

Surface Water Management Calculations

For:

Springdale Townhomes

City of Margate, Florida

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This item has been digitally signed and sealed by Jeffrey T. Schnars, P.E. on 1/5/2023.

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Date: December 2022

Project No. 17180

Prepared By:

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(FOR THE FIRM)

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Springdale Townhomes Drainage Report

Project Introduction/Location

The proposed project is a redevelopment of the existing and inactive Margate Executive Golf Course into a new 137-unit residential town home community. The site is comprised of two parcels totaling 21.30 acres of land that are located on the north side of Atlantic Blvd., west of Rock Island Road and south of Margate Blvd. in the City of Margate. The entire golf course site is anticipated to be demolished to accommodate the new residential community.

Existing Conditions

This surface water management responsibility for the property lies within the governmental jurisdictional agencies of South Florida Water Management District (SFWMD), Broward County, and the City of Margate. The subject property is an inactive golf course facility and, according to our research, there are no available SFWMD permits for the properties. It appears all the surrounding lands drain through the properties including the existing Oriole Homes Golf and Tennis Club (SFWMD Permit No. 06-00144-S) north of Margate Blvd. The site has a public and City of Margate 30' drainage flowage easement. The flow must be maintained, and new flowage easements will be granted to each of the adjacent property owners. The subject properties flow south unrestricted to the SFWMD C-14 canal via the City of Margate drainage system. To establish the existing permitting criteria, a pre-development analysis of the water quality and quantity will be performed. The site will be cleared and graded to accommodate the new community. Any loss of the golf course site storage, soil storage, and an increase in the impervious area above the original conditions will require supplemental detention.

Stormwater Treatment

In accordance with SFWMD criteria, detention for water quality purposes shall be provided in the amount of 2.5 inches times the percentage of imperviousness or the first inch of runoff, whichever is greater. The water quality volume will be detained in the proposed on-site lakes and will be greater than pre-development volume. The site is located within an impaired water body discharge area and will require an additional 50% water quality detention volume and a pre-post nutrient analysis, see attached map. According to the attached BMP analysis, the pre-development nutrient loadings exceed the post development nutrient loadings and will not require additional pre-treatment.

Stormwater Attenuation

The surface water management system will consist of a series of catch basins and pipe which will direct runoff to the proposed on-site lakes that will be designed to protect the proposed finished floor elevation above the calculated 100 year-3 day zero discharge storm elevation, the elevation specified by FEMA (Zone AE) + 1 foot, the Broward County Future Conditions 100 year flood elevation, or 18 inches above the average adjacent road crown, whichever is higher. According to the SFWMD C-14 East basin criteria, off-site discharge will be limited to 69.2 CSM at the 25 year – 3 day storm event. However, since the site is currently flowing unrestricted, off-site discharge will be limited to the pre-development stages in the SFWMD C-14 canal via the existing City of Margate drainage system. The crown of the on-site roadway will be designed above the Broward County 10 year flood map elevation and the calculated 10 year - 1 day storm event elevation.

Drainage Summary

Federal Emergency Management Agency (FEMA) Flood Zones

According to the FEMA FIRM Community Panel Number 12011C0355H dated August 18, 2014, as published by the Federal Emergency Management Agency (FEMA), the site contains the following flood designations: Zone AE, base flood elevations of 10.0' and 11.0' NAVD and Zone X.

The proposed calculated stages below are consistent with the pre-development criteria as follows:

Storm Event	Pre- Dev. Flood Contour	B.C. Map	City of Margate	This Proj. Calculated/ Proposed
Finished Floor 100year-3day	10.76'NAVD	12.50' NAVD	FEMA 11'+1' = 12.0' NAVD	10.74' NAVD 12.50' NAVD
25 year-3 day	10.02' NAVD			9.30' NAVD 9.30' NAVD
Road Crown 10 year-1 day	8.11' NAVD	10.5' NAVD		7.54' NAVD 10.50' NAVD
Discharge Allowable Proposed	Unrestricted			
Lake Design Water	5.00' NAVD	5.00' NAVD	5.00' NAVD	5.00' NAVD
Water Quality Det. & El.	1.78 ac-ft 5.92' NAVD			2.67 ac-ft 5.68' NAVD

Post-Development Surface Water Management Calculations

For:

Springdale TH

City of Margate, Florida

Springdale Townhomes

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SFWMD SURFACE WATER MANAGEMENT CALCULATIONS

1) SITE AREA DATA:		ACRES:	2) STAGE ELEVATIONS: (NAVD)		
<u>Land Use</u>			<u>Percent:</u>	<u>From:</u>	<u>To:</u>
Buildings	3.81	Ac.	17.9%	12.50	up
Roads/Park	2.95	Ac.	13.8%	10.30	11.75
Lake	3.79	Ac.	17.8%	5.00	up
Lake Bank	1.64	Ac.	7.7%	5.00	10.00
Driveways	1.22	Ac.	5.7%	10.50	13.00
Green	6.59	Ac.	30.9%	10.00	13.00
S/W Courts Patios	1.30	Ac.	6.1%	10.50	13.00
N/A	0.00	Ac.	0.0%	0.00	0.00
TOTAL:	21.30	Ac.	100%		
Total Impervious:			Average Existing Grade: 10.40 NAVD		
61.36%			Average Proposed Grade: 10.97 NAVD		
Total Pervious:			(B.C. Future Cond.) Lake, Water Table: 5.0 NAVD		
8.23			Depth to Water Table: 6.0 ft.		
38.64%					

2) FLOOD AND RAINFALL CRITERIA:

24 Hour Rainfall:					
5 Year	7.25	in.	Min. Road Crown:	10.50	NAVD
10 Year	8.00	in.			
25 Year	9.565	in.	Min. Floor Elevation:	12.50	NAVD
100 Year	13.245	in.			

Soil Storage:

Depth to Water Table (ft.)	Natural Available Storage (in.)	Developed Available Storage (in.)
3.00	4.40	3.30
4.00	6.80	5.10

Maximum Available Soil Storage, SFWMD: 5.1 in. Depressional Stor.

3) COMPUTE STAGE STORAGE: (Stage = FT, NAVD; Storage = AC-FT)

<u>Stage:</u>				<u>S/W Courts</u>		<u>Lake</u>		<u>Total:</u>
	<u>Roads/Park</u>	<u>Driveways</u>	<u>Green</u>	<u>Lake</u>	<u>Patios</u>	<u>N/A</u>	<u>Bank</u>	
5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00	1.90	0.00	0.00	0.04	1.94
6.00	0.00	0.00	0.00	3.79	0.00	0.00	0.16	3.95
6.50	0.00	0.00	0.00	5.69	0.00	0.00	0.37	6.06
7.00	0.00	0.00	0.00	7.58	0.00	0.00	0.66	8.24
7.50	0.00	0.00	0.00	9.48	0.00	0.00	1.03	10.51
8.00	0.00	0.00	0.00	11.37	0.00	0.00	1.48	12.85
8.50	0.00	0.00	0.00	13.27	0.00	0.00	2.01	15.28
9.00	0.00	0.00	0.00	15.16	0.00	0.00	2.62	17.78
9.50	0.00	0.00	0.00	17.06	0.00	0.00	3.32	20.38
10.00	0.00	0.00	0.00	18.95	0.00	0.00	4.10	23.05
10.50	0.04	0.00	0.27	20.85	0.00	0.00	4.92	26.08
11.00	0.50	0.06	1.10	22.74	0.07	0.00	5.74	30.21
11.50	1.46	0.24	2.47	24.64	0.26	0.00	6.56	35.63
12.00	2.88	0.55	4.39	26.53	0.59	0.00	7.38	42.32
12.50	4.35	0.98	6.86	28.43	1.04	0.00	8.20	49.86

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SWWMD SURFACE WATER MANAGEMENT CALCULATIONS

4) WATER QUALITY:

Greater of the following (5A. & 5B.)
Store the first inch for the entire site or the amount
of 2.5 times the percentage of imperviousness.

A. First Inch:

$V = 1 \text{ in.} \times \text{Total Area} \times 1 \text{ ft./12 in.}$

<u>Total (Ac.):</u>	<u>V = (ac-ft)</u>
21.30	1.78

B. 2.5 Times Percent Impervious:

1. Site Area = Total Area - (Lake Area + Bldg. Area)

<u>Total (Ac.):</u>	<u>Lake:</u>	<u>Bldg.:</u>	<u>Site (Ac.):</u>
21.30	3.79	3.81	13.70

2. Impervious Area = Site Area - Pervious Area

<u>Site (Ac.):</u>	<u>Pervious:</u>	<u>Imperv.:</u>
13.70	8.23	5.47

3. Percent Impervious = Impervious Area / Site Area x 100

39.93 % is less than 60% and will not require dry pre.

4. 2.5 in. x % Imperv x (Total Area - Lake Area) x 1 ft./12 in.

<u>Treated (in.):</u>	<u>V=(ac-ft)</u>
1.00	1.46

C. Total Required Detention:

1. The total required detention for water quality is either the first inch or 2.5 times the percent
whichever is greater. The total required detention is:

<u>Water Quality (ac-ft):</u>	<u>Water Quality (Elev.):</u>	
2.67	5.68 NAVD	Includes 50% additional for impaired water discharge

2. Allowable discharge thru bleed down device is 1/2" per day of the required detention volume:

<u>Req'd ac-ft.</u>	<u>Allowable ac-ft/day</u>	<u>Allow. CFS</u>
2.67	0.73	0.37

3. Allowable C-14 Basin discharge: 69.2 CSM

<u>Total (Ac.):</u>	<u>Allow CFS</u>
21.30	2.30

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SWFMD SURFACE WATER MANAGEMENT CALCULATIONS

5) RUNOFF (ZERO DISCHARGE)

A. Soil Storage

1. Soil Storage (S) = Available Soil Storage x Pervious Area/Total Area
(See F-1, SWFMD ERP Manual Vol.II)

<u>Av. Soil St.</u>	<u>Pervious:</u>	<u>Total (Ac.)</u>	<u>S = (in.)</u>
5.10	8.23	21.30	1.97

B. 100 Yr.-3 Day Storm Event

Finished Floor Elevation: **12.50 NAVD**

1. Rainfall - 3 Day Duration (P):

$$P72 = P24 \times 1.359$$

$$P24 = 13.245 \text{ in.}$$

$$P72 = 18.00 \text{ in.}$$

2. Runoff, Q (in.)

$$Q = \{(P - 0.2 \times S)^2\} / (P + 0.8 \times S)$$

<u>P72 (in.)</u>	<u>S = (in.)</u>	<u>Q (in.)</u>
18.00	1.97	15.83

3. Total Runoff Volume, V (ac-ft.)

$$V = Q \times \text{Total Area} \times 1 \text{ ft.} / 12 \text{ in.}$$

<u>Q (in.)</u>	<u>Total (Ac.)</u>	<u>V=(ac-ft.)</u>
15.83	21.30	28.10

4. From the Stage - Storage Curve, the zero discharge elevation is:

Interpolate Stage between... 10.50 11.00

Interpolate Runoff between... 26.08 30.21

Stage: 10.74 NAVD

The stage is at or below the Minimum Finished Floor Elevation.

C. 25 Yr.-3 Day Storm Event (Perimeter Berm)

1. Rainfall - 3 Day Duration (P):

$$P72 = P24 \times 1.359$$

$$P24 = 9.565 \text{ in.}$$

$$P72 = 13.00 \text{ in.}$$

2. Runoff, Q (in.)

$$Q = \{(P - 0.2 \times S)^2\} / (P + 0.8 \times S)$$

<u>P72 (in.)</u>	<u>S = (in.)</u>	<u>Q (in.)</u>
13.00	1.97	10.90

3. Total Runoff Volume, V (ac-ft.)

$$V = Q \times \text{Total Area} \times 1 \text{ ft.} / 12 \text{ in.}$$

<u>Q (in.)</u>	<u>Total (Ac.)</u>	<u>V=(ac-ft.)</u>
10.90	21.30	19.35

4. From the Stage - Storage Curve, the zero discharge elevation is:

Interpolate Stage between... 9.00 9.50

Interpolate Runoff between... 17.78 20.38

Stage: 9.30 NAVD

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SWFMD SURFACE WATER MANAGEMENT CALCULATIONS

D. 10 Yr.-1 Day Storm Event (Roadway Criteria)

1. Rainfall - 1 Day Duration (P):

P24 = 8.00 in.

2. Runoff, Q (in.)

$$Q = \{(P - 0.2 \times S)^2\} / (P + 0.8 \times S)$$

P24 (in.):	S = (in.):	Q (in.):
8.00	1.97	6.04

3. Total Runoff Volume, V (ac-ft.)

$$V = Q \times \text{Total Area} \times 1 \text{ ft.} / 12 \text{ in.}$$

Q (in.):	Total (Ac.):	V = (ac-ft):
6.04	21.30	10.72

4. From the Stage - Storage Curve, the zero discharge elevation is:

Interpolate Stage between...	7.50	8.00
Interpolate Runoff between...	10.51	12.85

Stage: 7.54 NAVD

E. 5 Yr.-1 Day Storm Event

Minimum Road Crown Elev: **10.50 NAVD**

1. Rainfall - 1 Day Duration (P):

P24 = 7.25 in.

2. Runoff, Q (in.)

$$Q = \{(P - 0.2 \times S)^2\} / (P + 0.8 \times S)$$

P24 (in.):	S = (in.):	Q (in.):
7.25	1.97	5.33

3. Total Runoff Volume, V (ac-ft.)

$$V = Q \times \text{Total Area} \times 1 \text{ ft.} / 12 \text{ in.}$$

Q (in.):	Total (Ac.):	V = (ac-ft):
5.33	21.30	9.46

4. From the Stage - Storage Curve, the zero discharge elevation is:

Interpolate Stage between...	7.00	7.50
Interpolate Runoff between...	8.24	10.51

Stage: 7.27 NAVD

The stage is at or below the Minimum Road Crown Elevation.

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SWFMD SURFACE WATER MANAGEMENT CALCULATIONS

6) SITE AREA BREAKDOWN:

<u>Land Use</u>	<u>Pervious</u>		<u>Impervious</u>		<u>Total</u>
Buildings	0.00	Ac.	3.81	Ac.	3.81 Ac.
Roads/Park	0.00	Ac.	2.95	Ac.	2.95 Ac.
Lake	0.00	Ac.	3.79	Ac.	3.79 Ac.
Lake Bank	1.64	Ac.	0.00	Ac.	1.64 Ac.
Driveways	0.00	Ac.	1.22	Ac.	1.22 Ac.
Green	6.59	Ac.	0.00	Ac.	6.59 Ac.
S/W Courts P&	0.00	Ac.	1.30	Ac.	1.30 Ac.
N/A	0.00	Ac.	0.00	Ac.	0.00 Ac.
Totals:	8.23	Ac.	13.07	Ac.	21.30 Ac.

7) SUMMARY

Required Water Quality Storage:	2.67 ac-ft
Site Soil Storage:	1.97 in
Allowable Detention Discharge:	0.73 ac-ft/day
Detention Provided:	
Allowable Discharge:	2.30 CFS
Discharge Provided:	CFS
B.C. 100 yr. Future Cond. Flood Map El.:	12.5' NAVD
FEMA 100 yr. 2021 Flood Map El.:	Flood Zone AE (11.0') NAVD
City of Margate Min. FF El.:	AE (11.0) + 1' NAVD
B.C. 10 yr. Flood Map El.:	10.5' NAVD

POST DEVELOPMENT ZERO DISCHARGE

5 Yr.-1 Day Storm:	9.46 ac-ft	7.27 NAVD Stage Elevation
10 Yr.-1 Day Storm:	10.72 ac-ft	7.54 NAVD Stage Elevation
25 Yr.-3 Day Storm:	19.35 ac-ft	9.30 NAVD Stage Elevation
100 Yr.-3 Day Storm:	28.10 ac-ft	10.74 NAVD Stage Elevation

FLOOD ROUTINGS

5 Yr.-1 Day Storm:	N/A NAVD	N/A cfs Disch.
10 Yr.-1 Day Storm:	N/A NAVD	N/A cfs Disch.
25 Yr.-3 Day Storm:	N/A NAVD	N/A cfs Disch.

<u>DATE PRINTED:</u>	<u>PREPARED BY:</u>	<u>REVISED BY:</u>	<u>DATE:</u>
06-Dec-22	JWM	JTS	

Pre-Development
Surface Water Management Calculations

For:

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City of Margate, Florida

Springdale Townhomes (formerly Margate Executive G.C.)

Margate, Florida

Project No. 17180

PRE-DEVELOPMENT SFWMD SURFACE WATER MANAGEMENT CALCULATIONS

1) SITE DATA:

ACRES:

2) STAGE ELEVATIONS (NAVD):

Landuse

Percent:

From:

To:

Buildings 0.01 Ac.

0.0%

Pavement 0.60 Ac.

2.8%

Lake 1.80 Ac.

8.5%

Lake Bank 0.82 Ac.

3.8%

Green 18.07 Ac.

84.8%

Lots 0.00 Ac.

0.0%

N/A 0.00 Ac.

0.0%

N/A 0.00 Ac.

0.0%

TOTAL AREA: 21.30 Ac.

100%

Total Impervious: 2.41
11.31%

Average Existing Grade: 10.66

Average Proposed Grade: 11.00

Lake, Water Table: 5.00

Total Pervious: 18.89
88.69%

2) FLOOD AND RAINFALL CRITERIA:

24 Hour Rainfall:

10 Year 8.00 in.

Min. Road Crown: 10.09 NAVD

25 Year 9.57 in.

Min. Floor Elev: 11.89 NAVD

100 Year 13.245 in.

Maximum Available Soil Storage, SFWMD: 5.1 in. Depressional Storage

3) COMPUTE STAGE STORAGE: (Stage = FT, NAVD; Storage = AC-FT)

<u>Stage:</u>	<u>Pavement</u>	<u>Green</u>	<u>Lots</u>	<u>Lake</u>	<u>N/A</u>	<u>N/A</u>	<u>Lake Bank</u>	<u>Total:</u>
5.00								0.00
5.50								0.97
6.00								2.05
6.50								3.22
7.00								4.49
7.50								5.86
8.00								7.33
8.50								8.92
9.00								10.66
9.50								12.68
10.00								15.45
10.50								20.02
11.00								26.81
11.50								35.14
12.00								44.37
								54.12

See Geopak calculations

Springdale Townhomes (formerly Margate Executive G.C.)

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PRE-DEVELOPMENT SFWMD SURFACE WATER MANAGEMENT CALCULATIONS

4) WATER QUALITY:

Greater of the following (4A and 4B)
Store the first inch for the entire site or the amount
of 2.5 times the percentage of imperviousness.

A. First Inch:

$V = 1 \text{ in.} \times \text{Total Area} \times 1 \text{ ft./12 in.}$

<u>Total (Ac.):</u>	<u>V = (ac-ft)</u>
21.30	1.78

B. 2.5 Times Percent Impervious:

1. Site Area = Total Area - (Lake Area + Bldg. Area)

<u>Total (Ac.):</u>	<u>Lake:</u>	<u>Bldg.:</u>	<u>Site (Ac.):</u>
21.30	1.80	0.01	19.49

2. Impervious Area = Site Area - Pervious Area

<u>Site (Ac.):</u>	<u>Pervious:</u>	<u>Imperv.:</u>
19.49	18.89	0.60

3. 2.5 in. x Imperv./Site x Total Area x 1 ft./12 in.

<u>Imperv.:</u>	<u>V=(ac-ft)</u>
0.6	0.14

C. Total Required Detention:

1. The total required detention for water quality is either the first inch or 2.5 times the percent impervious, whichever is greater. The total required detention is:

<u>Water Quality (ac-ft):</u>	<u>Water Quality (elev):</u>
1.78	5.92

2. Allowable discharge thru bleed down device is 1/2" per day of the required detention volume:

<u>ac-ft/day</u>	<u>Allow.CFS</u>
0.81	0.41

3. Allowable C-14 Basin discharge: 69.2 csm

<u>Total (Ac.):</u>	<u>Allow CFS</u>
21.30	2.30

5) RUNOFF (ZERO DISCHARGE)

A. Soil Storage

1. Soil Storage (S) = Available Soil Storage x Pervious Area/Total Area
(See C-35, SFWMD Vol.IV)

<u>Av. Soil St.</u>	<u>Pervious:</u>	<u>Total (Ac.):</u>	<u>S = (in.):</u>
5.10	18.89	21.30	4.52

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PRE-DEVELOPMENT SFWMD SURFACE WATER MANAGEMENT CALCULATIONS

B. 100 Yr.-3 Day Storm Event

Finished Floor Elevation: 11.89 NAVD

1. Rainfall - 3 Day Duration (P):

$$P_{72} = P_{24} \times 1.359$$

P₂₄ = 13.245 in.

P₇₂ = 18.00 in.

2. Runoff, Q (in.)

$$Q = \{(P - 0.2 \times S)^2\} / (P + 0.8 \times S)$$

<u>P₇₂ (in.):</u>	<u>S = (in.):</u>	<u>Q (in.):</u>
18.00	4.52	13.52

3. Total Runoff Volume, V (ac-ft.)

$$V = Q \times \text{Total Area} \times 1 \text{ ft.} / 12 \text{ in.}$$

<u>Q (in.):</u>	<u>Total (Ac.):</u>	<u>V=(ac-ft):</u>
13.52	21.30	24.00

4. From the Stage - Storage Curve, the zero discharge elevation is:

Interpolate Stage between... 10.50 11.50

Interpolate Runoff between... 20.02 35.14

Stage: 10.76

The stage is at or below the Minimum Finished Floor Elevation.

C. 25 Yr.-3 Day Storm Event (Basin Design)

1. Rainfall - 3 Day Duration (P):

$$P_{72} = P_{24} \times 1.359$$

P₂₄ = 9.57 in.

P₇₂ = 13.01 in.

2. Runoff, Q (in.)

$$Q = \{(P - 0.2 \times S)^2\} / (P + 0.8 \times S)$$

<u>P₇₂ (in.):</u>	<u>S = (in.):</u>	<u>Q (in.):</u>
13.01	4.52	8.81

3. Total Runoff Volume, V (ac-ft.)

$$V = Q \times \text{Total Area} \times 1 \text{ ft.} / 12 \text{ in.}$$

<u>Q (in.):</u>	<u>Total (Ac.):</u>	<u>V = (ac-ft):</u>
8.81	21.30	15.64

4. From the Stage - Storage Curve, the zero discharge elevation is:

Interpolate Stage between... 10.00 11.00

Interpolate Runoff between... 15.45 26.81

Stage: 10.02

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PRE-DEVELOPMENT SFWMD SURFACE WATER MANAGEMENT CALCULATIONS

D. 10 Yr.-1 Day Storm Event (Local Road Criteria)

Min. Road Elevation 10.09 NAVD

1. Rainfall - 1 Day Duration (P):

P24 = 8.00 in.

2. Runoff, Q (in.)

$$Q = \{(P - 0.2 \times S)^2\} / (P + 0.8 \times S)$$

<u>P24 (in.):</u>	<u>S = (in.):</u>	<u>Q (in.):</u>
8.00	4.52	4.33

3. Total Runoff Volume, V (ac-ft.)

$$V = Q \times \text{Total Area} \times 1 \text{ ft.} / 12 \text{ in.}$$

<u>Q (in.):</u>	<u>Total (Ac.):</u>	<u>V = (ac-ft):</u>
4.33	21.30	7.69

4. From the Stage - Storage Curve, the zero discharge elevation is:

Interpolate Stage between...	8.00	9.00
Interpolate Runoff between...	7.33	10.66

Stage: 8.11

The stage is at or below the Minimum Road Crown Elevation.

6) SUMMARY

Required WQ Storage: 1.78 ac-ft

Soil Storage: 4.52 in

ZERO DISCHARGE

10 Yr.-1 Day Storm:	7.69 ac-ft	8.11 NAVD Stage Elevation
25 Yr.-3 Day Storm:	15.64 ac-ft	10.02 NAVD Stage Elevation
100 Yr.-3 Day Storm:	24.00 ac-ft	10.76 NAVD Stage Elevation

FLOOD ROUTING

10 Yr.-1 Day Storm:	N/A NAVD	N/A cfs Disch.
25 Yr.-3 Day Storm:	N/A NAVD	N/A cfs Disch.

DATE PRINTED:

02-Dec-22

PREPARED BY:

JTS

REVISED BY:

DATE:

Springdale Townhomes (formerly Margate Executive G.C.)

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PRE-DEVELOPMENT SFWMD SURFACE WATER MANAGEMENT CALCULATIONS

7) Site Data Breakdown:

<u>Landuse</u>	<u>Pervious</u>	<u>Impervious</u>	<u>Total</u>
Buildings	0.00 Ac.	0.01 Ac.	0.01 Ac.
Pavement	0.00 Ac.	0.60 Ac.	0.60 Ac.
Lake	0.00 Ac.	1.80 Ac.	1.80 Ac.
Lake Bank	0.82 Ac.	0.00 Ac.	0.82 Ac.
Green	18.07 Ac.	0.00 Ac.	18.07 Ac.
Lots	0.00 Ac.	0.00 Ac.	0.00 Ac.
N/A	0.00 Ac.	0.00 Ac.	0.00 Ac.
<u>N/A</u>	<u>0.00 Ac.</u>	<u>0.00 Ac.</u>	<u>0.00 Ac.</u>
Totals:	18.89 Ac.	2.41 Ac.	21.30 Ac.

```

*****
**
** Plane To TIN Volume Report -- Thu May 19 12:57:29 2022
**
** From Elevation <14.000> to TIN <17180_exist.tin>
**
** Prismoïdal Volume
**
*****
**
** Total Cut =          137459.332 Cubic Yards
** Total Fill =          65.547 Cubic Yards
** Area =          103136.983 Sq Yards
** Balance =          137393.784 Cubic Yards
**
** Elevation Range Used
** 5.000 to 5.500      Cut = 1569.229   Fill = 0.000
** 5.500 to 6.000      Cut = 1735.793   Fill = 0.000
** 6.000 to 6.500      Cut = 1890.626   Fill = 0.000
** 6.500 to 7.000      Cut = 2047.476   Fill = 0.000
** 7.000 to 7.500      Cut = 2208.864   Fill = 0.000
** 7.500 to 8.000      Cut = 2380.507   Fill = 0.000
** 8.000 to 8.500      Cut = 2565.731   Fill = 0.000
** 8.500 to 9.000      Cut = 2802.417   Fill = 0.000
** 9.000 to 9.500      Cut = 3262.699   Fill = 0.000
** 9.500 to 10.000     Cut = 4456.444   Fill = 0.000
** 10.000 to 10.500    Cut = 7386.815   Fill = 0.000
** 10.500 to 11.000    Cut = 10945.905   Fill = 0.000
** 11.000 to 11.500    Cut = 13434.684   Fill = 0.000
** 11.500 to 12.000    Cut = 14892.138   Fill = 0.000
** 12.000 to 12.500    Cut = 15737.449   Fill = 0.000
** 12.500 to 13.000    Cut = 16353.457   Fill = 0.000
** 13.000 to 13.500    Cut = 16783.196   Fill = 0.000
** 13.500 to 14.000    Cut = 17004.024   Fill = 0.000
**
** Boundary Polygon Used
*****

```

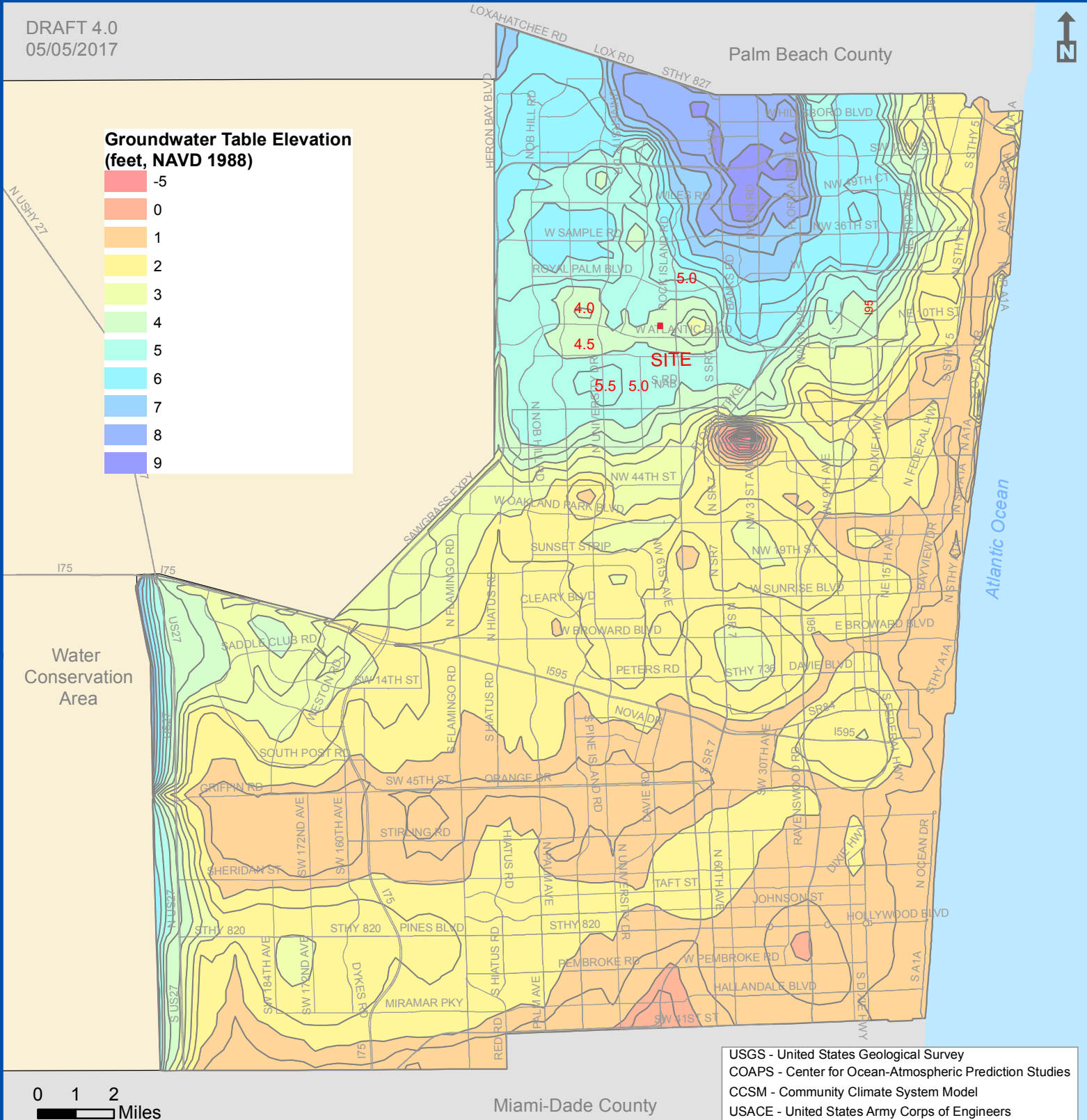
Springdale TH

City of Margate, Florida

“Maps”

DRAFT 4.0
05/05/2017

Groundwater Table Elevation (feet, NAVD 1988)



USGS - United States Geological Survey
COAPS - Center for Ocean-Atmospheric Prediction Studies
CCSM - Community Climate System Model
USACE - United States Army Corps of Engineers
NRC3 - National Research Council Curve 3
NAVD 88 - 1988 North American Vertical Datum

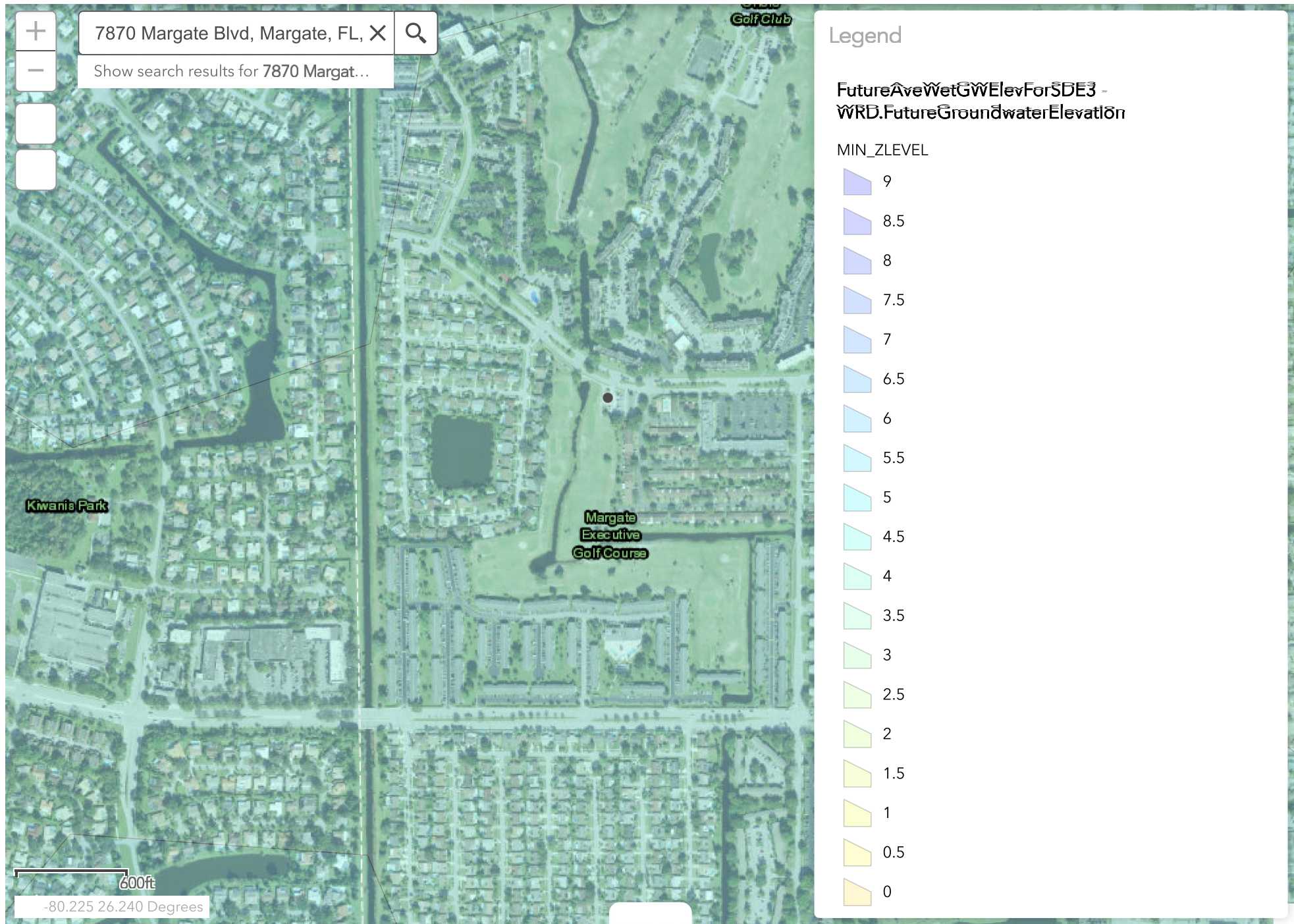
Division Name: Environmental Planning and Community Resilience
Department Name: Environmental Protection and Growth Management

The map represents the expected future average wet season groundwater elevations for Broward County. The average is based on model outputs for the months of May through October over the period of 2060-2069. The models used are The Broward County Inundation Model and the Broward County Northern Variable Density model, both developed by the USGS and MODFLOW based. The future conditions that are modified in the models are both precipitation and sea level rise. The future precipitation pattern is based on the COAPS downscaled CCSM global model and represents an increase of 9.1% rainfall from the base case of 1990-1999 (53.4 in/yr to 58.2 in/yr). Sea level rise was based on the USACE NRC3 curve which equates to an increase of 26.6 to 33.9 inches to the future period from 1992 levels. Final results are presented in NAVD 88.

This map is for planning purposes and should not be used for legal boundary determinations.

Future Conditions Groundwater Elevation

Average Wet Season



ENVIRONMENTAL RESOURCE PERMIT APPLICANT'S HANDBOOK VOLUME II
Effective: MAY 22, 2016

Appendix A: SFWMD - ALLOWABLE DISCHARGE FORMULAS

<u>Canal</u>	<u>Allowable Runoff</u>	<u>Design Frequency</u>
C-1	$Q = \frac{(112 + 31) A}{\sqrt{A}}$	10 year
C-2	Essentially unlimited inflow by gravity connections southeast of Sunset Drive: 54 CSM northwest of Sunset Drive	200 year +
C-4	Essentially unlimited inflow by gravity connections east of S.W. 87 th Avenue	200 year +
C-6	Essentially unlimited inflow by gravity connections east of FEC Railroad	200 year +
C-7	Essentially unlimited inflow by gravity connection	100 year +
C-8	Essentially unlimited inflow by gravity connection	200 year +
C-9	Essentially unlimited inflow by gravity connection east of Red Road; 20 CSM pumped, unlimited gravity with development limitations west of Red Road or Flamingo Blvd.	100 year +
C-10	-----	200 year +
C-11	20 CSM west of 13A; 40 CSM east of 13A	-----
C-12	90.6 CSM	25 year
C-13	75.9 CSM	25 year
C-14	69.2 CSM	25 year
C-15	70.0 CSM	25 year
C-16	62.6 CSM	25 year
C-17	62.7 CSM	25 year
C-18	41.6 CSM	25 year
C-19	57.8 CSM	-----
C-23	31.5 CSM	10 year
C-24	30.25 CSM	10 year
C-25	$Q = \frac{(47 + 28) A}{\sqrt{A}}$ (Under Review)	10 year
C-38	31.1 CSM (subject to restrictions of Basin Rule)	10 year
C-40, 41, 41A	35.4 CSM	10 year
Hillsboro Canal (east of S-39)	35 CSM	25 year
North New River (east of S-34)	70.8 CSM	25 year
Everglades Ag. Area (all canals)	20 CSM	5 year
L-28	11.8 CSM	-----
C-51	35 CSM east of Turnpike; 27 CSM west of Turnpike (subject to restrictions of Basin Rule)	10 year
C-100, 100A, 100B, 100C, 100D:	$Q = \frac{(104 + 43) A}{\sqrt{A}}$	10 year
C-102	$Q = \frac{(119 + 25) A}{\sqrt{A}}$	10 year
C-103N, C103-S	$Q = \frac{(107 + 39) A}{\sqrt{A}}$	10 year

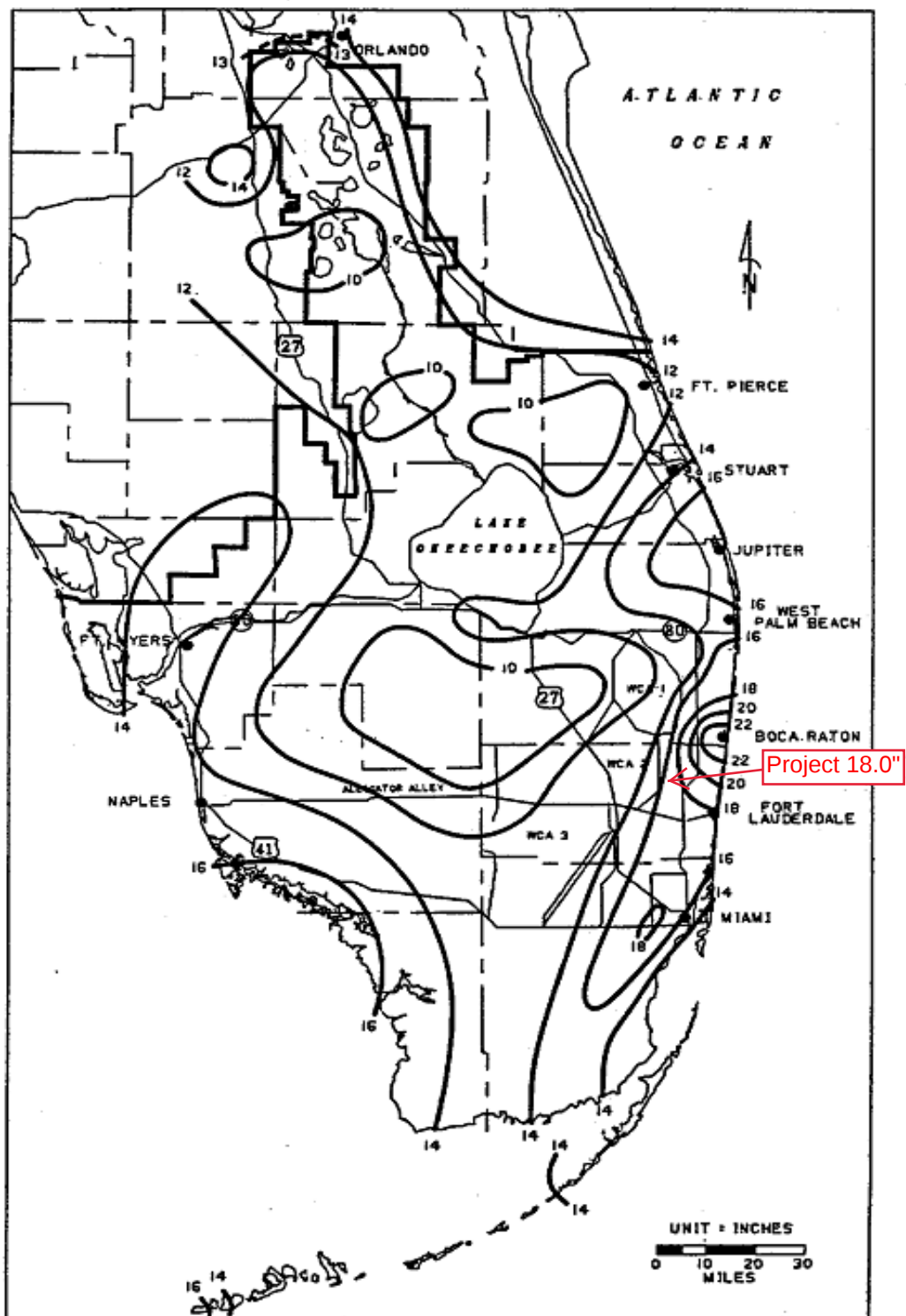


FIGURE C-9. 3-DAY RAINFALL: 100-YEAR RETURN PERIOD

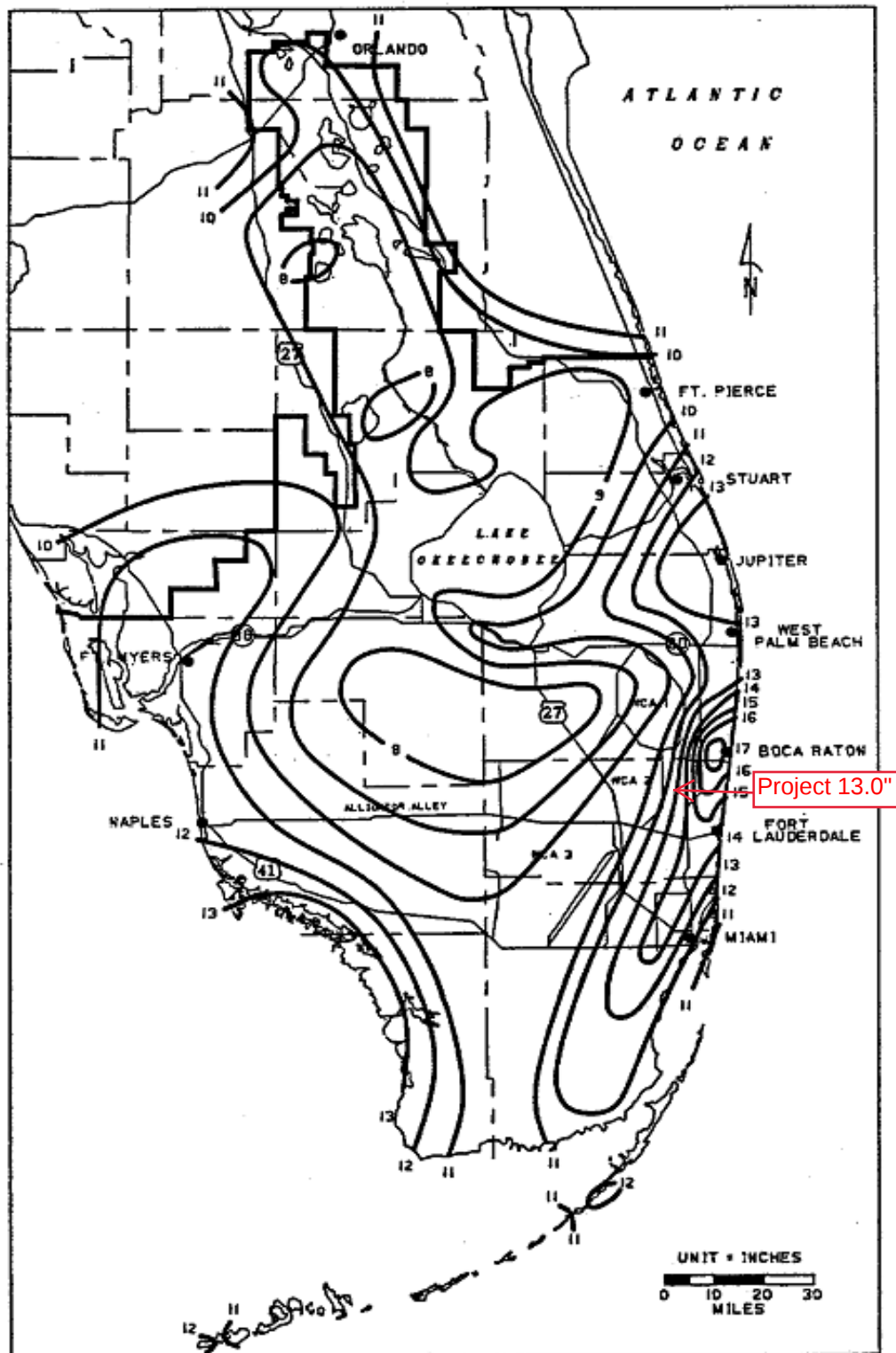


FIGURE C-8. 3-DAY RAINFALL: 25-YEAR RETURN PERIOD

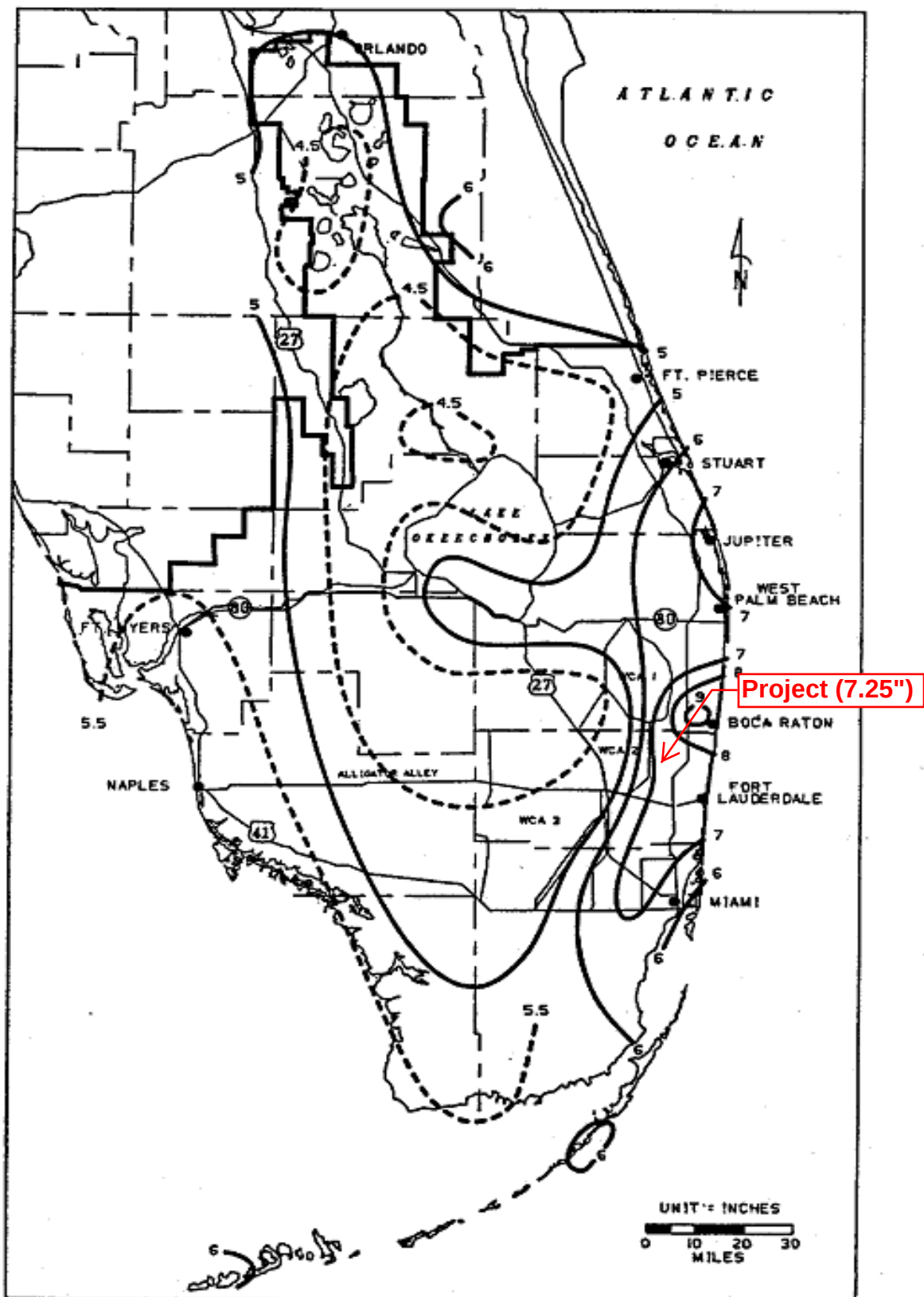


FIGURE C-3. 1-DAY RAINFALL: 5-YEAR RETURN PERIOD

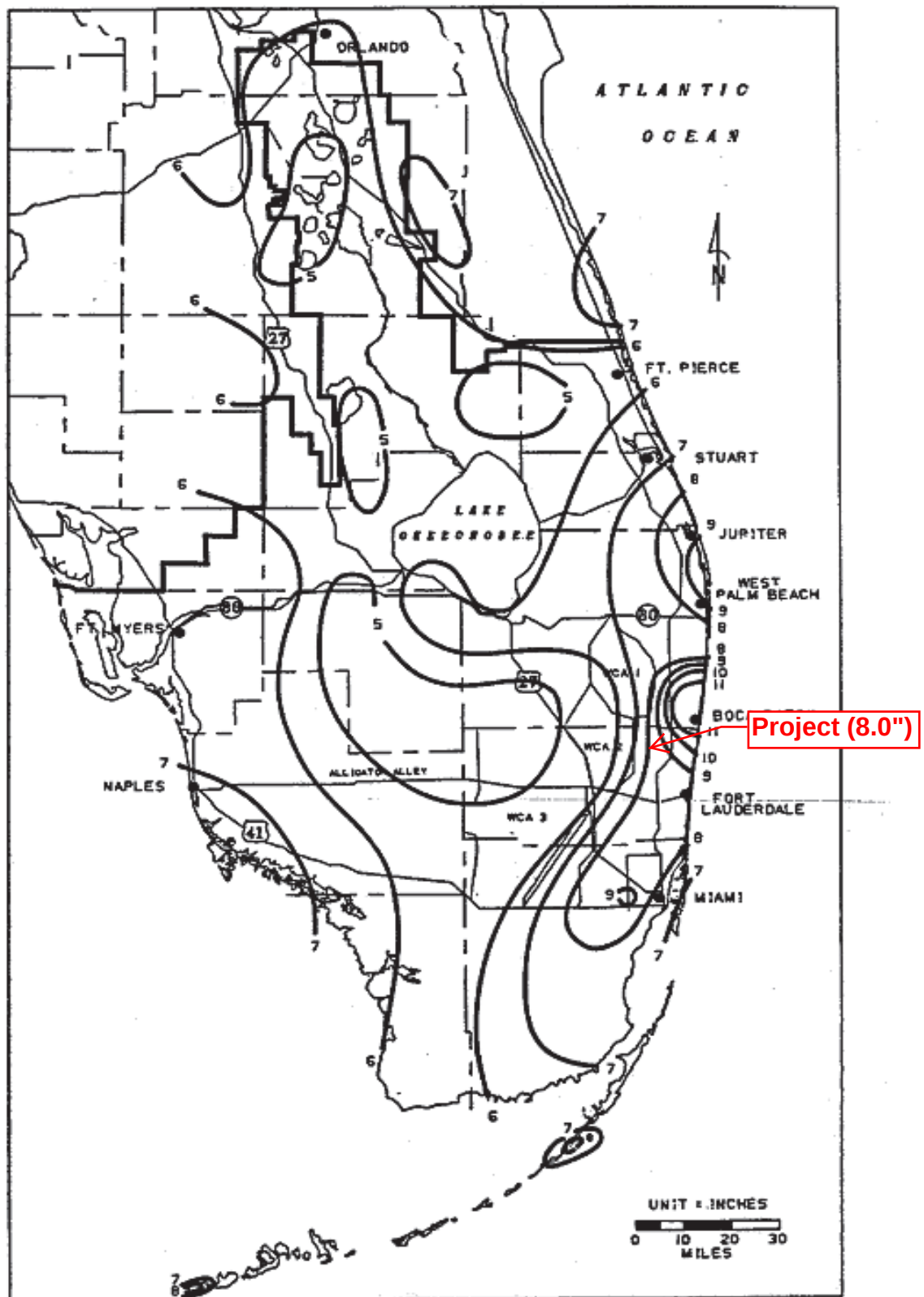
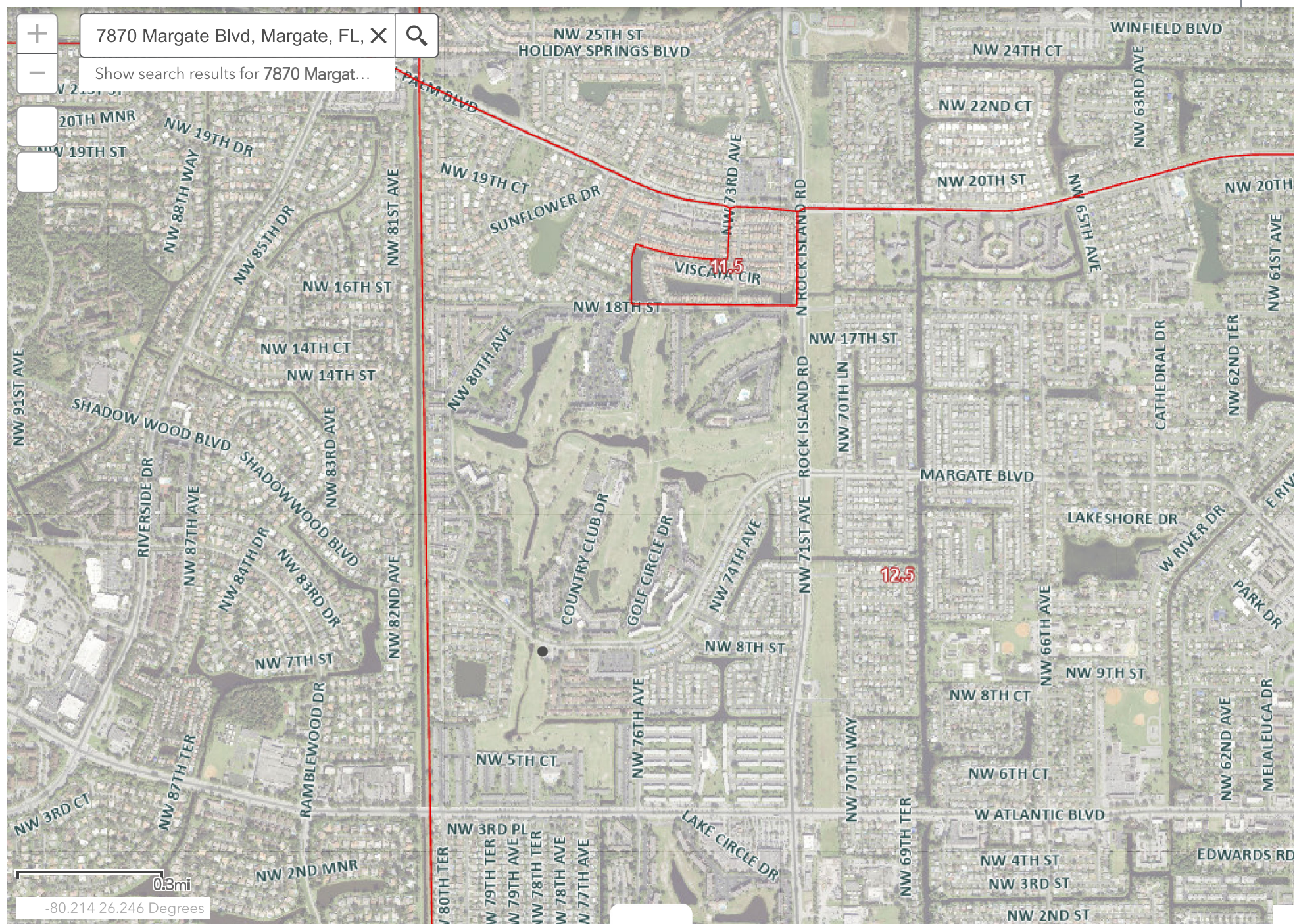


FIGURE C-4. 1-DAY RAINFALL: 10-YEAR RETURN PERIOD

Future Conditions 100-Year Flood Map 2060



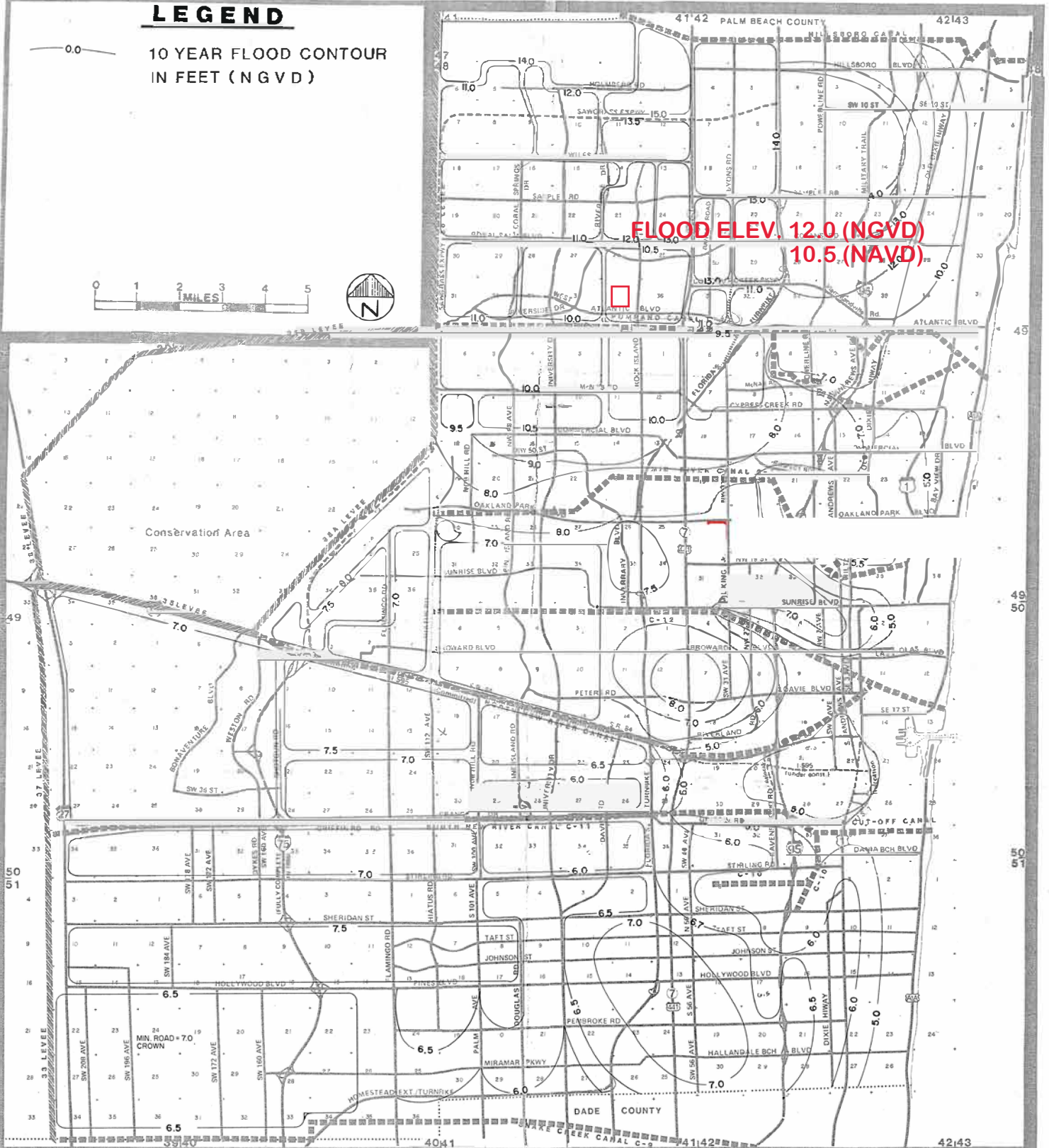
LEGEND

10 YEAR FLOOD CONTOUR
IN FEET (NGVD)

0.0



**FLOOD ELEV. 12.0 (NGVD)
10.5 (NAVD)**

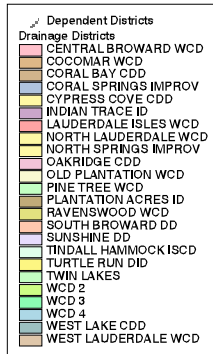


BOARD OF COUNTY COMMISSIONERS
PUBLIC WORKS DEPARTMENT
WATER RESOURCES MANAGEMENT DIVISION
BROWARD COUNTY FLORIDA

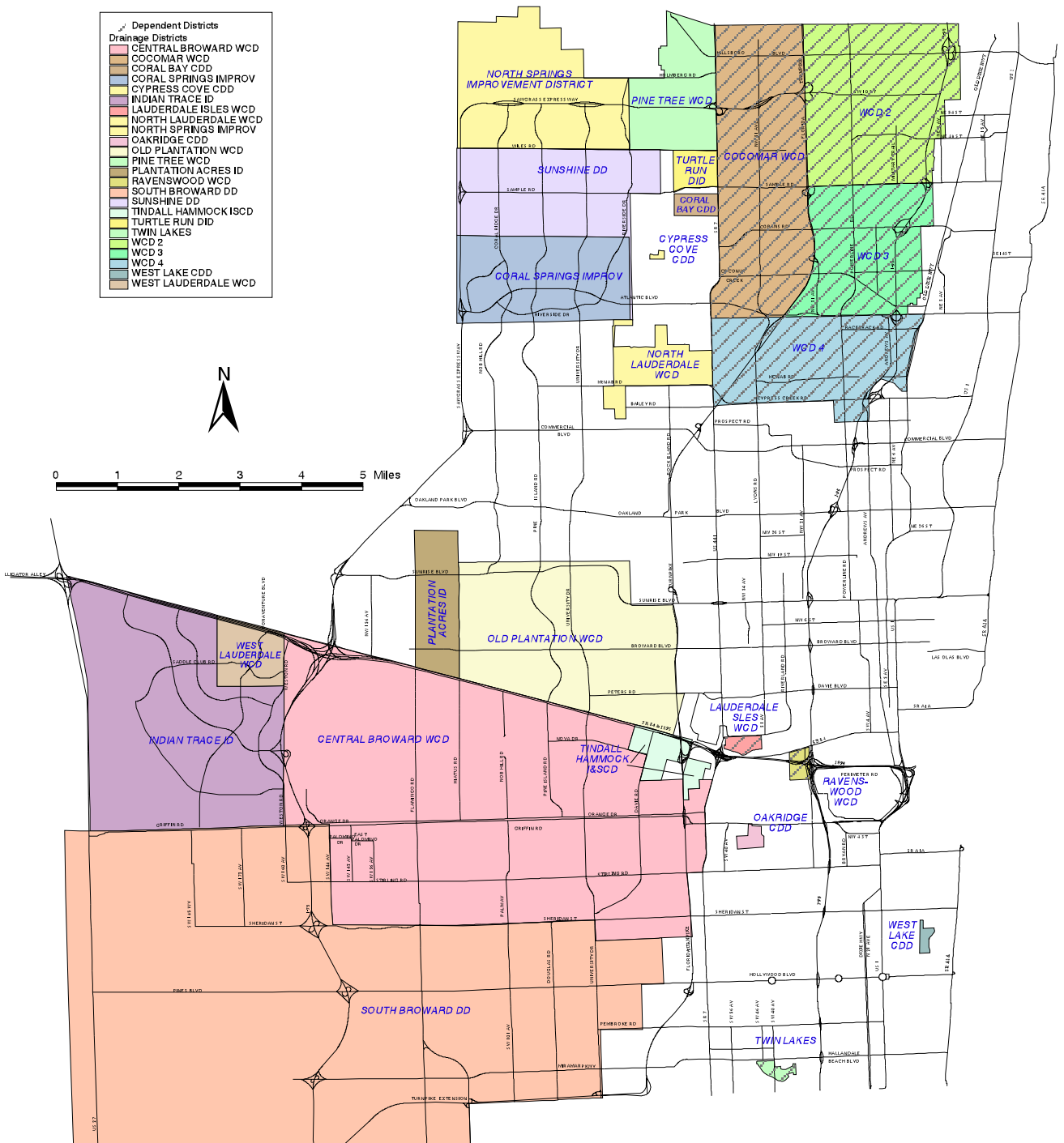
10 YEAR FLOOD ELEVATION MAP

NO.	REVISIONS	DATE	DATE 8-20-87	SHEET 1 OF 1	DRAWN BY JB

Drainage Districts Broward County, Florida



0 1 2 3 4 5 Miles

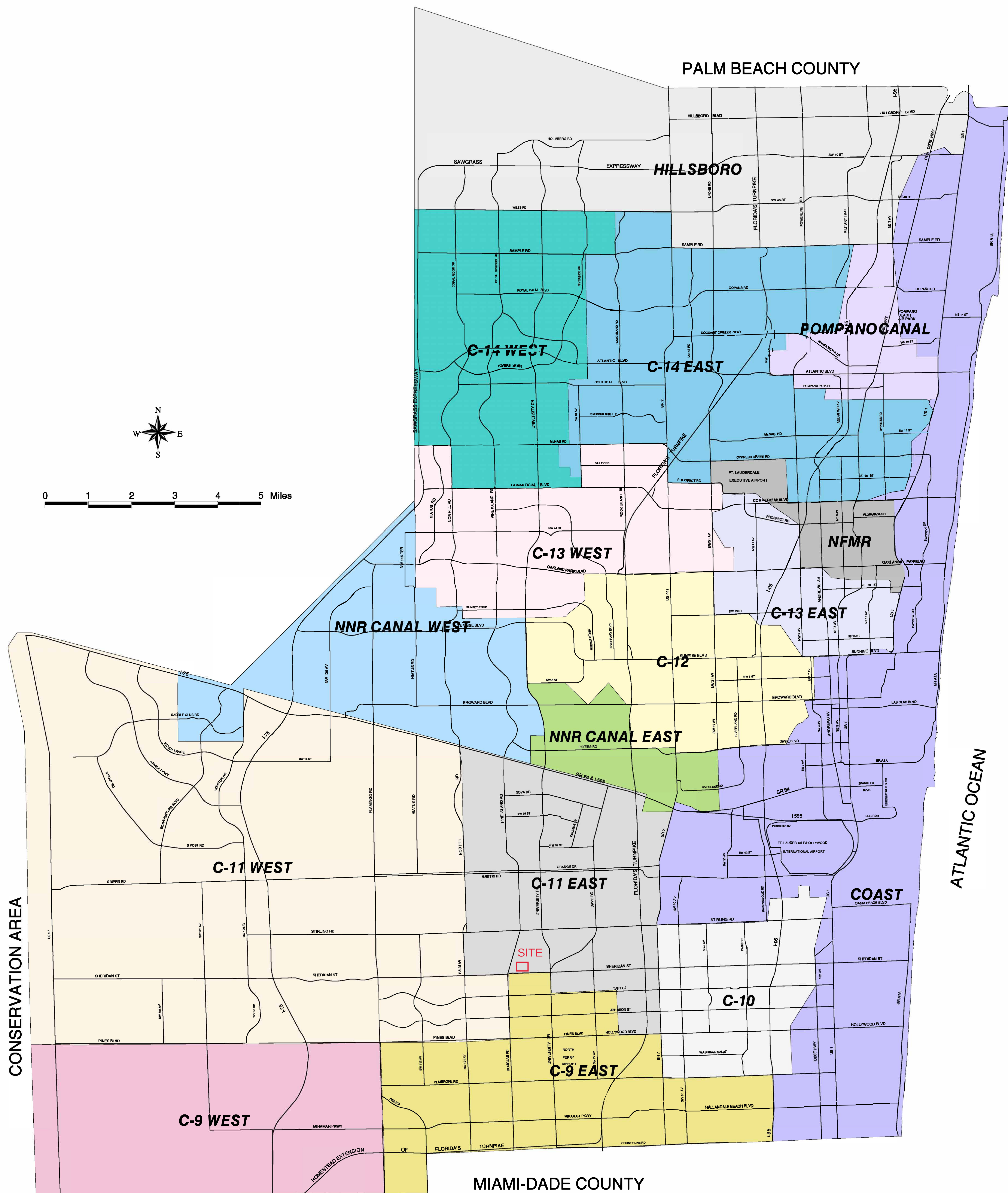


Broward County Department of
Planning and Environmental Protection
Geographic Information Systems
Water Resources Division



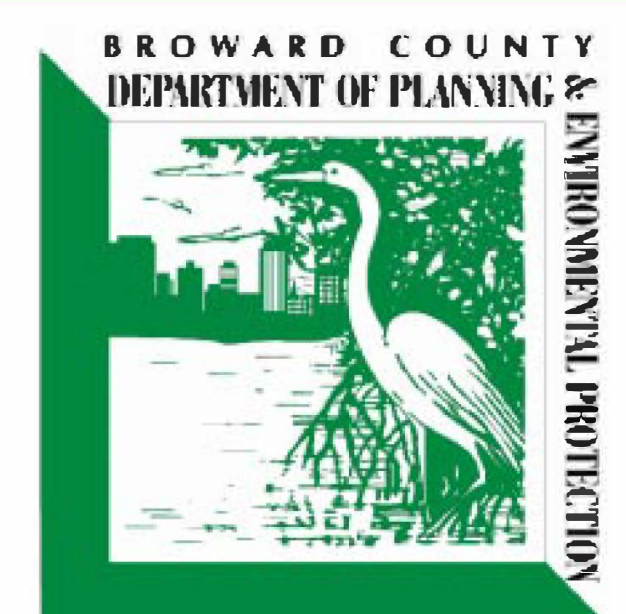
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Drainage Basins



***Broward County Department of
Planning & Environmental Protection
Geographic Information Systems***

March, 2000



rsoodeen: /usr/users/rsoodeen/1002.apr

BROWARD COUNTY LAND USE PLAN

Natural Resource Map Series- Eastern Broward County: Soils

Legend

Coastal Ridge Soils

- Paola - Urban Land - St. Lucie Association
- Palm Beach - Urban Land - Beaches Association

Low Ridge Knolls and Flatwoods Soils

- Dade - Urban Land Association
- Duette - Urban Land - Pomello Association
- Immokalee - Urban Land - Pompano Association
- Immokalee - Urban Land Association

Low Flatwoods, Sloughs and Marshes Soils

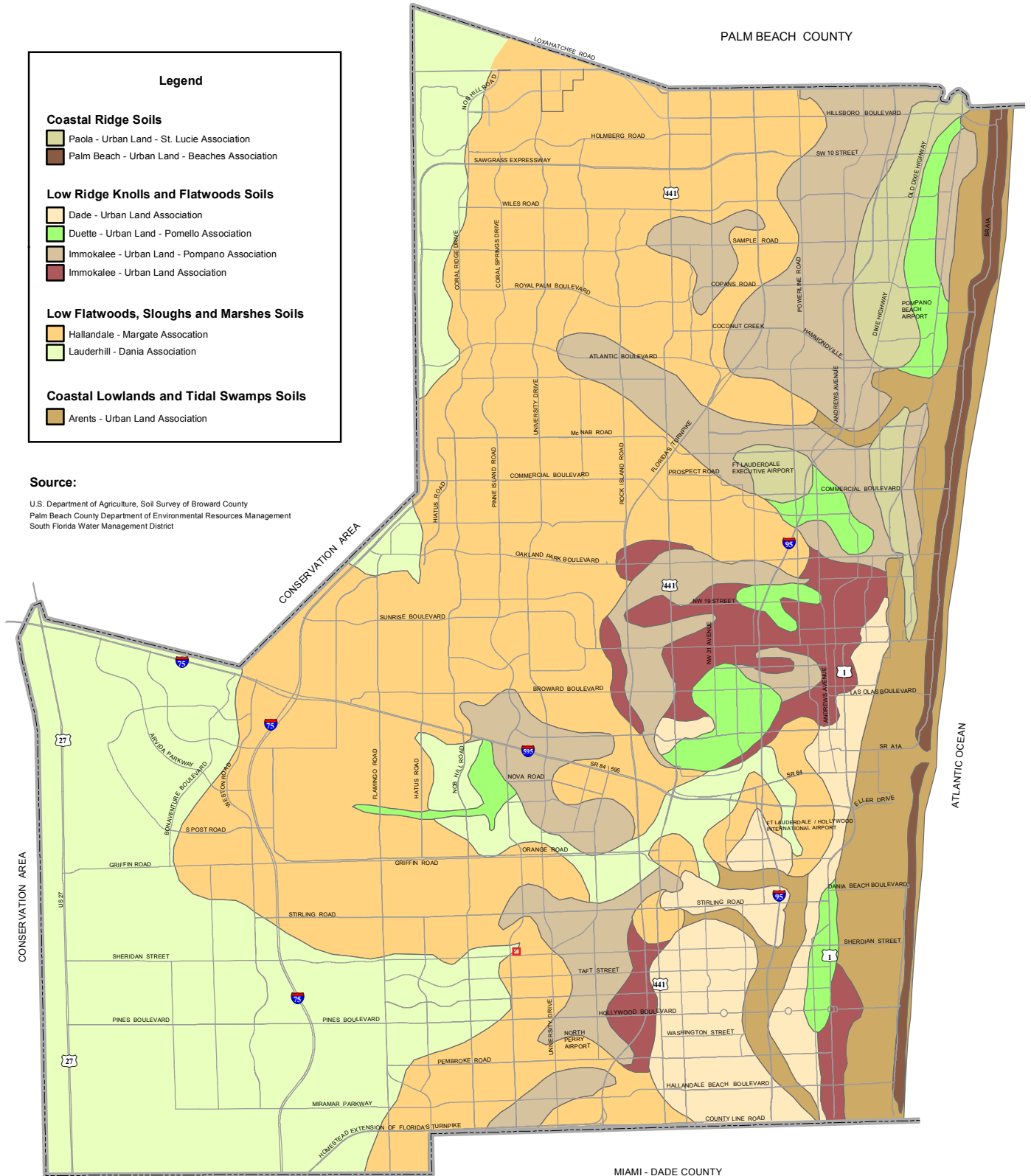
- Hallandale - Margate Association
- Lauderhill - Dania Association

Coastal Lowlands and Tidal Swamps Soils

- Arents - Urban Land Association

Source:

U.S. Department of Agriculture, Soil Survey of Broward County
Palm Beach County Department of Environmental Resources Management
South Florida Water Management District



MIAMI - DADE COUNTY



Broward County Wellfield Map

Broward County Board of County Commissioners Chapter 27- Article XIII Rule of 6/11/2013

Legend

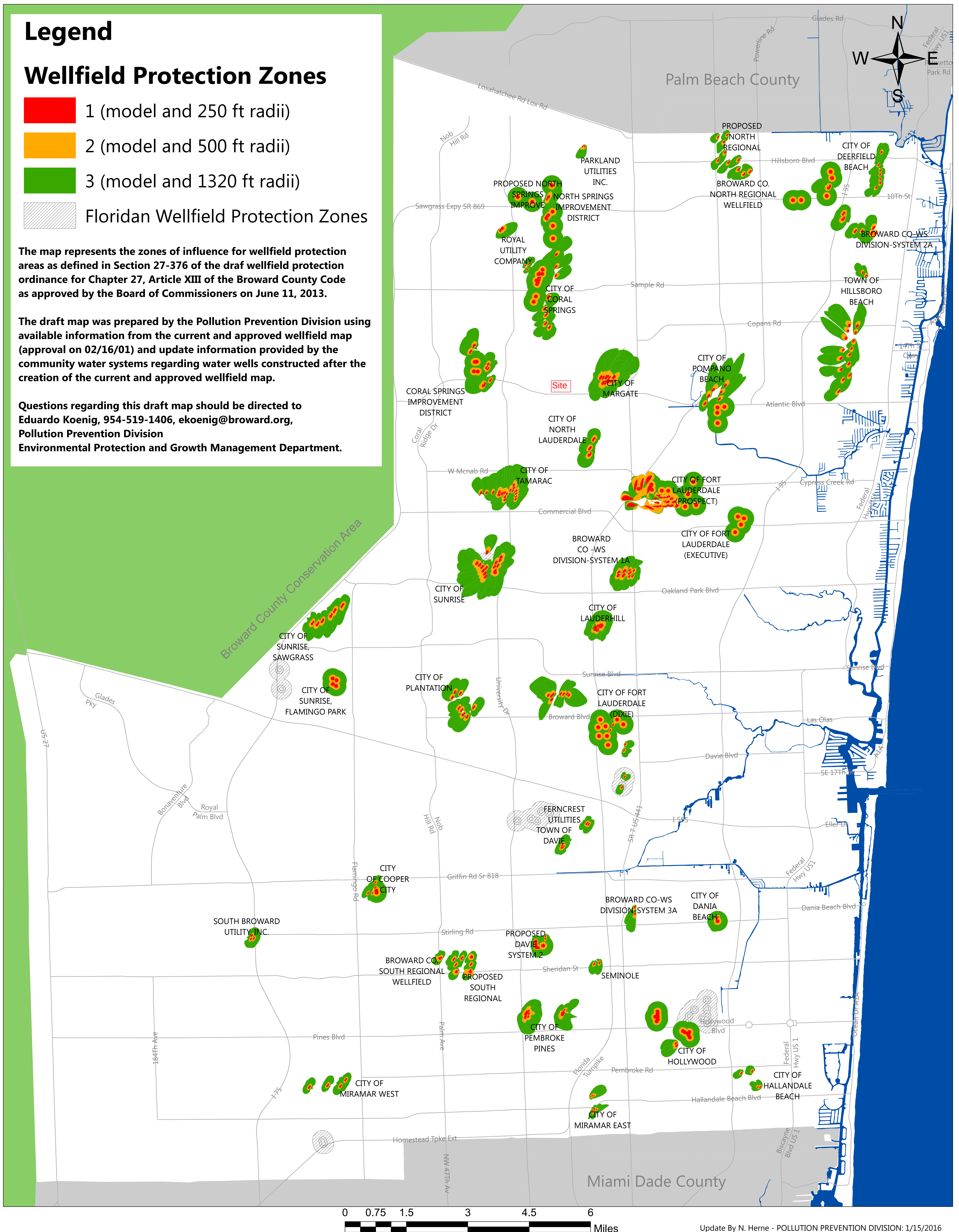
Wellfield Protection Zones

- 1 (model and 250 ft radii)
- 2 (model and 500 ft radii)
- 3 (model and 1320 ft radii)
- Floridan Wellfield Protection Zones

The map represents the zones of influence for wellfield protection areas as defined in Section 27-376 of the draft wellfield protection ordinance for Chapter 27, Article XIII of the Broward County Code as approved by the Board of Commissioners on June 11, 2013.

The draft map was prepared by the Pollution Prevention Division using available information from the current and approved wellfield map (approval on 02/16/01) and update information provided by the community water systems regarding water wells constructed after the creation of the current and approved wellfield map.

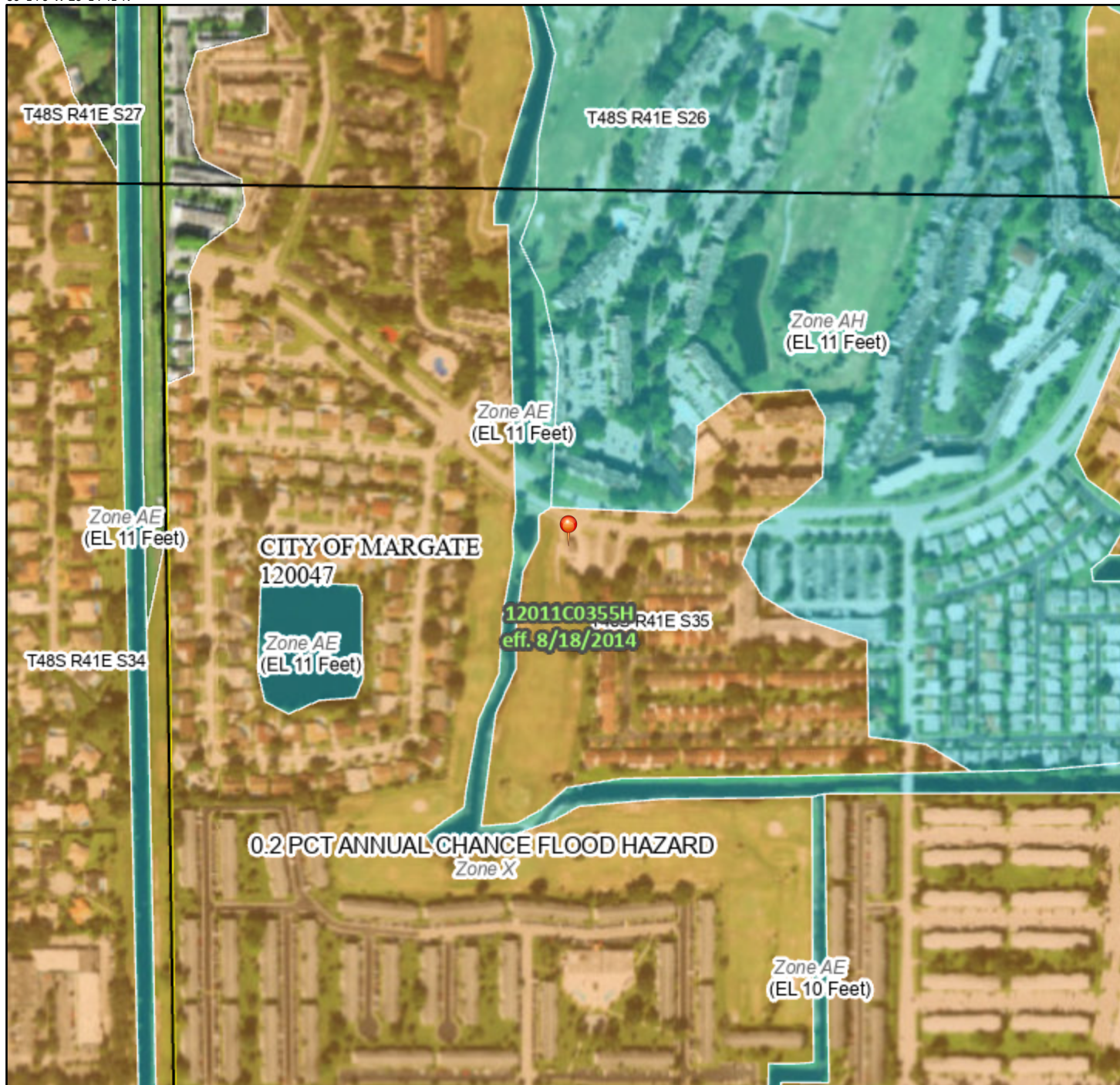
Questions regarding this draft map should be directed to Eduardo Koenig, 954-519-1406, ekoenig@broward.org, Pollution Prevention Division Environmental Protection and Growth Management Department.



National Flood Hazard Layer FIRMette



80°14'6"W 26°14'41"N



0 250 500 1,000 1,500 2,000 Feet 1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

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
MAP PANELS		Profile Baseline
		Hydrographic Feature
		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 6/15/2022 at 3:45 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.

Home ▾ Water Quality Assessments, TMDLs, and BMAPs

