NorthPort
FLORIDA

NorthPortFL.gov

NorthPort FLORIDA

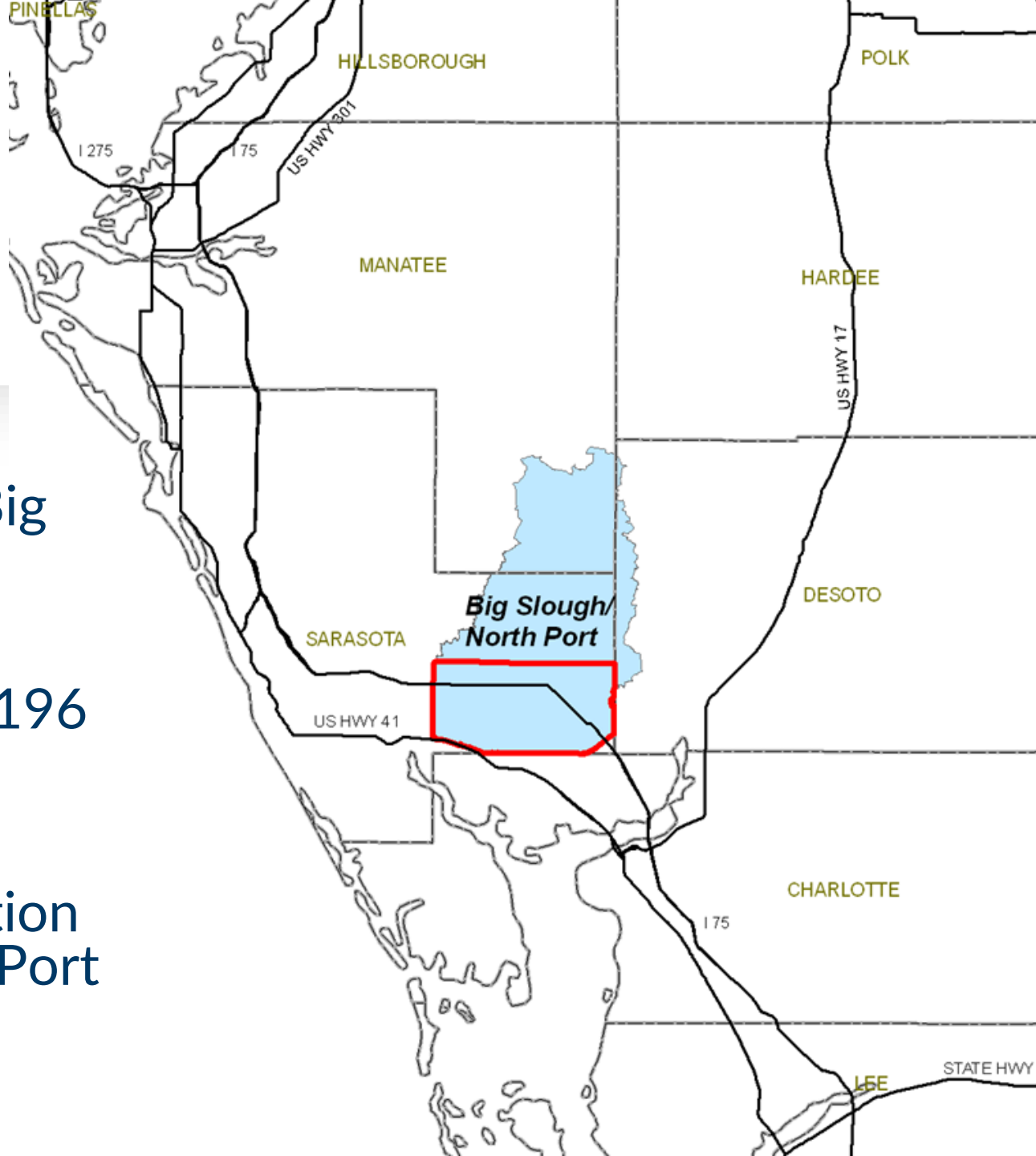
Stormwater Management

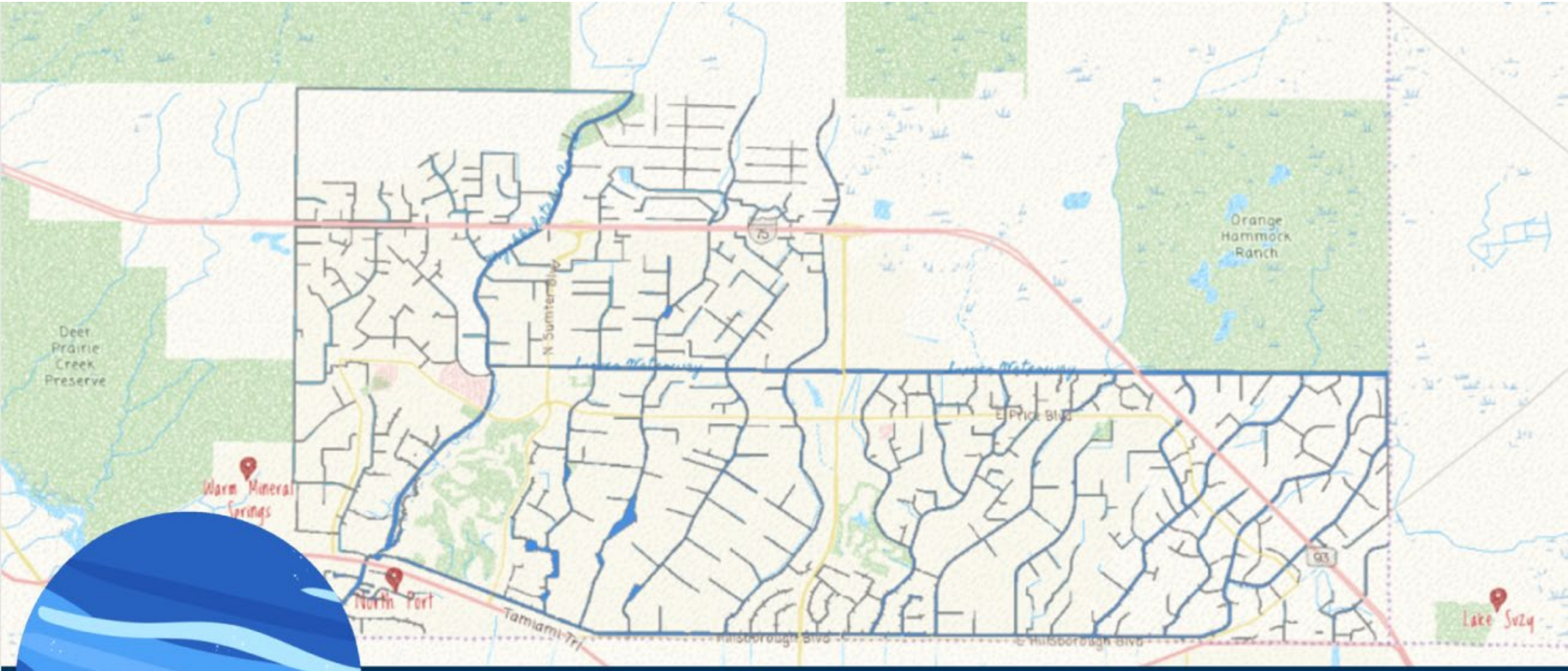
Presentation to the City Commission

September 18, 2024

Hydrology

- North Port is located within the Big Slough Watershed
- Big Slough Watershed is roughly 196 square miles
- Water moves from the north portion of the watershed, through North Port to Charlotte Harbor





How water moves through North Port

Designed/permitted stormwater system

NORTH PORT WATER CONTROL DISTRICT

PHASE I REPORT

INVENTORY AND APPROACH TO ANALYSIS

FOR

GENERAL DEVELOPMENT UTILITIES, INC.

R. D. GHIOTO & ASSOCIATES, INC.

APRIL, 1984

TABLE A.3

ORDERED 5-DAY RAINFALL DISTRIBUTIONS

DAY	NPWCD (Inches)	Big Slough Watershed (Inches)
1	Ø.7	Ø.75
2	1.2	1.2
3	6.4	6.4
4	Ø.9	Ø.9
5	Ø.4	Ø.55
Total	9.6	9.8

The City's Stormwater System was designed to handle a 10 year frequency, 5 day duration storm*

*5 day duration storms are no longer tracked

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.580** (0.481-0.695)	**0.652** (0.540-0.782)	**0.765** (0.631-0.921)	**0.856** (0.702-1.04)	**0.976** (0.768-1.21)	**1.06** (0.818-1.35)	**1.15** (0.851-1.50)	**1.23** (0.871-1.66)	**1.33** (0.905-1.86)	**1.41** (0.930-2.01)
10-min	**0.849** (0.704-1.02)	**0.954** (0.790-1.14)	**1.12** (0.925-1.35)	**1.25** (1.03-1.52)	**1.43** (1.12-1.78)	**1.56** (1.20-1.98)	**1.68** (1.25-2.20)	**1.80** (1.28-2.43)	**1.95** (1.32-2.72)	**2.06** (1.36-2.94)
15-min	**1.04** (0.858-1.24)	**1.16** (0.964-1.40)	**1.37** (1.13-1.64)	**1.53** (1.25-1.85)	**1.74** (1.37-2.17)	**1.90** (1.46-2.41)	**2.05** (1.52-2.68)	**2.20** (1.56-2.96)	**2.38** (1.62-3.32)	**2.51** (1.66-3.59)
30-min	**1.57** (1.30-1.88)	**1.76** (1.46-2.12)	**2.07** (1.71-2.49)	**2.32** (1.90-2.80)	**2.64** (2.08-3.28)	**2.88** (2.21-3.65)	**3.11** (2.30-4.06)	**3.33** (2.36-4.49)	**3.61** (2.44-5.02)	**3.80** (2.51-5.43)
60-min	**2.04** (1.69-2.45)	**2.29** (1.89-2.74)	**2.68** (2.21-3.22)	**3.00** (2.46-3.63)	**3.43** (2.70-4.28)	**3.75** (2.89-4.76)	**4.07** (3.01-5.32)	**4.38** (3.10-5.91)	**4.78** (3.25-6.68)	**5.08** (3.36-7.25)
2-hr	**2.51** (2.10-2.99)	**2.81** (2.34-3.35)	**3.29** (2.73-3.93)	**3.68** (3.04-4.42)	**4.21** (3.35-5.23)	**4.62** (3.58-5.84)	**5.02** (3.75-6.53)	**5.43** (3.87-7.29)	**5.96** (4.07-8.27)	**6.35** (4.22-9.01)
3-hr	**2.73** (2.29-3.24)	**3.05** (2.56-3.62)	**3.58** (2.99-4.26)	**4.03** (3.34-4.82)	**4.65** (3.72-5.77)	**5.14** (4.01-6.49)	**5.63** (4.23-7.32)	**6.14** (4.40-8.24)	**6.82** (4.69-9.46)	**7.34** (4.90-10.4)
6-hr	**3.07** (2.60-3.62)	**3.47** (2.93-4.09)	**4.15** (3.49-4.91)	**4.75** (3.97-5.64)	**5.62** (4.54-6.97)	**6.32** (4.98-7.97)	**7.06** (5.35-9.16)	**7.84** (5.68-10.5)	**8.93** (6.19-12.4)	**9.79** (6.58-13.8)
12-hr	**3.43** (2.92-4.01)	**3.94** (3.35-4.61)	**4.86** (4.12-5.70)	**5.69** (4.79-6.71)	**6.93** (5.67-8.60)	**7.97** (6.34-10.0)	**9.09** (6.95-11.8)	**10.3** (7.51-13.7)	**12.0** (8.38-16.5)	**13.4** (9.03-18.6)
24-hr	3.92 (3.36-4.55)	4.54 (3.89-5.27)	5.67 (4.84-6.61)	6.73 (5.70-7.88)	8.36 (6.91-10.4)	9.75 (7.82-12.2)	11.3 (8.69-14.5)	12.9 (9.51-17.2)	**15.3** (10.8-21.0)	**17.2** (11.7-23.9)
2-day	**4.66** (4.03-5.37)	**5.34** (4.61-6.16)	**6.63** (5.70-7.66)	**7.85** (6.70-9.12)	**9.76** (8.14-12.1)	**11.4** (9.24-14.3)	**13.2** (10.3-17.0)	**15.2** (11.3-20.2)	**18.1** (12.9-24.8)	**20.5** (14.1-28.3)
3-day	**5.18** (4.50-5.94)	**5.96** (5.17-6.84)	**7.40** (6.38-8.52)	**8.73** (7.49-10.1)	**10.8** (9.02-13.2)	**12.6** (10.2-15.6)	**14.5** (11.3-18.5)	**16.6** (12.3-21.8)	**19.6** (13.9-26.6)	**22.0** (15.1-30.2)
4-day	**5.64** (4.90-6.44)	**6.49** (5.64-7.43)	**8.03** (6.96-9.22)	**9.44** (8.12-10.9)	**11.6** (9.69-14.1)	**13.4** (10.9-16.5)	**15.3** (12.0-19.5)	**17.4** (13.0-22.9)	**20.4** (14.6-27.6)	**22.9** (15.8-31.3)
7-day	**6.88** (6.02-7.82)	**7.83** (6.85-8.91)	**9.50** (8.28-10.8)	**11.0** (9.51-12.6)	**13.2** (11.1-15.9)	**15.0** (12.2-18.3)	**16.9** (13.3-21.3)	**19.0** (14.2-24.7)	**21.9** (15.7-29.3)	**24.2** (16.8-32.9)
10-day	**7.99** (7.03-9.05)	**9.01** (7.91-10.2)	**10.7** (9.40-12.2)	**12.3** (10.7-14.0)	**14.5** (12.2-17.3)	**16.3** (13.3-19.8)	**18.2** (14.3-22.7)	**20.2** (15.1-26.0)	**22.9** (16.5-30.6)	**25.1** (17.5-34.0)
20-day	**11.2** (9.90-12.6)	**12.4** (11.0-14.0)	**14.5** (12.7-16.3)	**16.1** (14.1-18.3)	**18.5** (15.6-21.7)	**20.3** (16.7-24.3)	**22.1** (17.5-27.3)	**24.0** (18.1-30.6)	**26.4** (19.1-34.9)	**28.3** (19.8-38.1)
30-day	**13.9** (12.4-15.6)	**15.4** (13.7-17.3)	**17.8** (15.8-20.0)	**19.7** (17.3-22.3)	**22.3** (18.8-25.9)	**24.2** (19.9-28.7)	**26.0** (20.6-31.8)	**27.8** (21.0-35.2)	**30.1** (21.8-39.4)	**31.8** (22.4-42.6)
45-day	**17.6** (15.7-19.5)	**19.4** (17.3-21.6)	**22.3** (19.8-24.9)	**24.6** (21.7-27.6)	**27.5** (23.2-31.7)	**29.5** (24.4-34.8)	**31.5** (25.0-38.2)	**33.3** (25.3-41.8)	**35.5** (25.8-46.2)	**37.0** (26.2-49.5)
60-day	**20.7** (18.6-23.0)	**22.9** (20.6-25.5)	**26.3** (23.5-29.3)	**28.9** (25.7-32.4)	**32.2** (27.3-37.0)	**34.5** (28.6-40.4)	**36.6** (29.2-44.2)	**38.5** (29.2-48.1)	**40.7** (29.6-52.6)	**42.1** (29.8-56.1)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Hurricane Ian 9/28/22 delivered over 15 inches of rain in a 24 hour period

NOAA Rainfall Data Downloaded 9/4/24

Takeaway 1

North Port is within a large watershed which receives water from the north/northeast and is not in the same watershed as much of the rest of Sarasota County.

Takeaway 2

The permitted stormwater system was designed with full build out plan at a 5-day, 10-year storm.

Takeaway 3

Commercial Development is required to retain water onsite and cannot impact the permitted stormwater drainage system.

Stormwater drainage system components

Stormwater drainage system components, cont.

Roads are an essential component of the stormwater drainage system.

Stormwater drainage system objectives

- Direct water away from buildings and infrastructure
- Supply drinking water
- Use vegetation to slow, filter, and cleanse stormwater runoff from impervious surfaces
- Water held in swales for up to 72 hours allows vegetation to clean the stormwater to protect the natural environment and reduce erosion
- Water may pond in areas while working through the system. This is normal and expected and is not actually flooding
- Flooding: when water enters a building or structure

Takeaway 4

Roads are part of the stormwater system. During heavy rains, water on the roads keeps water away from flooding houses and buildings.

Takeaway 5

Stormwater routed to the Myakkahatchee Creek and Cocoplum waterway supply North Port Utilities drinking water.

Water Control Structures (WCS)

- City Drainage Canals are divided by water control structures designed to retain water within the system at controlled elevations to allow for water quality treatment and flow attenuation
- 64 Water Control Structures
- 23 have gates to allow movement of water through the system when necessary
- Aquatic vegetation, floating debris and downed trees have the potential to damage the gates or inhibit their proper function

Routine Stormwater Drainage System Maintenance

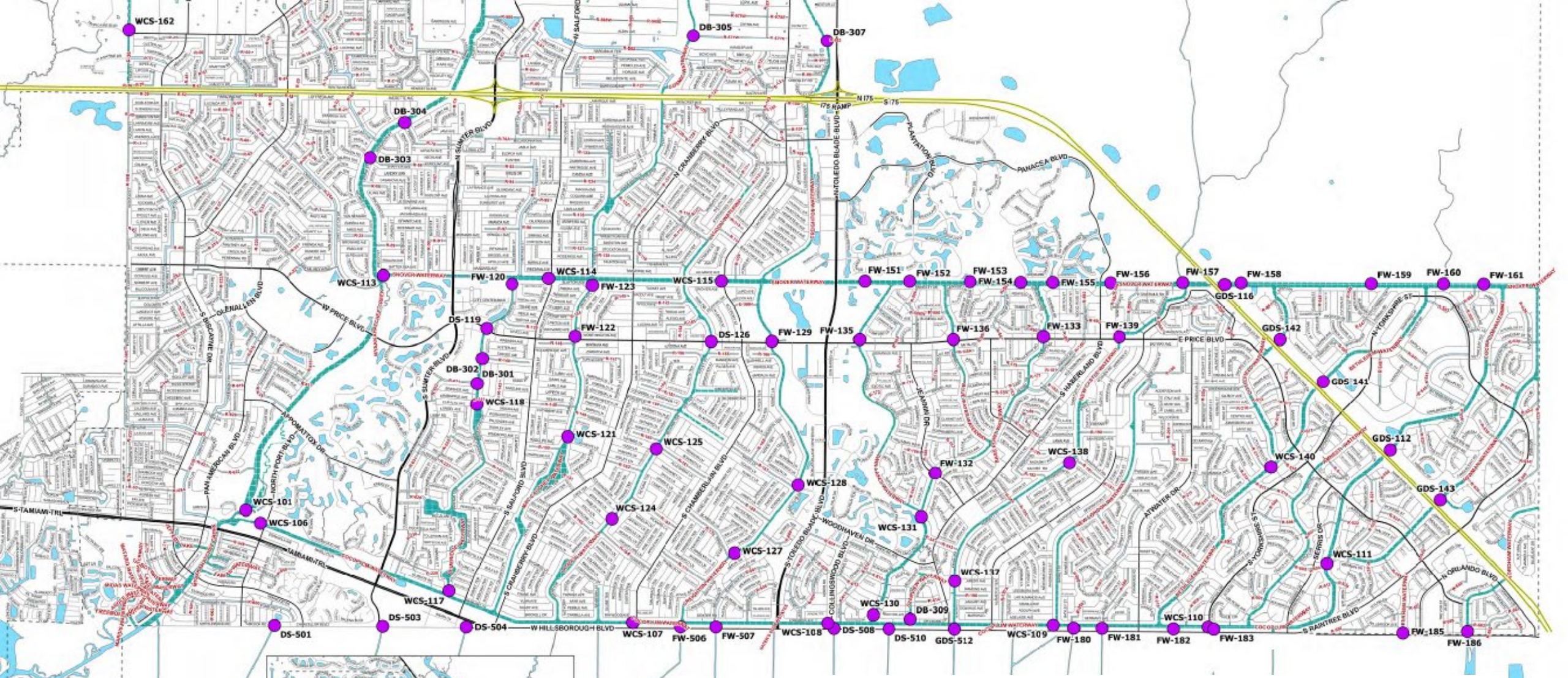
- Scheduled mowing of vegetation in R-Ditches to maintain proper hydraulic function:
  - Six mowing cycles per year for R-Ditches accessible with traditional mowing equipment
  - Two mowing cycles per year for those not accessible with traditional equipment
- Herbicide treatment as needed on R-Ditch bottoms to maintain hydraulic function
- R-Ditches are rehabilitated as needed to maintain proper elevations to efficiently move stormwater to the Drainage Canals

Routine Water Control Structure maintenance

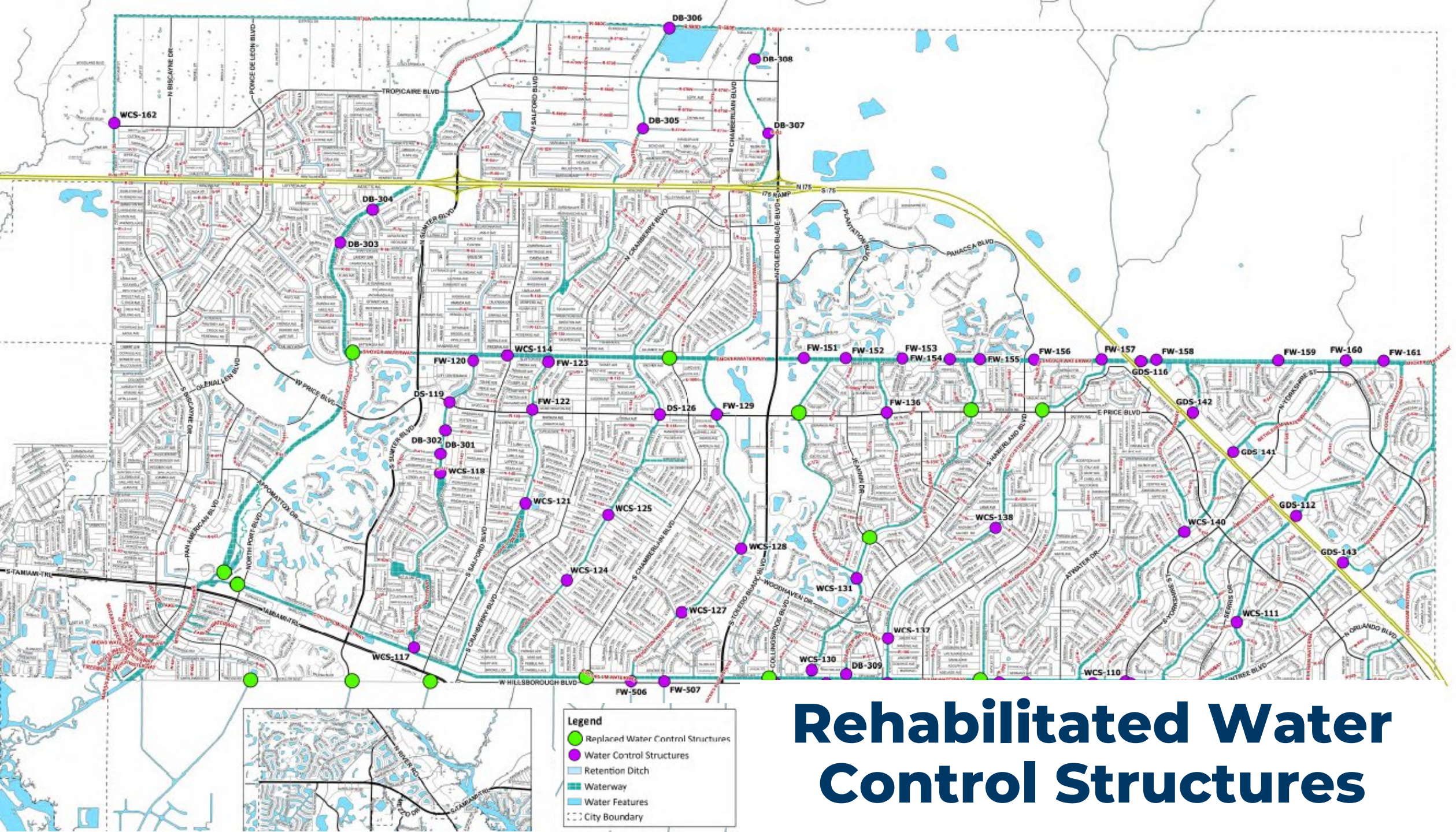
- The 23 gated Water Control Structures receive daily maintenance including greasing all moving parts, checking for any structural issues, confirming the operation of the gates and clearing any aquatic vegetation or debris from the structure and gate areas
- Quarterly inspection and maintenance of the remaining Water Control Structures
- Annual in-depth inspection of all structures

Stormwater Drainage System projects

- Annual Water Control Structure Rehabilitation
- Annual Drainage System Improvements (DSI) Grid Rehabilitation
- Clearing of debris and blockages within Myakkahatchee Creek

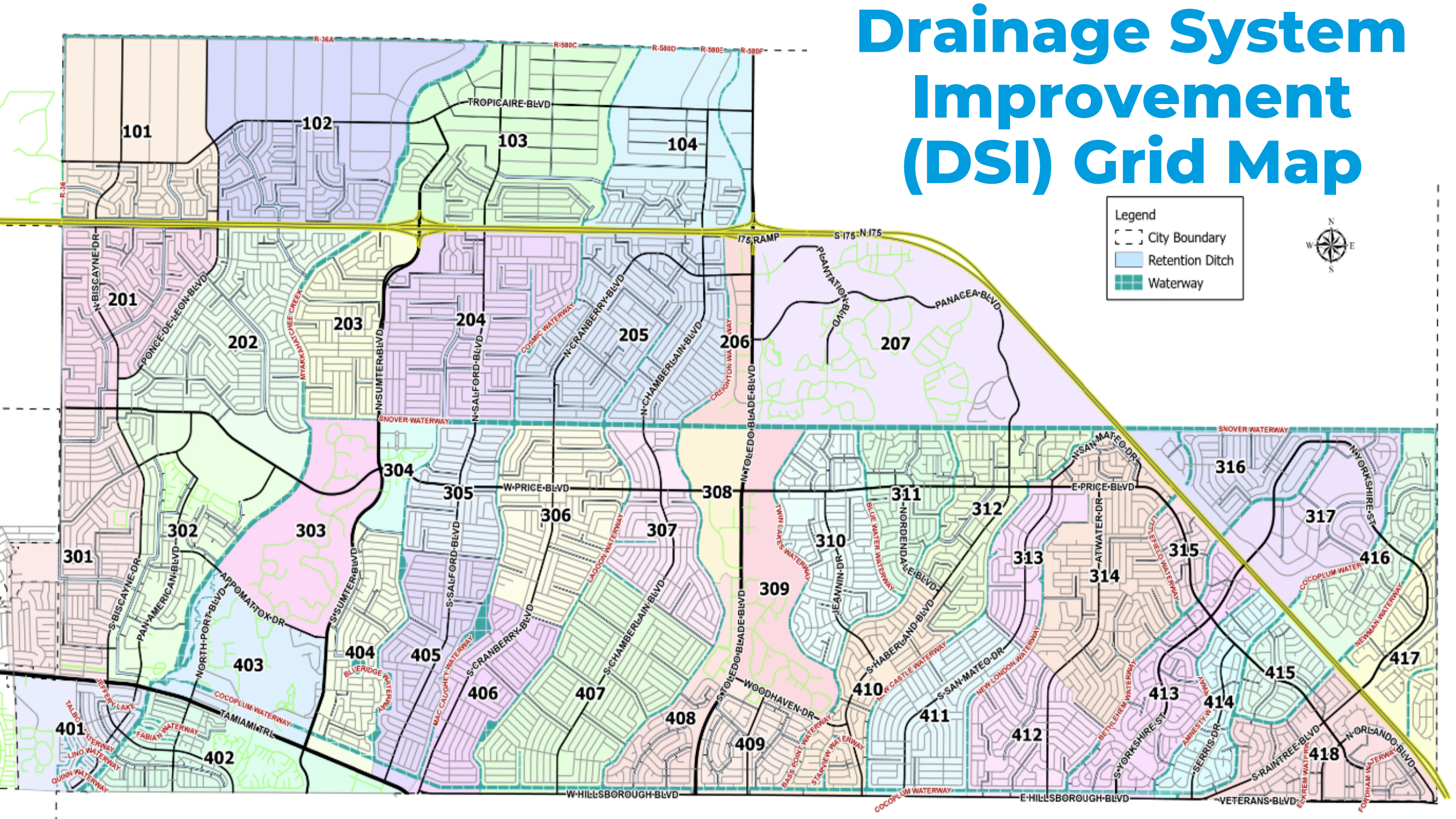


Water Control Structures

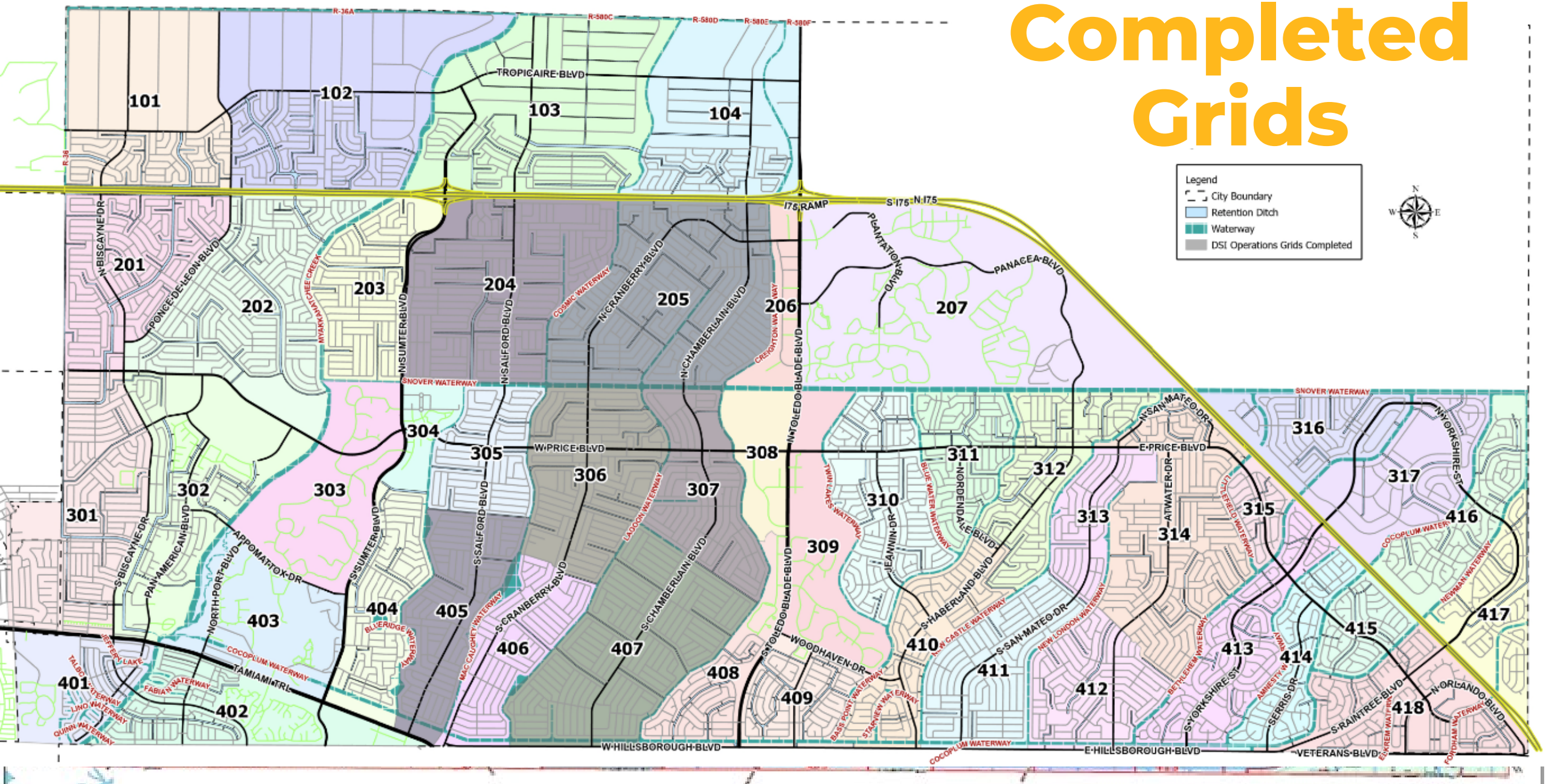


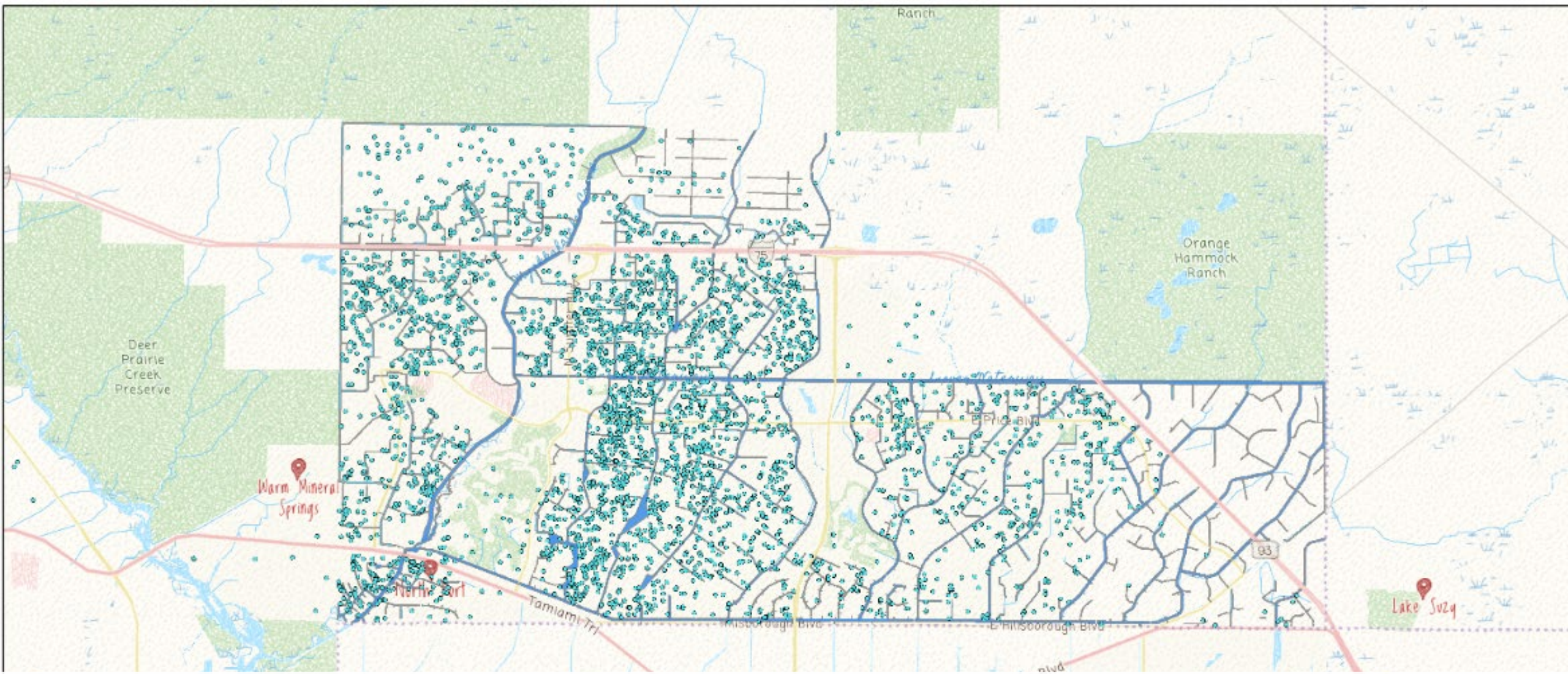
Rehabilitated Water Control Structures

Drainage System Improvement (DSI) Grid Map



Completed Grids





Approximately 5,890 Drainage System work orders completed since 10/1/2016

Takeaway 6

The Stormwater Drainage System is actively maintained within available budget.

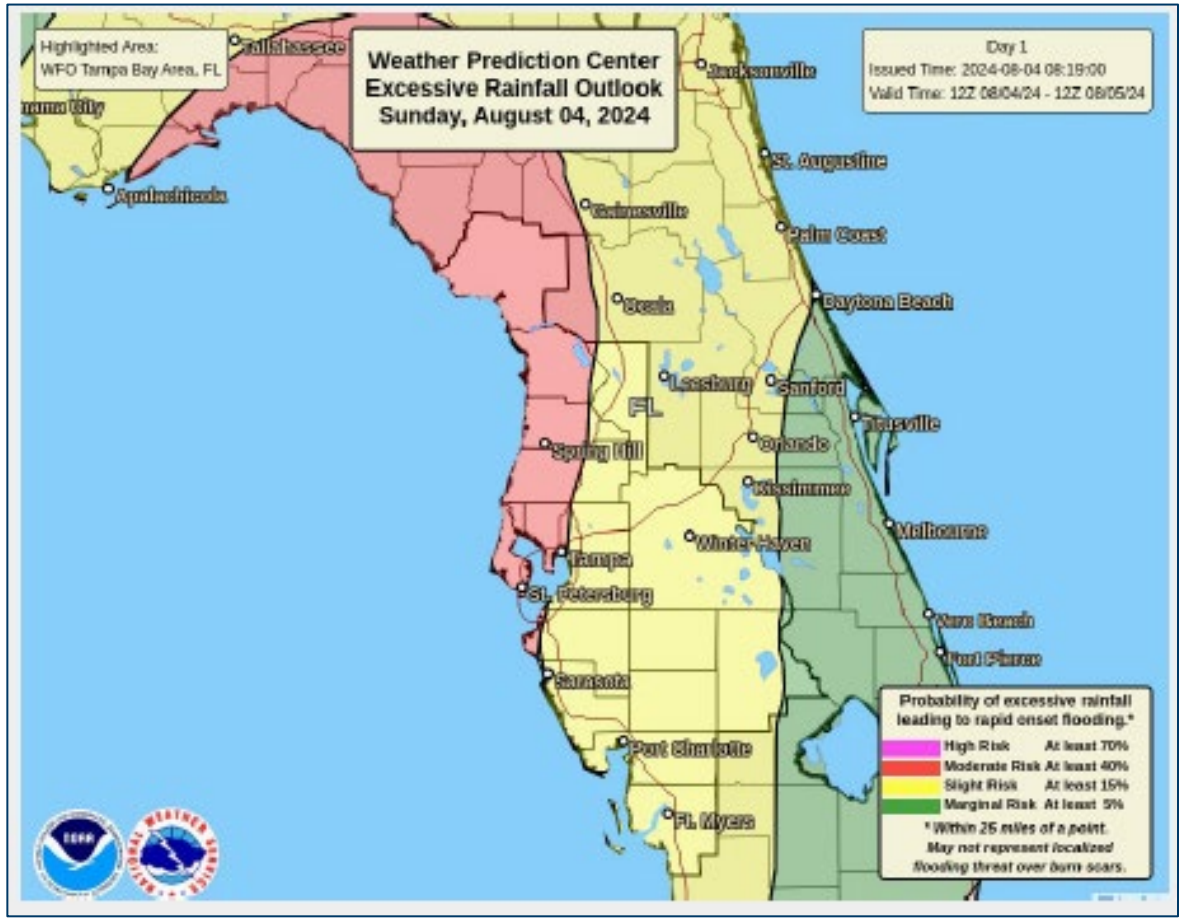
Can the System be Retrofitted to a Higher Capacity?

- Permitting considerations
- Habitat and environmental restrictions
- Potential impact to existing trees, infrastructure and similar
- If approval of permitting is obtainable, retrofitting the current system roadside system in Legacy North Port to a system that would have capacity for a 100 - year storm is estimated to cost $1.5 billion.

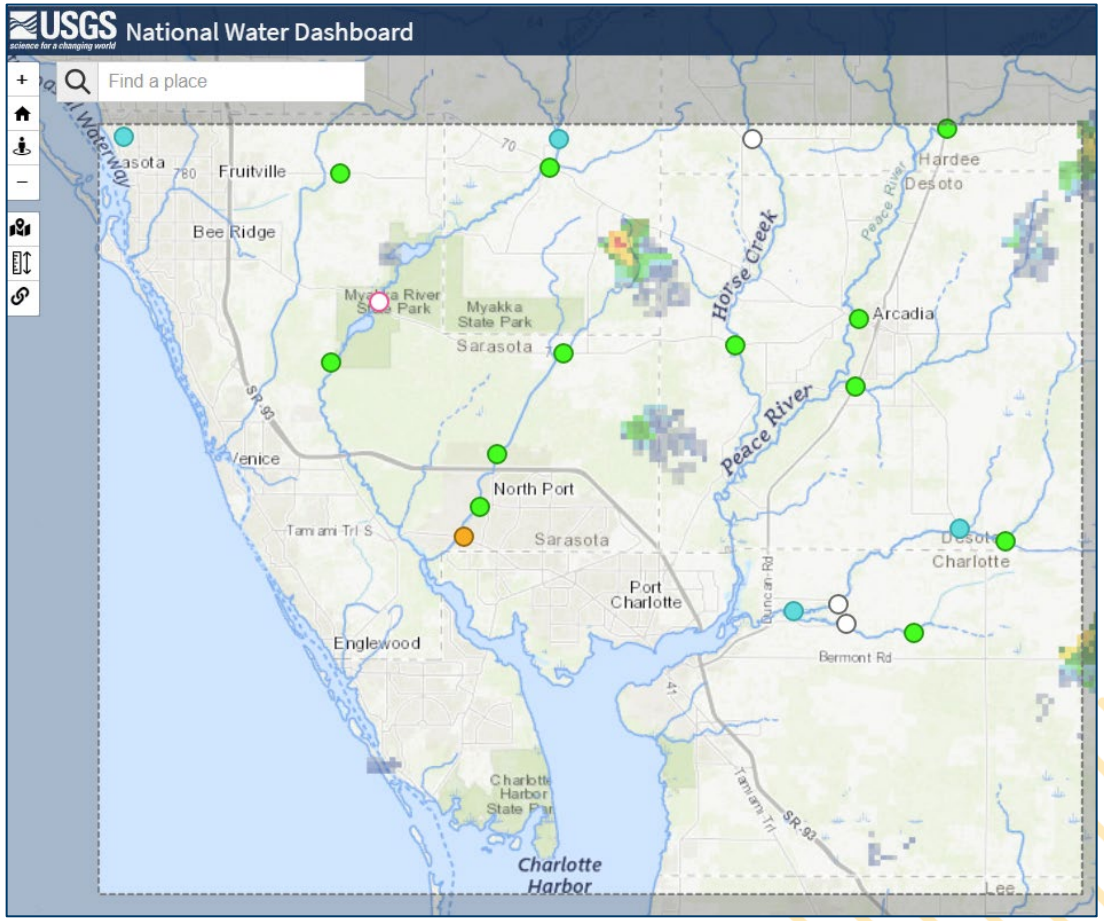
Takeaway 7

Water Control Structures need to be replaced as funding is available.

Adverse weather/storm preparation

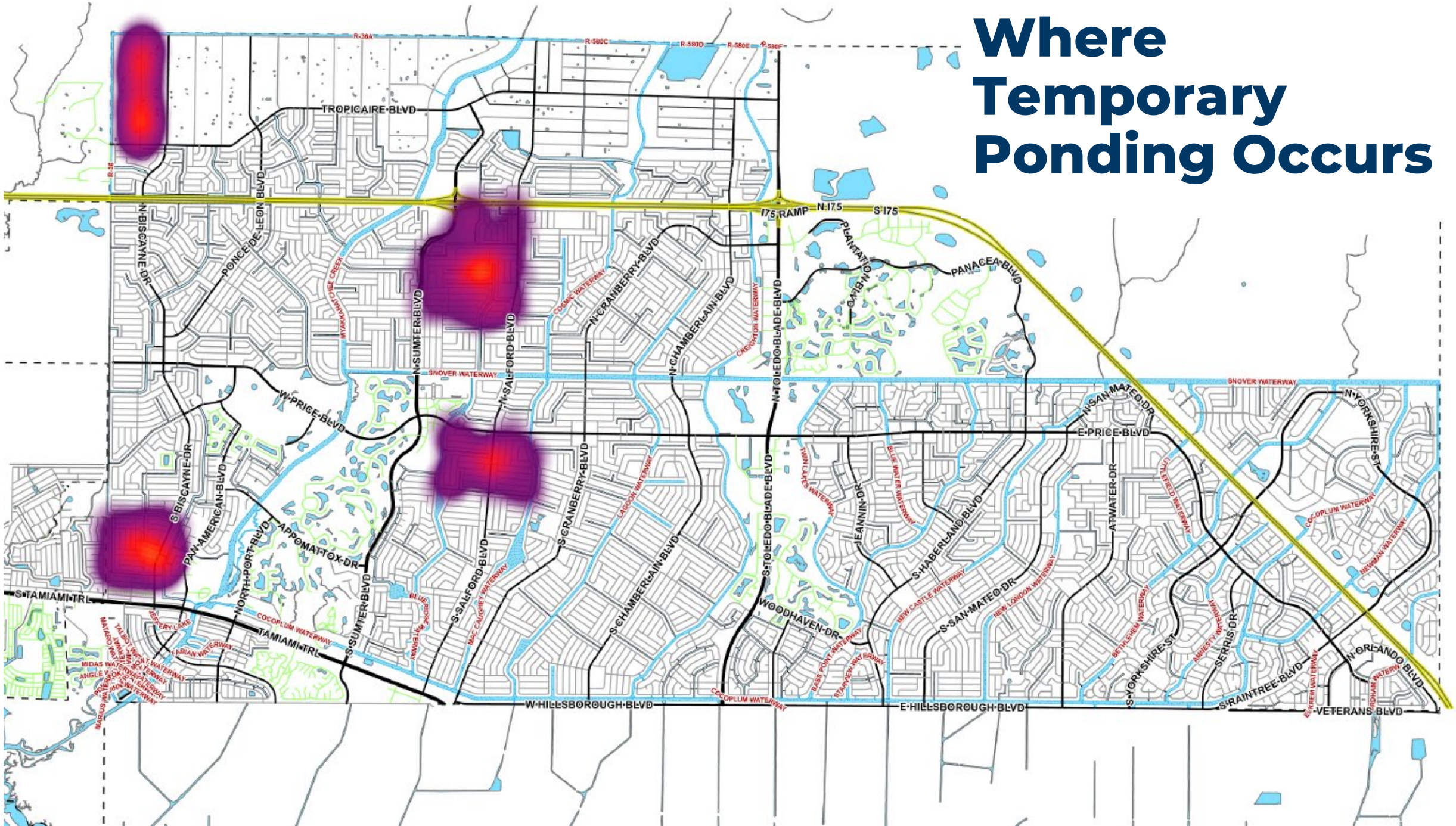


Forecasting Tools and Resources



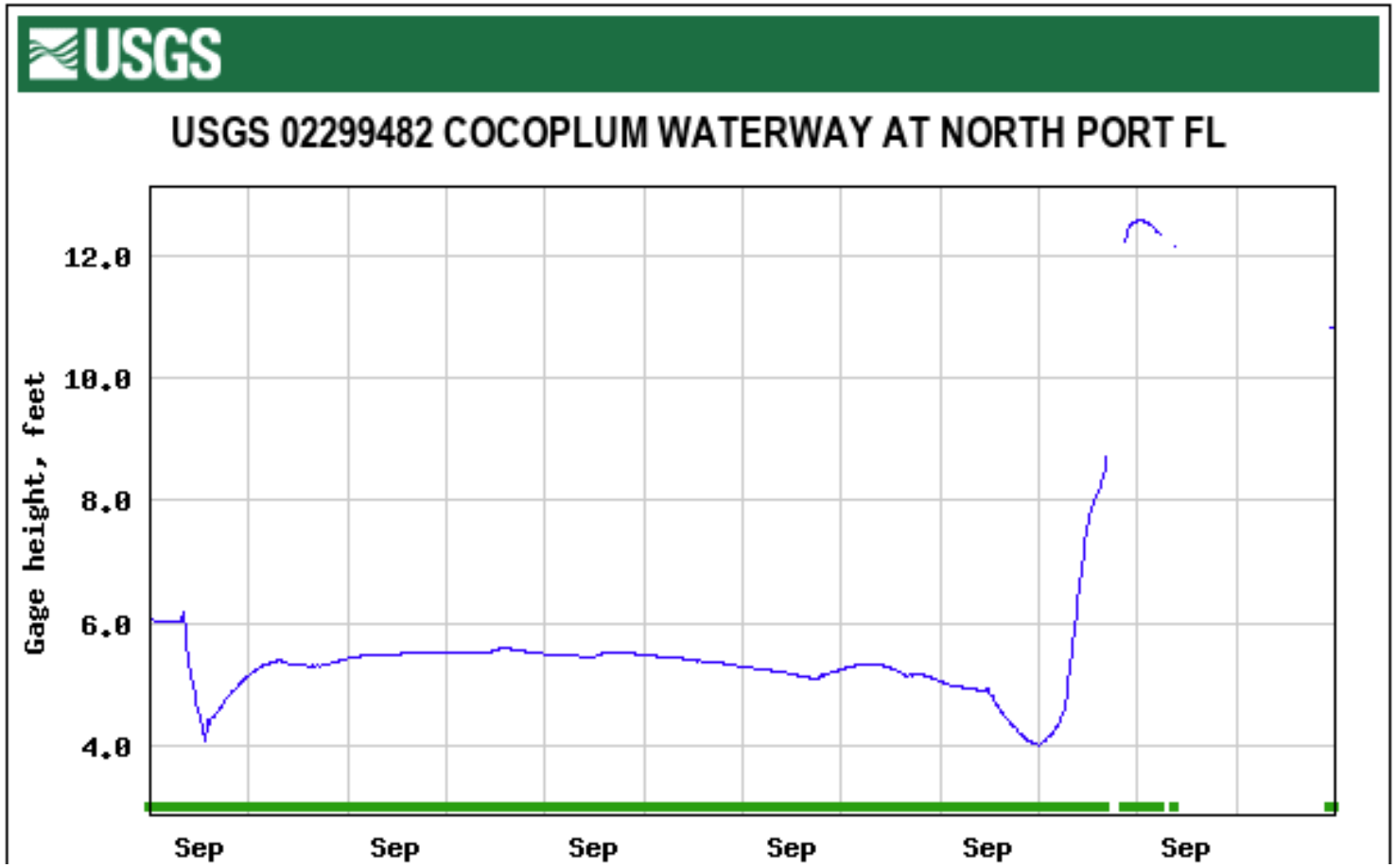
Water Level Monitoring Tools and Resources

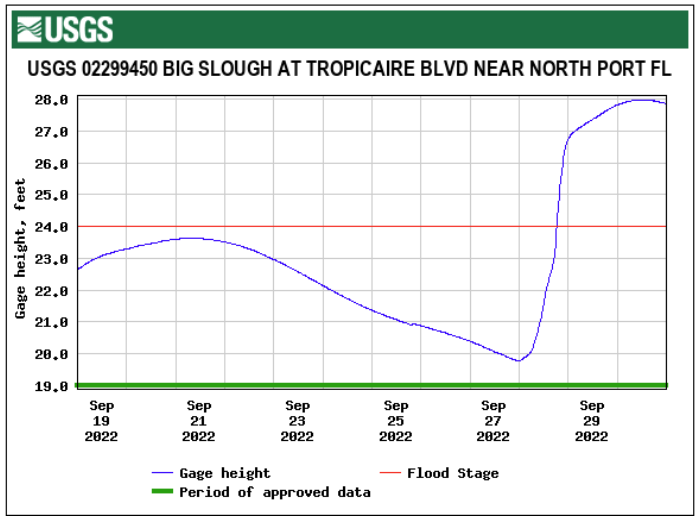
Where Temporary Ponding Occurs

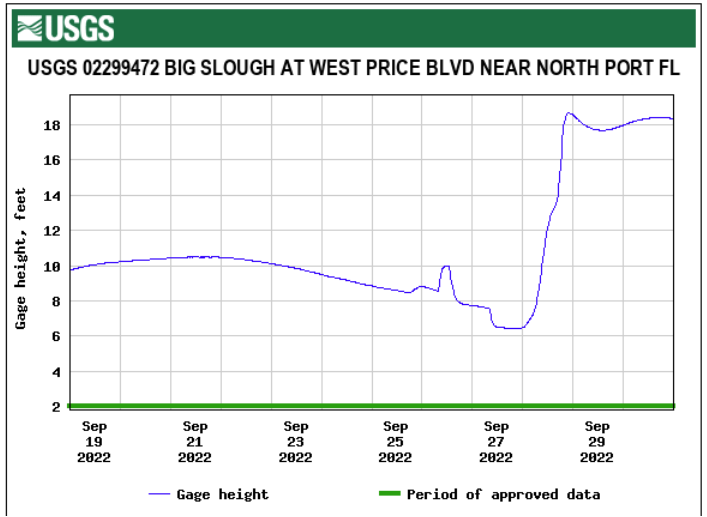


Water is moved to prepare for storms

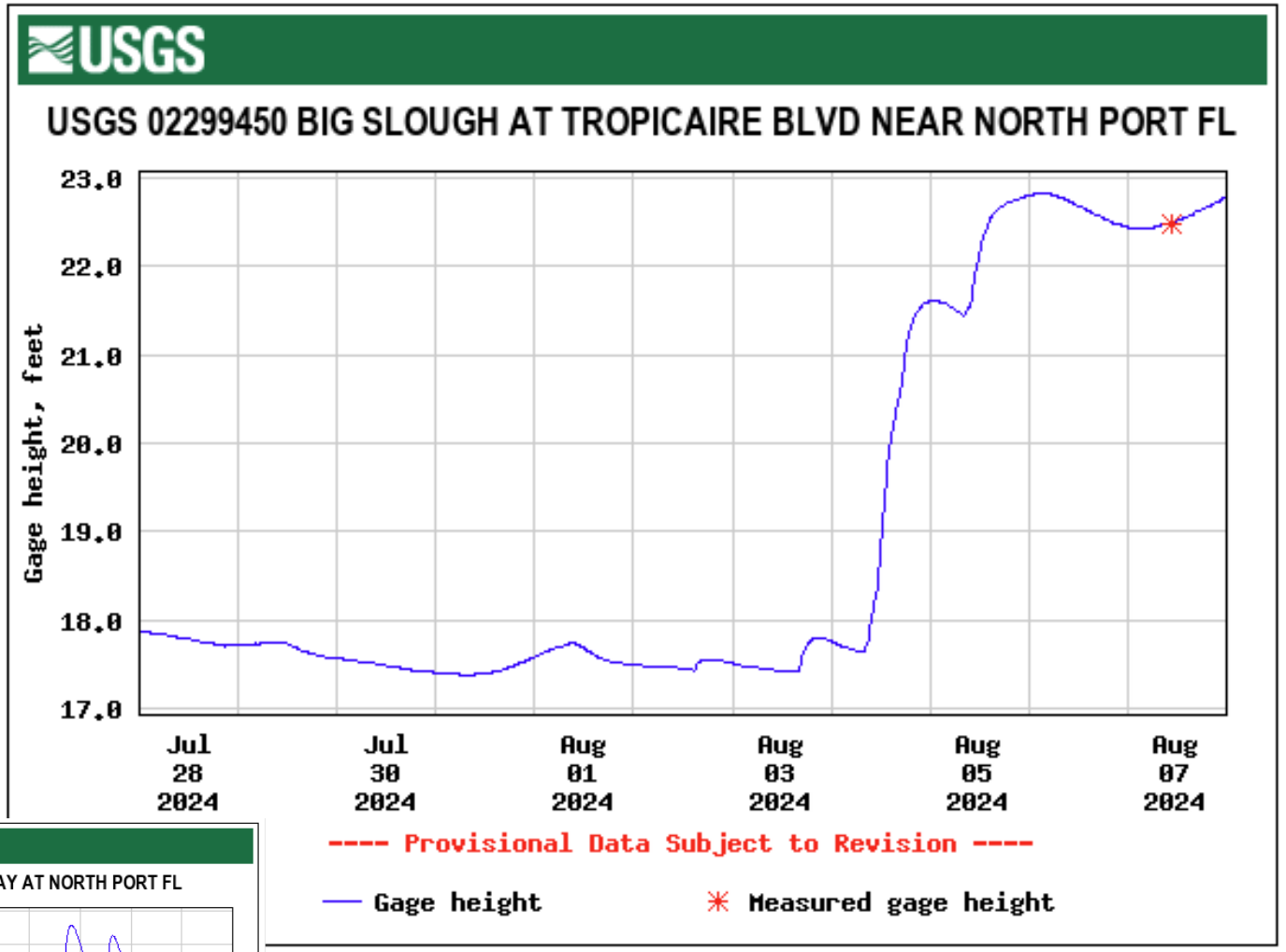
Gage height prior to Hurricane Ian

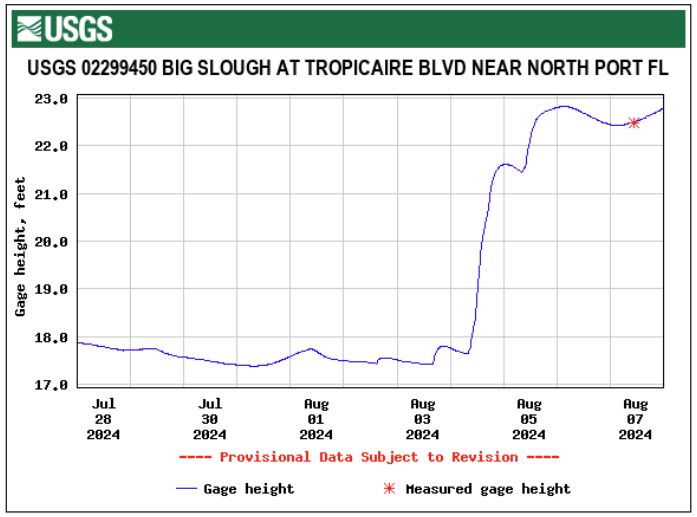


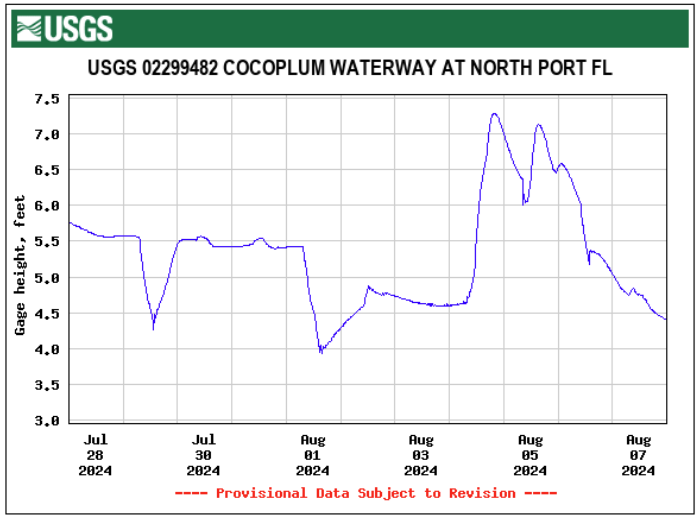




Water is moved to prepare for storms







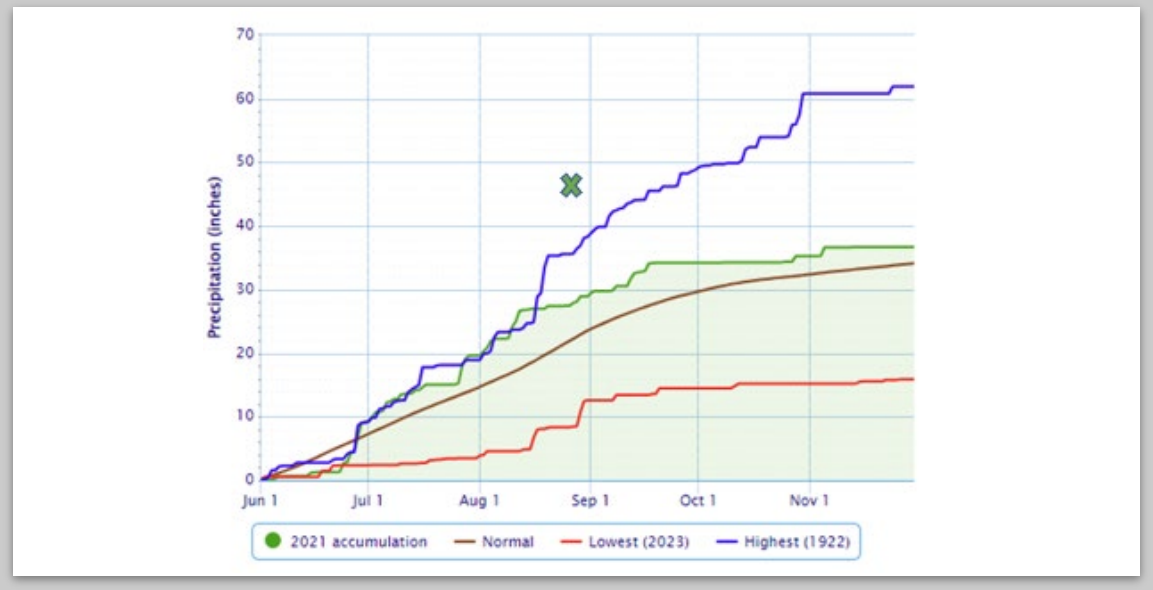
Gage height prior to Tropical Storm/Hurricane Debby

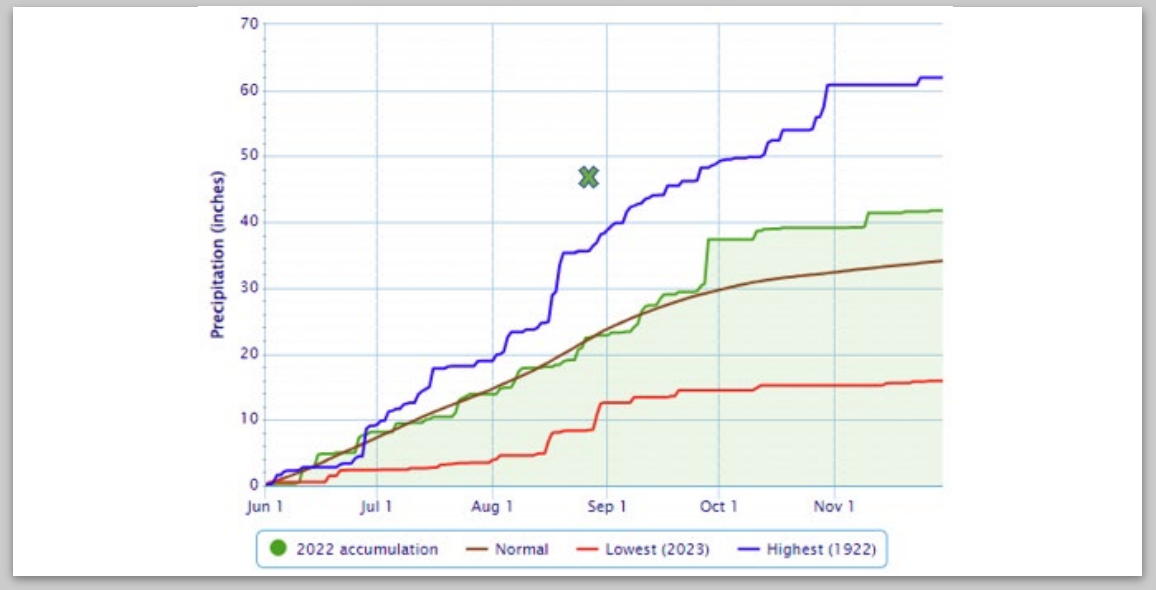
Takeaway 8

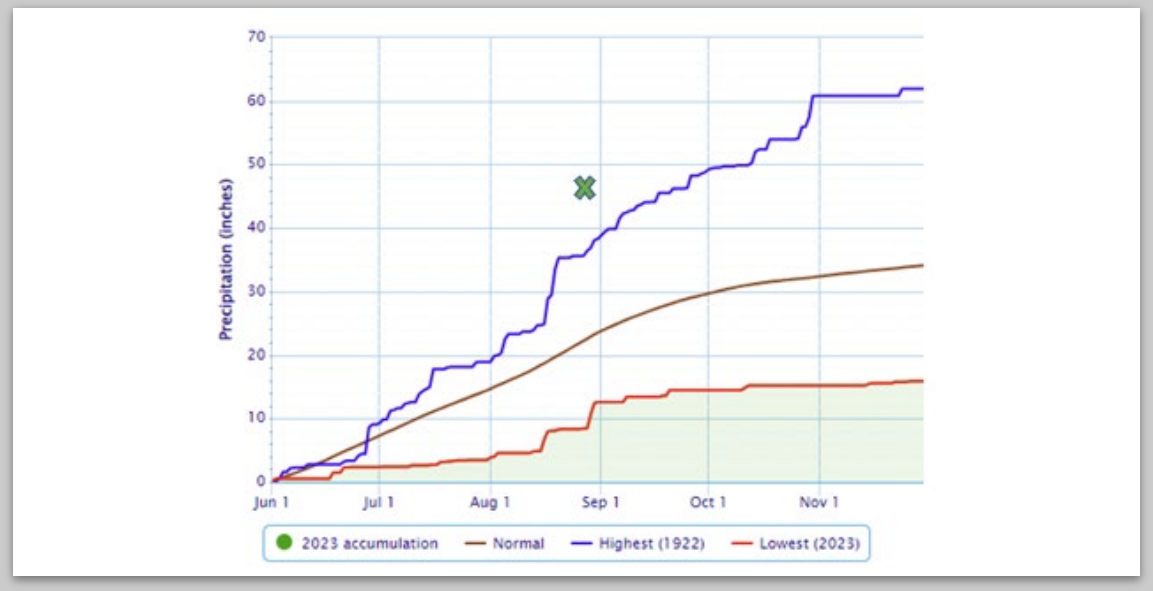
The City moves water to prepare for weather events based on science and data.

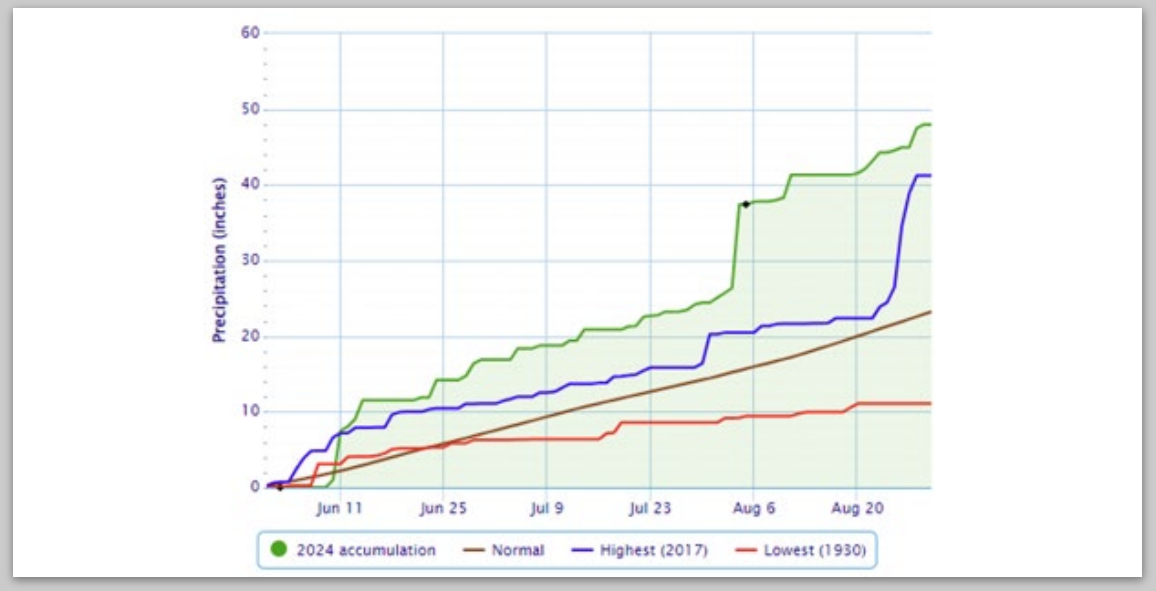
Precipitation rates

- Charts on next slide show precipitation accumulation during hurricane season, June 1 – Nov. 30, annually 2021-2023, and year to date for 2024
- 2024 is currently tracking higher accumulated precipitation rates than the previous highest year on record (1922)
- Increased storm intensity results in high water tables and slower drainage


Precipitation (inches)
70
60
50
40
30
20
10
0
Jun 1
Jul 1
Aug 1
Sep 1
Oct 1
Nov 1
2021 accumulation
Normal
Lowest (2023)
Highest (1922)


Precipitation (inches)
70
60
50
40
30
20
10
0
Jun 1
Jul 1
Aug 1
Sep 1
Oct 1
Nov 1
2022 accumulation
Normal
Lowest (2023)
Highest (1922)


Precipitation (inches)
70
60
50
40
30
20
10
0
Jun 1
Jul 1
Aug 1
Sep 1
Oct 1
Nov 1
2023 accumulation
Normal
Highest (1922)
Lowest (2023)


Precipitation (inches)
60
50
40
30
20
10
0
Jun 11
Jun 25
Jul 9
Jul 23
Aug 6
Aug 20
2024 accumulation
Normal
Highest (2017)
Lowest (1930)

Takeaway 9

It takes time for water to move. The more rain we get in a short amount of time, the longer it takes for water to recede.

How residents can help with stormwater

1. Clear or clean inflow/outflow structures on your property, including driveway pipes
2. Remove nuisance and excess vegetation
3. Repair eroded swales on your property
4. Clean up trash and yard waste in your yard and gutters and around storm drains
5. Limit / avoid fertilize use to protect habitat
6. Report blocked or damaged swales, pipes to the North Report app at NorthPortFL.gov/NorthReport or call Public Works at 941-240-8050

Takeaway 10

You can help! Report your drainage concerns via the North Report app or call 941-240-8050.

Stormwater Management 101

1

North Port is within a large watershed which receives water from the north/northeast and is not in the same watershed as much of the rest of Sarasota County.

2

The permitted stormwater system was designed with full build out plan at a 5-day, 10-year storm.

3

Commercial Development is required to retain water onsite and cannot impact the permitted stormwater drainage system.

4

Roads are part of the stormwater system. During heavy rains, water on the roads keeps water away from flooding houses and buildings.

5

Stormwater routed to the Myakkahatchee Creek and Cocoplum waterway supply North Port Utilities drinking water.

Stormwater Management 101

6

The Stormwater Drainage System is actively maintained within available budget.

7

Water Control Structures need to be replaced as funding is available.

8

The City moves water to prepare for weather events based on science and data.

9

It takes time for water to move. The more rain we get in a short amount of time, the longer it takes for water to recede.

10

You can help! Report your drainage concerns via the North Report app or call 941-240-8050.

NorthPort
FLORIDA

Questions?