	0.00	0.00
27-33838	3011 Creek Village Ln		137,460	0	754.53	0.00	0.00
27-33839	3007 Creek Village Ln		138,270	0	657.68	0.00	0.00
27-33840	3003 Creek Village Ln		285,180	0	1,218.50	0.00	0.00
27-33865	3102 Creek Village Ln		550,170	0	2,161.81	0.00	193.66

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27-33866	3108 Creek Village Ln		107,790	0	700.38	0.00	0.00
27-33867	3116 Creek Village Ln		4,730	0	403.50	0.00	0.00
27-33868	3120 Creek Village Ln		205,920	0	1,033.36	0.00	89.19
27-33869	3124 Creek Village Ln		118,760	0	723.76	0.00	0.00
27-33870	3128 Creek Village Ln		94,420	0	695.48	0.00	0.00
27-33871	3132 Creek Village Ln		124,260	0	796.90	0.00	0.00
27-33872	3136 Creek Village Ln		146,110	0	813.90	0.00	0.00
27-33873	3140 Creek Village Ln		108,720	0	730.34	0.00	0.00
27-33874	3142 Creek Village Ln		84,040	0	674.26	0.00	0.00
27-33875	3146 Creek Village Ln		295,530	0	1,263.78	0.00	0.00
27-33876	3150 Creek Village Ln		100,760	0	681.84	0.00	57.45
27-33877	3154 Creek Village Ln		102,200	0	695.23	0.00	0.00
27-33879	3160 Creek Village Ln		148,330	0	824.61	0.00	0.00
27-33880	3164 Creek Village Ln		163,010	0	872.33	0.00	69.07
27-33881	3168 Creek Village Ln		117,150	0	763.76	0.00	65.62
27-33882	3172 Creek Village Ln		241,250	0	1,111.58	0.00	1.50
27-33883	3173 Creek Village Ln		290,840	0	1,303.69	0.00	0.00
27-33884	3167 Creek Village Ln		188,310	0	979.26	0.00	0.00
27-33885	3163 Creek Village Ln		189,520	0	976.53	0.00	20.87
27-33886	3155 Creek Village Ln		195,810	0	1,099.34	0.00	0.00
27-33887	3135 Creek Village Ln		132,720	0	796.17	0.00	53.17
27-33888	3129 Creek Village Ln		159,980	0	944.84	0.00	0.00
27-33889	3121 Creek Village Ln		79,300	0	333.57	0.00	0.00
27-33890	3115 Creek Village Ln		265,220	0	1,205.67	0.00	0.00
27-33891	3109 Creek Village Ln		193,570	0	978.91	0.00	0.00
27-33892	3103 Creek Village Ln		447,360	0	1,668.11	0.00	123.02
27-92000	1905 Rebecca Pt		156,370	0	615.27	0.00	0.00
27-92010	1906 Rebecca Pt		93,710	0	400.34	0.00	0.00
27-92020	1911 Rebecca Pt		410,960	0	1,789.10	0.00	77.09
27-92030	1912 Rebecca Pt		236,020	0	1,217.53	0.00	90.91
27-92040	1916 Rebecca Pt		496,280	0	2,313.63	0.00	206.63
27-92050	1917 Rebecca Pt		355,240	0	1,573.49	0.00	127.70
27-92060	1919 Rebecca Pt		274,430	0	1,336.59	0.00	116.51
27-92070	1920 Rebecca Pt		851,810	0	3,424.35	0.00	293.56
27-92080	1921 Rebecca Pt		247,240	0	1,139.21	0.00	0.00
27-92090	1924 Rebecca Pt		111,730	0	495.08	0.00	0.00
27-92100	1925 Rebecca Pt		1,212,970	0	5,012.71	0.00	457.23
27-92110	1930 Rebecca Pt		516,610	0	2,186.71	0.00	153.95
27-92210	3210 Cypress Walk Pl		250,030	0	1,065.84	0.00	0.00
27-92220	3214 Cypress Walk Pl		205,650	0	982.27	0.00	0.00
27-92230	3220 Cypress Walk Pl		594,480	0	2,348.99	0.00	218.71
27-92250	3226 Cypress Walk Pl		400,450	0	1,671.49	0.00	142.47
27-92260	3232 Cypress Walk Pl		373,840	0	1,634.68	0.00	139.57
27-92270	3240 Cypress Walk Pl		906,140	0	3,659.90	0.00	318.53
27-92290	3246 Cypress Walk Pl		635,040	0	2,401.43	0.00	194.31
27-92300	3247 Cypress Walk Pl		583,480	0	2,585.82	0.00	182.41
27-92310	3250 Cypress Walk Pl		66,190	0	450.67	0.00	0.00
27-92320	3253 Cypress Walk Pl		421,260	0	1,763.42	0.00	138.50
27-92330	3256 Cypress Walk Pl		276,160	0	1,316.06	0.00	107.13
27-92340	3260 Cypress Walk Pl		418,870	0	316.86	0.00	0.00
27-92350	3268 Cypress Walk Pl		952,400	0	4,142.75	0.00	306.04
27-92360	3274 Cypress Walk Pl		644,880	0	2,617.87	0.00	217.72
27-92370	3278 Cypress Walk Pl		0	0	127.81	0.00	0.00
27-92380	3281 Cypress Walk Pl		428,070	0	1,740.78	0.00	142.99
27-92390	3282 Cypress Walk Pl		395,920	0	1,867.44	0.00	163.69
27-92400	3284 Cypress Walk Pl		151,760	0	986.76	0.00	82.10

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27-92410	3285 Cypress Walk Pl		64,360	0	386.23	0.00	0.00
27-92420	3288 Cypress Walk Pl		0	0	64.60	0.00	0.00
27-92430	3289 Cypress Walk Pl		164,070	0	799.96	0.00	0.00
27-92440	3292 Cypress Walk Pl		87,660	0	376.81	0.00	0.00
27-92450	3295 Cypress Walk Pl		291,850	0	1,153.96	0.00	0.00
27-92460	3296 Cypress Walk Pl		417,070	0	2,030.41	0.00	188.24
27-92470	3300 Cypress Walk Pl		384,630	0	1,762.70	0.00	145.95
27-92500	3104 Pretty Cv		1,106,210	0	4,576.12	0.00	418.95
27-92510	3107 Pretty Cv		82,400	0	386.60	0.00	0.00
27-92520	3110 Pretty Cv		0	0	25.30	0.00	0.00
27-92530	3113 Pretty Cv		253,470	0	1,151.07	0.00	0.00
27-92540	3114 Pretty Cv		0	0	25.30	0.00	0.00
27-92550	3118 Pretty Cv		169,730	0	990.31	0.00	84.81
27-92560	3121 Pretty Cv		215,260	0	998.01	0.00	0.00
27-92570	3124 Pretty Cv		320,150	0	1,359.06	0.00	105.30
27-92580	3125 Pretty Cv		160,490	0	827.02	0.00	0.00
27-92590	3129 Pretty Cv		163,960	0	745.38	0.00	0.00
27-92600	3130 Pretty Cv		0	0	25.30	0.00	0.00
27-92610	3134 Pretty Cv		81,840	0	392.72	0.00	0.00
27-92620	3140 Pretty Cv		0	0	25.30	0.00	0.00
27-92630	3142 Pretty Cv		820	0	27.99	0.00	0.00
27-92660	3154 Noble Ct		152,900	0	691.10	0.00	0.00
27-92670	3157 Noble Ct		483,120	0	2,087.49	0.00	164.56
27-92680	3160 Noble Ct		144,590	0	646.19	0.00	0.00
27-92690	3161 Noble Ct		225,360	0	1,231.35	0.00	51.88
27-92700	3166 Noble Ct		141,290	0	603.47	0.00	0.00
27-92710	3169 Noble Ct		129,670	0	887.63	0.00	74.28
27-92720	3170 Noble Ct		71,860	0	304.80	0.00	0.00
27-92730	3175 Noble Ct		337,740	0	1,427.84	0.00	113.29
27-92740	3176 Noble Ct		214,250	0	981.86	0.00	0.00
27-92750	3180 Noble Ct		205,930	0	950.95	0.00	0.00
27-92760	3181 Noble Ct		171,130	0	911.68	0.00	5.01
27-92770	3184 Noble Ct		208,480	0	974.98	0.00	0.00
27-92780	3187 Noble Ct		427,050	0	1,845.10	0.00	162.25
27-92790	3188 Noble Ct		0	0	53.03	0.00	0.00
27-92800	3191 Noble Ct		49,610	0	346.20	0.00	0.00
27-92810	3192 Noble Ct		0	0	53.03	0.00	0.00
27-92820	3195 Noble Ct		279,990	0	1,141.58	0.00	0.00
27-92830	3196 Noble Ct		0	0	25.30	0.00	0.00
27-92840	3197 Noble Ct		143,620	0	669.77	0.00	0.00
27-92850	3200 Noble Ct		0	0	25.30	0.00	0.00
27-92900	3106 Tuesdays Cv		453,730	0	2,150.88	0.00	192.87
27-92910	3116 Tuesdays Cv		502,680	0	2,176.96	0.00	184.38
27-92920	3119 Tuesdays Cv		201,760	0	911.99	0.00	0.00
27-92930	3122 Tuesdays		133,770	0	628.10	0.00	0.00
27-92940	3123 Tuesdays Cv		356,520	0	0.00	0.00	0.00
27-92950	3127 Tuesdays Cv		130,210	0	566.51	0.00	0.00
27-92960	3126 Tuesdays		276,330	0	1,151.70	0.00	0.00
27-92970	3130 Tuesday Cv		215,450	0	974.84	0.00	0.00
27-92980	3131 Tuesdays Cv		256,910	0	1,062.69	0.00	0.00
27-92990	3134 Tuesdays Cv		343,220	0	1,382.11	0.00	0.00
27-93000	3137 Tuesdays Cv		361,520	0	1,525.87	0.00	0.00
27-93100	3006 Free Bird Loop		160,660	0	719.25	0.00	0.00
27-93110	3007 Free Bird Loop		109,800	0	615.56	0.00	0.00
27-93120	3011 Free Bird Loop		156,270	0	1,036.37	0.00	87.85
27-93130	3012 Free Bird Loop		159,290	0	722.59	0.00	0.00

CITY OF GREEN COVE SPRINGS
Usage & Charges by Service User Type

Service Code: IR, From: 06/01/18 To: 06/30/21, Service User Types: R/O,C/O, Rate Type: All, Order by User Type by Bill Type

Location Code	Service Address	#Services Billed	Actual Consumption	Est Consumption	Amount Billed	Fuel Adjustment	Taxes
27-93140	3015 Free Bird Loop		296,070	0	1,555.18	0.00	135.26
27-93150	3018 Free Bird Loop		309,520	0	1,292.53	0.00	0.00
27-93160	3023 Free Bird Loop		197,100	0	781.21	0.00	0.00
27-93170	3024 Free Bird Loop		429,390	0	2,034.88	0.00	184.47
27-93180	3029 Free Bird Loop		435,310	0	1,985.50	0.00	177.40
27-93190	3030 Free Bird Loop		228,610	0	1,201.13	0.00	18.63
27-93200	3034 Free Bird Loop		127,880	0	586.22	0.00	0.00
27-93210	3037 Free Bird Loop		196,710	0	928.92	0.00	0.00
27-93220	3040 Free Bird Loop		272,020	0	1,179.21	0.00	0.00
27-93230	3045 Free Bird Loop		107,040	0	522.10	0.00	0.00
27-93240	3046 Free Bird Loop		274,300	0	1,177.39	0.00	0.00
27-93250	3049 Free Bird Loop		310,950	0	1,152.50	0.00	0.00
27-93260	3053 Free Bird Loop		148,440	0	934.22	0.00	77.26
27-93270	3056 Free Bird Loop		207,970	0	980.26	0.00	0.00
27-93280	3059 Free Bird Loop		244,570	0	1,041.20	0.00	0.00
27-93290	3060 Free Bird Loop		85,810	0	346.74	0.00	0.00
27-93300	3064 Free Bird Loop		195,870	0	927.58	0.00	0.00
27-93310	3070 Free Bird Loop		84,760	0	402.76	0.00	0.00
27-93320	3074 Free Bird Loop		229,610	0	1,006.26	0.00	0.00
27-93330	3075 Free Bird Loop		281,900	0	1,235.38	0.00	0.00
27-93340	3078 Free Bird Loop		399,830	0	1,742.69	0.00	132.88
27-93350	3082 Free Bird Loop		142,590	0	636.70	0.00	0.00
27-93360	3087 Free Bird Loop		196,520	0	842.18	0.00	0.00
27-93370	3088 Free Bird Loop		175,910	0	810.55	0.00	0.00
27-93380	3093 Free Bird Loop		500	0	135.54	0.00	0.00
27-93390	3096 Free Bird Loop		142,390	0	665.82	0.00	0.00
27-93400	3099 Free Bird Loop		133,440	0	577.55	0.00	0.00
27-93410	3102 Free Bird Loop		108,000	0	498.94	0.00	0.00
27-93420	3105 Free Bird Loop		360,130	0	1,587.46	0.00	0.00
27-93430	3108 Free Bird Loop		745,550	0	2,943.11	0.00	250.97
27-93440	3111 Free Bird Loop		121,140	0	544.66	0.00	0.00
27-93450	3114 Free Bird Loop		91,270	0	405.38	0.00	0.00
27-93460	3117 Free Bird Loop		120,060	0	538.07	0.00	0.00
27-93470	3123 Free Bird		135,060	0	624.93	0.00	0.00
27-93500	1907 Catlyn Ct		151,530	0	785.74	0.00	0.00
27-93510	1913 Catlyn Ct		72,890	0	345.71	0.00	0.00
27-93520	1914 Catlyn Ct		245,760	0	1,079.65	0.00	0.00
27-93530	1919 Catlyn Ct		69,160	0	355.48	0.00	0.00
27-93540	1923 Catlyn Ct		176,140	0	769.20	0.00	0.00
27-93550	1927 Catlyn Ct		218,100	0	986.82	0.00	0.00
27-93560	1931 Catlyn Ct		66,530	0	310.68	0.00	0.00
27-93570	1932 Catlyn Ct		0	0	65.23	0.00	0.00
27-93580	1935 Catlyn Ct		324,640	0	1,424.06	0.00	120.40
27-93590	1938 Catlyn Ct		0	0	53.03	0.00	0.00
27-93600	1941 Catlyn Ct		391,970	0	1,667.91	0.00	138.25
27-93610	1942 Catlyn Ct		0	0	65.23	0.00	0.00
27-93620	1945 Catlyn Ct		173,440	0	1,019.99	0.00	89.96
27-93630	1946 Catlyn Ct		293,720	0	1,293.86	0.00	0.00
27-93640	1949 Catlyn Ct		21,310	0	169.00	0.00	0.00
27-93650	1950 Catlyn Ct		3,690	0	150.52	0.00	0.00
27-93940	3168 Southern Oaks Dr		151,750	0	709.30	0.00	0.00
27-93950	3172 Southern Oaks Dr		299,270	0	1,401.57	0.00	110.44
27-93960	3176 Southern Oaks Dr		56,160	0	271.44	0.00	0.00
27-93970	3182 Southern Oaks Dr		38,340	0	218.97	0.00	0.00
27-93980	3190 Southern Oaks Dr		360,740	0	1,574.58	0.00	142.46
27-93990	3196 Southern Oaks Dr		271,310	0	1,174.12	0.00	0.00

CITY OF GREEN COVE SPRINGS
Usage & Charges by Service User Type

Service Code: IR, From: 06/01/18 To: 06/30/21, Service User Types: R/O,C/O, Rate Type: All, Order by User Type by Bill Type

Location Code	Service Address		#Services Billed	Actual Consumption	Est Consumption	Amount Billed	Fuel Adjustment	Taxes
27-94000	3202 Southern Oaks Dr			255,080	0	1,144.24	0.00	0.00
27-94010	3206 Southern Oaks Dr			251,720	0	1,088.08	0.00	0.00
27-94020	3212 Southern Oaks Dr			399,160	0	1,549.32	0.00	0.00
27-94030	3230 Southern Oaks Dr			206,120	0	972.50	0.00	0.00
27-94040	3236 Southern Oaks Dr			192,960	0	811.86	0.00	0.00
27-94050	3242 Southern Oaks Dr			76,390	0	392.63	0.00	0.00
27-94080	3322 Southern Oaks Dr			199,630	0	1,149.23	0.00	100.10
27-94100	3328 Southern Oaks Dr			359,950	0	1,588.77	0.00	128.56
27-94110	3332 Southern Oaks Dr			496,220	0	2,098.41	0.00	186.36
27-94120	3336 Southern Oaks Dr			169,010	0	841.98	0.00	0.00
27-94130	3340 Southern Oaks Dr			136,440	0	576.61	0.00	0.00
27-94150	3346 Southern Oaks Dr			327,930	0	1,391.74	0.00	0.00
27-94180	3358 Southern Oaks Dr			180,320	0	854.79	0.00	0.00
27-94200	3364 Southern Oaks Dr			272,600	0	1,111.36	0.00	0.00
27-94240	3384 Southern Oaks Dr			167,110	0	738.19	0.00	0.00
27-94250	3388 Southern Oaks Dr			117,200	0	533.39	0.00	0.00
R/O	RESIDENTIAL/OUTSIDE BT: 1	IN DIST:	4,814	53,209,350	0	242,230.97	0.00	8,654.78
		OUT DIST:	614	4,177,630	0	20,615.17	0.00	98.96
		TOTAL:	5,428	57,386,980	0	262,846.14	0.00	8,753.74
27-33889	3121 Creek Village Ln			312,860	0	1,275.13	0.00	127.52
27-92440	3292 Cypress Walk Pl			254,100	0	1,194.08	0.00	119.44
R/O	RESIDENTIAL/OUTSIDE BT: 2	IN DIST:	51	566,960	0	2,469.21	0.00	246.96
		OUT DIST:	0	0	0	0.00	0.00	0.00
		TOTAL:	51	566,960	0	2,469.21	0.00	246.96
27-93640	1949 Catlyn Ct			322,760	0	1,157.81	0.00	115.83
R/O	RESIDENTIAL/OUTSIDE BT: 3	IN DIST:	30	322,760	0	1,157.81	0.00	115.83
		OUT DIST:	0	0	0	0.00	0.00	0.00
		TOTAL:	30	322,760	0	1,157.81	0.00	115.83
R/O	RESIDENTIAL/OUTSIDE ==>	IN DIST:	5,130	58,037,686	0	259,078.77	0.00	10,339.74
		OUT DIST:	614	4,177,630	0	20,615.17	0.00	98.96
		TOTAL:	5,744	62,215,316	0	279,693.94	0.00	10,438.70
GRAND TOTALS		IN DIST:	5,321	67,624,136	0	303,064.05	0.00	13,854.80
		OUT DIST:	932	6,359,120	0	34,742.27	0.00	98.96
		TOTAL:	6,253	73,983,256	0	337,806.32	0.00	13,953.76

GLOSSARY: BT = RATE TYPE CODE / IN DIST = IN DISTRICT / OUT DIST = OUT OF DISTRICT / SUT = SERVICE USER TYPE

Attachment B

Technical Memorandum – Surface Water Discharge Elimination Review
Harbor Road WWTF – NPDES ID FL0020915
City of Green Cove Springs, Florida
Mittauer & Associates, Inc. Project No. 8905-19-1

2016 Reclaimed Water System Master Plan

III. GROWTH REVIEW AND POPULATION PROJECTIONS

A. OVERVIEW

The City's W&S Service Area is mostly developed with scattered vacant parcels, including some large tracts of land that could be developed in the future. With the exception of the Reynolds Park property in the southern portion of the City and Magnolia Point/Magnolia West in the northern portion of the City, the majority of the land in the City Limits is platted into small parcels (≤ ½ Ac), and the majority of these platted parcels are proposed for 'in-fill' residential development. Larger platted parcels exist in the area north of the City Limits to Black Creek and are anticipated to be future residential developments which is beginning to occur. At this time, growth is currently occurring within the final phases of Magnolia Point, which will bring the development to build-out capacity, and within the northern reaches of the City's W&S Service Area. Reynolds Park continues to be a large unknown, and it is anticipated growth within this area of the City will be more attractive once the First Coast Expressway is constructed.

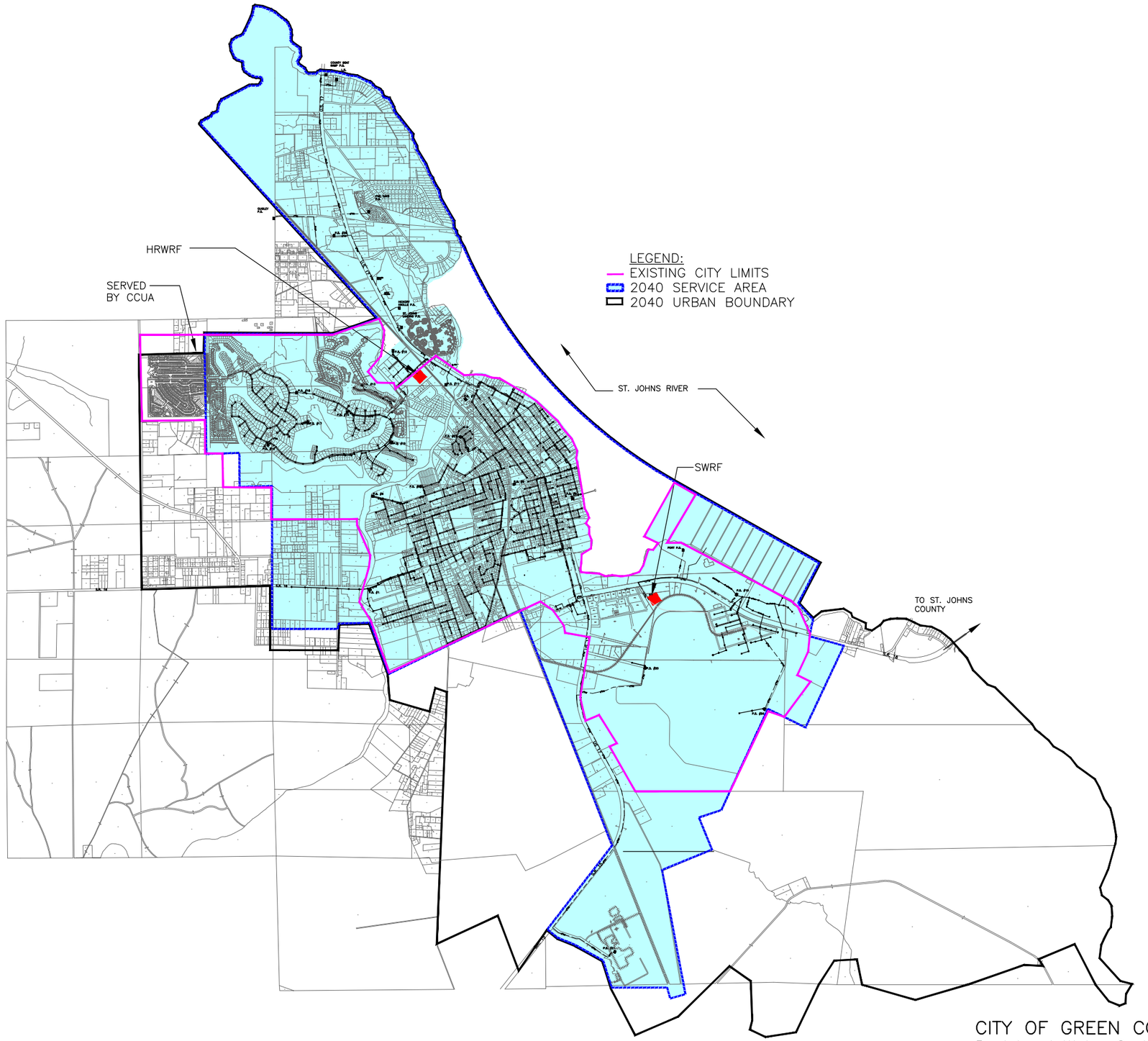
In addition to these demand nodes, the City has also considered a '2040 Urban Boundary Plan' that delineated a *potential* service area for utilities. The current City limits and existing W&S Service Area are shown within the 2040 Urban Boundary on **Figure III-1**. The 2040 Urban Boundary was reviewed and discussed in the 2015 WW Master Plan, and included consideration of potential wastewater demands (i.e., reclaimed water supplies) to the consolidated HRWRF.

B. 2015 WW MASTER PLAN - DEMAND CONSIDERATION SUMMARY

The City's 2015 WW Master Plan reviewed population growth and associated wastewater demands within the City's 2040 Urban Boundary, including the following items:

- Reynolds Future Land Use Map (FLUM) Amendment
- Clay County and City 2025 Comprehensive Plan
- Florida Department of Transportation (FDOT) First Coast Expressway
- City of Green Cove Springs 2040 Urban Boundary
- City of Green Cove Springs Build-Out Study
- University of Florida Bureau of Economic and Business Research (BEBR) Population Projections

SCALE: 1" = 4,500'



MITTAUER & ASSOCIATES, INC.
CONSULTING ENGINEERS
580-1 WELLS ROAD, ORANGE PARK, FLORIDA 32073

CITY OF GREEN COVE SPRINGS
Reclaimed Water System Master Plan
2040 Urban Services Boundary
Clay County, Florida

FIGURE III–1
June 2016
Project No. 8905–33–1

As it relates to this Plan, a brief summary of considerations for each of the denoted items is provided as follows:

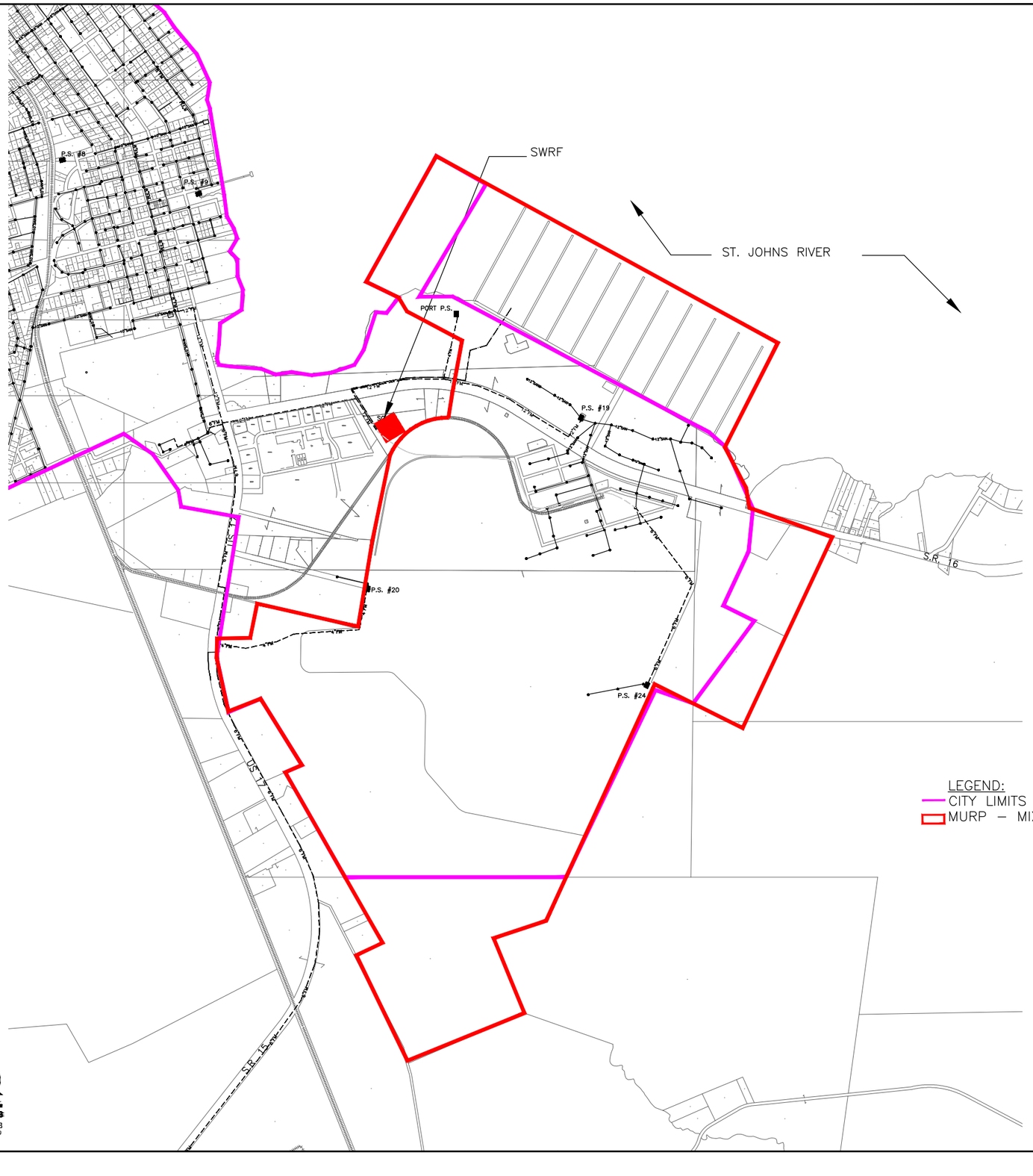
1. Reynolds Park

In 2009, Clay Port, Inc. submitted an application to amend the City's Comprehensive Plan and associated future land use map to promote the redevelopment of Reynolds Park ("Reynolds"). Clay Port submitted the text and map amendment to the City for review and approval, and subsequently to the Department of Community Affairs (DCA) [now the Department of Economic Opportunity (DEO)] and other reviewing agencies. The Reynolds Property is located on U.S. 17 and State Road 16 in the City of Green Cove Springs and contains five (5) City parcels within the larger boundary of the Reynolds Property. **Figure III-2** depicts the limits of Clay Port's ownership and defines the land that is called "Reynolds" throughout the remainder of the Plan.

The purpose of the "Amendment" was to revise the Future Land Use designation of the Reynold's parcel by changing the future Land Use Element to allow redevelopment under a mixed-use land use designation. The amendment also changed the land use category for five (5) parcels of land owned by the City. The Amendment changed the Reynold's land use categories from Residential Medium Density, Commercial Medium Intensity, Commercial High Intensity, Conservation, and Industrial to land use categories of Reynolds Park Mixed Use Redevelopment District (MU-RP) and Conservation. In sum, the proposed changes:

- Added a new land use category to the City's Future Land Use Element;
- Amended the Future Land Use Map to change the land use on 1,600 acres owned by Clay Port to MU-RP category and retain the Conservation designation on 142 acres;
- Amended the adopted Future Land Use Map to change the land use on 1.5 acres of land owned by the City to the MU-RP category;
- Amended the Future Transportation Map to reflect the alignment of the First Coast Expressway;

SCALE: 1" = 2,000'



LEGEND:
CITY LIMITS
MURP – MIXED USE REYNOLDS PARK

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CITY OF GREEN COVE SPRINGS
Reclaimed Water System Master Plan
Reynolds Parcel Limits
Clay County, Florida

FIGURE III–2
June 2016
Project No. 8905–33–1

- Added a policy to the Future Land Use Element that addresses the location of existing wellheads within the City; and

- Amended the adopted Existing and Future Recreation map to delete the Reynolds Golf Course.

As discussed further in the Plan, the redevelopment of the Reynolds area is the most dynamic variable in the City's long-term wastewater and reclaimed water service needs. The timing associated with the redevelopment is difficult to estimate, but the City will need to consider service requirements and associated approaches for growth within this corridor.

2. Clay County 2025 Comprehensive Plan

Within Clay County's 2025 Comprehensive Plan, a number of elements are reviewed and applicable portions were considered in the City's 2015 WW Master Plan. As it relates to reclaimed water service, the County's 2025 Comp Plan stated the following:

- Community Facilities Element:
  - Objective 3. The County shall ensure sufficient service of solid waste, potable water, and wastewater to meet the future needs of the County and the municipalities within the County. *The County shall coordinate with* the Clay County Utility Authority, *municipalities within the County*, and private service providers *to plan the efficient delivery of services to meet future demand*.

  - Policy 3.1. Clay County shall develop, in conjunction with the Clay County Utility Authority, private utility providers, state, and local governments, a Potable Water, Wastewater and Reuse Master Plan to coordinate the efficient delivery of these services to the urban areas of the County.

- Intergovernmental Coordination Element:
  - Policy 1.5.a. The County shall cooperate with other local governments, public and private utilities, regional water supply authorities, special districts, and water management districts with regard to potable and reuse water service delivery.

3. Green Cove Springs 2025 Comprehensive Plan

Like Clay County, the City also completes and maintains a comprehensive plan that is reviewed by the regional planning council, Department of Economic Opportunity, and others. This document provides overall guidance related to a wide range of factors as reviewed for the County. Those that are most applicable to this Plan include the following:

1. Future Land Use Element

   As it relates to reclaimed water infrastructure, Clay Port, or its successors, would be required to meet the following provisions:

   "*Infrastructure Planning. (e) Water Reuse. Development within the MURP category shall utilize reuse for irrigation purposes where available, economically feasible, and consistent with State regulations.*"

4. FDOT First Coast Expressway

The North Florida Transportation Planning Organization ("TPO") is the independent regional transportation planning agency for Clay, Duval, Nassau, and St. Johns Counties. It leads the region's efforts in planning, funding, and mobilizing resources to develop and maintain the transportation system. It's mission is to provide a regional forum for developing an effective transportation system that moves people and goods safety, economically, and efficiently, maintaining a high quality of life in North Florida.

The Transportation Improvement Program ("TIP") is a staged multi-year program of transportation project improvements to be implemented during the next five-year period in the North Florida TPO area which will be funded by Title 23 U.S.C. and the Federal Transit Act, prepared in accordance with 23 CFR Part 450 and 49 CFR Part 613.

The current First Coast Expressway alignment is shown in **Figure III-3.** At this time, the planned completion of right-of-way acquisition and design/permitting completion is scheduled for 2020. Construction of the expressway is not currently planned for a specific year.

SCALE: 1" = 3 MILES±

N

SEE TPO WEBSITE
FOR SPECIFIC PROJECT DETAILS

NEW INTERCHANGE (TYP.)

PROJECT NUMBER 4229382

CLAY

NOTE:
IMAGE FROM TRANSPORTATION PLANNING ORGANIZATION (TPO) ENVISION 2035 LONG RANGE TRANSPORTATION PLAN

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CONSULTING ENGINEERS
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CITY OF GREEN COVE SPRINGS
Reclaimed Water System Master Plan
First Coast Outer Beltway
Clay County, Florida

FIGURE
III–3
June 2016
Project No.
8905–33–1

The City should continue to monitor the progress of this roadway network and prepare infrastructure to address growth demands that will likely come as a result of its construction.

5. Green Cove Springs 2040 Urban Boundary

On April 3, 2012, the City Council adopted a policy for annexation and established an 'Urban Boundary' that was depicted within **Figure III-1**. The boundary was established to identify potential annexation areas where enclaves, service delivery, and development patterns/land-use controls would be important to the City due to their proximity to existing City/W&S Service Area limits. The boundaries are based on logical expansion of the current city limits and urban services provided by the City's Utilities and other departments.

The modifications do not result in changes to the City's existing W&S Service Area. Due to CCUA's regional service area, the locations within the 2040 Urban Boundary are currently planned to be served by CCUA. However, if developments occur before CCUA is ready to serve, then an interlocal agreement may be required for the City to provide sewer and/or reclaimed water service into these areas.

6. Green Cove Springs Build-out Study

The Build-Out Study prepared by Fleet & Associates in 2006 (see **Attachment C)** noted that many parcels in the W&S Service Area are underdeveloped and can be developed with higher densities and intensities than currently exist. This work preceded the Reynolds FLUM Amendment but is still applicable since the FLUM Amendment kept the intensities and densities less than, or equal to, what was available under the previous land use categories. This document was utilized in the 2015 WW Master Plan to determine potential 'build-out' wastewater demands.

7. BEBR Population Projections

The 2015 WW Master Plan reviewed the: Year 2000 and 2010 census counts for Clay County and Green Cove Springs; and 2013 University of Florida's Bureau of Economic and Business Research (BEBR) population projections for Clay County. This information in concert with the Build-out Study and Reynolds

FLUM Amendment were utilized to project wastewater demands for the City's Service Area.

C. WASTEWATER DEMAND SUMMARY

As a result of the considerations in **Section III(B)**, the 2015 WW Master Plan projected wastewater demands for the City's W&S Service Area into 2040. The results of this analysis are summarized in **Table III-1**.

TABLE III-1

2040 W&S SERVICE AREA FLOW PROJECTIONS

AREA	Exist. WW Flow (gpd)	Projected 2040 Flow (gpd)	% Increase
North-Upper Service Area	43,000	278,400	647%
North-Magnolia Service Area	96,000	127,200	33%
North-Core Service Area	361,000	434,400	20%
North Service Area Subtotal	**500,000**	**840,000**	**68%**
South Service Area Subtotal	**212,000**	**290,000**	**37%**
Total	**712,000**	**1,130,000**	**59%**

Redevelopment of Reynolds, the construction of the First Coast Expressway, and associated regional growth within the County are major variables that will impact the City's infrastructure needs. The Reynolds Redevelopment, for example, presents a significant 'supply' of housing, industrial uses, commercial uses, etc., but these components will not develop until 'demand' for the products or services are anticipated. Accordingly, the UF BEBR estimates for population growth utilized the 'Medium-Growth' curve as the basis for population growth and wastewater demands. Actual demand timelines could vary drastically if the market conditions were to significantly change.

Expanding further on the above summary, **Table III-2** is provided to define anticipated demands on a yearly basis beginning in 2020. These wastewater projections are also considered the potential reclaimed water supply. Assuming a 0.20 MGD-AADF reclaimed water demand for the Magnolia Point golf course, the resultant reclaimed water supplies are calculated.

TABLE III-2

2015 THROUGH 2040 SUMMARY OF W&S SERVICE AREA

WASTEWATER PROJECTIONS & RECLAIMED WATER SUPPLY

Year	W&S Service Area Wastewater Demand (MGD)	Mag Pt GC Reclaimed Demand (MGD)	Reclaimed Water Supply (MGD)
2015	0.712	0.200	0.512
2020	0.796	0.200	0.596
2021	0.812	0.200	0.612
2022	0.830	0.200	0.630
2023	0.845	0.200	0.645
2024	0.862	0.200	0.662
2025	0.878	0.200	0.678
2026	0.896	0.200	0.696
2027	0.912	0.200	0.712
2028	0.929	0.200	0.729
2029	0.946	0.200	0.746
2030	0.963	0.200	0.763
2035	1.046	0.200	0.846
2040	1.129	0.200	0.929

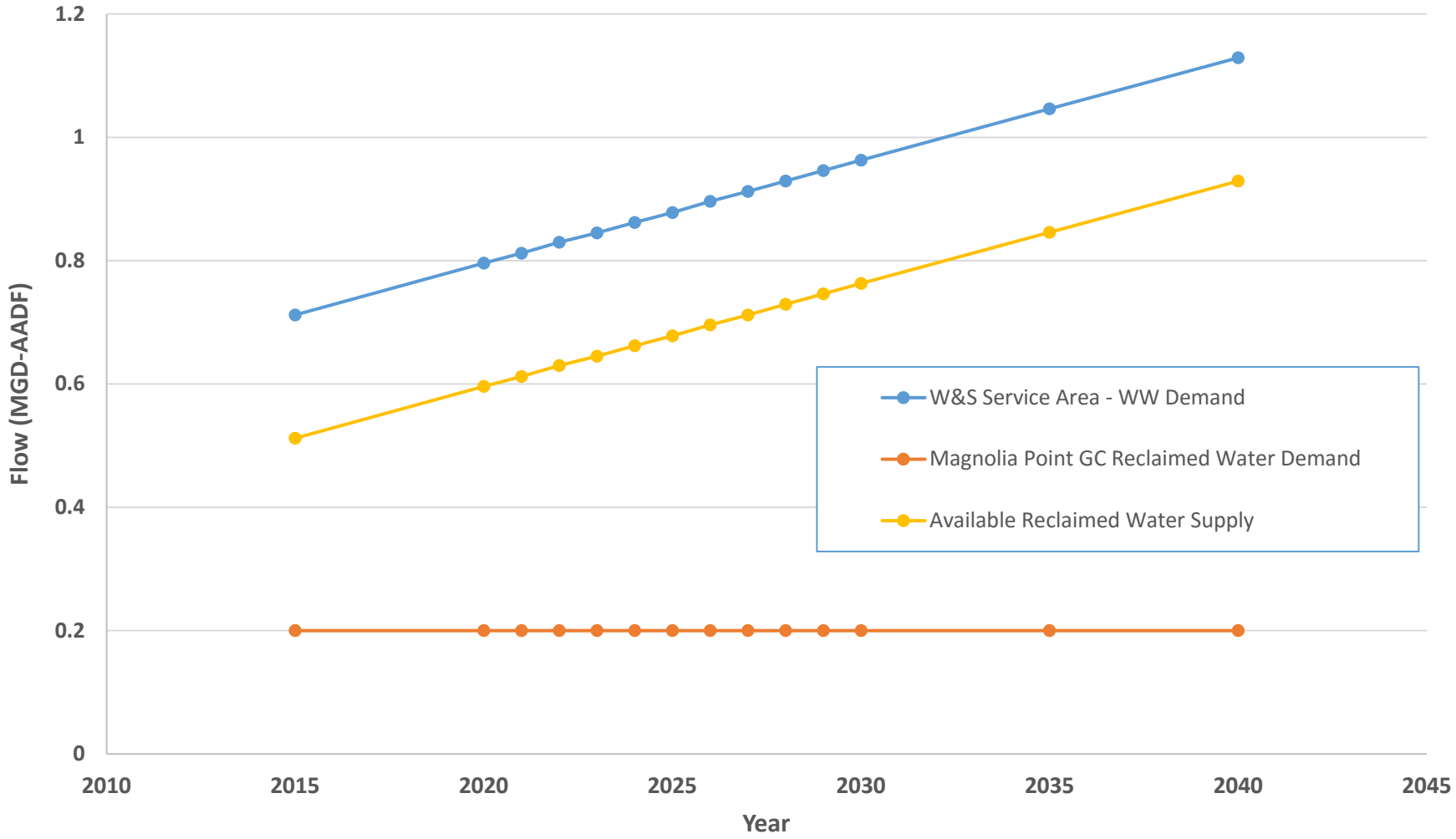
The demands are illustrated in **Figure III-4**.

City of Green Cove Springs

Reclaimed Water System Master Plan

M&A Project 8905-33-1

Figure III-4 - 2015 through 2040 HRWRF Wastewater (Reclaimed Water Supply) Projections



D. RECLAIMED WATER DEMAND PROJECTIONS

The City currently has a potential 'reclaimed water supply surplus' due to the amount of incoming wastewater in comparison to reclaimed water demands. As a result of the current reclaimed water supply availability and the future demands, the following review will consider:

- Anticipated reclaimed water supply volumes;
- Potential reclaimed water demand corridors; and
- Conceptual reclaimed water storage requirements.

Section V will consider potential mechanisms (i.e., capital projects) to serve future demands and provide recommendations to define a Reclaimed Water Service Area.

1. Reclaimed Water Supply Volumes

The values summarized in **Table III-2** will be used for 'traditional' reclaimed water supply volumes and for purposes of this Plan will be the limiting supply source for service area projections. Augmentation of this supply through non-traditional sources should be considered and pursued as the City begins to shape reclaimed water, or 'irrigation quality', service to customers. Further discussion related to stormwater and other non-traditional sources are provided in **Sections IV** and **V**.

2. Reclaimed Water Demand Projections

Within the City, the Magnolia Point residential development is the main location where irrigation demands are metered separate from household potable water demands. Within this development, irrigation meters are provided for residents so they don't have to pay sewer bills on the water utilized for irrigation purposes. To provide a 'planning basis' for future reclaimed water demands associated with residential developments, the following analysis is completed:

- Typical agronomic planning basis;
- Magnolia Point historic review;
- Peaking Factors | Demand Fluctuations; and
- Basis for Future Developments.

a. Planning Basis

Typically, a supplemental irrigation demand (i.e., water supplied above that received by rainfall) is recommended at rate of 0.75" per week which amounts to 39 inches of supplemental watering a year. Upon a general review of the Magnolia Point residential development, the City's largest residential irrigation demand was approximated based on the largest lots within the development. These larger residential lots have dimensions of approximately 120 feet by 240 feet, or 0.70 acres. Assuming approximately 3,500 square feet of the lot is non-irrigable (i.e., house, driveway, sidewalk, etc.) that leaves 25,300 square feet of irrigable area. Utilizing the SJRWMD watering recommendation of 0.75" per week, the anticipated irrigation demand would be as follows:

Residential Irrigation Demand = 25,300 ft^2 * 0.75 in/week * (4.33 weeks/month) * (1 ft/ 12 in) * (7.48 Gal/ ft^3)

= 51,200 gallons/month (1,700 gpd-ADF)

Reviewing the same metrics for a 1/4 acre lot and approximately 2,500 square feet of non-irrigable area results in the following irrigation demand:

Residential Irrigation Demand = 8,400 ft^2 * 0.75 in/week * (4.33 weeks/month) * (1 ft/ 12 in) * (7.48 Gal/ ft^3)

= 17,000 gallons/month (550 gpd-ADF)

b. Magnolia Point Analysis

Many Magnolia Point residential service connections currently have separate potable irrigation meters. From September 2012 to August 2014, an average of 345 connections had separate irrigation meters that were active (i.e., irrigating). These 'active' meters had an average irrigation demand of 12,200 gallons per month or 400 gpd ADF. This value is less than anticipated from the 'planning metrics' outlined above, and the differential is likely due to less irrigable acreage per connection as well as a general trend toward more water conservation as it relates to irrigation practices.

Table III-3 summarizes the findings for these connections.

City of Green Cove Springs
Reclaimed Water System Master Plan
M&A Project 8905-33-1
Table III-3: Typical Magnolia Point Irrigation Use

	January			February			March			April			May			June		
	No. of Active	Use		No. of Active	Use		No. of Active	Use		No. of Active	Use		No. of Active	Use		No. of Active	Use	
Connection Type	Connections	gal/month	gpd-ADF	Connections	gal/month	gpd-ADF	Connections	gal/month	gpd-ADF	Connections	gal/month	gpd-ADF	Connections	gal/month	gpd-ADF	Connections	gal/month	gpd-ADF
Residential Irrigation '12																		
Residential Irrigation '13	355	9,082	303	363	14,297	477	351	8,687	290	370	12,144	405	370	15,047	502	383	15,992	533
Residential Irrigation '14	303	8,583	286	256	6,158	205	258	5,510	184	324	8,551	285	347	13,602	453	371	17,037	568
Maximum	355	9,082	303	363	14,297	477	351	8,687	290	370	12,144	405	370	15,047	502	383	17,037	568
Minimum	303	8,583	286	256	6,158	205	258	5,510	184	324	8,551	285	347	13,602	453	371	15,992	533
Average	329	8,833	294	310	10,227	341	305	7,098	237	347	10,348	345	359	14,325	477	377	16,514	550

	July			August			September			October			November			December		
	No. of Active	Use		No. of Active	Use		No. of Active	Use		No. of Active	Use		No. of Active	Use		No. of Active	Use	
Connection Type	Connections	gal/month	gpd-ADF	Connections	gal/month	gpd-ADF	Connections	gal/month	gpd-ADF	Connections	gal/month	gpd-ADF	Connections	gal/month	gpd-ADF	Connections	gal/month	gpd-ADF
Residential Irrigation '12							361	16,296	543	366	14,858	495	376	14,257	475	388	13,185	439
Residential Irrigation '13	356	14,249	475	321	11,557	385	341	11,500	383	337	11,671	389	334	12,481	416	332	10,364	345
Residential Irrigation '14	361	15,040	501	365	13,541	451												
Maximum	361	15,040	501	365	13,541	451	361	16,296	543	366	14,858	495	376	14,257	475	388	13,185	439
Minimum	356	14,249	475	321	11,557	385	341	11,500	383	337	11,671	389	334	12,481	416	332	10,364	345
Average	359	14,645	488	343	12,549	418	351	13,898	463	352	13,264	442	355	13,369	446	360	11,774	392

	Per Connection			Total	
Overall	Connections	gal/month	gpd-ADF	gal/month	gpd-ADF
Maximum	388	17,037	568	6,320,800	210,693
Minimum	256	5,510	184	1,421,630	47,388
Average	345	12,237	408	4,311,448	143,715

Max/Average	1.1	1.4	1.4	1.5	
Max/Min	1.5	3.1	3.1	4.4	

c. Peaking Factors | Demand Fluctuations

The current irrigation practices of the 345 'active' Magnolia Point irrigation homes represents approximately 0.142 MGD (ADF) of potential reclaimed water demand. This results in an average demand of 410 gpd (ADF) per lot or 12,200 gallons per month (gal/mo).

Based on the same September 2012 to August 2014 time period, the monthly irrigation demand for the 345 homes varied between a low of 1,422,000 gal/mo to a high of 6,320,800 gal/mo. Between the monthly high and monthly low, the differential is 440%. As another review, the irrigation demand is reviewed as it relates to irrigation limitations of two (2) days per week during daylight savings (mid-March to November) and one (1) day per week during all other times. While this restriction does not apply to reclaimed water irrigation, it is provided as guidance related to what is considered a 'reasonable' amount of irrigation. At the Harbor Road WTP, the peak flow from the high service pumps during 'irrigation' cycles can be as high as 1,400 gpm and includes some potable demands such as showering, bathing, and other in-house demands. When compared against the overall 'average' monthly demands of 100 gpm, the resulting peaking factor is 12 to 14 (1,400 gpm/100 gpm).

It is anticipated each of the ERU connections would have an irrigation system that would have an instantaneous demand of approximately 10 to 15 gpm *(10 gpm will be used for projections)*. In addition, if watering occurred as prescribed by the SJRWMD, then odd-numbered homes would have two (2) days available for watering, even-numbered homes a separate two-day grouping, and non-residential on another two-day period. Watering times are also restricted to approximately 15 hours of the day from times after 4 p.m. and before 10 a.m. For each development, we could conservatively assume 25% of the homes would be irrigating on the same day during their designated watering day, and a large percentage would be irrigating around the same time. Thus, the City should anticipate peak hourly flows that are 6 to 12 times the average daily demands.

d. Basis for Future Developments

It is anticipated that newer development will have greater densities than Magnolia Point resulting in a net reduction of irrigable area. However, the City should plan for a reasonable 'average reuse ERU' demand value that provides some flexibility to address seasonal, daily, and hourly peaks. A value between 400 to 500 gpd (AADF) per ERU may be a prudent value to assess reclaimed water demand. For purposes of this plan, a 500 gpd/ERU value will be utilized. In comparison, the average wastewater supply will likely average between 150 to 250 gpd (AADF) per ERU creating an overall deficit. Therefore, the City must reasonably limit the geographic reclaimed water service area(s) to remain in balance with storage and supply volumes.

Appropriate storage volumes for reclaimed water expansion alternatives will be reviewed herein and in **Section V** along with considerations related to pump station sizing and associated piping based on the aforementioned considerations. Consideration of the facility limitations will assist the City's efforts to ensure reasonable service capabilities to reclaimed water customers.

For future scenarios, the following planning projections will be utilized:

- Residential Demand Projection = 500 gpd/ERU (0.25 Ac lots) (ADF)
- Commercial Demand Projection = 0.75"/week * irrigable area (ADF)
- Maximum Month Projection = 4.0 * ADF
- Peak Hour Demand Projection = 10.0 * ADF

E. FUTURE DEVELOPMENTS AND ESTIMATED NON-POTABLE DEMANDS

To date, the following locations have received future reclaimed water service considerations:

- Reynolds Park [Future Land Use Map (FLUM) Amendment];
- Edgewater Landing;
- Magnolia Point Phase 8; and
- Existing Magnolia Point residential development areas.

The locations for these demand nodes are provided in **Figure III-5**, and will be reviewed as follows:

1. Reynolds Park Demands

Various alternatives and potential development options were reviewed as part of the Reynold's FLUM Amendment. The anticipated 'maximum' wastewater production from the development was estimated at 3.61 MGD (AADF), but specific reclaimed water demands were not provided as development characteristics were unknown. The potential of industrial reclaimed water demand, as well as more traditional irrigation demands, are potential needs for the development. This location represents the largest unknown for the City's future service considerations given the wide flexibility in development alternatives.

Based on the materials provided by Reynolds, the development will be a mixed-use type of construction. To provide the most flexibility for future construction, Reynolds developed their FLUM Amendment to allow for a variety of development options. The lack of definition impedes opportunities to define or estimate future reclaimed water demands. Specific commercial and/or industrial construction beyond allowable floor areas are not known or located within the FLUM Amendment materials. In total, three broad options were reviewed for the FLUM Amendment analysis and they were named:

(a) Maximum Residential;
(b) Maximum Commercial; and
(c) Maximum Industrial.

The various aspects of each alternative are summarized in **Table III-4**.

TABLE III-4

REYNOLDS PARK FLUM AMENDMENT

ALTERNATIVE DEVELOPMENT CHARACTERISTICS

Scenario	Max. Residential Units (ERU)	Max. Commercial Area	Max. Industrial Area	Max. Institutional Area
Max. Residential	3,900	90 Acres	75 Acres	5 Acres
Max. Commercial	3,000	170 Acres	75 Acres	5 Acres
Max. Industrial	1,800	115 Acres	230 Acres	5 Acres

SCALE: 1" = 4,500'

EDGEWATER LANDING

HRWRF

MAGNOLIA POINT PHASE 8

MAGNOLIA POINT RESIDENTIAL

ST. JOHNS RIVER

SWRF

REYNOLDS PARK

MAGNOLIA POINT GOLF COURSE

TO ST. JOHNS COUNTY

LEGEND:
- CITY LIMITS
- W&S SERVICE AREA
- EXISTING RECLAIMED WATER CUSTOMER
- FUTURE RECLAIMED WATER CUSTOMER

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CITY OF GREEN COVE SPRINGS
Reclaimed Water System Master Plan
Reclaimed Water Customer Locations
Clay County, Florida

FIGURE III-5
June 2016
Project No. 8905-33-1

It is anticipated that residential growth will include vertical developments such as condominiums or other attached construction that will limit irrigable demands. However, specific development characteristics are not known.

To provide some basis of irrigation demands, the ERU demand basis developed within this Plan will be utilized. For overall residential demands, the maximum residential unit count will be reduced by 40% to account for vertical development that will limit irrigation demands. Based on this requirement, the potential irrigable demands for the residential component varies between:

- Min. Residential Irrigation Demand = 1,800 ERU * 0.60 * 500 gpd/ERU
  = 540,000 gpd (AADF)

- Max. Residential Irrigation Demand = 3,900 ERU * 0.60 * 500 gpd/ERU
  = 1,170,000 gpd (AADF)

These average demand values on a maximum month and peak hour demand basis are summarized as follows:

- Min. Residential Irrigation Demand = 540,000 gpd * 4.0 peaking factor
  = 1,500 gpd (2.16 MGD) [Max. Month]

  = 540,000 gpd * 10.0 peaking factor
  = 3,750 gpm (5.4 MGD) [Peak Hour]

- Max. Residential Irrigation Demand = 1,170,000 gpd * 4.0 peaking factor
  = 3,250 gpm (4.68 MGD) [Max. Month]

  = 1,170,000 gpd * 10.0 peaking factor
  = 8,125 gpm (11.7 MGD) [Peak Hour]

2. Edgewater Landing Demands

This residential development is located on the northerly limits of the City's W&S Service Area and consists of approximately 190 single-family detached homes. Lots are anticipated to be 0.25 Acres or less. Thus, the 500 gpd/ERU planning basis will be utilized for average demand projections.

In sum, the reclaimed water demand projections are summarized as follows:

- Average Demand = 190 ERUs * 500 gpd/ERU
  = 95,000 gpd-AADF (65 gpm)

- Maximum Month Demand = 95,000 gpd-AADF * 4.0 Peaking Factor
  = 380,000 gpd-Max Month (265 gpm)

- Peak Hour Demand = 95,000 gpd-AADF * 10.0 Peaking Factor
  = 660 gpm (950,000 gpd)

Within the CR 209 and 315 corridor, additional development potential is currently being reviewed by the City. In addition, developments within the CCUA service area may also desire service from the City. Therefore, demand projections in this part of the City's W&S Service Area could easily increase beyond the demands currently estimated for Edgewater Landing.

Those potential developments near Engewater Landing include two developments named the Black Creek Marina (located along US 17 at Black Creek) and Traceland (located in CCUA territory off of CR 315 just west of the CSX railroad). Each development is anticipating 75 units each. A 75 unit development would have the following demand aspects:

- Average Demand = 75 ERUs * 500 gpd/ERU
  = 37,500 gpd-AADF (25 gpm)

- Maximum Month Demand = 37,500 gpd-AADF * 4.0 Peaking Factor
  = 150,000 gpd-Max Month (105 gpm)

- Peak Hour Demand = 37,500 gpd-AADF * 10.0 Peaking Factor
  = 260 gpm (375,000 gpd)

These locations are reviewed further in **Section V**.

3. Magnolia Point Phase 8 Demands

This residential area is a final phase within the Magnolia Point development. The area was developed with central reclaimed water distribution piping and

services. This phase included 121 single-family detached homes. Using the same planning basis, the demand projections are as follows:

- Average Demand = 121 ERUs * 500 gpd/ERU
  = 60,500 gpd-AADF (40 gpm)

- Maximum Month Demand = 60,500 gpd-AADF * 4.0 Peaking Factor
  = 242,000 gpd-Max Month (170 gpm)

- Peak Hour Demand = 60,500 gpd-AADF * 10.0 Peaking Factor
  = 450 gpm (605,000 gpd)

4. Existing Magnolia Point Demands

As noted previously, approximately 350 single-family detached homes currently have separate potable water irrigation meters. For those lots without separate irrigation meters, the only central system available for irrigation water is the potable water distribution system. In total, an estimated 715 lots exist within the various phases. The reclaimed water demand projections for the entire service area demand are summarized as follows:

- Average Demand = 715 ERUs * 500 gpd/ERU
  = 358,000 gpd-AADF (250 gpm)

- Maximum Month Demand = 358,000 gpd-AADF * 4.0 Peaking Factor
  = 1,432,000 gpd-Max Month (995 gpm)

- Peak Hour Demand = 358,000 gpd-AADF * 10.0 Peaking Factor
  = 2,500 gpm (3.6 MGD)

5. Demand Summary

Table III-5 summarizes the demand projections for the aforementioned developments.

TABLE III-5 CONCEPTUAL DEVELOPMENT RECLAIMED WATER DEMAND PROJECTION SUMMARY				
Location	**Units (ERU)**	**Average Daily Demand (MGD-ADF)**	**Max. Month Demand (MGD)**	**Peak Hour Demand (gpm)**
Reynolds Park (Min)	1,080	0.540	2.160	3,750
Reynolds Park (Max)	2,340	1.170	4.680	8,125
Edgewater Landing	190	0.095	0.380	660
Black Creek Marina	75	0.038	0.152	265
Traceland	75	0.038	0.152	265
Mag Pt Phase 8	121	0.061	0.244	450
Magnolia Point	715	0.358	1.432	2,500

Figure III-6 provides a map of these locations with the associated reclaimed water demands.

If the demands are aggregated into demand horizons, the following summary could be anticipated:

- **Current Demands:**
  - Magnolia Point = 0.358 MGD (AADF)

- **Near-term Demands | 2016 to 2020 Demand Window:**
  - Edgewater Landing = 0.095 MGD (AADF)
  - Black Creek Marina = 0.038 MGD (AADF)
  - Traceland = 0.038 MGD (AADF)
  - Mag Pt Phase 8 = 0.061 MGD (AADF)
  - **Sum = 0.232 MGD (AADF)**

- **Long-term Demands | Beyond 2020:**
  - Reynolds Park = 0.54 to 1.17 MGD (AADF)

SCALE: 1" = 4,500'

N

EDGEWATER LANDING
ADF = 0.095 MGD
MAX. MONTH = 0.380 MGD
PEAK HOUR = 660 gpm

BLACK GREEK MARINA
ADF = 0.038 MGD
MAX. MONTH = 0.152 MGD
PEAK HOUR = 265 gpm

TRACELAND (CCUA TERRITORY)
ADF = 0.038 MGD
MAX. MONTH = 0.152 MGD
PEAK HOUR = 265 gpm

HRWRF

MAGNOLIA POINT PHASE 8
ADF = 0.061 MGD
MAX. MONTH = 0.244 MGD
PEAK HOUR = 450 gpm

MAGNOLIA POINT
ADF = 0.358 MGD
MAX. MONTH = 1.432 MGD
PEAK HOUR = 2,500 gpm

ST. JOHNS RIVER

MAGNOLIA WEST
(CCUA TERRITORY)

SWRF

REYNOLDS PARK
ADF = 0.52 MGD (MIN.) | 1.17 MGD (MAX.)
MAX. MONTH = 2.16 MGD (MIN.) | 4.68 MGD (MAX.)
PEAK HOUR = 3,750 gpm (MIN.) | 8,125 gpm (MAX.)

MAGNOLIA POINT GOLF COURSE
ADF = 0.15 TO 0.20 MGD
MAX. MONTH = 0.40 MGD

TO ST. JOHNS COUNTY

LEGEND:
- CITY LIMITS
- W&S SERVICE AREA
- EXISTING RECLAIMED WATER CUSTOMER
- FUTURE RECLAIMED WATER CUSTOMER

MITTAUER & ASSOCIATES, INC.
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CITY OF GREEN COVE SPRINGS
Reclaimed Water System Master Plan
Reclaimed Water Spatial Demand Summary
Clay County, Florida

FIGURE III-6
June 2016
Project No. 8905-33-1

Attachment C

Technical Memorandum – Surface Water Discharge Elimination Review
Harbor Road WWTF – NPDES ID FL0020915
City of Green Cove Springs, Florida
Mittauer & Associates, Inc. Project No. 8905-19-1

CCUA Reuse Water Demands

Table C.1 shows recent CCUA reuse consumption relative to wastewater generation on an Equivalent Residential Connection (ERC) basis. **Table C.2** shows the overall surface water discharge and reuse demand for the entire system.

Table C.1
CCUA Water, Wastewater, and Reuse Water Data…...

	Water		Wastewater		Reuse	
FY	ERCs	gpd/ERC	ERCs	gpd/ERC	ERCs	gpd/ERC
2013	48,364	203	43,729	180	8,706	294
2014	49,382	195	44,614	175	9,279	259
2015	49,810	201	45,017	177	9,640	283
2016	51,735	207	46,845	181	10,342	330
2017	52,419	208	47,613	181	10,860	361
2018	53,392	211	48,401	139	11,379	325
2019	54,192	223	49,146	140	11,914	386

Source: 2019 CCUA Biennial Engineering Evaluation & Report.

Table C.2
CCUA Surface Water Discharge and Reuse Water Data…...

Year	Average Reuse Water Availability (MGD)	Average Discharge to Surface Waters (MGD)	Total Rainfall (in)	Average Well Augmentation (MGD)	Average Reuse Demand (MGD)	Average Reuse Availability - Demand (MGD)
2007	7.181	3.709	38.55	1.542	5.014	2.167
2008	7.347	3.932	55.56	0.759	3.991	3.356
2009	7.707	4.34	54.63	0.516	3.883	3.824
2010	7.374	3.68	3.709	31.48	0.422	4.116
2011	7.582	2.866	32.01	0.472	5.188	2.394
2012	7.028	3.125	63.43	0.099	4.002	3.026
2013	6.893	3.266	49.03	0.045	3.673	3.221
2014	6.611	3.171	40.89	0.002	3.443	3.169
2015	6.818	3.088	32.88	0.135	3.865	2.952
2016	6.711	2.478	33.87	0.542	4.775	1.936
2007-2016	7.125	3.365	43.23	0.453	4.195	2.93

Source: 2017 CCUA Alternative Water Supply Report.

Attachment D

Technical Memorandum – Surface Water Discharge Elimination Review
Harbor Road WWTF – NPDES ID FL0020915
City of Green Cove Springs, Florida
Mittauer & Associates, Inc. Project No. 8905-19-1

2015 Wastewater System Master Plan - Effluent Disposal

ATTACHMENT P

ALTERNATIVE NO. 3 | REGIONAL EXPANSION ANALYSIS

For this scenario the entire Service Area's needs are proposed to be addressed through a regional WWTP that would consolidate treatment of the City's North and South Service Area. Through discussions related to the Reynolds FLUM Amendment and other regional reviews such as the 2008 Wastewater System Master Plan, the City's intention was to consolidate wastewater treatment service in the South Service Area. The main driver for this approach was the anticipated shift in wastewater service needs caused by the Reynolds redevelopment (i.e., demand center shift from north-north center of town to the southern limits of the City).

In the near-term, a consolidated facility away from the existing sites causes one (1) significant complication related to effluent disposal requirements. Without the river outfall(s) and no near-term reclaimed water delivery location, the City would be required to treat all of the effluent via 'restricted-access' means that are typically land intensive. Therefore, the effluent disposal requirements become a significant factor in siting a WWTP.

For purposes of this alternative, the regional site is anticipated to provide sufficient land area to accommodate the WWTP as well as the near-term effluent disposal requirements. The following review will evaluate the Regional Effluent Disposal Alternatives and then discuss the Regional AWWTP approach which utilizes the oxidation ditch technology.

Regional Effluent Disposal Alternatives

As a result of the near-term effluent disposal needs, three (3) options were evaluated to address this item for the consolidated site. They are summarized as follows:

1. Restricted Access Sprayfield Disposal;
2. Constructed Wetland Disposal; and
3. Rapid Infiltration Basins.

1. Restricted-Access Sprayfield Disposal

Restricted-access sprayfield regulations are found in Chapter 62-610, Part II of the Florida Administrative Code (F.A.C.). Some key, controlling factors related to this type of effluent disposal are summarized as follows:

- Use: Reclaimed water may be applied to pastures and areas used to grow feed, fodder, fiber, or seed crops. Trees, including managed hardwood or softwood plantations, may be irrigated. (*62-610.400(4), F.A.C.*).

For all slow-rate systems involving irrigation of sod farms, forests, fodder crops, pasture land, or similar areas where it is intended that public access shall be restricted, pre-application waste treatment shall result in reclaimed water meeting, at a minimum, secondary treatment and basic disinfection levels before the land application. (*62-610.410(1), F.A.C.*)

A ground water monitoring program shall be established by the permittee and approved by the Department, pursuant to Chapter 62-601 and Rule 62-522.600, F.A.C. (unless otherwise exempted). (*62-610.412(2), F.A.C.*)

- Storage: System storage ponds as described herein *shall not* be required where it is documented in the engineering report that an alternative system (e.g., *permitted surface water discharge*, deep wells) is incorporated into the system design to ensure continuous facility operation. (*62-610.414, F.A.C.*)

- Setbacks: *100 feet* from the edge of the wetted area to buildings that are not part of the treatment facility, utilities system, or municipal operation; or to the site property line. This distance shall be reduced to *50 feet* if the setback is vegetated with trees or shrubs to create a continuous visual barrier at least five feet high to minimize aerosol drift. This distance shall be reduced to *25 feet* if high-level disinfection is provided in addition to the setback vegetation. This distance shall be reduced to *50 feet* if only low trajectory, low pressure nozzles or surface application techniques are used within the outermost *50 feet* of the application area. This distance shall be further reduced to *25 feet* if high-level disinfection is also provided. (*62-610.421, F.A.C.*)

A *500-foo*t setback distance shall be provided from the edge of the wetted area to potable water supply wells, Class I surface waters; or Class II surface waters. This distance shall be reduced to *200 feet* if Class I reliability is provided. This distance shall be reduced to *100 feet* if facility Class I reliability and if high-level disinfection is provided. (*62-610.421, F.A.C.*)

The edge of the wetted area of the land application system shall be at least *100 feet* from outdoor public eating, drinking, and bathing facilities. (*62-610.421, F.A.C.*)

- Loading: Hydraulic loading rates shall be established after considering the ability of the soil-plant system to remove pollutants from the reclaimed water. (*62-610.423, F.A.C.*)

Other factors which shall be considered in establishing loading rates are the infiltration capacity and hydraulic conductivity of the geologic materials underlying the site; the resulting pollutant load shall be within the assimilative capacity of the soil-plant system. Since soil-plant relationships are complex, *the initial design loading rate shall be conservative; a maximum annual average of two inches per week is recommended*. (*62-610.423, F.A.C.*)

For this regional consolidation option, the WWTP effluent would be sprayed to a location where a fixed-head or center-pivot style irrigation system is available to deliver the reclaimed water in accordance with FDEP requirements. Since each WWTP alternative has included AWWT requirements, meeting the rule restrictions for 'restricted-access' effluent disposal is not an issue. The main driver related to this disposal option is the underlying hydraulic conductivity of the soils since it defines how much area is required to irrigate the WWTP flows. FDEP typically defines an initial 'maximum' sprayfield capacity of two (2) inches per week. As discussed further herein, the soils within this region are not highly 'conductive', and could result in hydraulic capacity being limited to values less than two (2) inches per week. Until additional site-specific geotechnical work is completed with associated hydraulic modeling, an application rate varying between 1.0-inches per week and 2.0-inches per week was utilized to determine land area requirements. Potentially, lands within the South Service Area could have application rates below 1.0-inches per week. Confirmation of a 'reasonable' application rate via a geotechnical exploration would be prudent if a sprayfield system was selected as an effluent disposal solution. A consolidated treatment system would likely be sized for a capacity of 1.25 MGD (AADF) resulting in a land area requirement as follows:

Conceptual Sprayfield Area Needs = 1.25 MGD/1.0-inches/week
= [1,250,000 gpd * (1 ft^3/7.48 gal) * (7 days/week) * (12 in/ft)] / [1.0 in/wk]
= 14,050,000 ft^2 * (AC/43,560 ft^2)
= 320 Ac @ 1-inch/week
= 160 Ac @ 2-inch/week

As seen from these calculations, the land area requirements become excessive at these higher flow rates. It is anticipated the sprayfield option would be an interim step until a public-access reclaimed water customer(s) become available.

Pending costs and growth expectations due to the Outer Beltway Construction and/or Reynolds redevelopment, the City may consider a lesser sprayfield capacity of 1.00 MGD (AADF). Current combined flows from the HRWWTP and SWWTP are approximately 0.75 MGD (AADF), and flow projections provided in **Section V** do not anticipate exceeding 1.00 MGD until after 2030. In addition, any regional consolidation anticipates that reclaimed water would continue to be delivered to the Magnolia Point Golf Course. This public-access component would further reduce the required sprayfield capacity.

At a 1.00 MGD effluent disposal capacity, the sprayfield needs are reduced to 0.80 MGD as long as Magnolia Point Golf Course continues to use 0.20 MGD (AADF). The aggregate area needs for a 0.80 MGD (AADF) sprayfield are defined as follows:

- 0.80 MGD (AADF) Sprayfield = 0.8 MGD/1.0-inches/week
  = [800,000 gpd * (1 ft3/7.48 gal) * (7 days/week) * (12 in/ft)] / [1.0 in/wk]
  = 9,000,000 ft^2 * (AC/43,560 ft^2)
  = 210 Ac @ 1-inch/week
  = 105 Ac @ 2-inch/week

Given the flow and 'permitted' application rate uncertainties, a land area of 100 to 150 acres was utilized as the basis within the Regional WWTP and sprayfield acquisition 'screening process'. For this review, it is assumed the Regional WWTP would be sited with the sprayfield. The sprayfield system would provide effluent disposal capabilities until such time as reclaimed water demands were present in the South Service Area.

Siting of the restricted-access sprayfield is a critical component as it relates to setback requirements, hydraulic loading capacity, distance from the WWTP, elevation, etc. The following 'screening' was reviewed as it relates to parcels located 'near' within the South Service Area, City Limits, and beyond into unincorporated areas of the County that are served by CCUA:

- Parcel Map Review (**Figures P-1** and **P-2**);
- Soils Map Review (**Figure P-3**);
- Florida Land Use and Cover Classification System (FLUCCS) Map Review (**Figure P-4**);
- Federal Emergency Management Agency (FEMA) Flood Map Review (**Figure P-5**); and
- Quadrangle Map Review (**Figure P-6**).

Parcel Map Review

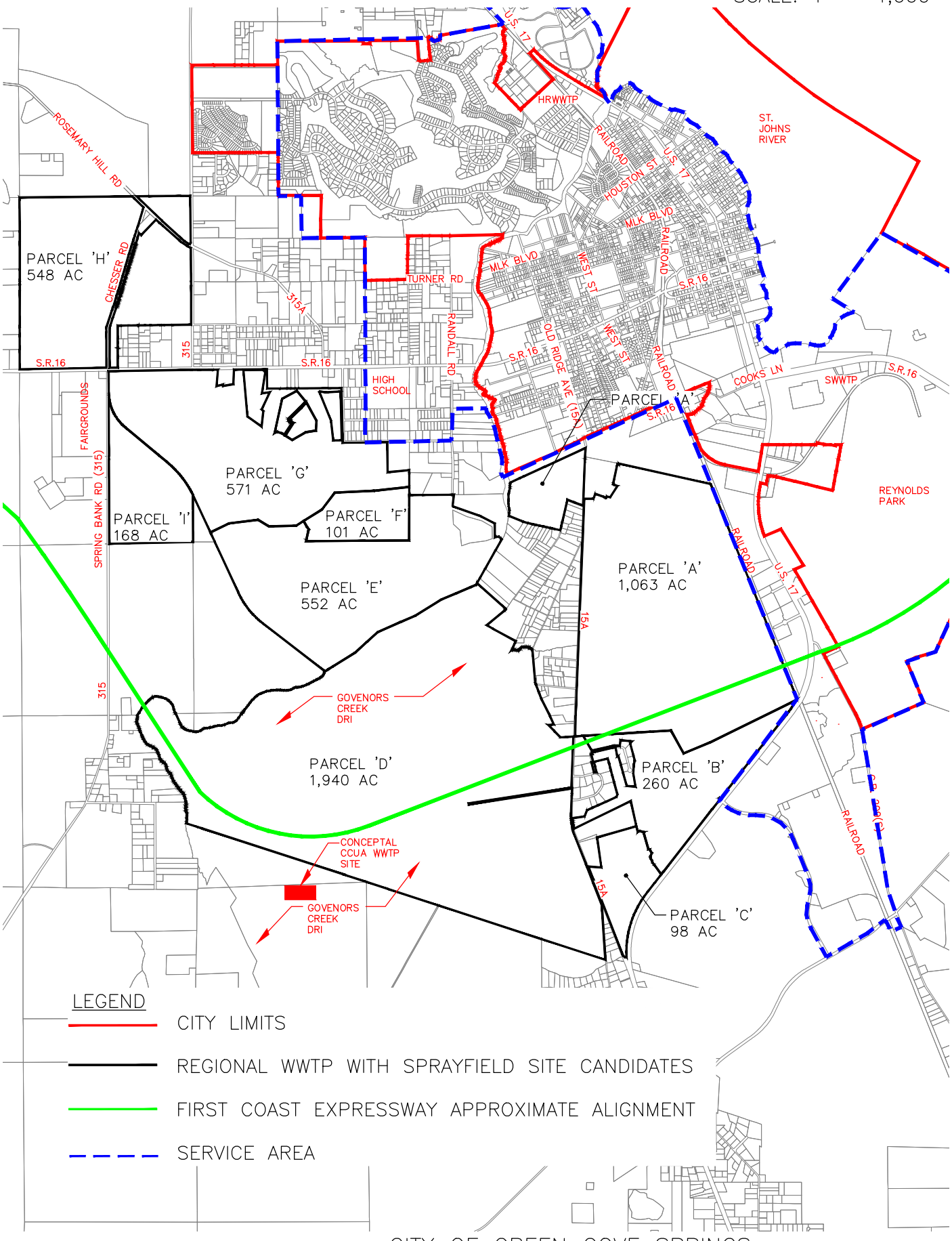
Figure P-1 summarizes a number of potential parcels that are over 100 acres in size and will be reviewed for effluent disposal and regional WWTP siting possibilities. These areas are within or adjacent to the South Service Area, and became logical options to extend pipelines from existing City infrastructure. As noted within the Master Plan, the various FAA recommended buffers from airports to existing or proposed wastewater treatment facilities include a 5-mile; 10,000-foot; and 5,000-foot radially offset that were applied to the Reynolds airfield. As shown in the Master Plan exhibit, the 5-mile offset limits all available land within the City and the City's Service Area. The 5-mile offset also encompasses the Harbor Road WWTP that is approximately 2 miles from the Reynolds airfield. Given the severity of these restrictions and the proposed sprayfield use being similar to other agricultural uses within these offsets, the FAA 5-mile offset is not utilized as a restriction to available parcel review associated with sprayfield siting.

In sum, the following parcels were initially found that met the 100 acre area requirement:

- Parcel 'A': Gustafson's Cattle Inc.
  Parcel ID 38-06-26-016515-000-00
  1,063 Acres

- Parcel 'B': West River Joint Venture
  Parcel ID 38-06-26-016571-001-00
  260 Acres

- Parcel 'C': CAM Development Company, LLC
  Parcel ID 38-06-26-016539-000-00
  98 Acres



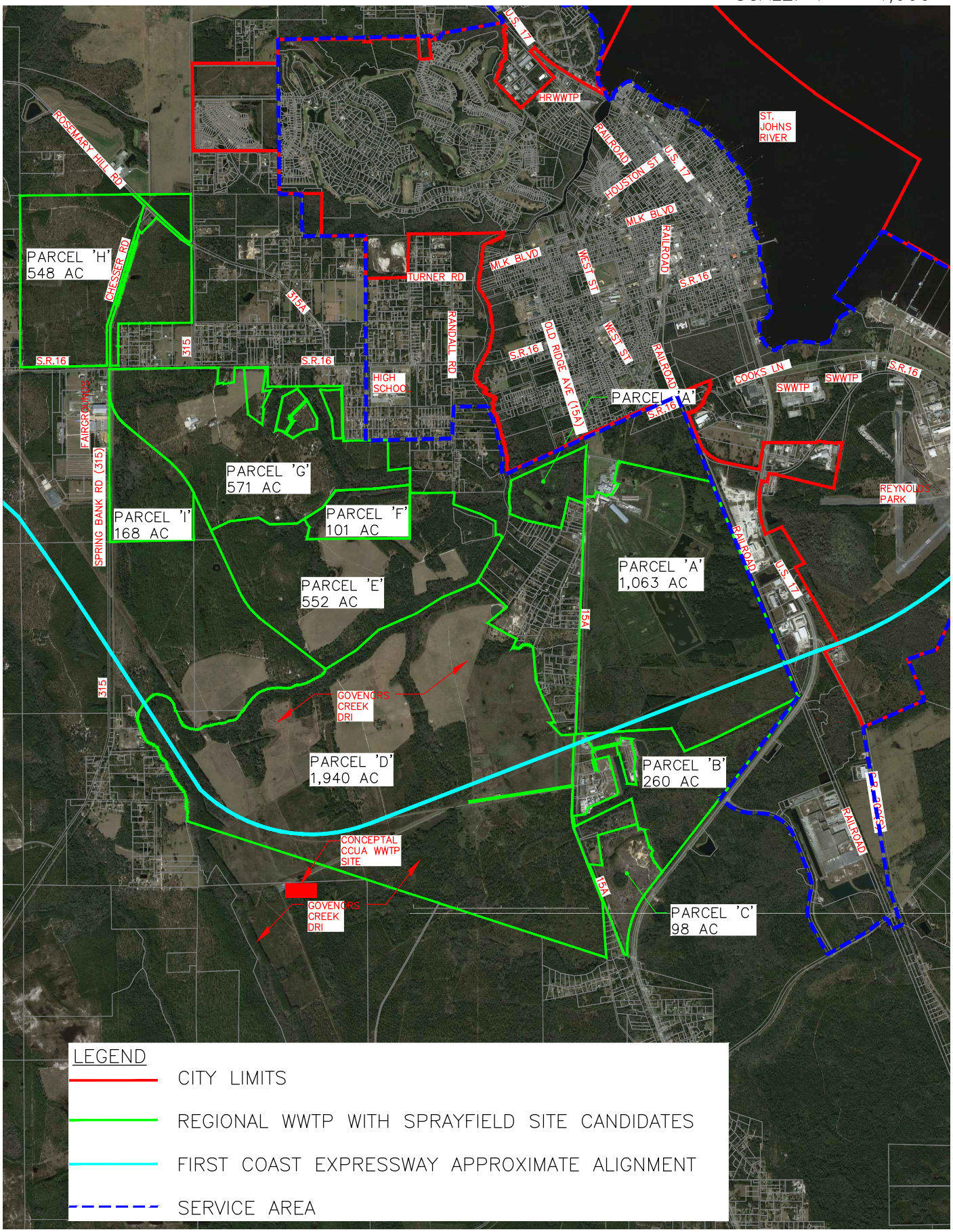
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CITY OF GREEN COVE SPRINGS
Wastewater System Master Plan
Regional WWTP & Sprayfield Disposal Candidate Sites (Parcel Map)
Clay County, Florida

FIGURE
P-1
March 2015
Project No.
8905-31-1

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SCALE: 1" = 4,000'



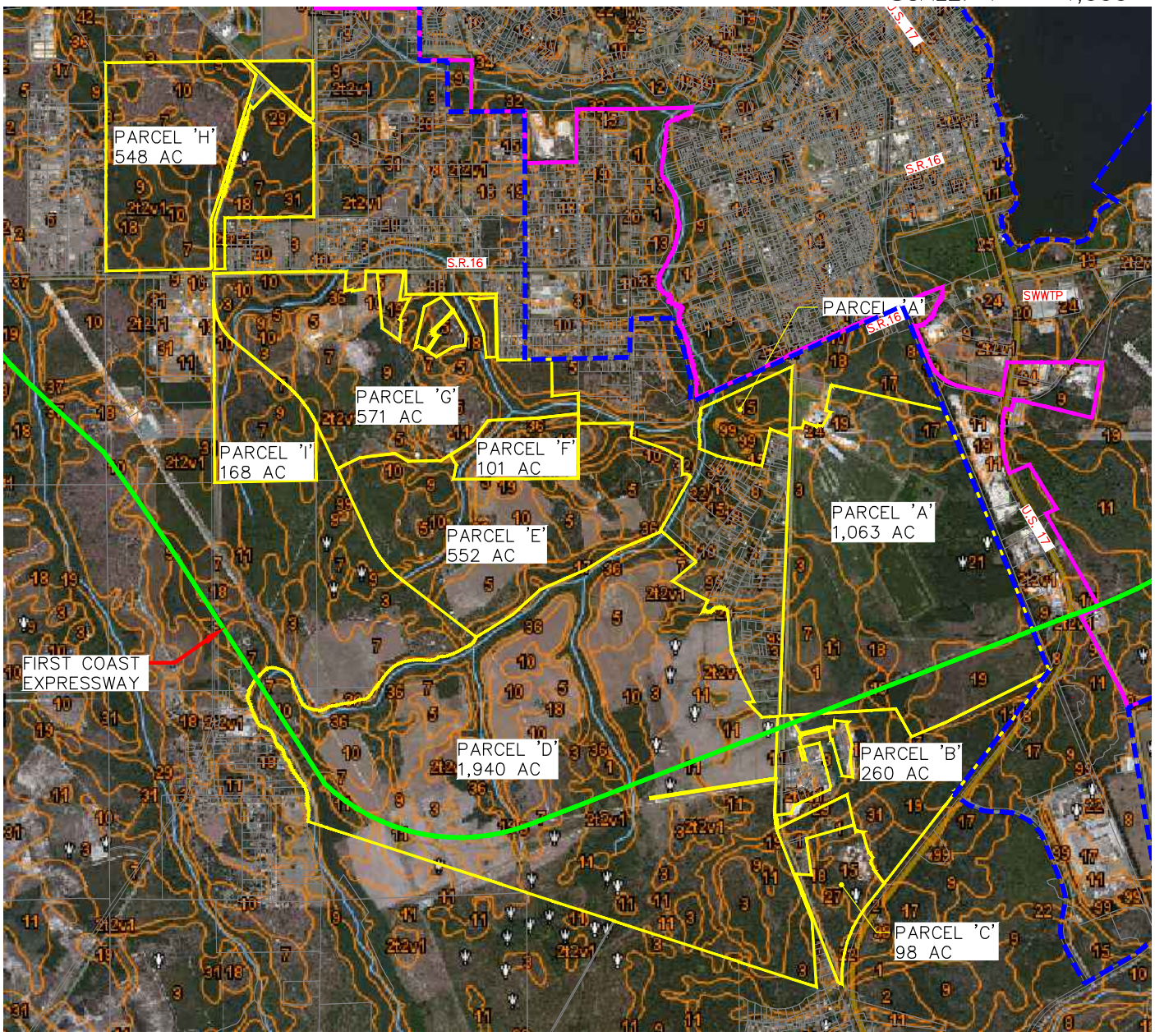
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CITY OF GREEN COVE SPRINGS
Wastewater System Master Plan
Restricted Access Sprayfield Disposal Candidate Sites (Aerial Map)
Clay County, Florida

FIGURE
P-2
March 2015
Project No.
8905-31-1

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SCALE: 1" = 4,000'



1	ALBANY FINE SAND, 0 TO 5 PERCENT SLOPES	22	PELHAM FINE SAND
2	BLANTON FINE SAND, 0 TO 5 PERCENT SLOPES	23	SAPELO–URBAN LAND COMPLEX
2t2v1	CASSIA FINE SAND	24	URBAN LAND
3	HURRICANE FINE SAND, 0 TO 5 PERCENT SLOPES	25	MAUREPAS MUCK, FREQUENTLY
4	OCILLA LOAMY FINE SAND, 0 TO 5 PERCENT SLOPES	27	PAMLICO MUCK
5	PENNEY FINE SAND, 0 TO 5 PERCENT SLOPES	28	SANTEE FINE SANDY LOAM, FREQUENTLY FLOODED
7	CENTENARY FINE SAND, 0 TO 5 PERCENT SLOPES	29	RUTLEGE–OSIER COMPLEX, FREQUENTLY FLOODED
8	SAPELO FINE SAND, 0 TO 5 PERCENT SLOPES	30	ARENTS, SANDY
9	LEON FINE SAND	31	POTTSBURG FINE SAND
10	ORTEGA FINE SAND, 0 TO 5 PERCENT SLOPES	32	BLANTON FINE SAND, 5 TO 8 PERCENT SLOPES
11	ALLANTON AND RUTLEGE MUCKY FINE SANDS, DEPRESSIONAL	34	PENNEY FINE SAND, 5 TO 8 PERCENT SLOPES
12	SURRENCY FINE SAND, DEPRESSIONAL	36	ORTEGA FINE SAND, 5 TO 8 PERCENT SLOPES
13	MEGGETT FINE SAND LOAM	37	RIDGEWOOD FINE SAND, 5 TO 8 PERCENT SLOPES
14	ORTEGA–URBAN LAND COMPLEX, 0 TO 5 PERCENT SLOPES	38	SURRENCY FINE SAND, FREQUENTLY FLOODED
15	QUARTZIPSAMENTS, EXCAVATED	42	OSIER FINE SAND, OCASSIONALLY FLOODED
16	HURICAN–URBAN LAND COMPLEX, 0 TO 5 PERCENT SLOPES	43	PAMLICO MUCK, FREQUENTLY FLOODED
17	PLUMMER FINE SAND	51	POTTSBURG FINE SAND, OCCASIONALLY FLOODED
18	RIDGEWOOD FINE SAND, 0 TO 5 PERCENT SLOPES	62	NEILHURST FINE SAND, UNDULATING
19	OSIER FINE SAND	63	SOLITE FINE SAND
20	SCRANTON FINE SAND	65	MEADOWBROOK SAND
21	GOLDHEAD FINE SAND	99	WATER

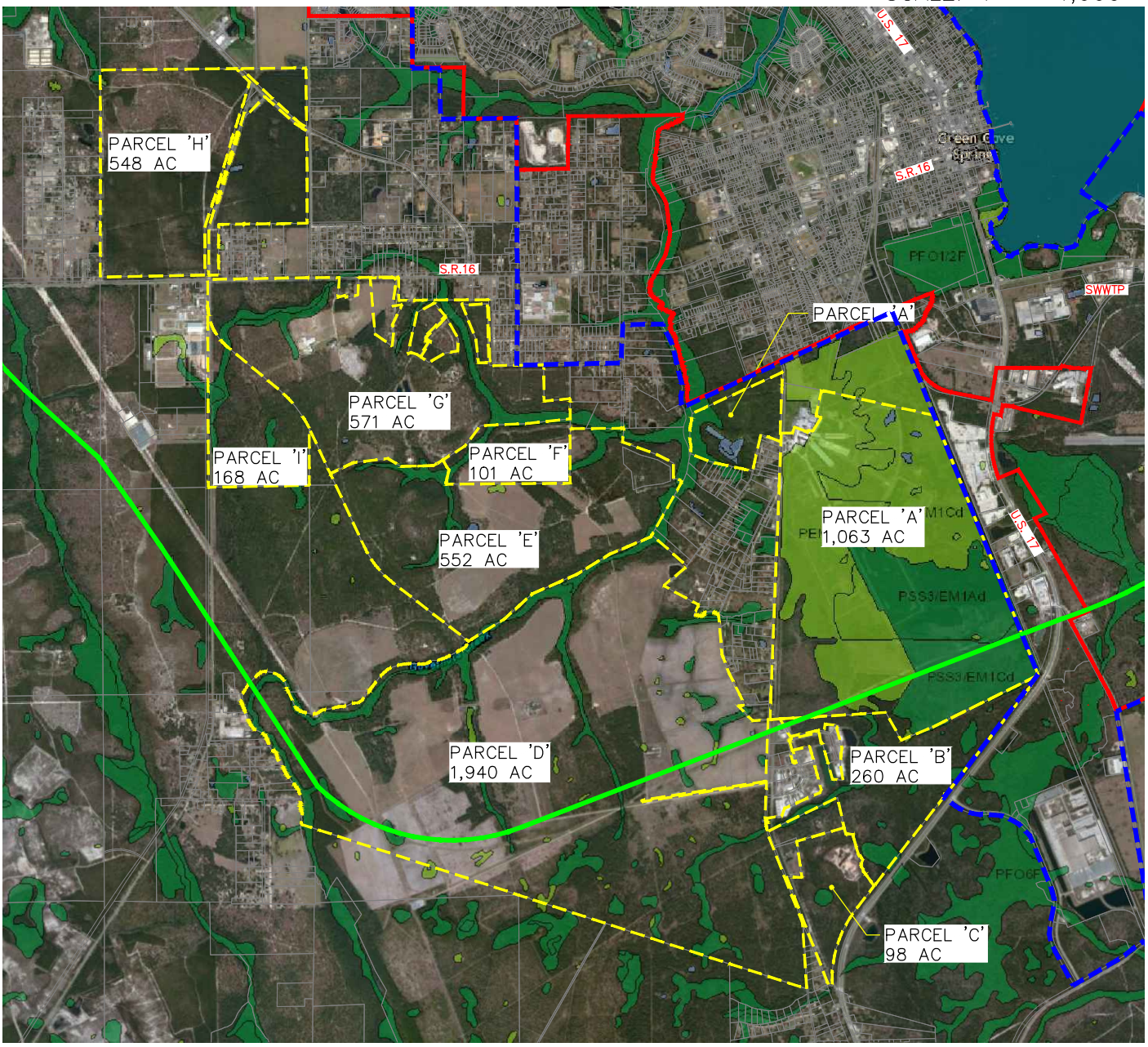
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CITY OF GREEN COVE SPRINGS
Wastewater System Master Plan
Restricted Access Sprayfield Disposal Candidate Sites (Soils Map)
Clay County, Florida

FIGURE
P–3
March 2015
Project No.
8905–31–1

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SCALE: 1" = 4,000'



LEGEND

- CITY LIMITS
- REGIONAL WWTP WITH SPRAYFIELD SITE CANDIDATES
- FIRST COAST EXPRESSWAY APPROXIMATE ALIGNMENT
- SERVICE AREA

Wetlands

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

Scanned Wetlands Maps

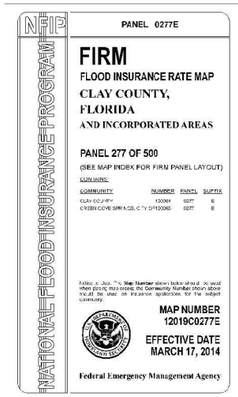
- Scanned Wetlands Maps

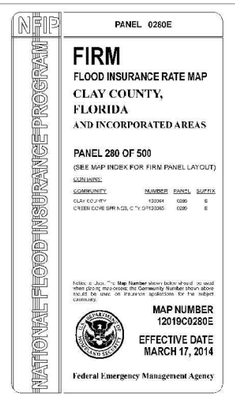
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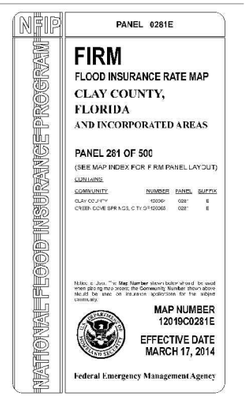
CITY OF GREEN COVE SPRINGS
Wastewater System Master Plan
Restricted Access Sprayfield Disposal Candidate Sites (FLUCCS Map)
Clay County, Florida

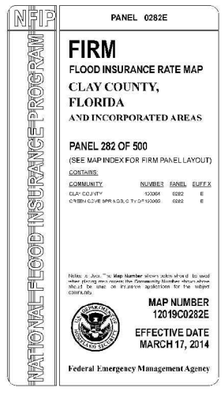
FIGURE P-4
March 2015
Project No. 8905-31-1

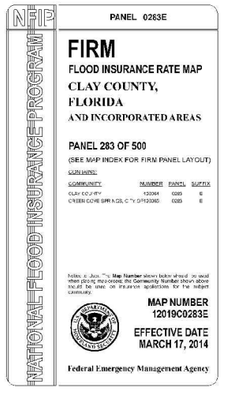
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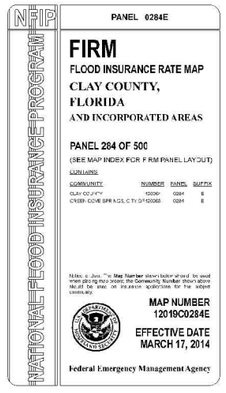


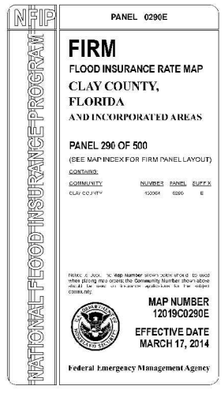


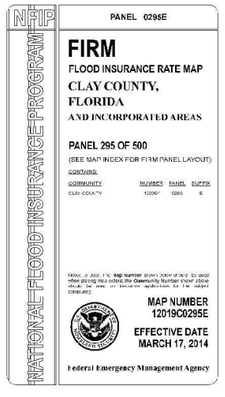












LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

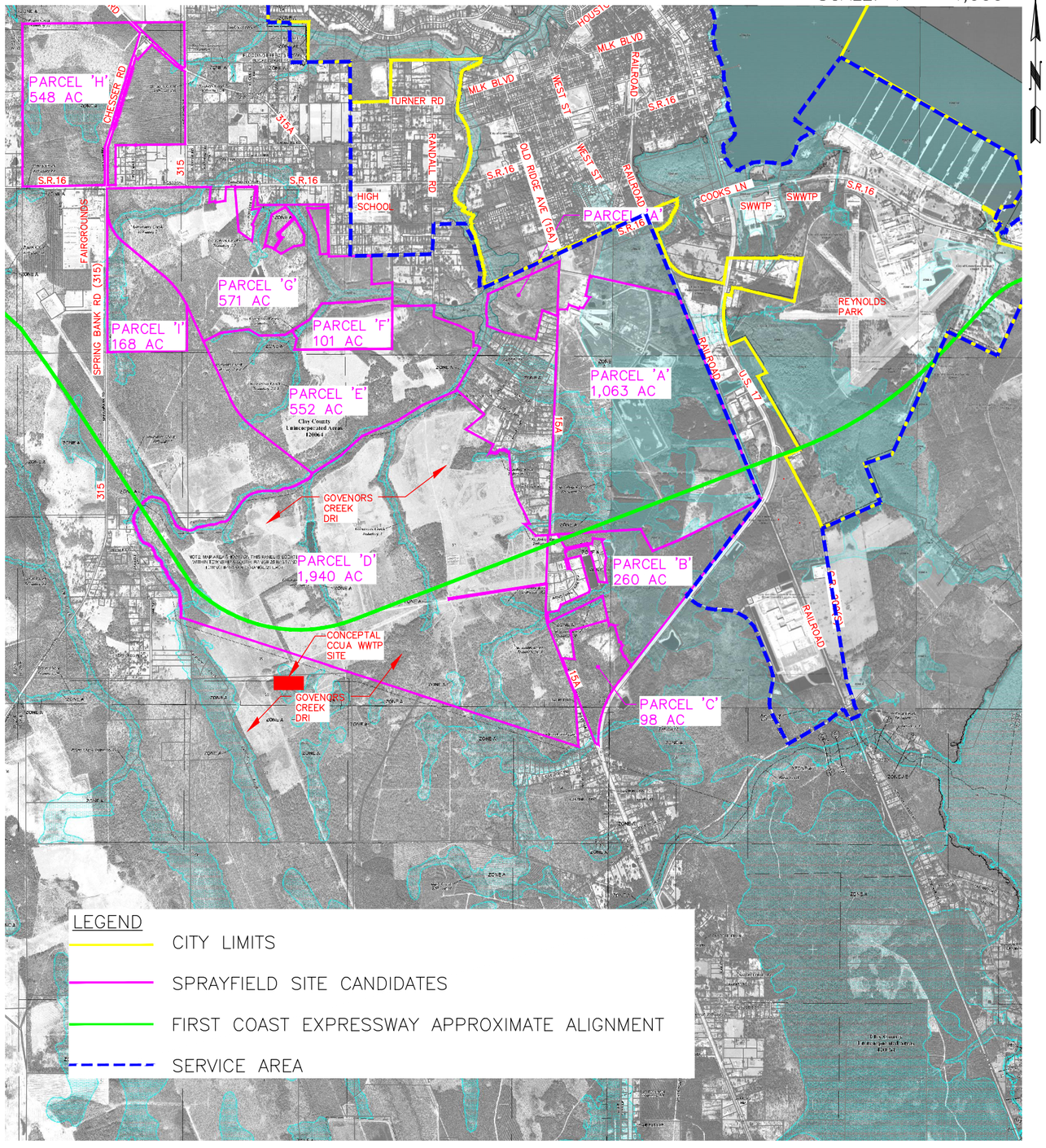
1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
513 (EL 987) — Base Flood Elevation line and value; elevation in feet*
Base Flood Elevation value where uniform within zone; elevation in feet*
* Referenced to the North American Vertical Datum of 1988
A — A — Cross section line
23 — 23 — Transect line
97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4275000mE — 1000-meter Universal Transverse Mercator grid ticks, zone 17
6000000 FT — 5000-foot grid values: Florida State Plane coordinate system, East Zone (FIPSZONE = 0901), Transverse Mercator projection
DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories List on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
March 17, 2014

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

SCALE: 1" = 4,000'



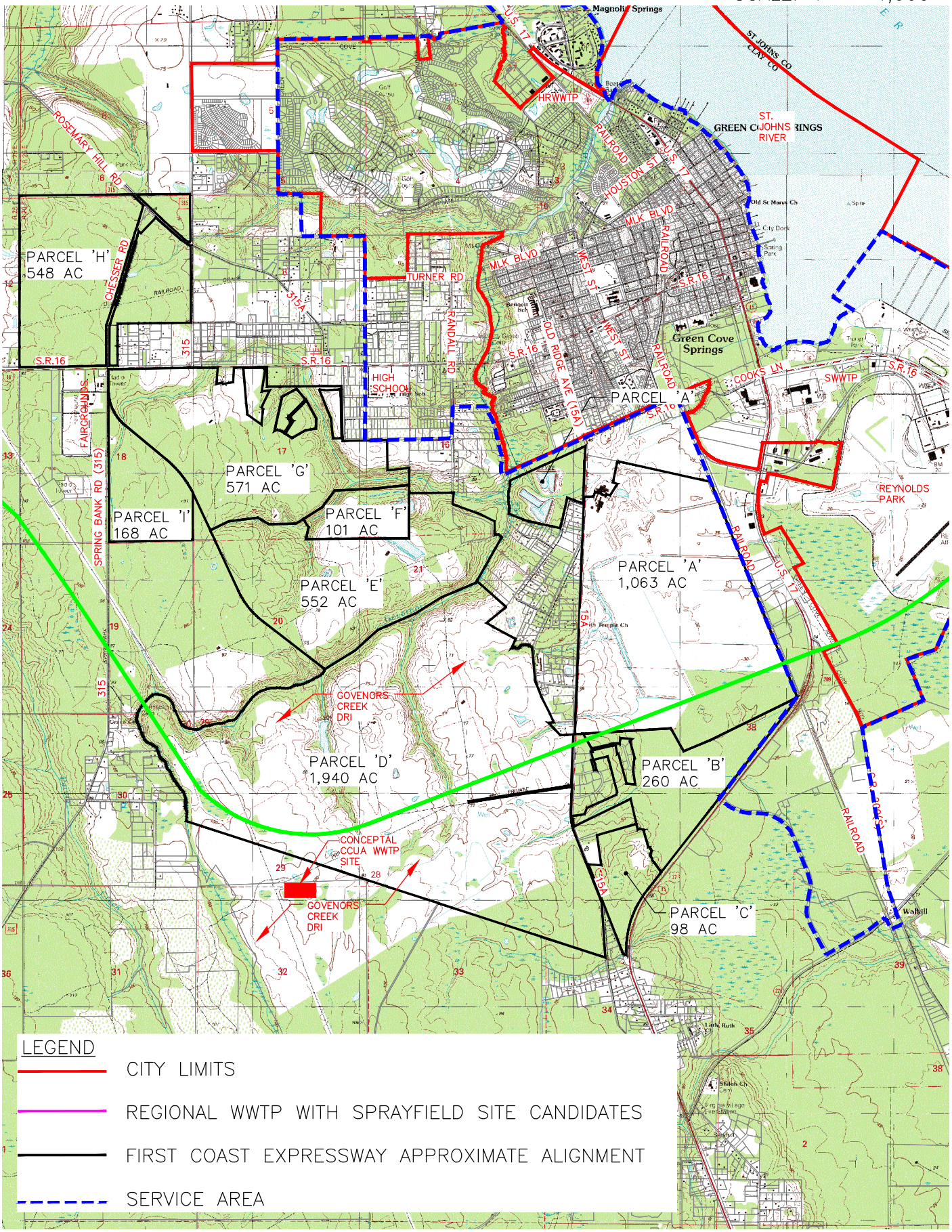
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CITY OF GREEN COVE SPRINGS
Wastewater System Master Plan
Restricted Access Sprayfield Disposal Candidate Sites (FEMA Flood Map)
Clay County, Florida

FIGURE
P-5
March 2015
Project No.
8905-31-1

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SCALE: 1" = 4,000'



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CITY OF GREEN COVE SPRINGS
Wastewater System Master Plan
Restricted Access Sprayfield Disposal Candidate Sites (USGS Map)
Clay County, Florida

FIGURE
P-6
March 2015
Project No.
8905-31-1

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- Parcel 'D': Buttercup Enterprises, LLC
  [Governor's Point Development of Regional Impact (DRI)]
  Parcel ID 38-06-26-016516-000-00
  1,940 Acres

- Parcel 'E': G Bar Ranch South, LLC
  Parcel ID 21-06-26-015610-000-00
  552 Acres

- Parcel 'F': G Bar Ranch South, LLC
  Parcel ID 17-06-26-015574-002-00
  101 Acres

- Parcel 'G': G Bar Ranch South, LLC
  Parcel ID 17-06-26-015574-001-00
  571 Acres

- Parcel 'H': Reinhold Corporation
  Parcel ID 07-06-26-015251-000-00
  548 Acres

- Parcel 'I': Gustafsons Family
  Parcel ID 18-06-26-015601-000-00
  168 Acres

Figure P-2 illustrates these parcel locations on an aerial map. As noted for Parcel 'D', this location has already begun planning for development and completed a DRI. CCUA is also coordinating with this development to site a new WWTP within this parcel to serve the development's needs. We have kept the parcel within the screening analysis to contrast other parcel characteristics, but it is not considered an option for the City's needs.

Other parcels may also have planning complete or other development actions underway that would influence their capabilities for regional wastewater treatment and disposal use. Further, CCUA and Clay County would also require coordination for any selected site that is located outside of the City's Service Area and/or City Limits. For

purposes of this analysis, the main review criteria were limited to environmental factors to determine the most suitable land for the City's long-term use.

Soil Map Review

Figure P-3 illustrates the soils present within each parcel. A summary of the various soils identified per parcel is summarized per soil type and characteristic (Sanitary facility suitability for absorption fields | Permeability | Hydrologic Group) as follows:

- Parcel 'A':
  Osier Fine Sand - 19 [Severe Wetness (poor filter) | 6-20 in/hr | D]
  Goldhead Fine Sand- 21 [Severe Wetness (poor filter) | 0.6-2.0 in/hr | D]

- Parcel 'B':
  Plummer Fine Sand - 17 [Severe Wetness (percs slowly)|0.6 - 2.0 in/hr| D]
  Osier Fine Sand - 19 [Severe Wetness (poor filter) | >20 in/hr | D]

- Parcel 'C':
  Quartzipsaments -15 [No Information]

- Parcel 'D':
  Hurricane Fine Sand - 3 [Severe Wetness (poor filter) | 2.0 - 20 in/hr | C]
  Ortega Fine Sand - 10 [Moderate (wetness) | 6-20 in/hr | A]
  Allanton & Rutledge
  Mucky Fine Sands - 11 [Severe (ponding) | 2-6 in/hr | D]
  Cassia Fine Sand - 2t2v1 [No Information]

- Parcel 'E':
  Penney Fine Sand - 5 [Slight | 6-20 in/hr | A]
  Ortega Fine Sand - 10 [Moderate (wetness) | 6-20 in/hr | A]

- Parcel 'F':
  Penney Fine Sand - 5 [Slight | 6-20 in/hr | A]
  Ortega Fine Sand - 10 [Moderate (wetness) | 6-20 in/hr | A]
  Ridgewood Fine Sand-18 [Severe Wetness | 6-20 in/hr | C]
  Osier Fine Sand - 19 [Severe Wetness (poor filter) | 6-20 in/hr | D]
  Ortega Fine Sand - 36 [Moderate (wetness) | 6-20 in/hr | A]

- Parcel 'G':
  Centenary Fine Sand - 7 [Moderate (wetness) | 2-6 in/hr | A]
  Leon Fine Sand - 9 [Severe (wetness) | 0.6 - 6.0 in/hr | D]
  Cassia Fine Sand - 2t2v1 [No Information]

- Parcel 'H':
  Centenary Fine Sand - 7 [Moderate (wetness) | 2-6 in/hr | A]
  Leon Fine Sand - 9 [Severe (wetness) | 0.6 - 6.0 in/hr | D]
  Cassia Fine Sand - 2t2v1 [No Information]
  Ortega Fine Sand - 10 [Moderate (wetness) | 6-20 in/hr | A]
  Rutledge-Osier Complex-29 [Severe (ponding) | 6-20 in/hr | D]

- Parcel 'I':
  Centenary Fine Sand - 7 [Moderate (wetness) | 2-6 in/hr | A]
  Leon Fine Sand - 9 [Severe (wetness) | 0.6 - 6.0 in/hr | D]

A higher permeability and a Hydrologic Group identification of A or B is desired for sprayfield purposes. Based on these findings, Parcels D (limited areas), E, F, G, H, and I were identified as having the best-suited soils for sprayfield development.

FLUCCS Map Review

Figure P-4 includes the parcel locations and various land use designations. The most limiting would be the wetland designation. Based on the anticipated wetland limits, Parcels D, E, G, H, and I were identified as 'upland' parcels that would best-suited for sprayfield development. However, each had reaches of wetland elements within each parcel.

FEMA Map Review

Figure P-5 includes the parcel locations and 100-year flood plain locations as determined by FEMA. In general, the flood plain locations generally coincide with the wetland parcels. Based on these limits, Parcels C, D, E, F, and G were identified as best-suited for sprayfield development.

Quadrangle Map Review

Figure P-6 includes the parcel locations and depicts general topographic elevations. Those parcels that have been less-suited for sprayfield development also coincide with lower elevations that are similar to the existing SWWTP site elevation. However, elevations rise moving west on SR 16 and a ridge begins to form where elevations

change from 25-feet (NGVD) to levels around 50-feet (NGVD). While providing 'better' land for development, the elevation change will have impacts related to pumping and electrical costs to move effluent to these locations.

Based on the soils, wetlands, and floodplain review, the best-suited parcels for sprayfield development would be Parcels D, E or G. The general elevations of each are: 75 to 100 ft-NGVD (Parcel D); 50 to 75 ft-NGVD (Parcel E); and 25 to 75 ft-NGVD with westerly limits of parcel being mostly 75 ft-NGVD (Parcel G).

Selected Parcel Grouping

Based on the various screening metrics, the three (3) parcels that would be best suited for sprayfield development are: (1) Parcel D, (2) Parcel E, and (3) Parcel G. The Future Land Use Map (FLUM) designation and zoning for each are summarized as follows: Planned Community (Parcel D); Agricultural (Parcel E); and Agricultural (Parcel G). Due to the FLUM designation, DRI completion, and the future expressway construction through Parcel D, it was eliminated from consideration as previously stated. Therefore, Parcels E or G are selected as the most suitable sites.

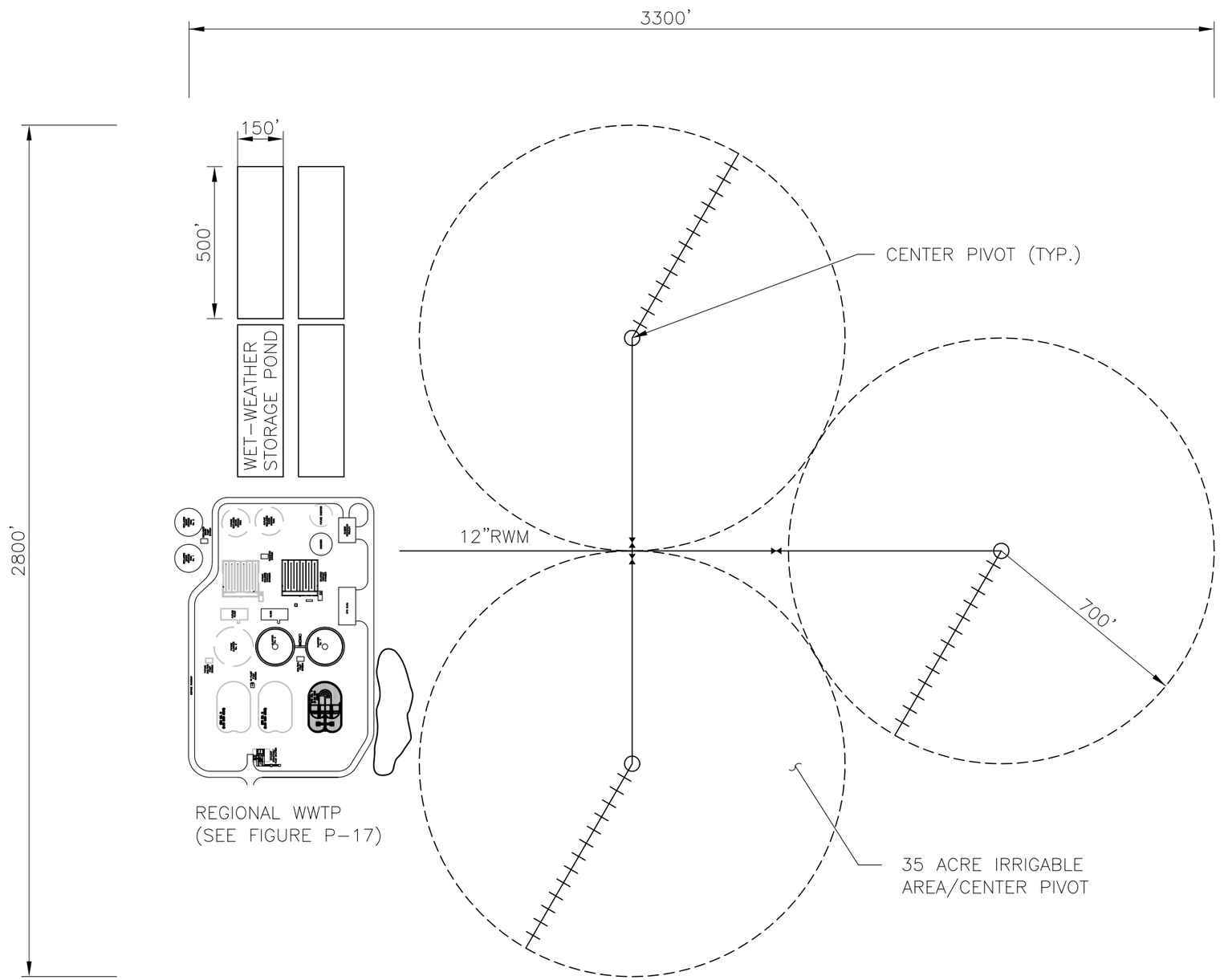
The following components would be required at the regional WWTP in order to serve the 100 to 150 acre sprayfield system:

- Wet-weather Storage Ponds or Ground Storage Tanks;
- Effluent/Reclaimed Water Pump Station;
- Reclaimed Water Main Extension; and
- Sprayfield Improvements.

The required improvements are summarized as follows and conceptually depicted in **Figure P-7**:

- *Wet-weather Storage Ponds:* At the proposed regional location, the City would no longer have the river outfall for wet-weather events. Thus, all effluent would have to be stored on-site or pumped onto the sprayfield site. FDEP requires a minimum of three (3) days of wet-weather storage and actual requirements would be based on water balance with hydrogeologic modeling of the sprayfield soils. For planning purposes, we have assumed a prudent approach of downsizing the 'permitted capacity' of the effluent disposal system to 1.0 MGD (AADF) to minimize storage needs. Assuming seven (7) days of storage would be required, the total storage volume would be 7.00 million gallons (1.00 MGD (permitted capacity) * 7 days). The storage would be provided by high-density polyethylene (HDPE) lined ponds.

SCALE: 1" = 400'



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CITY OF GREEN COVE SPRINGS
Wastewater System Master Plan
South Service Area Regional AWWTP with Sprayfields
Clay County, Florida

FIGURE
P-7
March 2015
Project No.
8905-31-1

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- *Effluent/Reclaimed Water Pump Stations:* Two (2) new reclaimed water pumps (with associated electrical and controls, as needed) would be required to deliver the treated effluent to the wet-weather storage ponds (i.e., Transfer Pumps) and then another duplex pumping system would be required to deliver the stored effluent to the sprayfield system (i.e., Sprayfield Pumps). Preliminary sizing for the Transfer Pumps is 2,750 gpm (4.0 MGD) per pump at 40 ft-TDH with variable frequency controls, and 1,040 gpm (1.5 MGD) per pump at 150 ft-TDH for the Sprayfield Pumps.

- *Reuse Piping Extensions:* A 12-inch header is conceptually proposed from the reuse station to the effluent disposal area. Final hydraulic considerations may result in a different size, but the proposed system would need to be capable of addressing the hydraulic losses in the piping, and provide sufficient pressure to deliver the effluent to the sprayfield irrigation system.

- *Sprayfield Improvements:* Pending if timber activities remain on a selected parcel, the irrigation approach would change. The most cost-effective means of irrigating a large space are through center-pivot devices that are utilized throughout the agricultural industry. They are limited in use due to their circular geometry, but provide a convenient means of irrigating land. For purposes of this plan, a total of three (3) center pivots are proposed have a radius of 700 feet providing a mechanism to irrigate 35 acres per pivot. Local controls would be provided, but these would also be automated and added to the City's existing DFS system for remote control of the pivots. The pivots require 3-phase power provided by the City's electrical system or an on-site generator. The required connection pressure at each pivot is 50 psi (116 ft)

The opinion of probable capital cost is presented in **Table P-1**.

TABLE P-1 SOUTH SERVICE AREA - RESTRICTED ACCESS SPRAYFIELD ALTERNATIVE ENGINEER'S OPINION OF PROBABLE CAPITAL COST	
Description	**Estimated Cost**
1. Sitework and Yard Piping	$50,000
2. Reuse Transfer Pumping Station at Regional WWTP	$150,000
3. 12-inch Reuse Main (7,500 LF @ $50/LF)	$375,000
4. Land Preparation (a) Clear & Grubbing ($10,000/Ac*150 Ac = $1,500,000) (b) Grading ($1,500/Ac*150 Ac = $225,000) © Seeding ($0.50/SY*150 Ac = $363,000)	$2,100,000
5. Center Pivots (3 Each at 700' Radius - $100,000/EA)	$300,000
6. Four (4) 1.75 MG HDPE Lined Storage Ponds (4 * 1.75 MG * $0.20/Gal)	$1,400,000
7. Sprayfield Pump Station	$200,000
8. Electrical & Instrumentation	$600,000
9. Miscellaneous	$100,000
Estimated Construction Costs	$5,275,000
Construction Contingency (15%)	$791,000
TOTAL ESTIMATED CONSTRUCTION	**$6,066,000**
NON-CONSTRUCTION COSTS (15%)	**$910,000**
TOTAL ESTIMATED CAPITAL COST	**$6,976,000**

The opinion of probable O&M costs are presented in **Table P-2**.

TABLE P-2 SOUTH SERVICE AREA - RESTRICTED ACCESS SPRAYFIELD ALTERNATIVE ENGINEER'S OPINION OF PROBABLE O&M COST	
Description	**Estimated Annual Cost**
1. Power (240,000 kwh/yr @ 0.125¢ / kwh)	$30,000
2. Equipment Maintenance / Repair (2% x $500,000)	$10,000
TOTAL	**$40,000**

2. Constructed Wetland Disposal

As noted within the sprayfield disposal review, many of the lands within the South Service Area are low lying areas that have wetlands or are adjacent to wetland areas. While these areas are unsuitable for sprayfield development, the option of constructing a wetland and discharging to a natural wetland system was reviewed to determine if it would be a cost-effective alternative. A detailed analysis of the requirements is provided herein and includes a review of eight (8) potential parcels.

Per the FDEP website, "*There are essentially two general types of domestic wastewater wetlands - natural and man-made (constructed) wetlands. Chapter 62-611, FAC, wastewater to wetlands rule, breaks natural wetlands into receiving and treatment wetlands. The difference between the two is explained below. For permitted purposes the wastewater to wetlands rule further classifies natural wetlands as hydrologically-altered or not. The intent of classifying certain wastewater wetlands as hydrologically-altered is to restore or prevent a previous or potential loss of wetland acreage. The use of hydrologically-altered wetland as well as creating wetlands for effluent polishing are both considered reuse of reclaimed water activities, according to Chapter 62-610, FAC.*

Some domestic wastewater facilities utilize a combination of more than one of these types, typically man-made wetlands and natural wetlands. There are 17 natural (both treatment and receiving) wastewater wetlands comprising roughly 6,200 acres and a total of 21 constructed wetland sites comprising roughly 4,000 acres across Florida. Of those, 5 facilities use a combination of both natural and constructed wetland systems, making that a total of 33 permitted domestic wastewater wetland sites in the state of Florida."

Notwithstanding the provisions in 62-611, F.A.C., the FDEP is permitting the constructed 'man-made' wetlands through Part III of Rule 62-610, F.A.C. The constructed wetland would be permitted in the same manner as either a lined or an unlined storage pond based on the provisions within the aforementioned rule. Furthermore, the use of a constructed wetland upstream of a natural receiving wetland allows many of the wetland monitoring requirements to be removed from consideration.

Operation of the facility would be very similar to current HRWWTP operations. A summary of some provisions applicable to this option are provided as follows:

- Use: Public-access reuse system having high-level disinfection requirements and removal of TSS to concentrations below 5 mg/l. (*62-610.450 & .460, F.A.C.*)

  Class I reliability required and multiple aeration basins are not required for an oxidation ditch facility. (*62-610.462, F.A.C.*)

  Groundwater monitoring will be required. (*62-610.463, F.A.C.*)

- Storage: System storage ponds shall not be required where another permitted reuse system or effluent disposal system is incorporated. (*62-610.464, F.A.C.*)

- Setbacks: No provision of access control required, but the public shall be notified of the use of reclaimed water. (*62-610.468, F.A.C.*)

  75-foot setback from wetted areas to potable water wells. (*62-610.468, F.A.C.*)

  200-foot setback from unlined storage ponds to potable water wells and may be reduced to 75 feet. (*62-610.468, F.A.C.*)

- Class I: If the constructed wetland discharged into Class I waters of the state, then additional restrictions would apply through Part V of Rule 62-610. However, it appears all discharges would be to Class III waters.

Constructed wetlands have the benefit of removing the mechanical components from the treatment system and are considered 'passive treatment'. They can be a cost-effective and environmentally conscious treatment technology that can be utilized as a recreation and educational resource. These wetlands are similar to natural wetlands because they include areas of open water, floating vegetation, and emergent vegetation. They offer habitat benefits similar to natural wetlands and attract a variety of wildlife. The purpose of the wetlands is to 'polish' effluent from secondary treatment processes. Within this alternative, the conceptual approach is to provide a constructed wetland system for effluent disposal options and not to provided specific treatment. As noted for other alternatives, it is assumed this

effluent disposal alternative would receive wastewater from the South WWTP having an 'influent' water quality of 5 mg/l (BOD_5) | 5 mg/l (TSS) | 3 mg/l (TN) | 1 mg/l (TP).

Within wetland treatment systems, TN treatment (i.e., removal) largely occurs in the first 'lined' cells of a constructed wetland system where inflow concentrations are greatest. Following this stage of treatment, the wetland cells are modified to unlined versions where the treated water is able to infiltrate to groundwater. Each wetland cell contains a deeper inlet area (at least 3 feet in depth) to prevent short-circuiting and limit certain plant growth. Downstream of this area is the marsh zone with a targeted depth of approximately 1 foot, which fluctuates based on weather patterns. A typical wetland cell profile is presented in **Figure P-8**.

For purposes of estimating the wetland area needs, the 62-611, F.A.C. rule basis will be utilized. Site specific analysis may allow for smaller land area requirements, but for purposes of this Plan the hydraulic loading, TN loading, and TP loading requirements will be utilized as defined within Rule 62-611, F.A.C. Each are evaluated as follows:

- Hydraulic Loading:
  Per rule, the minimum detention time required within the wetland cell would be 14 days. Since wetland disposal is less land intensive, a 1.00 MGD flow range is reviewed.

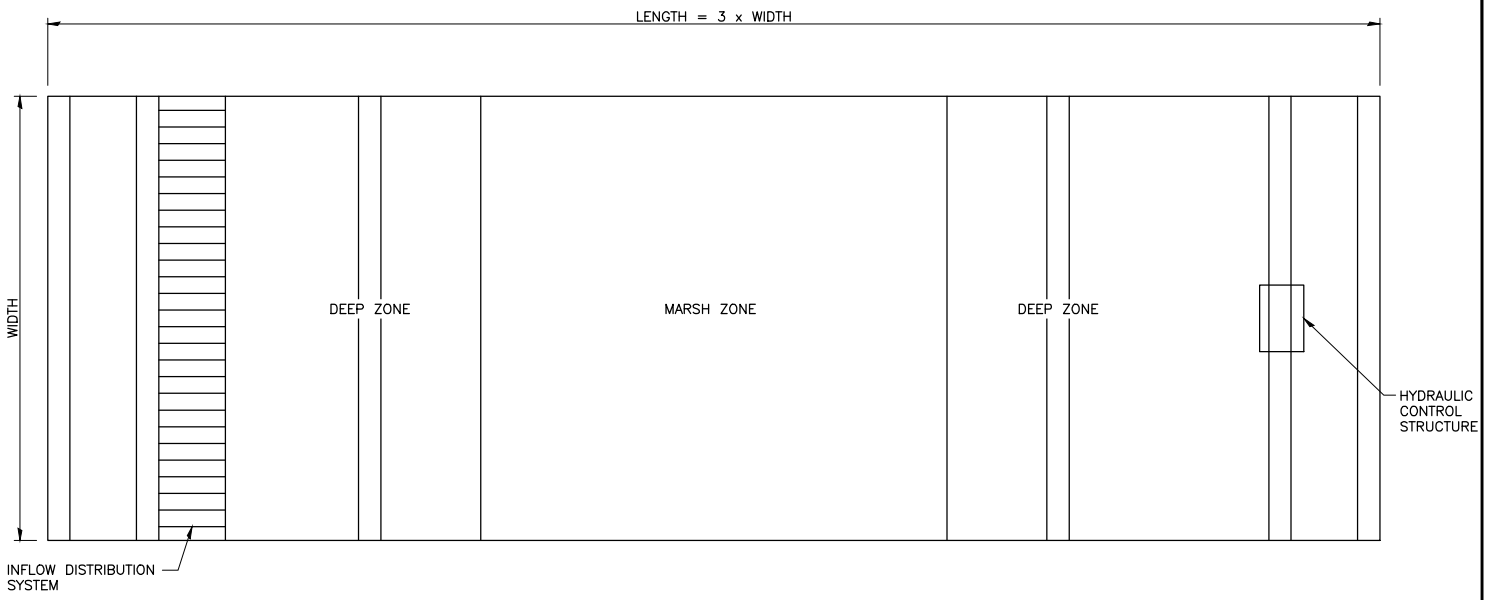
  Volume Requirements = 1.00 MGD * 14 days = 14 MG

  A typical wetland system has an operating depth of approximately one (1) foot. The land area needs at this operating depth are calculated as follows:

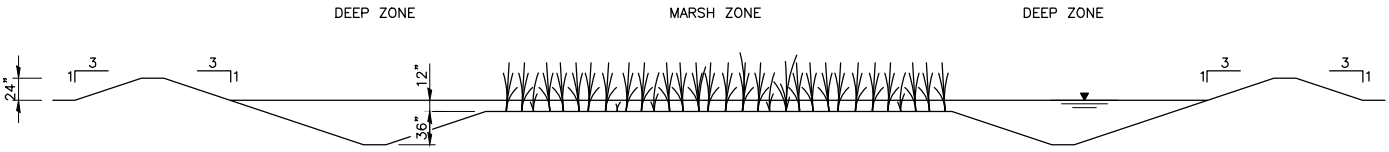
  Area Requirements = 14 MG * (ft^3/7.48 gal) * (1/ 1 ft) * (Ac/43,560 ft^2)
  = 43 Acres @ 1.00 MGD

- TN Loading:
  Per rule, the maximum TN loading within a wetland system is 25 grams per square meter per year (25 g/m^2/yr). This restriction is analyzed based on a TN concentration of 3 mg/l coming from the South WWTP.
  TN Requirements = 1.00 MGD * 8.34 lb/MGD-mg/l * 3 mg/l * 365 days/yr
  = 9,132 ppy * (1/25 g/m^2/yr) * (g/0.0022 lb)
  = 166,050 m^2 * (0.000247105 Ac/m^2)
  = 41 Acres @ 1.00 MGD

SCALE: NTS



PLAN



PROFILE

MITTAUER & ASSOCIATES, INC.
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CITY OF GREEN COVE SPRINGS
Wastewater System Master Plan
Typical Treatment Wetland Cell Plan and Profile View
Clay County, Florida

FIGURE
P–8
March 2015
Project No.
8905–31–1

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- TP Loading:
  Per rule, the maximum TP loading within a wetland system is 3 grams per square meter per year (3 $g/m^2/yr$). This restriction is analyzed based on a TP concentration of 1 mg/l coming from the South WWTP.

  TP Requirements = 1.00 MGD * 8.34 lb/MGD-mg/l * 1 mg/l * 365 days/yr
  = 3,044 ppy * (1/25 $g/m^2/yr$) * (g/0.0022 lb)
  = 461,230 m^2 * (0.000247105 Ac/m^2)
  = 114 Acres @ 1.00 MGD

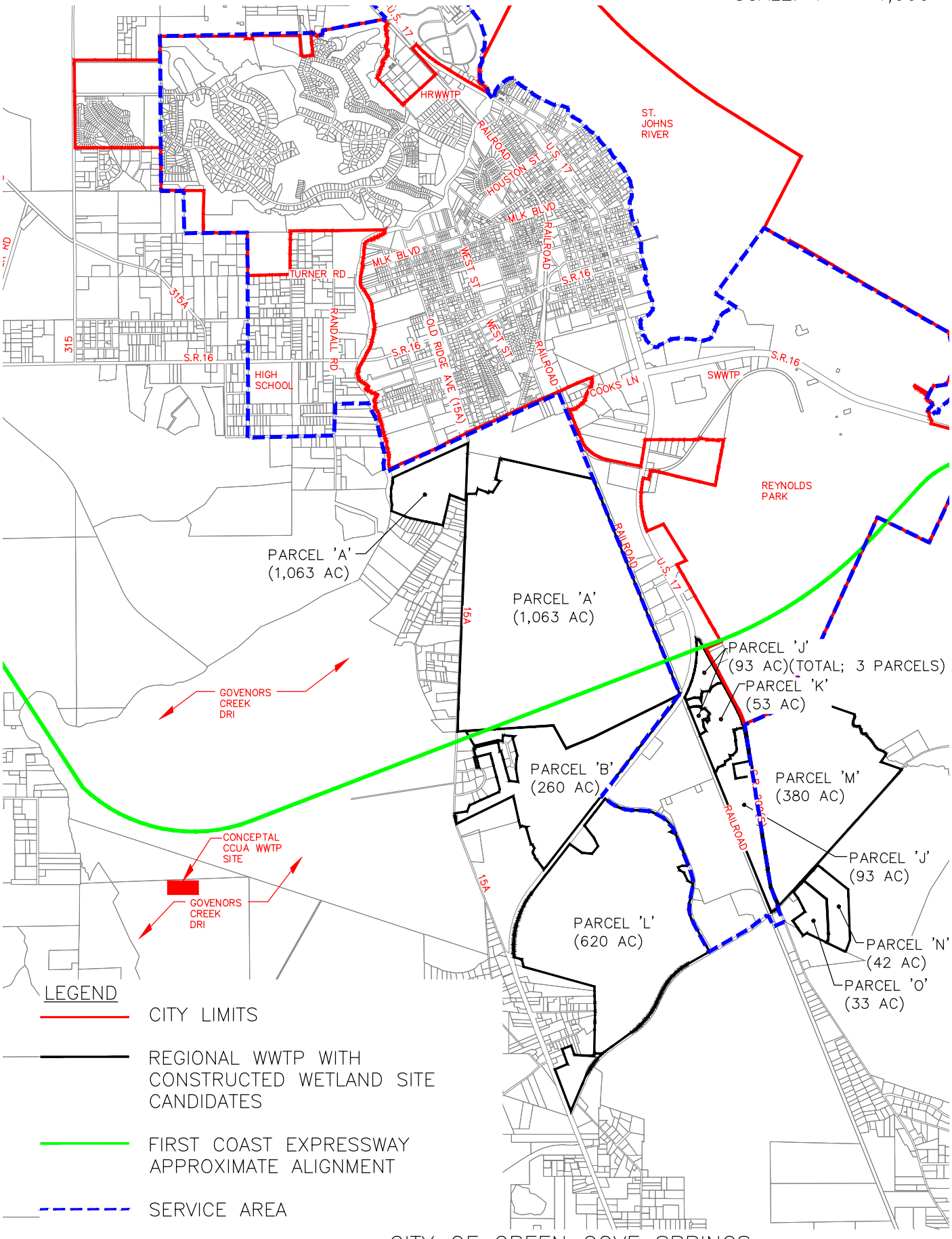
Since the hydraulic and TN loading restrictions were relatively consistent, the analysis will assume biological nutrient removal capabilities and/or chemical feed systems at the Regional WWTP would be sufficient to maintain TP levels at 0.50 mg/l or less. As a result the land area requirements would be reduced to:

TP @ 0.50 mg/l = 57 Acres @ 1.00 MGD

Based on this basis, the wetland system would need approximately 50 acres to provide an effluent disposal capacity up to 1.0 MGD (AADF). It is anticipated 40% of the land area would be developed with lined wetland cells and 60% would be unlined. Additional site specific, water balance, nutrient loading, etc. analysis would need to be done to determine final treatment aspects, but the aforementioned review provides an overall land area basis.

Similar to the restricted-access sprayfield siting review, the following components were reviewed as it relates to the wetland treatment option:

- Parcel Map (**Figures P-9** and **P-10**);
- Soils Map (**Figure P-11**);
- Florida Land Use and Cover Classification System (FLUCCS) Map (**Figure P-12**);
- Federal Emergency Management Agency (FEMA) Flood Map (**Figure P-13**); and
- Quadrangle Maps (**Figure P-14**)



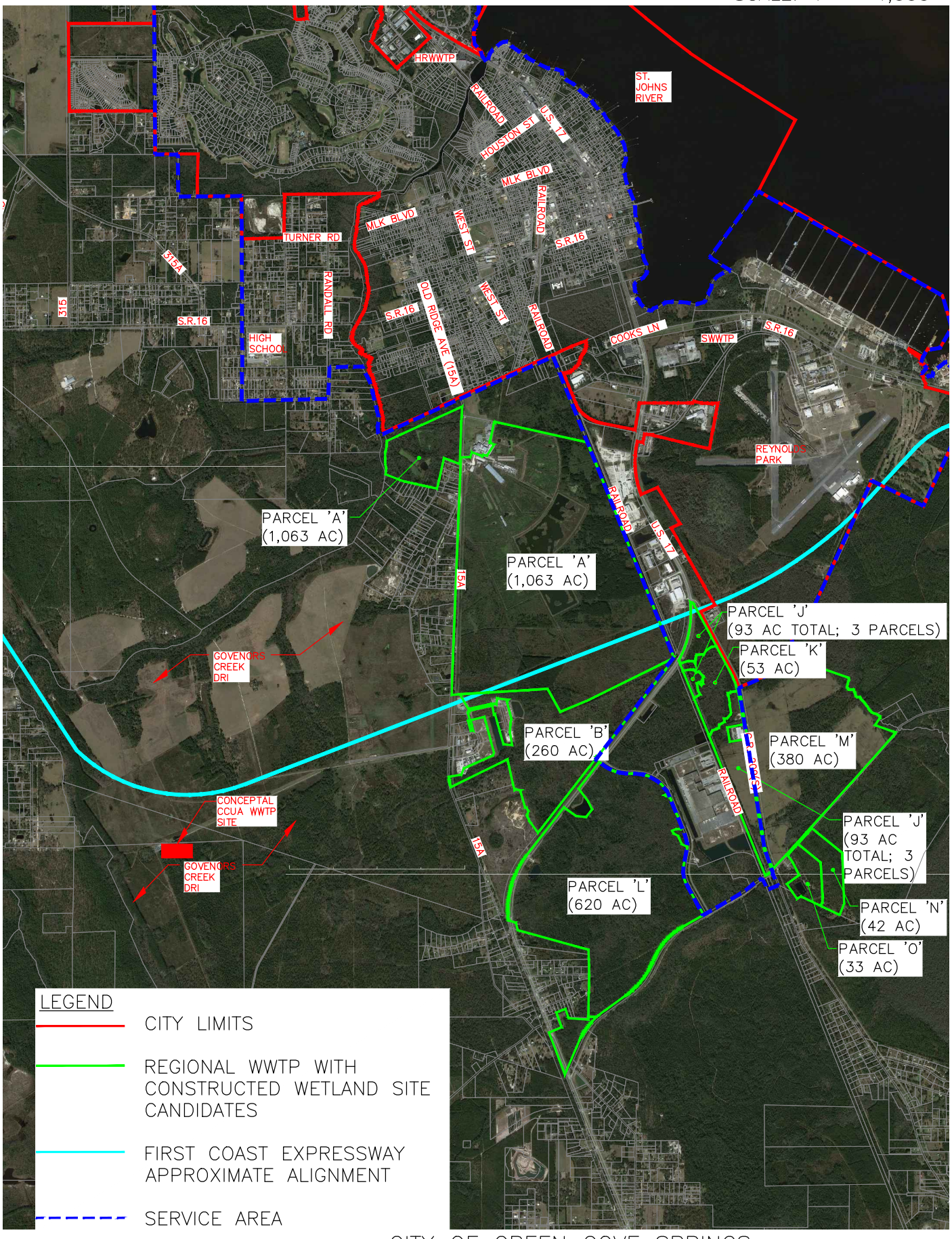
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CITY OF GREEN COVE SPRINGS
Wastewater System Master Plan
Regional WWTP & Constructed Wetland Disposal Candidate Sites (Parcel Map)
Clay County, Florida

FIGURE
P-9
March 2015
Project No.
8905-31-1

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SCALE: 1" = 4,000'



LEGEND

- CITY LIMITS
- REGIONAL WWTP WITH CONSTRUCTED WETLAND SITE CANDIDATES
- FIRST COAST EXPRESSWAY APPROXIMATE ALIGNMENT
- SERVICE AREA

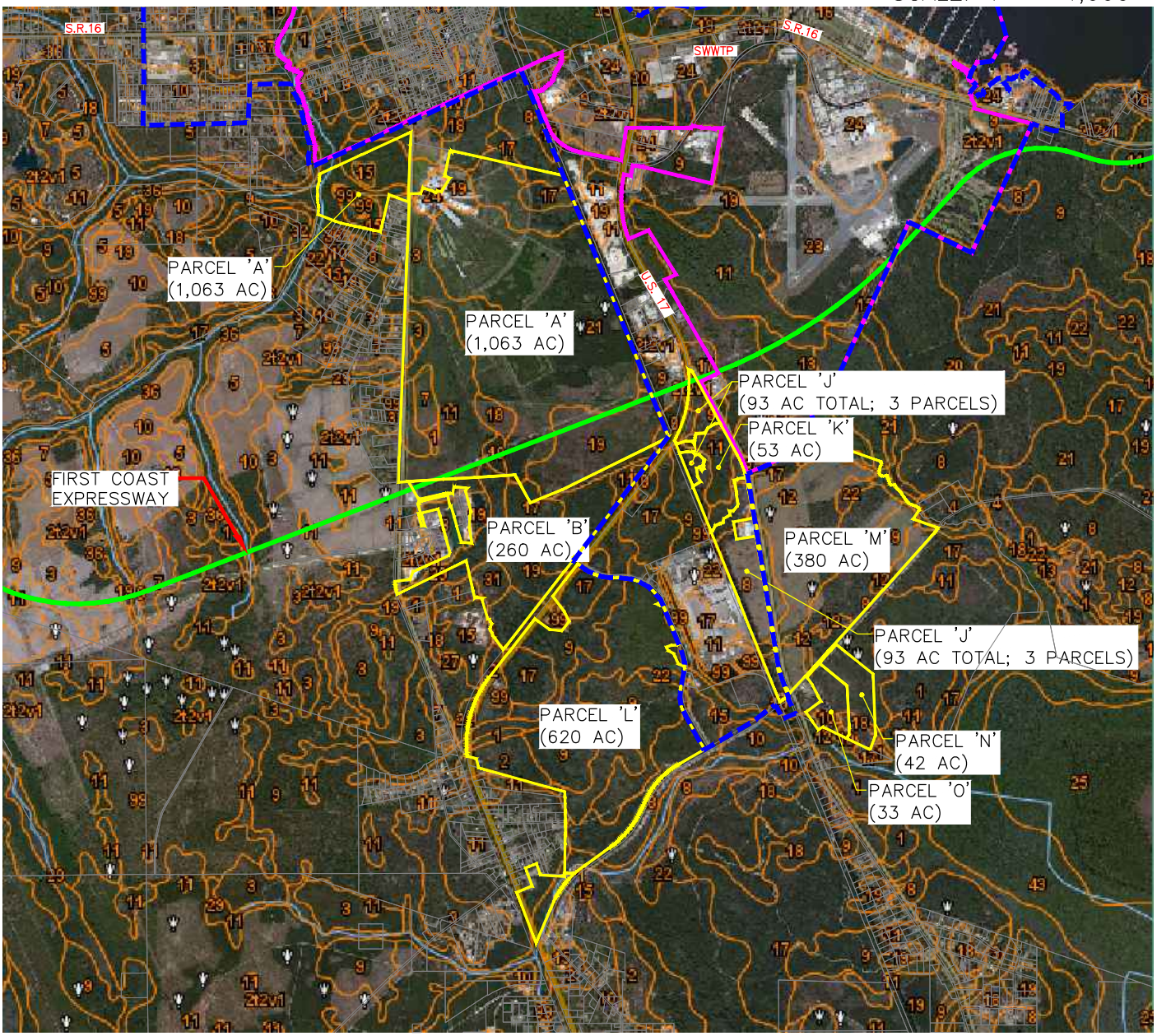
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CITY OF GREEN COVE SPRINGS
Wastewater System Master Plan
Regional WWTP & Constructed Wetland Disposal Candidate Sites (Aerial Map)
Clay County, Florida

FIGURE P-10
March 2015
Project No. 8905-31-1

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SCALE: 1" = 4,000'



1	ALBANY FINE SAND, 0 TO 5 PERCENT SLOPES
2	BLANTON FINE SAND, 0 TO 5 PERCENT SLOPES
2t2v1	CASSIA FINE SAND
3	HURRICANE FINE SAND, 0 TO 5 PERCENT SLOPES
4	OCILLA LOAMY FINE SAND, 0 TO 5 PERCENT SLOPES
5	PENNEY FINE SAND, 0 TO 5 PERCENT SLOPES
7	CENTENARY FINE SAND, 0 TO 5 PERCENT SLOPES
8	SAPELO FINE SAND, 0 TO 5 PERCENT SLOPES
9	LEON FINE SAND
10	ORTEGA FINE SAND, 0 TO 5 PERCENT SLOPES
11	ALLANTON AND RUTLEGE MUCKY FINE SANDS, DEPRESSIONAL
12	SURRENCY FINE SAND, DEPRESSIONAL
13	MEGGETT FINE SAND LOAM
14	ORTEGA–URBAN LAND COMPLEX, 0 TO 5 PERCENT SLOPES
15	QUARTZIPSAMENTS, EXCAVATED
16	HURICAN–URBAN LAND COMPLEX, 0 TO 5 PERCENT SLOPES
17	PLUMMER FINE SAND
18	RIDGEWOOD FINE SAND, 0 TO 5 PERCENT SLOPES
19	OSIER FINE SAND
20	SCRANTON FINE SAND
21	GOLDHEAD FINE SAND
22	PELHAM FINE SAND
23	SAPELO–URBAN LAND COMPLEX
24	URBAN LAND
25	MAUREPAS MUCK, FREQUENTLY
27	PAMLICO MUCK
28	SANTEE FINE SANDY LOAM, FREQUENTLY FLOODED
29	RUTLEGE–OSIER COMPLEX, FREQUENTLY FLOODED
30	ARENTS, SANDY
31	POTTSBURG FINE SAND
32	BLANTON FINE SAND, 5 TO 8 PERCENT SLOPES
34	PENNEY FINE SAND, 5 TO 8 PERCENT SLOPES
36	ORTEGA FINE SAND, 5 TO 8 PERCENT SLOPES
37	RIDGEWOOD FINE SAND, 5 TO 8 PERCENT SLOPES
38	SURRENCY FINE SAND, FREQUENTLY FLOODED
42	OSIER FINE SAND, OCASSIONALLY FLOODED
43	PAMLICO MUCK, FREQUENTLY FLOODED
51	POTTSBURG FINE SAND, OCCASIONALLY FLOODED
62	NEILHURST FINE SAND, UNDULATING
63	SOLITE FINE SAND
65	MEADOWBROOK SAND
99	WATER

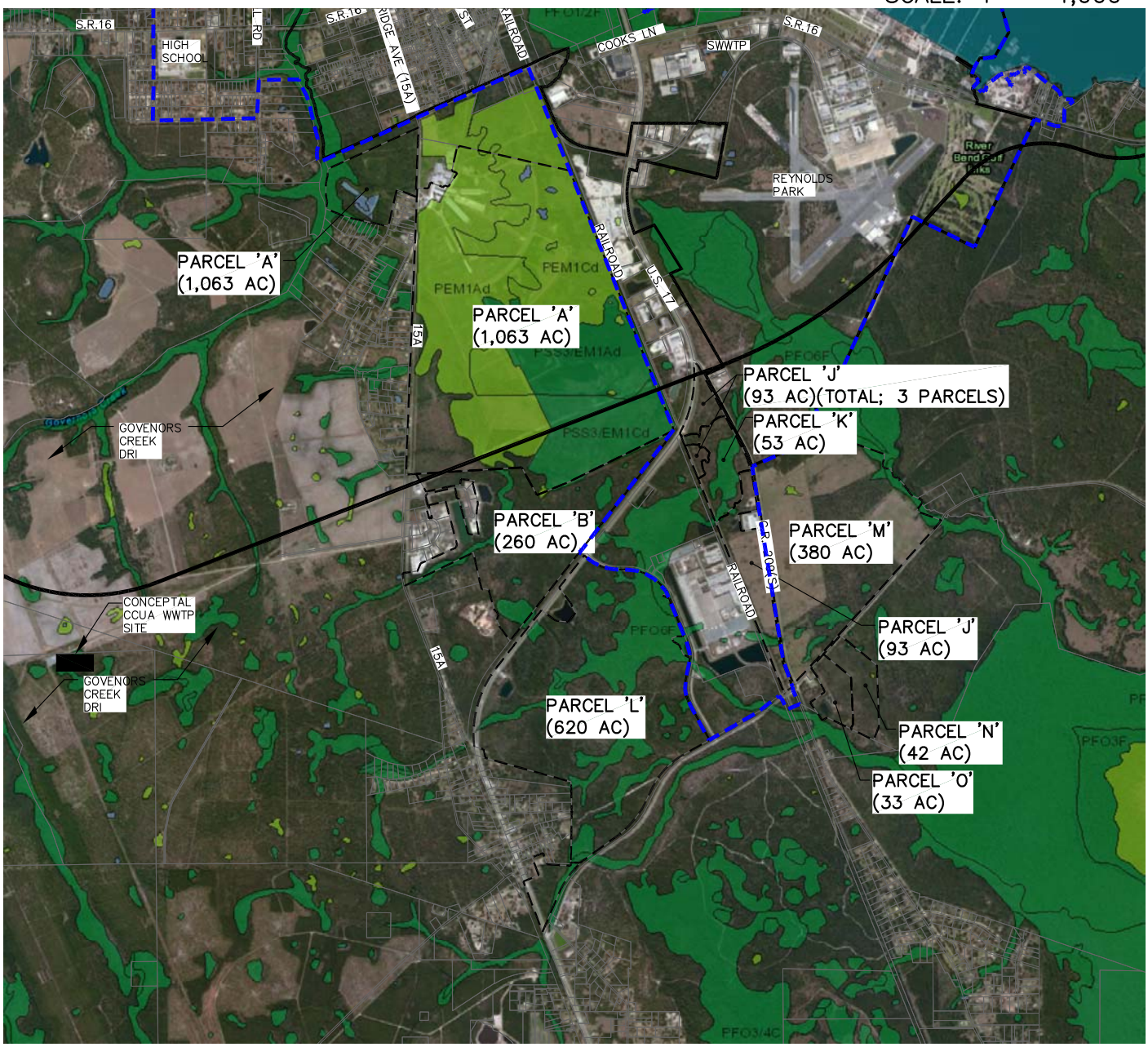
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CITY OF GREEN COVE SPRINGS
Wastewater System Master Plan
Regional WWTP & Constructed Wetland Disposal Candidate Sites (Soils Map)
Clay County, Florida

FIGURE
P–11
March 2015
Project No.
8905–31–1

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SCALE: 1" = 4,000'



N

LEGEND

- CITY LIMITS
- REGIONAL WWTP WITH CONSTRUCTED WETLAND SITE CANDIDATES
- FIRST COAST EXPRESSWAY APPROXIMATE ALIGNMENT
- SERVICE AREA

Wetlands

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

Scanned Wetlands Maps

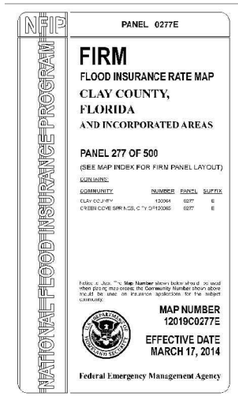
- Scanned Wetlands Maps

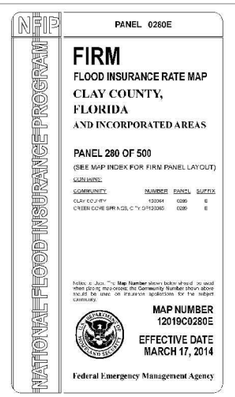
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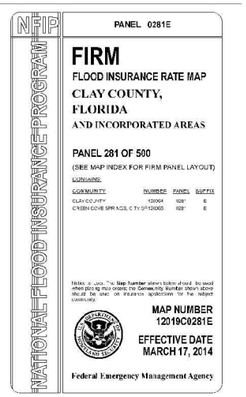
CITY OF GREEN COVE SPRINGS
Wastewater System Master Plan
Regional WWTP & Constructed Wetland Disposal Candidate Sites (FLUCCS Map)
Clay County, Florida

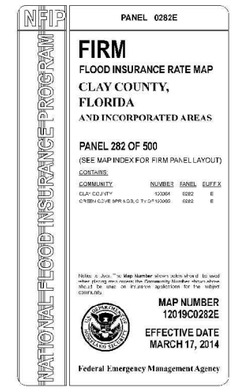
FIGURE P-12
March 2015
Project No. 8905-31-1

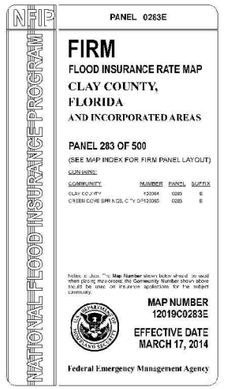
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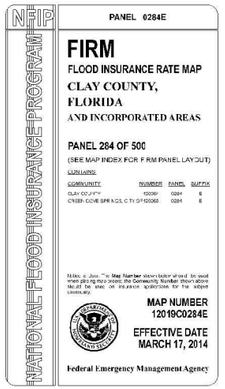


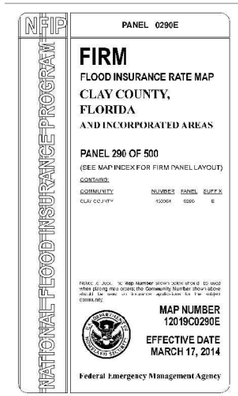


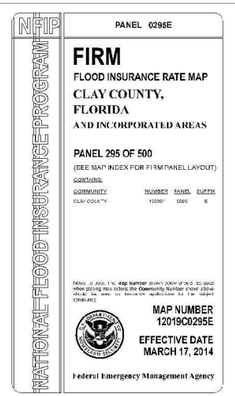












LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

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

* Referenced to the North American Vertical Datum of 1988

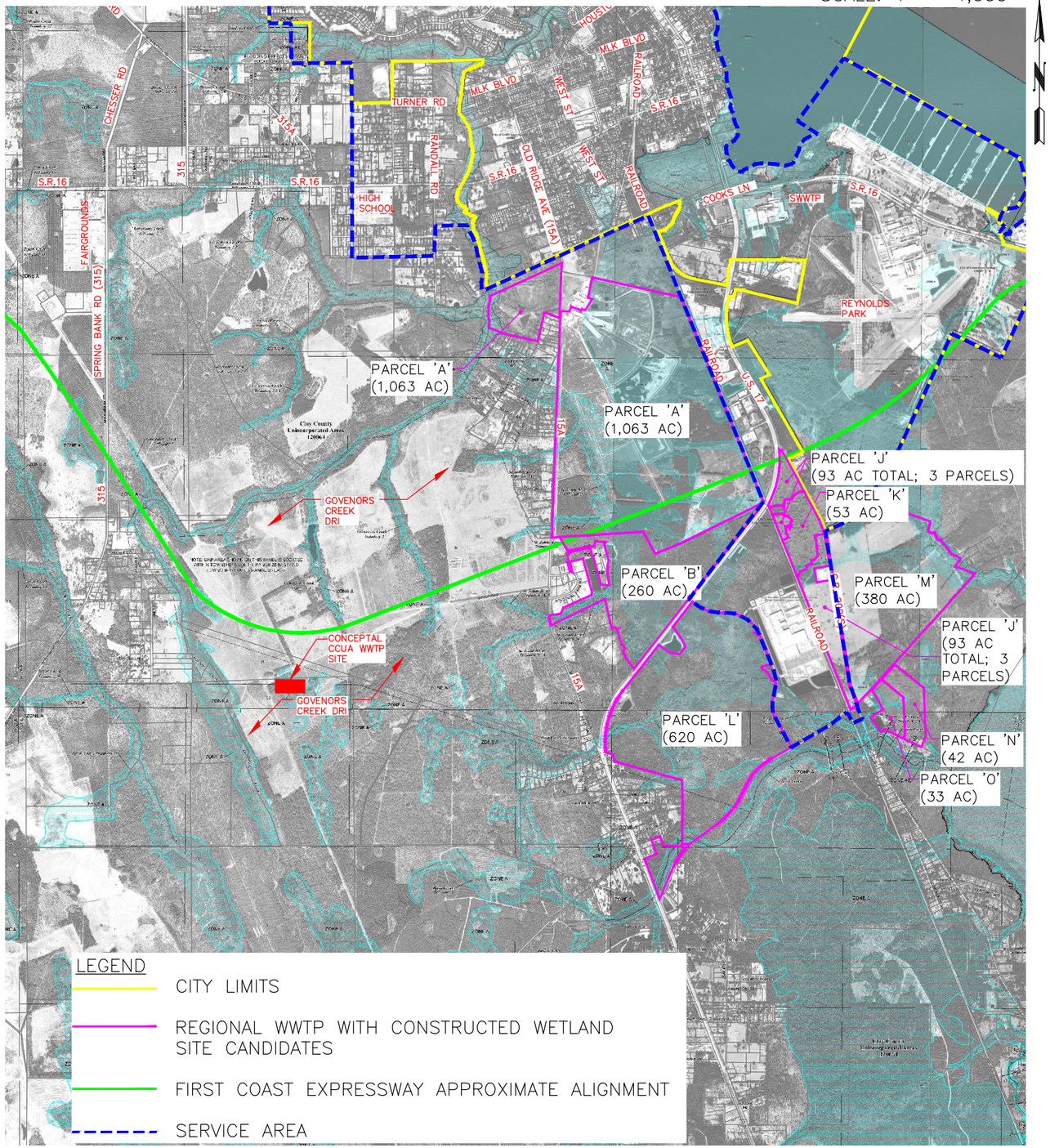
- A — A — Cross section line
- 23 — 23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 4275000mE — 1000-meter Universal Transverse Mercator grid ticks, zone 17
- 6000000 FT — 5000-foot grid values: Florida State Plane coordinate system, East Zone (FIPSZONE = 0901), Transverse Mercator projection
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories List on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
March 17, 2014

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

SCALE: 1" = 4,000'



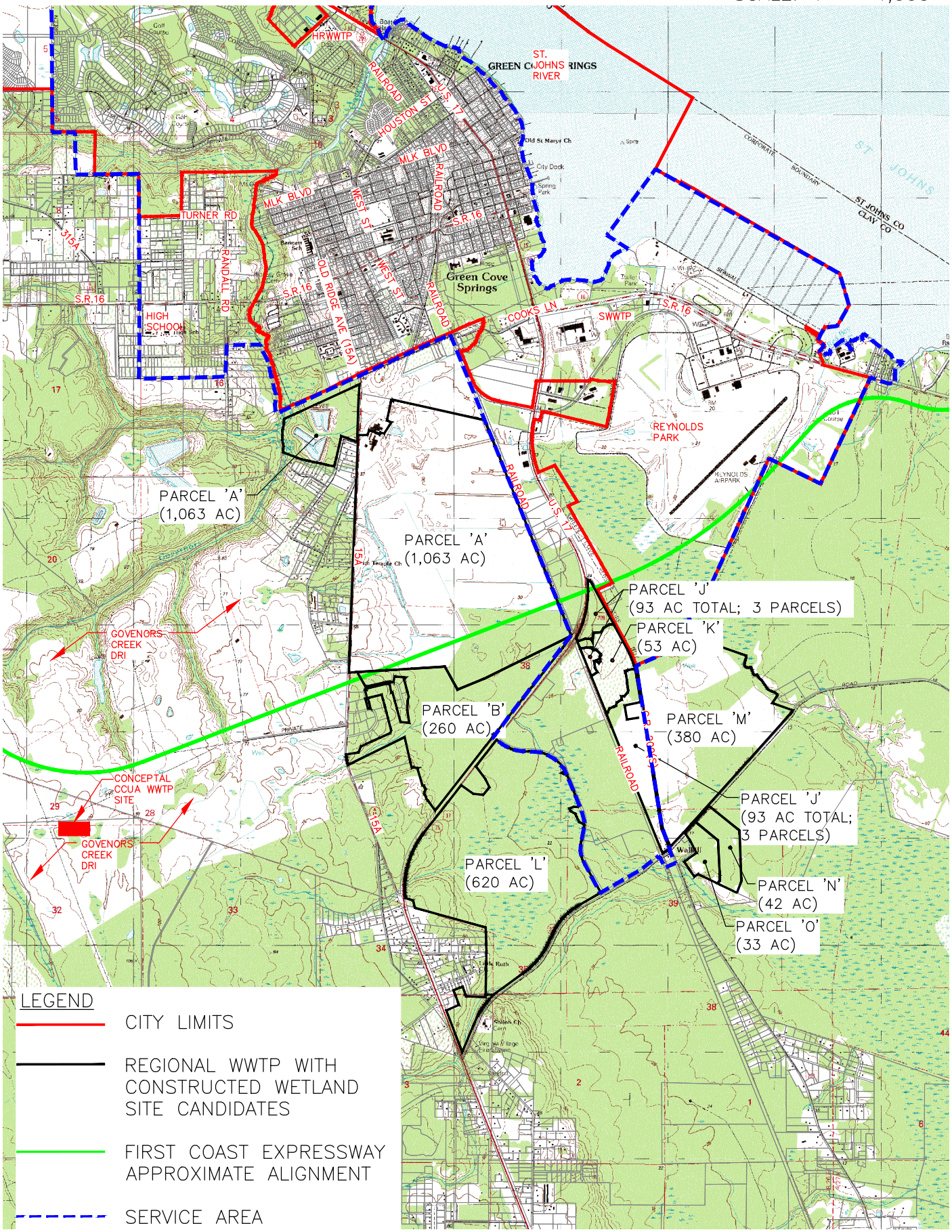
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CITY OF GREEN COVE SPRINGS
Wastewater System Master Plan
Regional WWTP & Constructed Wetland Disposal Candidate Sites (FEMA Flood Map)
Clay County, Florida

FIGURE P-13
March 2015
Project No. 8905-31-1

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SCALE: 1" = 4,000'



LEGEND

- CITY LIMITS
- REGIONAL WWTP WITH CONSTRUCTED WETLAND SITE CANDIDATES
- FIRST COAST EXPRESSWAY APPROXIMATE ALIGNMENT
- SERVICE AREA

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CITY OF GREEN COVE SPRINGS
Wastewater System Master Plan
Regional WWTP & Constructed Wetland Disposal Candidate Sites (USGS Map)
Clay County, Florida

FIGURE P-14
March 2015
Project No. 8905-31-1

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Parcel Map Review

The following parcels, as shown in **Figure P-9**, meet the 50 acre requirement for the constructed wetlands and approximately 20 acres for the Regional WWTP for a total land area need of at least 70 acres (*anticipated some parcels would be aggregated for use to meet the total land area needs*):

- Parcel 'A': Gustafson's Cattle Inc.
  Parcel ID 38-06-26-016515-000-00
  1,063 Acres
  (*Note: 1,063 Acres is split between 2 separate land areas*)

- Parcel 'B': West River Joint Venture
  Parcel ID 38-06-26-016571-001-00
  260 Acres

- Parcel 'J': John Bishop Trustee
  Parcel ID 38-06-26-016513-000-00
  93 Acres
  (*Note: 93 Acres is split between 3 separate land areas*)

- Parcel 'K': JPHCC LLC
  Parcel ID 38-06-26-016513-013-00
  53 Acres

- Parcel 'L': St. Johns River Water Management District
  Parcel ID 35-06-26-015717-000-00
  620 Acres

- Parcel 'M': St. Johns River Water Management District
  Parcel ID 38-06-26-016503-002-00
  380 Acres

- Parcel 'N': William T Lemen, III Trustee
  Parcel ID 39-06-26-016503-005-00
  42 Acres

- Parcel 'O': William T Lemen, III Trustee
  Parcel ID 39-06-26-016503-006-00
  33 Acres

Figure P-10 illustrates these parcel locations on an aerial map.

The SJRWMD parcels are currently conservation lands, and are not included within this analysis.

Soil Map Review

Figure P-11 illustrates the soils present within the remaining parcels. A summary of the various soils identified per parcel is summarized per soil type and characteristic (Sanitary facility suitability for absorption fields | Permeability | Hydrologic Group) as follows:

- Parcel 'A':
  Osier Fine Sand - 19 [Severe Wetness (poor filter) | 6-20 in/hr | D]
  Goldhead Fine Sand- 21 [Severe Wetness (poor filter) | 0.6-2.0 in/hr | D]

- Parcel 'B':
  Plummer Fine Sand - 17 [Severe Wetness (percs slowly)|0.6 - 2.0 in/hr| D]
  Osier Fine Sand - 19 [Severe Wetness (poor filter) | >20 in/hr | D]

- Parcel 'J':
  Sapelo Fine Sand - 8 [Severe (wetness) | 0.6 - 2.0 in/hr | D]
  Leon Fine Sand - 9 [Severe (wetness) | 0.6 - 6.0 in/hr | D]
  Allanton/Rutledge - 11 [2.0 - 6.0 in/hr | D]

- Parcel 'K':
  Sapelo Fine Sand - 8 [Severe (wetness) | 0.6 - 2.0 in/hr | D]
  Leon Fine Sand - 9 [Severe (wetness) | 0.6 - 6.0 in/hr | D]
  Allanton/Rutledge - 11 [Severe (ponding) | 2.0 - 6.0 in/hr | D]

- Parcel 'N':
  Sapelo Fine Sand - 8 [Severe (wetness) | 0.6 - 2.0 in/hr | D]
  Ortega Fine Sand - 10 [Moderate (wetness) | 6-20 in/hr | A]
  Ridgewood Fine Sand-18 [Severe Wetness | 6-20 in/hr | C]

- Parcel 'O':
  Sapelo Fine Sand - 8 [Severe (wetness) | 0.6 - 2.0 in/hr | D]
  Ortega Fine Sand - 10 [Moderate (wetness) | 6-20 in/hr | A]
  Ridgewood Fine Sand-18 [Severe Wetness | 6-20 in/hr | C]

With the exception of Parcels 'N' and 'O', the soils within the denoted areas are primarily poor, but would be suitable for a wetland system. Infiltration capacities vary between the soil depths, but it is anticipated the soil matrix will have limited percolation capabilities.

FLUCCS Map Review

Figure P-12 includes the parcel locations and various land use designations. Excluding Parcels 'L' and 'M' that are already in conservation, Parcels 'A', 'B', and 'K' have significant portions of existing wetland features that would limit their capabilities for use as an effluent disposal option.

The most suitable parcels based on this screening category are Parcels 'J', 'N', and 'O'.

FEMA Map Review

Figure P-13 includes the parcel locations and 100-year flood plain locations as determined by FEMA. In general, the flood plain locations generally coincide with the wetland parcels. Based on the 100-year flood plain limits (Zone A), Parcels 'J', 'K', 'M' (portions), and 'N' were identified as parcels that could be developed and utilized as man-made wetland areas.

Quadrangle Map Review

Figure P-14 includes the parcel locations and depicts general topographic elevations. In comparison to the sprayfield review, parcels reviewed under this screening are relatively low-lying areas. Elevations generally range between 15 to 30-feet (NGVD).

Based on the soils, wetlands, and flood plain review, the best-suited parcels for wetland development would be Parcel 'J' or 'N'. Parcel 'J' is split between three (3) separate land areas, so the approach would include development of the southerly limits of this parcel grouping that has a total land area of approximately 70 acres. The general elevations of each are: 20 ft-NGVD (Parcel 'J' *southerly limits*); and 15-ft NGVD (Parcel 'N').

Selected Parcel Grouping

Based on the various screening metrics, the two (2) parcels that would be best suited for wetland development are: (1) Parcel 'J', and (2) Parcel 'N'. The Future Land Use Map (FLUM) designation for each is summarized as follows: Industrial (Parcel 'J'); and Agricultural-Residential/Conservation (Parcel 'N'). Either of these FLUM designations would not limit man-made wetland development, but the Industrial designation may lead to higher land acquisition costs. Lastly, the overall Parcel 'N' size of 42 acres is limiting, but is anticipated to yield a permitted effluent disposal capacity between 0.50 MGD to 1.00 MGD pending final site assessments and TP control.

In order to serve this quadrant and provide infrastructure capable of operating a wetland system, the following infrastructure would be required:

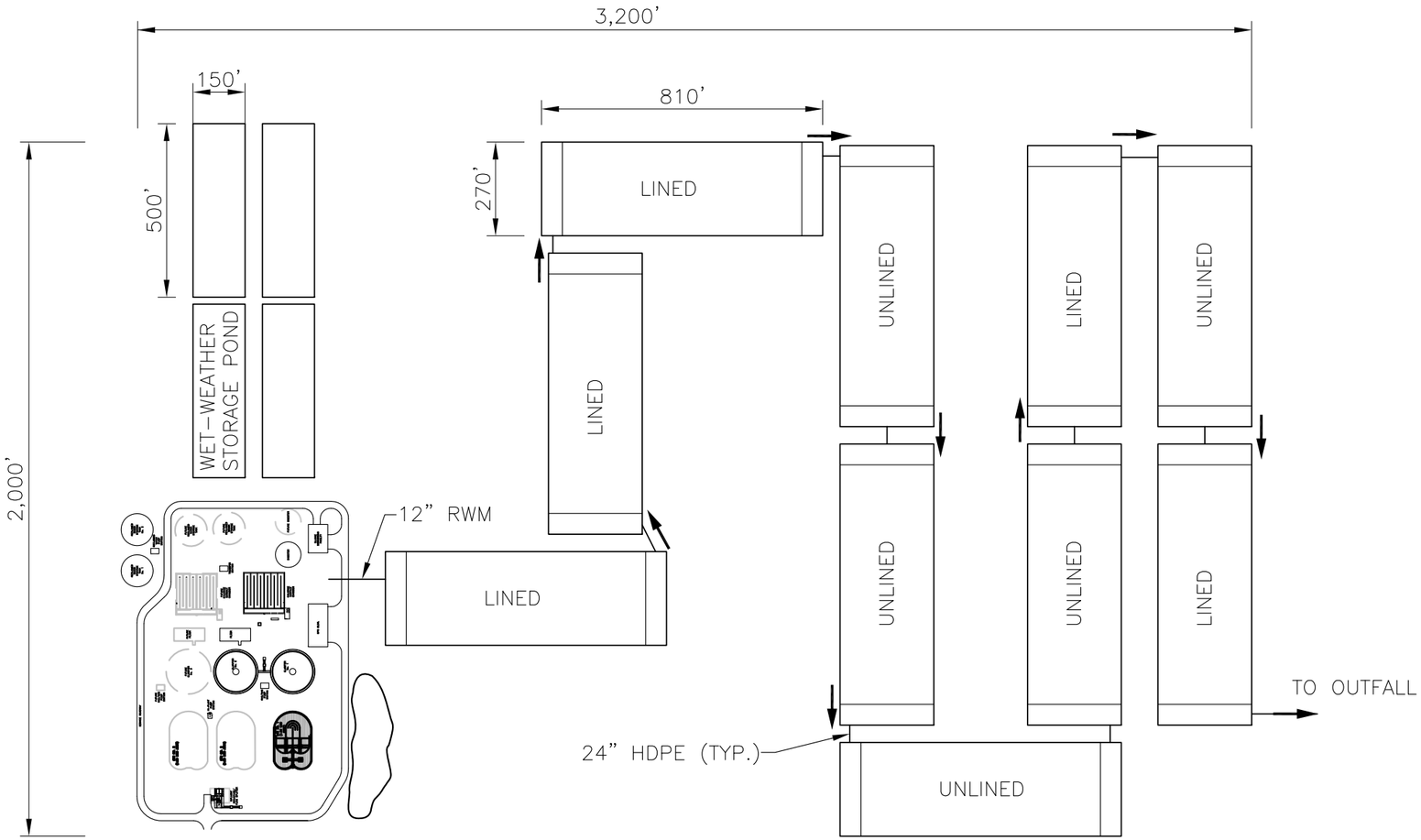
- Reclaimed Water Main Extension; and
- Wetland Improvements.

Figure P-15 illustrates a conceptual Regional WWTP site plan with the constructed wetland disposal system. The required improvements are summarized as follows:

- *Wet-weather or Reject Storage Ponds:* At the proposed regional location, the City would no longer have the river outfall for wet-weather events. Thus, all effluent would have to be stored on-site or pumped into the constructed wetland system. FDEP requires a minimum of three (3) days of wet-weather storage and actual requirements would be based on water balance with hydrogeologic modeling of the sprayfield soils. For planning purposes, we have assumed a prudent approach of downsizing the 'permitted capacity' of the sprayfield system to 1.0 MGD (AADF) to minimize storage needs. Assuming seven (7) days of storage would be required, the total storage volume would be 7.00 million gallons (1.00 MGD (permitted capacity) * 7 days). The storage would be provided by high-density polyethylene (HDPE) lined ponds.

- *Effluent/Reclaimed Water Pump Stations:* Two (2) new reclaimed water pumps (with associated electrical and controls, as needed) would be required to deliver the treated effluent to the wet-weather storage ponds (i.e., Transfer Pumps) and then another duplex pumping system would be required to deliver the stored effluent to the wetland system (i.e., Wetland

SCALE: 1" = 400'



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CITY OF GREEN COVE SPRINGS
Wastewater System Master Plan
South Service Area Regional AWWTP with Constructed Wetlands
Clay County, Florida

FIGURE
P-15
March 2015
Project No.
8905-31-1

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- Pumps). Preliminary sizing for the Transfer Pumps is 2,750 gpm (4.0 MGD) per pump at 40 ft-TDH with variable frequency controls, and 1,040 gpm (1.5 MGD) per pump at 60 ft-TDH for the Wetland Pumps.

- *Reuse Piping Extensions:* A 12-inch header is conceptually proposed from the Wetland Pumps to the wetland treatment/disposal area. Final hydraulic considerations may result in a different size.

- *Conceptual Wetland Improvements:* Pending final detailed design analysis, the number of lined cells and associated land areas could change, which could reduce the land requirements. For this conceptual review, a total of 20 acres of lined ponds and 30 acres of unlined ponds would be constructed aligned in a ten (10) cell arrangement. Each cell would be approximately 5 acres in size resulting in four (4) lined cells and six (6) unlined cells. Individual cell alignment would be in a 3 to 1 (length to width) ratio. The effluent would be pumped to an entry lined cell which would flow then flow to the remaining lined and then unlined cells. A lined cell may be installed near the end of the hydraulic train pending final site considerations and TN and/or TP treatment needs.

The opinion of probable capital cost is presented in **Table P-4**.

TABLE P-4

SOUTH SERVICE AREA - WETLAND DISPOSAL ALTERNATIVE
ENGINEER'S OPINION OF PROBABLE CAPITAL COST

Description	Estimated Cost
1. Reuse Transfer Pumping Station at Regional WWTP	$150,000
2. Four (4) 1.75 MG HDPE Lined Storage Ponds (4 * 1.75 MG * $0.20/Gal)	$1,400,000
3. Wetland Pump Station	$200,000
4. 12-inch Reuse Main to Wetlands (2,000 LF @ $60/LF)	$120,000
5. Clear and Grubbing (50 Ac @ $10,000/Ac)	$500,000
6. Excavation (12,000 CY @ $6/CY)	$72,000
7. Backfill (12,000 CY @ $8/CY)	$96,000
8. Cell Lining - Imported Clay (870,000 SF @ $1.50/SF)	$1,300,000

TABLE P-4 (cont.) SOUTH SERVICE AREA - WETLAND DISPOSAL ALTERNATIVE ENGINEER'S OPINION OF PROBABLE CAPITAL COST	
Description	**Estimated Cost**
9. Berm Construction (25,000 CY @ $8/CY)	$200,000
10. Berm Seeding (80,000 SY @ $0.50/SY)	$40,000
11. Wetland Seeding (50 Ac @ $2,500/Ac)	$125,000
12. Wetland Plantings (0.25 plantings/SY * 50 Ac @ $6/EA)	$360,000
13. Water Control Structures (10 structures @ $6,000/EA)	$60,000
14. Piping - Wetland Cells (5,000 LF of 24" HDPE @ $120/LF)	$600,000
15. Water Level Meters & Data Loggers (10 @ $10,000/EA)	$100,000
Estimated Construction Costs	$5,323,000
Construction Contingency (15%)	$798,000
TOTAL ESTIMATED CONSTRUCTION	**$6,121,000**
NON-CONSTRUCTION COSTS (15%)	**$918,000**
TOTAL ESTIMATED CAPITAL COST	**$7,039,000**

The opinion of probable O&M costs are presented in **Table P-5**.

TABLE P-5 SOUTH SERVICE AREA - WETLAND DISPOSAL ALTERNATIVE ENGINEER'S OPINION OF PROBABLE O&M COST	
Description	**Estimated Annual Cost**
1. Power (160,000 kwh/yr @ 0.125¢ / kwh) @ 1.00 MGD	$20,000
2. System Maintenance / Repair (2% x $2,500,000)	$50,000
TOTAL	**$70,000**

3. Rapid Infiltration Basins

Due to the site limitations (i.e., general poor soils) determined during the sprayfield and wetland disposal options, alternatives related to rapid infiltration basins (RIBs) were not completed. This effluent disposal option can reduce land

area needs since application rates can be permitted as high as 3 inches per day (21 inches per week) or higher, but require site specific geotechnical testing and modeling/analysis. Given the parcel findings outlined herein, the RIB disposal option was not considered feasible at this time. The only parcels that may provide some capabilities for RIB disposal are located outside of the City's Service Area along SR 16 heading west toward Penney Farms. Along this location, the topographic elevations climb and soils improve.

If the City considered this regional option and further due diligence was pursued for a specific parcel grouping, then site specific soil testing should be completed to determine effluent disposal alternatives. This information would also allow the engineer to further define wet-weather storage needs as well as size requirements for sprayfields and/or RIBs.

4. Selected Alternative

The constructed wetland option was the most cost effective effluent disposal alternative when compared to the sprayfield costs as well as the siting limitations within the South Service Area. The constructed wetland system could be utilized in the upland areas or other low-lying areas reviewed herein. Due to the outer beltway construction interface with Parcels N or J and notwithstanding the required coordination with CCUA and Clay County, the conceptual location for the regional facility was slated as either Parcel E or G.

Regional Consolidation

The conceptual approach to consolidate includes developing a site that would provide the capacity to meet the City's anticipated Build-Out Demands. Current combined flows from the HRWWTP and SWWTP are approximately 0.70 to 0.75 MGD (AADF) and the Build-Out Potential is 3.5 MGD (AADF). To accommodate the first phase, provide a logical expansion sequence, and provide some contingency for build-out, the first phase will include construction of a 1.25 MGD (AADF) treatment train and the overall facility will have provisions for three (3) 1.25 MGD (AADF) trains bringing the total capacity to 3.75 MGD (AADF).

The HRWWTP and SWWTP systems would be decommissioned and replaced with pump stations. Each master pump station would have a new bulk force main to deliver the wastewater to the new regional site. In total, the City has eleven (11) pump stations within the North Service Area and three (3) pump

stations within the South Service Area that respectively manifold together and delivery wastewater to the HRWWTP and SWWTP. Due to the elevation changes from the existing WWTP sites to the new location, the existing pump stations would have to be modified to the new head conditions or a repump station would need to be constructed at each WWTP to deliver the raw wastewater to the new WWTP.

In order to develop an order-of-magnitude level of construction costs to compare against other alternatives, Parcel G was developed as the South Service Area Regional Site. Notwithstanding the location and required coordinate with Clay County and CCUA, Parcel G was selected due to its benefits in comparison to other locations and the limitations available to the City along U.S. 17 due to parcel geometry and the outer beltway construction limits. For this location, the bulk force main from the SWWTP would be constructed using a 16-inch main that would extend approximately 21,500 feet to Parcel G (12,500 feet of this pipeline would be an 18-inch force main that would manifold with the HRWWTP pump station). The 16-inch force main from the HRWWTP pump station to Parcel G would be approximately 17,500 feet to the manifold point.

The last complication associated with this alternative is maintaining service to the Magnolia Point Golf Course. At this time, it is assumed bulk service to this location would need to be maintained. Therefore, costs are also included herein to develop a new bulk reclaimed water main that would extend from the Regional WWTP back to the Magnolia Point bulk reuse delivery system.

A conceptual bulk main routing for the force main and reclaimed water mains is provided in **Figure P-16**.

The Phase 1 improvements include:

- HRWWTP and SWWTP decommissioning;
- HRWWTP and SWWTP Master Pump Stations;
- Bulk force main extensions from Master Pump Stations to Regional WWTP;
- Influent structure with fine screening, grit removal systems, and future flow splitter considerations;
- 1.25 MGD (AADF) AWWT Oxidation Ditch (“Treatment Train No. 1");

SCALE: 1" = 2,000'

N

DECOMMISSION HRWWTP
& CONSTRUCT MASTER
PUMP STATION

16"RW

16"FM

U.S. 17

S.R.16

16"FM

16"RW

S.R.16

18"FM

16"RW

16"FM

16"FM

S.R.16

DECOMMISSION SWWTP
& CONSTRUCT MASTER
PUMP STATION

PARCEL 'G'
(571 AC)

PARCEL 'E'
(552 AC)

FIRST COAST
EXPRESSWAY

FIRST COAST
EXPRESSWAY

U.S. 17

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CITY OF GREEN COVE SPRINGS
Wastewater System Master Plan
South Service Regional WWTP w/ On-site Disposal
Clay County, Florida

FIGURE
P-16
March 2015
Project No.
8905-31-1

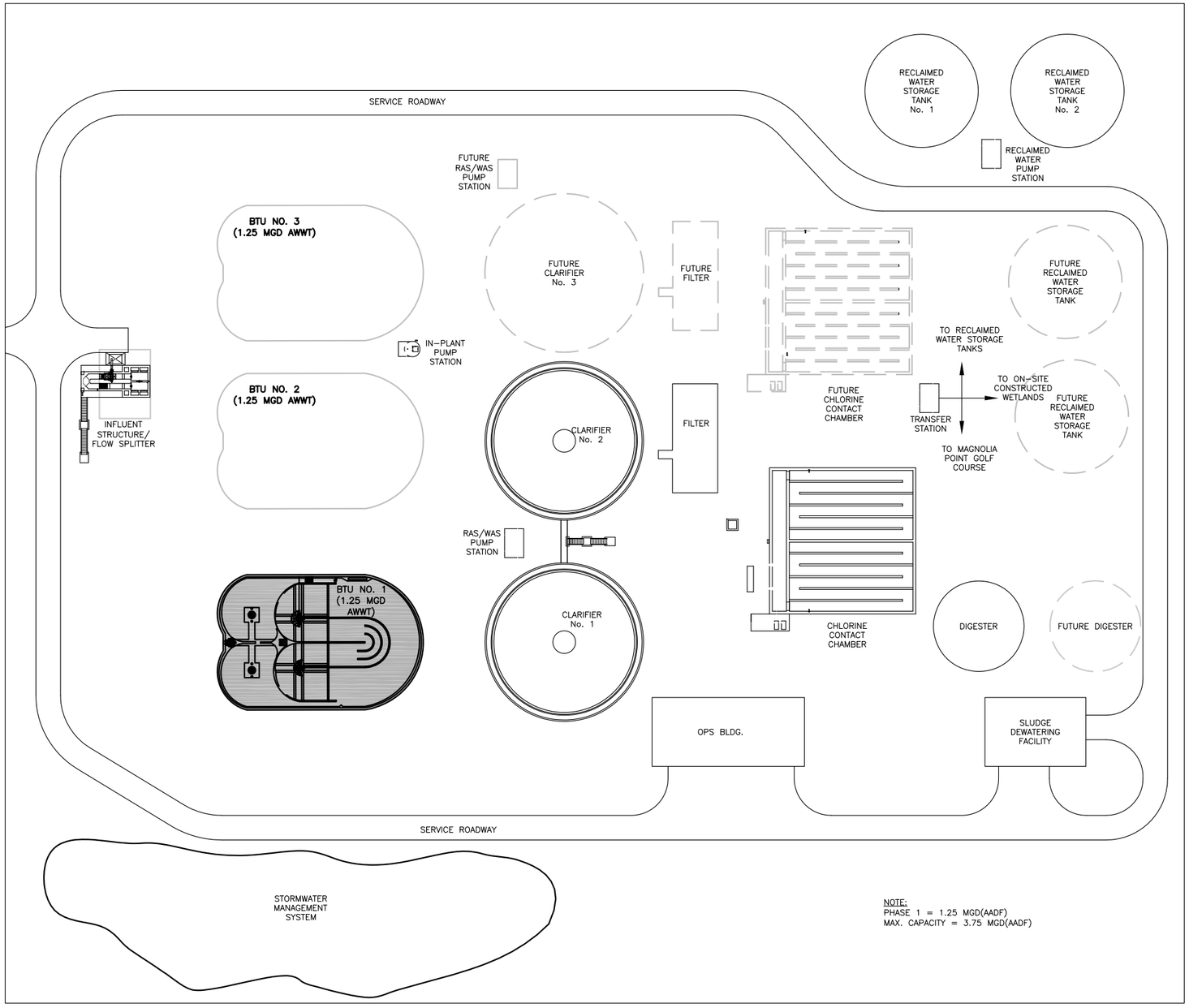
- Two (2) new 75-foot diameter central clarifiers with RAS/WAS pump station;
- Filtration system;
- Chlorine Contact Chamber with disinfection facilities;
- Reclaimed water transfer pump station;
- Reclaimed water storage ponds;
- Reuse pumping station and reclaimed water main to Magnolia Point;
- Constructed wetland effluent disposal and reject pond system;
- Two (2) new Aerobic Digesters;
- Biosolids Dewatering System; and
- Control building with emergency generator.

Figure P-17 gives a general site plan layout of the proposed AWWT improvements while **Figure P-15** illustrated the regional WWTP with the constructed wetland system. In the near-term, the only public-access reuse option is located at Magnolia Point. An additional effluent disposal option would also need to be constructed as part of the project improvements. Based on the considerations reviewed within that analysis, the wetland disposal option was the most cost effective alternative and would be implemented as part of this plan at the regional site.

As noted previously, the oxidation ditch design is capable of meeting the design requirements of 5 mg/l (BOD_5) | 3 mg/l (TN) | 1 mg/l (TP). The advanced wastewater treatment improvements are summarized as follows:

- *Influent Structure:* Based on recommendations from the manufacturer, the maximum influent screen opening should be 0.125" (3 mm). The new influent structure would be constructed with grit removal capabilities and design considerations for a future flow splitter box capable of controlling flows to the future three (3) train system. Design capacity of the structure and associated treatment units would include considerations of a build-out demand of 3.75 MGD (AADF) and 11.25 MGD (PHF). The initial phase would likely address capacities up to 2.5 MGD (AADF) and 7.5 MGD (PHF).

SCALE: 1" = 100'



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CITY OF GREEN COVE SPRINGS
Wastewater System Master Plan
Oxidation Ditch Site Plan at Regional Site
Clay County, Florida

FIGURE
P-17
March 2015
Project No.
8905-31-1

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- *Oxidation Ditch:* One (1) carrousel oxidation ditch will be constructed to process the screened wastewater to produce an effluent carrying no more than 5 mg/l of BOD_5, 3 mg/l of Total Nitrogen and 1 mg/l of Total Phosphorus. Total Suspended Solids (TSS) will be removed to 5 mg/l with utilization of the disk filters. The proposed carrousel layout is provided within **Figure P-18**.

- *Clarifier No. 1 and No. 2:* Two (2) new central clarifiers would be constructed having respective diameters of 75 feet. Each clarifier would provide sufficient surface area and depth to meet average day and peak hour loading requirements. The clarifier system would be fitted with a new RAS/WAS pumping station.

- *Filtration:* This alternative would include construction of two (2) new filters providing a firm capacity of 3.75 MGD (PHF).

- *Chlorine Contact Chamber:* A concrete chlorine contact chamber would be constructed providing parallel runs and would be capable of providing high-level disinfection at peak flows of 3.75 MGD (PHF).

- *Reuse System:* The first phase would include restricted-access reclaimed water improvements including a transfer pumping station, lined storage ponds, and an effluent pumping station. The system would serve both the Magnolia Point Golf Course and the on-site effluent disposal system (i.e., constructed wetlands). The transfer pumping station and wet-weather storage ponds would be designed for the Phase I capacity of 1.75 MGD (AADF) and 3.75 MGD (PHF).

- *Digester:* A new biosolids treatment facility with dewatering capabilities are proposed. This alternative includes construction of two (2) new aerobic digesters with biosolids dewatering capabilities to address this need. In the near-term the biosolids dewatering system would include a gravity filter box or similar unit to address current demands.

- *Ancillary Improvements:* The new WWTP will also require a new site, driveway improvements, stormwater management facilities, operations building, generator, new electrical service, new water service, etc.

Design criteria for the oxidation ditch approach is summarized in **Table P-6**.

TABLE P-6 REGIONAL EXPANSION ALTERNATIVE OXIDATION DITCH IMPROVEMENTS PROPOSED DESIGN CRITERIA	
Influent BOD_5 (mg/l)	300 (avg) | 380 max day
Influent TSS (mg/l)	280 (avg) | 350 max day
Influent TKN (mg/l)	60 (avg) | 80 max day
Annual Avg Daily Flow (MGD)	1.25 per treatment train
Max Daily Flow (MGD)	2.50 per treatment train
Peak Hour Flow (MGD)	3.75 per treatment train
Design Parameter	
Anaerobic Vol (gal)[A]	164,000 (½ Anoxic Chamber)
Anoxic Vol (gal)	328,000 (two (2) 164,000 gal basins)
Aeration Vol (gal)	1,195,000
Anaerobic HRT AADF | MDF (hrs)[A]	1.0 | 0.5
Anoxic HRT AADF | MDF (hrs)	6.2 | 3.1
Aeration HRT AADF | MDF (hrs)	23.0 | 11.5
MLSS (mg/l)	4,000
F/M (lb BOD_5 / lb MLSS / day)[B]	0.08 (AADF)
Wastewater Temperature Range (ºC)	15 - 30
SRT Aeration (days)	16 (AADF)
RAS Flow Rate (% of Q)	75%
Sludge Yield (lb TSS / lb BOD_5 removed)	0.81
Sludge Production (lb / day dry solids)	2,490
O_2 required per lb BOD_5 removed	1.16
O_2 required per lb TKN removed	4.57
Aerator/Mixer Motor Size (Hp)	100 per each (two (2) units)

Capital costs include both construction and non-construction costs associated with the Alternative. Construction costs are based on budget pricing from equipment vendors, recent bid pricing for similar work, and engineering judgment. Non-construction costs include engineering, administration, legal, and finance-related costs and will be represented as 15% of the total estimated construction cost. The Oxidation Ditch Improvements opinion of probable capital cost is presented in **Table P-7**.

TABLE P-8

REGIONAL EXPANSION ALTERNATIVE
OXIDATION DITCH IMPROVEMENTS
ENGINEER'S OPINION OF PROBABLE CAPITAL COST

Description	Estimated Cost
1. Mobilization & General Conditions	$600,000
2. Land Acquisition ($15,000/Ac * 100 Ac)	$1,500,000
3. HRWWTP and SWWTP Decommissioning	$200,000
4. HRWWTP Master Pump Station	$250,000
5. SWWTP Master Pump Station	$250,000
6. Transmission System Improvements (a) 16" FM from SWWTP to manifold (12,000 LF @ $80/LF) (b) 16" FM from HRWWTP to manifold (14,500 LF @ $80/LF) (c) 18" FM from manifold to Regional Site (9,500 LF @ $90/LF)	$2,975,000
7. Sitework and Yard Piping	$550,000
8. Influent Structure (Fine Screen & Grit Removal System)	$1,000,000
9. Oxidation Ditch (1.25 MGD Treatment Train No. 1)	$3,000,000
10. Clarifier No. 1 and 2 ($450,000 per each)	$900,000
11. RAS/WAS Pump Station	$135,000
12. Filtration Improvements	$570,000
13. Chlorine Contact Chamber	$175,000
14. In-plant Reuse System	$75,000
15. Aerobic Digesters	$1,500,000
16. Biosolids Dewatering System	$800,000
17. Operations Building & Site Improvements	$570,000
18. Chemical Feed Facilities	$150,000

TABLE P-8 (cont.) REGIONAL EXPANSION ALTERNATIVE OXIDATION DITCH IMPROVEMENTS ENGINEER'S OPINION OF PROBABLE CAPITAL COST	
Description	**Estimated Cost**
19. Electrical & Instrumentation Improvements	$2,000,000
20. Miscellaneous	$150,000
21. On-site wetland disposal system (see Table P-4)	$7,000,000
22. Magnolia Point Reuse Transfer Pump Station	$205,000
23. 16" Reuse Main Extension to Existing Reuse Main (24,000 LF @ $80/LF)	$1,920,000
Estimated Construction Costs	$26,475,000
Construction Contingency (15%)	$3,971,000
TOTAL ESTIMATED CONSTRUCTION	**$30,446,000**
NON-CONSTRUCTION COSTS (15%)	**$4,567,000**
TOTAL ESTIMATED CAPITAL COST	**$35,013,000**

The opinion of probable O&M costs are presented in **Table P-9**.

TABLE P-9 REGIONAL EXPANSION ALTERNATIVE OXIDATION DITCH IMPROVEMENTS ENGINEER'S OPINION OF PROBABLE O&M COST	
Description	**Estimated Annual Cost**
1. WWTP Power (1,900,000 kwh/yr @ 0.125¢ / kwh)	$233,750
2. HRWWTP Master Pump Station Power (286,000 kwh/yr @ 0.125¢ / kwh)	$35,750
3. SWWTP Master Pump Station Power (286,000 kwh/yr @ 0.125¢ / kwh)	$35,750
4. Magnolia Point Reuse Transfer Pump Station Power (109,000 kwh/yr @ 0.125¢ / kwh)	$13,625
5. Wetland Disposal Operating Cost (see Table P-5)	$70,000
6. Equipment Maintenance / Repair (2% x $3,000,000)	$60,000

TABLE P-9 (cont.) REGIONAL EXPANSION ALTERNATIVE OXIDATION DITCH IMPROVEMENTS ENGINEER'S OPINION OF PROBABLE O&M COST	
Description	**Estimated Annual Cost**
7. Chlorination Chemicals (23,000 ppy @ $1.25 / pound)	$28,750
8. Dechlorination Chemicals (0 ppy @ $1.25 / pound)	$0
9. Sludge Dewatering Chemicals (3,750 gpy @ $14/gal)	$52,500
10. Sludge Handling ($75 / wet ton x 2,100 wet tons/yr @ 10% solids)	$157,500
TOTAL	**$687,625**

The cost summary for this alternative is provided as follows:

Total Est. Const. Cost	=	$30,500,000 @ 3.0% for 30 yrs
	=	$30,500,000 x 0.0510
	=	$1,555,000/yr
Total Est. Annual O&M Cost	=	$690,000/yr
TOTAL ANNUAL COST		**$2,245,000/yr (*estimated*)**

5. North Service Area Review

Due to the anticipated construction and non-construction costs associated with the South Service Area consolidation alternative, a cursory review was completed of potential sites within the North Service Area. The parcel information and a summary table is provided herein. In the end, a suitable site was not located a feasible alternative.

In addition to the above, consolidation of the wastewater treatment capabilities at a new site also has several 'risks' associated with parcel acquisition timing, the ability to subdivide the parcel, and overall costs.

CITY OF GREEN COVE SPRINGS
Northern Service Area – Siting Review
WW and Reuse Master Plan
M&A Project 8905-31-1
December 4, 2014

[Water Plant Relocation would have to consider either: (a) new production well development & well head protection, or (b) new well pumps and raw water piping systems to carry raw water to new site for treatment and re-pumping into distribution system.]

SITE	SITING CONCERNS
A William T Ball Trustee 18.9 Ac (too small for WWTP)	1. Residential Area | Competing Uses 2. Near River 3. 'Narrow' – Deep Parcel 4. Eliminated from Consideration
B Thelma M Stahler 20.6 Ac (too small for WWTP)	1. Residential Area | Competing Uses 2. Near River 3. 'Narrow' – Deep Parcel 4. Wetland Areas 5. Eliminated from Consideration
C Bruce D McAnnally Trustee 11.5 Ac (too small for WWTP)	1. Residential Area | Competing Uses 2. Near River 3. 'Narrow' – Deep Parcel 4. Wetland Concerns 5. Eliminated from Consideration
D George E Platt Trustee 11.5 Ac (too small for WWTP)	1. Residential Area | Competing Uses 2. Near River 3. 'Narrow' – Deep Parcel 4. Wetland Concerns 5. Eliminated from Consideration
E Sue Hall Trustee 13.3 Ac (too small for WWTP)	1. Residential and/or Commercial Area | Competing Uses 2. US 17 frontage 3. Wetland Concerns 4. Floodplain Concerns 5. Eliminated from Consideration
F Sue Hall Trustee 8.4 Ac (too small for WWTP)	1. US 17 frontage 2. Commercial/Residential Development 3. Eliminated from Consideration
G Anne H Anthony 8 Ac (too small for WWTP)	1. Access Issues unless combined with adjacent parcel 2. Commercial/Residential Development 3. Eliminated from Consideration
H Ruth Mitchell 11.1 Ac (too small for WWTP)	1. Access Issues unless combined with adjacent parcel 2. Commercial/Residential Development 3. Eliminated from Consideration

SITE	SITING CONCERNS
I Edgewater Landing, LLC. (in development)	1. Development. Already in Planning. 2. Eliminated from Consideration
J Michael & Joyce Bramer 6.9 Ac (too small for WWTP)	1. Commercial/Residential Development 2. Eliminated from Consideration
K Clay County BOCC 163.5 Ac	1. Floodplain and Wetland Issues 2. Creek Frontage 3. Park Area 4. Eliminated from Consideration
L REO Funding Solutions III, LLC 25.6 Ac	1. Developer owned? Development Property 2. US 17 frontage 3. Eliminated from Consideration
M W T Lamb 14.2 Ac (too small for WWTP)	1. US 17 frontage 2. Commercial/Residential Development 3. Wetland Concerns 4. Eliminated from Consideration
N John & Nina Soileau 8.7 Ac (too small for WWTP)	1. US 17 frontage 2. Commercial/Residential Development 3. Wetland Concerns 4. Eliminated from Consideration
O Bowles 12.5 Ac (too small for WWTP)	1. US 17 frontage 2. Commercial/Residential Development 3. Eliminated from Consideration
P thru Q Various Parcels See enclosed	1. Parcels abutting existing residential and abutting CR 209. 2. Some limited wetland concerns. 3. Need multiple parcels for sufficient area and/or access. 4. Eliminated from Consideration

CITY OF GREEN COVE SPRINGS

Southern Service Area – Siting Review (Within City Service Area and/or City Limits)
WW and Reuse Master Plan
M&A Project 8905-31-1
December 4, 2014

SITE	SITING CONCERNS
Wetland Disposal Site J John Bishop Trustee 93 Ac (split between 3 separate parcels)	1. Poor Soils. 2. Trust ownership may be issue for acquisition. 3. 3 separate parcels…disjointed. 4. Eliminated from Consideration
Wetland Disposal Site K JPHCC LLC 53 Ac	1. Poor Soils. 2. Development potential? 3. Wetland issues. 4. Eliminated from Consideration

SITE	SITING CONCERNS

CITY OF GREEN COVE SPRINGS

Southern Service Area – Siting Review (Outside of City Service Area and City Limits)

WW and Reuse Master Plan

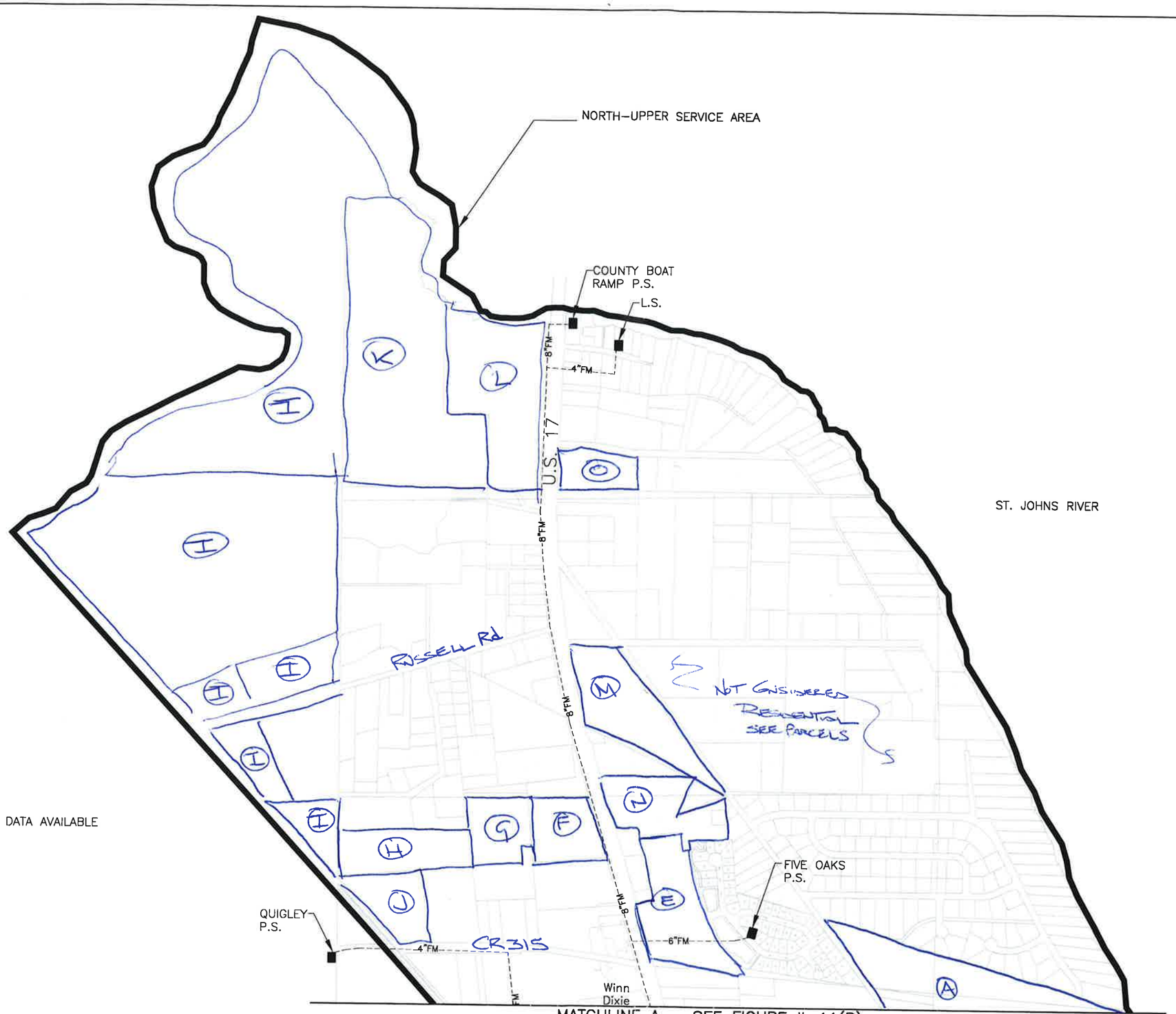
M&A Project 8905-31-1

December 4, 2014

SITE	SITING CONCERNS
Sprayfield Site A Gustafson's Cattle Inc. 1,063 Ac	1. Poor Soils 2. Existing on-site wetlands 3. Floodplain areas 4. CCUA Coordination. 5. Eliminated from Consideration
Sprayfield Site B West River Joint Venture 260 Ac	1. Poor Soils 2. Existing on-site wetlands 3. Floodplain areas 4. Development potential? 5. CCUA Coordination 6. Eliminated from Consideration
Sprayfield Site C CAM Development Company, LLC 98 Ac	1. Existing on-site wetlands 2. Future Development? May not want to sell. 3. CCUA Coordination 4. Eliminated from Consideration
Sprayfield Site D Buttercup Enterprises, LLC 1,940 Ac	1. Already in development process 2. CCUA has slated area for new WWTP 3. Eliminated from Consideration
Sprayfield Site E G Bar Ranch South, LLC 552 Ac	1. Potential Parcel 2. Development Potential? 3. Can parcel be split off for WWTP and/or Sprayfield development? 4. CCUA Coordination? 5. Possible candidate.
Sprayfield Site F G Bar Ranch South, LLC 101 Ac	1. Areas of poor soils 2. Existing on-site wetlands 3. Somewhat landlocked. 4. CCUA Coordination 5. Eliminated from Consideration
Sprayfield Site G G Bar Ranch South, LLC 571 Ac	1. Areas of poor soils 2. Can sub parcel be split off? 3. CCUA Coordination. 4. Possible candidate.

SITE	SITING CONCERNS
Sprayfield Site H Reinhold Corporation 548 Ac	1. Areas of poor soils 2. Floodplain areas 3. Can sub parcel be split off? 4. CCUA Coordination. 5. Possible candidate.
Sprayfield Site I Gustafsons Family 168 Ac	1. Areas of poor soils 2. Floodplain areas 3. CCUA Coordination 4. Eliminated from Consideration
Sprayfield or Wetland Site L SJRWMD 620 Ac	1. Conservation Parcel? May preclude any use for the City. 2. Floodplain issues. 3. Wetland issues. 4. CCUA Coordination 5. Eliminated from Consideration
Wetland Disposal Site M SJRWMD 380 Ac	1. Poor Soils 2. Conservation Parcel? May preclude any use for the City. 3. CCUA Coordination 4. Eliminated from Consideration
Wetland Disposal Site N William T. Lemen, III Trustee 42 Ac	1. Poor Soils, but may be suitable for wetland disposal. 2. CCUA Coordination. 3. Trust Issue. 4. Low-end of area needs. 5. Possible candidate.
Wetland Disposal Site O William T. Lemen, III Trustee 33 Ac	1. Poor Soils, but may be suitable for wetland disposal. 2. CCUA Coordination. 3. Trust issue? 4. Low-end of area needs. 5. Possible candidate.

SCALE: 1" = 1000'



NOTE:
NO COLLECTION SYSTEM DATA AVAILABLE

SEP 29 2014

MITTAUER & ASSOCIATES, INC.
CONSULTING ENGINEERS
580-1 WELLS ROAD, ORANGE PARK, FLORIDA 32073
TEL. (904) 278-0030 FAX. (904) 278-0840 FLORIDA CA No. 6569

CITY OF GREEN COVE SPRINGS
Wastewater & Reuse System Master Plan
North – Upper Service Area Map/Collection System
Clay County, Florida

FIGURE II–11(A)
September 2014
Project No. 8905–31–1

M:\CAD Files\Green Cove Springs\8905311\Exhibits\Figure II-11A-B North - Upper Service Area.dwg, 9/29/2014 10:34:00 AM

MATCHLINE A – SEE FIGURE II–11(A)

SCALE: 1" = 1000'

N

NOTE:
ALL GRAVITY COLLECTION PIPING
IS 8"ø UNLESS NOTED OTHERWISE

P.S. #26
8"FM

8"FM

U.S. 17

8"FM

Magnolia Manor

Magnolia Manor

Animal Hospital

8"FM

HICKORY KNOLLS P.S.

ST. JOHNS LANDING P.S.

8"FM

ST. JOHNS LANDING

NORTH–UPPER SERVICE AREA

ST. JOHNS RIVER

16" GRAVITY OUTFALL PIPING(SEE FIGURE II–4 FOR ROUTING LOCATION)

NORTH–MAGNOLIA SERVICE AREA

P.S. #12

4"FM

Enterprise Way

Virgils Way

8"FM

12"FM

EXISTING HRWWTP

Magnolia Layne

P.S. #11

12"FM

8"FM

Magnolia Point Golfside Villas U3

Magnolia Point Golfside Villas U2

P.S. #13

Magnolia Point Golfside Villas U1

Magnolia Point Golfside Villas U1

Magnolia Point Estates Lots U1

Magnolia Point Phase 2

P.S. #18

4"FM

Magnolia Point

P.S. #14

8"FM

Hull Field Dr.

8"FM

8"FM

P.S. #17

4"FM

Magnolia Point Phase 1

P.S. #15

P.S. #16

4"FM

Magnolia Point Clubhouse Dr.

Gator Bay Rd.

Governors Creek Drive

Governors Creek Dr.

P.S. #4

P.S. #7

NORTH–CORE SERVICE AREA

Cove Subdivision

P.S. #27

LEGEND

-X"FM- FORCE MAIN

SANITARY MANHOLE

-X"SAN- GRAVITY CONNECTION PIPING

P.S. PUMP STATION

SEP 29 2014

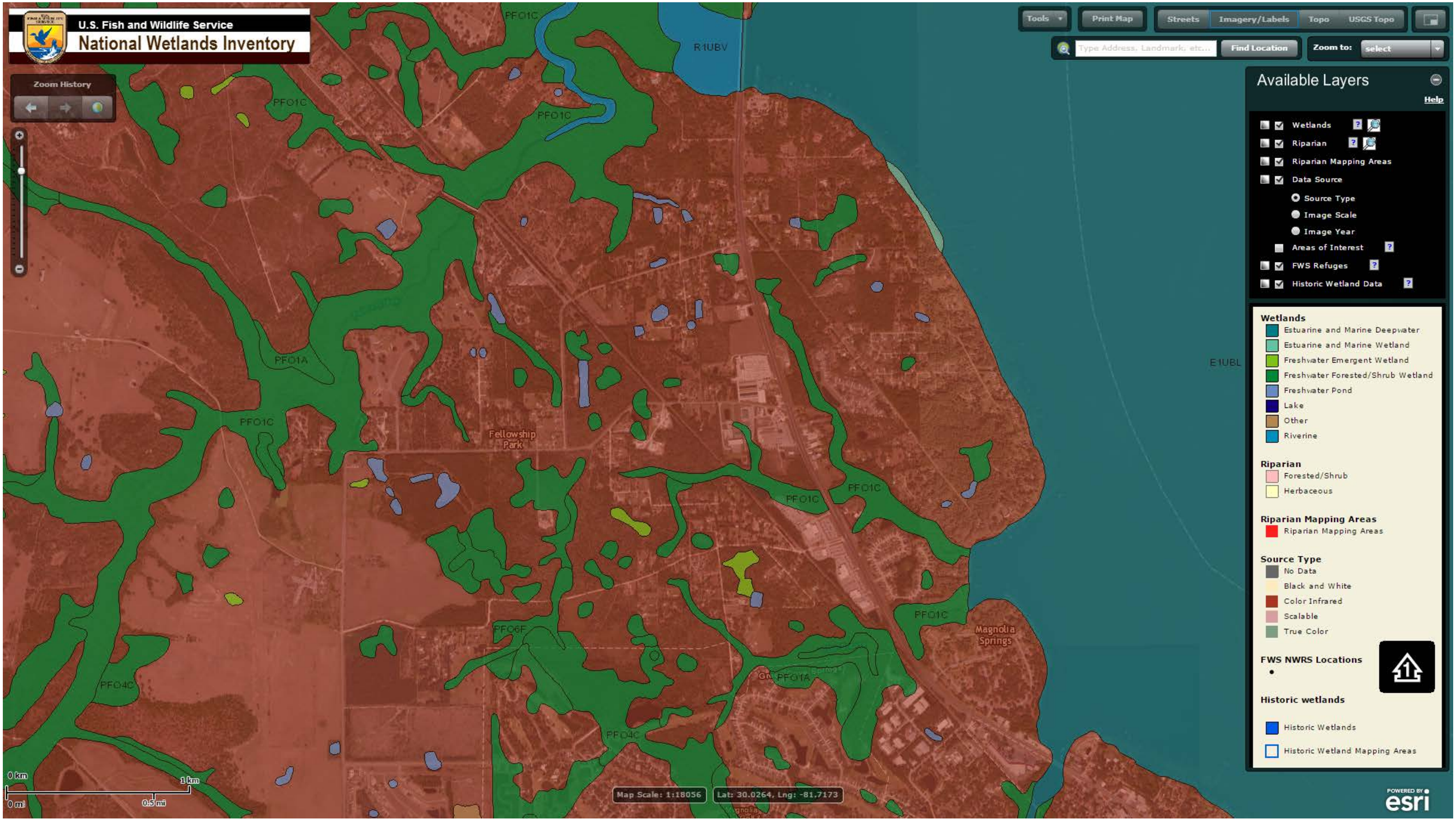
MITTAUER & ASSOCIATES, INC.
CONSULTING ENGINEERS
580-1 WELLS ROAD, ORANGE PARK, FLORIDA 32073
TEL. (904) 278-0030 FAX. (904) 278-0840 FLORIDA CA NO. 6569

CITY OF GREEN COVE SPRINGS
Wastewater & Reuse System Master Plan
North – Upper Service Area Map/Collection System
Clay County, Florida

FIGURE II–11(B)
September 2014
Project No. 8905–31–1

M:\CAD Files\Green Cove Springs\8905311\Exhibits\Figure II-11A-B North - Upper Service Area.dwg, 9/29/2014 10:34:18 AM


U.S. Fish and Wildlife Service
National Wetlands Inventory
Zoom History
Tools
Print Map
Streets
Imagery/Labels
Topo
USGS Topo
Type Address, Landmark, etc...
Find Location
Zoom to:
select
Available Layers
Help
Wetlands
Riparian
Riparian Mapping Areas
Data Source
Source Type
Image Scale
Image Year
Areas of Interest
FWS Refuges
Historic Wetland Data
Wetlands
Estuarine and Marine Deepwater
Estuarine and Marine Wetland
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Lake
Other
Riverine
Riparian
Forested/Shrub
Herbaceous
Riparian Mapping Areas
Riparian Mapping Areas
Source Type
No Data
Black and White
Color Infrared
Scalable
True Color
FWS NWRS Locations
Historic wetlands
Historic Wetlands
Historic Wetland Mapping Areas
R1UBV
E1UBL
PFO1C
PFO1A
PFO4C
PFO6F
Fellowship Park
Magnolia Springs
Map Scale: 1:18056
Lat: 30.0339, Lng: -81.6900
0 km
1 km
0 m
0.5 mi
POWERED BY esri


U.S. Fish and Wildlife Service
National Wetlands Inventory
Zoom History
Tools
Print Map
Streets
Imagery/Labels
Topo
USGS Topo
Type Address, Landmark, etc...
Find Location
Zoom to:
select
Available Layers
Help
Wetlands
Riparian
Riparian Mapping Areas
Data Source
Source Type
Image Scale
Image Year
Areas of Interest
FWS Refuges
Historic Wetland Data
Wetlands
Estuarine and Marine Deepwater
Estuarine and Marine Wetland
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Lake
Other
Riverine
Riparian
Forested/Shrub
Herbaceous
Riparian Mapping Areas
Riparian Mapping Areas
Source Type
No Data
Black and White
Color Infrared
Scalable
True Color
FWS NWRS Locations
Historic wetlands
Historic Wetlands
Historic Wetland Mapping Areas
R1UBV
E1UBL
PFO1C
PFO1A
PFO6F
PFO4C
Fellowship Park
Magnolia Springs
0 km
1 km
0 mi
0.5 mi
Map Scale: 1:18056
Lat: 30.0264, Lng: -81.7173
POWERED BY esri

website at http://www.ngs.noaa.gov/.

s provided in digital format by the Clay
nformation was photogrammetrically
ography dated 2008.

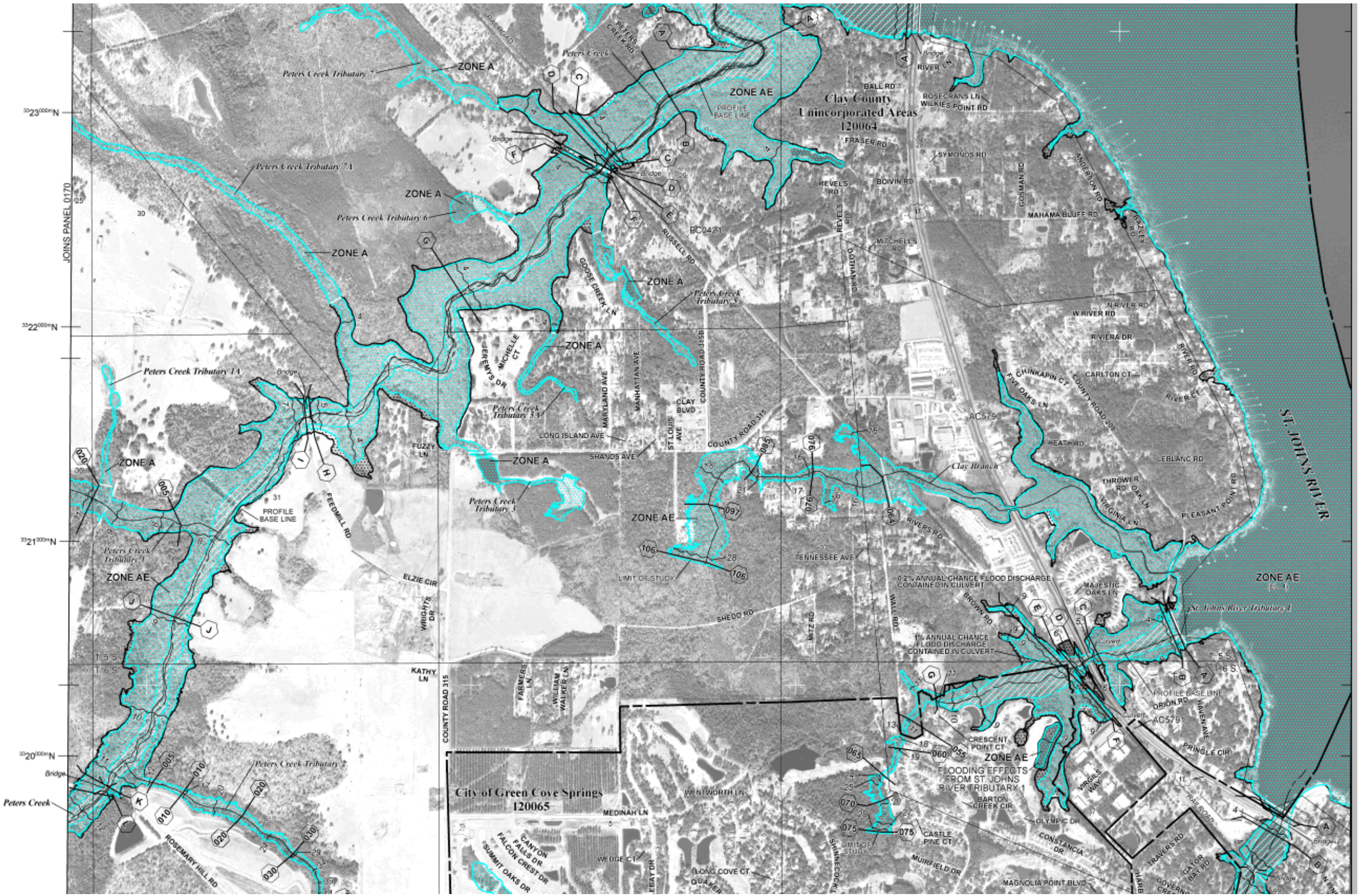
ate **stream channel configurations** this jurisdiction. The floodplains and ous FIRM may have been adjusted to ations. As a result, the Flood Profiles urance Study report (which contains m channel distances that differ from

d on the best data available at the time exations or de-annexations may have p users should contact appropriate mit locations.

ex for an overview map of the county ty map repository addresses; and a al Flood Insurance Program dates for panels on which each community is

ange (FMIX) at 1-877-336-2627 for ith this FIRM. Available products may nge, a Flood Insurance Study report, may also be reached at its website at

estions concerning the National Flood **877-FEMA MAP** (1-877-336-2627) or business/nfip/.



Attachment E

Technical Memorandum – Surface Water Discharge Elimination Review
Harbor Road WWTF – NPDES ID FL0020915
City of Green Cove Springs, Florida
Mittauer & Associates, Inc. Project No. 8905-19-1

Capital Estimates

City of Green Cove Springs
Surface Water Discharge Elimination Review
Engineer's Opinion of Probable Construction Costs
AACE Class 5 Estimate

8905-19-1
10/8/2021

HRWRF - PACKAGE WWTF CONVERSION TO REJECT STORAGE TANK					
ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST					
Item	**Description**	**Est. Qty**	**Unit**	**Unit Cost**	**Total**
1	Mobilization/Demobilization (≤ 5%)	1	LS	$ 36,000	$ 36,000
2	General/Special Conditions (≤ 15%)	1	LS	$ 95,000	$ 95,000
3	Interior Tank Demolition	1	LS	$ 100,000	$ 100,000
4	Interior Tank Coatings	1	LS	$ 75,000	$ 75,000
5	Piping Extensions				
a	16" PVC Reject Main	1,200	LF	$ 200	$ 240,000
b	12" PVC Drainline Modifications	150	LF	$ 250	$ 37,500
c	16" PVC Overflow Piping	250	LF	$ 250	$ 62,500
6	Electrical & Instrumentation	1	LS	$ 115,000	$ 115,000
				SUBTOTAL	**$ 761,000**
				25% Contingency	$ 190,000
				SUBTOTAL	**$ 951,000**
				20% Non-Construction	$ 190,000
				TOTAL	**$ 1,141,000**

Class 5 Estimate Range	**-50%**	**$ 571,000**
	100%	**$ 2,282,000**

City of Green Cove Springs 8905-19-1

Surface Water Discharge Elimination Review 10/8/2021

Engineer's Opinion of Probable Construction Costs

AACE Class 5 Estimate

HRWRF - 1.25 MG REJECT GST					
ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST					
Item	**Description**	**Est. Qty**	**Unit**	**Unit Cost**	**Total**
1	Mobilization/Demobilization (≤ 5%)	1	LS	$ 91,000	$ 91,000
2	General/Special Conditions (≤ 15%)	1	LS	$ 236,000	$ 236,000
3	Piping Extensions				
a	16" PVC Reject Main	800	LF	$ 200	$ 160,000
b	12" PVC Drainline & Overflow Piping	1,250	LF	$ 250	$ 312,500
4	Site Work				
a	Tree Protection	1	LS	$ 10,000	$ 10,000
b	Site Clearing and Grubbing	1	LS	$ 25,000	$ 25,000
c	Earthwork	1	LS	$ 50,000	$ 50,000
d	Finish Grading	1	LS	$ 15,000	$ 15,000
e	Erosion & Sediment Control	1	LS	$ 6,000	$ 6,000
f	Grassing	1	LS	$ 7,500	$ 7,500
5	1.25 MG Pre-Stressed GST	1	LS	$ 800,000	$ 800,000
6	Tank Coatings	1	LS	$ 75,000	$ 75,000
7	Electrical & Instrumentation	1	LS	$ 115,000	$ 115,000
				SUBTOTAL	**$ 1,903,000**
				25% Contingency	$ 476,000
				SUBTOTAL	**$ 2,379,000**
				20% Non-Construction	$ 476,000
				TOTAL	**$ 2,855,000**

Class 5 Estimate Range	**-50%**	**$**	**1,428,000**
	100%	**$**	**5,710,000**

City of Green Cove Springs 8905-19-1

Surface Water Discharge Elimination Review 10/8/2021

Engineer's Opinion of Probable Construction Costs

AACE Class 5 Estimate

HRWRF - RECLAIMED WATER GST NO. 2					
ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST					
Item	**Description**	**Est. Qty**	**Unit**	**Unit Cost**	**Total**
1	Mobilization/Demobilization (≤ 5%)	1	LS	$ 70,000	$ 70,000
2	General/Special Conditions (≤ 15%)	1	LS	$ 234,000	$ 234,000
3	Site Work				
a	Tree Protection	1	LS	$ 10,000	$ 10,000
b	Site Clearing and Grubbing	1	LS	$ 25,000	$ 25,000
c	Earthwork	1	LS	$ 50,000	$ 50,000
d	Finish Grading	1	LS	$ 15,000	$ 15,000
e	Erosion & Sediment Control	1	LS	$ 6,000	$ 6,000
f	Grassing	1	LS	$ 7,500	$ 7,500
4	1.25 MG Pre-Stressed GST	1	LS	$ 800,000	$ 800,000
5	Tank Coatings	1	LS	$ 75,000	$ 75,000
6	Piping & Valves				
a	20" DI Reuse	200	LF	$ 200	$ 40,000
b	16" DI Reuse	200	LF	$ 250	$ 50,000
c	Control Valves	1	LS	$ 15,000	$ 15,000
7	Electrical & Instrumentation	1	LS	$ 75,000	$ 75,000
				SUBTOTAL	**$ 1,472,500**
				25% Contingency	$ 368,000
				SUBTOTAL	**$ 1,840,500**
				20% Non-Construction	$ 368,000
				TOTAL	**$ 2,208,500**

Class 5 Estimate Range	**-50%**	**$**	**1,104,000**
	100%	**$**	**4,417,000**

City of Green Cove Springs 8905-19-1

Surface Water Discharge Elimination Review 10/8/2021

Engineer's Opinion of Probable Construction Costs

AACE Class 5 Estimate

HRWRF - MAGNOLIA POINT PHASE 8 RECLAIMED WATER MAIN EXTENSION					
ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST					
Item	**Description**	**Est. Qty**	**Unit**	**Unit Cost**	**Total**
1	Mobilization/Demobilization (≤ 5%)	1	LS	$ 102,000	$ 102,000
2	General/Special Conditions (≤ 15%)	1	LS	$ 266,000	$ 266,000
3	12" PVC RW Main (Open Cut)	2,300	LF	$ 80	$ 184,000
4	12" FPVC RW Main (Directionally Drilled)	7,580	LF	$ 200	$ 1,516,000
5	12" Isolation Valves	6	EA	$ 2,500	$ 15,000
6	Roadway & Driveway Restoration	600	SY	$ 60	$ 36,000
7	Golf Course Restoration	1	LS	$ 25,000	$ 25,000
				SUBTOTAL	**$ 2,144,000**
				25% Contingency	$ 536,000
				SUBTOTAL	**$ 2,680,000**
				20% Non-Construction	$ 536,000
				TOTAL	**$ 3,216,000**

Class 5 Estimate Range	**-50%**	**$**	**1,608,000**
	100%	**$**	**6,432,000**

City of Green Cove Springs 8905-19-1

Surface Water Discharge Elimination Review 10/8/2021

Engineer's Opinion of Probable Construction Costs

AACE Class 5 Estimate

HRWRF - MAGNOLIA POINT PHASE 8 RECLAIMED WATER MAIN EXTENSION					
ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST					
Item	**Description**	**Est. Qty**	**Unit**	**Unit Cost**	**Total**
1	Mobilization/Demobilization (≤ 5%)	1	LS	$ 290,000	$ 290,000
2	General/Special Conditions (≤ 15%)	1	LS	$ 755,000	$ 755,000
3	16" PVC RW Main (Open Cut)	2,200	LF	$ 150	$ 330,000
4	12" PVC RW Main (Open Cut)	6,900	LF	$ 80	$ 552,000
5	8" PVC RW Main (Open Cut)	25,900	LF	$ 70	$ 1,813,000
6	6" PVC RW Main (Open Cut)	21,000	LF	$ 60	$ 1,260,000
7	1" Reuse Service Connections	715	LF	$ 84	$ 60,060
8	16" Isolation Valves	6	EA	$ 5,000	$ 30,000
9	12" Isolation Valves	15	EA	$ 2,500	$ 37,500
10	8" Isolation Valves	60	EA	$ 2,000	$ 120,000
11	6" Isolation Valves	50	EA	$ 1,500	$ 75,000
12	Roadway & Driveway Restoration	6,000	SY	$ 60	$ 360,000
13	R/W Restoration	53,000	SY	$ 7.5	$ 397,500
				SUBTOTAL	**$ 6,080,060**
				25% Contingency	$ 1,520,000
				SUBTOTAL	**$ 7,600,060**
				20% Non-Construction	$ 1,520,000
				TOTAL	**$ 9,120,060**

Class 5 Estimate Range	**-50%**	**$**	**4,560,000**
	100%	**$**	**18,240,000**

City of Green Cove Springs 8905-19-1

Surface Water Discharge Elimination Review 10/8/2021

Engineer's Opinion of Probable Construction Costs

AACE Class 5 Estimate

HRWRF - BULK RECLAIMED WATER EXTENSION TO REYNOLDS PARK (SOUTH WWTF)					
ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST					
Item	**Description**	**Est. Qty**	**Unit**	**Unit Cost**	**Total**
1	Mobilization/Demobilization (≤ 5%)	1	LS	$ 192,000	$ 192,000
2	General/Special Conditions (≤ 15%)	1	LS	$ 500,000	$ 500,000
3	16" PVC RW Main (Open Cut)	2,200	LF	$ 150	$ 330,000
4	16" FPVC RW Main (Directional Drilled)	6,900	LF	$ 250	$ 1,725,000
5	South WWTF Tank Conversion to Reclaimed Water GST	1	LS	$ 500,000	$ 500,000
6	South WWTF Clarifier Conversion to Reclaimed Water GST	1	LS	$ 300,000	$ 300,000
7	Reclaimed Water Pump Station	1	LS	$ 250,000	$ 250,000
8	Two (2) 10,000 GAL Hydro Tanks	1	LS	$ 100,000	$ 100,000
9	Electrical & Instrumentation	1	LS	$ 125,000.0	$ 125,000
				SUBTOTAL	**$ 4,022,000**
				25% Contingency	$ 1,006,000
				SUBTOTAL	**$ 5,028,000**
				20% Non-Construction	$ 1,006,000
				TOTAL	**$ 6,034,000**

Class 5 Estimate Range	**-50%**	**$**	**3,017,000**
	100%	**$**	**12,068,000**

Attachment F

Technical Memorandum – Surface Water Discharge Elimination Review
Harbor Road WWTF – NPDES ID FL0020915
City of Green Cove Springs, Florida
Mittauer & Associates, Inc. Project No. 8905-19-1

CCA Distribution System Limits

Attachment G

Technical Memorandum – Surface Water Discharge Elimination Review
Harbor Road WWTF – NPDES ID FL0020915
City of Green Cove Springs, Florida
Mittauer & Associates, Inc. Project No. 8905-19-1

Class I Injection Well Criteria

Requirements for all Class I Wells and Class I Hazardous Waste Wells

SITING – Fluids must be injected into a formation that is below the lowermost formation containing, within ¼ mile of the well, a USDW. To demonstrate this, owners and operators are required to provide the following information:

Requirements for All Class I Wells	**Additional Requirements for Hazardous Waste Wells**
Geologic Studies of the injection and confining zones to determine that: • The receiving formations are sufficiently permeable, porous, homogeneous, and thick enough to receive the fluids at the proposed injection rate without requiring excessive pressure • Formations are large enough to prevent pressure buildup and injected fluid would not reach aquifer recharge areas • There is a low-permeability confining zone to prevent vertical migration of injection fluids • Injected fluids are compatible with well materials and with rock and fluid in injection zone • The area is geologically stable • The injection zone has no economic value	Additional **structural** studies to demonstrate: • Injection and confining formations are free of vertically transmissive fissures or faults • Low seismicity and probability of earthquakes • Proposed injection will not induce earthquakes or increase the frequency of naturally occurring earthquakes
Area Of Review (AoR) analysis of the surrounding area to identify artificial penetrations, such as other wells, that might allow fluid to move out of the injection zone • Minimum area of review is ¼ mile • Can be a fixed radius around the well or mathematically calculated • Includes a corrective action plan to address improperly completed or plugged wells within the AoR	Additional **review** required: • Minimum AoR of 2 miles • No-migration petition demonstrating that fluids will remain in the injection zone for as long as they are hazardous (modeling conducted to show either the waste will remain in the injection zone for 10,000 years or it will be rendered non-hazardous before migration)

CONSTRUCTION – Wells must have a multilayered design to prevent fluids from entering USDWs.

Requirements for All Class I Wells	Additional Requirements for Hazardous Waste Wells

• Approved engineering schematics and subsurface construction details
• At least 2 layers of concentric casing and cement
• Outer (or surface) casing cemented to the surface
• Tubing and packer design based on
  o well depth
  o characteristics of the injected fluid
  o injection and annular pressure
  o injection rate
  o temperature and volume of injected fluid
  o size of well casing
  o cementing requirements
• Tests during drilling to ensure no vertical migration of fluid
	• Detailed requirements for tubing and packer
	• Long-string (inner) casing fully cemented to surface
	• UIC Program approval of casing, cement, tubing, and packer prior to construction

OPERATION – Provides multiple safeguards to ensure the injected wastewater is fully confined.

Requirements for All Class I Wells	Additional Requirements for Hazardous Waste Wells
• Maintain injection at pressures that will not initiate new fractures or propagate existing fractures • Approved fluids and permitted pressures must be maintained in the annular space • Continuous monitoring and recording devices	• Automatic alarms and shutdown devices • Notify permitting authority within 24 hours if problem occurs • Cease injection and resume only with UIC Program Director's permission

MONITORING AND TESTING – Ensures that there are no leaks in the casing, tubing, or packer and the injected fluid is contained within the injection zone.

Requirements for All Class I Wells	Additional Requirements for Hazardous Waste Wells

• Continuously monitor:
  o Annulus pressure (to detect leaks in the casing, tubing, or packer; and any fluid movement into a USDW)
  o Containment in the injection zone
  o Characteristics of injected waste
  o Monitor for fluid movement into USDWs within the AoR
• Internal and external mechanical integrity test (MIT) every 5 years
	• Explicit procedures for reporting and correcting problems due to lack of mechanical integrity
	• Develop and follow a waste analysis plan
	• Analyze wastewaters as specified in the plan
	• Internal MIT every year
	• Test cement at base of well annually

REPORTING AND RECORD KEEPING – Informs the UIC Program about the operation of the well and all testing results.

Requirements for All Class I Wells	Additional Requirements for Hazardous Waste Wells
• Quarterly on injection and injected fluids and monitoring of USDW in the area of review • Every 5 years on internal and external MITs • Changes to the facility, progress on compliance schedule, loss of mechanical integrity (MI), or noncompliance with permit conditions	• Results from the waste analysis program and geochemical compatibility • Internal MIT yearly • Maximum injection pressure quarterly • Volume of fluid injected

CLOSURE –Ensures that the well is safely and properly abandoned when injection is completed.

Requirements for All Class I Wells	Additional Requirements for Hazardous Waste Wells
• Submit plugging and abandonment report	• Conduct pressure fall off and mechanical integrity tests • Continue ground water monitoring until injection zone pressure cannot influence USDW • Flush well with non-reactive fluid • Inform authorities about the well, its location, and zone of influence