
STORMWATER MANAGEMENT CALCULATIONS

For

Gordy Creek

Gordy Road

Fort Pierce, FL 34953

City of Fort Pierce

NSLRWCD

SFWMD

October 2024

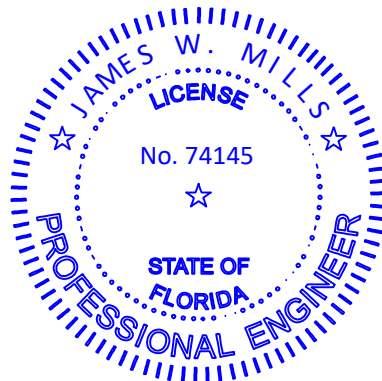
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I. Introduction

The following report provides a discussion of the proposed stormwater management system design and calculations for a single family subdivision in the City of Fort Pierce. This report contains the required documentation to demonstrate that the surface water management system for the proposed residential development complies with the state and local requirements. The project is located off of Gordy Rd, just west of Florida's Turnpike and approx. 1,500 ft to the south of the intersection of Okeechobee Rd/Gordy Rd. A location map is included below for further review of the site's location. All elevations referenced herein are in NAVD 1988 unless otherwise noted.



LOCATION MAP

N.T.S.

II. Existing Site Conditions

The proposed development site is currently 76.97 acres of undeveloped wooded land. The 58.76 AC drainage basin is contained within the parcel boundaries and can be referenced in Appendix D. Tenmile Creek travels through the site as shown in the map above. Approximately ± 11 AC of undisturbed area to the east of Tenmile Creek and ± 10 AC to the west of Tenmile Creek will remain undeveloped. Tenmile Creek is listed as an impaired water body and will require additional stormwater treatment.

TOPOGRAPHY Survey data shows existing grade on the site ranging from approximately $\pm 14.00'$ to $\pm 16.20'$ NAVD 88. Tenmile creek elevations are not included in that range. Average site grade within the drainage basin is approximately 15.60'. A wetland area, which will be preserved as part of this project, exists between the drainage basin area and Tenmile Creek and serves as the first outfall location for the project. The site, in existing condition, generally slopes towards Tenmile Creek.

SOILS Please refer to the soils map enclosed as Appendix C for existing soil types as prepared by the USDA & NRCS Web Soil Survey. The site consists of predominantly sandy soils.

FLOODPLAIN The site area lies within multiple flood zones. The majority of the site lies within flood zone 'X', with some area near the Creek falling into the 'AE' zone. Zone 'AE' holds a base flood elevation of 16 feet NAVD.

CURVE NUMBER The site primarily contains Hydrologic Type 'D' soil. A CN value of 60 was calculated based on the SCS Method.

TIME OF CONCENTRATION The time of concentration for the pre-development basin was determined using the TR-55 Method. A maximum sheet flow of 300 feet and shallow concentrated flow were calculated to determine the Tc of 49 min. Please refer to time of concentration calculations in Section VIII of this report.

TAILWATER The tailwater for the SWMS design for this site is the Tenmile Creek that runs through the site on the western half. NSLRWCD has advised referencing past designs and adjacent permits for the tailwater information. Tailwater conditions used in the enclosed ICPR model have been derived from SFWMD Permit #56-02198-P with Application No. 050926-15.

MAXIMUM ALLOWABLE DISCHARGE The maximum allowable discharge for the design storm (10 year-72 hour storm event), as required by NSLRWCD, is 2" over the drainage area for a 24 hour period. This amount computes to 9.80 ac-ft of discharge for the site in any given 24-hour period during the design storm event. See section VIII for calculations.

III. Proposed Development

The proposed development consists of 178 single-family lots, 138 townhome units, and an amenity center with associated utility and drainage infrastructure. The total project area is 75.98 acres. The site is divided by the Ten Mile Creek with 9.36 acres located on the west side of the Ten Mile Creek and 66.62 acres located on the east side. There is approximately 12.22 acres of undisturbed preservation area that will remain within the overall project area. The drainage basin for the proposed project is 58.76 acres. Please refer to Appendix D for the post-development basin map. The proposed stormwater management system design is intended to provide treatment and attenuation of the project's stormwater runoff. The runoff from the site will be collected through a series of interconnected catch basins leading to a series of onsite lakes. The lakes will provide the required quality and quantity volumes before discharging to the preserved area and ultimately Tenmile Creek. A proposed control structure will implement a weir elevation which will retain runoff and regulate discharge into the outfall system per South Florida Water Management District and NSLRWCD stormwater treatment and discharge criteria.

Based on our understanding of the City of Fort Pierce, NSLRWCD, and South Florida Water Management District Stormwater requirements, the proposed design meets all design criteria for both regulating agencies. A pre- vs. post-development and discharge analysis has been conducted via ICPR and is enclosed in this report as Appendix A.

CURVE NUMBER The post-development curve number was calculated to be 67 based on the SCS CN Method. See enclosed calculations in section VIII for the land use breakdown used to calculate this number.

TIME OF CONCENTRATION The time of concentration for the post-development basin was determined using the TR-55 Method. The Tc value was less than the minimum, therefore a Tc value of 10 minutes was used in the flood routing. Please refer to post-development time of concentration calculations in Section VIII of this report.

SYSTEM DESIGN CRITERIA The discharge rate of the proposed SWM system is constrained as previously discussed in this report. NSLRWCD specifies that the 10 year-72 hour storm be used as the design storm for purposes of discharge regulation. Because the project is associated with discharge to an impaired water body, the treatment volume required to be held prior to discharge is 150% of the greater of 1" over the drainage area, or 2.5" times the percent impervious area on the proposed site (per SFWMD). In the case of this design, the larger of the two was 1" over the drainage area = 150% of 4.90 ac-ft; 7.35 ac-ft of treatment volume. The site utilizes a control structure with a weir elevation governed by the required treatment volume and the NSLRWCD maximum allowable discharge. The building finished floor shall be

above the 100 year-72 hour zero-discharge storm event stage elevation (SFWMD) and the Base Flood Elevation as determined by the FEMA Flood Maps (El. 16.0 NAVD 88). The road crown shall be above the routed 10yr-24hr storm event stage. Please refer to calculations enclosed in section VIII and ICPR routing in Appendix A for the proposed system and recovery model.

GROUNDWATER USE FOR IRRIGATION The irrigation demand for the site was determined assuming an irrigation need of 1 inch of rain per week over the pervious area on the site, including individual lot pervious area.

$$(1 \text{ in/wk}) * (52 \text{ wk/yr}) * (32.34 \text{ ac pervious}) * (43,560 \text{ ft}^2/\text{ac}) * (1 \text{ ft}/12 \text{ in}) * (7.48 \text{ gal}/\text{CF}) \\ = 6.39 \text{ MG/yr needed from groundwater}$$

WETLAND CONTROL ELEVATION GRADIENT Analysis of gradient between the proposed control elevation with associated wetlands is as follows: A gradient of 0.005 ft/ft (vertical distance in elevation/horizontal distance) or less, using the elevation of the wetland boundary and the proposed control elevation, is assumed to not result in adverse impacts to wetlands.

The elevation of the wetland boundary is 11.97' NAVD.

The proposed control elevation is 10.50' NAVD.

The closest horizontal distance between the wetland boundary and the nearest pond's water level at control elevation is 355 ft.

The elevation gradient is 0.0041 ft/ft.

DISCHARGE The SFWMD criteria for limiting discharge to that of the pre-development discharge rate of the site to Tenmile Creek during the 10-Year 72-Hour storm event is met and exceeded. The max total outflow was calculated to be approximately 67.66 cfs per the Pre-Development ICPR model found in Appendix A. The post development conditions discharge approximately 2.18 cfs to Tenmile creek in the 10yr-72hr storm event. Please see Appendix A for the Post Development ICPR calculations. Discharge from the site to the adjacent wetland was analyzed in addition to ultimate outfall into Tenmile Creek in order to assess any potential effects on the wetland's hydroperiod. None are observed.

Per NLSRWCD requirements, the post-development discharge to Tenmile Creek for the proposed site will not exceed more than 2.0 inches of depth over the area served for any 24-hour period from the 10-year frequency, 72-hour duration rainfall. For the proposed site, this requirement equals 9.80 ac-ft in any 24-hour period. This limited discharge criteria is based on the drainage connection requirements set forth by NSLRWCD.

The maximum discharge for the 24-hour period during the 10-year frequency, 72-hour duration rainfall event yielded a maximum of 9.73 ac-ft between hours 44-68 of this storm event. Please see Appendix E for the Post-Development Limited Discharge.

Design Storm Events			
<u>Description</u>	<u>Frequency (years)</u>	<u>Duration (days)</u>	<u>Rainfall (in)</u>
Design	10	3	9.00
Minimum Road Crown	10	1	5.50
Finished Floor	100	3	10.0

Peak Discharge & Stage				
<u>Storm Frequency</u>	<u>Pre-Development</u>	<u>Post Development (to Tenmile Creek)</u>	<u>Post Development (to onsite wetland)</u>	<u>Stage Elevation (NAVD 88)</u>
5 Year 24 Hour	54.05 cfs	2.28 cfs	1.36 cfs	14.01
10 Year 24 Hour	70.09 cfs	2.28 cfs	2.09 cfs	14.69
10 Year 72 Hour	66.75 cfs	4.69 cfs	4.69 cfs	15.33
25 Year 72 Hour	100.02 cfs	6.84 cfs	6.84 cfs	16.24
10 Year 24 Hour No Discharge	N/A	N/A	N/A	14.98 (Min Road Crown)
100 Year 72 Hour No Discharge	N/A	N/A	N/A	17.84 (Min FFE)

Wetland Discharge Structures			
<u>Structure Number</u>	<u>Structure Type</u>	<u>Structure Info</u>	<u>Wetland Normal Pool & Seasonal High El.</u>
CS-1	Control Structure FDOT Manhole	Rim El: 15.00' Weir El: 12.79'	11.97'
WD-1	30" Dia Energy Dissipator	Inv El: 12.00'	11.97'

IV. Erosion and Sediment Control

The project specifications require the contractor and owner to install stormwater pollution prevention devices in accordance with the construction drawings and Florida Development Manual, A Guide to Sound Land and Water Management, published by the DEP. All disturbed areas shall be fully sodded, seeded and mulched. Silt fence will be required to be installed at the perimeter and any other applicable locations within the project area.

V. Stormwater System Maintenance Plan

The maintenance of the Stormwater Management System shall be the responsibility of the Gordy Creek POA.

The stormwater maintenance plan for Gordy Creek Residential includes several key actions to ensure the system operates efficiently and complies with the City of Fort Pierce code and SFWMD regulations. Routine inspections shall be performed on a monthly basis to check for debris in inlets, pipes, and drainage structures, with additional inspections after significant storms. Stormwater retention ponds, drainage pipes, and vegetated swales shall be regularly maintained. This includes quarterly debris removal, mowing of swales, and managing vegetation around ponds to prevent erosion and maintain proper function. Additionally, sediment removal from inlets, catch basins, and pipes shall take place annually, or more frequently if necessary, to prevent blockages.

Structural maintenance shall include inspecting outfalls, pipes, and control structures to ensure they are free of damage and functioning as intended. If any damage or clogging is identified, repairs shall be performed promptly. An annual comprehensive inspection by a licensed professional shall assess the entire stormwater system, and any necessary repairs or upgrades shall be scheduled. Detailed records of all inspections and maintenance activities shall be kept. In the event of a system failure, emergency procedures shall be enacted, including immediate inspections, temporary solutions like sandbagging or debris removal, and rapid repairs. These efforts shall ensure the stormwater system effectively manages runoff, reduces flooding risks, and protects water quality for the subdivision.

VI. Jurisdictional Permitting Agencies

1. South Florida Water Management District
2. NSLRWCD
3. City of Fort Pierce

VII. Calculations

Gordy Creek
Drainage Calculations

Site Data

Onsite Area (ac.) =	75.98
DA = Area (ac.) =	58.76
RT = Residence Time (days) =	31
R = Wet Season Rainfall (inches) =	32
WS = Wet Season Duration (days) =	153
Conversions: CF (in/ft.) =	12
Composite "C" Value =	0.53

Land Use	Area	Runoff C
Pavement & Building	21.75	0.95
Lake	3.94	1
Pervious	33.07	0.20
	58.76	0.53

Pond Design Criteria: SFWMD Rule Criteria

1.) Treatment Volume: Provide first 1.0 inch of runoff or 2.5 multiplied by the percentage impervious as defined by the SFWMD Vol. IV, Area to be used for water quality calcs equals the total area less the area of buildings, preserves, lakes, and wetlands.

1-inch over the project Area

$$\text{Treated Volume} \quad 1\text{-inch} \quad \times \quad 1\text{-ft}/12\text{in} \quad \times \quad 58.76 \quad = \quad \boxed{4.90} \text{ ac-ft}$$

Treated Volume

2.5-inches times the percent impervious

75.98	-	15.78	-	17.22	-	3.94	=	39.04 AC
Total Area		Buildings		Preserves		Lakes		Total WQ Area
39.04	-	33.07	=	5.97 AC	=	15.3%		
Total WQ Area		Pervious		Impervious WQ Area		WQ Percent Impervious		

$$(2.5\text{-in} * \% \text{ Imp.}) \quad 2.5 \quad \times \quad 15.3\% \quad = \quad 0.38 \quad \text{in}$$

(Treated Volume)	0.38	x	1-ft/12-in	x	Inches to be treated 54.82	=	1.75	ac-ft
					Project Area-Lakes & Preserves		Treated Volume	

Gordy Creek
 Drainage Calculations

Water Quality Volume:

1.0 Inch:	4.90	ac-ft	=	213,299	cu-ft
2.50 Inch:	1.75	ac-ft	=	76,036	cu-ft
TV Required Wet Detention:		4.90		ac-ft	

SFWMD WQ Volume Adjustment for Discharge to Impaired Waterway (OFW)

WQ Required Volume	=	WQ Req'd	x	1.5	=	----	ac-ft
WQ Required Volume	=	4.90	x	1.5	=	7.345	ac-ft
SFWMD Required Water Quality Volume					=	7.345	ac-ft

Permanent Pool Volume Required:

PPV (ac-ft) = (DA x C x R x RT) / (WS x CF)

PPV (ac-ft) =	16.83	ac-ft
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Discharge Volume Criteria: (NSLRWCD)

2 inch x Project Area =	9.8	ac-ft	(Within a 24 hour period)
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Gordy Creek
 Drainage Calculations

Proposed Pond Stage - Storage Calculations:

Pond Area (ac.) = 3.94
 Tailwater Elevation (NAVD 88) = 10.50 (Min. Assumed El. In Tenmile Creek)
 Seasonal High Groundwater Elevation NAVD 88 (ft.) = 11.10
 Normal Groundwater Elevation NAVD 88 (ft.) = 10.50 (Control elevation based on NSLWCD Tailwater)

Stage - Storage Characteristics - Ponds (N/I 0.63 AC Pond)

Contours	Area Within Contour		Interval Volume	Cumulative Volume		Storage Above Control El.
	(sq. ft.)	(ac.)	(cu. ft.)	(cu. ft.)	(ac.-ft.)	(ac.-ft.)
T.O.B. 15.5	259,447	5.96		2,074,280	47.62	24.66
			250,347			
14.5	241,246	5.54		1,823,933	41.87	18.91
			232,295			
13.5	223,344	5.13		1,591,638	36.54	13.58
			214,546			
12.5	205,748	4.72		1,377,092	31.61	8.66
			197,110			
11.5	188,472	4.33		1,179,982	27.09	4.13
			92,107			
Weir Crest El. 14.00 Pond Control El. 10.5 11	179,956	4.13		1,087,875	24.97	2.02
			87,869			
10.5	171,521	3.94		1,000,006	22.96	0
			310,116			
8.5	138,595	4.13		689,890	15.84	
			261,214			
6.5	122,619	3.94		428,676	9.84	
			229,667			
4.5	107,048	3.18		199,009	4.57	
			199,009			
Pond Bottom 2.5	91,961	2.81		0	0.00	

Gordy Creek
Drainage Calculations

Check mean depth of stormwater pond

$$MD = PPV / A_p$$

$$A_p \text{ (ac)} = \text{Area of pond measurement at Control Elevation} = 3.94 \text{ AC}$$

$$PPV \text{ (ac-ft.)} = 22.96$$

$$MD \text{ (ft.)} = 5.83$$

Acceptable mean depth must be between 2 and 8 ft.

SFWMD Criteria for Wet Detention Treatment:

1.) Treatment Volume for Wet Detention

$$\text{Treatment Volume Required (ac-ft.)} = 7.345$$

2.) Outfall Structure Control Elevations

$$\text{Estimated seasonal high ground water elevation (ft.)} = 11.10$$

$$\text{Orifice invert elevation (ft.)} = 10.50$$

$$\text{Treatment Weir Elevation (ft.)} = 13.00$$

$$\text{Top of Bank Elevation (ft.)} = 15.50$$

3.) Calculations for sizing orifice to recover 50% of treatment volume within 24 hours of a storm event

a. Calculation of Treatment Volume Stage

$$T.V. \text{ Stage} = (\text{TOB El.} - \text{Orifice Inv. El.}) \times (T.V. \text{ Required}) / (\text{Storage @ TOB} - \text{Storage @ Orifice Inv.}) + \text{Orifice Inv. El.}$$

$$T.V. \text{ Stage (ft.)} = 12.79$$

b. Treatment Volume Depth (h1) = T.V. Stage - Orifice Inv. Elev.

$$h1 \text{ (ft.)} = 2.29$$

h1 = Depth of water between the top of the treatment volume and the flow line (size of orifice has yet been determined, use the invert elevation of the orifice as an approximation of the flow line (center of the orifice))

c. Calculation of Stage at 50% of T.V. = ((T.V. Required x 0.5) / (Storage TOB - Storage Orifice Inv.)) x (TOB El. - Orifice Inv. El.) + Orifice Inv. El.

$$50\% \text{ Stage (ft.)} = 14.16$$

$$h2 \text{ (ft.)} = 3.66$$

h2 = Depth of water between the stage at which half the treatment volume has been released and the flow line of the orifice

d. $H = (h1 + h2) / 2$

$$h \text{ (ft.)} = 2.98$$

(Depth of water (h) should be set to the average depth above the flow line between the top of the treatment volume and the stage at which half the treatment released)

Gordy Creek
 Drainage Calculations

SFWM Criteria for Wet Detention Treatment

e. Average Flow Rate (Q) required to drawdown 50% treatment volume

$$Q = T.V. \text{ Required} / (2 \times t \times \text{Conv. Factor})$$

T.V. required = 7.35 ac-ft

1/2" over the Basin area = 2.45 ac-ft

Drawdown Time = 24 hrs

Conversion Factors: 1hr / 3600 seconds, 43,560 sq. ft./ac

$$Q = \frac{TV}{2 t CF}$$

where: *TV* = Treatment Volume (*ft*³)
t = Recovery time (*hrs*)
CF = Conversion Factor = 3600 *sec/hr*

Q (cfs) = 0.62
 Number of Orifices = 1
 Flow (cfs) = 0.62

f. Calculate Area of Orifice

$$A = Q / (C * (\text{Sqrt}(2 \times g \times h)))$$

Discharge Coefficient = C = 0.60

g (ft/sec²) = 32.2

h (ft.) = 2.98

Area of Orifice (sq.ft) = 0.07 SF

g. Calculate Diameter of Orifice

Circular:

Orifice Diameter = 0.31 ft
3.69 in

Rectangular:

Orifice Area = 10.69 sq. in.
Height = 2 in.
Length = 5.35 in.

Pre-Development
Land Use Table

<u>Use</u>	<u>Imp. (ac)</u>	<u>Pervious (ac)</u>	<u>Total (ac)</u>
Buildings =	0.00	0.00	0.00
Pavement & Curb =	0.00	0.00	0.00
Concrete Surfaces =	0.00	0.00	0.00
Lake (CWE) =	0.00	0.00	0.00
Lake (Slope) =	0.00	0.00	0.00
W.T.A. (Bottom) =	0.00	0.00	0.00
W.T.A. (Slopes) =	0.00	0.00	0.00
West Area (West of 10-Mile Creek) =	0.00	9.36	9.36
East Area (East of 10-Mile Creek) =	0.00	67.63	67.63
Total =	0.00	76.99	76.99

Find Curve Number:

Avg. Pervious Ground El. = 15.5 NAVD 88
 Control Elevation = 10.5 Based on operation of NSLRWCD Gordy Road Control
 Distance to Water Table = 4.5 Structure during wet season

Soil Storage Table

<u>Depth to</u>	<u>Coastal Storage (in)</u>	<u>Flatwoods Storage (in)</u>	<u>Depression Storage (in)</u>
1.0	0.6	0.6	0.6
1.5	1.6	1.6	1.4
2.0	2.5	2.5	2.1
2.5	4.6	4.0	3.3
3.0	6.6	5.4	4.4
3.5	8.8	7.2	5.6
4.0	10.9	9.0	6.8

Find the basin's soil classification and input below as "Soil Storage" using the above "Depth to W.T."

West Area

Developed Pervious Area =	0.00
Undeveloped Pervious Area =	9.36
Soil Storage =	6.8 inches
Soil Moisture Storage (S) =	6.8 inches
Curve Number =	60

East Area

Developed Pervious Area =	0.00
Undeveloped Pervious Area =	67.63
Soil Storage =	6.8 inches
Soil Moisture Storage (S) =	6.8 inches
Curve Number =	60

Gordy Creek Subdivision

Pre-Development Tc Calculations

Time of Concentration

Pre-Development

Basin: Pre-Development Gordy Creek Basin

Sheet Flow			
1	Surface Description	Dense Grasses	TR-55
2	Manning's Roughness Coeff	0.24	TR-55
3	Flow Length, L (total <=300 ft)	300 feet	
4	2-year 24-hour rainfall, P2	6 inches	FDOT Fig. 5-13
5	Land slope, s	0.01 ft/ft	
6	$T_t = (0.007 * (nL)^{0.8}) / ((P2^{0.5}) * (s^{0.4}))$ (hr)	0.55 hr =	33 min

Shallow Concentrated Flow			
7	Surface Description	Unpaved	TR-55
8	Flow Length, L	1500 feet	
9	Watercourse slope, s	0.01 ft/ft	
10	Average velocity, V	1.6 ft/s	TR-55 fig 3-1
11	$T_t = (L/(3600*V))$	0.26 hr =	16 min

Channel Flow			
12	Cross sectional flow area, a	- SF	
13	Wetted perimeter, Pw	- ft	
14	Hydraulic radius, r = a/Pw	#VALUE! ft	
15	Channel slope, s	- ft/ft	
16	Manning's Roughness Coeff, n	-	TR-55
17	Average velocity, $V = (1.49*(r^{2/3})*(s^{1/2}))/n$	- ft/s	
18	Flow length, L	- ft	
19	$T_t = (L/(3600*V))$	#VALUE! hr =	#VALUE! min

Total			
20	Total Tc	0.81 hours	
21	Total Tc	49 minutes	

Post-Development

Land Use Table

<u>Use</u>	<u>Imp. (ac)</u>	<u>Pervious (ac)</u>	<u>Total (ac)</u>
Buildings =	15.78	0.00	15.78
Pavement & Curb =	4.63	0.00	4.63
Sidewalk =	1.61	0.00	1.61
Lake (CWE) =	4.40	0.00	4.40
Lake (Slope) =	0.00	2.30	2.30
Dry Detention (Bottom) =	0.00	0.00	0.00
Dry Detention (Slopes) =	0.00	0.00	0.00
Gordy Road ROW (West of 10-Mile Creek) =	0.00	0.00	0.00
General Impervious =	0.00	0.00	0.00
Open Space (disturbed) =	0.00	30.04	30.04
Total =	26.42	32.34	58.76

Find Curve Number:

Avg. Ground El. = 15.5 NAVD 88
Control Elevation = 10.5 Based on operation of NSLRWCD Gordy Road Control
Distance to Water Table = 4.8

Soil Storage Table

<u>Depth to</u>	<u>Coastal Storage (in)</u>	<u>Flatwoods Storage (in)</u>	<u>Depression Storage (in)</u>
1.0	0.6	0.6	0.6
1.5	1.6	1.6	1.4
2.0	2.5	2.5	2.1
2.5	4.6	4.0	3.3
3.0	6.6	5.4	4.4
3.5	8.8	7.2	5.6
4.0	10.9	9.0	6.8

Find the basin's soil classification and input below as "Soil Storage" using the above "Depth to W.T."

East Area	
Developed Pervious Area =	32.34
Undeveloped Pervious Area =	0.00
Soil Storage =	9 inches
Soil Moisture Storage (S) =	5.0 inches
Curve Number =	67

Gordy Creek Residential

Post-Dev Tc Calculations

Time of Concentration

Post-Development

Basin: Post-Development Gordy Creek Basin

Sheet Flow			
1	Surface Description	Smooth surfaces; asphalt	TR-55
2	Manning's Roughness Coeff	0.011	TR-55
3	Flow Length, L (total <=300 ft)	11 feet	
4	2-year 24-hour rainfall, P2	6 inches	FDOT Fig. 5-13
5	Land slope, s	0.02 ft/ft	
6	$T_t = (0.007 * (nL)^{0.8}) / ((P2^{0.5}) * (s^{0.4}))$ (hr)	0.00 hr =	0 min

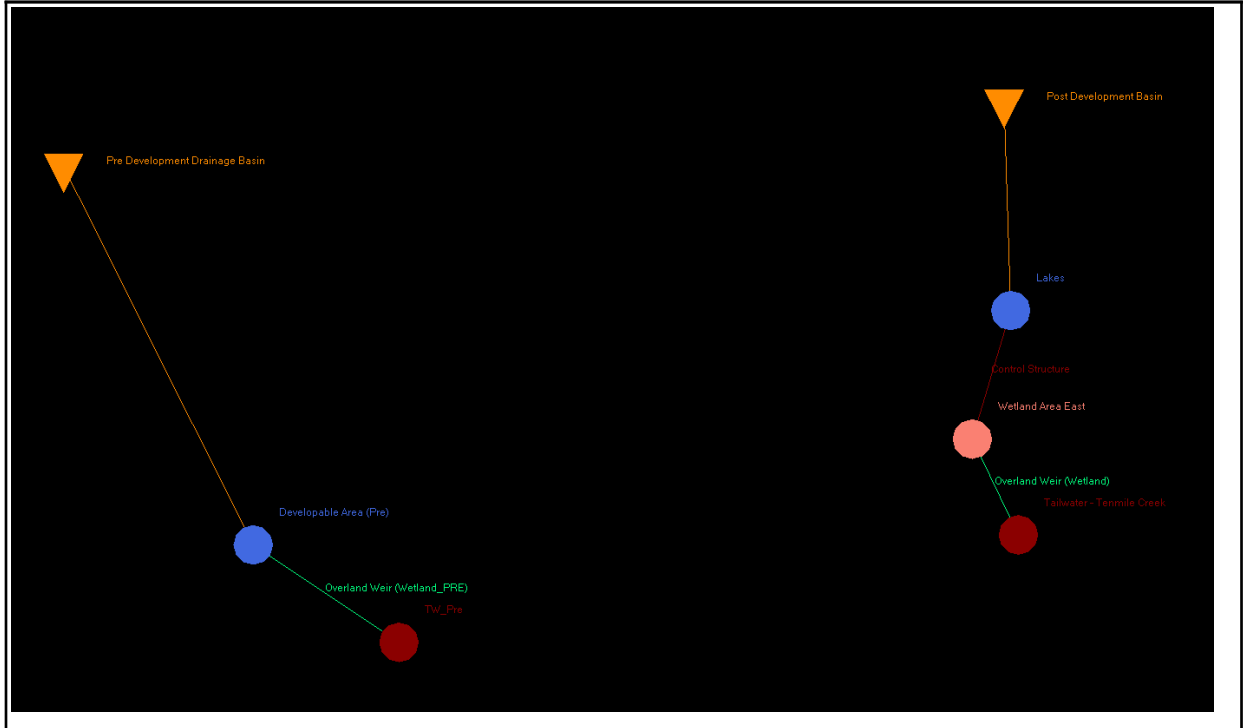
Shallow Concentrated Flow			
7	Surface Description	concrete curb	TR-55
8	Flow Length, L	150 feet	
9	Watercourse slope, s	0.005 ft/ft	
10	Average velocity, V	1.45 ft/s	TR-55 fig 3-1
11	$T_t = (L/(3600*V))$	0.03 hr =	2 min

Channel Flow			
12	Cross sectional flow area, a	1.77 SF	
13	Wetted perimeter, Pw	2.36 ft	
14	Hydraulic radius, r = a/Pw	0.75 ft	
15	Channel slope, s	0.003 ft/ft	
16	Manning's Roughness Coeff, n	0.011	TR-55
17	Average velocity, $V = (1.49*(r^{2/3})*(s^{1/2}))/n$	6.13 ft/s	
18	Flow length, L	1067 ft	
19	$T_t = (L/(3600*V))$	0.05 hr =	3 min

Total			
20	Total Tc	0.08 hours	
21	Total Tc	5 minutes	

Appendix A

Background Image: view



Node Max Conditions : Multi Item | (sim, name) [Scenario 1]

Sim Name	Node Name	Warning Stage [ft]	Alert Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
100YR-72HR	Lakes	15.51	0.00	16.30	0.0010	156.27	6.95	397703
100YR-72HR	Tailwater - Tenmile Creek	0.00	0.00	6.50	0.0000	6.95	0.00	0
100YR-72HR	Wetland Area East	0.00	0.00	8.59	-0.0023	6.95	6.95	1742
10YR-24HR	Lakes	15.51	0.00	14.69	0.0010	192.82	2.09	270095
10YR-24HR	Tailwater - Tenmile Creek	0.00	0.00	6.50	0.0000	2.28	0.00	0
10YR-24HR	Wetland Area East	0.00	0.00	8.50	-0.0023	2.09	2.28	100
10YR-72HR	Lakes	15.51	0.00	15.33	0.0010	118.92	4.69	283412
10YR-72HR	Tailwater - Tenmile Creek	0.00	0.00	6.50	0.0000	4.69	0.00	0
10YR-72HR	Wetland Area East	0.00	0.00	8.56	-0.0023	4.69	4.69	1742
25YR-72HR	Lakes	15.51	0.00	16.24	0.0010	240.62	6.84	397703
25YR-72HR	Tailwater - Tenmile Creek	0.00	0.00	6.50	0.0000	6.84	0.00	0
25YR-72HR	Wetland Area East	0.00	0.00	8.59	-0.0023	6.84	6.84	1742
5YR-24HR	Lakes	15.51	0.00	14.01	0.0010	155.94	1.36	256159
5YR-24HR	Tailwater - Tenmile Creek	0.00	0.00	6.50	0.0000	2.28	0.00	0
5YR-24HR	Wetland Area East	0.00	0.00	8.50	-0.0023	1.36	2.28	100

Node Max Conditions : Multi Item | (sim, name) [Scenario 1]

Sim Name	Node Name	Warning Stage [ft]	Alert Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
100YR-72HR	Developable Area (Pre)	0.00	0.00	9.01	-0.0022	91.01	91.01	1641
100YR-72HR	TW_Pre	0.00	0.00	6.50	0.0000	91.01	0.00	0
100YR-72HR	Wetland Area East (Pre)	0.00	0.00	8.50	0.0000	0.00	0.00	1742

Sim Name	Node Name	Warning Stage [ft]	Alert Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
10YR-24HR	Developable Area (Pre)	0.00	0.00	8.95	-0.0022	70.09	70.09	1528
10YR-24HR	TW_Pre	0.00	0.00	6.50	0.0000	70.09	0.00	0
10YR-24HR	Wetland Area East (Pre)	0.00	0.00	8.50	0.0000	0.00	0.00	1742
10YR-72HR	Developable Area (Pre)	0.00	0.00	8.94	-0.0022	66.75	66.75	1510
10YR-72HR	TW_Pre	0.00	0.00	6.50	0.0000	66.75	0.00	0
10YR-72HR	Wetland Area East (Pre)	0.00	0.00	8.50	0.0000	0.00	0.00	1742
25YR-72HR	Developable Area (Pre)	0.00	0.00	9.03	-0.0022	100.02	100.02	1732
25YR-72HR	TW_Pre	0.00	0.00	6.50	0.0000	100.02	0.00	0
25YR-72HR	Wetland Area East (Pre)	0.00	0.00	8.50	0.0000	0.00	0.00	1742
5YR-24HR	Developable Area (Pre)	0.00	0.00	8.90	-0.0022	54.05	54.05	1424
5YR-24HR	TW_Pre	0.00	0.00	6.50	0.0000	54.05	0.00	0
5YR-24HR	Wetland Area East (Pre)	0.00	0.00	8.50	0.0000	0.00	0.00	1742



Node Max Conditions : Multi Item | (sim, name) [No Discharge]

Sim Name	Node Name	Warning Stage [ft]	Alert Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
100YR-72HR (FFE)	Lakes	15.51	0.00	17.84	0.0010	156.27	0.00	397703
10YR-24HR (Road Crown)	Lakes	15.51	0.00	14.98	0.0010	192.81	0.00	276118

Simple Basin: Pre Development Drainage Basin

Scenario: Scenario 1
 Node: Developable Area (Pre)
 Hydrograph Method: NRCS Unit Hydrograph
 Infiltration Method: Curve Number
 Time of Concentration: 49.0000 min
 Max Allowable Q: 999.00 cfs
 Time Shift: 0.0000 hr
 Unit Hydrograph: UH256
 Peaking Factor: 256.0
 Area: 56.1100 ac
 Curve Number: 82.0
 Ia/S: 0.00
 % Impervious: 0.00
 % DCIA: 0.00
 % Direct: 0.00
 Rainfall Name:

Comment:

Node: Developable Area (Pre)

Scenario: Scenario 1
 Type: Stage/Area
 Base Flow: 0.00 cfs
 Initial Stage: 8.50 ft
 Warning Stage: 0.00 ft
 Alert Stage: 0.00 ft

Stage [ft]	Area [ac]	Area [ft2]
8.50	0.0000	0
8.60	0.0030	131
8.70	0.0040	174
8.80	0.0070	305
8.90	0.0330	1437
9.00	0.0370	1612
9.10	0.0470	2047
9.20	0.0530	2309
9.30	0.0620	2701
9.40	0.0950	4138
9.50	0.1030	4487
9.60	0.1200	5227
9.70	0.1340	5837
9.80	0.1460	6360
9.90	0.1650	7187
10.00	0.1850	8059
10.10	0.1870	8146
10.20	0.1900	8276

Stage [ft]	Area [ac]	Area [ft2]
10.30	0.1930	8407
10.40	0.1950	8494
10.50	0.1970	8581
10.60	0.1990	8668
10.70	0.2110	9191
10.80	0.2210	9627
10.90	0.2220	9670
11.00	0.2220	9670
11.10	0.2290	9975
11.20	0.2350	10237
11.30	0.2380	10367
11.40	0.2500	10890
11.50	0.2630	11456
11.60	0.2730	11892
11.70	0.2800	12197
11.80	0.2880	12545
11.90	0.2930	12763
12.00	0.2970	12937
12.10	0.3080	13416
12.20	0.3170	13809
12.30	0.3230	14070
12.40	0.3240	14113
12.50	0.3280	14288
12.60	0.3330	14505
12.70	0.3330	14505
12.80	0.3330	14505
12.90	0.3330	14505
13.00	0.3360	14636
13.10	0.3430	14941
13.20	0.3450	15028
13.30	0.3450	15028
13.40	0.3500	15246
13.50	0.3510	15290
13.60	0.3520	15333
13.70	0.3520	15333
13.80	0.3540	15420
13.90	0.3550	15464
14.00	17.6000	766656
15.00	58.7600	2559586
16.00	58.7600	2559586

Comment:

Node: TW_Pre

Scenario: Scenario 1

Type: Time/Stage

Base Flow: 0.00 cfs
 Initial Stage: 6.50 ft
 Warning Stage: 0.00 ft
 Alert Stage: 0.00 ft
 Boundary Stage:

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	6.50
0	0	0	999.0000	6.50

Comment:

Node: Wetland Area East (Pre)

Scenario: Scenario 1
 Type: Stage/Volume
 Base Flow: 0.00 cfs
 Initial Stage: 8.50 ft
 Warning Stage: 0.00 ft
 Alert Stage: 0.00 ft

Stage [ft]	Volume [ac-ft]	Volume [ft3]
8.50	0.00	0
8.60	0.00	131
8.70	0.00	174
8.80	0.01	305
8.90	0.03	1437
9.00	0.04	1612
9.10	0.05	2047
9.20	0.05	2309
9.30	0.06	2701
9.40	0.10	4138
9.50	0.10	4487
9.60	0.12	5227
9.70	0.13	5837
9.80	0.15	6360
9.90	0.17	7187
10.00	0.19	8059
10.10	0.19	8146
10.20	0.19	8276
10.30	0.19	8407
10.40	0.20	8494
10.50	0.20	8581
10.60	0.20	8668
10.70	0.21	9191
10.80	0.22	9627
10.90	0.22	9670
11.00	0.22	9670

Stage [ft]	Volume [ac-ft]	Volume [ft3]
11.10	0.23	9975
11.20	0.24	10237
11.30	0.24	10367
11.40	0.25	10890
11.50	0.26	11456
11.60	0.27	11892
11.70	0.28	12197
11.80	0.29	12545
11.90	0.29	12763
12.00	0.30	12937
12.10	0.31	13416
12.20	0.32	13809
12.30	0.32	14070
12.40	0.32	14113
12.50	0.33	14288
12.60	0.33	14505
12.70	0.33	14505
12.80	0.33	14505
12.90	0.33	14505
13.00	0.34	14636
13.10	0.34	14941
13.20	0.35	15028
13.30	0.35	15028
13.40	0.35	15246
13.50	0.35	15290
13.60	0.35	15333
13.70	0.35	15333
13.80	0.35	15420
13.90	0.36	15464
14.00	0.36	15507
14.10	0.36	15507
14.20	0.36	15551
14.30	0.36	15551
14.40	0.36	15551
14.50	0.36	15551
14.60	0.36	15551
14.70	0.36	15551
14.80	0.36	15551
14.90	0.36	15551

Comment:

Weir Link: Overland Weir (Wetland_PRE)

Scenario: Scenario 1	Bottom Clip
From Node: Developable Area (Pre)	Default: 0.00 ft
To Node: TW_Pre	Op Table:

Link Count: 1
 Flow Direction: Both
 Damping: 0.0000 ft
 Weir Type: Broad Crested Vertical
 Geometry Type: Irregular
 Invert: 8.30 ft
 Control Elevation: 0.00 ft
 Cross Section: Wetland Overland Weir

Ref Node:
 Top Clip
 Default: 0.00 ft
 Op Table:
 Ref Node:
 Discharge Coefficients
 Weir Default: 2.800
 Weir Table:
 Orifice Default: 0.600
 Orifice Table:

Comment:

Weir Cross Section: Wetland Overland Weir

Scenario: Scenario 1
 Lid: No

Bottom Point Table

Order	Station [ft]	Elevation [ft]
0	-786.00	10.90
1	-674.00	10.40
2	-494.00	8.80
3	-382.00	9.20
4	-202.00	11.50
5	-90.00	9.00
6	90.00	9.20
7	202.00	11.60
8	426.00	8.30
9	476.00	9.90
10	588.00	8.40
11	700.00	11.30

Comment:

Simple Basin: Post Development Basin

Scenario: Scenario 1
 Node: Lakes
 Hydrograph Method: NRCS Unit Hydrograph
 Infiltration Method: Curve Number
 Time of Concentration: 10.0000 min
 Max Allowable Q: 999.00 cfs
 Time Shift: 0.0000 hr
 Unit Hydrograph: UH256
 Peaking Factor: 256.0
 Area: 58.7600 ac
 Curve Number: 90.0
 Ia/S: 0.00
 % Impervious: 0.00
 % DCIA: 0.00
 % Direct: 0.00
 Rainfall Name:

Comment:

Node: Lakes

Scenario: Scenario 1
 Type: Stage/Area
 Base Flow: 0.00 cfs
 Initial Stage: 10.50 ft
 Warning Stage: 15.51 ft
 Alert Stage: 0.00 ft

Stage [ft]	Area [ac]	Area [ft2]
16.00	9.1300	397703
15.50	6.5900	287060
14.50	6.1100	266152
13.50	5.6400	245678
12.50	5.1800	225641
11.50	4.7200	205603
11.00	4.5000	196020
10.50	4.2800	186437

Comment:

Node: Tailwater - Tenmile Creek

Scenario: Scenario 1
 Type: Time/Stage
 Base Flow: 0.00 cfs
 Initial Stage: 6.50 ft

Warning Stage: 0.00 ft
 Alert Stage: 0.00 ft
 Boundary Stage:

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	6.50
0	0	0	999.0000	6.50

Comment: Tailwater from SFWMD Permit #56-02198-P(050926-15)

Node: Wetland Area East

Scenario: Scenario 1
 Type: Stage/Volume
 Base Flow: 0.00 cfs
 Initial Stage: 8.50 ft
 Warning Stage: 0.00 ft
 Alert Stage: 0.00 ft

Stage [ft]	Volume [ac-ft]	Volume [ft3]
8.50	0.00	0
8.60	0.00	131
8.70	0.00	174
8.80	0.01	305
8.90	0.03	1437
9.00	0.04	1612
9.10	0.05	2047
9.20	0.05	2309
9.30	0.06	2701
9.40	0.10	4138
9.50	0.10	4487
9.60	0.12	5227
9.70	0.13	5837
9.80	0.15	6360
9.90	0.17	7187
10.00	0.19	8059
10.10	0.19	8146
10.20	0.19	8276
10.30	0.19	8407
10.40	0.20	8494
10.50	0.20	8581
10.60	0.20	8668
10.70	0.21	9191
10.80	0.22	9627
10.90	0.22	9670
11.00	0.22	9670
11.10	0.23	9975
11.20	0.24	10237

Stage [ft]	Volume [ac-ft]	Volume [ft3]
11.30	0.24	10367
11.40	0.25	10890
11.50	0.26	11456
11.60	0.27	11892
11.70	0.28	12197
11.80	0.29	12545
11.90	0.29	12763
12.00	0.30	12937
12.10	0.31	13416
12.20	0.32	13809
12.30	0.32	14070
12.40	0.32	14113
12.50	0.33	14288
12.60	0.33	14505
12.70	0.33	14505
12.80	0.33	14505
12.90	0.33	14505
13.00	0.34	14636
13.10	0.34	14941
13.20	0.35	15028
13.30	0.35	15028
13.40	0.35	15246
13.50	0.35	15290
13.60	0.35	15333
13.70	0.35	15333
13.80	0.35	15420
13.90	0.36	15464
14.00	0.36	15507
14.10	0.36	15507
14.20	0.36	15551
14.30	0.36	15551
14.40	0.36	15551
14.50	0.36	15551
14.60	0.36	15551
14.70	0.36	15551
14.80	0.36	15551
14.90	0.36	15551

Comment:

Drop Structure Link: Control Structure	Upstream Pipe	Downstream Pipe
Scenario: Scenario 1	Invert: 9.50 ft	Invert: 9.00 ft
From Node: Lakes	Manning's N: 0.0190	Manning's N: 0.0190
To Node: Wetland Area East	Geometry: Circular	Geometry: Circular
Link Count: 1	Max Depth: 2.00 ft	Max Depth: 2.00 ft
Pipe Flow Direction: Positive	Bottom Clip	

Solution:	Combine	Default:	0.00 ft	Default:	0.00 ft
Increments:	0	Op Table:		Op Table:	
Pipe Count:	1	Ref Node:		Ref Node:	
Damping:	0.0000 ft	Manning's N:	0.0000	Manning's N:	0.0000
Length:	213.00 ft	Top Clip			
FHWA Code:	0	Default:	0.00 ft	Default:	0.00 ft
Entr Loss Coef:	1	Op Table:		Op Table:	
Exit Loss Coef:	1	Ref Node:		Ref Node:	
Bend Loss Coef:	0	Manning's N:	0.0000	Manning's N:	0.0000
Bend Location:	0.00 dec				
Energy Switch:	Energy				

Pipe Comment:

Weir Component			
Weir:	1	Bottom Clip	
Weir Count:	1	Default:	0.00 ft
Weir Flow Direction:	Both	Op Table:	
Damping:	0.0000 ft	Ref Node:	
Weir Type:	Sharp Crested Vertical	Top Clip	
Geometry Type:	Irregular	Default:	0.00 ft
Invert:	12.79 ft	Op Table:	
Control Elevation:	12.79 ft	Ref Node:	
Cross Section:	Weir and notch	Discharge Coefficients	
		Weir Default:	3.200
		Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Weir Comment: 1/2 36" cap weir inside manhole.
2" Weir notch at Treatment volume stage, overflow at 2' above TVS

Weir Component			
Weir:	2	Bottom Clip	
Weir Count:	1	Default:	0.00 ft
Weir Flow Direction:	Both	Op Table:	
Damping:	0.0000 ft	Ref Node:	
Weir Type:	Sharp Crested Vertical	Top Clip	
Geometry Type:	Circular	Default:	0.00 ft
Invert:	10.50 ft	Op Table:	
Control Elevation:	10.50 ft	Ref Node:	
Max Depth:	0.31 ft	Discharge Coefficients	
		Weir Default:	3.200
		Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Weir Comment: bleeder @ CE

Drop Structure Comment: Outfall pipe has flapgate at Wetland

Weir Link: Overland Weir (Wetland)	
Scenario:	Scenario 1
From Node:	Wetland Area East
To Node:	Tailwater - Tenmile Creek
Link Count:	1
Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Broad Crested Vertical
Geometry Type:	Irregular
Invert:	8.30 ft
Control Elevation:	0.00 ft
Cross Section:	Wetland Overland Weir
	Bottom Clip
	Default: 0.00 ft
	Op Table:
	Ref Node:
	Top Clip
	Default: 0.00 ft
	Op Table:
	Ref Node:
	Discharge Coefficients
	Weir Default: 2.800
	Weir Table:
	Orifice Default: 0.600
	Orifice Table:
Comment:	

Weir Cross Section: Weir and notch	
Scenario:	Scenario 1
Lid:	Yes

Bottom Point Table

Order	Station [ft]	Elevation [ft]
0	-1.50	2.21
1	-1.50	2.00
2	-0.08	2.00
3	-0.08	0.00
4	0.08	0.00
5	0.08	2.00
6	1.50	2.00
7	1.50	2.21

Lid Point Table

Order	Station [ft]	Elevation [ft]
0	-1.50	2.21
1	1.50	2.21

Comment:

Simulation: Recovery

Scenario: Recovery
 Run Date/Time: 9/25/2024 2:06:18 PM
 Program Version: StormWise 4.08.03

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	336.0000

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

Output Time Increments

Hydrology

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

Surface Hydraulics

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

Groundwater

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

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:
 Reference ET Folder:
 Unit Hydrograph Folder:

Lookup Tables

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

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

Conductivity Set:
Leakage Set:

Tolerances & Options

Time Marching: SAOR	IA Recovery Time: 24.0000 hr
Max Iterations: 6	ET for Manual Basins: False
Over-Relax Weight: 0.5 dec	Ia/S: 0.20 dec
Fact:	
dZ Tolerance: 0.0010 ft	
Max dZ: 1.0000 ft	Smp/Man Basin Rain: Global
	Opt:
Link Optimizer Tol: 0.0001 ft	OF Region Rain Opt: Global
	Rainfall Name: ~SFWMD-72
Edge Length Option: Automatic	Rainfall Amount: 0.00 in
	Storm Duration: 72.0000 hr
Dflt Damping (2D): 0.0050 ft	Dflt Damping (1D): 0.0050 ft
Min Node Srf Area: 100 ft2	Min Node Srf Area: 100 ft2
(2D):	(1D):
Energy Switch (2D): Energy	Energy Switch (1D): Energy

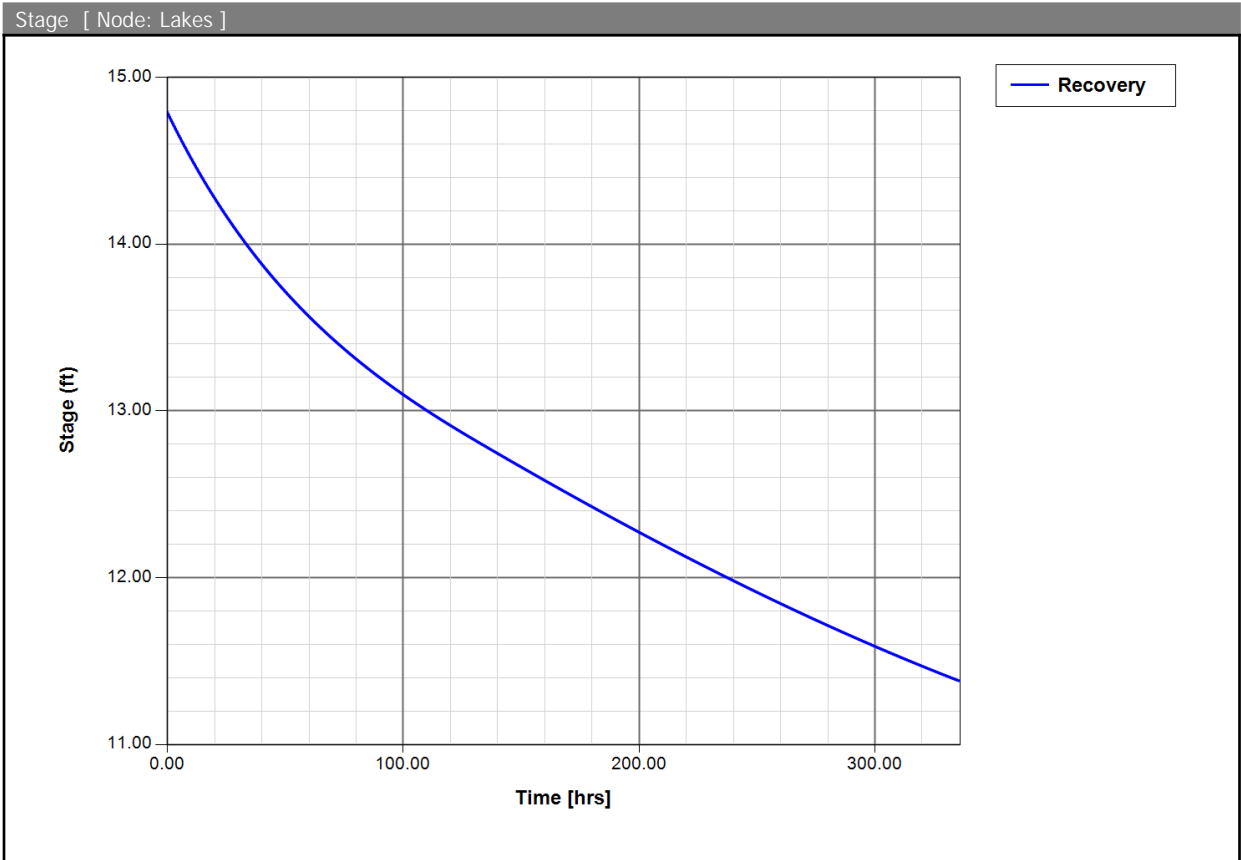
Comment:

Node: Lakes

Scenario: Recovery
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 14.79 ft
Warning Stage: 0.00 ft
Alert Stage: 0.00 ft

Stage [ft]	Area [ac]	Area [ft2]
16.50	15.0000	653400
16.00	9.1300	397703
15.50	6.5900	287060
14.50	6.1100	266152
13.50	5.6400	245678
12.50	5.1800	225641
11.50	4.7200	205603
11.00	4.5000	196020
10.50	4.2800	186437

Comment: 10 Yr 24 Hour recovery from peak stage

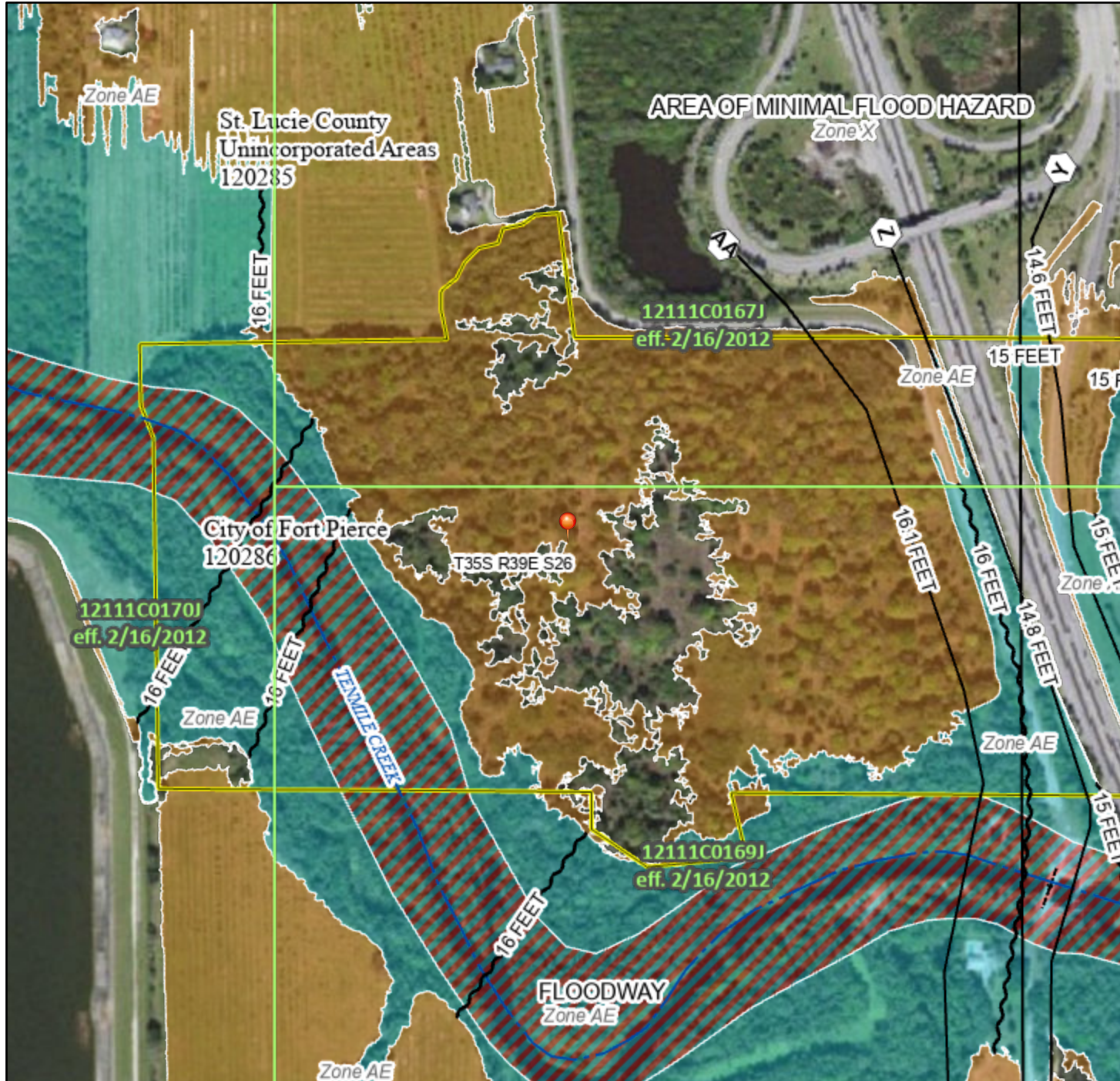


Appendix B

National Flood Hazard Layer FIRMette



80°24'31"W 27°24'37"N



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE)
Zone A, V, A99
- With BFE or Depth Zone AE, AO, AH, VE, AR
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee. See Notes. Zone X
- Area with Flood Risk due to Levee Zone D

OTHER AREAS

- NO SCREEN Area of Minimal Flood Hazard Zone X
- Effective LOMRs
- Area of Undetermined Flood Hazard Zone D

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES

- 20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
- 17.5 Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS

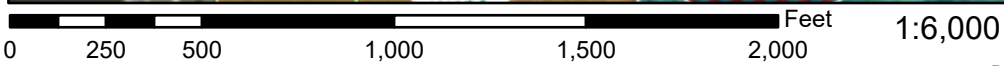
- Digital Data Available
- No Digital Data Available
- Unmapped

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/24/2024 at 5:59 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



Basemap Imagery Source: USGS National Map 2023

80°23'54"W 27°24'5"N

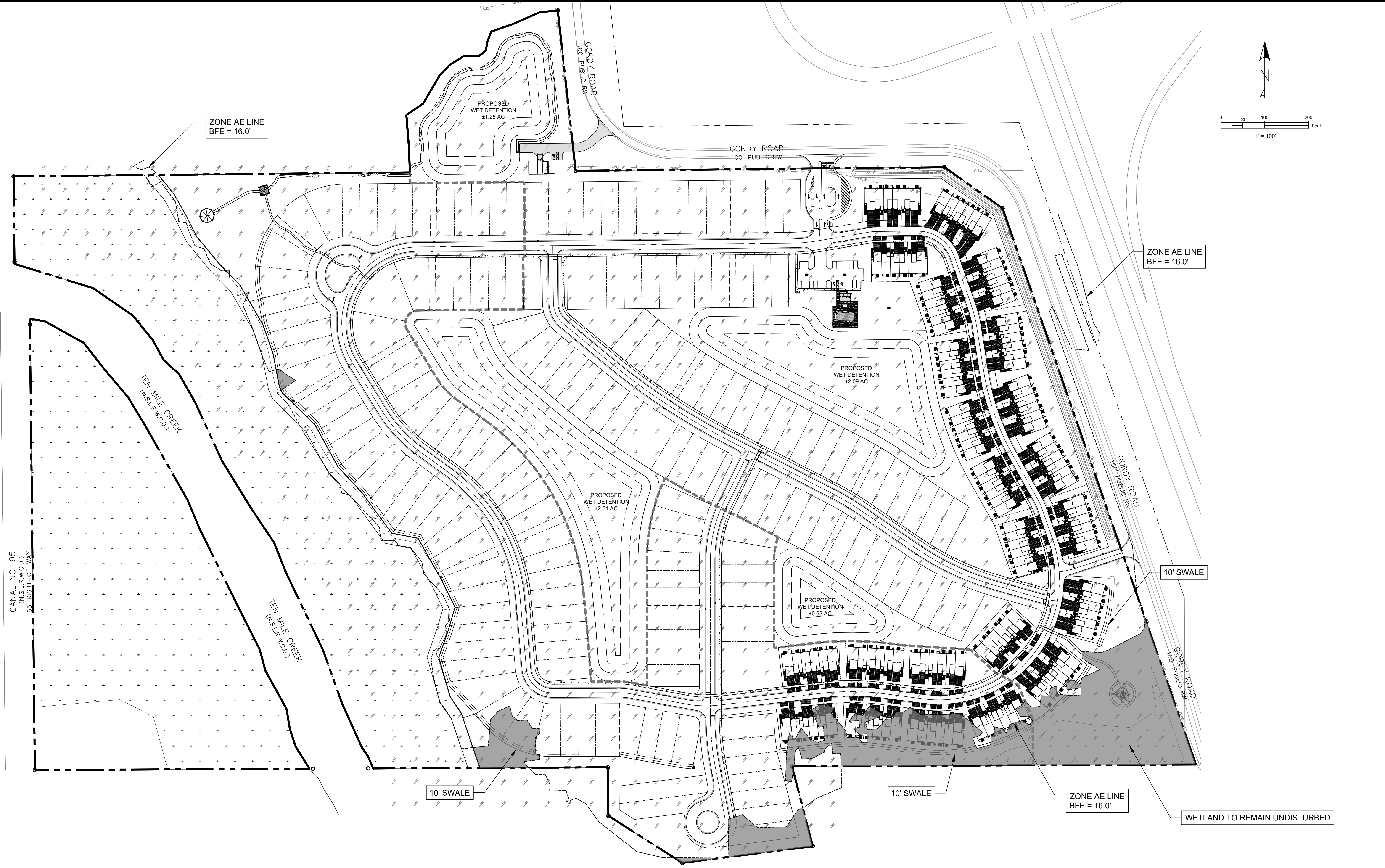





EXHIBIT LEGEND:

	FLOOD ZONE AE EL. 16.0' OVERLAP WITHIN PROPERTY BOUNDARIES TOTAL ONSITE AREA = 3.62 AC
	PROPERTY BOUNDARY
	EXISTING SPOT ELEVATION

GORDY CREEK RESIDENTIAL
CITY OF FORT PIERCE
FLORIDA, 34945

PROJ. NO. 24-170
DATE 2024.09.25
SHEET NO.

EX-1

ISSUE	DATE	COMMENTS

CHECKED BY: JWM
APPROVED BY: JWM
SCALE: SEE SHEET

THIS SHEET FLOODPLAIN ANALYSIS EXHIBIT
DRAWN BY: KKR

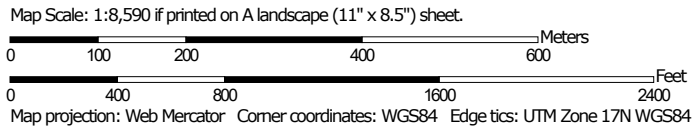
Mills, Short & Associates
WEBSITE: www.MillsShortAssociates.com
PHONE: 772.226.7282
C.A. #: 30699
700 22nd Place, Suite 2C2D
Vero Beach, Florida 32960

Appendix C

Soil Map—St. Lucie County, Florida
(Gordy Creek Subdivision Site)




Soil Map may not be valid at this scale.




MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: St. Lucie County, Florida

Survey Area Data: Version 17, Sep 6, 2023

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

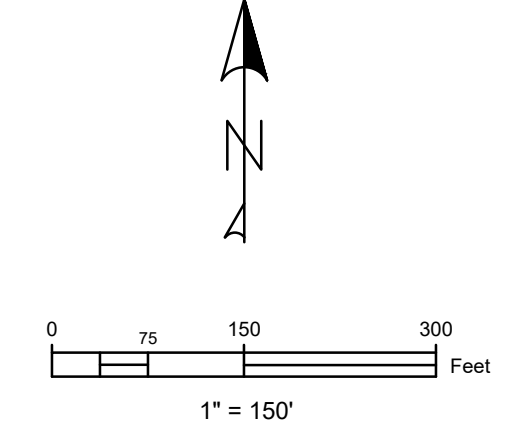
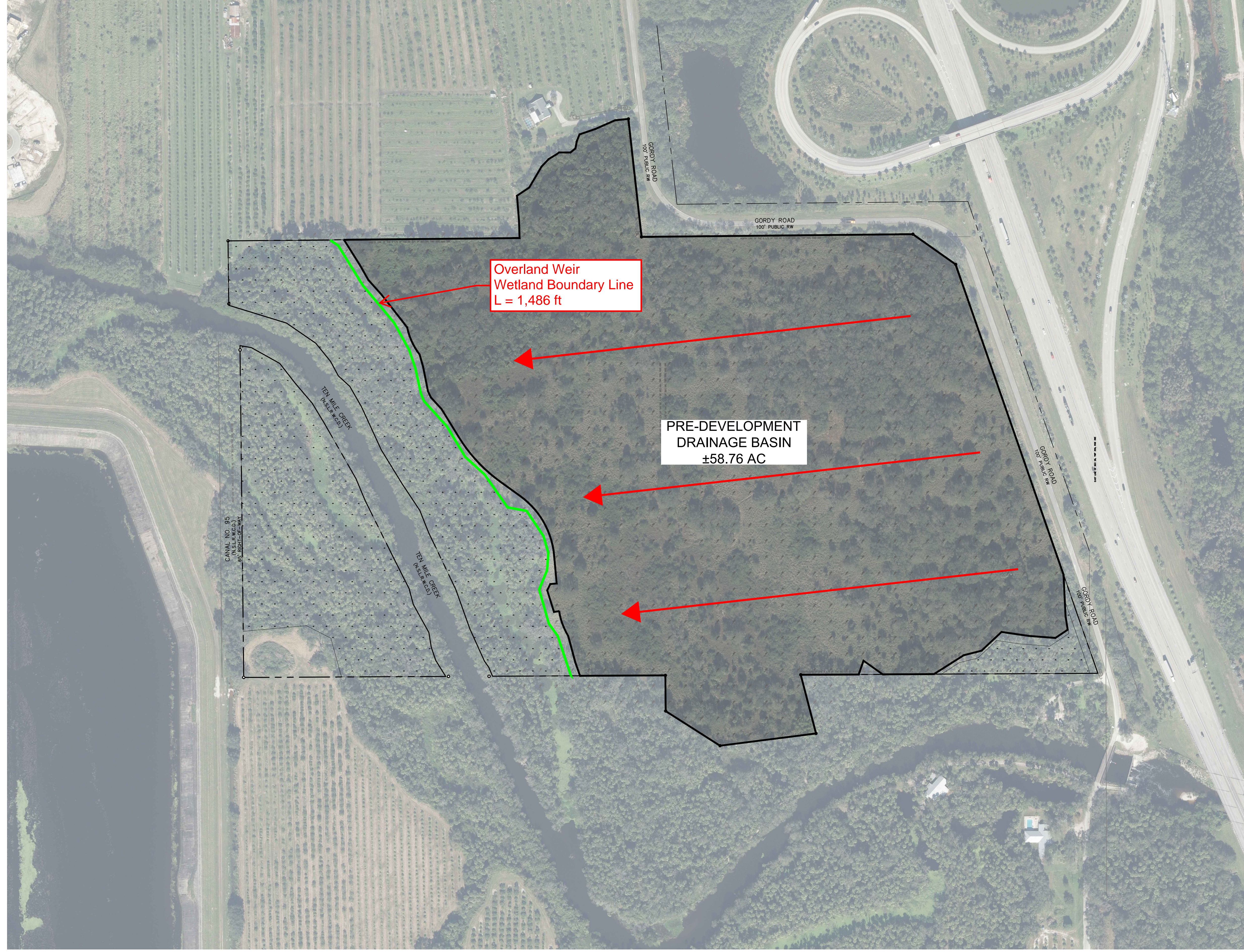
Date(s) aerial images were photographed: Jan 18, 2022—Jan 30, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
2	Ankona and Farnton sands	23.0	8.6%
4	Arents, 0 to 5 percent slopes	22.1	8.3%
5	Arents, 45 to 65 percent slopes	30.6	11.4%
14	Fluvaquents, frequently flooded	77.1	28.8%
25	Nettles and Oldsmar sands	0.5	0.2%
38	Riviera fine sand, 0 to 2 percent slopes	7.5	2.8%
43	Susanna and Wauchula sands	14.6	5.5%
48	Wabasso sand, 0 to 2 percent slopes	34.0	12.7%
99	Water	58.0	21.7%
Totals for Area of Interest		267.4	100.0%

Appendix D



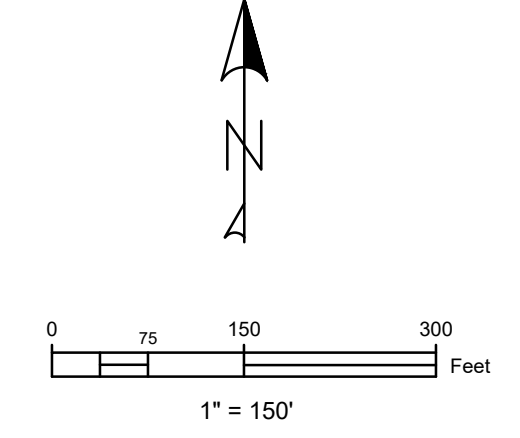
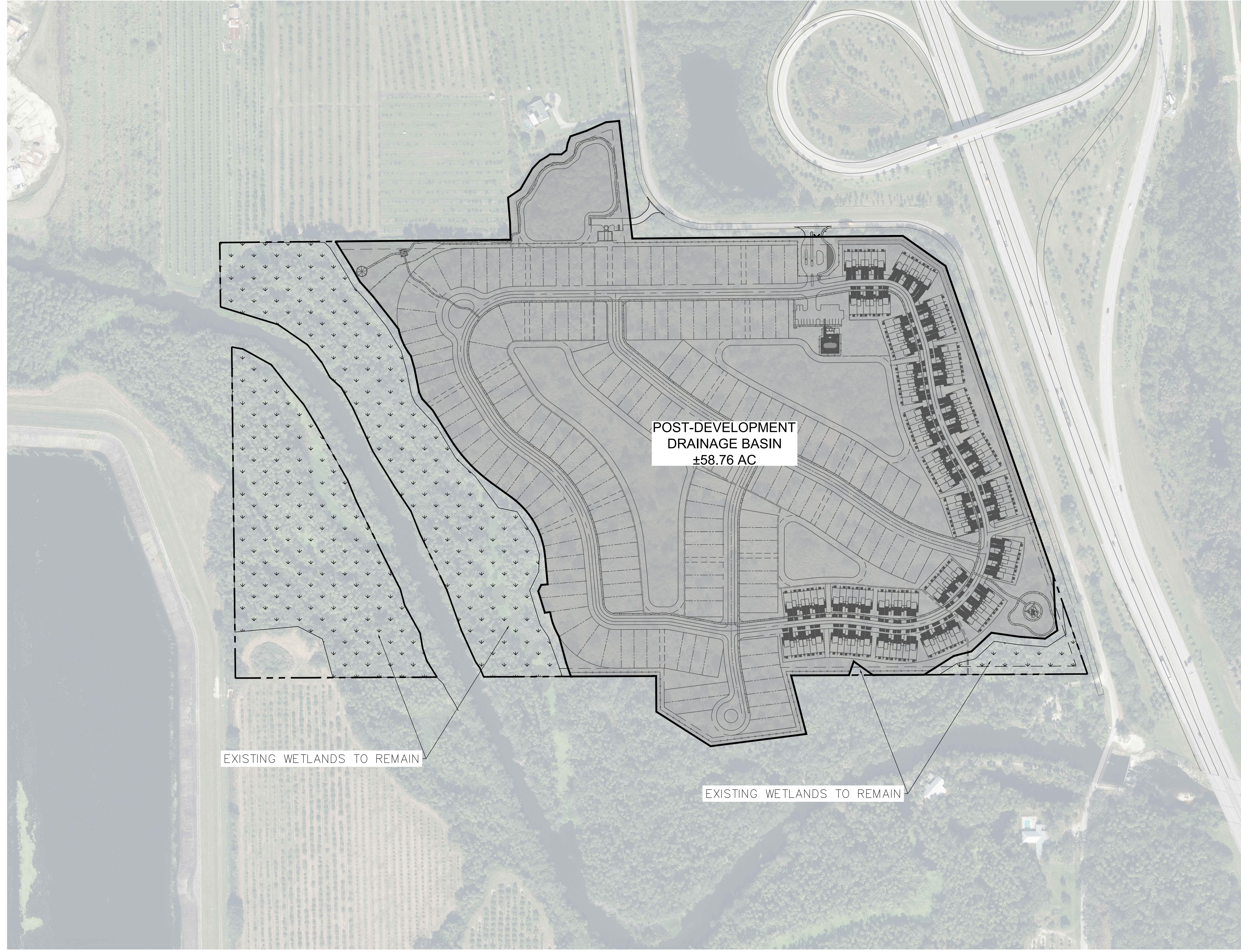
PROJ. NO. 24-170
DATE 2024.01.26
SHEET NO.

GORDY CREEK
GORDY ROAD
CITY OF FORT PIERCE
THIS SHEET
PRE-DEVELOPMENT DRAINAGE BASIN
DRAWN BY KKR
CHECKED BY JWM
APPROVED BY JWM
SCALE: SEE SHEET

ISSUE	DATE	COMMENTS

Mills, Short & Associates
WEBSITE: www.MillsShortAssociates.com
PHONE: 772.226.7282
C.A. #: 30689
700 22nd Place, Suite 2C2D
Vero Beach, Florida 32960

EX-1



PROJ. NO.	24-170
DATE	2024.01.26
SHEET NO.	

GORDY CREEK
 GORDY ROAD
 CITY OF FORT PIERCE
 THIS SHEET
 POST-DEVELOPMENT DRAINAGE BASIN
 DRAWN BY
 KKR
 CHECKED BY
 JWM
 APPROVED BY
 JWM
 SCALE:
 SEE SHEET

ISSUE	DATE	COMMENTS

Mills, Short & Associates
 WEBSITE:
 www.MillsShortAssociates.com
 PHONE: 772.226.7282
 C.A. #: 30698
 700 22nd Place, Suite 2C/2D
 Vero Beach, Florida 32960

Appendix E

Gordy Creek
 Drainage Calculations

Discharge Volume Criteria: (NSLRWCD)

24 Hr Increments			AC-FT/Day	24 Hr Increments			AC-FT/Day
13	-	37	0.6	42	-	66	8.5
14	-	38	0.8	43	-	67	8.4
15	-	39	1.1	44	-	68	9.7
16	-	40	1.4	45	-	69	9.6
17	-	41	1.7	46	-	70	9.4
18	-	42	2.1	47	-	71	9.2
19	-	43	2.4	48	-	72	9.0
20	-	44	2.8	49	-	73	8.8
21	-	45	3.2	50	-	74	8.6
22	-	46	3.6	51	-	75	8.3
23	-	47	3.9	52	-	76	8.1
24	-	48	4.3	53	-	77	7.9
25	-	49	4.7	54	-	78	7.7
26	-	50	5.0	55	-	79	7.5
27	-	51	5.4	56	-	80	7.4
28	-	52	5.7	57	-	81	7.2
29	-	53	6.1	58	-	82	7.0
30	-	54	6.4	59	-	83	6.8
31	-	55	6.8	60	-	84	6.6
32	-	56	7.1	61	-	85	6.4
33	-	57	7.4	62	-	86	6.3
34	-	58	7.7	63	-	87	6.1
35	-	59	8.0	64	-	88	5.9
36	-	60	8.3	65	-	89	5.8
37	-	61	8.5	66	-	90	5.6
38	-	62	8.6				
39	-	63	8.6				
40	-	64	8.6				
41	-	65	8.5				

Appendix F

Complete Report (not including cost) Ver 4.3.5

Project: Gordy Creek

Date: 7/10/2024 5:59:25 PM

Site and Catchment Information

Analysis: Net Improvement

Catchment Name	Gordy Creek Dev Area
Rainfall Zone	Florida Zone 5
Annual Mean Rainfall	54.00

Pre-Condition Landuse Information

Landuse	Agricultural - General: TN=2.800 TP=0.487
Area (acres)	58.76
Rational Coefficient (0-1)	0.06
Non DCIA Curve Number	60.00
DCIA Percent (0-100)	0.00
Nitrogen EMC (mg/l)	2.800
Phosphorus EMC (mg/l)	0.487
Runoff Volume (ac-ft/yr)	15.072
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	52.034
Phosphorus Loading (kg/yr)	9.050

Post-Condition Landuse Information

Landuse	Single-Family: TN=2.070 TP=0.327
Area (acres)	58.76
Rational Coefficient (0-1)	0.12
Non DCIA Curve Number	67.00
DCIA Percent (0-100)	5.23
Wet Pond Area (ac)	4.28
Nitrogen EMC (mg/l)	2.070
Phosphorus EMC (mg/l)	0.327
Runoff Volume (ac-ft/yr)	29.244
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	74.639

Phosphorus Loading (kg/yr)

11.791

Catchment Number: 1 Name: Gordy Creek Dev Area

Project: Gordy Creek

Date: 7/10/2024

Wet Detention Design

Permanent Pool Volume (ac-ft) 16.000

Permanent Pool Volume (ac-ft) for 31 days residence 2.484

Annual Residence Time (days) 200

Littoral Zone Efficiency Credit

Wetland Efficiency Credit

Watershed Characteristics

Catchment Area (acres) 58.76

Contributing Area (acres) 54.480

Non-DCIA Curve Number 67.00

DCIA Percent 5.23

Rainfall Zone Florida Zone 5

Rainfall (in) 54.00

Surface Water Discharge

Required TN Treatment Efficiency (%) 30

Provided TN Treatment Efficiency (%) 43

Required TP Treatment Efficiency (%) 23

Provided TP Treatment Efficiency (%) 80

Media Mix Information

Type of Media Mix Not Specified

Media N Reduction (%)

Media P Reduction (%)

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr) 0.000

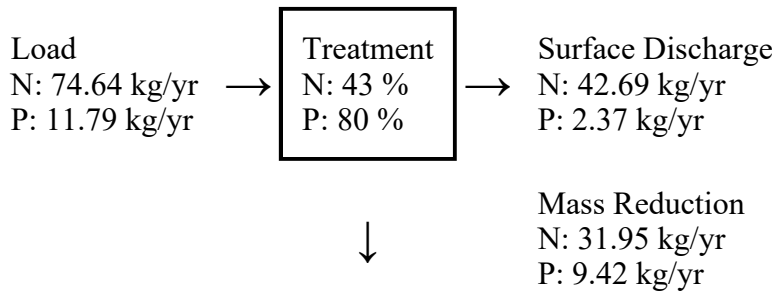
TN Mass Load (kg/yr) 0.000

TN Concentration (mg/L) 0.000

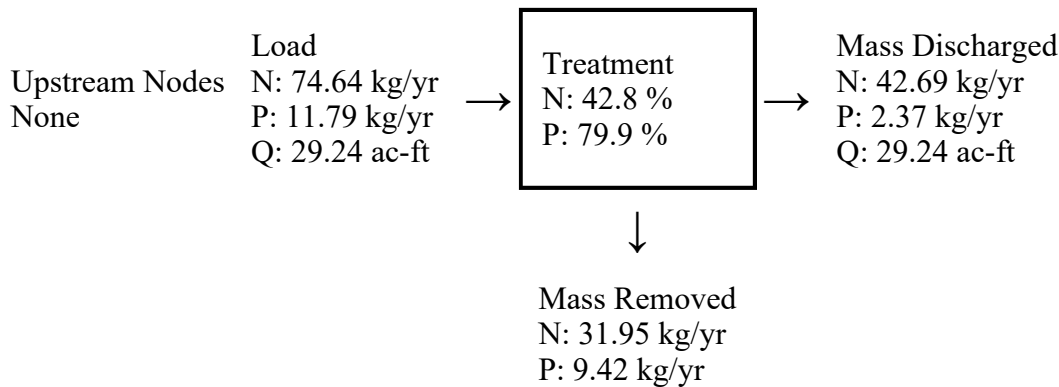
TP Mass Load (kg/yr) 0.000

TP Concentration (mg/L) 0.000

Load Diagram for Wet Detention (stand-alone)



Load Diagram for Wet Detention (As Used In Routing)



Summary Treatment Report Version: 4.3.5

Project: Gordy Creek

Analysis Type: Net Improvement

Date: 7/10/2024

BMP Types:

Catchment 1 - (Gordy Creek Dev Area) Wet Detention

Routing Summary

Catchment 1 Routed to Outlet

Based on % removal values to the nearest percent

Total nitrogen target removal met? **Yes**

Total phosphorus target removal met? **Yes**

Summary Report

Nitrogen

Surface Water Discharge

Total N pre load	52.03 kg/yr	
Total N post load	74.64 kg/yr	
Target N load reduction	30 %	
Target N discharge load	52.03 kg/yr	
Percent N load reduction	43 %	
Provided N discharge load	42.69 kg/yr	94.12 lb/yr
Provided N load removed	31.95 kg/yr	70.46 lb/yr

Phosphorus

Surface Water Discharge

Total P pre load	9.05 kg/yr	
Total P post load	11.791 kg/yr	
Target P load reduction	23 %	
Target P discharge load	9.05 kg/yr	
Percent P load reduction	80 %	
Provided P discharge load	2.375 kg/yr	5.24 lb/yr
Provided P load removed	9.416 kg/yr	20.762 lb/yr

Appendix G



DATA REPORT

ZENTEX PARCEL SHWT
GORDY ROAD
FORT PIERCE, FLORIDA

UES PROJECT No. 3330.2400022.0000

PREPARED FOR:

Mills, Short & Associates, LLC
700 22nd Place, Suite 2C
Vero Beach, FL 32960

Attn: J. Wesley Mills

PREPARED BY:

UES
607 NW Commodity Cove
Port St. Lucie, Florida 34986
(772) 924-3575

February 7, 2024

February 7, 2024

J. Wesley Mills
Mills, Short & Associates, LLC
700 22nd Place, Suite 2C
Vero Beach, FL 32960

Subject: Data Report
Zentex Parcel SHWT
Gordy Road, Fort Pierce, FL
UES Project No. 3330.2400022.0000

Dear J. Wesley Mills:

UES has completed the engineering evaluation for the above referenced project in accordance with the service agreement for this project. The scope of services was completed in general accordance with UES's Geotechnical Engineering Proposal No. 21-2193.03 dated January 26, 2024, planned in conjunction with and authorized by you.

Background Information

Per UES's recent email correspondence with you, UES understands that you are looking for an estimate of seasonal high-water table (SHWT) for the site located along Gordy Road in Fort Pierce, Florida. UES performed preliminary geotechnical exploration at the site in March 2022 for Meritage Homes of Florida, Inc. On January 26, 2024, Jeff Alexander of Meritage Homes authorized the use of findings from the preliminary study to provide SHWT estimates.

As illustrated on the Vicinity Map in Appendix A, the site is located along the west side of Gordy Road in Fort Pierce, Florida. At the time of UES's field exploration, the property was relatively flat with miscellaneous surface vegetation and some trees. However, some areas were densely vegetated. The site was generally bordered by similar properties and Gordy Road to the north, Gordy Road to the east, and Tenmile Creek to the south and west.

Normal Groundwater Table

Normal water table refers to the average level of the groundwater table in the area under natural conditions. It is subject to seasonal fluctuations and can be influenced by factors such as precipitation, climate, and geological conditions. The normal water table used to estimate the seasonal high-water table was determined during the initial exploration conducted in March 2022 and it was found to be approximately **7.0 to 10.0 feet below the existing grade, depending on the test boring location.**

Seasonal High Groundwater Table

The normal seasonal high groundwater level each year is the level that typically occurs in the July to September period at the end of the rainy season during a year of normal or average rainfall.

Note that UES's estimate of seasonal high groundwater level is based on limited data and does not provide any assurance that groundwater levels will not exceed the estimated level during any given year in the future. If the rainfall intensity and duration or total rainfall quantities exceed those normally anticipated, then groundwater levels will likely exceed the seasonal high estimate.

The estimate of seasonal high groundwater level is made for the site at the present time. Future development of adjoining or nearby properties and development on a regional scale may affect the local seasonal high groundwater table. UES makes no warranty on the estimate of the seasonal high groundwater table.

The normal seasonal high groundwater level is affected by several factors. The drainage characteristics of the soils, the land surface elevation, relief points such as drainage ditches, lakes, rivers, canals, swamp areas, etc., and distance to relief points are some of the more important factors influencing the seasonal high groundwater level.

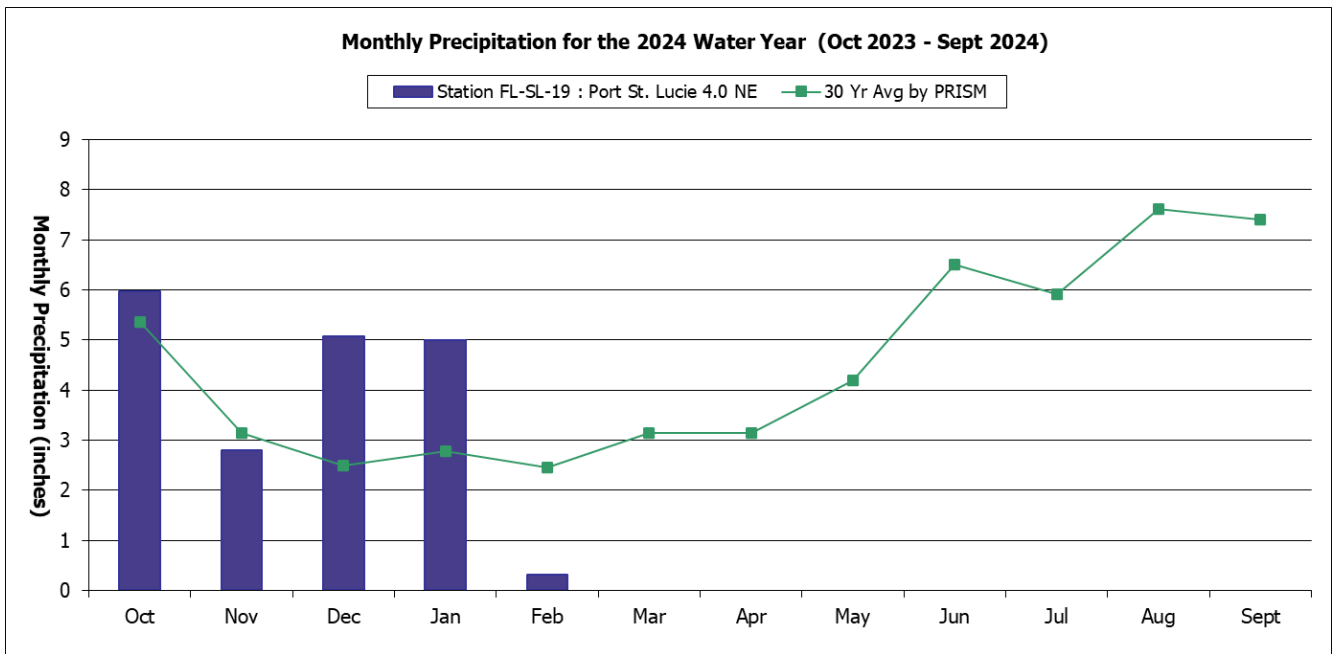
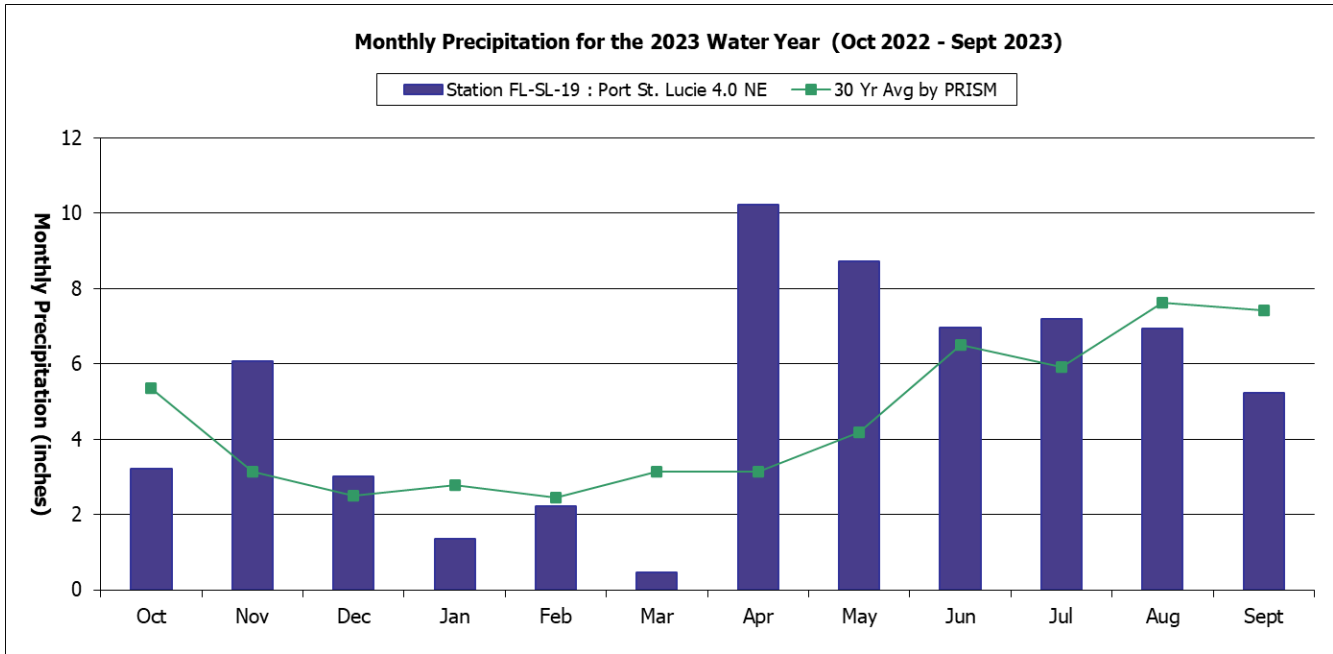
Historical Rainfall Information

UES reviewed available monthly precipitation data from several stations in the Fort Pierce area (Station Number FL-SL-19) from August 2023 through January 2024 utilizing the Community Collaborative Rain, Hail & Snow Network website, which corresponds to the six (6) months prior to the time of the field exploration. The data indicated that the recorded rainfall during this period was slightly higher than the 30-year recorded average rainfall.

2023-2024 CoCoRaHS Water Year Summary for Station ¹		
Station Name: Port St. Lucie 4.0 NE		Station Number: FL-SL-19
Month / Year	Daily Precipitation Sum (inches)	30-Year Average by PRISM (inches)
August 2023	6.94	7.62
September 2023	5.23	7.41
October 2023	5.97	5.36
November 2023	2.79	3.15
December 2023	5.08	2.49
January 2024	4.99	2.78

¹ Data Obtained from <https://wys.cocorahs.org/station/FL-SL-19/2023>
Data Obtained from <https://wys.cocorahs.org/station/FL-SL-19/2024>





The geology of the site, as mapped on the USDA Soil Survey of St. Lucie County, Florida, consists of six (6) soil type. A brief summary of the mapped surficial soil types is presented in table below:



Summary of Published Soil Data ²				
Soil Symbol	Soil Type	Hydrologic Group	Drainage Characteristics	Depth of Published GWT (feet)
14	Fluvaquents, frequently flooded	D	Very Poorly Drained	0.0 – 0.5
38	Riviera fine sand, 0 to 2 percent slopes	A/D	Poorly Drained	0.25 – 1.5
43	Susanna and Wauchula Sands	A/D	Poorly Drained	0.5 – 1.5
48	Wabasso sand, 0 to 2 percent slopes	C/D	Poorly Drained	0.5 – 1.5
5	Arents, 45 to 65 percent slopes	A	Well Drained	> 6.5
99	Water	-	-	-

² Data Obtained from <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>

U. S. Geological Survey (USGS) Water Database

UES reviewed the U. S. Geological Survey (USGS) water database for existing monitoring wells in the adjacent areas of the site. One (1) well was encountered at the northeast corner of the site which is STL-213. STL-213 (monitoring location 272427080240201) presents water data back to 1988 available online. **Figure 1** depicts the summary groundwater level in feet above NAVD 1988 (feet) for this adjacent well.

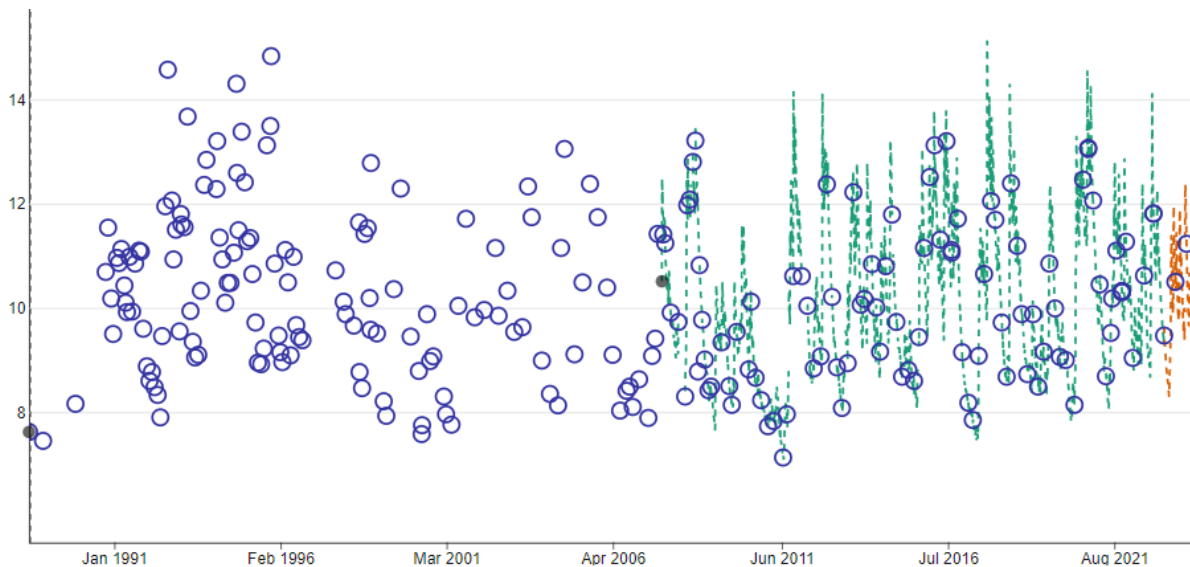


Figure 1 – Groundwater level above NAVD 1988, ft, ft for Well STL-213



Based on the information presented and reviewed and considering the elevation of the site, UES anticipated an Estimated Seasonal High Groundwater Table of approximately **3.0 to 5.0 feet below the existing grade**. If a more comprehensive water table analysis is necessary, UES recommends a site-specific investigation. To better interpret the groundwater data, UES suggests the following measures, but not limited to:

1. On-site installation of monitoring wells or piezometers for a certain period of time, preferably during the wet season since the groundwater table fluctuates throughout the year in response to seasonal rainfall.
2. Performing a comprehensive study to determine accurate seasonal high-water data by a hydrogeologist.

The groundwater table typically fluctuates seasonally depending upon local rainfall and other site specific and/or local influences. Brief ponding of stormwater may occur across the site after heavy or extended rainfall events. No additional evaluation was included in UES's scope of work in relation to the wet seasonal high/low groundwater table or any existing well fields in the vicinity. Well fields may influence water table levels and cause significant fluctuations.

Dry Groundwater Table

The condition in which the water table is lower than the normal level, it's termed as dry water table. It may occur due to factors such as excessive pumping of groundwater and climatic conditions leading to a decrease in the amount of water available in aquifers and wells. UES is unaware of any dewatering wells in the vicinity of the site. Based on UES's knowledge of the general area, aquifers are expected to be at depths greater than 100 ft below existing grades, and therefore should not influence the normal groundwater levels. Based on the information presented and reviewed and considering the elevation of the site, UES anticipates the dry groundwater table to be the same as the normal ground water table.

Limitations

This consulting report has been prepared for the exclusive use of Mills, Short & Associates, LLC, and members of the design team for the proposed development in Fort Pierce, Florida. This report has been prepared in accordance with accepted local geotechnical engineering practices. No other warranty, express or implied, is made.

The evaluation submitted in this report is based in part upon the data collected during a field exploration conducted on March 4, 2022. However, the nature and extent of variations throughout the subsurface profile may not become evident until construction. If variations then appear evident, it may be necessary to reevaluate information and professional opinions as provided in this report.



Closure

UES appreciates the opportunity to be of service during this phase of the project and looks forward to a continued association. Please do not hesitate to contact UES if you have any questions or comments, or if UES may further assist you as your plans proceed.

Respectfully Submitted,

UES

Florida Registry No. 4930

This item has been digitally signed and sealed by Allan G. Abubakar, P.E. on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Allan G. Abubakar, P.E.
Senior Project Engineer
Florida Registration No. 69952

Dhanuhasini Subramaniam, E.I.
Project Engineer

Distribution: J. Wesley Mills – Mills, Short & Associates, LLC

1 pdf

